STAGE 1A ARCHAEOLOGICAL ASSESSMENT

600 WASHINGTON STREET MANHATTAN

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MANHATTAN

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EXECUTIVE SUMMARY

Washington Street Associates, LLC is considering utilizing the block bounded by Morton, Leroy, Washington, and West Streets in lower Manhattan as the site of a proposed new apartment building (Figures 1, 2). The proposed development site, Lot 1 of Block 602, is located at 600 Washington Street between Leroy and Morton Streets. Development under the proposed action would result in the demolition of a building containing a one-story industrial component formerly used for freight forwarding, and an adjacent two-story component formerly used for office space. Except for a small wooden shed on the northeastern corner of the block, the remainder of the site is paved. The site would then be developed with a residential building with ground-floor retail space and a below-grade parking garage.

As part of the development process, a Stage 1A Archaeological Assessment was prepared. The Stage 1A documentary study, completed by Historical Perspectives, Inc., was designed to determine the likelihood that precontact - or prehistoric - and historic archaeological resources were once present on the project site and the likelihood that these resources have remained undisturbed by historic and modern development and still possess their integrity. Background research included a review of primary and secondary sources, including modern soil borings, to document the prior usage of the project site, cartographic analysis, site file reviews of previous pertinent archaeological findings, informant interviews, and field visits. This research was analyzed to determine the archaeological potential of the project site.

PRECONTACT PERIOD RESOURCES

The documentary study concluded that the project site is not sensitive for precontact period resources that would have research potential and meet the criteria necessary for inclusion on the National Register of Historic Places. The eastern half of the project block was on fast land at the time of European Contact, and could have been utilized by Native Americans over the course of the last 12,000 years. However, the precontact topography would have afforded little protection to the site, rendering it vulnerable to winds coming down the Hudson River. The western half of the project site was inundated by the Hudson River for several thousand years, but may have once contained exposed landforms when water levels were considerably lower. However, previously completed shoreline reconstructions failed to identify any potentially sensitive buried landforms within or adjacent to the project site.

Soil boring logs reviewed for this project indicate that twentieth century fill, largely construction and demolition debris, extends between four and 12 feet below current grade, and possibly deeper. Underlying the fill are levels of moist and wet sand with gravel and some silt. Subsurface conditions do not suggest there are any potential living surfaces which would have been ideal for precontact period habitation.

Precontact period resources, which the project block is only marginally sensitive for, would have been greatly disturbed by the construction of historic buildings with basements, excavations to

accommodate associated pipes, conduits, and other infrastructure improvements, and finally with the installation of the numerous buried 4000, 2000, and 550-gallon tanks. If any precontact period resources were ever present within the project site, subsurface impacts have disturbed them to an extent rendering them ineligible for inclusion on the National Register of Historic Places.

HISTORICAL PERIOD RESOURCES

The extensive cartographic review of the project block has failed to identify any potential historical period resources predating the twentieth century. Maps and atlases from the eighteenth through nineteenth centuries identified a series of commercial structures, almost all possessing basements, which covered the entire block.

The lack of documented historic dwellings or early farmsteads has eliminated this resource type from the project site's potential. Documented development of the project block dates to the nineteenth and twentieth centuries. Commercial and industrial buildings were systematically razed and replaced by larger more substantial structures, each with basements, until the entire block was razed and redeveloped in the twentieth century with the extant building.

Structures which historically stood on the project block in the nineteenth century were commercial and industrial in nature. It is highly unlikely that archaeological investigations into any of the structures formerly on the project block could provide potentially significant data that would address meaningful research issues. Inner workings and mechanisms from all buildings were likely removed and either recycled or discarded. Footprints of structures would probably be all that is left of their former existence. Furthermore, because the block was continually redeveloped throughout the nineteenth and twentieth centuries, any formerly-vacant yards - which could have once maintained archaeological resources documenting workers' lives - were subsequently disturbed. Therefore, the project site has no potential for historical period archaeological resources which may possess the potential to meet the necessary criteria for inclusion on the National Register of Historic Places.

RECOMMENDATIONS

No additional investigations are recommended for Block 602 since the documentary study has demonstrated the lack of archaeological potential. No archaeological resources which would meet the criteria necessary for inclusion on the National Register of Historic Places were identified and none are anticipated. Therefore, no further archaeological study is proposed.

INTRODUCTION

Washington Street Associates, LLC is considering utilizing the block bounded by Morton, Leroy, Washington, and West Streets in lower Manhattan as the site of a proposed new apartment building (Figures 1, 2). The proposed development site, Lot 1 of Block 602, is located at 600 Washington Street between Leroy and Morton Streets. Development under the proposed action would result in the demolition of a building containing a one-story industrial component formerly used for freight forwarding, and an adjacent two-story component formerly used for office space. Except for a small wooden shed on the northeastern corner of the block, the remainder of the site is paved (Photographs A-C). The site would then be developed with a residential building with ground-floor retail space and a below-grade parking garage.

As part of the development process, a Stage 1A Archaeological Assessment was prepared. The Stage 1A documentary study, completed by Historical Perspectives, Inc., was designed to determine the likelihood that precontact - or prehistoric - and historic archaeological resources were once present on the project site and the likelihood that these resources have remained undisturbed by historic and modern development and still possess their integrity. Background research included a review of primary and secondary sources, including modern soil borings, to document the prior usage of the project site, cartographic analysis, site file reviews of previous pertinent archaeological findings, informant interviews, and field visits. This research was analyzed to determine the archaeological potential of the project site.

RESEARCH GOALS AND METHODS

Background research was conducted to establish a prehistoric and historical framework for the interpretation of potential resources. Areas of prehistoric and historical sensitivity were identified through archival and cartographic research, following those criteria put forth in the current CEQR (City Environmental Quality Review) technical manual, and by the Department of the Interior, National Park Service (NPS).

Background research was designed to address two major questions:

- What is the specific level of potential for prehistoric and historical archaeological resources of significance to exist in the project site; and

- What is the likelihood that such resources have survived the subsurface disturbances concomitant with construction episodes, utility line installations, landscaping activities, and playground construction.

Sufficient information must be gathered to compare, both horizontally and vertically, the prehistoric past, the historical past, and the subsurface disturbance record. In order to answer these questions background research was conducted, including reviews of primary and secondary sources, cartographic analyzes, site file reviews, informant interviews, and field visits.

Review of Primary and Secondary Sources

Primary and secondary source material was researched in order to document the prior usage of the project site. These resources included pertinent archaeological reports as well as local and regional source material for data on prehistoric and historical settlements, and manuscripts and newspaper articles held by the New York Public Library. Particularly valuable were local historians' accounts, and prehistoric archaeological research work conducted by both professional and amateur archaeologists. Building records were also sought at the Manhattan Building's Department in order to further document construction and disturbance episodes. In addition, a series of 36 soil borings was performed on the project block in spring 2000. Logs and summaries from these borings were reviewed to determine existing subsurface conditions.

Cartographic Analysis

Historical maps and atlases were obtained from the Map Division of the New York Public Library. These were compared for early and later land use, topography, historical events, and documented subsurface disturbance episodes. Early maps helped to provide an account of land-use modifications and episodes of construction over the course of the last two centuries.

Site Files Review

Site file reviews were conducted at the New York State Office of Parks, Recreation, and Historic Preservation, State Historic Preservation Office (SHPO), and the New York State Museum (NYSM), to determine if prehistoric or historical materials had previously been reported in the vicinity of, or within, the project site.

Informant Interviews

Local historians and archaeologists provided information regarding construction episodes which may have impacted archaeologically sensitive areas and also reported areas where cultural resources had been previously identified and/or collected.

Field Visit

Field visits were conducted in September 2000. Photographs were taken of current conditions in the project site and obvious signs of disturbance were recorded (Photographs A - C).

SITE LOCATION AND CONDITIONS

The project block is bounded on the north by Morton Street, on the south by Leroy Street, on the west by West Street, and on the east by Washington Street (Figures 1, 2). Currently, the project site is occupied by a one- and two-story structure that operates as a motor freight station. The remainder of the block is vacant and paved, except for a small one-story shed fronting Morton Street (Photographs A-C).

The prehistory and history of Manhattan has been influenced, in part, by the topographic, ecological, and economic conditions. Establishing the project site's geological and ecological history is necessary toward understanding land-use history. During the Pleistocene period, ice advanced in North America four times. In the last 50,000 years, the Wisconsonian period, ice was 1,000 feet thick over Manhattan. Gravel and boulders deposited at the ice sheet's melting margin formed Long Island about 15,000 years ago (Kieran 1982:26). During the last 10,000 years, glacial till and outwash was covered by the fluvial deposits of the Hudson River. Sea levels have gradually risen as glaciers retreated, and the velocity of the Hudson River has decreased (Vollmer Associates 1989:6). Estuary formation in the Hudson began between 11,000 and 12,000 years ago. Between 8,000 and 10,000 years ago, the river experienced a reduction in salinity, which then increased between 7,000 and 8,000 years ago when the estuary obtained its maximum extent (Rutsch et al. 1983:25). The Hudson River is known for freezing in the winter, with ice floating down river during spring thaws (Luke 1953:10).

The project site falls within the embayed section of the Coastal Plain which extends along the Atlantic Coast and ranges from 100 to 200 miles wide. The Manhattan prong, which includes southwestern Connecticut, Westchester County, and New York City, is a small eastern projection of the New England uplands, characterized by 360 million year old highly metamorphosed bedrock (Schuberth 1968:11). The Manhattan ridge generally rises in elevation toward the north, and sinks toward the south. South of 30th Street, the bedrock dips down several feet beneath the earth's surface, and south of Washington Square Park it plunges down below 100 feet, forming a subterranean valley.

The prevalent gneissoid formation underlying the project site is Hudson River metamorphosed rock. Manhattan is characterized by a group of gneissoid islands, separated from each other by depressions which are slightly elevated above tide and filled with drift and alluvium. The area consists of drift with underlying crystalline rocks including stratified gneiss, mica schist, hornblendic gneiss and hornblende schist with some feldspar and quartz (Gratacap 1909:27).

Historical development has altered many of the natural topographic features that once characterized Manhattan (Gratacap 1909:5). The land which comprises the western half of the project site was historically submerged until it was filled sometime in the early- to mid-nineteenth century. Prior to that time the Hudson River shoreline ran almost directly through the center of the project site. Historically, it was described as a series of bluffs with beaches below them (Stokes Vol. III 1918:157). A deep valley with a large stream ran from the Collect Pond, southeast of the project

area, through Lispinard's swamp along the current route of Canal Street and drained into the Hudson River (French 1860:418). Eventually a sewer line replaced the route of the stream; one example of how development has obliterated and hidden these natural topographic features (Gratacap 1909:5).

Soil within Manhattan is mostly glacial till, clay, sand, gravel, mud, and assorted debris (Kieran 1982:24). Within the project area, the soils include landfill, silty clay, clayey silt and fine sand, silty coarse to fine sand, and glacial till (Vollmer Associates 1989:7). The groundwater level fluctuates with tidal variations in the river (Ibid.:9).

PRECONTACT AND CONTACT PERIOD ARCHAEOLOGICAL POTENTIAL

Archaeologists interpret precontact, or prehistoric, finds within both a locally derived and regionally based contextual framework. Established models for precontact cultural chronologies are based on previously investigated archaeological sites. Precontact settlement and subsistence trends have been established for the lower Hudson Valley and coastal New York areas, providing a framework for understanding precontact land and resource utilization that can represent stages in Manhattan's prehistory, and therefore, the project area's prehistory. Based on long term archaeological research, the following chronological description outlines the prehistory of the region. As research in the area continues, data bases increase and theoretical issues become more refined, further enhancing this regional chronology. All dates provided are Before Present (B.P.).

CONTEXTUAL OVERVIEW

Precontact Period (ca.12,000 - 500 B.P.)

Archaeologists have concluded that Native Americans established themselves in the Northeast after the last glacial episode, the Wisconsin. Between 18,000 and 16,000 years ago, the last episode of the Pleistocene in the Northeast, ice reached its maximum advance and then receded north. Glacial gravels and erratics were left along the melting margin. Striations can be seen on Manhattan's bedrock outcrops marking the path of receding glaciers. By 13,000 years ago, ice had retreated north enough so that the lower Hudson Valley and surrounding area were open for the reestablishment of flora and fauna. As ice melted, glacial lakes formed, eventually filling with sediments and becoming swamps. Current studies indicate that the exact date Native Americans first occupied the Northeast was around 12,000 years ago, although there is increasing evidence to suggest an earlier date. Until this evidence becomes substantiated, the accepted date remains ca. 12,000 years Before Present (B.P.).

- PaleoIndian Period (12,000-9,500 B.P.)

The precontact environment of post-glacial New York was far different from today. Between 14,000 and 12,000 years ago the Northeast was characterized by spruce-dominated open woodland, and by 10,000 years ago the region was predominately defined by pine (Gaudreau 1988:240). Pollen samples show that the southeastern New York region had a mixed coniferous-hardwood forest following deglaciation (Salwen 1975:43). This post-glacial environment supported mega-fauna hunted by PaleoIndians including mammoth, giant ground sloth, horse, and giant beaver. The PaleoIndian period represents the earliest documented human occupation in the Northeast, dating approximately between 12,000 and 9,500 B.P.

Few sites have actually been found dating to this period, perhaps because Native Americans first settled on the exposed continental shelf, now submerged. The immense quantity of water retained in ice sheets and glaciers drastically lowered the sea level, extending the Atlantic coastline twenty to thirty miles south and east of what it currently is (Ibid.). The exposed continental shelf, now

submerged beneath the ocean, would have possessed the resources necessary to support the emergent PaleoIndian population (Edwards and Emory 1977:19).

A typical artifact assemblage from PaleoIndian sites in the Hudson River Valley and throughout the Northeast include diagnostic Clovis-type fluted projectile points (points) and processing tools such as scrapers, gravers, and drills suggesting animal processing. Stone tools were made from cherts native to eastern New York, and jasper from Pennsylvania and New Jersey. To some archaeologists, lithics recovered far from their sources suggest well-defined or extensive travel or trade networks in operation at that time. Other research in the Northeast has lead to the postulation that small bands of hunters nomadically roamed large territories, relying predominantly on post-pleistocene megafauna. Alternative hypotheses based on research in the mid-Hudson valley suggest that PaleoIndians inhabiting the area utilized wide variety of resources and had a restricted territory in which they operated (Eisenberg 1978:139). Further research continues to assist in developing and refining models of regional and local subsistence and settlement.

Despite the years of research, there are still many questions left unanswered regarding the culture and settlement and subsistence systems of PaleoIndians. Sites found tend to be situated in one of three specific geographic locales: on lowland waterside camps near coniferous swamps and near larger rivers; on upland bluffs in areas where deciduous trees dominated; and on ridge tops also dominated by deciduous trees (Eisenberg 1978:138). Throughout the Northeast it has been more common to locate isolated spot finds of diagnostic artifacts than habitation sites. The lack of recovered habitation sites may be due to post-glacial changes in topography or subsequent development where habitation sites once existed (Saxon 1973:252). The rising sea levels and resultant changes in water courses have probably inundated numerous encampments. However, since the Hudson River is a fjord (a narrow inlet of the sea bordered by steep cliffs), it is possible that early occupation sites may be preserved along the naturally elevated post-glacial shoreline (Snow 1980:180). Currently, no habitation sites have been identified on Manhattan Island.

Several miles southwest of the project site, on nearby Staten Island, a PaleoIndian habitation site was found at Port Mobil (Ritchie 1980:xvii). The site was situated on high ground, sloping down to the Arthur Kill, about 1000 feet away. Although the site was substantially disturbed, several fluted points were recovered together with tools made of eastern Pennsylvania tan and yellow jasper, and eastern New York Normanskill flint. Not far from Port Mobil, on the tidal beach of the Arthur Kill, six fluted points were also found made of jasper and local and exotic flints (Ibid.). This represents the only PaleoIndian component recovered within the metropolitan New York area. Spot finds further north have occurred along the Hudson River and its tributaries (Funk 1976:205).

- Archaic Period (9,500-3,000 B.P.)

The Archaic period lasted for about 6,500 years. Unique point types and tool kits have caused this period to be further subdivided into the Early, Middle, Late, and Terminal periods. Throughout the Early Archaic (9,500-7,000 B.P.) fluctuations in the climate occurred, giving way to a gradual warming trend and allowing new resources to become established. Although sea levels were rising,

New York Harbor, contiguous to the project area, was still considerably smaller than it is today (Salwen 1975:49). As a result of environmental changes, it appears that the primary dependence on big game gave way to a hunting, fishing, and gathering economy, relying upon a diversity of resources. The more reliable resource base may have encouraged population growth.

Diagnostic projectile point types of this period are predominantly bifurcate-based points found on major drainages. Sites in the coastal New York area have been found on tidal inlets, coves, and bays, and on fresh water ponds (Ritchie 1980:143). Few inland sites of the Early Archaic period have been recovered and excavated in northern New York and New England. However, on nearby Staten Island four sites were found with an Early Archaic component (Salwen 1975:50). Salwen ascribes the earlier and more prolific population of the southeastern New York area to the early establishment of hardwood forests in this region (Ibid.). Although resources may have been abundant in more northern regions, climatic fluctuations and extremes would have prohibited the establishment of a reliable resource base. The locally established hardwood forests may have attracted people to the southern New England and New York area (Dincauze and Mulholland 1977:450).

Subsequently, Middle Archaic cultures populated the region from about 7,000 to 5,500 years ago, as the climate continued to warm allowing assorted flora and fauna to grow. Dincauze and Mulholland (1977) suggest that in this period seasonal population movements, based on the exploitation of specialized resources, became well established and may have led to the creation of territories. Tool kits expanded in response to diverse resources, with artifacts including Neville and Stark projectile points. Middle Archaic shell middens, situated to the north along the Hudson River, show a growing reliance on shellfish. At Croton Point and Montrose Point, archaeological sites on the Hudson River in Westchester County north of Manhattan, shell middens yielded dates of between 5,600 and 5,800 B.P. (Brennan 1974:85).

Late Archaic cultures radiated across the Northeast from approximately 5,500 to 4,000 B.P, with continued climatic warming providing a resource-rich environment. Diagnostic projectile point types of this period include small stemmed points such as Lamokas and Taconics, as well as Squibnocket and Brewerton Points. The lower Hudson Valley has evidence for increased habitation, with numerous shell middens along it dating to this period (Brennan 1974:87). Site types of this period include rockshelters, open woodland camps, and high bluffs along the Hudson, identified north of the project site. Archaic points found in metropolitan New York were commonly made from locally available quartz (Suggs 1966:42). The switch to local, versus exotic, lithics could mean decreased seasonal migration or a reduction in trade with neighboring groups.

Settlement and subsistence patterns in operation may have been a centrally based wandering pattern focused on the use of seasonal resources. A high degree of cultural complexity is suggested by the wide range of site types and the great diversity in site locations. More Late Archaic sites have been found than sites of either of the two previous periods. This may be because of either an increase in the population brought on by the more stable environment, or a bias in site visibility. By the Late Archaic period, sea levels were much as they are today, and sites of this period would have less of a chance of being inundated. In another interpretation, archaeologists in the Northeast have

postulated that small stemmed quartz points attributed to this period actually represent an underlying cultural tradition, persistent through later periods (McBride 1984:133). Therefore, sites attributed to this period based on projectile point typologies may actually have been misinterpreted.

During the Terminal Archaic period (4,000-3,000 B.P.), three cultural traditions persisted in the Northeast. These include the Laurentian tradition represented by the Vergennes phase and the Vosberg complex; the small stemmed tradition represented by the Sylvan Lake complex; and the Susquehanna tradition represented by the Snook Kill and Orient phases (Funk 1976:250). Although New York State Archaeologist Bob Funk defines these three separate traditions as persisting in the Hudson River Valley, Snow reassesses the distribution of Terminal Archaic points and suggests that the Susquehanna tradition dominated the first half of the period and consisted of Snook Kill, Perkiomen and Susquehanna Broad points, while the latter half of the period was dominated by the Orient complex characterized by the Orient Fishtail point (Snow 1980:237). The precise sequence of Terminal Archaic traditions, complexes, and phases is a continuing source of debate.

These three cultural traditions, based on unique projectile point types, may represent distinct settlement patterns centered on the use of specific resource niches. According to Funk and Ritchie, authors of *Aboriginal Settlement Patterns in the Northeast*, sites of the Snook Kill Tradition, predominant in the southern subarea, tend to be located on high, sandy river terraces (1973:342). Orient phase habitation and burial sites have been recovered from eastern Long Island (Ibid.:344). Whether these three distinct traditions, Laurentian, Small Stemmed and Susquehanna, represent the migration of new people into the area, or the spread of new technological ideas, has yet to be answered. Each of these tool traditions predominantly used locally available raw materials, with the small stemmed point tradition relying heavily upon quartz.

Local Terminal Archaic groups added a new type of artifact to their tool kit. Bowls and other utilitarian and decorative items were fashioned from ground and polished steatite, or soapstone. The majority of sites found in the surrounding region were located on the banks of the Hudson River and its major tributaries. This may be because of the high visibility along major river drainages rather than the actual lack of sites in remote settings. Continued research from interior areas has more recently begun to find sites of this period. Orient points recovered in the Hudson Valley have been radiocarbon-dated to approximately 4,000 to 2,800 B.P.

- Woodland Period (3,000-500 B.P.)

The Woodland period continued in the Northeast from approximately 3,000 to 500 years ago. Like the Archaic period, the Woodland is further divided into three subcategories: the Early, Middle and Late periods. The first of these, the Early Woodland period, lasted from about 3,000 to 1,700 years ago and manifests itself by the Middlesex Phase in eastern New York. Crude, undecorated ceramic vessels, called Vinette 1 pottery, were tempered with steatite. Simple pottery designs of this type have been found at sites on major waterways and tributaries. Early Woodland, Middlesex Phase sites are commonly uncovered at sand and gravel mining operations near fresh water as these sites tend to be located on well drained knolls adjacent to water (Ritchie 1980:201).

The climate gradually cooled during this period, perhaps reducing resource availability. Settlement systems changed with the need to exploit alternative resources. Coastal resources, providing year round availability, were sought while upland hunting and gathering supplemented coastal resources. Fish runs in rivers provided a stable and reliable resource. Fish weirs were used in the Hudson and smaller tributary rivers to catch large quantities of anadromous fish to feed the growing population (Brumbach 1986:35).

The Middle Woodland period lasted from ca. 1,700 to 1,000 B.P. This period is marked by regional changes in ceramic and projectile point styles. Stone tool assemblages include Jack's Reef Corner Notched and Pentagonal points, and Fox Creek points. More exotic lithics were used, perhaps suggesting a growth in trade networks. By this time, subsistence and settlement seems to have been characterized by semipermanent settlements with task-specific locations used for the purpose of exploiting target resources. Ritchie and Funk identify several settlement types for Middle Woodland cultures including repeatedly occupied small and semipermanent large camps, small temporary camps, workshops, cemeteries and burial mounds (1973:349).

Shell middens found on the seacoast and shores of the Hudson River suggest an increase in the reliance on aquatic resources. During this period, maize horticulture was introduced from the west and horticultural practices were slowly adapted. The nature and extent of precontact maize cultivation have been debated among archaeologists working in the Northeast. Research on Long Island has led to the hypothesis that before European contact, maize was not cultivated on the sandy, nutrient-poor soils of the island. Nonetheless, with the benefits of trading with Europeans, Native Americans on Long Island settled more permanently along the sandy coast where shells were available for wampum manufacturing, an integral part of the mercantile exchange. Concurrent with this was the need for a reliable and storable food source. It is theorized that maize horticulture was incorporated to provide food, and a commodity for trade, required to support villages (Ceci 1979:72). Other archaeologists throughout the Northeast are now questioning the distribution and adoption of non-indigenous, that is, introduced, horticultural systems.

Again, artifacts encountered changed with the addition of ornamental pendants and pins, and the bow and arrow. Ceramics changed technologically as walls were thinned and overall shape was rounded. Some interpretations suggest that the shift to a rounded bottom corresponds to the adoption of maize and results from the desire to cook food longer (Braun 1980:100). Surface decorations included netmarking and ornamentation of the collars and bodies, reflecting the cultural affiliation of the producer. Overall, the material remains in the region are limited in number, compared to those found further to the northwest in the Great Lakes region of New York (Funk 1976:298). This bias may be due to sampling and preservation rather than the actual lack of sites.

Within the Late Woodland period, the Windsor cultural tradition was defined with its components found in the Long Island Sound area and in the Hudson and Connecticut River drainages. In the lower Hudson Valley and on western Long Island, the tradition is represented by the Windsor North Beach and Clearview phases (Snow 1978:63). The Fox Creek Phase of the Middle Woodland period may have been centered in the New York coastal region, and in the eastern New York drainages

(Ritchie and Funk 1973:356). Artifact types of this period include the Levanna triangular projectile point and Cayadutta Incised pottery. General trends of the period show a move toward semipermanent villages.

By the Late Woodland period, 1,200 to 500 years ago, the climate was much as it is now. Settlement patterns suggest the use of diverse topographic settings including coastal and island sites, inland sites on major drainages, and campsites located near swamps and along streams as well as inland rockshelter sites. There is evidence of an increase in site size and number in addition to abundance and frequency of artifacts. The annual subsistence round may have included seasonal movements among riverine, coastal and inland wintering sites. Increased use of horticulture may have affected seasonal movements, with spring and summer spent planting crops. While maize, beans, and squash were procurable, these did not comprise the entire subsistence base. Hunting and gathering were continued. A semipermanent settlement pattern may have led to competition and defense of productive land, contributing to territoriality (Mulholland 1988:163).

The Windsor tradition was replaced by the East River cultural tradition by about 600 B.P., while the Bowmans Brook and later Clasons Point phases are local manifestations of the ceramics associated with this period (Snow 1978:63). The Bowmans Brook culture may have entered New York from New Jersey through Staten Island, where many artifacts of this phase have been found (Ritchie 1980:269). Sites have been found on tidal streams or coves, with large village sites containing between fifty and one hundred storage pit features (Ibid.). There appears to be more shellfish use at these sites. Ritchie notes that sites of the Clasons Point culture tend to be found on the second rise of ground above high-water level, on tidal inlets, and have many of the characteristics of Bowmans Brook Phase sites (Ibid.:271).

Contact Period (500-300 B.P.)

The initial interactions between Native Americans and Europeans typify the Contact period, dating from 500 to 300 B.P. At the beginning of this period, Native American settlement patterns were essentially the same as those of the Late Woodland period. Stream side camp sites were occupied in the spring and fall to take advantage of bountiful fish runs. Upland and inland task-specific sites were also occupied for short periods for hunting, trapping, and lithic procurement. Semipermanent villages, with oval and round bark and mat covered houses, were located near planting fields. Large pits were used for storing dried meat, fish, and corn, and to bury unwanted trash. Planting fields were commonly burned at the end of the season to encourage new growth and, as a result, fauna. Horticultural villages were commonly moved to a new site after ten or twenty years when soil fertility, firewood, and nearby game resources were reduced (Salwen 1975:57).

Initial interactions between Native Americans and Europeans transpired when early explorers traded with the native population. As non indigenous materials were introduced into the native material culture, tool assemblages and settlement and subsistence patterns changed drastically. Traditional stone, bone, and wood tools were replaced by European goods made of copper and iron. Shell beads and wampum were produced, and furs were collected by Native Americans as a medium of

exchange. Europeans were happy to procure furs from Native Americans, resulting in many trading posts being established along the Hudson River. Although early historical accounts discuss the presence of Native American stockaded villages or forts in the Hudson Valley and coastal New York, archaeological data does not confirm their presence until the middle of the seventeenth century (Ritchie and Funk 1973:368).

In the seventeenth century, metropolitan New York was populated by Native Americans speaking a Munsee dialect of the Eastern Algonquian language (Goddard 1978b:73). Northern Manhattan was primarily occupied by a group identified by colonists as the Wiechquesgeck (Grumet 1981:60). At that time, Native Americans called the Hudson River "Mahicanituk," which translated to "the great waters or seas, which are constantly in motion" (Ibid.:22). Manhattan itself was called "Minna-atn," which meant "Island of Hills" (Bolton 1934:47).

The arrival of Governor Willem Kieft in 1638, who maintained a hardline policy with the local Indians, resulted in large scale conflicts between Native Americans and European settlers. His policies resulted in the deaths of about 1,000 Native Americans between 1640 and 1645 (Washburn 1978:98). In 1655 Native Americans attacked the growing city of New Amsterdam, and the ensuing Esopus Wars, named so for the involvement of the Esopus Indians of the mid-Hudson Valley, lasted until 1664. As a result, Algonquian bands in the lower Hudson Valley lost their independence and fell under Dutch control (Ibid.).

Plagues, intertribal stress, and the pursuits of Europeans to obtain land rights resulted in the subsequent breakdown of native sociopolitical organization during the seventeenth century. The plagues of 1616-1620, inadvertently introduced by Europeans, depopulated many groups with total losses in southern New England and New York estimated at between 70-90 percent of the original population (Snow 1980:34). Moreover, the conflicts engendered by rapid colonial expansion, war, and epidemics, caused many Native American groups to leave the area or take up habitation in established communities, i.e., reservations (Brasser 1978:85).

The foregoing cultural chronologies are based, in part, on precontact sites found in the metropolitan New York area, although none were ever found within the project site. On Staten Island, numerous precontact sites have been reported, ranging from the PaleoIndian through Woodland periods. The Tottenville site, a burial site on the southern portion of the island, was found on a bluff overlooking the shoreline and may represent a wampum manufacturing station (Jacobson 1980:5). In total, more than one hundred precontact period sites have been reported from Staten Island, although significantly fewer have been scientifically studied. It is thought that cultural groups inhabiting Staten Island were probably affiliated with groups in New Jersey and the mid Atlantic region. Staten Island may have demarcated the boundary of New York and New Jersey groups (Ritchie 1980:145). If this is the case, then the role of Manhattan Island may have been similar. With the proximity of New Jersey cultural groups, as well as the Long Island Sound groups, cultural traits of Manhattan Indians would undoubtedly reflect these associations.

Because of the lack of sites actually recovered on Manhattan, the accepted settlement system established for the coastal New York area has been based primarily on the large and highly visible shell midden sites found along the coast of Long Island Sound. Yet more recent archaeological research indicates a variety of occupation sites other than villages associated with shell middens. An intensive survey of Shelter Island in the Long Island Sound, many miles east of the project site, has yielded a number of small short term lithic workshops and food processing stations, previously unseen and excluded from settlement pattern studies (Lightfoot et al. 1985:59). Further research and unbiased testing strategies in upland areas have also shown that many sites exist in these locales. While it's true that the coast of Manhattan was undoubtedly attractive for Native American habitation and resource procurement, smaller sites located inland may have been used as well, but such inland sites would be situated east of the project site.

KNOWN SITES IN THE VICINITY

The only reference to a known Native American site near the project site was a parcel of land named "Werpoes," depicted on historic maps as an elevated terrace below Canal Street south of the project site (MacCoun 1909; Grumet 1981; Figure 3). The word, a derivative of the Delaware word "Wipochk," is thought to translate to "a bushy place or thicket" (Grumet 1981:58). No other Native American sites or trails were known to exist nearby. No precontact or contact period sites were inventoried at either SHPO or the NYSM.

POTENTIAL FOR PRECONTACT PERIOD RESOURCES

In order to address the precontact sensitivity for the project block, it is necessary to discuss the eastern half of the block, which was on fast land at the time of European contact, separately from the western half of the block, which was flooded by the Hudson River for several thousand years.

Eastern Half of Block 602

As discussed in the Precontact Background section above, archaeologists typically encounter sites on well drained elevated soils near fresh water resources. Environments with a broad spectrum of resources were favorable for precontact period habitation and/or resource procurement. Coastal and riverine areas could provide a mix of aquatic, estuarial, and terrestrial resources. In particular, the confluences of streams and/or rivers were considered choice sites for habitation and have a high potential to yield precontact period archaeological resources. However, settlement studies on islands in the southern New England area have shown that settlement patterns are also affected by strong prevalent winds, such as those experienced in the lower Hudson Valley, with precontact people favoring protected sites (Little 1985:26).

Several years ago, various agencies attempted to create a model of potential precontact site locations in the metropolitan New York area. In an attempt to provide a planning tool, the NYCLPC created a model identifying potentially sensitive areas where precontact archaeological remains may be

found in Manhattan. No sensitive areas were identified in proximity to the project parcel (Baugher-Perlin et al, 1982).

Background research suggests that there is very little likelihood that precontact period resources once existed within the eastern half of the project block, and there is an even smaller chance that they have remained undisturbed *in situ*. Existing models of precontact period habitation document that these site types are not typically found in topographic settings similar to that of the current project site, which during the precontact period was essentially an unsheltered shoreline. Furthermore, no known sites have been reported from the immediate vicinity, nor were any established trails or hunting and/or fishing stations documented nearby. Therefore, there is only a small possibility that precontact period peoples inhabited the eastern half of the project site block at any point in time.

In addition to this section of the project block having low sensitivity for precontact period resources, historic and modern development has caused extensive disturbance to subsurface conditions. Under normal circumstances (i.e., not within a flood zone), prehistoric archaeological resources within Manhattan are usually located within three or four feet of the pre-development surface. That is, they are shallowly buried beneath surface of the prehistoric landscape. As a result, unless extensive fill has been deposited above them, sealing them from later construction impacts, they are extremely vulnerable to post-depositional construction. The following ***Cartographic Review*** section documents a series of historic structures on the eastern half of the block throughout the nineteenth and twentieth centuries, all containing basements. The excavation and installation of basements and the required infrastructure would have completely eradicated any shallowly buried prehistoric resources which may have once existed on this section of the block.

Further documenting the extent of disturbance to the eastern half of the project block are seven soil borings completed in spring 2000. The soil boring logs report between four and 12 feet of fill beneath the pavement on this section of the site (Advanced Cleanup Technologies, Inc., 2000, Boreholes SB/TW-09, 10, 14, 15, 19, 20, 23; Appendix A). Beneath the fill were levels of moist sand with some silt and clay (Ibid.). Sandy soils are not typically associated with precontact period habitation sites due to their excessive drainage.

Another subsurface study, completed by GZA GeoEnvironmental, Inc. (GZA), also in spring 2000, documents the installation of four monitoring wells on the property and the removal of three 4,000-gallon steel tanks from the eastern section of the site, and a 275-gallon tank located in the extant building's basement (Appendix B). Borings completed for the monitoring wells encountered fill to about nine feet below the surface. "At about nine feet the soil changed to a well-drained, brown, medium to coarse sand with little fine gravel." (GZA GeoEnvironmental, Inc., 2000, Addendum A: 4). Groundwater in each well ranged from 11 to 13 feet below ground surface (Ibid.). The report also documented the presence of two abandoned 550-gallon diesel tanks, one buried near the southeast corner of the block, the other near the northeast corner. In total, GZA documented a total of 21 abandoned in place 550-gallon oil, diesel, and waste tanks and one inactive 2000-gallon fuel tank. While the locations of some of these are portrayed on maps (Appendix B), others are not and their exact locations are unknown. Subsurface conditions on the eastern half of the project site,

which is known to have possessed at least six buried tanks, have been tremendously compromised by their installation.

Precontact period resources, which the eastern half of the project block is only marginally sensitive for, would have been greatly disturbed by the construction of buildings with basements, excavations to accommodate associated pipes, conduits, and other infrastructure improvements, and finally with the installation of the two 550-gallon and one 4,000-gallon tank, all located near Washington Street. If any precontact period resources were ever present on this section of the project site, subsurface impacts have disturbed them to an extent rendering them ineligible for inclusion on the National Register of Historic Places.

Western Half of Block 602

Precontact period sensitivity for the western half of the block, outboard of the contact period shoreline, must be assessed with a slightly different approach. At the time Europeans first set foot on Manhattan, the western half of the project site block was land under water. Consequent landfilling pushed the shoreline further west and West Street was created, burying precontact period landforms. Precontact period archaeological sites which may have been present on formerly exposed land surfaces, may also have been buried. In 1983 a subsurface soil and fill profile of West Street was created by Historic Conservation and Interpretation (HCI) during an early archaeological survey for the proposed Westway project. Based on soil borings, paleoecologists and prehistorians reconstructed the post-glacial shoreline between Battery Place and West 44th Street, including West Street adjacent to the project site (Rutsch et al. 1983:17). This data is directly applicable toward establishing the potential for precontact period resources to exist beneath landfill on the western half of the project block.

The research conducted by HCI concluded that although West Street was submerged beneath the Hudson River before European settlement, there were pockets of land that were once exposed and could have been occupied. Rutsch identified specific areas within the Westway corridor which may lie deeply buried below eighteenth and nineteenth century fill and which may be sensitive for prehistoric resources. However, no sensitive areas were identified by Rutsch either adjacent to or within the current project site. Furthermore, soil borings for the Westway project found that fill beneath West Street ranges between 14' and 28' in depth, suggesting that any precontact period resources on the western half of the block would be very deeply buried, if they did exist.

Soil borings taken within the project site indicate that there is at least eight to 12 feet of fill beneath the pavement on this section of the site (Advanced Cleanup Technologies, Inc., 2000, Boreholes SB/TW-01, 02, 03, 04, 05, 06, 12, 13, 29; Appendix A). Beneath the fill were levels of moist sand with some silt and clay (Ibid.). Sandy soils are not typically associated with precontact period habitation sites due to their excessive drainage. Three additional borings taken from this section of the project site by GZA GeoEnvironmental, Inc., in spring, 2000 document about twelve feet of fill beneath the paved surface, underlain by wet or saturated brown, medium to coarse sand or silt with fine gravel (GAZ GeoEnvironmental Inc., 2000, Addendum B: Page 4; Appendix B).

Like the eastern half of the project site, GZA GeoEnvironmental, Inc., in spring 2000, documented the removal of two oil tanks, one 275-gallon, and the other 550-gallon, from the western half of the project site. They also noted that there is a buried out-of-service 2,000-gallon tank on the northwestern section of the site (Appendix B). As previously detailed, they documented a total of 21 abandoned 550-gallon tanks, and one inactive 2000-gallon tank. While the location of some of these are not portrayed on maps (Appendix B), at least the three discussed above definitely fell within the western half of the project site. The installation and subsequent removal of each of these would have caused extensive impacts to their locations.

The previously completed shoreline reconstruction failed to identify any potentially sensitive buried land forms which may exist within or adjacent to the project site. Furthermore, the following ***Cartographic Review*** section documents several building episodes for the western half of the project block. A series of substantial nineteenth and twentieth century structures with basements were built on this section of the block, and their excavation would have caused impacts to at least ten feet below grade. Soil borings indicate that fill extends between eight and 12 feet below grade, and beneath this are levels of river-borne sand and silt. Furthermore, at least three large buried oil tanks were located in this section of the project site. Therefore, the western half of the project site is not considered sensitive for prehistoric period cultural resources due to low sensitivity, depth of prehistoric landforms, and depth of prior impact, and depth of documented fill. There is little, if no, potential for *in situ* precontact period resources that would satisfy the requirements of the National Register of Historic Places to exist within this section of the project block.

HISTORICAL ARCHAEOLOGICAL POTENTIAL

CONTEXTUAL HISTORY

When Giovanni de Verrazano first sailed into New York Harbor in 1524, the west half of the project site was land under water. The shoreline on the banks of the pristine Hudson River, named for Henry Hudson who first sailed up it in 1609, were further east than they are today, and ran approximately through the center of the project block. Early trading and exploring ventures by Europeans were such that traders sustained few interactions with Native Americans, conducting transactions on ships to avoid entering unexplored territory. As trading ventures increased in frequency and the new territory was explored, European settlements were slowly established. By 1613 a trade house was built on the southern tip of Manhattan by the New Netherlands Company, a sponsor of many voyages to the new world in search of trade goods (Wilson 1902:395). Shacks were also built to house the few traders who chose to settle on the island. The rapidly expanding fur trade up and down the Hudson River proved enticing for European entrepreneurs and thus the small village at Manhattan's southern tip grew.

In 1623 the Dutch West India Company was granted rights to all lands within Manhattan by the Dutch States General (Hoag 1905:32). Subsequently in 1626 Peter Minuit, the Director General, purchased Manhattan Island from the local Indians for what amounted to less than 25 dollars (Jones 1978:10). By 1664 the English had obtained possession of the island, and King Charles II regranted the land to the Duke of York. Once land rights were granted, the growing community on Manhattan built a gristmill near Battery Place and Greenwich Street (Rutsch et al. 1983:334). Ensuing land disputes provoked the Dutch to build a wall at what is now Wall Street in 1653 to demarcate the northern boundary of the city and keep out undesirables (Works Progress Administration 1939:58). In 1699 the British removed the stockade and the city slowly expanded northward.

In 1686 the Dongon Charter was decreed by Lieutenant Governor Thomas Dongon, granting a charter to the Mayor Alderman of New York City, and the City of New York became officially established. Land ownership, out to the low water mark, was transferred from the Crown to the City of New York (Hoag 1905:32). At that time, Marginal Street was still submerged land and the shoreline along the Hudson River was situated east of its current location, between what are now Greenwich and Washington Streets.

The earliest travelers found the East River a better and safer harbor as the high bluffs and jagged edges of the Hudson River thwarted docking. However, the Hudson River did prove vital in linking northern territories to the growing village on Manhattan. The depth of the Hudson, the lack of protected coves needed to provide shelter from strong northerly winds, and the propensity for winter ice floes left the Hudson shorefront virtually unused (Buttenwieser 1987:27). As a result, early landfilling was not avidly pursued on the banks of the Hudson River for lack of economic interest (Buttenwieser 1987:32). One of the earliest landfilling episodes documented on the Hudson shorefront took place between 1699 and 1701 when several entrepreneurs filled and built docks on

the three blocks between Cedar and Cortlandt Streets and Greenwich Street and Washington Street (Ibid.:32).

Inland, east of the project site, the fertile upland proved more valuable. By 1663 Governor Van Twiller was cultivating a large tobacco plantation north of Spring Street adjacent to the Hudson River. His farm, titled "Bossen Bouwerie," which translates to "Farm in the Woods" (Works Progress Administration 1929:125), was the site of his home located at the foot of Charlton Street. In the 1740s Sir Peter Warren purchased 300 acres of land, together with several houses, at the site of what is now Greenwich Village. His land along the shorefront was described as "a bluff along the river with a fine beach below" (Stokes Vol. III 1918:157).

A large tract of land between Fulton and Christopher Streets, Broadway and the Hudson River - including the east half of the project site - eventually became part of the Queen's Farm, granted by Queen Ann to Trinity Church in 1705 (Works Progress Administration 1939:79). In 1794 William Rhinelander, a shipbuilder, obtained a 99 year lease for a large part of this parcel and, in 1797, the Common Council granted him rights to fill and develop water-lots on the Hudson River contiguous to his property. The Rhinelanders proceeded to lease much of their land to commercial interests at a substantial profit.

In 1730 the Montgomery Charter was established, extending land ownership privileges an additional two blocks beyond the low water mark into the Hudson River, prompting additional land filling. The charter included a provision for creating three streets - Greenwich, Washington and West - parallel to the river (Hoag 1905:32). However, eighteenth century growth continued to focus to the north where land was cheap and could be developed more easily, and landowners were slow to fill their water lots (Buttenwieser 1987: 34).

Through the eighteenth century, mounting tension between the colonies and England further shaped the city. By the 1740s civil defense construction had been spurred by growing conflicts between the French and English. As a result, "a band of palisades was built across the width of Manhattan from near the east side of Greenwich Street to Peck's Slip on the East River. Associated with the palisades were block houses and city gates, however, none were built in the vicinity of the project site (Kirkorian and Tidlow 1984:6).

International conflicts preceding the War of 1812 prompted the erection of yet another fort south of the project site. The "Red Fort," or "North Battery," was constructed on landfill between Hubert and Laight Streets (Rutsch et al 1983:162; Poppleton 1817). The semi-circular stone fort housed both a magazine and a furnace. Following the war, in 1823 the City received permission to use the bridge extending out to the structure as a public landing place for incoming farm produce (Vollmer Associates 1987:11). The site was later used as a landing for immigrant vessels, and finally as a dumping station. The fort itself was eventually removed in 1832 and auctioned off in sections (Rutsch et al. 1983:162).
Following the Revolutionary War an attempt was made to urge the construction of the street along the Hudson River originally provided for in the 1730 charter. In 1795 the Common Council again

passed an ordinance creating West Street, a 70-foot wide outer street, demarcating the western boundary of the city. The proposed creation of West Street was intended to compel landowners to pursue landfilling where they were granted water rights. In 1804 the Common Council increased the distance from Washington to West Street from 160 feet to 200 feet, lengthening the developed blocks between them by 40 feet (Rutsch et al. 1983:153). In 1818 yet another attempt was made to complete West Street when a resolution was passed extending West Street over the Canal Street basin and Spring Street Slip. In 1825 another petition was granted to extend West Street from Canal Street south to Hubert Street.

The relatively slow pace of development which characterized the eighteenth century was succeeded by rapid expansion on the Hudson River shorefront in the nineteenth century. By the early nineteenth century, many docks and piers had been built on the Hudson River shorefront, and by the middle of the nineteenth century, new technologies fostered additional waterfront growth. The invention of the steamboat in 1807, the production of larger vessels by local shipbuilders, the opening of the Erie Canal in 1825, and the demand for coal in New York City generated more shipping through the port of New York and a demand for deeper berths (Buttenwieser 1987:39). To accommodate these growing industries, new piers were built off of West Street into the Hudson River. The Hudson River ferry industry started with the 1812 maiden voyage of Robert Fulton's Jersey, but had grown exponentially by the 1820s with the adoption of steamboats (Cudahy 1990:42).

By the early nineteenth century it was clear that the street system throughout lower Manhattan was poorly designed with pedestrian and commercial traffic becoming increasingly congested. City planning responded by devising a regulated system of streets and avenues throughout Manhattan. The resultant Commissioner's Plan of 1811 imposed a grid system over the city, disregarding natural topographic features which may have impeded road construction. Street regulations called for extensive grading and filling, removing massive rocks and boulders, and tearing down existing houses located in the path of proposed roadways. Although the plan was laid down on paper, many streets were not created until decades later. West Street remained impassable in many areas (1811 Commissioners of New York State; 1927-30 Ewen).

The frustrations experienced by the City in their attempts to create a circumferential road around the perimeter of Manhattan caused the Common Council to pass yet another ordinance in 1825, demanding the creation of West Street and filling of water lots. Land reclamation and filling along the Hudson River waterfront was pursued by either allowing unstructured harbor silts and river accretion to build up, or by placing fill in engineered retaining devices (Geismar 1983:672). In lower Manhattan, ships were sometimes deliberately sunk as cribbing to help stabilize the fill (Berger 1983:9). After wharves and piers were built, derelict ships were sunk adjacent to them, and together these features contributed to and operated to retain fill. In one such case, part of the burnt seventeenth century Dutch ship "Tiger" was sunk and subsequently encountered during subway excavation at the corner of Dey and Greenwich Streets in 1916 (Solecki 1974:109). During the later excavation of the World Trade Center, archaeologists unsuccessfully searched for the remainder of the ship.

Wooden cofferdams, wharves, and bulkheads were built as fill retaining devices, framed with hewn logs, filled with loose stone, and covered with earth (Geismar 1983:30). Timber grillage was commonly used as cribbing, a practice first employed in Europe. Colonists continued to use this method, as both the Dutch and English had previously, aided by the ample supply of wood in the region. To retain fill, quays were first built by driving a row of wooden piles into the river with diagonal braces bolted to the inside, forming the face work. Earth and fill were then placed in the vacant area behind the piles, and planked over to form a roadway level with adjacent streets (Ibid.:31). Wooden jetties were similarly built. Once the economic value of clean fill generated from building excavations was realized, this was no longer used as fill. Instead, wharves and piers were frequently used as dumping boards, where garbage was collected and pushed overboard into scows or directly into the river. Rubbish, ballast, and street trash pushed the shoreline further west.

The rapidly growing west side supported many successful business ventures. One of these was the Clinton Market which once stood several blocks south of the project site at Canal and West Streets. One of the most influential early nineteenth century industries in this neighborhood was the Delameter Iron Works, founded in the 1830s near the corner of West and Laight Streets, about ten blocks south of the project site. The company was founded by three men who repaired ships, working out of their machine and blacksmith shops. Their successful venture enabled them to expand their business along West Street in 1838 and to establish a second company, the Phoenix Foundry, north at Vestry Street (Vollmer Associates 1987:11). A second ship yard was opened on a newly filled waterfront lot at the foot of West 13th Street near Tenth Avenue (Rutsch et al. 1983: 352). These industries served the waterfront community for many years.

In 1847 waterfront commerce was further amplified when the Hudson River Railroad was organized and a track was laid from Chambers to West 30th Street (Rutsch et al. 1983:258). The railroad serving the waterfront helped to spur industrial and commercial growth. In the 1870s the Hudson River Railroad merged with the New York Central and added a new passenger and freight terminal at St. Johns Park near Canal and Hudson Streets to accommodate ferry users (Buttenwieser 1987:75). By 1851 a railroad station was opened at West 30th Street and Eleventh Avenue, and by 1852 the Eight Avenue Railroad opened a second line between Chambers and West 51st Streets (Works Progress Administration 1939:146). Elevated railways were complete throughout Manhattan by 1875, expediting local travel to the growing shorefront (McCabe 1882:239).

The shorefront itself continued to be controlled by private individuals and businesses, contributing to deplorable waterfront conditions (Hoag 1905:36). For example, in 1856 the owners of the bulkhead between Beach and Hubert Streets were permitted to build a 112-foot long bridge on piles 18 feet beyond the existing bulkhead, slightly north of Pier 37 (Rutsch et al. 1983:99). These haphazard waterfront "improvements" hardly improved conditions at all. Instead, irregularly shaped, privately owned piers were in a continual state of disrepair and the solid base construction of piers prohibited the flow of sewage, draining from the shores out to sea, creating disease-ridden waters (New York Pier and Warehouse Co. 1869:58). Conveying merchandise to and from the Hudson River waterfront was also impeded by the tremendous volume of freight and pedestrian traffic. The

miserable waterfront conditions desperately called for corrective measures, and numerous public agencies were established to deal with these issues.

One of the agencies created to address waterfront conditions was the Department of Docks, established in 1870. The department was granted rights and land for the construction of wharves, bulkheads, docks, piers, basins, and slips. They then instituted the McClellan Plan which resulted in the construction of a solid block and granite bulkhead wall, around the southern half of Manhattan between West 61st and East 51st Streets, over the course of the next sixty years. The wall was to be placed outside of the previously existing bulkhead to allow 250 feet for the width of West and Marginal Streets (Buttenwieser 1987:73). Unfortunately, similar problems were encountered in creating these outer streets, and by the 1890s both West and Marginal Streets were still blocked with many intrusions (Rutsch et al. 1983:297). As late as 1910 "numerous encroachments into the right-of-way still existed, especially south of Cortlandt Street where some old bulkheads maintained the 70-foot width of West Street" (Ibid.:270). The plan enabled the available pier area to double on the Hudson River shorefront. Piers were built to accommodate many steam ship lines and ferry houses for the New Jersey Central and Pennsylvania Railroads (McCabe 1882:360).

Despite all the efforts put forth by the Department of Docks, by the twentieth century conditions along the waterfront had barely improved. In the 1930s, West Street was edged with busy docks, and was the "main highway for the city's incoming and outgoing supplies" (Works Progress Administration 1939:58). South of 23rd Street, the Hudson River was walled by an "almost unbroken line of bulkhead sheds and dock structures" (Ibid.:69), blocking any view of the river itself from pedestrians or nearby residents. Cross streets were packed with traffic heading for ferries situated at the foot of Chambers, Barclay, Cortlandt and Liberty Streets. Subsequently, more plans were enacted to help alleviate traffic congestion in the 1920s and 1930s, and thus the West Side Highway was constructed. By 1947 the elevated structure continued as far south as Rector Street, supported on piles driven to bedrock (Vollmer Associates 1989:10). It has since been demolished and an at-grade roadway was built to replace it (Ibid.).

CARTOGRAPHIC REVIEW

Maps and atlases were generally reviewed at approximately five-to-ten year intervals, while in some cases several maps were used dating to the same period to verify accuracy. This interval of map dates proved sufficient to identify potentially sensitive areas and accurately track landfilling episodes (see Bibliography). Buildings or features present for less than five to ten years rarely were constructed in such a manner as to leave a vertical or horizontal footprint on the landscape and disturbance by these transient structures tended to be minimal, therefore reviewing maps at shorter intervals is generally ineffective.

The early historic maps of Manhattan depict the western half of the project site block as land under water, while the eastern half is depicted as a terrace along the Hudson River's edge (Montresor 1766; MacCoun 1909; Ratzer 1766; Poppleton 1817; Viele 1859; Dripps 1859; Viele 1874; Figure 4). The southeastern corner of the block, which abutted the shoreline, was once part of the Fiscock, Hansen,

and Adriaensen farm prior to 1638 (Stokes Vol. VI 1922: Plate 84B-b). The northeastern corner of the block fell within Jan Van Rotterdam's parcel. While there appeared to be no dwellings on the Fiscock tract, Van Rotterdam maintained a dwelling one block north of the project site near Barrow Street and Washington Avenue (Ibid.). Fiscock originally gained title to this 27-acre tract sometime prior to 1638. By 1639, he maintained only a one-third share of the parcel, with Hansen and Adriaensen the other owners. Together, the parcel contained a "house and plantation" (Stokes Vol. VI 1928: 148). Thomas Hall, a tobacco farmer, purchased the tract from Maryn Adriaensen in 1642. This tract became part of Trinity's Upper Farm in 1705.

In the early nineteenth century, Trinity Church deeded land to the city of New York for the opening of Morton Street (1808), and Leroy Street (1808) (Stokes Vol. III 1918: 1004, 1006). Between 1817 and 1827, fill had been added to the shoreline, allowing for the creation of the project block, and the completion of Leroy, Morton, and West Streets (Poppleton 1817; Ewen 1827-30). By 1827 the project block had been subdivided into four horizontal linear strips of land belonging to Samuel Thompson, Thomas S. Clarkson, Richard J. Tucker, and Campbell P. White, from south to north (Ewen 1827-30). Both the Clarkson and Tucker parcels were leased to Jacob Brush.

The project block may have been developed as early as 1836, when it was depicted as shaded - indicating development - on the Colton *Topographical Atlas.* The lack of detail showing distinct buildings on this densely developed section of lower Manhattan made it impossible to determine just how many buildings were present on the block, although it appeared that at least part of the block was covered with structures (Colton 1836). Both the 1839 Burr and 1845 Ensign maps also depicted the block as shaded, but did not show individual structures (Burr 1839; Ensign 1845).

The first map to clearly show individual structures on the project site dates to 1850, when there is a large building portrayed covering much of the project block (Dripps 1850). The structure, labeled *R.P. Getty's Packing House*, covers the entire block except the southwestern and southeastern corners. In addition to the packing house, a very small detached building stood at the southwest corner of the lot. While its function is unknown, its interesting to note that many blocks to the north and the south of the project site had similar structures in the same general locale, their southwest or northwest corners, at that time (Dripps 1850; 1852).

By 1853, the vacant southwestern corner of the block had been turned into a lumber yard, and a long rectangular building covered the northern one-third of the block fronting Morton Street. Several smaller buildings fronted Washington Street, while another large building fronted Leroy Street (Perris 1853). Between the two buildings was a vacant yard labeled as the *Pennsylvania Coal Company's Yard* (Perris 1853). Surrounding blocks to the north and south were predominantly industrial in nature, and were served by the network of docks in the Hudson River built off of West Street, and the Hudson River Railroad which had been constructed on West Street.

During the 1860s, cartographers were redirected for the war effort leaving few to generate urban maps and atlases. As a result, only one detailed map of development for the project site could be found dating to this period. In 1868, the long structure on the northern one-third of the block,

fronting Morton Street, was unlabeled. A new structure had been built on the southern one-third of the block, fronting Leroy Street, and was labeled *Lewis Pack'g House*. Between the two structures was an open yard for the *Pennsylvania Coal Company*. By this time, water lines had been installed in Washington Avenue (Dripps 1868).

By 1879, the date of the next available map with detailed structures, all of the project block was developed with the exception of a small vacant yard directly in the middle of the block (Bromley 1879; Figure 5). A *Cotton Press and Lumber Yard* took up the entire frontage on Morton Street. Fronting onto Washington Street was a coal yard, with a wood shed behind it. To the south, fronting Leroy Street, was the *Lewis and Company Store Houses*, a long structure which spanned the length of the block. Finally, fronting onto West Street was another structure, which was either part of the store houses or cotton press (Figure 5).

In 1885 the block appeared similar in configuration, however, the building on Morton Street had been razed (Robinson 1885). To the east, the building fronting Washington Street was labeled *W.H. Kirby* and *Rockman*. South of this fronting Leroy Street was the *Wm. C. Casey U.S. Bonded Warehouse* spanning the entire length of the block. Finally, fronting West Street was the *Albany Brewing Company*. It appears that a small yard may have been left vacant behind the brewery, in the center of the block (Robinson 1885).

Sometime during the following eight years, a small brick building had been constructed at the northeast corner of the block (Robinson 1893). The *U.S. Bonded Warehouses* and the *Albany Brewing Company* buildings on the southern and western sections of the block, respectively, were unchanged. Between these two buildings was a long wooden structure, and another wooden building had been constructed at the intersection of Morton and West Streets (Ibid.). Small undeveloped sections of the block, now numbered block 602, remained in its center.

In 1904, the southern one-third of the block was still covered by the *W.C. Casey Storage Stores* - a long rectangular structure consisting of three and five-story attached buildings with basements (Sanborn 1904; Figure 6). At the western end of the block the brewery was now owned by the *Columbia Smelting and Refining Works*, which maintained a one- and two-story building with a basement. An addition had been built on the rear of the building, covering the previously vacant center of the block. A four-story *U.S. Post Office* had been built at the northwest corner of the block at the intersection of Morton and West Streets. To its east was a packing box yard with another small building at the intersection of Morton and Washington Streets. To the south of this, fronting Washington Street, were three two-story buildings with basements. Two of the buildings were not labeled, and one was vacant (Ibid.).

By 1921 the *U.S. Post Office* had been expanded to the east to cover the entire northern one-third of the block fronting Morton Street (Sanborn 1921). The addition, a four-story building with a basement, covered the former location of the packing box yard. To the south of this, fronting Washington Street, the three individual structures were listed as residential dwellings. Fronting Leroy Street, the *Independent Warehouse Inc. Public Storage Warehouses* continued to stand, as

did the *Columbia Smelting and Refining Works* fronting West Street. At this time, the entire block was covered with structures, most possessing basements (Sanborn 1921). The only exception to this was in the center of the block which was covered by a one-story addition to the smelting works that did not have a basement recorded.

Supplementing the cartographic sources for the period between 1921 and 1951 were several building permits pertinent to the project site. In 1931 a demolition permit was issued for a brick factory on the site (New York City Building Department File). Sometime over the course of the next twenty years, all of the remaining buildings on the project block were razed except for the post office (Sanborn 1951). This was shortened on its eastern end, and was utilized as a motor freight station and parking garage on the first level. Behind it, to the south and fronting West Street, was an auto body works. South of this, a gasoline filling station was built at the southwest corner of the block - complete with underground gas tanks. The *New York Central Railroad* (N.Y.C.R.R.) maintained a right-of-way along Washington Street for the entire length of the block where several structures had formerly stood (Ibid.).

In 1960, demolition permits were issued for a two-story brick warehouse; a one-story wood-framed diner; a metal shed; and a brick office and gas station (New York City Building Department File). By 1976 all the remaining buildings on the block were razed, and the extant one- and two-story building had been constructed fronting Leroy Street and extending north to cover a large section of the project block (Sanborn 1976). By 1986 this building was reduced in size and was operating as a motor freight station (Sanborn 1986). Its current configuration is similar to that evident in 1986.

POTENTIAL FOR HISTORICAL PERIOD RESOURCES

The extensive cartographic review of the project block has failed to identify any potential historical period resources predating the twentieth century. Maps and atlases from the eighteenth through nineteenth centuries identified a series of commercial structures, almost all possessing basements, which covered the entire block. The exception to this was a one-story addition to the smelting works on the center of the block, which did not contain a basement. However, this area is currently beneath the extant building.

The earliest documented development of the project block dates to between 1827 (Ewen 1827) and 1836 when it was portrayed as at least partially developed (Colton 1836). Specific structures were not presented on maps until the 1850s, when a packing house covered much of the block. This was later replaced by a series of commercial structures including a brewery, warehouse, cotton press, lumber yard, coal yard, smelting and refining works, U.S. Post office, and finally, a motor freight station. The buildings were systematically razed and replaced by larger more substantial structures, each with basements, until the entire block was razed and redeveloped in the twentieth century with the extant building.

The lack of documented historic dwellings or early farmsteads has eliminated this resource type from the project site's potential. Structures which historically stood on the project block in the nineteenth

century were commercial and industrial in nature. It is highly unlikely that archaeological investigations into any of the structures formerly on the project block could provide potentially significant data that would address meaningful research issues. Inner workings and mechanisms from all buildings were likely removed and either recycled or discarded. Footprints of structures would probably be all that is left of their former existence. Furthermore, because the block was continually redeveloped throughout the nineteenth and twentieth centuries, any formerly-vacant yards - which could have once maintained archaeological resources documenting workers' lives - were subsequently disturbed. Therefore, the project site has no potential for historical period archaeological resources which may possess the potential to meet the necessary criteria for inclusion on the National Register of Historic Places.

CONCLUSIONS AND RECOMMENDATIONS

This Stage 1A Archaeological Assessment was designed to determine the likelihood that precontact - or prehistoric - and historic archaeological resources were once present on the project site and the likelihood that these resources have remained undisturbed by historic and modern development and still possess their integrity. Background research was completed, including a review of primary and secondary sources, including modern soil borings, to document the prior usage of the project site, cartographic analysis, site file reviews of previous pertinent archaeological findings, informant interviews, and field visits. This research was analyzed to determine the archaeological potential of the project site.

PRECONTACT PERIOD RESOURCES

The documentary study concluded that the project site is not sensitive for precontact period resources that would have research potential and meet the criteria necessary for inclusion on the National Register of Historic Places. The eastern half of the project block was on fast land at the time of European Contact, and could have been utilized by Native Americans over the course of the last 12,000 years. However, the precontact topography would have afforded little protection to the site, rendering it vulnerable to winds coming down the Hudson River. The western half of the project site was inundated by the Hudson River for several thousand years, but may have once contained been exposed landforms when water levels were considerably lower. In a previous study completed for the Westway Project in 1982, archaeologists and paleoecologists created a shore-line reconstruction of the drowned topography along the Hudson River's edge. Their study identified specific areas which may now lie beneath the landfill which may be sensitive for precontact habitation. However, their study did not identify any areas either near or within the current project site as sensitive for such.

Soil boring logs reviewed for this project indicate that twentieth century fill, largely construction and demolition debris, extends between four and 12 feet below current grade, and possibly deeper (see Appendices A, B). Underlying the fill are levels of moist and wet sand with gravel and some silt. Subsurface conditions do not suggest there are any potential living surfaces which would have been ideal for precontact period habitation.

Precontact period resources, which the project block is only marginally sensitive for, would have been greatly disturbed by the construction of historic buildings with basements, excavations to accommodate associated pipes, conduits, and other infrastructure improvements, and finally with the installation of numerous buried oil, diesel, and waste-oil tanks (21 550-gallon tanks, three four-thousand gallon tanks, and one 2,000-gallon tank). If any precontact period resources were ever present within the project site, subsurface impacts have disturbed them to an extent rendering them ineligible for inclusion on the National Register of Historic Places.

HISTORICAL PERIOD RESOURCES

The extensive cartographic review of the project block has failed to identify any potential historical period resources predating the twentieth century. Maps and atlases from the eighteenth through nineteenth centuries identified a series of commercial structures, almost all possessing basements, which covered the entire block. The exception to this was a one-story addition to the smelting works on the center of the block, which did not contain a basement. However, this area is currently beneath the extant building.

Structures which historically stood on the project block in the nineteenth century were commercial and industrial in nature. It is highly unlikely that archaeological investigations into any of the structures formerly on the project block could provide potentially significant data that would address meaningful research issues. Inner workings and mechanisms from all buildings were likely removed and either recycled or discarded. Footprints of structures would probably be all that is left of their former existence. Furthermore, because the block was continually redeveloped throughout the nineteenth and twentieth centuries, any formerly-vacant yards - which could have once maintained archaeological resources documenting workers' lives - were subsequently disturbed. Therefore, the project site has no potential for historical period archaeological resources which may possess the potential to meet the necessary criteria for inclusion on the National Register of Historic Places.

RECOMMENDATIONS

No additional investigations are recommended for Block 602 since the documentary study has demonstrated the lack of archaeological potential. No archaeological resources which would meet the criteria necessary for inclusion on the National Register of Historic Places were identified and none are anticipated. Therefore, no further archaeological study is proposed.

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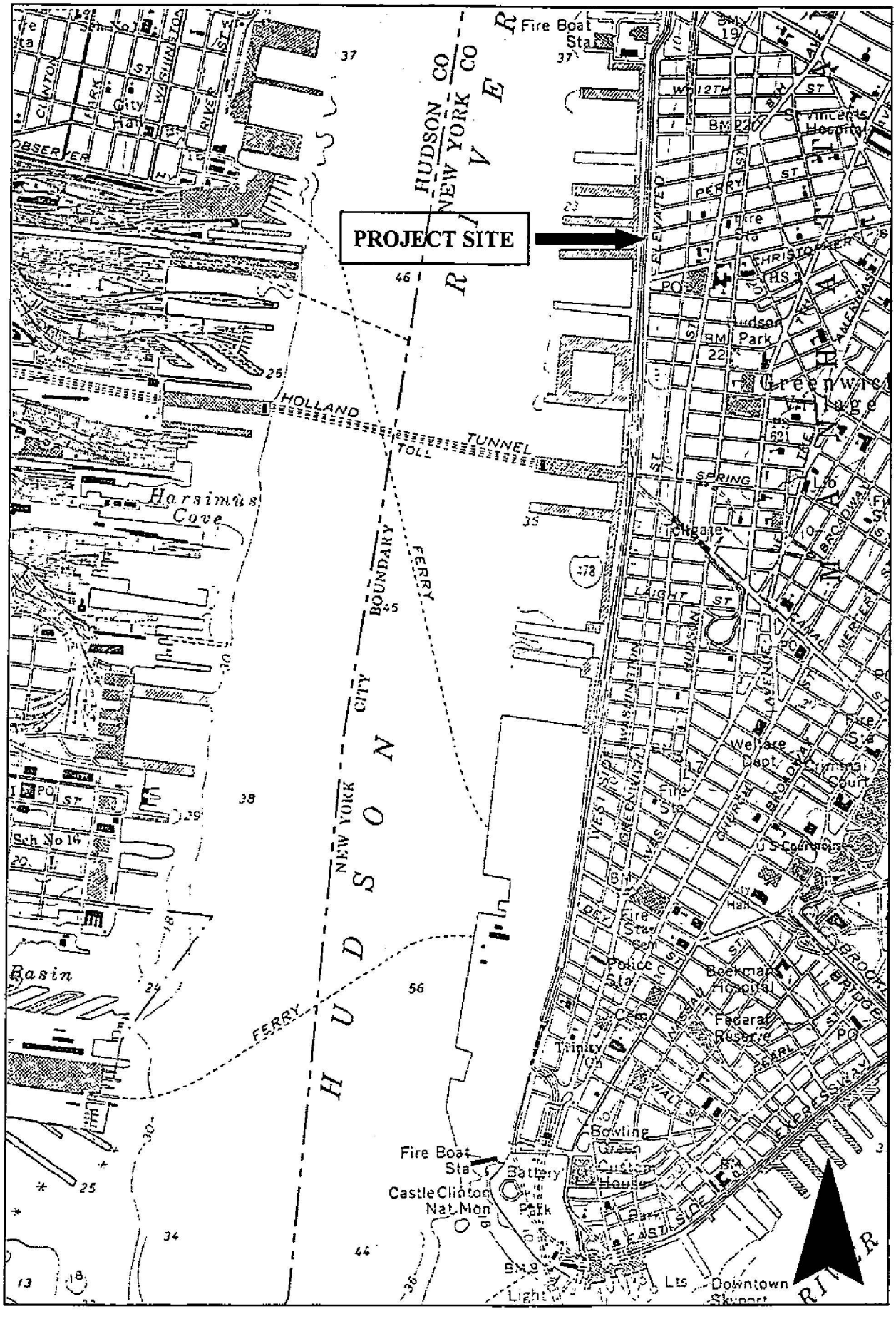
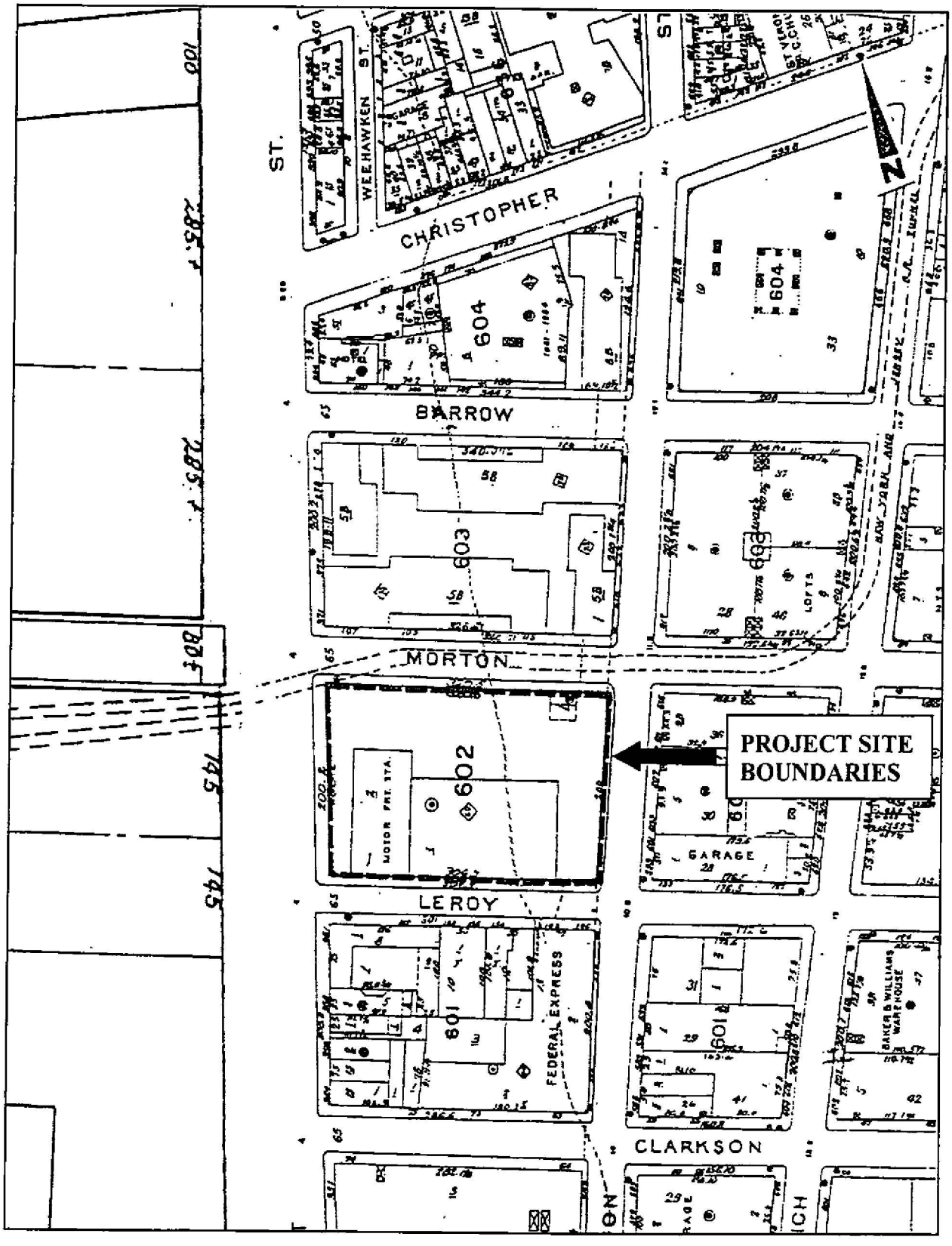


FIGURE 1

Project Site Location, U.S.G.S. *Jersey City Quadrangle,* 1979



0 Feet 200

FIGURE 2

Project Site Location
Insurance Maps, Sanborn 1999

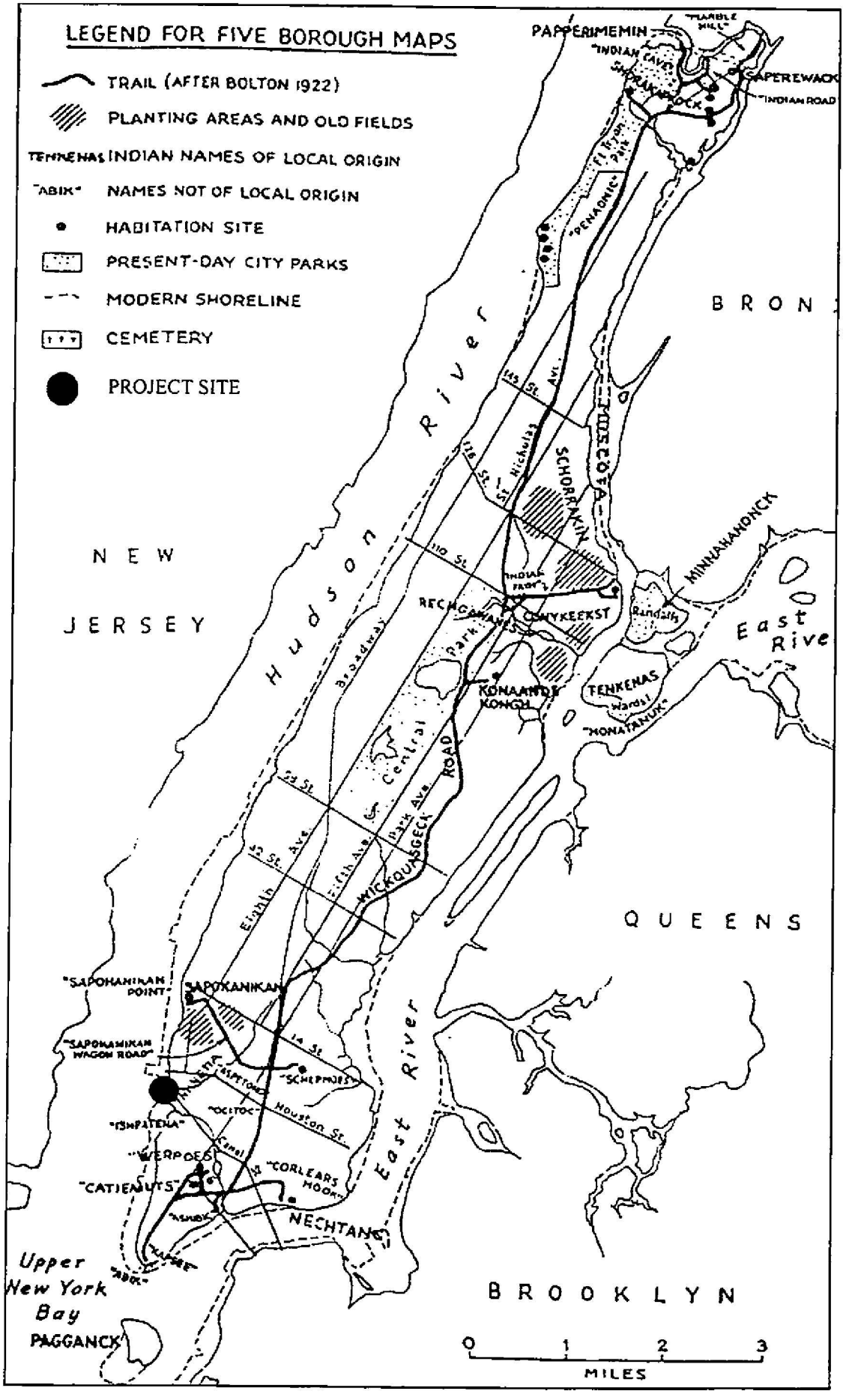


FIGURE 3

Native American Place Names in New York City, Grumet 1981

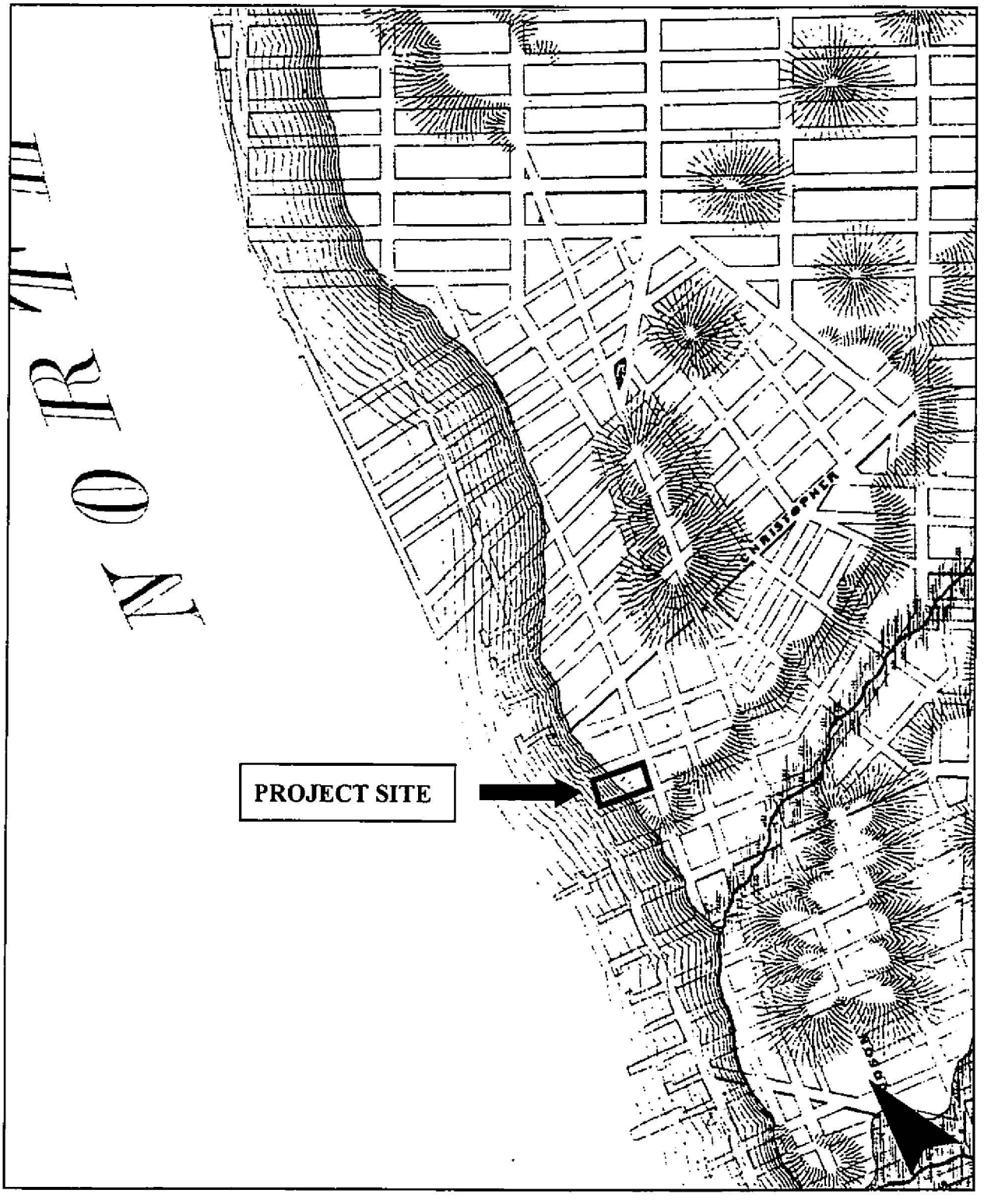


FIGURE 4

Original Topography of Manhattan Island, Viele 1859

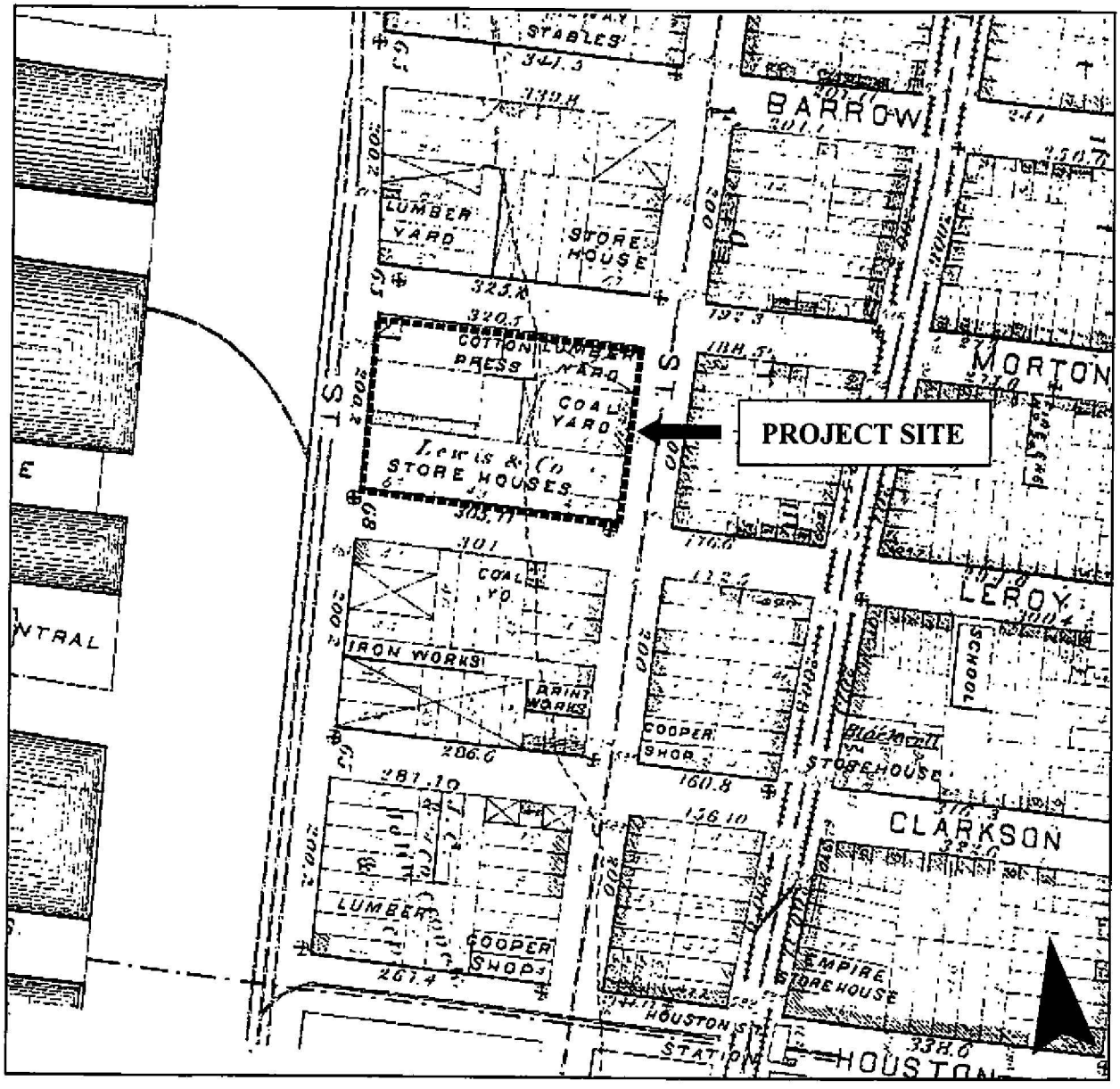


FIGURE 5

Atlas of the City of New York, Bromley 1879

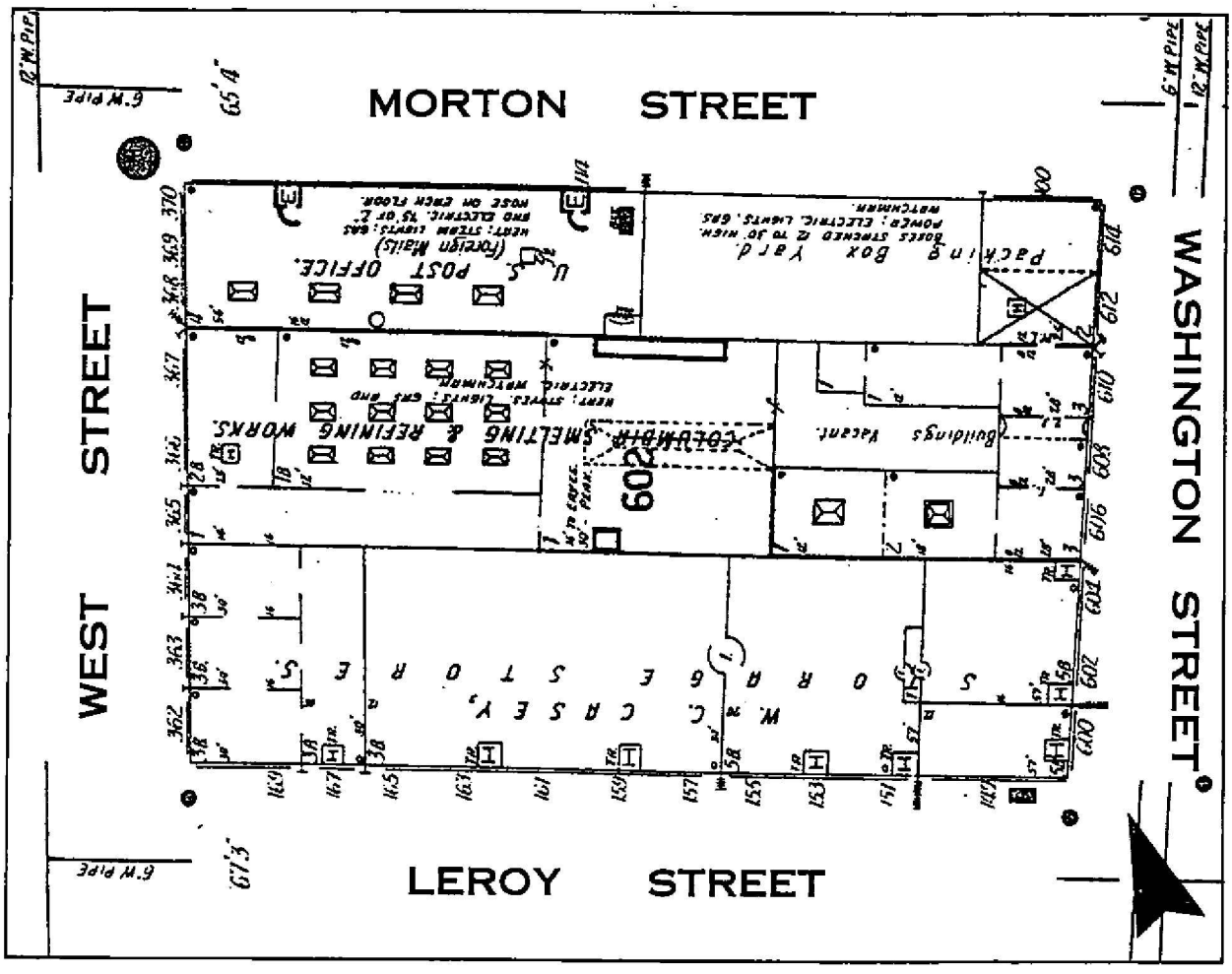


FIGURE 6

Insurance Maps of the City of New York, Sanborn 1904

PHOTOGRAPH A
VIEW SOUTH OF THE PROJECT SITE ON WEST STREET

PHOTOGRAPH B
VIEW SOUTHWEST OF THE PROJECT SITE AT THE CORNER OF WASHINGTON AND MORTON STREETS

PHOTOGRAPHS OF THE SITE

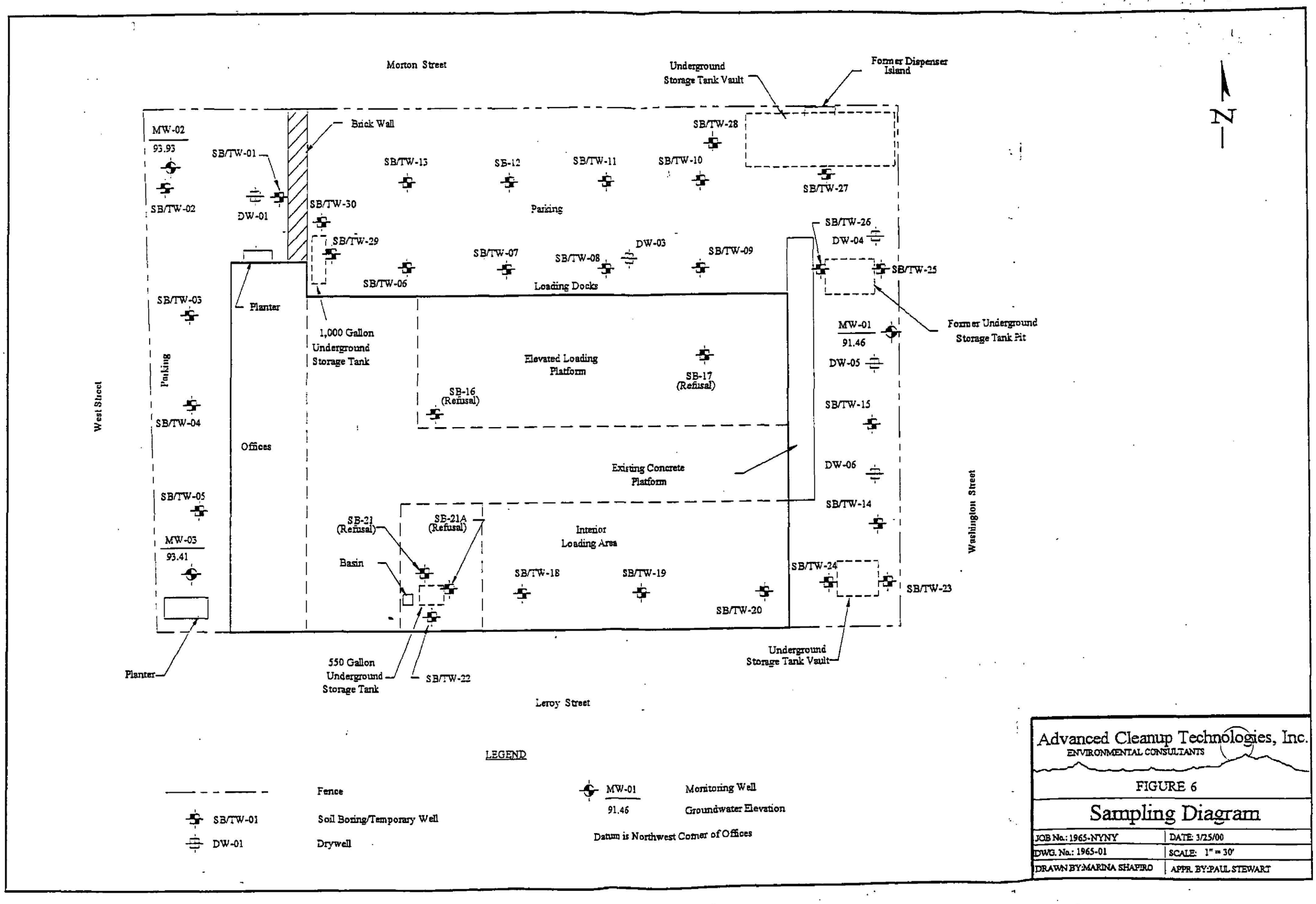
PHOTOGRAPH C
VIEW NORTHWEST OF THE PROJECT SITE AT THE CORNER OF WASHINGTON AND LEROY STREETS

PHOTOGRAPHS OF THE SITE

APPENDIX

A. Soil Boring Logs, Advanced Cleanup Technologies, Inc.

B. Underground Storage Tank Closure Report - Addendums 1 and 2
GZA GeoEnvironmental, Inc.



LEGEND

Fence	
SB/TW-01	Soil Boring/Temporary Well
DW-01	Drywell
MW-01 / 91.46	Monitoring Well / Groundwater Elevation

Datum is Northwest Corner of Offices

Advanced Cleanup Technologies, Inc.
ENVIRONMENTAL CONSULTANTS

FIGURE 6

Sampling Diagram

JOB No.: 1965-NYNY	DATE: 3/25/00
DWG. No.: 1965-01	SCALE: 1" = 30'
DRAWN BY:MARINA SHAPIRO	APPR. BY:PAUL STEWART

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB/TW-01

CLIENT: J.D. Carlisle Development
PROJECT: 149 Leroy St., NY, NY
A.C.T. PROJECT NO.: 1965-NYNY
DATE STARTED: 3/8/00
DATE COMPLETED: 3/8/00

DRILLING CO.: Powerprobe
DRILLER: Steven Walls
DRILLING METHOD: Direct Push
SAMPLING METHOD: Macrocore
HOLE DIAMETER: 2 inches

TD: 16 feet
SURFACE ELEV.:
GW DEPTH: 13.6 feet
LOGGED BY: Ed Hayes
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1	0-4' 36" RECOVERY	0.0	0-12	1
2	Red granular debris: Sand, Silty Clay, No Odor	0.2	12-24	2
3		0.0	24-36	3
4				4
5	4-8' 48" RECOVERY			5
6	Silty Clay with Fine Sand, No Odor	0.0	0-12	6
7		0.0	12-24	7
8		0.0	24-36	8
9		0.0	36-48	9
10	8-12' 48" RECOVERY			10
1	Brown Silty Clay, Saturated, No Odor	0.0	0-12	1
2		0.0	12-24	2
3		0.2	24-36	3
4		0.0	36-48	4
5	12-16' 48" RECOVERY			5
6	Brown Coarse to silty sand, Saturated, No Odor	0.0	0-12	6
7		0.0	12-24	7
8		0.0	24-36	8
9		0.0	36-48	9
20				20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB/TW-02

CLIENT: J.D. Carlisle Development
PROJECT: 149 Leroy St., NY, NY
A.C.T. PROJECT NO.: 1965-NYNY
DATE STARTED: 3/8/00
DATE COMPLETED: 3/8/00

DRILLING CO.: Powerprobe
DRILLER: Steven Walls
DRILLING METHOD: Direct Push
SAMPLING METHOD: Macrocore
HOLE DIAMETER: 2 inches

TD: 16 feet
SURFACE ELEV.:
GW DEPTH: 13.2 feet
LOGGED BY: Ed Hayes
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1–4	0-4' 48" RECOVERY Fill: Stones, construction debris, brick fragments, black tar material, No Odor	0.0 0.0 0.0 0.0	0-12 12-24 24-36 36-48	1–4
5–8	4-8' 36" RECOVERY Fill: Black to Brown Tar or Coal and Brick Fragments, Silty Clay, No Odor	0.0 0.0 0.0	0-12 12-24 24-36	5–8
9–12	8-12' 36" RECOVERY Red Silty Sand to Brown Coarse Sand. Some Silt and Clay, Saturated, No Odor	0.0 0.0 0.0	0-12 12-24 24-36	9–12
13–16	12-16' 48" RECOVERY Coarse Sand, Some Silt and Clay, No Odor	0.0 0.0 0.0 0.0	0-12 12-24 24-36 36-48	13–16
17–20				17–20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB/TW-03

CLIENT: J.D. Carlisle Development
DRILLING CO.: Powerprobe
TD: 16 feet
PROJECT: 149 Leroy St. NY, NY
DRILLER: Steven Walls
SURFACE ELEV.:
A.C.T. PROJECT NO.: 1965-NYNY
DRILLING METHOD: Direct Push
GW DEPTH: 13.7 feet
DATE STARTED: 3/8/00
SAMPLING METHOD: Macrocore
LOGGED BY: Ed Hayes
DATE COMPLETED: 3/8/00
HOLE DIAMETER: 2 inches
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1	0-4' 48" RECOVERY Silty Sand with Stone Fragments, No Odor	0.0 0.0 0.0 0.0	0-12 12-24 24-36 36-48	1 2 3 4
5	4-8' 36" RECOVERY Silty Sand with Clay and Stone Fragments, No Odor	0.0 0.0 0.0	0-12 12-24 24-36	5 6 7 8
9	8-12' 48" RECOVERY Silty Sand with Stone Fragments, No Odor	0.0 0.0 0.0 0.0	0-12 12-24 24-36 36-48	9 10 1 2
3	12-16' 48" RECOVERY Coarse to Clayey Sand, Saturated, No Odor	0.0 0.0 0.0 0.0	0-12 12-24 24-36 36-48	3 4 5 6
7				7 8 9 20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB/TW-04

CLIENT: J.D. Carlisle Development
DRILLING CO.: Powerprobe
TD: 16 feet
PROJECT: 149 Leroy St. NY, NY
DRILLER: Steven Walls
SURFACE ELEV.:
A.C.T. PROJECT NO.: 1965-NYNY
DRILLING METHOD: Direct Push
GW DEPTH: 13.5 feet
DATE STARTED: 3/9/00
SAMPLING METHOD: Macrocore
LOGGED BY: Ed Hayes
DATE COMPLETED: 3/9/00
HOLE DIAMETER: 2 inches
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1	0-4' 48" RECOVERY Silty Sand with Clay and Stone Fragments, No Odor	0.0 0.0 0.0 0.0	0-12 12-24 24-36 36-48	1 2 3 4
5	4-8' 36" RECOVERY Silty Sand with Clay and Stones, No Odor	0.0 0.0 0.0	0-12 12-24 24-36	5 6 7 8
9	8-12' 24" RECOVERY Silty Sand with Clay and Stones, Saturated, No Odor	0.0 0.0	0-12 12-24	9 10 1 2
3	12-16' 24" RECOVERY Silty to Coarse Sand with Stones, Saturated, No Odor	0.0 0.0	0-12 12-24	3 4 5 6
7				7 8 9 20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB/TW-05

CLIENT: J.D. Carlisle Development
PROJECT: 149 Leroy St. NY, NY
A.C.T. PROJECT NO.: 1965-NYNY
DATE STARTED: 3/9/00
DATE COMPLETED: 3/9/00

DRILLING CO.: Powerprobe
DRILLER: Steven Walls
DRILLING METHOD: Direct Push
SAMPLING METHOD: Macrocore
HOLE DIAMETER: 2 inches

TD: 16 feet
SURFACE ELEV.:
GW DEPTH: 13.2 feet
LOGGED BY: Ed Hayes
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
0-4'	36" RECOVERY Silty Sand with Construction Debris, Stones, Brick Fragments, No Odor	0.0 0.0 0.0	0-12 12-24 24-36	
4-8'	36" RECOVERY Silty Sand with Clay, Moist, Moderate Odor	1.0 4.0 289.0	0-12 12-24 24-36	
8-12'	36" RECOVERY Silty Sand with Stones, Brick Fragments, Strong Odor	9.4 28.0 595.0	0-12 12-24 24-36	
12-16'	48" RECOVERY Silty Sand with Stones, Saturated, Moderate Odor	3.0 50.1 11.2 115.0	0-12 12-24 24-36 36-48	

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB/TW-06

CLIENT: J.D. Carlisle Development
DRILLING CO.: Powerprobe
TD: 16 feet
PROJECT: 149 Leroy St., NY, NY
DRILLER: Steven Walls
SURFACE ELEV.:
A.C.T. PROJECT NO.: 1965-NYNY
DRILLING METHOD: Direct Push
GW DEPTH:
DATE STARTED: 3/27/00
SAMPLING METHOD: Macrocore
LOGGED BY: Ed Hayes
DATE COMPLETED: 3/27/00
HOLE DIAMETER: 2 inches
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1–4	0-4' 24" RECOVERY Fill: Black and White Debris and Red Brick Fragments, No Odor	0.0 0.0	0-12 12-24	1–4
5–8	4-8' 48" RECOVERY Brick Fragments, Sand with Clay, No Odor	0.0 0.0 0.0 0.0	0-12 12-24 24-36 36-48	5–8
9–12	8-12' 24" RECOVERY Sandy Clay to Coarse Sand, Saturared, No Odor	0.0 0.0	0-12 12-24	9–12
1–6	12-16' 48" RECOVERY Coarse Sand with gravel, Saturated, No Odor	0.0 0.0 0.0 0.0	0-12 12-24 24-36 36-48	1–6
7–20				7–20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB/TW-07

CLIENT: J.D. Carlisle Development
PROJECT: 149 Leroy St., NY, NY
A.C.T. PROJECT NO.: 1965-NYNY
DATE STARTED: 3/27/00
DATE COMPLETED: 3/27/00

DRILLING CO.: Powerprobe
DRILLER: Steven Walls
DRILLING METHOD: Direct Push
SAMPLING METHOD: Macrocore
HOLE DIAMETER: 2 inches

TD: 16 feet
SURFACE ELEV.:
GW DEPTH:
LOGGED BY: Ed Hayes
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1–4	0-4' 24" RECOVERY Fill: Grey Ash and Construction Debris, Brick Fragments, No Odor	0.0 0.0	0-12 12-24	1–4
5–8	4-8' 36" RECOVERY Black to Dark Brown Coarse Sand with Pebbles, No Odor	0.0 0.0 0.0	0-12 12-24 24-36	5–8
9–12	8-12' 36" RECOVERY Clayey Sand with Stones, Wet, No Odor	0.0 0.0 0.0	0-12 12-24 24-36	9–12
1–6	12-16' 48" RECOVERY Silty to Medium Sand with Pebbles, Saturated, No Odor	0.0 0.0 0.0 0.0	0-12 12-24 24-36 36-48	1–6
7–20				7–20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB/TW-08

CLIENT: J.D. Carlisle Development
PROJECT: 149 Leroy St., NY, NY
A.C.T. PROJECT NO.: 1965-NYNY
DATE STARTED: 3/27/00
DATE COMPLETED: 3/27/00

DRILLING CO.: Powerprobe
DRILLER: Steven Walls
DRILLING METHOD: Direct Push
SAMPLING METHOD: Macrocore
HOLE DIAMETER: 2 inches

TD: 16 feet
SURFACE ELEV.:
GW DEPTH:
LOGGED BY: Ed Hayes
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1–4	0-4' 24" RECOVERY Fill: Black Construction Debris, Brick Fragments, No Odor	0.0 0.0	0-12 12-24	1–4
5–8	4-8' 24" RECOVERY Construction Debris and Ash with Silty sand and Stones, No Odor	0.0 0.0	0-12 12-24	5–8
9–12	8-12' 48" RECOVERY Coarse Sand, Red Silty Clay, Saturated, No Odor	0.0 0.0 0.0 0.0	0-12 12-24 24-36 36-48	9–12
13–16	12-16' 48" RECOVERY Red to Brown Medium Sand with Pebbles, Saturated, No Odor	0.0 0.0 0.0 0.0	0-12 12-24 24-36 36-48	13–16
17–20				17–20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB/TW-09

CLIENT: J.D. Carlisle Development
DRILLING CO.: Powerprobe
TD: 16 feet
PROJECT: 149 Leroy St., NY, NY
DRILLER: Steven Walls
SURFACE ELEV.:
A.C.T. PROJECT NO.: 1965-NYNY
DRILLING METHOD: Direct Push
GW DEPTH:
DATE STARTED: 3/16/00
SAMPLING METHOD: Macrocore
LOGGED BY: Ed Hayes
DATE COMPLETED: 3/16/00
HOLE DIAMETER: 2 inches
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1	0-4' 36" RECOVERY Grey Silty Sand and Brick Fragments, No Odor	0.0 0.0 0.0	0-12 12-24 24-36	1 2 3
4				4
5	4-8' 36" RECOVERY Fine to Coarse Sand with Stones, No Odor	0.0 0.0 0.0	0-12 12-24 24-36	5 6 7
8				8
9	8-12' 48" RECOVERY Fine to Medium Sand with Clay, Pebbles, Saturated, No Odor	0.0 0.0 0.0 0.0	0-12 12-24 24-36 36-48	9 10 1 2
3	12-16' 48" RECOVERY Medium to Coarse Sand with Gravel, Saturated, No Odor	0.0 0.0 0.0 0.0	0-12 12-24 24-36 36-48	3 4 5 6
7				7
8				8
9				9
20				20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB/TW-10

CLIENT: J.D. Carlisle Development
DRILLING CO.: Powerprobe
TD: 16 feet
PROJECT: 149 Leroy St., NY, NY
DRILLER: Steven Walls
SURFACE ELEV.:
A.C.T. PROJECT NO.: 1965-NYNY
DRILLING METHOD: Direct Push
GW DEPTH: 11.1 feet
DATE STARTED: 3/15/00
SAMPLING METHOD: Macrocore
LOGGED BY: Ed Hayes
DATE COMPLETED: 3/15/00
HOLE DIAMETER: 2 inches
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1	0-4' 36" RECOVERY	0.0	0-12	1
2	Silty Sand with Construction Debris, Brick Fragments, No Odor	0.0	12-24	2
3		0.0	24-36	3
4				4
5	4-8' 24" RECOVERY	0.0	0-12	5
6	Fill: Ash, Cinders, Debris, Stones, No Odor	0.0	12-24	6
7				7
8				8
9	8-12' 36" RECOVERY			9
10	Medium to Coarse Sand, Saturated, No Odor	0.0	0-12	10
1		0.0	12-24	1
2		8.2	24-36	2
3	12-16' 48" RECOVERY			3
4	Medium to Fine Sand, Saturated, No Odor	0.0	0-12	4
5		0.0	12-24	5
6		0.0	24-36	6
7		0.0	36-48	7
8				8
9				9
20				20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB/TW-11

CLIENT: J.D. Carlisle Development
PROJECT: 149 Leroy St., NY, NY
A.C.T. PROJECT NO.: 1965-NYNY
DATE STARTED: 3/16/00
DATE COMPLETED: 3/16/00

DRILLING CO.: Powerprobe
DRILLER: Steven Walls
DRILLING METHOD: Direct Push
SAMPLING METHOD: Macrocore
HOLE DIAMETER: 2 inches

TD: 16 feet
SURFACE ELEV.:
GW DEPTH: 11.2 feet
LOGGED BY: Ed Hawes
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1–4	0-4' 24" RECOVERY Silty Sand with Stones, Debris, No Odor	0.0 0.0	0-12 12-24	1–4
5–8	4-8' 24" RECOVERY Medium Sand and Silt with Stone Fragments, No Odor	0.0 0.0	0-12 12-24	5–8
9–12	8-12' 36" RECOVERY Medium to Coarse Sand with Clay, Moist, No Odor	0.0 0.0 0.0	0-12 12-24 24-36	9–12
13–16	12-16' 48" RECOVERY Medium Sand with Stones, Saturated, No Odor	0.0 0.0 0.0 0.0	0-12 12-24 24-36 36-48	13–16
17–20				17–20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB-12

CLIENT: J.D. Carlisle Development
PROJECT: 149 Leroy St, NY, NY
A.C.T. PROJECT NO.: 1965-NYNY
DATE STARTED: 3/16/00
DATE COMPLETED: 3/16/00

DRILLING CO.: Powerprobe
DRILLER: Steven Walls
DRILLING METHOD: Direct Push
SAMPLING METHOD: Macrocore
HOLE DIAMETER: 2 inches

TD: 8 feet
SURFACE ELEV.:
GW DEPTH:
LOGGED BY: Ed Eaves
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
0-4'	24" RECOVERY Silty Sand with Asphalt and Stones	0.0 0.0	0-12 12-24	
4-8'	12" RECOVERY Silty Sand with Stones	0.0	0-12	

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB/TW-13

CLIENT: J.D. Carlisle Development
DRILLING CO.: Powerprobe
TD: 16 feet
PROJECT: 149 Leroy St., NY, NY
DRILLER: Steven Walls
SURFACE ELEV.:
A.C.T. PROJECT NO.: 1965-NYNY
DRILLING METHOD: Direct Push
GW DEPTH: 10.5 feet
DATE STARTED: 3/16/00
SAMPLING METHOD: Macrocore
LOGGED BY: Ed Hayes
DATE COMPLETED: 3/16/00
HOLE DIAMETER: 2 inches
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1	0-4' 36" RECOVERY Medium to Coarse Sand with Stones, No Odor	0.0 0.0 0.0	0-12 12-24 24-36	1
2				2
3				3
4				4
5	4-8' 48" RECOVERY Fine to Medium Sand with Stones, Moist, No Odor	0.0 0.0 0.0 0.0	0-12 12-24 24-36 36-48	5
6				6
7				7
8				8
9	8-12' 36" RECOVERY Fine to Medium Sand with Clay, Moist, No Odor	0.0 0.0 0.0	0-12 12-24 24-36	9
10				10
1				1
2				2
3	12-16' 36" RECOVERY Medium to Coarse Sand with Stones, Saturated, No Odor	0.0 0.0 0.0	0-12 12-24 24-36	3
4				4
5				5
6				6
7				7
8				8
9				9
20				20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB/TW-14

CLIENT: J.D. Carlisle Development
PROJECT: 149 Leroy St., NY, NY
A.C.T. PROJECT NO.: 1965-NYNY
DATE STARTED: 3/14/00
DATE COMPLETED: 3/14/00

DRILLING CO.: Powerprobe
DRILLER: Steven Walls
DRILLING METHOD: Direct Push
SAMPLING METHOD: Macrocore
HOLE DIAMETER: 2 inches

TD: 16 feet
SURFACE ELEV.:
GW DEPTH: 13.3 feet
LOGGED BY: Ed Hawes
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1	0-4' 24" RECOVERY	0.0	0-12	1
2	Black Silty Sand with Stones, No Odor	0.0	12-24	2
3				3
4				4
5	4-8' 48" RECOVERY	0.0	0-12	5
6	Silty Sand with Stones, No Odor	0.0	12-24	6
7		0.0	24-36	7
8		0.0	36-48	8
9	8-12' 36" RECOVERY	0.0	0-12	9
10	Medium Sand with Clay, Wet, No Odor	0.0	12-24	10
1		0.0	24-36	1
2				2
3	12-16' 48" RECOVERY			3
4	Medium to Coarse Sand with Pebbles, Saturated, No Odor	0.0	0-12	4
5		0.0	12-24	5
6		0.0	24-36	6
7		0.0	36-48	7
8				8
9				9
20				20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB/TW-15

CLIENT: J.D. Carlisle Development
PROJECT: 149 Leroy St. NY, NY
A.C.T. PROJECT NO.: 1965-NYNY
DATE STARTED: 3/14/00
DATE COMPLETED: 3/14/00

DRILLING CO.: Powerprobe
DRILLER: Steven Walls
DRILLING METHOD: Direct Push
SAMPLING METHOD: Macrocore
HOLE DIAMETER: 2 inches

TD: 16 feet
SURFACE ELEV.:
GW DEPTH: 13.2 feet
LOGGED BY: Ed Hewes
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1	0-4' 24" RECOVERY Fill: Brick Fragments, Cinders with Silty Clay, No Odor	0.0 0.0	0-12 12-24	1
2				2
3				3
4				4
5	4-8' 24" RECOVERY Fill: Brick, Ash, Clay Chunks, No Odor	0.0 0.0	0-12 12-24	5
6				6
7				7
8				8
9	8-12' 48" RECOVERY Silty Sand with Clay, Brick Fragments, No Odor	0.0 0.0 0.0 0.0	0-12 12-24 24-36 36-48	9
10				10
1				1
2				2
3	12-16' 24" RECOVERY Clay with Silty Sand, Stones, yellow debris, Saturated, No Odor	0.0 0.0	0-12 12-24	3
4				4
5				5
6				6
7				7
8				8
9				9
20				20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB-16

CLIENT: J.D. Carlisle Development
PROJECT: 149 Leroy St. NY, NY
A.C.T. PROJECT NO.: 1965-NYNY
DATE STARTED: 3/10/00
DATE COMPLETED: 3/10/00

DRILLING CO.: Powerprobe
DRILLER: Steven Walls
DRILLING METHOD: Direct Push
SAMPLING METHOD: Macrocore
HOLE DIAMETER: 2 inches

TD: 2 feet
SURFACE ELEV.:
GW DEPTH:
LOGGED BY: Ed Hayes
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1	0-4' REFUSAL			1
2				2
3				3
4				4
5				5
6				6
7				7
8				8
9				9
10				10
1				1
2				2
3				3
4				4
5				5
6				6
7				7
8				8
9				9
20				20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB-17

CLIENT: J.D. Carlisle Development
PROJECT: 149 Leroy St. NY, NY
A.C.T. PROJECT NO.: 1965-NYNY
DATE STARTED: 3/10/00
DATE COMPLETED: 3/10/00

DRILLING CO.: Powerprobe
DRILLER: Steven Walls
DRILLING METHOD: Direct Push
SAMPLING METHOD: Macrocore
HOLE DIAMETER: 2 inches

TD: 2 feet
SURFACE ELEV.:
GW DEPTH:
LOGGED BY: Ed Eaves
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1	0-4' REFUSAL			1
2				2
3				3
4				4
5				5
6				6
7				7
8				8
9				9
10				10
1				1
2				2
3				3
4				4
5				5
6				6
7				7
8				8
9				9
20				20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB/TW-18

CLIENT: J.D. Carlisle Development
PROJECT: 149 Leroy St, NY, NY
A.C.T. PROJECT NO.: 1965-NYNY
DATE STARTED: 3/23/00
DATE COMPLETED: 3/23/00

DRILLING CO.: Powerprobe
DRILLER: Steven Walls
DRILLING METHOD: Direct Push
SAMPLING METHOD: Macrocore
HOLE DIAMETER: 2 inches

TD: 16 feet
SURFACE ELEV.:
GW DEPTH: 9.1 feet
LOGGED BY: Ed Hayes
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1–4	0-4' 24" RECOVERY Fine Sand with Pebbles, No Odor	0.0 0.0	0-12 12-24	1–4
4–8	4-8' 36" RECOVERY Red Brick Fragments, Sand, No Odor	0.0 0.0 0.0	0-12 12-24 24-36	4–8
8–12	8-12' 36" RECOVERY Brown Medium to Coarse Sand, Saturated, No Odor	0.0 0.0 0.0	0-12 12-24 24-36	8–12
12–16	12-16' 48" RECOVERY Medium to Coarse Sand with Pebbles, Saturated, No Odor	0.0 0.0 0.0 0.0	0-12 12-24 24-36 36-48	12–16
16–20				16–20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB/TW-19

CLIENT: J.D. Carlisle Development
DRILLING CO.: Powerprobe
TD: 16 feet
PROJECT: 149 Leroy St., NY, NY
DRILLER: Steven Walls
SURFACE ELEV.:
A.C.T. PROJECT NO.: 1965-NYNY
DRILLING METHOD: Direct Push
GW DEPTH: 9.1 feet
DATE STARTED: 3/10/00
SAMPLING METHOD: Macrocore
LOGGED BY: Ed Hawes
DATE COMPLETED: 3/10/00
HOLE DIAMETER: 2 inches
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1	0-4' 48" RECOVERY Medium Sand with Stones, Gravel, No Odor	0.0 0.0 0.0 0.0	0-12 12-24 24-36 36-48	1 2 3 4
5	4-8' 24" RECOVERY Metallic Ash with Sand and Stones, No Odor	0.0 0.0	0-12 12-24	5 6 7 8
9	8-12' 36" RECOVERY Silty Sand with Stones, Clay, Moist, No Odor	0.0 0.0 0.0	0-12 12-24 24-36	9 10 1 2
3	12-16' 48" RECOVERY Clay, Fine to Coarse Sand, Saturated, No Odor	0.0 0.0 0.0 0.0	0-12 12-24 24-36 36-48	3 4 5 6
7				7 8 9 20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB/TW-20

CLIENT: J.D. Carlisle Development
PROJECT: 149 Leroy St, NY, NY
A.C.T. PROJECT NO.: 1965-NYNY
DATE STARTED: 3/10/00
DATE COMPLETED: 3/10/00

DRILLING CO.: Powerprobe
DRILLER: Steven Walls
DRILLING METHOD: Direct Push
SAMPLING METHOD: Macrocore
HOLE DIAMETER: 2 inches

TD: 16 feet
SURFACE ELEV.:
GW DEPTH: 11.3 feet
LOGGED BY: Ed Hayes
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1–4	0-4' 24" RECOVERY Silty Sand with Stones, Construction Debris, No Odor	0.0 0.0	0-12 12-24	1–4
5–8	4-8' 12" RECOVERY Silty Sand with Ash and Cinders, No Odor	0.0	0-12	5–8
9–12	8-12' 36" RECOVERY Fine to Medium Sand with Silt and Clay, No Odor	0.0 0.0 0.0	0-12 12-24 24-36	9–12
13–16	12-16' 48" RECOVERY Sandy clay, Medium to Coarse Sand, Saturated, No Odor	0.0 0.0 0.0 0.0	0-12 12-24 24-36 36-48	13–16
17–20				17–20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB-21, 21A

CLIENT: J.D. Carlisle Development
PROJECT: 149 Leroy St. NY, NY
A.C.T. PROJECT NO.: 1965-NYNY
DATE STARTED: 3/23/00
DATE COMPLETED: 3/23/00

DRILLING CO.: Powerprobe
DRILLER: Steven Walls
DRILLING METHOD: Direct Push
SAMPLING METHOD: Macrocore
HOLE DIAMETER: 2 inches

TD: 2 feet
SURFACE ELEV.:
GW DEPTH:
LOGGED BY: Ed Eaves
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1	0-4' REFUSAL			1
2				2
3				3
4				4
5				5
6				6
7				7
8				8
9				9
10				10
1				1
2				2
3				3
4				4
5				5
6				6
7				7
8				8
9				9
20				20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB/TW-22

CLIENT: J.D. Carlisle Development
PROJECT: 149 Leroy St. NY, NY
A.C.T. PROJECT NO.: 1965-NYNY
DATE STARTED: 3/23/00
DATE COMPLETED: 3/23/00

DRILLING CO.: Powerprobe
DRILLER: Steven Walls
DRILLING METHOD: Direct Push
SAMPLING METHOD: Macrocore
HOLE DIAMETER: 2 inches

TD: 16 feet
SURFACE ELEV.:
GW DEPTH: 9.3 feet
LOGGED BY: Ed Hayes
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1–4	0-4' NO RECOVERY			1–4
4–8	4-8' 48" RECOVERY Dark Brown Fine to Medium Sand, No Odor	0.0 0.0 0.0 0.0	0-12 12-24 24-36 36-48	4–8
8–12	8-12' 36" RECOVERY Fine to Medium Sand, Moist, No Odor	0.0 0.0 0.0	0-12 12-24 24-36	8–12
12–16	12-16' 48" RECOVERY Coarse Sand with Pebbles, Saturated. No Odor	0.0 0.0 0.0 0.0	0-12 12-24 24-36 36-48	12–16
16–20				16–20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB/TW-23

CLIENT: J.D. Carlisle Development
DRILLING CO.: Powerprobe
TD: 16 feet
PROJECT: 149 Leroy St, NY, NY
DRILLER: Steven Walls
SURFACE ELEV.:
A.C.T. PROJECT NO.: 1965-NYNY
DRILLING METHOD: Direct Push
GW DEPTH: 13.2 feet
DATE STARTED: 3/15/00
SAMPLING METHOD: Macrocore
LOGGED BY: Ed Hayes
DATE COMPLETED: 3/15/00
HOLE DIAMETER: 2 inches
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1–4	0-4' 36" RECOVERY Medium Sand with Silt, Pebbles, No Odor	0.0 0.0 0.0	0-12 12-24 24-36	1–4
5–8	4-8' 24" RECOVERY Silty Sand with Clay, Construction Debris, Moist, No Odor	0.0 0.0	0-12 12-24	5–8
9–12	8-12' 48" RECOVERY Fine to Medium Sand with Silt, Clay, Stones and Construction Debris. No Odor	0.0 0.0 0.0 0.0	0-12 12-24 24-36 36-48	9–12
13–16	12-16' 48" RECOVERY Medium to Coarse Sand, Saturated, No Odor	0.0 0.0 0.0 0.0	0-12 12-24 24-36 36-48	13–16
17–20				17–20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB/TW-24

CLIENT: J.D. Carlisle Development
PROJECT: 149 Leroy St. NY, NY
A.C.T. PROJECT NO.: 1965-NYNY
DATE STARTED: 3/15/00
DATE COMPLETED: 3/15/00

DRILLING CO.: Powerprobe
DRILLER: Steven Walls
DRILLING METHOD: Direct Push
SAMPLING METHOD: Macrocore
HOLE DIAMETER: 2 inches

TD: 16 feet
SURFACE ELEV.:
GW DEPTH: 13.0 feet
LOGGED BY: Ed Hayes
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1	0-4' 24" RECOVERY Medium Yellow Sand, No Odor	0.0 0.0	0-12 12-24	1
2				2
3				3
4				4
5	4-8' 24" RECOVERY Medium to Coarse Sand with Stones, Construction Debris, No Odor	0.0 0.0	0-12 12-24	5
6				6
7				7
8				8
9	8-12' 48" RECOVERY Organic silt, clay with Fine Sand and Stones, Moist, No Odor	0.0 0.0 0.0 0.0	0-12 12-24 24-36 36-48	9
10				10
1				1
2				2
3	12-16' 36" RECOVERY Coarse Sand with Gravel, Stones, Saturated, No Odor	0.0 0.0 0.0	0-12 12-24 24-36	3
4				4
5				5
6				6
7				7
8				8
9				9
20				20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB/TW-25

CLIENT: J.D. Carlisle Development
DRILLING CO.: Powerprobe
TD: 16 feet
PROJECT: 149 Leroy St. NY, NY
DRILLER: Steven Walls
SURFACE ELEV.:
A.C.T. PROJECT NO.: 1965-NYNY
DRILLING METHOD: Direct Push
GW DEPTH: 15.1 feet
DATE STARTED: 3/14/00
SAMPLING METHOD: Macrocore
LOGGED BY: Ed Hayes
DATE COMPLETED: 3/14/00
HOLE DIAMETER: 2 inches
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1	0-4' 36" RECOVERY Medium Sand with Stones, Brick Fragments, No Odor	0.0 0.0 0.0	0-12 12-24 24-36	1
2				2
3				3
4				4
5	4-8' 36" RECOVERY Medium Sand with Silt, Stones, No Odor	0.0 0.0 0.0	0-12 12-24 24-36	5
6				6
7				7
8				8
9	8-12' 36" RECOVERY Medium Sand with Clay, Stones, Moist, No Odor	0.0 0.0 0.0	0-12 12-24 24-36	9
10				10
1				1
2				2
3	12-16' 48" RECOVERY Medium Sand with Stones, Saturated, Strong Odor	0.7 3.1 113 78.6	0-12 12-24 24-36 36-48	3
4				4
5				5
6				6
7				7
8				8
9				9
20				20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB/TW-26

CLIENT: J.D. Carlisle Development
PROJECT: 149 Leroy St. NY, NY
A.C.T. PROJECT NO.: 1965-NYNY
DATE STARTED: 3/14/00
DATE COMPLETED: 3/14/00

DRILLING CO.: Powerprobe
DRILLER: Steven Walls
DRILLING METHOD: Direct Push
SAMPLING METHOD: Macrocore
HOLE DIAMETER: 2 inches

TD: 16 feet
SURFACE ELEV.:
GW DEPTH: 15.2 feet
LOGGED BY: Ed Hayes
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1	0-4' 36" RECOVERY Fine to Medium Sand with Silt, No Odor	0.0 0.0 0.0	0-12 12-24 24-36	1 2 3
4	4-8' 36" RECOVERY Silty Sand with Stones, No Odor	0.0 0.0 0.0	0-12 12-24 24-36	4 5 6 7
8	8-12' 48" RECOVERY Fine to Medium Sand with Stones, No Odor	0.0 0.0 0.0 0.0	0-12 12-24 24-36 36-48	8 9 10 1 2
12	12-16' 48" RECOVERY Clayey Sand with Stones, Moderate Odor, Saturated	0.0 1.9 35.5 4.0	0-12 12-24 24-36 36-48	3 4 5 6
16				7 8 9 20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB/TW-27

CLIENT: J.D. Carlisle Development
PROJECT: 149 Leroy St, NY, NY
A.C.T. PROJECT NO.: 1965-NYNY
DATE STARTED: 3/15/00
DATE COMPLETED: 3/15/00

DRILLING CO.: Powerprobe
DRILLER: Steven Walls
DRILLING METHOD: Direct Push
SAMPLING METHOD: Macrocore
HOLE DIAMETER: 2 inches

TD: 16 feet
SURFACE ELEV.:
GW DEPTH: 13.1 feet
LOGGED BY: Ed Eaves
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1	0-4' 36" RECOVERY	0.0	0-12	1
2	Fine to Medium Sand with Stones, No Odor	0.0	12-24	2
3		0.0	24-36	3
4				4
5	4-8' 24" RECOVERY	0.0	0-12	5
6	Fine to Medium Sand with Stones, Debris, Moist, No Odor	0.0	12-24	6
7				7
8				8
9	8-12' 48" RECOVERY	0.0	0-12	9
10	Silty Sand with Clay, Stones, Moderate Odor	0.0	12-24	10
1		42.2	24-36	1
2		22.9	36-48	2
3	12-16' 36" RECOVERY			3
4	Silty to Coarse Grey Sand, Strong Odor, Saturated	13.7	0-12	4
5		27.7	12-24	5
6		51.6	24-36	6
7				7
8				8
9				9
20				20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB/TW-28

CLIENT: J.D. Carlisle Development
DRILLING CO.: Powerprobe
TD: 16 feet
PROJECT: 149 Leroy St., NY, NY
DRILLER: Steven Walls
SURFACE ELEV.:
A.C.T. PROJECT NO.: 1965-NYNY
DRILLING METHOD: Direct Push
GW DEPTH: 12.8 feet
DATE STARTED: 3/16/00
SAMPLING METHOD: Macrocore
LOGGED BY: Ed Hayes
DATE COMPLETED: 3/16/00
HOLE DIAMETER: 2 inches
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1	0-4' 36" RECOVERY	0.0	0-12	1
2	Brown Fine to Medium Sand with Red Brick Fragments, No Odor	0.0	12-24	2
3		0.0	24-36	3
4				4
5	4-8' 48" RECOVERY			5
6	Construction Debris, Brown Fine Sand, No Odor	0.0	0-12	6
7		0.0	12-24	7
8		0.0	24-36	8
9		0.0	36-48	9
10	8-12' 36" RECOVERY			10
1	Light Brown Sand, Rock Fragments, No Odor, Moist	0.0	0-12	1
2		0.0	12-24	2
3		0.0	24-36	3
4	12-16' 36" RECOVERY			4
5	Brown Fine Sand, Some Clay, Rock Fragments, No Odor	0.0	0-12	5
6		0.0	12-24	6
7		0.0	24-36	7
8				8
9				9
20				20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB/TW-29

CLIENT: J.D. Carlisle Development
DRILLING CO.: Powerprobe
TD: 16 feet
PROJECT: 149 Leroy St., NY, NY
DRILLER: Steven Walls
SURFACE ELEV.:
A.C.T. PROJECT NO.: 1965-NYNY
DRILLING METHOD: Direct Push
GW DEPTH: 8.8 feet
DATE STARTED: 3/23/00
SAMPLING METHOD: Macrocore
LOGGED BY: Ed Reyes
DATE COMPLETED: 3/23/00
HOLE DIAMETER: 2 inches
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1–4	0-4' 24" RECOVERY Fill: Red Brick Fragments, Construction Debris, No Odor	0.0 0.0	0-12 12-24	1–4
5–8	4-8' 36" RECOVERY Fill: Construction Debris, Grey Medium Sand with Clay, Brick Fragments, No Odor	0.0 0.0 0.0 0.0	0-12 12-24 24-36 36-48	5–8
9–12	8-12' 24" RECOVERY Coarse Sand with Pebbles, Saturated, Strong Odor	0.0 53.0 62.0 29.2	0-12 12-24 24-36 36-48	9–12
1–6	12-16' 48" RECOVERY Coarse Silty Sand with Large Pebbles, Saturated, Moderate Odor	21.7 17.9 2.6 0.3	0-12 12-24 24-36 36-48	1–6
7–20				7–20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: SB/TW-30

CLIENT: J.D. Carlisle Development
PROJECT: 149 Leroy St., NY, NY
A.C.T. PROJECT NO.: 1965-NYNY
DATE STARTED: 3/23/00
DATE COMPLETED: 3/23/00

DRILLING CO.: Powerprobe
DRILLER: Steven Walls
DRILLING METHOD: Direct Push
SAMPLING METHOD: Macrocore
HOLE DIAMETER: 2 inches

TD: 16 feet
SURFACE ELEV.:
GW DEPTH: 8.6 feet
LOGGED BY: Ed Hayes
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1-4	0-4' 24" RECOVERY Fill: Rock and Brick Fragments, Construction Debris with Fine Sand, No Odor	0.0 0.0	0-12 12-24	1-4
5-8	4-8' 24" RECOVERY Medium Sand with Grey Rock Fragments, No Odor	0.0 0.0	0-12 12-24	5-8
9-12	8-12' 36" RECOVERY Medium sand with Rock Fragments, Moist, Moderate Odor	0.3 2.9 45.0	0-12 12-24 24-36	9-12
13-16	12-16' 48" RECOVERY Coarse Sand with Medium to Large Pebbles, Saturated, Slight Odor	13.8 1.5 0.3 0.6	0-12 12-24 24-36 36-48	13-16
17-20				17-20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: DW-01

CLIENT: J.D. Carlisle Development
PROJECT: 149 Leroy St, NY, NY
A.C.T. PROJECT NO.: 1965-NYNY
DATE STARTED: 3/8/00
DATE COMPLETED: 3/8/00

DRILLING CO.: Powerprobe
DRILLER: Steven Walls
DRILLING METHOD: Direct Push
SAMPLING METHOD: Macrocore
HOLE DIAMETER: 2 inches

TD: 4 feet
SURFACE ELEV.:
GW DEPTH:
LOGGED BY: Ed Eaves
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1	0-4' 48" RECOVERY	9.5	0-12	1
2	Black Organic Silty to Medium Sand, No Odor	0.8	12-24	2
3		0.0	24-36	3
4		0.0	36-48	4
5				5
6				6
7				7
8				8
9				9
10				10
1				1
2				2
3				3
4				4
5				5
6				6
7				7
8				8
9				9
20				20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: DW-02

CLIENT: J.D. Carlisle Development
PROJECT: 149 Leroy St. NY, NY
A.C.T. PROJECT NO.: 1965-NYNY
DATE STARTED: 3/10/00
DATE COMPLETED: 3/10/00

DRILLING CO.: Powerprobe
DRILLER: Steven Walls
DRILLING METHOD: Direct Push
SAMPLING METHOD: Macrocore
HOLE DIAMETER: 2 inches

TD: 4 feet
SURFACE ELEV.:
GW DEPTH:
LOGGED BY: Ed Eaves
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1	0-4' 48" RECOVERY	54.0	0-12	1
2	Black Organic Sediment to Grey Sandy Clay, Moderate	23.1	12-24	2
3	Petroleum Odor	0.0	24-36	3
4		0.0	36-48	4
5				5
6				6
7				7
8				8
9				9
10				10
1				1
2				2
3				3
4				4
5				5
6				6
7				7
8				8
9				9
20				20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: DW-03

CLIENT: J.D. Carlisle Development
PROJECT: 149 Leroy St. NY, NY
A.C.T. PROJECT NO.: 1965-NYNY
DATE STARTED: 3/10/00
DATE COMPLETED: 3/10/00

DRILLING CO.: Powerprobe
DRILLER: Steven Walls
DRILLING METHOD: Direct Push
SAMPLING METHOD: Macrocore
HOLE DIAMETER: 2 inches

TD: 4 feet
SURFACE ELEV.:
GW DEPTH:
LOGGED BY: Ed Eaves
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1	0-4' 48" RECOVERY	0.0	0-12	1
2	Black Organic Sediment with Silty Sand, Clay, No Odor	0.0	12-24	2
3		0.0	24-36	3
4		0.0	36-48	4
5				5
6				6
7				7
8				8
9				9
10				10
1				1
2				2
3				3
4				4
5				5
6				6
7				7
8				8
9				9
20				20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: DW-04

CLIENT: J.D. Carlisle Development
PROJECT: 149 Leroy St. NY, NY
A.C.T. PROJECT NO.: 1965-NYNY
DATE STARTED: 3/10/00
DATE COMPLETED: 3/10/00

DRILLING CO.: Powerprobe
DRILLER: Steven Walls
DRILLING METHOD: Direct Push
SAMPLING METHOD: Macrocore
HOLE DIAMETER: 2 inches

TD: 4 feet
SURFACE ELEV.:
GW DEPTH:
LOGGED BY: Ed Eaves
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1	0-4' 24" RECOVERY	0.0	0-12	1
2	Black Organic Sediment with Silty Sand, Clay, No Odor	0.0	12-24	2
3				3
4				4
5				5
6				6
7				7
8				8
9				9
10				10
1				1
2				2
3				3
4				4
5				5
6				6
7				7
8				8
9				9
20				20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

BOREHOLE/WELL No.: DW-05

CLIENT: J.D. Carlisle Development
PROJECT: 149 Leroy St. NY, NY
A.C.T. PROJECT NO.: 1965-NYNY
DATE STARTED: 3/10/00
DATE COMPLETED: 3/10/00

DRILLING CO.: Powerprobe
DRILLER: Steven Walls
DRILLING METHOD: Direct Push
SAMPLING METHOD: Macrocore
HOLE DIAMETER: 2 inches

TD: 4 feet
SURFACE ELEV.:
GW DEPTH:
LOGGED BY: Ed Eaves
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1	0-4' 48" RECOVERY	0.8	0-12	1
2	Black Organic Sediment with Grey Clay, No Odor	0.0	12-24	2
3		0.0	24-36	3
4		0.0	36-48	4
5				5
6				6
7				7
8				8
9				9
10				10
1				1
2				2
3				3
4				4
5				5
6				6
7				7
8				8
9				9
20				20

BOREHOLE/MONITOR WELL LOG

ADVANCED CLEANUP TECHNOLOGIES, INC.

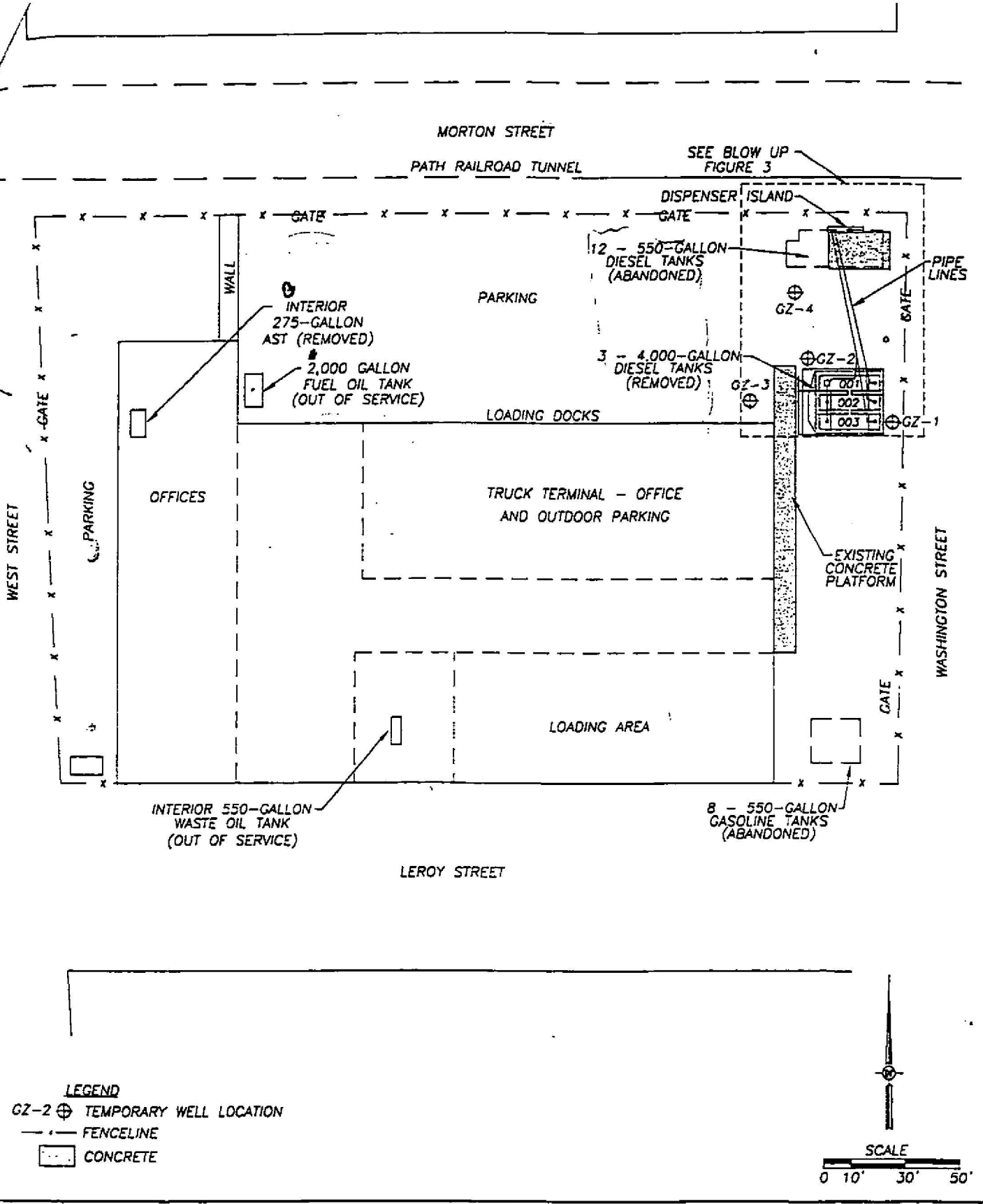
BOREHOLE/WELL No.: DW-06

CLIENT: J.D. Carlisle Development
PROJECT: 149 Leroy St. NY, NY
A.C.T. PROJECT NO.: 1965-NYNY
DATE STARTED: 3/10/00
DATE COMPLETED: 3/10/00

DRILLING CO.: Powerprobe
DRILLER: Steven Walls
DRILLING METHOD: Direct Push
SAMPLING METHOD: Macrocore
HOLE DIAMETER: 2 inches

TD: 4 feet
SURFACE ELEV.:
GW DEPTH:
LOGGED BY: Ed Eaves
SHEET 1 OF 1

DEPTH	DESCRIPTION	PID READING (PPM)	SCREEN (INCHES)	DEPTH
1	0-4' 48" RECOVERY	0.0	0-12	1
2	Black Organic Sediment with Silty Sand, Clay, No Odor	0.0	12-24	2
3		0.0	24-36	3
4		0.0	36-48	4
5				5
6				6
7				7
8				8
9				9
10				10
1				1
2				2
3				3
4				4
5				5
6				6
7				7
8				8
9				9
20				20



Yellow Freight System

149 Leroy Street
New York, NY

Exploration Location Plan

PROJECT NO. 75250.02

FIGURE NO. Figure 2

REV. NO.	DESCRIPTION	BY	DATE

ACKNOWLEDGEMENT:
Based on Ribelle Perotto Engineers Plot Plan Dated 9/1960 Original Scale 1"=50'

PROJECT MGR: F.S.
DESIGNED BY: S.K.
REVIEWED BY: S.K.
DRAWN BY: B.F.
DATE: 3/9//00

GZA GeoEnvironmental, Inc.

WILLOWBROOK BLVD., WAYNE, NEW JERSEY 07470
GEOTECH/GEOHYDROLOGICAL CONSULTANTS

Yellow Freight System-NYR
149 Leroy Street
New York, New York

SHEET 1 OF 1
FILE NO. 75258.02
CHKD BY: FS

BORING CO. Salomone Brothers, Inc.
FOREMAN William Ellefsen
GZA ENGINEER Stephen Kline

BORING LOCATION See exploration location plan
GROUND SURFACE ELEV. 99.7'
DATUM Assumed
DATE START 3/7/00
DATE END 3/7/00

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 IN

CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING A 300 LB HAMMER FALLING 24 IN.

CASING SIZE: None OTHER: 3 1/4" ID HSA (6 3/4" OD)

GROUNDWATER READINGS

DATE	TIME	WATER	CASING	STABILIZATION TIME
3/7/00	09:30	13.2'		None
	10:30	13.1'		1 hour

DEPTH (FT)	TIME	SAMPLE NO	SAMPLE PEN/REC	SAMPLE DEPTH (FT)	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION BURMISTER CLASSIFICATION	STRATUM DESCRIPTION	EQUIPMENT INSTALLED	FIELD TESTING OVM
						Split spoon samples not taken. Stratum descriptions	3" Asphalt		
						are based on auger cuttings and drill rig response.	SANDY FILL	FILL 4'	
		G-1	Grab	2-3		Red-brown silty sand, some debris (brick chips,			ND
						concrete, glass).			
5							Concrete Footing	4.7'	
							SANDY FILL	FILTER SAND	
		G-2	Grab	7-8		Brown/gray fine to medium SAND, little			1
						silt, little debris.	9'		
10							SAND		
						Lost cuttings below 10'			
15		G-3	Grab	15	Off the auger	Saturated, brown medium to coarse SAND, trace fine Sand		14.7'	75
						END OF EXPLORATION 15'			
20									
25									
30									

REMARKS:

1 : Grab sample field screening was performed with a photoionization detector (PID) equipped with a 10.6 eV lamp calibrated to 250 parts per million (ppm) isobutylene. ND = indicates "Not Detected" above 0.1 ppm headspace.

2 : Encountered concrete at 3' bgs. Switched to a 5 7/8" air hammer button bit. Still in footing at 5'. Backfilled boring and relocated 6 feet north. Augered to depth.

3 : Definite petroleum-like odor associated with auger spoils from 12' to 15.'

4 : A temporary groundwater monitoring well constructed of 2" ID Sch. 40 PVC was installed with 10' of 20-slot well screen to a depth of 14.7' and topped with 4.7' of solid PVC riser pipe on 3/7/00. The borehole annulus was backfilled with 11 feet of filter sand around the screen section and allowed to cave-in around the riser once the augers were removed.

5 : Water level meter probe was coated with a petroleum sheen. After one hour of stabilization, PID=70.5 ppm in the riser after well cap removed.

6 : Bailed 1.5 gallons from well and allowed to stabilize prior to sampling for VOCs and SVOCs. Water is very silty and contains evidence of petroleum product.

7 : Temporary well removed and the boring backfilled with the auger cuttings after sampling.

NOTES:

1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES; TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED; FLUCTUATIONS OF GROUNDWATER TABLE MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

GZA

BORING NO. GZ-1

GEOTECH/GEOHYDROLOGICAL CONSULTANTS

149 Leroy Street
New York, New York

FILE NO. 75258.02
CHKD BY FS

BORING CO. Salamone Bros.
FOREMAN William Ellefsen
GZA ENGINEER Stephen Kline

BORING LOCATION See exploration location plan
GROUND SURFACE ELEV. 98.90'
DATE START 7/26/99
DATUM Assumed
DATE END 7/26/99

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 IN

CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING A 300 LB HAMMER FALLING 24 IN.

CASING SIZE: None OTHER: 3 1/4" ID HSA (6 3/4" OD)

GROUNDWATER READINGS

DATE	TIME	WATER	CASING	STABILIZATION TIME
3/7/00	12:55	12.90		None
	13:30	12.90		30 minutes

DPTH (FT)	TIME	SAMPLE NO	SAMPLE PEN/REC	SAMPLE DEPTH (FT)	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION BURMISTER CLASSIFICATION	STRATUM DESCRIPTION	EQUIPMENT INSTALLED	FIELD TESTING OVM	R K
						Split spoon samples not taken. Stratum descriptions	3" Asphalt	FILL		1
						are based on auger cuttings and drill rig response.			<1	
5		G-1	Grab	4-5		Brown/gray f-m SAND, little debris (Bricks & Glass) little Silt	SANDY FILL Cobbles Debris 4'	FILTER SAND 5.0'		
10		G-2	Grab	9-10		Moist, red-brown medium to coarse SAND, trace Silt (petroleum-like odor)	9' SAND		78	2
15		G-3	Grab	15	Off the augers	Saturated, brown medium to coarse SAND, trace fine Sand		15.0'	118	
						END OF EXPLORATION 15'				4
20										
25										
30										

REMARKS:

1 : Grab sample field screening was performed with a photoionization detector (PID) equipped with a 10.6 eV lamp calibrated to 250 parts per million (ppm) isobutylene. ND = indicates "Not Detected" above 0.1 ppm headspace.

2 : Strong petroleum-like odor associated with auger spoils from 9'. No sheen in jar test on G-2. Slight sheen on G-3.'

3 : Well pulled up approx. 1.5' while removing augers. Able to reset well back on the bottom.

4 : A temporary groundwater monitoring well constructed of 2" ID Sch. 40 PVC was installed with 10' of 20-slot well screen to a depth of 15.0' and topped with 5.0' of solid PVC riser pipe on 3/7/00. The borehole annulus was backfilled with 11 feet of filter sand around the screen section andallowed to cave-in around the riser once the augers were removed.

5 : Water level meter probe was coated with a petroleum sheen. After 30 minutes of stabilization, PID=90 ppm in the riser after well cap removed.

6 : Bailed 2.0 gallons from well and allowed to stabilize prior to sampling for VOCs and SVOCs. Water is very silty and a very slight petroleum sheen.

7 : Temporary well removed and the boring backfilled with the auger cuttings after sampling.

NOTES:

1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES; TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED; FLUCTUATIONS OF GROUNDWATER TABLE MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

GZA

BORING NO GZ-2

...WILLOW BROOK BLVD., WAYNE, NEW JERSEY 07470

...OTECH/GEOHYDROLOGICAL CONSULTANTS

Yellow Freight System-NYR
149 Leroy Street
New York, New York

SHEET 1 OF 1
FILE NO. 75258.02
CHKD BY FS

...ORING CO. Salomone Brothers, Inc.
...OREMAN William Ellefsen
... ENGINEER Stephen Kline

BORING LOCATION See exploration location plan
GROUND SURFACE ELEV. 96.60' DATUM Assumed
DATE START 3/7/00 DATE END 3/7/00

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 IN

...NG: UNLESS OTHERWISE NOTED, CASING DRIVEN USING A 300 LB HAMMER ...ING 24 IN.

CASING SIZE: None OTHER: 3 1/4" ID HSA (6 3/4" OD)

GROUNDWATER READINGS

DATE	TIME	WATER	CASING	STABILIZATION TIME
3/7/00	11:55	10.95		None
	12:45	10.95		50 minutes

...TH (...)	TIME	SAMPLE NO	SAMPLE PEN/REC	SAMPLE DEPTH (FT)	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION BURMISTER CLASSIFICATION	STRATUM DESCRIPTION	EQUIPMENT INSTALLED	FIELD TESTING OVM
						Split spoon samples not taken. Stratum descriptions are based on auger cuttings and drill rig response.	4" Concrete	FILL	
		G-1	Grab	4-5		Red Brown f-m SAND, little debris (Bricks & Glass) little Silt.	SANDY FILL 4'		<1
							8.5'	FILTER SAND 4.5'	
		G-2	Grab	9-10		Moist, red-brown medium to coarse SAND, trace Silt	SAND		4.5
15		G-3	Grab	14.0		Saturated, brown, medium to coarse SAND		14.5'	9.0
						END OF EXPLORATION 14.5'			
20									
25									
30									

...MARKS:

1 : Grab sample field screening was performed with a photoionization detector (PID) equipped with a 10.6 eV lamp calibrated to 250 parts per million (ppm) Isobutylene. ND = indicates "Not Detected" above 0.1 ppm headspace.

2 : Used a 5 7/8" air hammer button bit to get through surface concrete pad. Advanced to 5' bgs and augered to depth.

3 : Slight petroleum-like odor. No sheen in jar test.

4 : A temporary groundwater monitoring well constructed of 2" ID Sch. 40 PVC was installed with 10' of 20-slot well screen to a depth of 14.5' and topped with 4.5' of solid PVC riser pipe on 3/7/00. The borehole annulus was backfilled with 11 feet of filter sand around the screen section and allowed to cave-in around the riser once the augers were removed.

5 : After 50 minutes of stabilization, PID=3 ppm in the riser after well cap removed.

6 : Bailed 2.5 gallons from well and allowed to stabilize prior to sampling for VOCs and SVOCs. Water is very silty and exhibits a very slight sheen.

7 : Temporary well removed and the boring backfilled with the auger cuttings after sampling.

...TE

1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES; TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED; FLUCTUATIONS OF GROUNDWATER TABLE MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

...ZA

BORING NO. GZ-3

WILLOWBROOK BLVD., WAYNE, NEW JERSEY 07470

GEOTECH/GEOHYDROLOGICAL CONSULTANTS

PROJECT: Yellow Freight System-NYR; 149 Leroy Street; New York, New York

REPORT OF BORING NO. GZ-4; SHEET 1 OF 1; FILE NO. 75258.02; CHKD BY FS

BORING CO. Salomone Brothers, Inc.

FOREMAN William Ellefsen

GZA ENGINEER Stephen Kline

BORING LOCATION See exploration location plan

GROUND SURFACE ELEV. 98.85'

DATUM Assumed

DATE START 3/7/00

DATE END 3/7/00

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 IN

CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING A 300 LB HAMMER FALLING 24 IN.

CASING SIZE: None

OTHER: 3 1/4" ID HSA (6 3/4" OD)

GROUNDWATER READINGS

DATE	TIME	WATER	CASING	STABILIZATION TIME
3/7/00	1100	12.6		None
	1200	12.5		1 hour

DPTH (FT)	TIME	SAMPLE NO	SAMPLE PEN/REC	SAMPLE DEPTH (FT)	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION BURMISTER CLASSIFICATION	STRATUM DESCRIPTION	EQUIPMENT INSTALLED	FIELD TESTING OVM
						Split spoon samples not taken. Stratum descriptions are based on auger cuttings and drill rig response.	3" Asphalt 6" Concrete Slab	FILL	
		G-1	Grab	3-4		Grey brown Silty Fill, little Gravel, little Silt	SANDY FILL (Debris)	4'	1
5							Cobbles & Bricks	FILTER SAND 5.0'	
10							9'		
		G-2	Grab	10-11		Moist, red-brown m. -f. SAND, little Gravel, trace Silt (oily feel - sheen in jar test).	SAND		65
15		G-3	Grab	15		Saturated, brown m. -c. SAND, little Gravel, trace Silt		15.0'	31
						END OF EXPLORATION 15'			
20									
25									
30									

REMARKS:

1 : Grab sample field screening was performed with a photoionization detector (PID) equipped with a 10.6 eV lamp calibrated to 250 parts per million (ppm) isobutylene. ND = indicates "Not Detected" above 0.1 ppm headspace.

2 : Slight petroleum-like odor in the work zone.

3 : Definite petroleum-like odor associated with auger spoils from 10' to 15.'

4 : A temporary groundwater monitoring well constructed of 2" ID Sch. 40 PVC was installed with 10' of 20-slot well screen to a depth of 15.0' and topped with 5.0' of solid PVC riser pipe on 3/7/00. The borehole annulus was backfilled with 11 feet of filter sand around the screen section and allowed to cave-in around the riser once the augers were removed.

5 : Water level meter probe was coated with a petroleum sheen. After one hour of stabilization, PID=108 ppm in the riser after well cap removed.

6 : Bailed 2.0 gallons from well and allowed to stabilize prior to sampling for VOCs and SVOCs. Water is very silty and contains evidence of petroleum product.

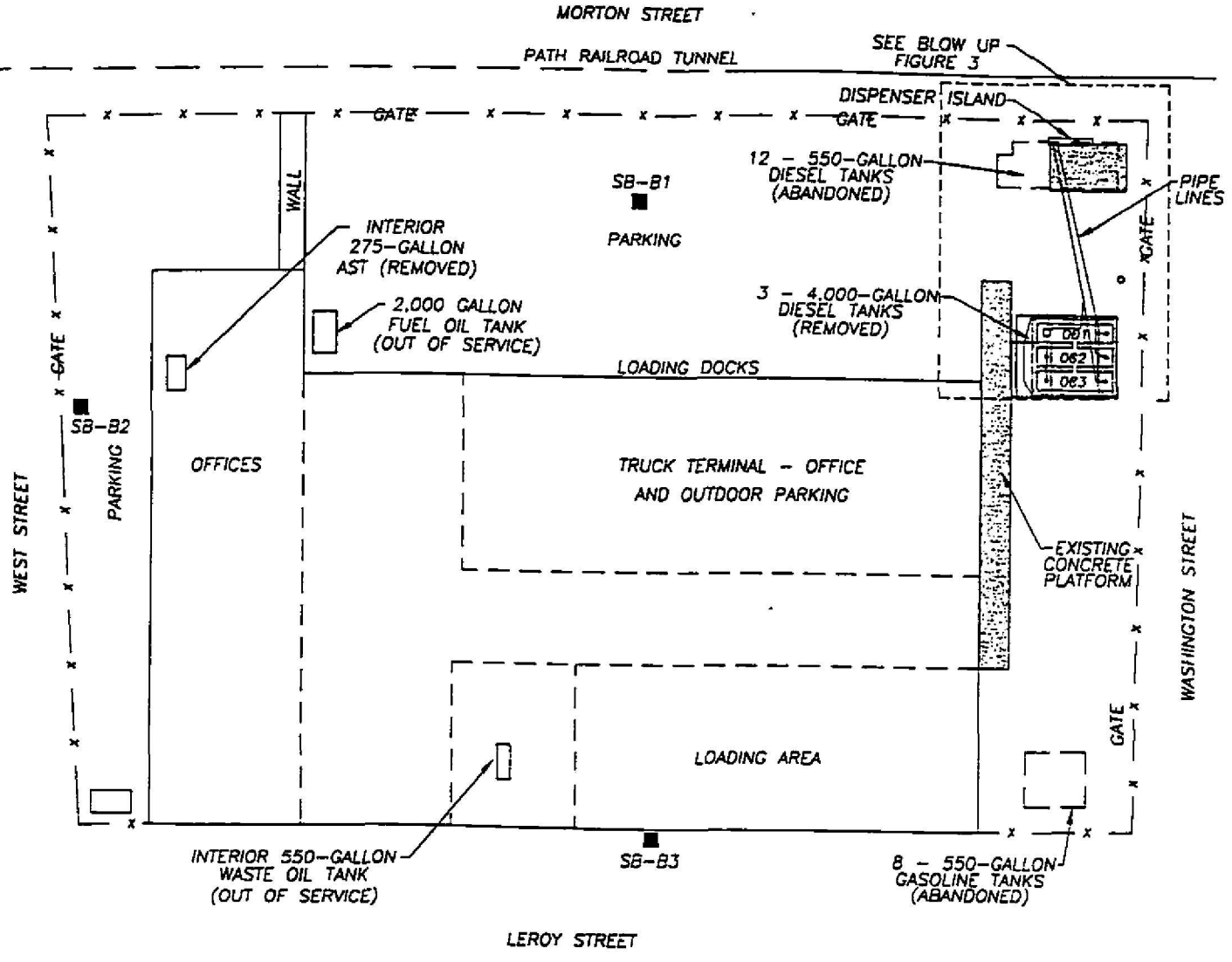
7 : Temporary well removed and the boring backfilled with the auger cuttings after sampling.

NOTES:

1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES; TRANSITIONS MAY BE GRADUAL.

2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED; FLUCTUATIONS OF GROUNDWATER TABLE MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

GZA



REV. NO.	DESCRIPTION	BY	DATE

Yellow Freight System
149 Leroy Street
New York, NY

Exploration Location Plan

FIGURE NO. Figure 1

PROJECT NO. 75258.02

ACKNOWLEDGEMENT:
Based on Ribelle Perotto Engineers Plot Plan Dated 9/1960 Original Scale 1"=50'

PROJECT MGR: F.S. DRAWN BY: E.M.
DESIGNED BY: B.D.
REVIEWED BY: B.D. DATE: 5/16/200

GZA GeoEnvironmental, Inc.

GZA GEOENVIRONMENTAL INC.
65 WILLOWBROOK BLVD., WAYNE, NEW JERSEY
GEOTECH/GEOHYDROLOGICAL CONSULTANTS

PROJECT
YELLOW FREIGHT SYSTEMS
149 Leroy Street
New York, New York

REPORT OF BORING NO. SB-B1
SHEET 1 of 1
FILE NO.
CHKD BY

BORING CO. Salomone Brothers, Inc.
FOREMAN Eric Ellefsen
GZA ENG. Brian D'Agostino

BORING LOCATION Morton Street Side
GROUND SURFACE ELEV. -
DATUM -
DATE START 5/8/00
DATE END 5/8/00

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 IN
CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING A 300 lb HAMMER FALLING 24 IN.
CASING SIZE: -

GROUNDWATER READINGS

DATE	TIME	WATER	CASING	STABILIZATION TIME

DEPTH	CASING BLOWS	SAMPLE PID	SAMPLE PEN./REC	SAMPLE DEPTH (FT)	SAMPLE BLOWS/2"	SAMPLE DESCRIPTION BURMISTER CLASSIFICATION	R K	COMMENTS
	-	0.0	24"	0.0-2.0	CORED			Asphalt, red brick, cobbles
	-							
	-	0.0	24"/24"	2.0-4.0	46	Coarse gray GRAVEL with gray ash, red brick, cobbles		
	-							
5	-	0.0	24"/12"	4.0-6.0	15	Coarse to fine gray GRAVEL with gray ash		
	-							
	-	0.0	24"/0"	6.0-8.0	23	No Recovery		Composite sample taken 0.0-8.0 feet bgs
	-							
	-	0.0	24"/24"	8.0-10.0	40	Coarse GRAVEL with some red brick, cobbles		
10	-					some concrete, trace ash		
	-	0.0	24"/24"	10.0-12.0	42	Gray fine GRAVEL with some sand, trace red brick		
	-					Reddish GRAVEL with red brick		
	-	0.0	24"/24"	12.0-14.0	44	Wet, red fine GRAVEL and sand, trace cobbles		
	-							
15	-	0.0	24"/24"	14.0-16.0	27	Wet, gray SAND with gravel, trace cobbles		Composite sample taken 8.0-16.0 feet bgs; End of Boring at 16 fgs
16	-							
20								
25								
30								

GRANULAR SOILS BLOWS/FT	DENSITY	COHESIVE SOILS BLOWS/FT	DENSITY
0-4	VERY LOOSE	<2	VERY SOFT
4-10	LOOSE	2-4	SOFT
10-30	MEDIUM DENSE	4-8	M. STIFF
30-50	DENSE	8-15	STIFF
>50	VERY DENSE	15-30	V. STIFF
		>30	HARD

REMARKS:

NOTES:
1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED, FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE

GZA

BORING NO. SB-B1

GEOTECH/GEOHYDROLOGICAL CONSULTANTS

149 Leroy Street
New York, New York

SHEET 1 of 1
FILE NO.
CHKD BY

BORING CO. Salomone Brothers, Inc.
FOREMAN Eric Ellefsen
GZA ENG. Brian D'Agostino

BORING LOCATION West Street Side
GROUND SURFACE ELEV. –
DATUM –
DATE START 5/8/00
DATE END 5/8/00

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 IN

CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING A 300 lb HAMMER FALLING 24 IN.

CASING SIZE: –

GROUNDWATER READINGS

DATE	TIME	WATER	CASING	STABILIZATION TIME

DEPTH	CASING BLOWS	SAMPLE PID	SAMPLE PEN./REC	SAMPLE DEPTH (FT)	SAMPLE BLOWS/2	SAMPLE DESCRIPTION BURMISTER CLASSIFICATION	R K	COMMENTS
	–	0.0	24"	0.0-2.0	CORED			
	–							Asphalt, red brick, cobbles
	–	0.0	24"/24"	2.0-4.0	47	Coarse reddish GRAVEL with red brick, some cobbles		
	–					trace gray ash		
	–	0.0	24"/24"	4.0-6.0	35	Coarse grayish GRAVEL with red brick, trace black debris		
	–					little moisture		
	–	0.0	24"/12"	6.0-8.0	44	Coarse reddish-brown GRAVEL with red brick, some cobbles		
	–					little concrete, trace gray ash		Composite sample taken
	–	0.0	24"/24"	8.0-10.0	15	Wet, red-brown SILT, some red brick, gravel		0.0-8.0 feet bgs
10	–					little concrete		
	–	0.0	24"/0"	10.0-12.0	15	No Recovery		
	–							
	–	0.0	24"/24"	12.0-14.0	23	Saturated, grayish brown SILT with some gravel, red brick		
15	–	0.0	24"/24"	14.0-16.0	38	Saturated gray SILT (14.0-15.0)		
16	–					Saturated gray SILT with gravel (15.0-16.0)		Composite sample taken 8.0-16.0 feet bgs: End of Boring at 16 fgs
20								
25								
30								

GRANULAR SOILS BLOWS/FT	DENSITY	COHESIVE SOILS BLOWS/FT	DENSITY
0-4	VERY LOOSE	<2	VERY SOFT
4-10	LOOSE	2-4	SOFT
10-30	MEDIUM DENSE	4-8	M. STIFF
30-50	DENSE	8-15	STIFF
>50	VERY DENSE	15-30	V. STIFF
		>30	HARD

REMARKS:

NOTES:
1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED. FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE

GZA

BORING NO. SB-B2

GEOTECH/GEOHYDROLOGICAL CONSULTANTS

149 Leroy Street
New York, New York

SHEET 1 of 1
FILE NO.
CHKD BY

BORING CO. Salomone Brothers, Inc.
FOREMAN Eric Elefsen
GZA ENG. Brian D'Agostino

BORING LOCATION Leroy Street Side
GROUND SURFACE ELEV. –
DATUM –
DATE START 5/8/00
DATE END 5/8/00

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 IN

CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING A 300 lb HAMMER FALLING 24 IN.

CASING SIZE: –

GROUNDWATER READINGS

DATE	TIME	WATER	CASING	STABILIZATION TIME

DEPTH	CASING BLOWS	SAMPLE PID	SAMPLE PEN./REC	SAMPLE DEPTH (FT)	SAMPLE BLOWS/2"	SAMPLE DESCRIPTION BURMISTER CLASSIFICATION	R K	COMMENTS
	–	0.0	24"	0.0-2.0	CORED			
	–							Asphalt, red brick, cobbles
	–	0.0	24"/12"	2.0-4.0	25	Coarse reddish GRAVEL with red brick, some brown sand trace black ash		
5	–	0.0	24"/24"	4.0-6.0	25	Coarse reddish-gray GRAVEL and sand, trace red brick		
	–	0.0	24"/12"	6.0-8.0	15	Reddish GRAVEL and sand, trace red brick, cobbles some moisture		Composite sample taken 0.0-8.0 feet bgs
10	–	0.0	24"/12"	8.0-10.0	14	Coarse reddish GRAVEL with red brick, some cobbles		
	–	0.0	24"/24"	10.0-12.0	28	Coarse reddish GRAVEL with red brick, some cobbles		
	–	0.0	24"/24"	12.0-14.0	23	Saturated, medium coarse reddish GRAVEL with some sand some cobbles		
15	–	0.0	24"/24"	14.0-16.0	38	Saturated, fine reddish cobbly GRAVEL and silt		Composite sample taken 8.0-16.0 feet bgs: End of Boring at 16 fbs
16	–							
20								
25								
30								

GRANULAR SOILS BLOWS/FT	DENSITY	COHESIVE SOILS BLOWS/FT	DENSITY
0-4	VERY LOOSE	<2	VERY SOFT
4-10	LOOSE	2-4	SOFT
10-30	MEDIUM DENSE	4-8	M. STIFF
30-50	DENSE	8-15	STIFF
>50	VERY DENSE	15-30	V. STIFF
		>30	HARD

REMARKS:

NOTES:
1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED, FLUCTUATIONS OF GROUNDWATER