



Phase IA Archaeological Documentary Study

Willoughby Square Park Project, Brooklyn, New York
Willoughby Street and Gold Street (Albee Square)
Block 146, Lots 29, 37 and 41

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EXECUTIVE SUMMARY

As part of the Downtown Brooklyn Development Plan (approved by the New York City Planning Commission and adopted by the New York City Council in 2004), the New York City Department of Planning and the New York City Economic Development Corporation (EDC), are proposing that new public open spaces will be developed on the northern portion of Block 146, bounded by Willoughby Street on the north, Fulton Street on the south, Gold Street (Albee Square) on the east and Duffield Street on the west. Willoughby Square Park will provide public open space at street level with a public parking facility below grade for approximately 700 cars. The Willoughby Square project site on Block 146 includes Lots 16, 17, 18, 23, 29, 34, 35, 36, 37, and a part of Lot 41, for a total of 1.2 acres (Figures 1 and 2). Three of these lots – Lots 29, 37, and 41 – were identified by the New York City Landmarks Preservation Commission (LPC) as having potential sensitivity for nineteenth-century archaeological resources as part of the larger Downtown Brooklyn Development Final Environmental Impact Statement. EDC and the developer of the garage will be making an application to the City Planning Commission for certain modifications of the 2004 approvals as to the design of the entrance to the garage, the dimensions of the garage, and the inclusion of a portion of Lot 41 in the project. LPC requested an archaeological assessment on Lots 29, 37, and 41 prior to any development (AKRF et al. 2004). The LPC refers to this type of assessment as a Phase IA Archaeological Documentary Study.

Although the overall Willoughby Square project site includes ten modern lots, the Area of Potential Effect (APE) for potential archaeological resources is limited to Lots 29, 37, and 41, which currently function as at-grade public parking lots. Lot 29 is located at the northeastern end of the block, and has a 100-foot wide frontage on Willoughby Street and a 75-foot wide frontage on Gold Street. The interior of the lot measures 100 feet deep on the west side, for a slightly irregular configuration. Lot 37 has an 81.7 foot frontage on Gold Street and is 100 feet deep. Lot 41, adjoining Lot 37, has a 21.83 foot frontage on Gold Street and is 100 feet deep. The project proposes to subdivide Lot 41 and use only a northern portion of the lot. However, this report addresses Lot 41 in its entirety, as that is how it was identified by LPC, and because lot has not yet been subdivided.

Archival research concentrating on the specific histories of the original lots on the APE has revealed that most of the ten historic lots had residences constructed on them by the early to mid-1840s (the exception is modern Lot 41, which had its house built between 1850 and 1855). Each of these historic lots had a series of occupants over time, but many of them had occupants who lived there for over five years from the 1840s-1870s, and in general, the lots all had residents whose household heads worked in professional occupations during the initial decades of occupancy.

Archaeological resources, such as domestic artifacts and refuse, associated with these residents may have been deposited in domestic shaft features—such as wells, cisterns, and privies—that were likely located in the rear yards of the lots. Comparative data has shown that these types of archaeological resources frequently are found in urban contexts, particularly in Brooklyn. Privies were located furthest from the houses, often along the rear lot lines, while wells and cisterns frequently (but not always) were located closer to the rear walls of street-fronting buildings or outbuildings. Privies and cisterns could be excavated up to 10-15 feet below grade, while wells would need to be excavated as deep as the water table, which varied according to location.

Public water was available under both Willoughby and Gold Streets by 1860; sewers were laid under both streets by 1868 (Nassau Water 1865:89, 95). From the mid-1840s through ca. 1860, before the introduction of piped city water, residents would have relied on rear yard shaft features, such as wells and cisterns. Privies and cesspools would have been used at least until the introduction of municipal sewers.

All of the ten historic lots on the APE had houses constructed with basements. Additionally, the houses on historic lots 30, 31, 32, and 33 fronting Willoughby Street had large extensions constructed off the rear of the original houses, which also had basements. Much smaller extensions with basements were built off the rear of houses on historic Lots 39 and 40, fronting Gold Street. Remaining yard areas of most of these lots remained open space with no deeply constructed structures. The exceptions were historic lots 30, 31, 32, and 33, which lost the rear 25 feet of their original yards when that land was sold in 1864. Today there is a large apartment building fronting Gold Street that is located within the former rear yards of these historic lots. After 1864, the configuration of the APE lot houses and yards remained the same into the mid-twentieth century. As noted above, the houses on modern Lot 37 were demolished in the 1940s; the house on modern Lot 41 was razed in 1963, and the houses on modern Lot 29 were removed in the mid-1960s. Since that time, there has been no additional subsurface construction on the project site lots.

Determining archaeological sensitivity for the APE historic lots is a two part process. The first step is ruling out those lots that have significant disturbance that would have compromised or destroyed potential archaeological resources. Historic Lots 30, 31, 32, and 33 meet that condition. The large house extensions with basements covering most of the area behind the original house footprints likely would have destroyed any shaft features once situated immediately behind the houses, such as wells and cisterns, and the construction of a large apartment building on the rear 25 feet of the original lots presumably would have destroyed any privies that were once situated there. The remaining historic lots on the APE (29, 37, 38, 39, 40, and 41) do not appear to have sustained disturbance that could have destroyed potential archaeological resources.

The second step in determining archaeological sensitivity is assessing which of the likely undisturbed historic lots has the best possible research value, should archaeological resources be found. Of the remaining six historic lots, Historical Perspectives concludes that historic Lots 29, 38, and 40 meet this condition. These lots were occupied by the mid to late 1840s, which was ca. 10-20 years earlier than municipal utilities were available. The residents were of a similar economic class across the three lots, and detailed information about the households is available.

Identifying and examining buried features associated with the mid nineteenth century occupation of the APE may reflect the daily activities of the residents and provide insight into cultural behavior at the time just before Brooklyn's rapid growth. If undisturbed deposits of cultural material do still exist, they may have the potential to provide meaningful information regarding the lives of the people who lived there. When recovered from their original context and in association with a specific historical occupation, historical deposits can provide a wealth of information about consumption patterns, consumer choice, gender relations, ethnicity, economic status, and other important issues. The locations of these lots and proposed testing locations on them are shown on Figure 12.

Based on the conclusions outlined above, HPI recommends that a program of archaeological field testing be undertaken on historic Lots 29, 38 and 40 of the APE, within the archaeologically sensitive areas on Figure 12. This testing, often referred to as Phase IB, would determine the presence or absence of nineteenth-century shaft features and possible yard deposits associated with the former buildings on the property. Archaeological field testing would involve using a backhoe to remove the existing ground surface (now covered with asphalt paving) from test trenches within the sensitive areas, or portions of the former rear yards of the APE lots. Mechanical excavations, under the direction of an archaeologist, would continue to assist with removing modern fill or debris underlying the removed pavement in order to expose potential archaeological resources.

All archaeological testing should be conducted according to OSHA regulations (including use of Level D personal protective equipment) and applicable archaeological standards, which includes prior LPC approval of the testing protocol (LPC 2002; CEQR 2012). Professional archaeologists, with an understanding of and experience in urban archaeological excavation techniques, would be required to be part of the archaeological field team.

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14. Lot 41 showing detail of exposed foundation remains in foreground. View looking west from Gold Street.

I. INTRODUCTION

As part of the Downtown Brooklyn Development Plan (approved by the New York City Planning Commission and adopted by the New York City Council in 2004), the New York City Department of Planning and the New York City Economic Development Corporation (EDC), are proposing that new public open spaces will be developed on the northern portion of Block 146, bounded by Willoughby Street on the north, Fulton Street on the south, Gold Street (Albee Square) on the east and Duffield Street on the west. Willoughby Square Park will provide public open space at street level with a public parking facility below grade for approximately 700 cars. The Willoughby Square project site on Block 146 includes Lots 16, 17, 18, 23, 29, 34, 35, 36, 37, and a part of Lot 41, for a total of 1.2 acres (Figures 1 and 2). Three of these lots – Lots 29, 37, and 41 – were identified by the New York City Landmarks Preservation Commission (LPC) as having potential sensitivity for nineteenth-century archaeological resources as part of the larger Downtown Brooklyn Development Final Environmental Impact Statement. EDC and the developer of the garage will be making an application to the City Planning Commission for certain modifications of the 2004 approvals as to the design of the entrance to the garage, the dimensions of the garage, and the inclusion of a portion of Lot 41 in the project. LPC requested an archaeological assessment on Lots 29, 37, and 41 prior to any development (AKRF et al. 2004). The LPC refers to this type of assessment as a Phase IA Archaeological Documentary Study.

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Philip Habib & Associates (PHA) has retained Historical Perspectives, Inc. (HPI) to complete the required Phase IA Archaeological Documentary Study, which has been prepared to satisfy the requirements of the City Environmental Quality Review (CEQR), and to comply with the standards of the LPC (LPC 2002; CEQR 2012). The HPI project team consisted of Julie Abell Horn, M.A., R.P.A., who conducted research and wrote the report; Christine Flaherty, M.A., who conducted the site visit, additional research, and prepared the graphics; and Cece Saunders, M.A., R.P.A., who managed the project and provided editorial and interpretive assistance.

II. METHODOLOGY

The present study entailed review of various resources.

- Primary and secondary sources concerning the general history of Brooklyn and specific events associated with the project site and vicinity were reviewed at the Brooklyn Historical Society, the library of HPI, and using online resources.
- Historic maps and photographs were reviewed at the New York Public Library, the Brooklyn Historical Society, the Brooklyn City Clerk's Office, the New York City Municipal Archives, the library of HPI, and using various online websites. These maps and photographs provided an overview of the topography and a chronology of land usage for the project site. A selection of these maps has been reproduced for this report.
- Land records for Block 146 (formerly Block 2077) were reviewed at the Brooklyn Historical Society, focusing on the 19th century. A summary of the conveyances is presented in Appendix A.
- Tax assessment records were reviewed at the New York City Municipal Archives. These records include data from 1867-1899 for Brooklyn. Data from these records are included in Appendix A.
- Selected city directories and federal and state census records were reviewed to identify residents on historic lots within the APE; this information is included in Appendix A.
- Department of Building records were reviewed using online resources.
- A Phase I Environmental Site Assessment (TRC 2007) and two Phase II Environmental Site Investigations (The Louis Berger Group 2009, H2M 2008) for the overall project site were provided, including limited soil boring results (Appendix B).

- Information about previously recorded archaeological sites and surveys in the area was compiled from data available at the New York State Office of Parks, Recreation and Historic Preservation (NYSOPRHP), the LPC, and the library of HPI.
- Last, a site visit was conducted by Christine Flaherty of HPI on July 31, 2013 to assess any obvious or unrecorded subsurface disturbance (Photographs 1-14; Figure 2).

III. CURRENT CONDITIONS AND ENVIRONMENTAL SETTING

A. Current Conditions

As noted in the Introduction, the APE consists of three modern lots: Lots 29, 37, and 41. All three lots are used as parking lots, and are paved with asphalt.

Lot 29 contains a small concrete block structure used as an attendant's booth, and there are car lifts along the southern and western edges of the lot (Photographs 1-4). Although some of the lifts have concrete pads underneath them, the mechanisms themselves do not appear to have any subsurface components. The asphalt surface of the lot is uneven, with patches and repaving in places, and there is a manhole for the electric line in the northwest portion of the lot near Willoughby Street. There is a sign pole in the northeastern portion of the lot. The northern edge of the lot is open while the eastern edge contains a chain link fence. The western side abuts a brick building, and remnants of the former Lot 29 structure(s) can be seen in the brickwork (Photograph 5). There also appears to be the remnant of a sandstone column protruding from the adjacent wall. The southern edge abuts a brick apartment building, and a portion of Lot 29 extends behind this building. The open rear area of the adjacent southern lots (Lots 34-36) are approximately seven feet below the surface of Lot 29, and has a stone and concrete retaining wall and chain link fencing on top of the walls (Photograph 6).

Lot 37 contains a concrete block attendant's booth, and the asphalt surface is uneven and is patched in numerous places (Photographs 7-9). The lot is open along the east side on Gold Street, and is bordered on the other three sides by chain link fencing. The northern side abuts a brick apartment building to the north (Lot 36). In the northeastern corner this lot faces the same sunken rear yard as Lot 29 (Photograph 10). On the western edge is a seven-story building (Lot 18) and two smaller buildings (Lots 16 and 17). The concrete footing of the larger building abuts the fencing, although the walls are set back several feet. The two smaller lots have a brick garden wall at the rear; this is approximately three feet away from the chain link fence.

Lot 41 is part of a larger parking lot to the south (Photograph 11). It is bordered to the north and west by chain link fencing (Photograph 12). The asphalt surface is uneven, and in a number of places near the Gold Street portion of the lot sandstone and brick foundations and granite blocks are exposed in areas where the asphalt paving is missing (Photographs 13 and 14).

B. Topography and Hydrology

The project site and vicinity are within a relatively level portion of Brooklyn with minimal change in elevation. One of the earliest topographical maps that indicated elevations (U.S.G.S. 1891) showed the entire site vicinity to be ca. 40 feet above sea level. The earliest available Sanborn map, from 1887 (see Figure 8) indicates the intersection of Willoughby and Gold Streets was 48 feet above sea level, the intersection of Willoughby and Duffield Streets was 46 feet above sea level, and the intersection of Gold and Fulton Streets was 40 feet above sea level, with the APE lots ranging in between those three numbers. The modern survey completed for this project (Figure 2) shows that today, all three lots within the APE range in elevation from ca. 46.5-48.5 feet above sea level, suggesting minimal change in elevation on the property over time. The closest water source is the East River, which is slightly less than one mile to the west.

C. Soils

According to the soil survey for New York City, the project site falls within soil mapping unit 2, known as "Pavement & buildings, till substratum, 0 to 5 percent slopes" and described as:

Nearly level to gently sloping, highly urbanized areas with more than 80 percent of the surface covered by impervious pavement and buildings, over glacial till; generally located in urban centers (USDA 2005:11).

As part of the Phase II Environmental Site Investigation undertaken for this overall project, two sets of soil investigations were completed.

The first set of five soil borings across the project site, by The Louis Berger Group (2009), focused on geotechnical data. Soil borings SB-04 and SB-05 were located on Lot 29 and SB-02 was located on Lot 41. The remaining borings were located on lots not within the APE. SB-4 was located near the Willoughby Street side of Lot 29, in an area once containing a building with a basement. Not surprisingly, the boring recorded historic fill to a depth of 22.5 feet below the surface, with naturally occurring soils beneath the fill. Refusal was at 34 feet below grade, corresponding to bedrock. SB-4 was located at the extreme southwest corner of Lot 29, in an area that historically did not have any buildings on it. SB-4 recorded fill to 11 feet below the ground surface, with natural soils beneath the fill and refusal at 35 feet below grade. SB-2 was located at the western edge of Lot 41, in an area that historically did not have any buildings. That boring recorded historic fill to 17 feet below the ground surface, with natural soils below the fill, and refusal at 25 feet below grade. None of these soil borings reached groundwater.

The second set of eleven soil explorations were completed by The H2M Group (2008), and focused on hazardous materials in the soils. The study included Soil Vapor/Ambient Air sampling (SV), Soil Probes up to 22 foot depths (SB), and Soil Probes up to 4 foot depths (ST). There were six samples located on Lot 37, designated SV-1, SV-2, SB-1, SB-2, ST-1, and ST-2. The recording process for these explorations focused primarily on readings for hazardous materials, and so the soil descriptions are less reliable. For example, there is no indication of whether strata were, in fact, fill materials or naturally occurring soils. However, the notation of inclusions such as brick in the soil strata allows some analysis of these data. For example, SB-2, located in the central portion of Lot 37, indicated brick inclusions to a depth of ca. 16 feet below grade. Again, none of these tests reached groundwater.

IV. BACKGROUND RESEARCH/HISTORICAL OVERVIEW

A. Previously Recorded Archaeological Sites

The archaeological site file inventories from the New York State Museum (NYSM) and the NYSOPRHP indicate that a number of historic period archaeological sites have been recorded within a one-mile radius of the project site. The closest site is the Metrotech Site, located on the blocks just north of the project site. This 10-block project was studied extensively during the 1980s and early 1990s, with archaeological field testing and mitigation occurring on the two blocks bounded by Myrtle Avenue, Johnson, Duffield and Lawrence Streets (Historic Sites Research 1984; Rothschild and Dublin 1985; Greenhouse 1990, 1991, 1993). Testing areas were identified based on a combination of occupation and disturbance data. The mitigation report summarized the results:

This fieldwork resulted in the identification of ten features associated with the water supply and sewage disposal practices of households occupying six of the seven lots. Six of these features proved to be undisturbed and were excavated during the data recovery. Of these six features, two cisterns and two privies located in three lots were found to contain extensive refuse deposits. These deposits were associated with the long term domestic occupation of the lots by three families of English and Irish extraction during the latter half of the nineteenth century (Greenhouse 1993:1).

Additional archaeological sites and surveys further from the project site have included (but are not limited to) the Atlantic Terminal Urban Renewal Site along Atlantic Avenue (Historical Perspectives 1985; John Milner Associates 1995, 1996), the Atlantic Yards Site (Historical Perspectives 2006; URS 2007, 2010), the Brooklyn Bridge Park Project along the East River waterfront (Historical Perspectives and Raber Associates 2005; URS 2008, 2009, 2012), and extensive studies at the Brooklyn Navy Yard. Those archaeological sites within a one-mile radius of the project site are listed in the table, below.

NYSOPRHP Site Number	Site Name/Description	Location	Site Type/Time Period
04701.015112	Metrotech Site	Blocks bounded by Myrtle Avenue, Johnson, Duffield and Lawrence Streets	Historic
04701.016710	Deforest/Martin Stores Warehouse site	Brooklyn Bridge Park Area 6	Historic
04701.016711	Jewell Brothers Flour Mill Site	Brooklyn Bridge Park Area 7	Historic
04701.013923	Atlantic Terminal Historic Site	Atlantic Avenue between Cumberland and Carlton Streets	Historic
04701.015450	Privy and Cistern	Atlantic Avenue and Smith Street	Historic
04701.014975	Naval Hospital Archaeological Site	Brooklyn Navy Yard	Historic
04701.014899	Naval Hospital Cemetery	Brooklyn Navy Yard	Historic
04701.017205	45-53 Clinton Ave., 50 Waverly Ave., Consumer's Biscuit & Manufacturing Co. – 1915	Wallabout Industrial Historic District	Historic
04701.016569	PCI/Admiral's Row Historic Site	Brooklyn Navy Yard	Historic

Last, although not a formally recorded archaeological site, recent research on the project site block, immediately south of the project site and APE, has revealed a potential but unconfirmed association of six extant residences on Duffield Street and one extant residence on Gold Street with Underground Railroad activity during the nineteenth century. The extensive study was completed as part of the Downtown Brooklyn Development Plan (AKRF 2007).

B. Historic Period Summary

At the turn of the nineteenth century – the period identified by LPC as having the potential for archaeological resources – the project site was part of two large farm tracts. These farms fronted what is now Fulton Street to the south of the project site block, but which formerly was a more winding road linking downtown Brooklyn with Jamaica, Queens. The project site and APE were within the interior portions of the farms, and were undeveloped during the time they were part of these properties.

The majority of the project site, including portions fronting Willoughby and Duffield Streets, was part of the John Duffield farm (Figure 3, Beers 1874, Hopkins 1880). The Duffield farm had been part of the larger Carel Debevois property, which upon his death had passed to his heirs, including daughter Margaret Duffield. The Debevois/Duffield house was located at the approximate intersection of Duffield and Fulton Streets, well south of the APE (Stiles 1869). In 1829 the Duffield property was surveyed into blocks and lots (Ludlam 1829, Figure 3). Within the APE, modern Lot 29 included Farm Map lots 465, 466, 467, and 468, each of which was 25 feet wide and 100 feet deep. A triangular section of the Duffield holdings ran through the western portion of modern Lots 37 and 41, but was not given Farm Map lot numbers.

The remainder of the project site, including most of the area fronting Gold Street, was part of the Samuel Fleet farm (Figure 4, Beers 1874, Hopkins 1880). Samuel Fleet had acquired the farm from the descendants of Barent Johnson in the 1830s. Fleet's house was located at the southeastern corner of the project site block, but well off the APE (Stiles 1869). In 1832, the Fleet farm was surveyed into block and lots (Figure 4). Within the APE, modern Lot 37 included portions of Farm Map Lots 108, 109, 110, and 111, and modern Lot 41 included portions of Farm Map Lots 107 and 108. Again, these lots were 25 feet wide.

From the late 1820s through the mid-1840s all of the conveyances for the APE lots were among the Duffield and Fleet families, as they sorted out inheritances and transferred land between themselves. Most of these conveyances hued to the original farm map lot divisions and numbering schemes, with each lot measuring 25 feet in width.

By the 1830s, the City of Brooklyn had extended its city grid into the project site vicinity, with new streets laid out, including those surrounding the project site. Willoughby, Duffield, and Gold Streets were laid out officially in 1835, although the streets may have existed on paper for a number of years before and after that time (Dikeman 1870).

During the mid-1840s the first land transfers on the APE began to be made to people outside these two extended families. Complicating the process, though, was the new division of formerly 25-foot wide lots into lots measuring either 20 feet in width (on Willoughby Street) or ca. 22 feet in width on Gold Street. Each 20- or 22-foot wide lot was given a unique lot number within the block, with a numbering scheme beginning at the southwest corner of the block with Lot 1, and increasing moving clockwise. Thus modern Lot 29 contained (from west to east) historic lots 29, 30, 31, 32, and 33. Modern Lot 37 contained (from north to south) historic lots 37, 38, 39, and 40. The triangular division between the Duffield and Fleet farms also had to be incorporated into the new lot configurations, necessitating numerous deeds for small, irregular parcels along what is now the western side of modern Lots 37 and 41. The correlation of the Farm Map Lots, the subsequent historic lot designations and addresses, and the modern lots on the APE is provided in Appendix A.

The mid-1840s marks the period when the first structures were built on the APE lots. The Willoughby Street historic lots were sold by the Duffield heirs to new owners in 1843 and 1844 (Appendix A). Samuel Fleet sold several of the Gold Street lots in 1844 as well, although retained others. City directories show no residents in 1840 on the APE, but by 1843, some of the APE lots had occupants, and by 1848 most of the remaining APE lots had occupants, implying that houses had been built on the lots between 1840 and the mid to late-1840s. The 1850 Dripps map, although not particularly detailed, does show that the entire Willoughby Street frontage of the APE had structures by this time, and most of the Gold Street frontage of the APE did as well (the exception seems to be modern Lot 41, which was vacant). The 1855 Perris map (Figure 5) shows the layout of these 1840s houses within the APE, and confirms that modern Lot 41 now had a house as well. Those on modern Lots 29 and 41 were made of brick and the remaining houses were frame constructed.

Appendix A lists the occupants of the APE lots from the 1840s through the 1890s, based on city directory and census data. Tax assessment data are available from 1867-1899 and confirm ownership and the size of the houses on the lots.

During first decades of occupation on the project site, generally during the 1840s, 1850s, and into the 1860s, city directories show that the APE lots were occupied by men who were merchants and commission merchants, brokers, a druggist, custom house officers, clerks, teachers, and other professional occupations. All had families, and some had servants. Some women were listed as well in the directories, albeit without professions. Some of the wealthier families lived alone in the houses, while other residences housed two families at a time. Only a few of the lots were owner-occupied at any given time. With the exception of a few residents born in Germany, most of the APE household heads were not recent immigrants, having been born in the United States, many in New York. Female servants living in the households usually were from Ireland or Germany.

Prior to about 1848, however, city directories did not list specific addresses, only general locations, such as “Willoughby near Gold Street,” which makes assigning specific residents to lots difficult during these initial years. Additionally, the earliest federal (1850) and state (1855) censuses applicable for the APE lots did not necessarily document households in address order, as is often the case, but seem to have skipped some houses and recorded them at a later date, making the sequencing out of order and more difficult to rectify in terms of identifying residents on specific APE lots during this period. Appendix A represents the best effort, based on these sometimes problematic sources, to assign occupants to specific lots within the APE.

Starting in the 1860s, classified advertisements began to appear in the local newspaper offering rooms and board in a number of the APE houses (a selection are included in Appendix A), illustrating both a sociological and economic shift. By the late 1860s and continuing through the end of the nineteenth century, APE residences began to house

multiple families, and sometimes workspaces as well (several doctors were listed as practicing on APE lots during this time). There was greater turnover of occupants after the 1860s as well. A number of the classified advertisements noted that the houses had hot and cold water, indoor bathrooms, and gas hookups. This part of Brooklyn was provided with municipal water and sewer services beginning in the late 1850s and continuing into the mid-1860s. Both Gold and Willoughby Streets had water mains installed prior to 1860 (Nassau Water 1865:89, 95), and it is assumed that the houses on the APE lots were hooked up to city water soon afterwards. Sewer records indicate the houses were hooked up to city sewers before 1868 (the volumes prior to 1868 no longer exist and the addresses are not included in the post-1868 volumes). Thus, the shift to multiple-family occupancy on many of the APE lots coincided with a time when houses were better equipped to accommodate additional residents.

Maps from the 1860s through the early 1880s (Dripps 1869, Figure 6; Bromley 1880, Figure 7) show little change to the houses on the APE lots. However, by 1864 the rear portion of historic Lots 30-33 had been sold to form a new lot fronting Gold Street (Lot 34), where an existing apartment building now stands. This sale truncated the yard areas of these lots by 25 feet. The 1869 Dripps map (Figure 6) does not yet show this change, but the 1880 Bromley map (Figure 7) does show the new lot configuration. During the 1880s, tax records show that the four houses on historic Lots 30-33 had extensions built off the rear of the original buildings, eliminating yet more of the former yards. These extensions are depicted on the 1887 Sanborn map (Figure 8) as well as all subsequent Sanborn maps (Sanborn 1904, Figure 9; Sanborn 1915, Figure 10; and Sanborn 1950, Figure 11). The Sanborn maps indicate that the main part of the houses were three stories with a basement, as were the extensions. The houses on the APE lots fronting Gold Street also were 2.5 or 3 stories high, with basements, and several of them had small extensions off the back as well.

The houses on the APE lots stood with little to no changes from their late nineteenth century configurations into the mid-twentieth century. The houses on modern Lot 37 were demolished in the 1940s (the 1950 Sanborn map, Figure 11) shows the lot as vacant; the house on modern Lot 41 was razed in 1963, and the houses on modern Lot 29 were removed in the mid-1960s. The 1969 Sanborn map update shows the entire APE as vacant. Since that time, there has been no additional construction on the project site lots, except for parking attendant booths associated with the surface parking lots.

C. SUMMARY OF ARCHIVAL RESULTS

The archival research pertaining to the ten historic lots that comprise the APE revealed that the dwellings that occupied the project site beginning in the 1840s had a series of occupants at each of the properties, sometimes several families per house at any given time. The table below summarizes the longer term occupants on each lot for the first decades that the residences were used. These dates coincide with the period most likely to yield archaeological remains deposited in shaft features such as wells, cisterns, and privies. Urban homelot shaft features often are the places that harbor the best preserved materials. Of note, although municipal water and sewers were available for APE lots beginning in the late 1850s and 1860s, other archaeological investigations in Brooklyn and other boroughs have shown that shaft features frequently were not completely filled in and sealed until years after this period (e.g. Greenhouse 1991, 1993; John Milner Associates 1996). For this reason longer term occupants are listed in the table through later periods than the 1850s and 1860s when relevant.

Historic Lot	Years of occupation	Occupants
29	Mid-1840s-1860	Households of Charles Barnes (possible), Sarah Degraw, Robert Cromwell/Crommelin
29	1860-1880	Household of Cornell Franklin
30	1840s-1860	Household of Cornell Franklin
31	1843-1849	Household of Rufus Mead
31	ca. 1855-1863	Household of John Barton
32	1844-1850	Household of Charles Barnes
32	1862-1873	Households of Coffin family members
33	1848-1867	Households of Sarah Winslow, John Moffat, Joseph Roberts, Conklin Bishop and others
37	1848-1858	Households of Robert F. Cox and others

Historic Lot	Years of occupation	Occupants
38	1848-1865	Households of J.H. Havens and Joseph Stockbridge
39	1848-1860	Households of H.A. Norris, Charles W. Remington and Phineas Potter
40	1843-1856	Household of Caspar Kuhlke
41	ca. 1855-1862	Households of George Haring/Hering, F.W. Knapp and Joseph Williams
41	1863-1876	Household of Phineas Potter

Although not all the occupants of the properties stayed for long periods, archival data show that many of the lots had tenancies of over five years in length. Moreover, the data indicate a similar background for most of the residents during the 1840s-1860s: the majority of the household heads had professional occupations, such as merchants and commission merchants, brokers, a druggist, custom house officers, clerks and teachers.

V. CONCLUSIONS

Archival research concentrating on the specific histories of the original lots on the APE has revealed that most of the ten historic lots had residences constructed on them by the early to mid-1840s (the exception is modern Lot 41, which had its house built between 1850 and 1855). Each of these historic lots had a series of occupants over time, but many of them had occupants who lived there for over five years from the 1840s-1870s, and in general, the lots all had residents whose household heads worked in professional occupations during the initial decades of occupancy.

Archaeological resources, such as domestic artifacts and refuse, associated with these residents may have been deposited in domestic shaft features—such as wells, cisterns, and privies—that were likely located in the rear yards of the lots. Comparative data has shown that these types of archaeological resources frequently are found in urban contexts, particularly in Brooklyn. Privies were located furthest from the houses, often along the rear lot lines, while wells and cisterns frequently (but not always) were located closer to the rear walls of street-fronting buildings or outbuildings. Privies and cisterns could be excavated up to 10-15 feet below grade, while wells would need to be excavated as deep as the water table, which varied according to location.

Public water was available under both Willoughby and Gold Streets by 1860; sewers were laid under both streets by 1868 (Nassau Water 1865:89, 95). From the mid-1840s through ca. 1860, before the introduction of piped city water, residents would have relied on rear yard shaft features, such as wells and cisterns. Privies and cesspools would have been used at least until the introduction of municipal sewers.

All of the ten historic lots on the APE had houses constructed with basements. Additionally, the houses on historic lots 30, 31, 32, and 33 fronting Willoughby Street had large extensions constructed off the rear of the original houses, which also had basements. Much smaller extensions with basements were built off the rear of houses on historic Lots 39 and 40, fronting Gold Street. Remaining yard areas of most of these lots remained open space with no deeply constructed structures. The exceptions were historic lots 30, 31, 32, and 33, which lost the rear 25 feet of their original yards when that land was sold in 1864. Today there is a large apartment building fronting Gold Street that is located within the former rear yards of these historic lots. After 1864, the configuration of the APE lot houses and yards remained the same into the mid-twentieth century. As noted above, the houses on modern Lot 37 were demolished in the 1940s; the house on modern Lot 41 was razed in 1963, and the houses on modern Lot 29 were removed in the mid-1960s. Since that time, there has been no additional subsurface construction on the project site lots.

Determining archaeological sensitivity for the APE historic lots is a two part process. The first step is ruling out those lots that have significant disturbance that would have compromised or destroyed potential archaeological resources. Historic Lots 30, 31, 32, and 33 meet that condition. The large house extensions with basements covering most of the area behind the original house footprints likely would have destroyed any shaft features once situated immediately behind the houses, such as wells and cisterns, and the construction of a large apartment building on the rear 25 feet of the original lots presumably would have destroyed any privies that were once situated there. The remaining historic lots on the APE (29, 37, 38, 39, 40, and 41) do not appear to have sustained disturbance that could have destroyed potential archaeological resources.

The second step in determining archaeological sensitivity is assessing which of the likely undisturbed historic lots has the best possible research value, should archaeological resources be found. Of the remaining six historic lots,

Historical Perspectives concludes that historic Lots 29, 38, and 40 meet this condition. These lots were occupied by the mid to late 1840s, which was ca. 10-20 years earlier than municipal utilities were available. The residents were of a similar economic class across the three lots, and detailed information about the households is available.

Identifying and examining buried features associated with the mid nineteenth century occupation of the APE may reflect the daily activities of the residents and provide insight into cultural behavior at the time just before Brooklyn's rapid growth. If undisturbed deposits of cultural material do still exist, they may have the potential to provide meaningful information regarding the lives of the people who lived there. When recovered from their original context and in association with a specific historical occupation, historical deposits can provide a wealth of information about consumption patterns, consumer choice, gender relations, ethnicity, economic status, and other important issues. The locations of these lots and proposed testing locations on them are shown on Figure 12.

VI. RECOMMENDATIONS

Based on the conclusions outlined above, HPI recommends that a program of archaeological field testing be undertaken on historic Lots 29, 38 and 40 of the APE, within the archaeologically sensitive areas on Figure 12. This testing, often referred to as Phase IB, would determine the presence or absence of nineteenth-century shaft features and possible yard deposits associated with the former buildings on the property. Archaeological field testing would involve using a backhoe to remove the existing ground surface (now covered with asphalt paving) from test trenches within the sensitive areas, or portions of the former rear yards of the APE lots. Mechanical excavations, under the direction of an archaeologist, would continue to assist with removing modern fill or debris underlying the removed pavement in order to expose potential archaeological resources.

All archaeological testing should be conducted according to OSHA regulations (including use of Level D personal protective equipment) and applicable archaeological standards, which includes prior LPC approval of the testing protocol (LPC 2002; CEQR 2012). Professional archaeologists, with an understanding of and experience in urban archaeological excavation techniques, would be required to be part of the archaeological field team.

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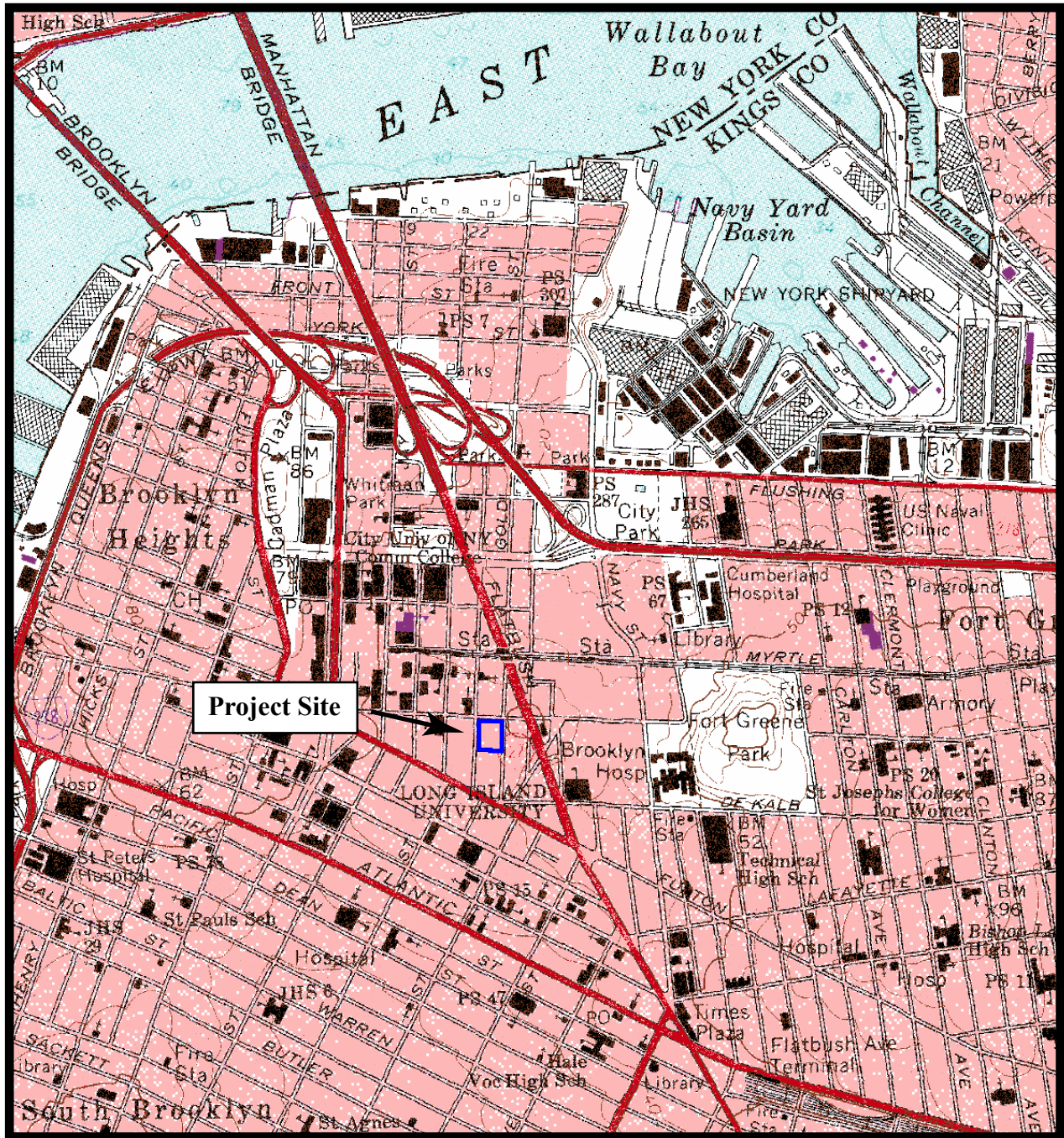
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Phase IA Archaeological Documentary Study
 Willoughby Square Park Project, Brooklyn, New York 11201
 Willoughby Street and Gold Street (Albee Square)
 Block 146, Lots 29, 37 and 41

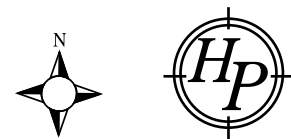
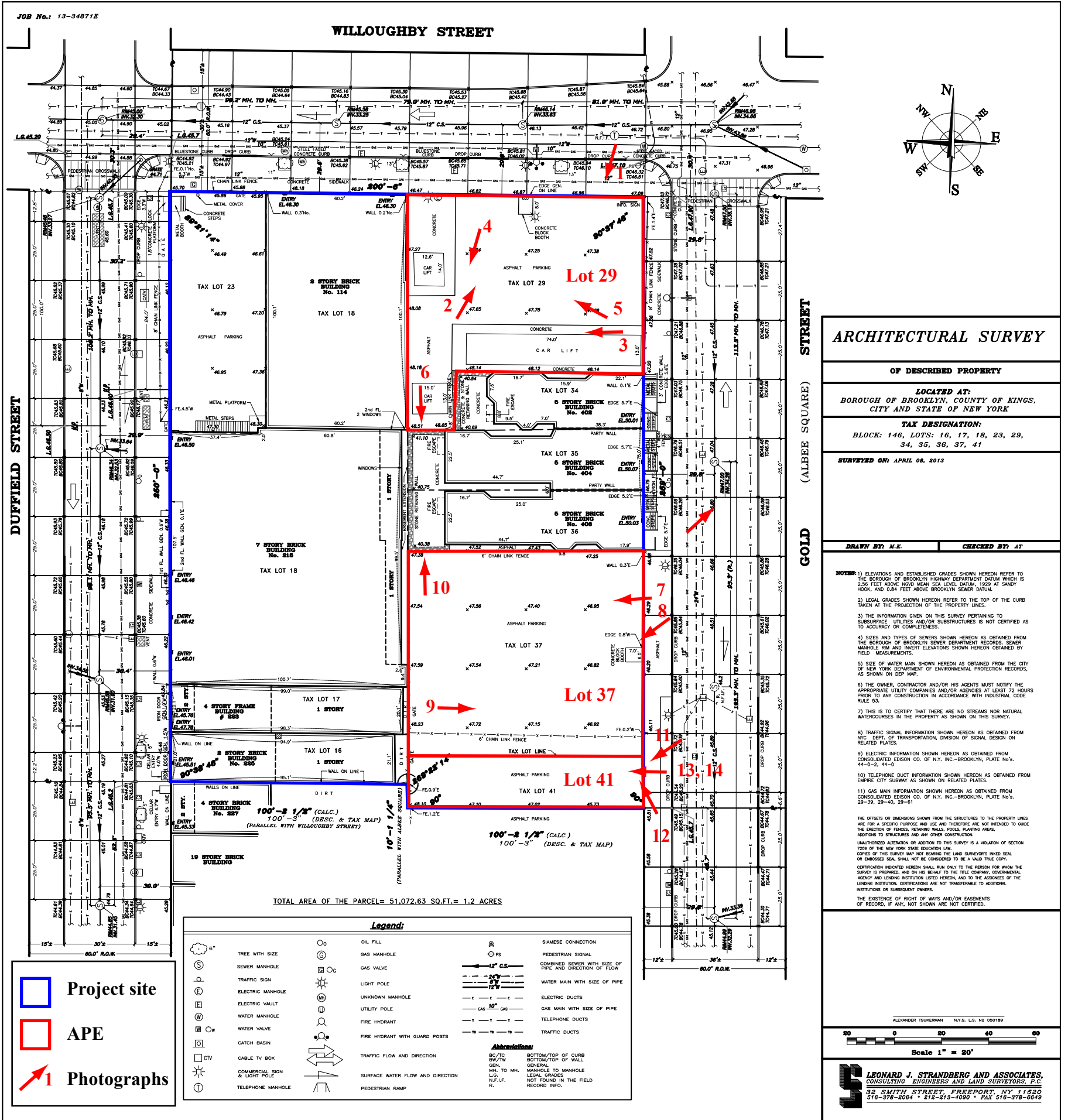


Figure 1: Project site on *Brooklyn, N.Y. 7.5 Minute Topographic Quadrangle* (U.S.G.S. 1979).

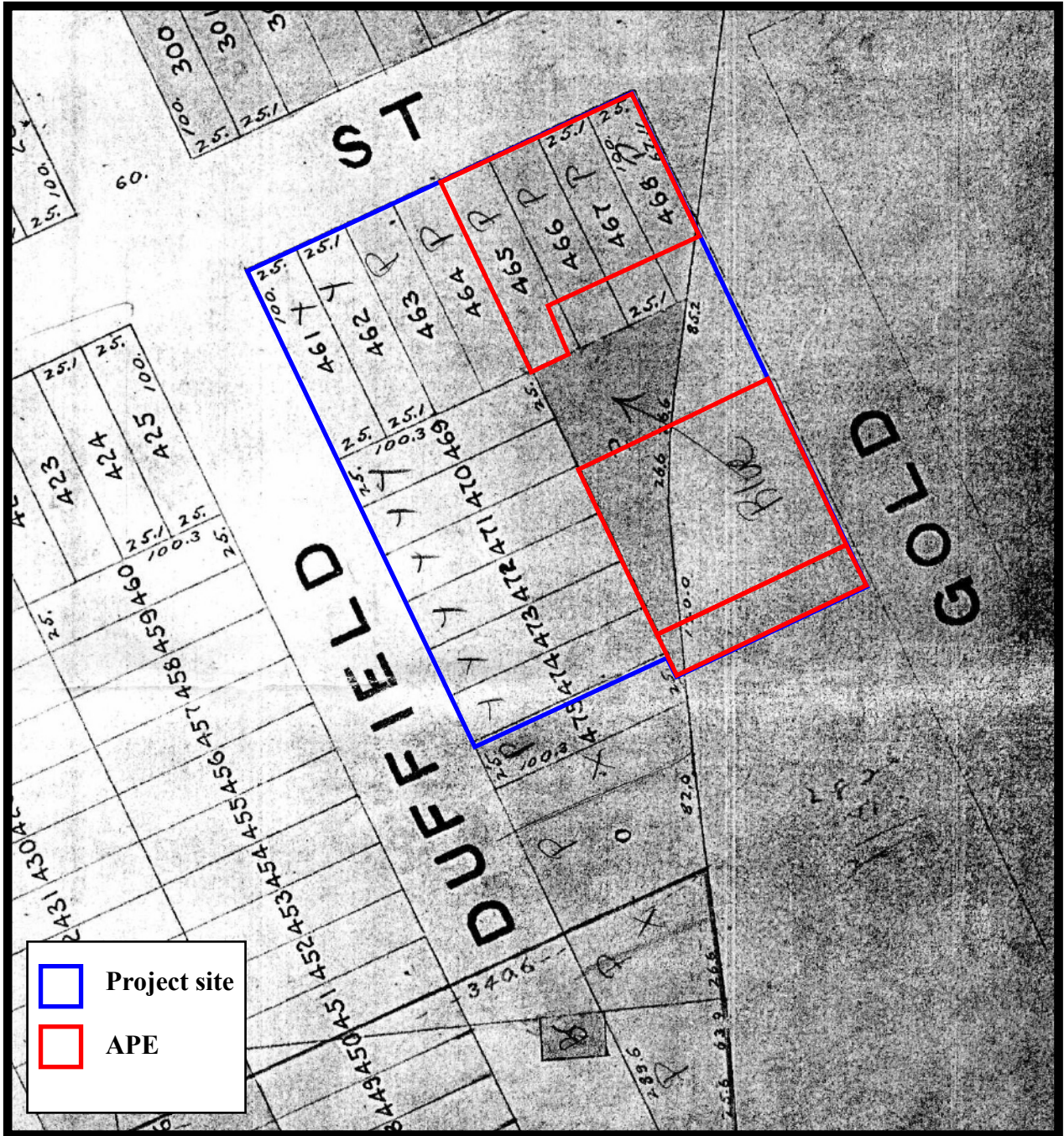
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Figure 2: Project site, APE, and photograph locations on modern survey (Leonard J. Strandberg and Associates 2013).





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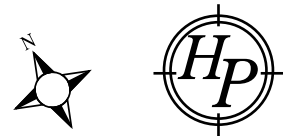
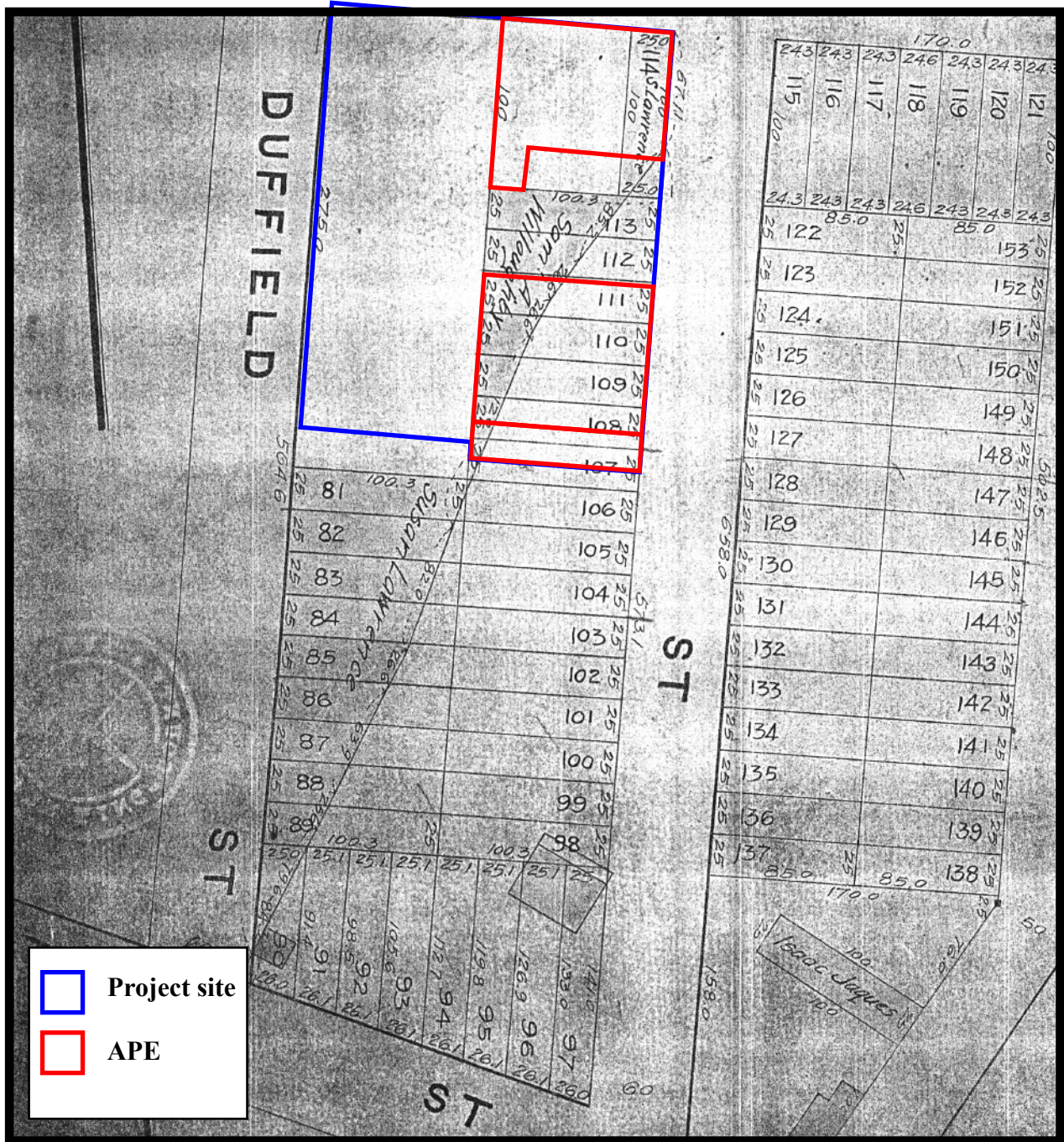


Figure 3: Project site and APE on Map of Property in Brooklyn Belonging to the Heirs of Dr. John Duffield, Deceased (Ludlam 1829).

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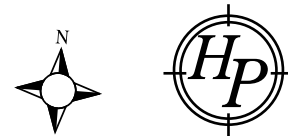


Figure 4: Project site and APE on Samuel Fleet property (Ludlam 1832).

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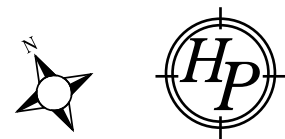
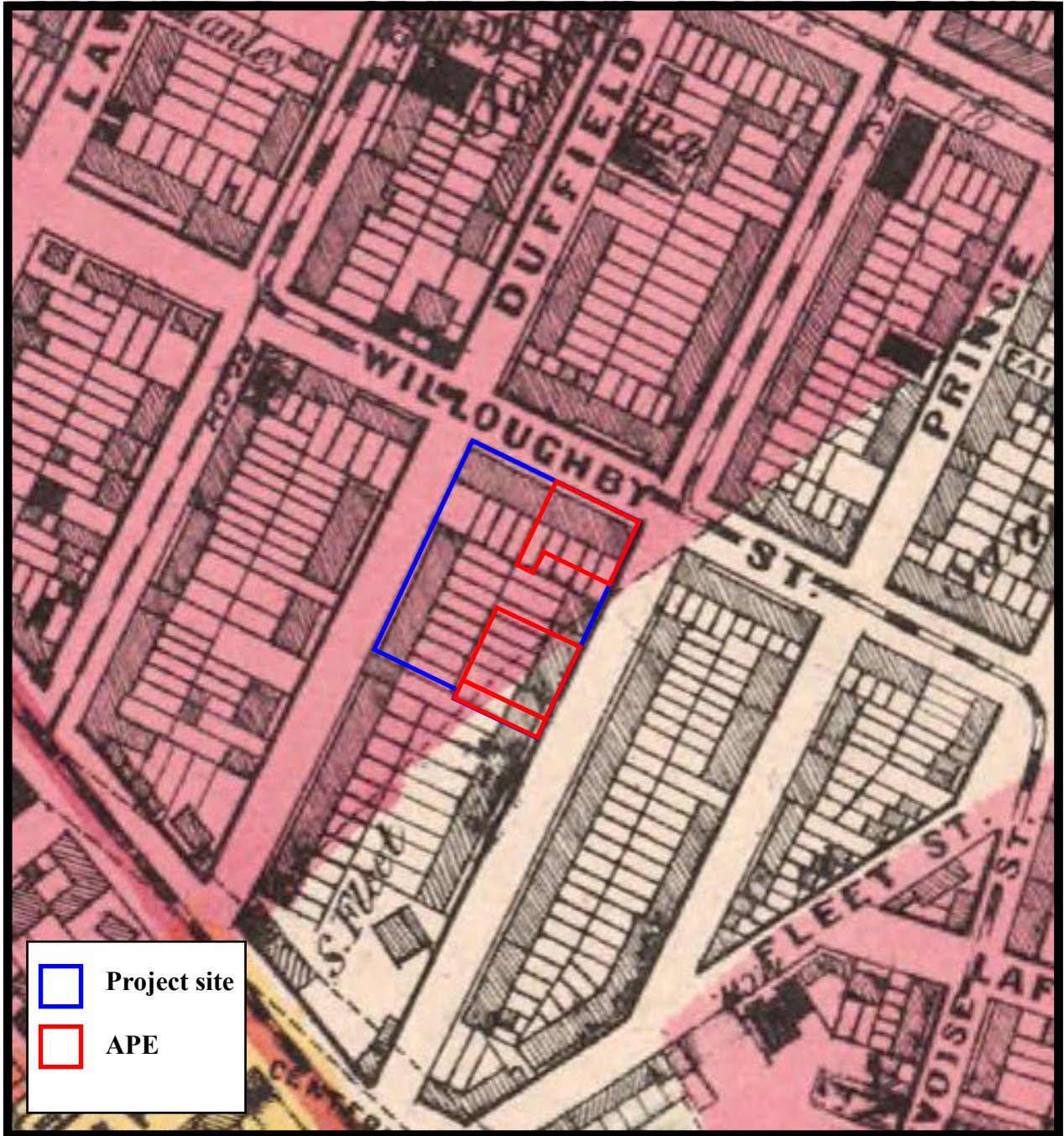


Figure 5: Project site and APE on *Maps of the City of Brooklyn* (Perris 1855).





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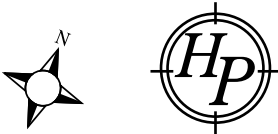
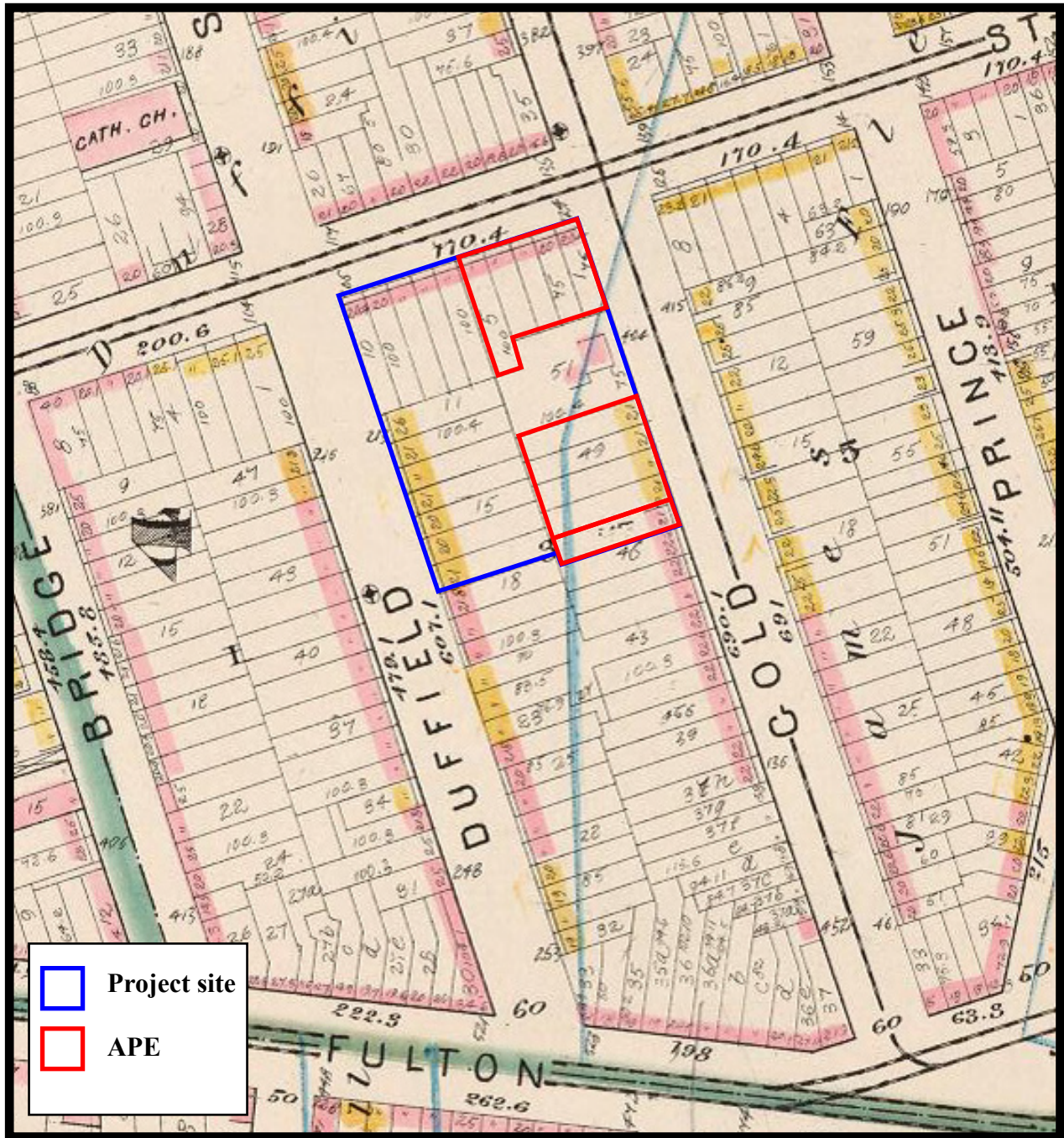


Figure 6: Project site and APE on *Map of the City of Brooklyn* (Dripps 1869).

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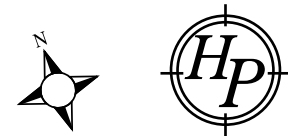
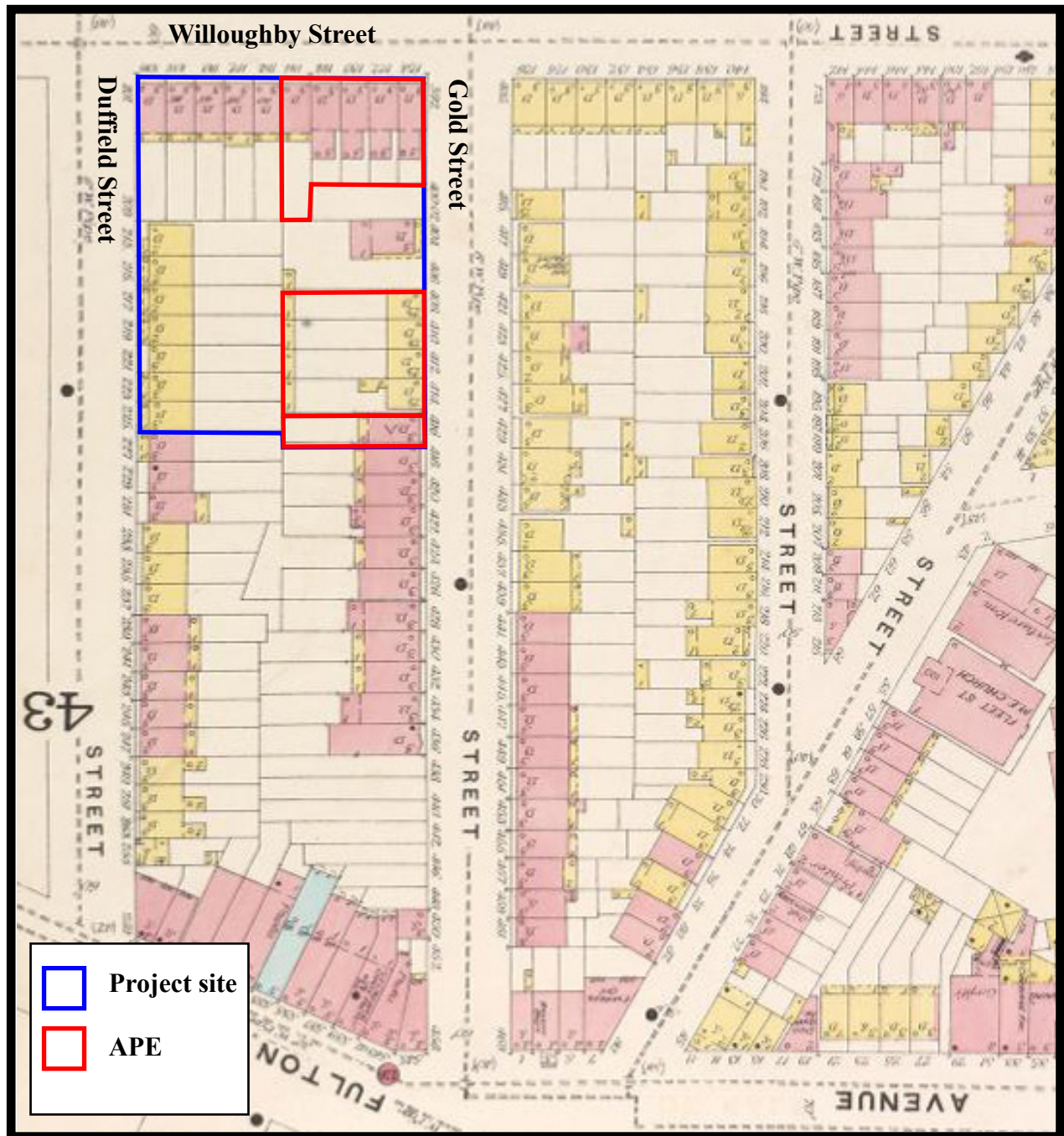


Figure 7: Project site and APE on *Atlas of the Entire City of Brooklyn* (Bromley 1880).

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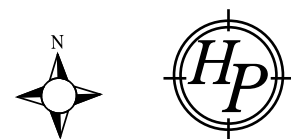
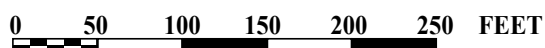
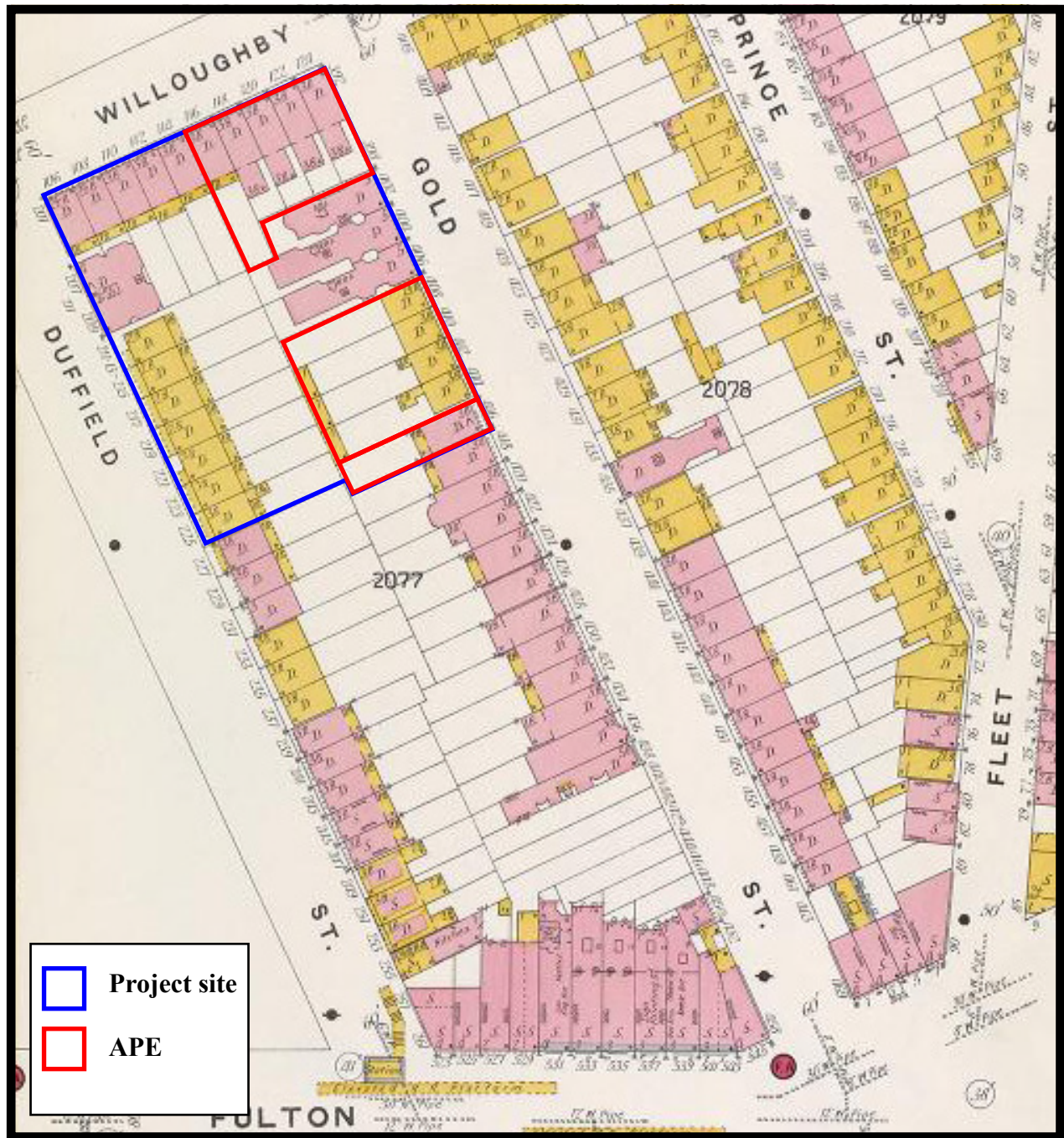


Figure 8: Project site and APE on *Insurance Maps of Brooklyn, New York* (Sanborn 1887).





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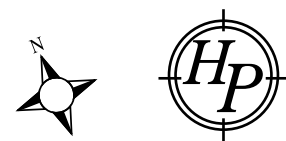
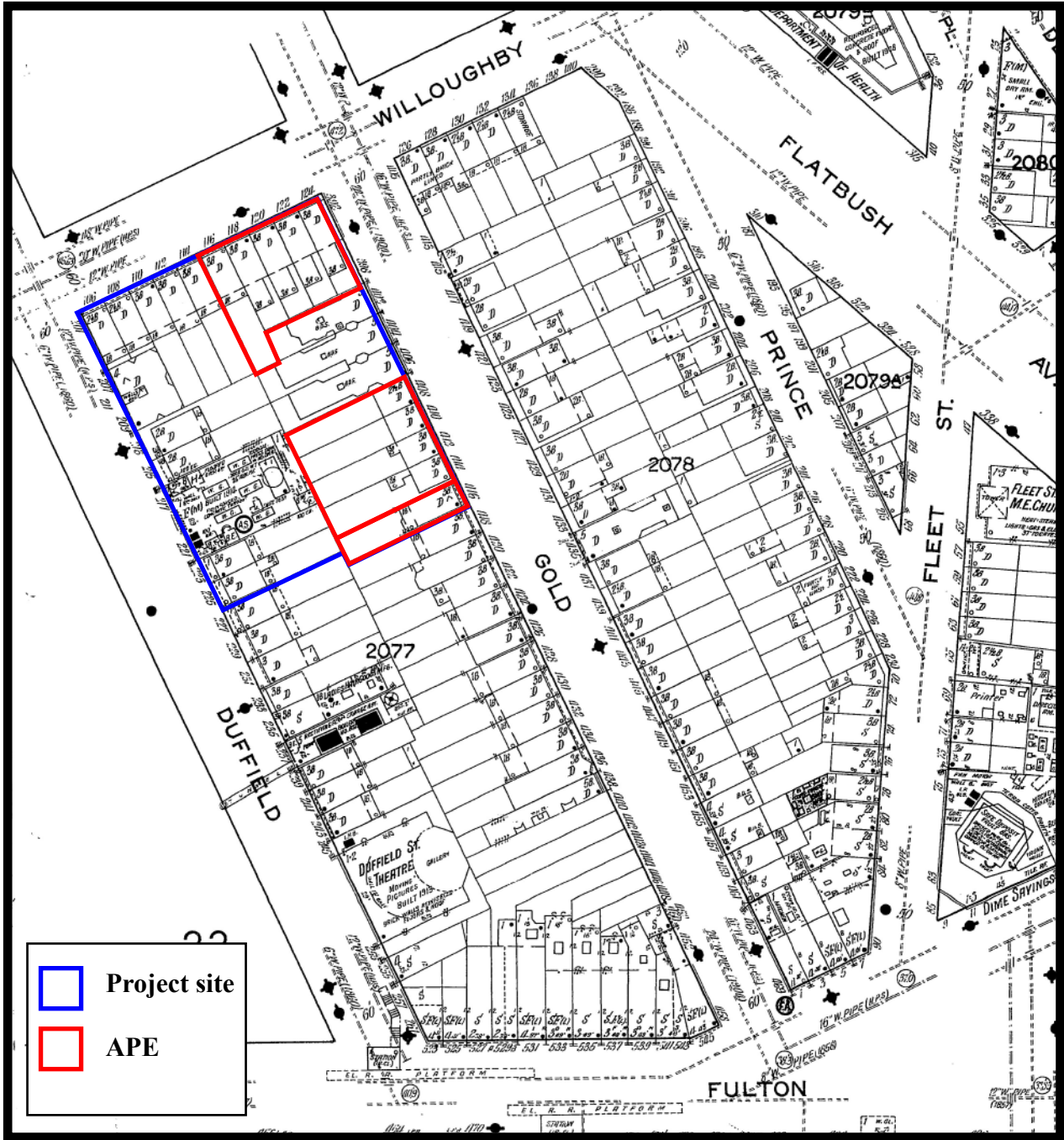


Figure 9: Project site and APE on *Insurance Maps of Brooklyn, New York* (Sanborn 1904).

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Phase IA Archaeological Documentary Study
 Willoughby Square Park Project, Brooklyn, New York 11201
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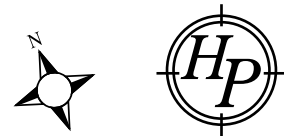
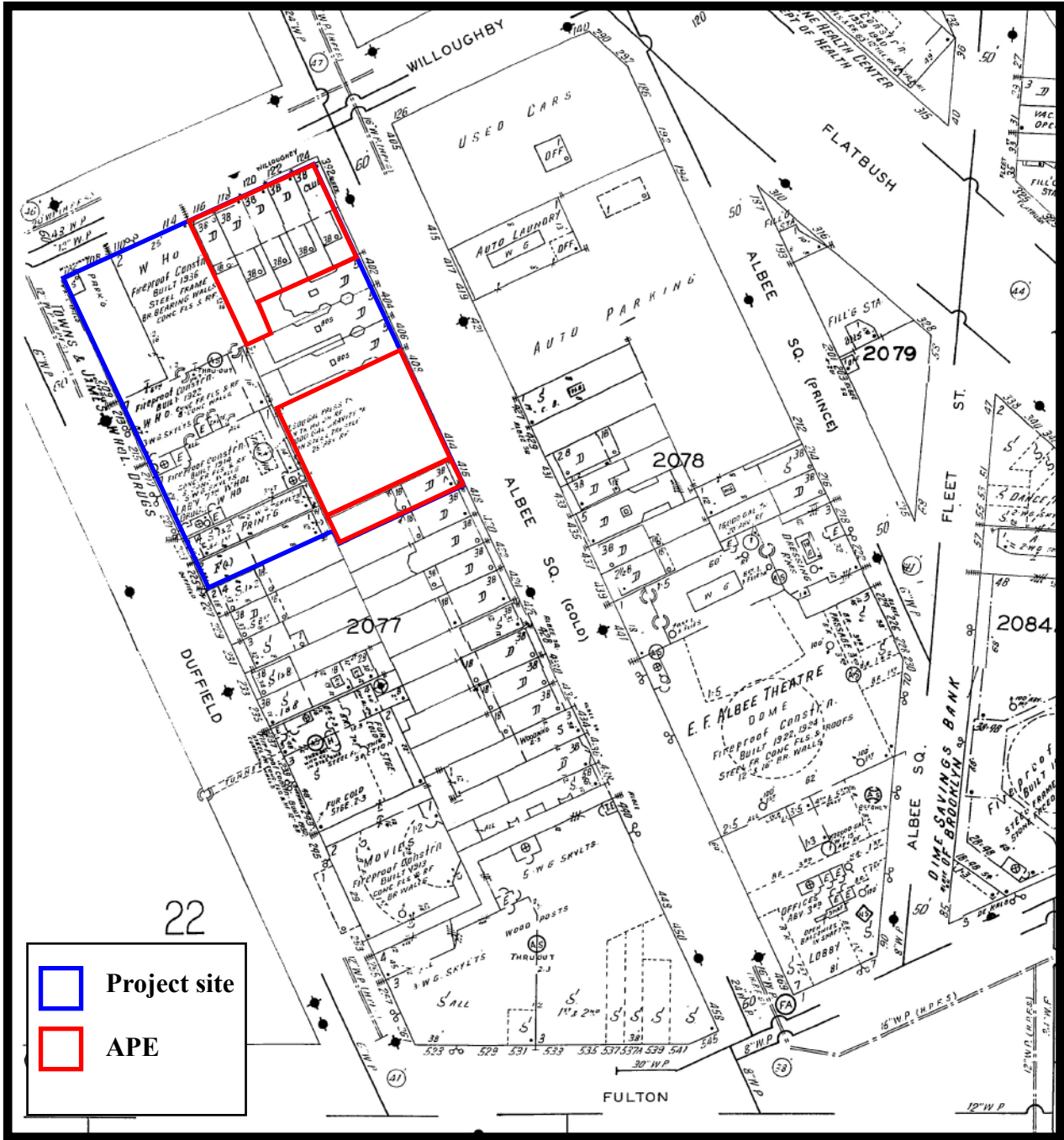


Figure 10: Project site and APE on *Insurance Maps of Brooklyn, New York* (Sanborn 1915).

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 Willoughby Square Park Project, Brooklyn, New York 11201
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 Block 146, Lots 29, 37 and 41

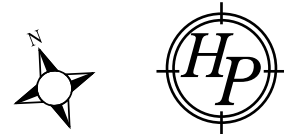
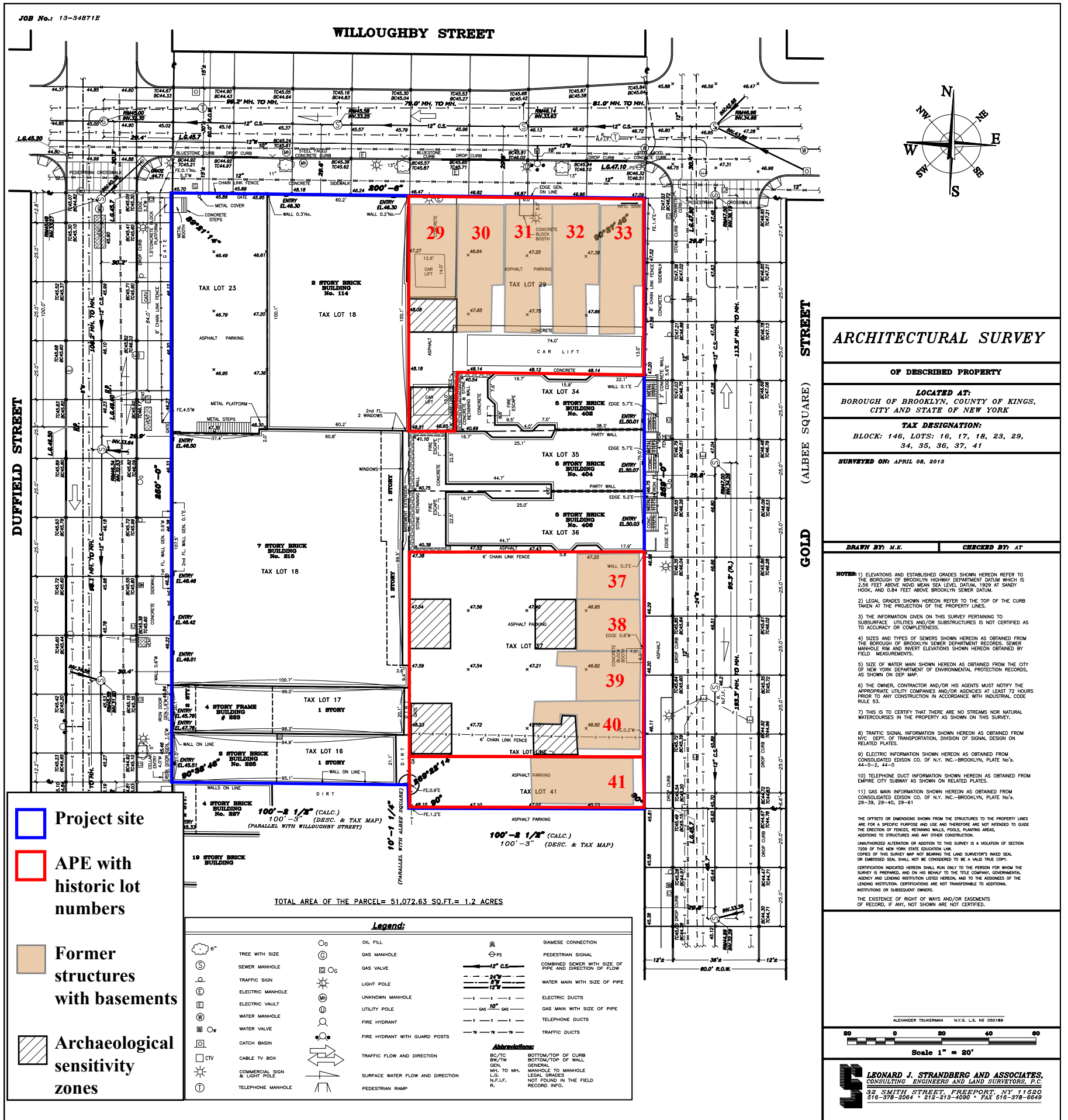


Figure 11: Project site and APE on *Insurance Maps of Brooklyn, New York* (Sanborn 1950).

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Figure 12: Project site, APE and archaeological sensitivity zones on modern survey (HPI and Leonard J. Strandberg and Associates 2013).





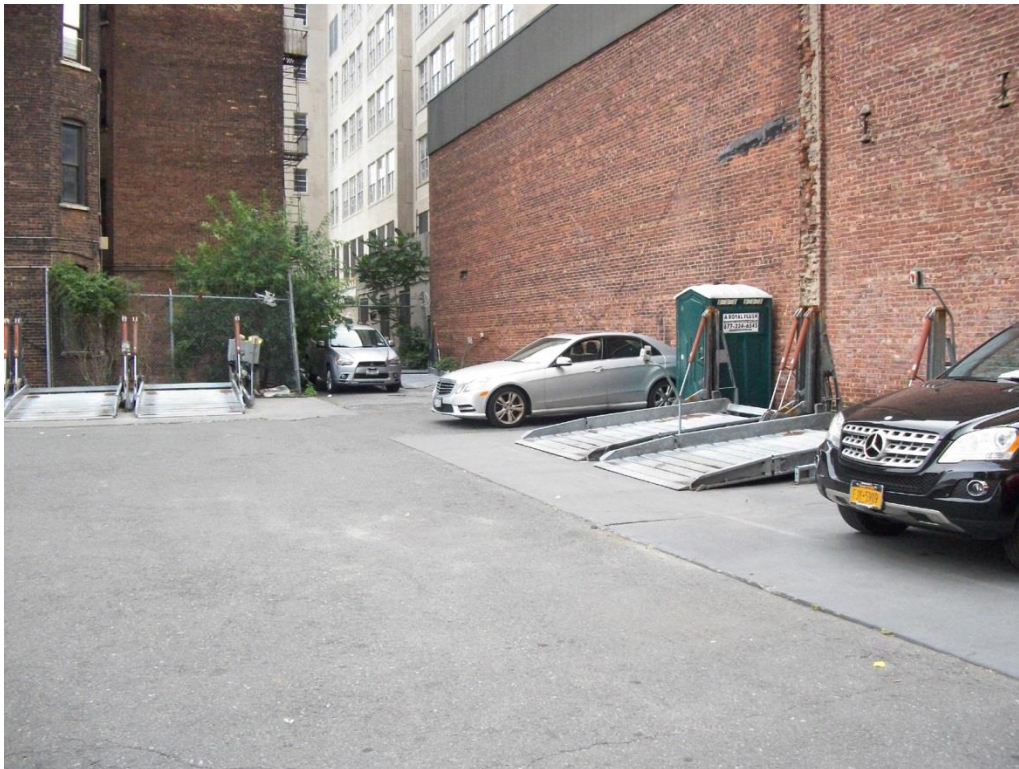
Photograph 1: Lot 29 parking lot. View looking southwest from intersection of Willoughby and Gold Streets.



Photograph 2: Interior of Lot 29 parking lot showing attendant's booth next to white van in right rear. View looking northeast toward intersection of Willoughby and Gold Streets.



Photograph 3: Interior of Lot 29 parking lot showing lifts on left and right rear. Outline of former building visible on existing building near lifts in right rear. View looking west.



Photograph 4: Interior of Lot 29 parking lot showing lifts in left rear, center rear (car parked on one) and right. Outline of former building visible on existing building near lifts on right. View looking southwest.



Photograph 5: Interior of Lot 29 parking lot showing lifts in rear. Outline of former building visible on existing building near lifts in rear. View looking northwest.



Photograph 6: Sunken yard of adjacent Lot 35 with retaining wall. Lot 37 of APE is visible in far background. View looking south from southwest corner of Lot 29.



Photograph 7: Lot 37 parking lot with attendant's booth on left. Buildings facing Duffield Street are in background. View looking west from Gold Street.



Photograph 8: Lot 37 parking lot with attendant's booth in center. Buildings facing Duffield Street are in background. View looking southwest from Gold Street.



Photograph 9: Interior of Lot 37 parking lot showing patched pavement. View looking east toward Gold Street.



Photograph 10: Sunken yard of adjacent Lot 36 with retaining wall. Lot 29 of APE is visible in far background. View looking north from northwest corner of Lot 37.



Photograph 11: Lot 41 parking lot. Buildings facing Duffield Street are in right background. View looking southwest from Gold Street.



Photograph 12: Lot 41 parking lot with Lot 37 parking lot in rear. Note exposed foundation remains in foreground. View looking northwest from Gold Street.



Photograph 13: Lot 41 showing detail of exposed foundation remains in foreground. View looking west from Gold Street.



Photograph 14: Lot 41 showing detail of exposed foundation remains in foreground. View looking west from Gold Street.

APPENDIX A: INDIVIDUAL LOT HISTORIES

APE lots are presented beginning with the west side of modern Lot 29 and continuing clockwise around the block, using historic lot designations. Farm map lots are indicated in italics.

Block 146 (former Block 2077), modern Lot 29, historic Lot 29, portion of Farm Map Lot 465, 94 Willoughby Street to ca. 1870, 116 Willoughby Street, Ward 5

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1843	Martenus Bergen William Lawrence (Assignees for Susan Lawrence)	Archibald T Lawrence				Lot 29, 100x20 (western 20' of 465); Liber 113/34
1844	Archibald T Lawrence	Calvin Flint-Spear	Charles Barnes, clerk, NY, h. Willoughby n. Gold (could also be 100 Willoughby)			Lot 29, Liber 118/148
1845	Calvin Flint and Jane B Spear	John Disson or Dirrane?				Lot 29, Liber 134/308
1846	John and Margaret Disson or Dirrane?	Charles L Barnes	Charles Barnes, clerk, NY, h. Willoughby n. Gold (could also be 100 Willoughby)			Lot 29, Liber 156/101
1848-49			Sarah N. Degraw, widow Aaron Degraw, Gold n. Willoughby			No Degraws on lot in earlier directory years
1849	Charles L and Ann Louisa Barnes	Sarah M Degraw, widow				Lot 29, Liber 263/125, recorded 1851
1850			Sarah M. Degraw	unclear		
1855				Robert O. Cromwell, 27, broker, wife Adaline, 3 children, 2 servants, brick house		
1856	Executors of Sarah M Degrauw	Cornell Samuel Franklin	Robert O. Crommelin, broker			Lot 29, Liber 417/209
1858	Euphemia Degrauw (Not as heir)	Quit Claim Cornell Samuel Franklin	Mrs. S. Fraser, widow			Lot 29, Liber 471/350
1860				Cornell Franklin, 54, Dep. Nav. off., wife Caroline, another female relative, 2 servants		
1862			Thomas Barrows, stoves Cornell Franklin, Custom House			
1867			Cornell S. Franklin, c.h.			

APPENDIX A: INDIVIDUAL LOT HISTORIES

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1867-1879					C.F. Franklin, 1 house, 2.5 or 3 stories, value ranges from \$3000-3800	
1870			Cornell S. Franklin, dep. naval officer George Lamb, u.s.n.	John Franklin, 60, wife Ann, 1 servant		Lamb widower of Franklin's daughter (NYT 9/12/1862)
1871			C.S. Franklin, c.h.			
1876			Cornell S. Franklin			
1880	Cornell S and Caroline B Franklin	Joanna Smith	Cornelius S. Franklin	William Green, 47, laborer, wife Bridgett, 1 child		Lot 29, Liber 1402/491
1880-1899					Joanna Smith, 1 house, 3 stories, value ranges from \$3800-4500	Joanna Smith was the sister-in-law of William Q. Judge, who lived at 116 Willoughby from 1882 until at least 1891. Joseph Smith was his father-in-law. Judge was one of the founders of the Theosophical Society in 1875.
1882			William Q. Judge, lawyer Joseph Smith			
1885			William Q. Judge, lawyer Alfred Hall, bkkpr. Joseph Smith			
1889			William Q. Judge, lawyer Alfred Hall, bkkpr. Joseph Smith			
1900				Jane J. Krogen, 53, head, 4 adult children Joseph Smith, 92, retired, daughter Johanna, 70		William Q. Judge died in 1896.

Block 146 (former Block 2077), modern Lot 29, historic Lot 30, portion of Farm Map Lots 465 and 466, 96 Willoughby Street to ca. 1870, 118 Willoughby Street, Ward 4

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1843	Martenus Bergen William Lawrence (Assignees for Susan Lawrence)	Samuel Willets				466-468, part 465 (30-33, part 34), Liber 110/230

APPENDIX A: INDIVIDUAL LOT HISTORIES

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1844	Samuel and Phebe Fleet	Amos Willets	Cornell Franklin, Willoughby near Gold (first year listed)			Triangular lot on Gold St 67°11”S (part of 33/34), Liber 119/423
1845						C.S. Franklin, Executive Committee for Society for Improving the Condition of the Poor, noted as living on Willoughby near Gold Street (BDE 12/3/1845)
1848	Samuel and Sarah H Willets	Amos Willets				466-468, part 465 (30-33, part 34), Liber 463/463, recorded 1857
1848-49			C.S. Franklin, custom house officer			C.S. Franklin at 96 Willoughby, taking contributions for St. Thomas Church fair (BDE 12/6/1849)
1850			C.S. Franklin, custom house	Cornell S. Franklin, 38, custom house, wife Cornelia L. 1 child, adult Charity Cornell		Girl to do housekeeping wanted for 3-person family at 96 Willoughby (BDE 5/23/1850)
1855				Cornell S. Franklin, 43, custom office deputy, wife Caroline L., 1 child, 2 servants, brick house		
1856			Cornell S. Franklin, U.S.N.			
1858			Cornell S. Franklin, deputy c.h.			
1860				unclear		
1864	Amos Willets (Widow of) [Phebe Willets]	Quit Claim: Mary W Wright				80x100, now includes triangle along Gold St (Lots 30-34), Liber 647/453
1864	Daniel T and Elizabeth J Willets (Not as heirs)	Mary W Wright				Same as 647/453 (notation: “All the undivided one half”), Liber 647/652

APPENDIX A: INDIVIDUAL LOT HISTORIES

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1867			Catherine F. Ringwood, teacher			Cornell Franklin now at 94 Willoughby
1867-1887					Amos Willets, 1 house, 2.5 or 3 stories, value ranges from \$3000-3700, addition built in 1885, then value at \$5500	Room and board offered on second and third floors (BDE 9/1/1868), second ad notes house has hot and cold water, bath and gas (BDE 11/20/1868)
1870				Ann Douglas, 38, keeping house, daughter Georgiana George W. Ryer, clerk in P.O., wife and daughter Susan See, 76 George E. Hale, law student John Cooney, lawyer Peter Mussoe?, butcher		
1871			Elizabeth Douglass, wid. George Ryer, clk.			Catherine Ringwood elsewhere
1876			Lucius G. Brewster Charles Close, clk Ann E. Douglass, wid. Hezekiah Georgie Douglass, artist Augustus MacFarland, clk			Lucius Brewster formerly at 120 Willoughby, has moved to 123 Willoughby by 1879
1880			Elizabeth Douglass, wid. Henry Georgiana Douglass, artist Joseph Kene, physician (work) Edward Stearns, Jr., lighters	Francis W Spek (Speck), 74, clerk, wife Margaretta, 2 children, 1 boarder, 2 grandchildren		
1885			nothing			Kene, Speck, Stearns elsewhere
1888-1899					Mary W. Wright, 1 house with addition, 3 stories, value ranges from \$5500-6700	
1889			Alonzo J. Burton, tel. oper Roy Burton, printer			

APPENDIX A: INDIVIDUAL LOT HISTORIES

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1900				Ruth E. Wheeler, 59, boarding house, 3 boarders		

Block 146 (former Block 2077), modern Lot 29, historic Lot 31, portion of Farm Map Lots 466 and 467, 98 Willoughby Street to 1870, 120 Willoughby Street, Ward 3

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1843	Martenus Bergen William Lawrence (Assignees for Susan Lawrence)	Samuel Willets	Rufus Mead, Willoughby near Gold (first year listed)			466-468, part 465 (30-33, part 34), Liber 110/230
1844	Samuel and Phebe Fleet	Amos Willets	Rufus Mead, Willoughby near Gold			Triangular lot on Gold St 67°11'S (part of 33/34), Liber 119/423
1846-47			Rufus Mead, Willoughby near Gold			
1848	Samuel and Sarah H Willets	Amos Willets				466-468, part 465 (30-33, part 34), Liber 463/463, recorded 1857
1848-49			Rufus Mead, merchant			
1850				unclear		
1855				Ann Barton, 63, son John C. Barton, 33, merchant, and wife Ann S., 2 other children, brick house		
1856			John C. Barton, com. mer.			Lost dog, return to John C. Barton at 98 Willoughby (BDE 4/11/1856)
1858			John C. Barton, imp.			
1860				no listing for Barton found		
1862			John C. Barton, importer John C. Burton (sic?), hardware			
1863			John C. Barton			Barton moves to 302 Gold after 1863
1864	Amos Willets (Widow of) [Phebe Willets]	Quit Claim: Mary W Wright				80x100, now includes triangle along Gold St (Lots 30-34), Liber 647/453

APPENDIX A: INDIVIDUAL LOT HISTORIES

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1864	Daniel T and Elizabeth J Willets (Not as heirs)	Mary W Wright				Same as 647/453 (notation: "All the undivided one half"), Liber 647/652
1867			Lucius Brewster, watchmkr			John C. Barton, hardware, now at 302 Gold
1867-1887					Amos Willets, 1 house, 2.5 or 3 stories, value ranges from \$3000-3700, addition built in 1885, then value at \$5500	
1870				Margaret McWilliams, 54, keeping house, son James, 24, shipping clerk, daughter Isabel, 26 Lucius Brewster, 42, watch case maker, wife Julia, 1 son, servant		
1871			L.G. Brewster Margaret McWilliam, wid.			
1875			L.G. Brewster, watchmaker			
1876						Lucius Brewster moves to 118 Willoughby (still at 120 as of 1875), McWilliam elsewhere
1880			Denis McNamara, depy city clk.	Denis McNamary (<i>sic</i>), 41, clerk, wife Catherine, 2 children, servant, aunt Christine? Edgerton Samuel Martin, 44, bookkeeping, wife Annie, 2 children		
1885			nothing			McNamara, Martin elsewhere
1888-1899					Mary W. Wright, 1 house with addition, 3 stories, value ranges from \$5500-6700	

APPENDIX A: INDIVIDUAL LOT HISTORIES

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1889			William E. Belger, machinist George W. Hadden, jeweler			
1900				Elizabeth Boyle, 50, boarding house, grandson, servant, 6 boarders		

Block 146 (former Block 2077), modern Lot 29, historic Lot 32, portion of Farm Map Lots 467 and 468, 100 Willoughby Street to ca. 1870, 122 Willoughby Street, Ward 2

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1843	Martenus Bergen William Lawrence (Assignees for Susan Lawrence)	Samuel Willets	Charles Barnes not listed			466-468, part 465 (30-33, part 34), Liber 110/230
1844	Samuel and Phebe Fleet	Amos Willets	Charles Barnes, clerk, NY, h. Willoughby n. Gold (could also be 94 Willoughby)			Triangular lot on Gold St 67' 11"S (part of 33/34), Liber 119/423
1846-47			Charles Barnes, clerk, NY, h. Willoughby n. Gold (could also be 94 Willoughby)			
1848	Samuel and Sarah H Willets	Amos Willets				466-468, part 465 (30-33, part 34), Liber 463/463, recorded 1857
1848-49			Charles T. Barnes, hardware dealer			Charles L. Barnes noted as living at 100 Willoughby (BDE 3/8/1848)
1850			Charles T. Barnes, hardware dealer; Eliza Cromwell, widow	Charles L. Barnes, 32, merchant, wife Ann L., 4 children, Eliza Cromeline, Sarah Scott		
1855				William D. Dupont, 55, broker, wife Mary Ann, 9 children, servant brick house		
1856			William D. Dupont, insurance J.K. Post, painter Abner W. Spooner, broker			

APPENDIX A: INDIVIDUAL LOT HISTORIES

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1858			W.D. Dupont, bookkeeper, John G. Mather, express, Joel K. Post, shipjoiner			
1860				unclear		
1862			Isaac M. Coffin, broker John F. Coffin, gauger			J.K. Post, shipcarpenter, now listed at Gold c. Willoughby, Spooner elsewhere
1864	Amos Willets (Widow of) [Phebe Willets]	Quit Claim: Mary W Wright				80x100, now includes triangle along Gold St (Lots 30-34), Liber 647/453
1864	Daniel T and Elizabeth J Willets (Not as heirs)	Mary W Wright				Same as 647/453 (notation: "All the undivided one half"), Liber 647/652
1867			John F. Coffin, gauger			Room and board offered by private family (BDE 6/14/1867)
1867-1887					Amos Willets, 1 house, 2.5 or 3 stories, value ranges from \$3000-3700, addition built in 1885, then value at \$5500	
1870				John Coffin, 73, gauger, wife Elizabeth, 2 children George Woolsey, butter dealer Wm Meldrum, lawyer's clerk John Layton, merchant, and 2 sons		
1871			John F. Coffin, gauger Richard Layton, Jr, clk			
1873			John F. Coffin (off APE after 1873) William Meldren, clk. B. Whittaker, grainer			
1876			Benj. Whittaker, grainer			John F. Coffin elsewhere

APPENDIX A: INDIVIDUAL LOT HISTORIES

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1877			Benj. Whittaker, grainer Mary Whittaker, principal			
1880			Michael O'Brien hatter	Job Tanner, 40, clerk, wife Eliza, 2 children, parents Susan and John Van Allen Abraham Brooks, 42, engineer, wife Mary, 3 children		Benj. Whittaker elsewhere
1881			Job Tanner, clk Abraham Brooks, engineer			
1884			Job Tanner, clerk			Abraham Brooks elsewhere
1885			nothing			Michael O'Brien elsewhere, Job Tanner on Duffield
1887			Sarah Bermingham, wid. John James Bennett, machinist			
1888-1899					Mary W. Wright, 1 house with addition, 3 stories, value ranges from \$5500-6700	
1889			John M. Morell, upholsterer			
1894			Walter I. Hair, artist			
1900				Walter I. Hair, 61, artist, wife Elizabeth H., servant, niece, 6 boarders		

Block 146 (former Block 2077), modern Lot 29, historic Lot 33, portion of Farm Map Lot 468, 102 Willoughby Street to ca. 1870, 124 Willoughby Street, Ward 1

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1843	Martenus Bergen William Lawrence (Assignees for Susan Lawrence)	Samuel Willets				466-468, part 465 (30-33, part 34), Liber 110/230
1844	Samuel and Phebe Fleet	Amos Willets				Triangular lot on Gold St 67' 11"S (part of 33/34), Liber 119/423
1848	Samuel and Sarah H Willets	Amos Willets				466-468, part 465 (30-33, part 34), Liber 463/463, recorded 1857

APPENDIX A: INDIVIDUAL LOT HISTORIES

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1848-49			Jane Winslow, widow, John Roome, carpenter R.J. Crommelin, broker			
1850			Joseph Roberts; Jane Winslow	Joseph Roberts, 35, book seller, wife, 2 other women		
1855				John Moffett, 39, merchant, wife Jane M., Wm B. Winslow, stepson, 2 more stepchildren, 2 children, servant Concklin Bishop, 25, carpenter, wife Elizabeth frame house		Abner Spooner/ Joel K. Post and John Moffett/Conklin Bishop are listed next to each other, but as frame houses (may be off APE). Abner W. Spooner, 45, merchant, wife Harriet, 3 children, 1 servant Joel K. Post, 56, ship joiner, wife Louisa W., brother-in-law Robert J. Van Valen?, 38, ship joiner, wife Jenette, 1 child, frame house
1856			Conklin Bishop, carpenter John Moffatt, tailor			
1858			Conklin W. Bishop, shirt front manuf.			
1860				unclear		W.M. Winslow, Principal of Winslow's Institute, home at 102 Willoughby (BDE 9/10/1860)
1862			John Moffat, tailor L. Wilkins, agent Lemuel Wilkins, traveler William Winslow, teacher			Conklin Bishop off APE by 1862
1864	Amos Willets (Widow of) [Phebe Willets]	Quit Claim: Mary W Wright	John Moffat, Lemuel Wilkins (William Winslow now off APE)			80x100, now includes triangle along Gold St (Lots 30-34), Liber 647/453

APPENDIX A: INDIVIDUAL LOT HISTORIES

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1864	Daniel T and Elizabeth J Willets (Not as heirs)	Mary W Wright				Same as 647/453 (notation: "All the undivided one half"), Liber 647/652
1865			James Briggs, clerk John Flint, clerk John Moffatt, tailor Henry T. Winslow, clerk Rosa Wilkins, wid.			Boarding offered at 102 Willoughby (BDE 7/27/1865), other similar offers in 1866 and 1867
1867			J.M. Moffat Charles H. Watkins Jr., agent Rosa Wilkins, wid. Henry J. Winslow, clerk			
1867-1887					Amos Willets, 1 house, 2.5 or 3 stories, value ranges from \$3000-3700, addition built in 1885, then value at \$5500	
1870				William Stevens, 47, storekeeper "Custom House," wife Amanda, daughter Elizabeth A.W. Shepard, 35, physician, Alfred Faye, 18, office boy		A.W. Shepard, doctor, at 102 Willoughby (BDE 7/27/1870)
1871			George F.M. Park, real estate William Stevens, c.h. Henry J. Winslow, clk. A.W. Shepard, physician (work)			
1876			Isaac W. Carter, driver A. Warner Shepard, physician (work)			George Park elsewhere
1880			Isaac W. Carter, coachman A. Warner Shepard, physician (work)	Isaac W. Carter, 38, coachman, wife Lucinda?, 1 son, sister-in-law Emma R. Hewlett, age 10 (all listed as black except for Emma Hewlett)		

APPENDIX A: INDIVIDUAL LOT HISTORIES

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1882			Joseph Jukes, carpenter A. Warner Shepard, physician (work)			Isaac Carter elsewhere after 1881
1885			Joseph Jukes, supt.			Shepard now at 126 Willoughby
1888-1899					Mary W. Wright, 1 house with addition, 3 stories, value ranges from \$5500- 6700	
1889			Joseph Jukes, collector			
1897			Jos. K. Blyler, boarding John A. Holmes P.J.C. McKenzie. H'y C. Zenke Otto H. Zenke			Mary Wright living elsewhere
1900				1 servant, 7 boarders		possibly associated with 118 or 122 Willoughby as boarding house, since no head of household listed

Block 146 (former Block 2077), modern Lot 37, historic Lot 37, portion of Farm Map Lot 111, 306 Gold Street to ca. 1870, 408 Gold Street, Ward 51

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1848-49			Robert F. Cox, saddler, Gold c. Willoughby			
1856			George Jennison, forwarder			1882
1858			William Wright, manufacturer fancy goods Robert F. Cox, saddler			
1860				unclear		
1862			E.H. Cheshire, sec. ins.			
1865	Devises of Samuel Fleet	Araminta F Houston				Lot 37, Liber 677/267
1867			William Cuff, upholsterer William H. Tyler, tobacconist			E.H. Cheshire now at 45 Fleet
1867-1873					A.T. Houston, 1 house, 2.5 or 3 stories, value ranges from \$2600-3300	

APPENDIX A: INDIVIDUAL LOT HISTORIES

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1870				William H. Tyler, 36, tobacconist, wife Elizabeth, 3 children, mother Douglass Gregory, 25, bookkeeper, wife Annie B.		Lease offered of second and third floor of 306 Gold, hot and cold water and bath noted (BDE 3/30/1870)
1871			William H. Tyler (last year on APE)			William Cuff now at 308 Gold
1872			John A. Fountain, letter carrier			
1874-1899					Mrs. A.T. Baxter, 1 house, 2.5 or 3 stories, value ranges from \$3000-2800	
1876			Charles E. Griswold, physician (work) John Parsons, carpenter			William Tyler elsewhere
1880			Caspar Borneman, janitor Abel H. Byers, hatter	no entry for 408 Gold St.		Griswold's home and office now at 412 Gold
1885			George H. Fitchett, manager			Borneman elsewhere
1889			John Keating, conductor Jane Lightbody, wid. George M. John MacCormick, salesman William F. MacCormick, bkkpr. John J. MacCormick, clk. Charles Van Clief, clk.			Fitchett elsewhere
1900				Chas. Allenberg, 39, chandelier mfr, wife Mary, 7 children, John Bisell, boarder		

Block 146 (former Block 2077), modern Lot 37, historic Lot 38, portion of Farm Map Lots 111 and 110, 308 Gold Street to ca. 1870, 410 Gold Street, Ward 50

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1848-49			J.H. Havens, commission merchant (first year listed)			

APPENDIX A: INDIVIDUAL LOT HISTORIES

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1850			J.H. Havens, commission merchant	J.H. Havens, 45, C. merchant, wife Harriet, 1 child, 1 other adult		
1855				Joseph Stockbridge, 34, wine merchant, wife Amanda, 2 children, servant, frame house		
1856			Joseph Stockbridge, merchant			Burglary at 308 Gold, occupant noted as Joseph Tallbridge (sic?) (BDE 1/3/1856)
1858			Joseph Stockbridge, wine merchant			
1860				Lesper Cheser?, 26, cler, wife Sarah, 2 children, 2 other adult women, servant Jos. Stockbridge, 39, merchant, wife Amanda, 2 children, servant		
1862			Joseph Stockbridge, liquors			
1865			Joseph Stockbridge, wines (last year on APE)			
1867			Mathew W. Aylwin, clerk			Woman looking for housekeeping work, 308 Gold (BDE 7/11/1867)
1868						Upper part of house to let at 308 Gold, water, gas, bathroom privileges (BDE 4/13/1868)
1867-1889					O.S. Fleet, 1 house, 2.5 or 3 stories, value ranges from \$2600-3000	
1870				James Winans, 24, hardware retail, wife Johanna E. Peter Cuff, 35, dealer in furniture, wife Eliza, 1 son		Parlor rooms, basement and attic rooms to let at 410 (308) Gold (BDE 11/12/1870)

APPENDIX A: INDIVIDUAL LOT HISTORIES

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1871			William Cuff, furniture			formerly at 306 Gold, Aylwin elsewhere
1876			William H. Cain, agt. Truman B. White, sailmkr, u.s.n.			
1880			Walter P. Lewis, driver	Henry Tomkie (Tomke), 33, milkman, wife Caroline Walter Lewis, 30, drive truck, wife Emma, 1 child		Truman White elsewhere
1885			William Kennish, insp. Henry J. Press, corks			Walter Lewis, Henry Tomke elsewhere
1889			George Teasdale, glassblower			Press elsewhere, no Kennish
1890	Samuel Fleet (dec'd) Executors and Trustees of	Daniel M Kelly				Lot 38, Liber 1987/84
1890-1899					Daniel M. Kelly, 1 house, 2.5 or 3 stories, value is \$3000	
1897			Daniel M. Kelly, insurance			
1900				Dan'l M. Kelly , 40, coroner's office, wife Katharine, 3 children, servant		

Block 146 (former Block 2077), modern Lot 37, historic Lot 39, portion of Farm Map Lots 110 and 109, 310 Gold Street to ca. 1870, 412 Gold Street, Ward 49

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1848	Samuel Augustus and Margaret Willoughby	Casper H Kuhlke				Irreg parcel: rear of <i>107-109 (107 and 109 partial)</i> , Liber 180/90
1848-49			H.A. Norris, dealer in iron pipe; James Norris, salesman (first year listed)			
1850			H.A. Norris, dealer in iron pipe	unclear		Furniture sale at 310 Gold (BDE 3/25/1850)

APPENDIX A: INDIVIDUAL LOT HISTORIES

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1855	Casper H Kühlke Samuel Fleet	Agreement		Charles Remington, 27, Com. merchant, wife Jane L., 2 children, mother in law, servant, frame house		Boundary line at 213' south of Willoughby (Fleet to N, Kuhlke to S), middle of Lot 109, Liber 389/467; Fire in house occupied by Charles Remington, quickly extinguished (BDE 8/13/1855)
1856			Charles W. Remington, flour			
1857	John D and Harriet L Williams	William Potts				202'3" S of Willoughby, 22x100.3, 109 partial, Lot 39 partial, Liber 440/329
1858			Charles W. Remington, com. mer.			
1859						Father of Charles W. Remington is Rev. Stephen Remington, Pastor of Bedford Ave. Baptist Church (BDE 6/14/1859)
1860				Potter household		
1862			Phineas Potter, hardware (last year at this address)			
1867			John Peake, drugs			Phineas Potter now at 314 Gold; Housekeeper wanted at 310 Gold (BDE 9/5/1867)
1868						Protestant housekeeper wanted at 310 Gold (BDE 4/1/1868)
1867-1887					C.F. Sackett, 1 house, 2.5 or 3 stories, value ranges from \$2600-2700	
1870				unclear		Room and board offered at 310 Gold (BDE 9/2/1870)

APPENDIX A: INDIVIDUAL LOT HISTORIES

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1871			Gardner H. Kendall, provisions			
1876			Lucretia De Clue, dressmkr. (work) William De Clue, carpenter			
1880			Alfred C. Burton, clk. Charles E. Griswold, physician (home and work)	C.E. Griswold, 34, doctor, wife Charlotte, Joseph Barton, 59, manufacturing, 2 adult Barton children (Alfred C. Burton is son), all listed as one household		
1885	Emeline L Sackett (Exec of)	John J Hennessy	Chas. E. Griswold, physician			Lot 39 (412 Gold St), Liber 1617/309
1888-1899					John J. Hennessey, 1 house, 2.5 or 3 stories, value ranges from \$2600-3000	
1889			John J. Hennessy, cooper			Griswold at 453 Gold
1897			John Hennessy, cooper			
1900				John J. Hennessy, 45, cooper, wife Mary J., 3 children, 1 boarder George Perry, 45, supt. lamps, wife Agnes, 1 child		

Block 146 (former Block 2077), modern Lot 37, historic Lot 40, portion of Farm Map Lots 109 and 108, 312 Gold Street to ca. 1870, 414 Gold Street, Ward 48

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1843			Casper H. Kuhlke, Gold near Willoughby (first year listed)			
1844			Casper H. Kuhlke, Gold near Willoughby			
1846			Casper H. Kuhlke, Gold near Fulton			
1848	Samuel Augustus and Margaret Willoughby	Casper H Kuhlke				Irreg parcel: rear of 107-109 (107 and 109 partial), Liber 180/90
1848-49			Caspar H. Kuhlke, druggist			
1850			Caspar H. Kuhlke, druggist	Caspar Kuhlke, 50, clerk, wife Caroline, 4 children		

APPENDIX A: INDIVIDUAL LOT HISTORIES

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1854	Casper H Kühlke	Isaac Embrel William Williamson				107-108 partial (21x100), Liber 368/162
1855				Casper H. Kuhlke, 53, druggist, wife Eliza, 4 children, servant Alonzo Hopkins, 26, merchant, wife Mary, 1 child, servant frame house		
1856			Caspar H. Kuhlke			
1858			Robert R. Story, Jr., music teacher, S.B. Bowles, agent, John E. Luckey, plumber			
1860				John A. Luckey, 23, master plumber, wife Caroline, 1 child, servant Gilbert Mullon, 29, printer, wife Martha, 2 children Eckford Jacobs, 35, clerk, wife Caroline, 2 children		
1862			W.E. Hartt Alfred Weekes, carman			
1864			Harlow Fenn			
1865						Luke R. Salt at 312 Gold, B Co., 52nd Regiment (BDE 9/11/1865)
1866			Electus B. Calhoun, tinsmith			
1867	Executors of Casper H Kühlke	Catharine Sutherland (wife of James)	E.B. Calhoun, tinsmith I.B. Luddington, bookkeeper Daniel J. Salt, photographs Luke R. Salt, photographs			Lot 40 (213' S of Willoughby), Liber 765/428
1867	Elizabeth Kuhlke (wife of C.N. "Decd")	Release of Dower/Quit Claim Catharine Sutherland				Lot 40, 25x100 (312 Gold St), Liber 875/437

APPENDIX A: INDIVIDUAL LOT HISTORIES

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1867-1878					C.H. Kulkhe, 1 house, 2.5 or 3 stories, value ranges from \$2800-3800	
1868			James Sutherland			
1870				James Sutherland, 59, lawyer, wife Catherine, son Verplanck Harry C. Gourley, 28, clerk, wife Ella S., 1 daughter (as one household)		Room to let, 312 Gold (BDE 9/2/1870)
1871			James Sutherland, Jr., lawyer Verplanck Sutherland, clk Henry W. Gourley, clk			
1876			Harry W. Gourley, clk Catharine Sutherland, wid. James Verplanck Sutherland, bookkpr			
1879	Catharine Sutherland (widow of James)	Ella S Gourley (wife of Harrison W)				Lot 40, Liber 1352/223
1879-1895					Ella S. Gourley, 1 house, 2.5 or 3 stories, value ranges from \$3000-3300	
1880			Harrison W. Gourlay	H.W. Gourley, 40, naval officer, wife E.S., 1 child and C. Southerland (sic)		
1885			Harrison W. Gourlay, u.s.n. Catherine Sutherland, wid. Jas.			
1889			Harrison W. Gourlay, c.h.			
1896-1899					John F. Jordan, 1 house, 2.5 or 3 stories, value \$3300	
1897			Harrison W. Gourley, depy. naval officer			

APPENDIX A: INDIVIDUAL LOT HISTORIES

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1900				John S. Jordan, 46, inspector C.H., mother Bridget, 3 sisters, brother-in-law Wm. Vandergrift, 30, optician, wife Agnes, 1 child		

Block 146 (former Block 2077), modern Lot 41, historic Lot 41, portion of Farm Map Lots 108 and 107, 314 Gold Street to ca. 1870, 416 Gold Street, Ward 47

Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1844	Samuel and Phebe Fleet	Casper H Kuhlke				Lot 41 (108/109) exc rear triangle, Liber 119/125
1848	Samuel Augustus and Margaret Willoughby	Casper H Kuhlke				Irreg parcel: rear of 107-109 (107 and 109 partial), Liber 180/90
1848-49			nothing			
1850				unclear		
1854	Casper H Kuhlke	Isaac Embrel William Williamson				107-108 partial (21x100), Liber 368/162
1855	Caleb H and Amelia Baldwin	Frederika Caroline Haring		George Haring, 44, lithographer, wife Caroline F., 4 children, brick house		237'4" S of Willoughby, 21'10"x100' (107/108 partial), Liber 392/20
1856			George Hering, lithographer			
1857	Frederika Caroline and George Haring	Harriet Knapp				237'4" S of Willoughby, 21'10"x100' (107/108 partial), Liber 441/500
1858			F.W. Knapp, imp. wines			
1860				Joseph Williams, 46, clerk, wife Charlotte, 2 children, servant		
1861	Daniel A and Harriet A James (Not as heirs)	Thos. B Butler				Lot 41, Liber 659/244, recorded 1865
1862			Joseph P. Williams			
1863			Phineas Potter, hardware			
1866						Room to let, 314 Gold (BDE 4/28/1866)
1867			Phineas Potter, hardware			A suit (sic) of rooms to let at 314 Gold (BDE 3/30/1867)

APPENDIX A: INDIVIDUAL LOT HISTORIES

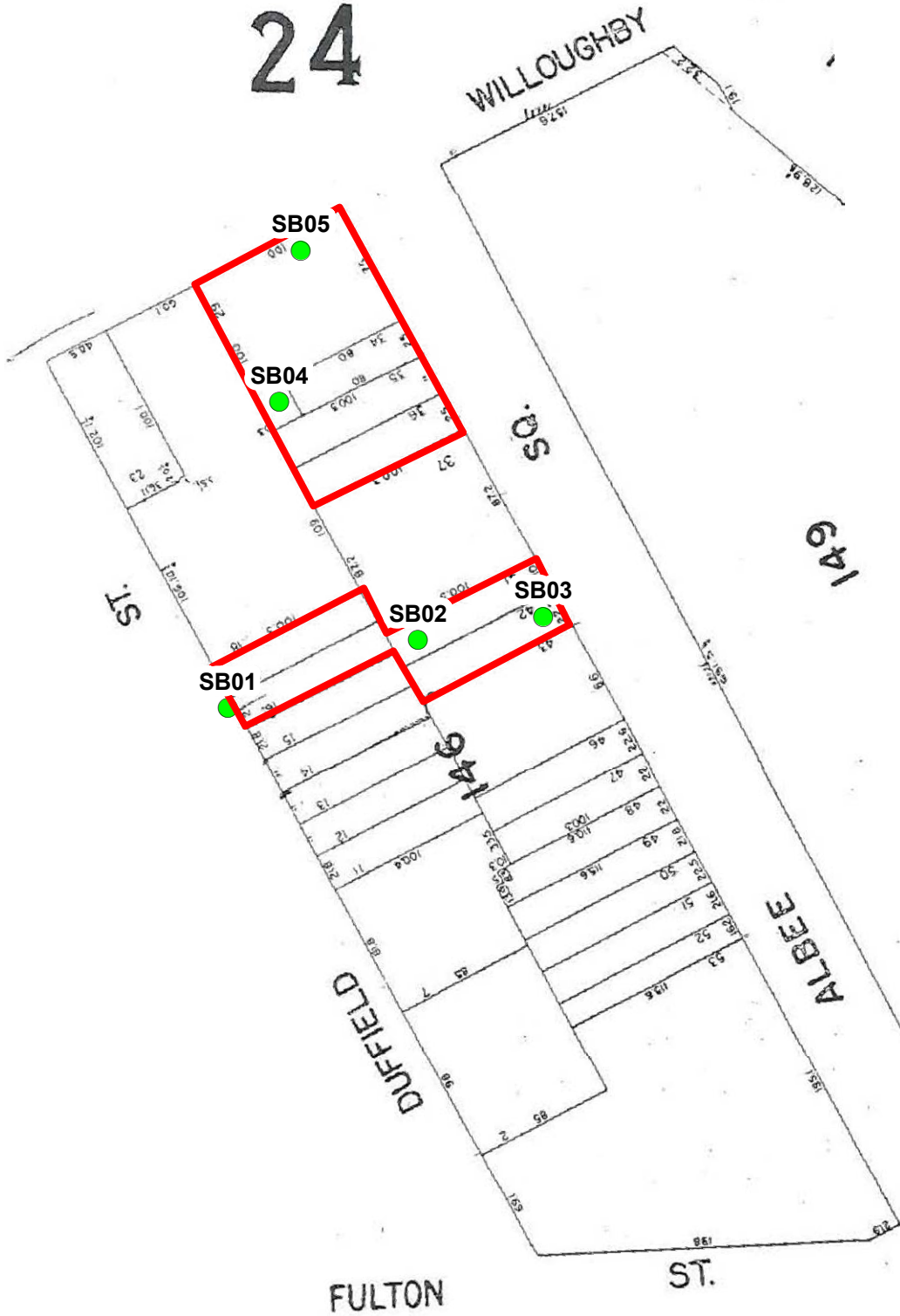
Year	Grantor	Grantee	City Directory	Census	Tax Assessment	Remarks
1869	Thomas B and Mary P.C. Butler	Annie W Knapp				Lot 41, Liber 1028/249, recorded 1872
1870				Phineas Potter, 49, hardware wholesaler, wife Louisa, daughters Helen and Harriet David Worthy, 44, die cutter, wife Mary		
1871			Phineas Potter, hardware			
1872	Annie W Knapp	Phineas Potter				Lot 41, Liber 1034/11
1867-1881					Harriett A. Jones, 1 house, 2.5 or 3 stories, value ranges from \$3000-3800	
1876			Phineas Potter, hardware			
1880	Phineas Potter (wife Harriet L Potter as Trustee)	Helen L Potter (equal undivided 1/2 part)				Lot 41, Liber 1414/265
1880	Helen L Potter	N. David Welts (as Trustee) Helen L Potter (Beneficiary)	Amos L. Richards, clk. Charles A. Richards, agt.	Harriet Potter, 48, daughter H.L. Potter		Lot 41, Liber 1414/269
1881	Helen Pearsall (wife of William) (Not as heir)	Harriet L Potter (all that equal undivided one half part) (formerly Helen L Pearsall)				Lot 41, Liber 1421/44
1882-1899					Harriett L. Potter, 1 house, 2.5 or 3 stories, value ranges from \$3800-4500	
1885			Charles E. Whitney, locks			both Richards elsewhere
1889			Francis Emmins, books Mary Reynolds, wid.			
1897			Wm. Hackett, corsetmfr.			
1900				Augusta White, 22, head, 2 children, sisters Anna, 47, and Emma, 45, Smith Rosie Joseph, 69, head, Amelia Joseph, daughter		

APPENDIX B
SOIL BORING DATA PROGRAMS



THE LOUIS BERGER GROUP (2008)
H2M GROUP (2008)

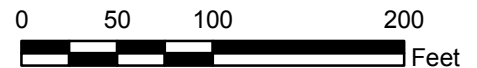


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Legend

-  Proposed Boring Location
-  Approximate Site Boundary





The Louis Berger Group, Inc.
199 Water Street, 23rd Floor
New York, NY 10038

Drilling Log

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BORING NO.: SB01

WELL NO.: N/A

CLIENT: New York City Economic Development Corporation

PROJECT NO.: KT200B0

PROJECT: Willoughby Square Phase II ESI

DATE STARTED: 4/9/2009

DRILLING CONTRACTOR: Zebra Environmental Corp.

DATE FINISHED: 4/9/2008

DRILLING METHOD: Vactron/Air Knife with Geoprobe Direct Push Sampling

DRILLER: J. Diamond

BOREHOLE DATA

WELL DATA

INSPECTOR: A. Trescott

Diameter (in): 2

Completion: N/A

NORTHING (ft): N/A

Total Depth (ft): 25

Total Depth (ft): N/A

EASTING (ft): N/A

Sampler: Macrocore

Screen Length (ft) /Slot (in): N/A

GROUND ELEVATION (ft): N/A

Depth to Water (ft): N/A

Depth to Water (ft): N/A

TOC ELEVATION (ft): N/A

Depth to Rock (ft): N/A

Permit No.: N/A

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	FID (ppm)	PID (ppm)	Description	Remarks
	0		Asphalt				N/A	Black (N1) ASPHALT; dry.	Asphalt
	1		FILL				N/A	Dark yellowish brown (10YR4/2) medium to fine SAND (with roadbase cobbles); moist.	Roadbase
	2								
	3		FILL				<1	Dark yellowish brown (10YR4/2) medium to fine SAND, little medium to fine Gravel; moist.	Sand (Fill)
	4								
	5		FILL				<1	Dark yellowish brown (10YR4/2) medium to fine SAND, little medium to fine Gravel; moist.	Composite sample SB01A collected from 3 to 13 ft bgs. Grab sample SB01A collected from 6 to 6.5 ft bgs.
	6		FILL				1.5	Dark yellowish brown (10YR4/2) medium to fine SAND, some medium to fine Gravel (brick fragments); moist.	
	7		FILL				<1	Dark yellowish brown (10YR4/2) medium to fine SAND, little medium to fine Gravel; moist.	
	8								
	9								
	10		FILL				<1	Dark yellowish brown (10YR4/2) to moderate yellowish brown (10YR5/4) medium to fine SAND, little medium to fine Gravel, trace Silt; moist.	
	11								
	12								
	13								
	14								



Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
	15		SM				<1	Moderate yellowish brown (10YR5/4) medium to fine SAND, some Silt, some medium to fine Gravel.	Silty Sand
	16								Composite sample SB01B collected from 15 to 20.5 ft bgs.
	17								
	18								
	19								
	20		SM				<1	Light brown (5YR5/6) to moderate yellowish brown (10YR5/4) medium to fine SAND, some Silt, little medium Gravel; moist.	Grab sample SB01B collected from 20.5 to 21 ft bgs.
	21								
	22								
	23								
	24								
	25								Refusal encountered at 25 ft bgs. End of boring at 25 ft bgs.



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New York, NY 10038

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BORING NO.: SB02

WELL NO.: N/A

CLIENT: New York City Economic Development Corporation

PROJECT NO.: KT200B0

PROJECT: Willoughby Square Phase II ESI

DATE STARTED: 4/9/2009

DRILLING CONTRACTOR: Zebra Environmental Corp.

DATE FINISHED: 4/9/2008

DRILLING METHOD: Vactron/Air Knife with Geoprobe Direct Push Sampling

DRILLER: J. Diamond

BOREHOLE DATA

WELL DATA

INSPECTOR: A. Trescott

Diameter (in): 2

Completion: N/A

NORTHING (ft): N/A

Total Depth (ft): 38

Total Depth (ft): N/A

EASTING (ft): N/A

Sampler: Macrocore

Screen Length (ft) /Slot (in): N/A

GROUND ELEVATION (ft): N/A

Depth to Water (ft): N/A

Depth to Water (ft): N/A

TOC ELEVATION (ft): N/A

Depth to Rock (ft): N/A

Permit No.: N/A

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	FID (ppm)	PID (ppm)	Description	Remarks
	0		Asphalt				N/A	Black (N1) ASPHALT; dry.	Asphalt
	1		FILL				<1	Dark reddish brown (10R3/4) to Dark yellowish brown (10YR4/2) medium to fine SAND (brick and concrete debris); moist.	Sand (Fill)
	2								
	3								
	4								
	5		FILL				<1	Light gray (N7) coarse GRAVEL; dry.	Composite sample SB02A collected from 5 to 16.5 ft bgs. Grab sample SB02A collected from 16.5 to 17 ft bgs.
	6		FILL				<1	Moderate yellowish brown (10YR5/4) to dark yellowish orange (10YR6/6) fine SAND, trace Silt; moist.	
	7								
	8								
	9								
	10		FILL				<1	Moderate yellowish brown (10YR5/4) medium to fine SAND, trace Silt, some coarse to fine Gravel; moist.	Gravelly Sand (Fill)
	11								
	12								
	13								
	14								
	15								



Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
	16		FILL				<1	Moderate yellowish brown (10YR5/4) medium to fine SAND, trace Silt, some coarse to fine Gravel; moist.	
	17		SM				<1	Moderate brown (5YR4/4) medium to fine SAND, some medium to fine Gravel; moist.	Gravelly Sand Composite sample SB02B collected from 17 to 37 ft bgs.
	18		SM				<1	Moderate brown (5YR4/4) medium to fine SAND, some medium to fine Gravel; moist.	
	19		SM				<1	Moderate brown (5YR4/4) medium to fine SAND, some medium to fine Gravel; moist.	
	20		SM				<1	Moderate brown (5YR4/4) medium to fine SAND, some medium to fine Gravel; moist.	
	21		SM				<1	Moderate brown (5YR3/4) coarse to fine SAND, some medium to fine Gravel; moist.	
	22		SM				<1	Moderate brown (5YR3/4) coarse to fine SAND, some medium to fine Gravel; moist.	
	23		SM				<1	Moderate brown (5YR3/4) medium to fine SAND, little coarse to fine Gravel; moist.	
	24		SM				<1	Moderate brown (5YR3/4) medium to fine SAND, little coarse to fine Gravel; moist.	
	25		SM				<1	Moderate brown (5YR3/4) medium to fine SAND, little coarse to fine Gravel; moist.	
	26		SM				<1	Moderate brown (5YR3/4) medium to fine SAND, little coarse to fine Gravel; moist.	
	27		SM				<1	Moderate brown (5YR3/4) to yellowish gray (5Y8/1) coarse to fine SAND, some medium to fine Gravel; moist.	
	28		SM				<1	Moderate brown (5YR3/4) to yellowish gray (5Y8/1) coarse to fine SAND, some medium to fine Gravel; moist.	
	29		SM				<1	Moderate brown (5YR3/4) coarse to fine SAND, some medium to fine Gravel; moist.	
	30		SM				<1	Moderate brown (5YR3/4) coarse to fine SAND, some medium to fine Gravel; moist.	
	31		SM				<1	Moderate brown (5YR3/4) coarse to fine SAND, some medium to fine Gravel; moist.	
	32		SM				<1	Moderate brown (5YR3/4) coarse to fine SAND, some medium to fine Gravel; moist.	
	33		SM				<1	Moderate brown (5YR3/4) coarse to fine SAND, some medium to fine Gravel; moist.	
	34		SM				<1	Moderate brown (5YR3/4) coarse to fine SAND, some medium to fine Gravel; moist.	
	35		SM				<1	Moderate brown (5YR3/4) medium to fine SAND, some coarse to fine Gravel; moist.	
	36		SM				<1	Moderate brown (5YR3/4) medium to fine SAND, some coarse to fine Gravel; moist.	
	37		SM				<1	Moderate brown (5YR3/4) medium to fine SAND, some coarse to fine Gravel; moist.	
	38		SM				<1	Moderate brown (5YR3/4) medium to fine SAND, some coarse to fine Gravel; moist.	Grab sample SB02B collected from 37 to 37.5 ft bgs. Refusal encountered at 38 ft bgs. End of boring at 38 ft bgs.



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New York, NY 10038

Drilling Log

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BORING NO.: SB03

WELL NO.: N/A

CLIENT: New York City Economic Development Corporation

PROJECT NO.: KT200B0

PROJECT: Willoughby Square Phase II ESI

DATE STARTED: 4/9/2009

DRILLING CONTRACTOR: Zebra Environmental Corp.

DATE FINISHED: 4/9/2008

DRILLING METHOD: Vactron/Air Knife with Geoprobe Direct Push Sampling

DRILLER: J. Diamond

BOREHOLE DATA

WELL DATA

INSPECTOR: A. Trescott

Diameter (in): 2

Completion: N/A

NORTHING (ft): N/A

Total Depth (ft): 25

Total Depth (ft): N/A

EASTING (ft): N/A

Sampler: Macrocore

Screen Length (ft) /Slot (in): N/A

GROUND ELEVATION (ft): N/A

Depth to Water (ft): N/A

Depth to Water (ft): N/A

TOC ELEVATION (ft): N/A

Depth to Rock (ft): N/A

Permit No.: N/A

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	FID (ppm)	PID (ppm)	Description	Remarks
	0		Asphalt				N/A	Black (N1) ASPHALT; dry.	Asphalt
	1		FILL				<1	Moderate yellowish brown (10YR5/4) to dark yellowish brown (10YR4/2) medium to fine SAND (few cobblestones); moist.	Gravelly Sand (Fill)
	2								
	3								
	4								
	5		FILL				<1	Moderate yellowish brown (10YR5/4) fine SAND; moist.	Sand (Fill)
	6								
	7								
	8								
	9								
	10		FILL				<1	Moderate yellowish brown (10YR5/4) fine SAND; moist.	Composite sample SB03A collected from 5 to 15.5 ft bgs. Grab sample SB03A collected from 15.5 to 16 ft bgs.
	11								
	12								
	13								
	14								



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BORING NO.: SB04

WELL NO.: N/A

CLIENT: New York City Economic Development Corporation

PROJECT NO.: KT200B0

PROJECT: Willoughby Square Phase II ESI

DATE STARTED: 4/8/2009

DRILLING CONTRACTOR: Zebra Environmental Corp.

DATE FINISHED: 4/8/2008

DRILLING METHOD: Vactron/Air Knife with Geoprobe Direct Push Sampling

DRILLER: J. Diamond

BOREHOLE DATA

WELL DATA

INSPECTOR: A. Trescott

Diameter (in): 2

Completion: N/A

NORTHING (ft): N/A

Total Depth (ft): 35

Total Depth (ft): N/A

EASTING (ft): N/A

Sampler: Macrocore

Screen Length (ft) /Slot (in): N/A

GROUND ELEVATION (ft): N/A

Depth to Water (ft): N/A

Depth to Water (ft): N/A

TOC ELEVATION (ft): N/A

Depth to Rock (ft): N/A

Permit No.: N/A

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	FID (ppm)	PID (ppm)	Description	Remarks
	0		Asphalt				N/A	Black (N1) ASPHALT; dry.	Asphalt
	1		Stone				N/A	Moderate reddish brown (10R4/6) Red Brick Roadbase; dry.	Roadbase
	1		FILL				<1	Moderate yellowish brown (10YR5/4) to Dark yellowish orange (10YR6/6) fine SAND, trace Silt (few cobbles); moist.	Sand (Fill)
	2								Composite sample SB04A collected from 0.25 to 10 ft bgs. Grab sample SB04A collected from 10.5 to 11.0 ft bgs. Sample DUP01 collected from SB04A.
	3								
	4								
	5		FILL				<1	Moderate yellowish brown (10YR5/4) to Dark yellowish orange (10YR6/6) fine SAND, trace Silt (few cobbles); moist.	
	6								
	7								
	8								
	9								
	10		FILL				<1	Moderate yellowish brown (10YR5/4) to Dark yellowish orange (10YR6/6) fine SAND, trace Silt; moist.	
	11		SP				<1	Moderate brown (5YR4/4) medium to fine SAND, some medium to fine Gravel; moist.	Gravelly Sand
	12								Composite sample SB04B collected from 11 to 31 ft bgs.
	13								
	14								



Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
	15		SP				<1	Moderate brown (5YR4/4) medium to fine SAND, some medium to fine Gravel trace Silt, some medium to fine Gravel; moist.	
	20		SP				<1	Moderate brown (5YR4/4) medium to fine SAND, some medium to fine Gravel; moist.	
	25		SP				<1	Moderate brown (5YR4/4) medium to fine SAND, some medium to fine Gravel; moist.	
	30		SP				<1	Moderate brown (5YR4/4) medium to fine SAND, some medium to fine Gravel; moist.	Grab sample SB04B collected from 31 to 31.5 ft bgs.
	35								Refusal encountered at 35 ft bgs. End of boring at 35 ft bgs.



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Drilling Log

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BORING NO.: SB05

WELL NO.: N/A

CLIENT: New York City Economic Development Corporation

PROJECT NO.: KT200B0

PROJECT: Willoughby Square Phase II ESI

DATE STARTED: 4/10/2009

DRILLING CONTRACTOR: Zebra Environmental Corp.

DATE FINISHED: 4/10/2008

DRILLING METHOD: Vactron/Air Knife with Geoprobe Direct Push Sampling

DRILLER: J. Diamond

BOREHOLE DATA

WELL DATA

INSPECTOR: A. Trescott

Diameter (in): 2

Completion: N/A

NORTHING (ft): N/A

Total Depth (ft): 34

Total Depth (ft): N/A

EASTING (ft): N/A

Sampler: Macrocore

Screen Length (ft) /Slot (in): N/A

GROUND ELEVATION (ft): N/A

Depth to Water (ft): N/A

Depth to Water (ft): N/A

TOC ELEVATION (ft): N/A

Depth to Rock (ft): N/A

Permit No.: N/A

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	FID (ppm)	PID (ppm)	Description	Remarks
	0		Asphalt				N/A	Black (N1) ASPHALT; dry.	Asphalt
	1		FILL				<1	Moderate yellowish brown (10YR5/4) fine SAND, trace Silt (brick and concrete debris); moist.	Sand (Fill)
	2								
	3								
	4								
	5		FILL				<1	Dark yellowish brown (10YR4/2) fine SAND, some medium to fine Gravel (brick and concrete debris); moist.	Gravelly Sand (Fill)
	6								Composite sample SB05A collected from 5 to 18.5 ft bgs. Grab sample SB05A collected from 18.5 to 19 ft bgs.
	7		FILL				<1	Moderate yellowish brown (10YR5/4) fine SAND some medium to fine Gravel (brick fragments); moist.	
	8								
	9								
	10		FILL				<1	Moderate yellowish brown (10YR5/4) to dark yellowish orange (10YR6/6) medium to fine SAND, some medium to fine Gravel (brick fragments); dry.	
	11								
	12								
	13		FILL				<1	Moderate yellowish brown (10YR5/4) medium to fine SAND, some medium to fine Gravel (brick fragments); moist.	
	14								

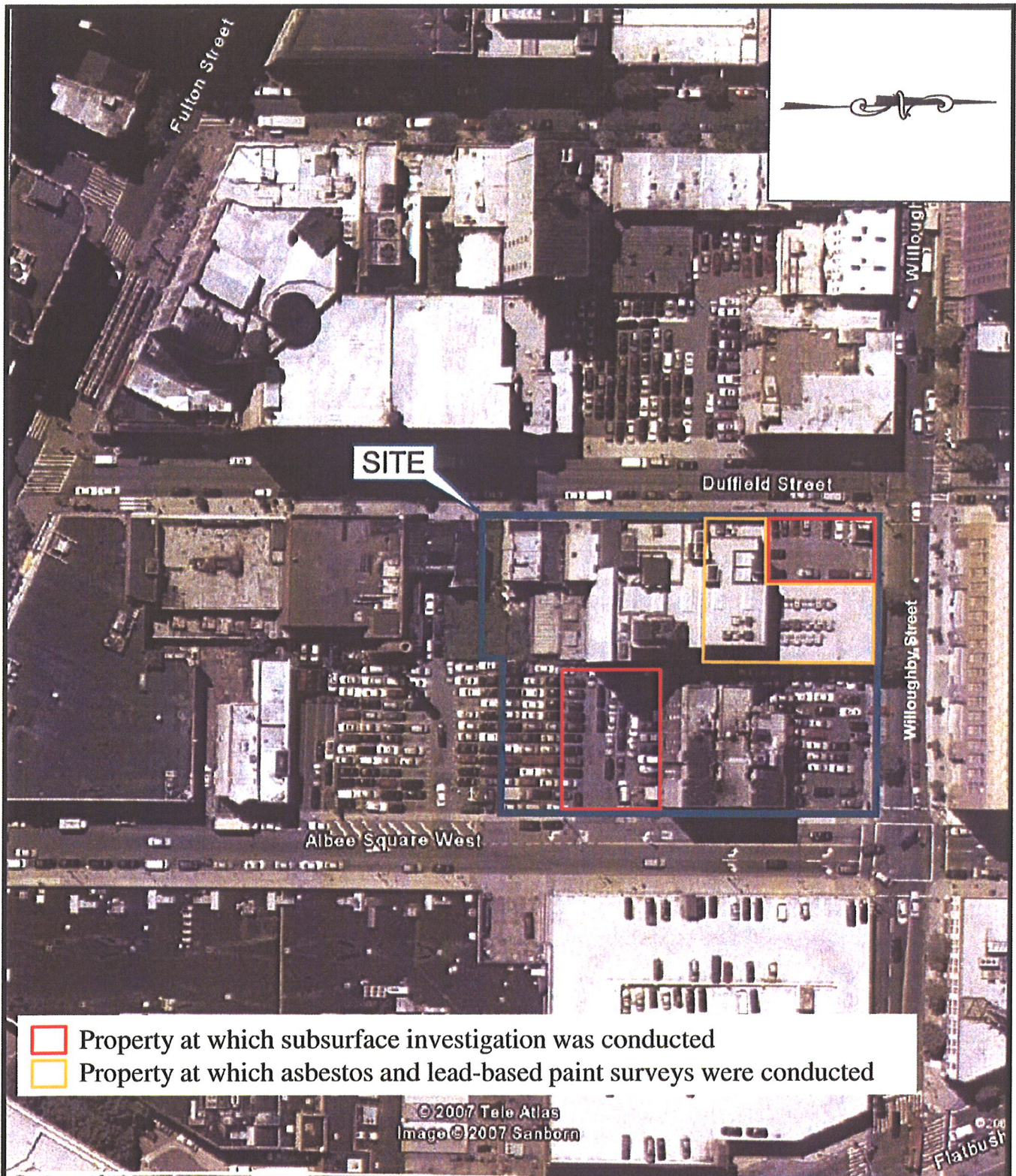
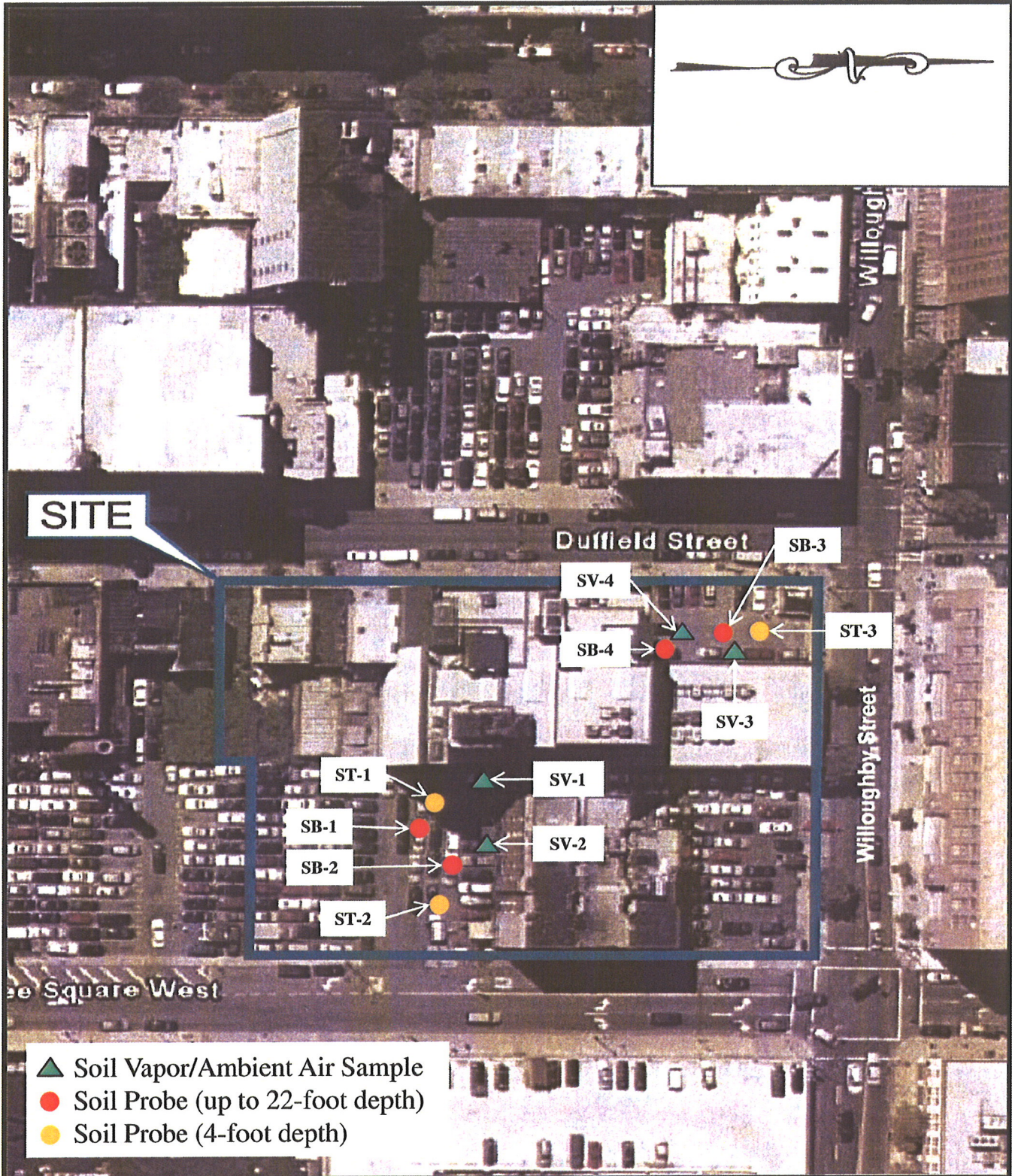


Figure 1.

Site Layout
Willoughby Square Site

H2M GROUP

ENGINEERS • ARCHITECTS • SCIENTISTS • PLANNERS • SURVEYORS



SITE

Duffield Street

Willoughby

Willoughby Street

- ▲ Soil Vapor/Ambient Air Sample
- Soil Probe (up to 22-foot depth)
- Soil Probe (4-foot depth)

**Figure 2. Subsurface Investigation Sample Locations
Willoughby Square Site**

