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STAGE I ARCHAEOLOGICAL SURVEY

WP 152 RED HOOK WPCP
CONTRACTS 1B-1 and 1B-2
Alternate Route From No. 12 Regulator
to Degraw Street Inclusive.
SOUTH BROOKLYN, NEW YORK

for

Mason&Hanger-Silas Mason Co., Inc.
437 Madison Avenue, New York

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May 20, 1984

Abstract

The author made a Stage 1 Cultural Resources Survey of a linear distance of approximately 1700 feet of the route of Contract 1B-1 and 1 B-2 from Amity Street to Degraw Street in the area between the pier heads and Columbia Street, in Brooklyn New York. The survey was made in order to determine whether or not there were any cultural remains, prehistoric or historic, which might be adversely affected by the excavation of the proposed sewer trench. The survey consisted of a surface examination of the area, an examination of the open trench from end to end on Atlantic Avenue, an examination and section drawing of the open cut where Regulator No. 12 will be sited, an examination of the soil excavated from the present sewer trenches on the Port Authority site, and an examination of seven borings samples, plus the usual literary and documentary search. Reviewing all of the evidence available to me at the present time, I am forced to conclude that the chances of the sewer trench having an adverse affect on prehistoric or historic cultural resource in the proposed route are negligible. The one site of possible historic significance is well out of bounds of the proposed sewer trench (the Red Mill near the corner of Irving and Columbia Streets).

Introduction

I undertook a Stage 1 Cultural Resources Survey under the Red Hook Water Pollution Control Project, Contract 1B-1 & 1B-2 beginning on May 4, 1984, and brought this report to completion on May 20, 1984. The approximate location of the proposed route of the work is from the proposed Regulator # 12 on Columbia Street and Amity Street, in a southwesterly direction on to Port Authority Pier # 7, across Congress Street to Pier # 8 and then south to Kane Street. At the meeting held in the office of the Environmental Protection Agency at 26 Federal Plaza in New York City by the interested parties on May 4th, it was learned that the project should include the distance of the proposed route from Kane Street to Degraw Street. The length of the first leg is about 1100 feet. The length of the second leg in continuation of the first is about 600 feet, making a total length of about 1700 feet for the survey. Dr. Steve Kopper (n.d.) had made a Stage I Archaeological Survey on Columbia Street between Atlantic Avenue and Degraw Street (Contract 1 B) for Mason & Hanger, and had submitted his report on June 8, 1981. Dr. Kopper's conclusions were that "the area is minimally sensitive to impact by the proposed construction and that no significant pre-historic or historic cultural resources will be affected by it." He further recommended that no cultural resource studies be made in connection with the project.

I spent a total of seven hours in the field surveying the project area during three visits to Columbia Street. My wife, Dr. Rose L. Solecki, who had assisted me in cultural resources work on Staten Island, helped with the literature search in the Long Island Historical Society and Columbia University libraries. I enlisted the aid of Prof. John Sanders of the Geology Department of Barnard College on one of the field trips in order to examine the stratigraphy of the deposits in the exposed cut on Atlantic Avenue. Prof. Sanders expressed deep appreciation in being able to see the deposits for himself, since in his own words the situation appeared to prove his hypothesis about two different directions for separate episodes of the Wisconsin Glaciation. He thought that a nice paper could be written about

the exposures for publication in a scientific journal. We took a number of samples of peat and a fragment of preserved wood for radio-carbon-14 dating at the Lamont Laboratory at Columbia University (see Appendix I). Although I had observed strata cuts in other areas of the Red Hook area as consultant with Mason & Hanger, notably Joralemon Street and Fulton Street, these cuts did not contain the same stratigraphy as Atlantic Avenue. It would appear then that we were fortunate to be able to observe the Atlantic Avenue section. Mr. Christie Nobriga, the Resident Engineer on the project, informed us that in a day more the deposits and stratigraphy would have been swept up by the clam digger and lost to knowledge.

With the help of Dr. Rose Solecki, we surface collected the half acre heap of soil dumped in a seven foot mound near the Mason&Hanger trailer at Columbia and Congress Streets. The information retrieved in material remains of archaeological importance was minimal, including some sea shells, a piece of modern china and a couple bricks plus a late 19th century pipe-stem bit. We paid particular attention to the exposed cut at Regulator # 12, and made a couple profile sections there before the work closed it up again. There were no structures to be seen along the proposed route of the sewer. Half of the area was covered with an asphalted parking lot for the Port Authority, and the other half was a couple blocks of fenced in rubble fields without any relief.

Aside from the libraries mentioned, I visited and conferred with Prof. Arthur Konop at the James Kelly Institute of St. Francis College, where there is a very unique library. I also examined the farm maps in the Brooklyn Supreme Court building, and studied the atlases in the Department of Transportation on Court Street, Brooklyn. In Manhattan, I visited the office of the Landmarks Preservation Commission to learn if there were any changes in status regarding historic landmarks in the Red Hook area. The Cobble Hill District is still the only historic area close to Columbia Street. I also paid a visit to Mr. Sudhir Parekh of the New York City Department of Environmental

Conservation at 40 Worth Street in Manhattan, as well as to John Vetter of the Environmental Protection Agency at 26 Federal Plaza. At the meeting held in New York on May 4th at this office I met Mr. Edward Curtin, who represented the New York State Cultural Resource Section. Mr. Curtin accompanied the small party consisting of Mr. Christie Nobriga, P.E., Resident Engineer for the Mason & Hanger Red Hook project at Columbia Street, his associate, Mr. James Heyden, and myself on a short tour of the project area the same afternoon.

Since there was very little to see physically of the former structures which had stood in the area, we paid particular attention to the block records and other documentary materials.

At the New York City Bureau of Public Structures, Sub-surface Investigations, I spent several hours examining the bore samples taken during the course of the boring work in the project area, namely Job No. 1545, the seven borings made between Degraw and Kane Streets. These borings were made on the proposed alternate route which forms part of the present enlarged survey (Fig. 2). Nine additional borings were planned to be made on another alternate approach route to Kane Street tie in from Regulator No. 12 (Fig. 5). Unfortunately up to the present writing this work has not yet been done because of legal complications in obtaining permission to do the work on the Port Authority property. Prior commitments abroad make it necessary for me to leave the country shortly, and thus be unable to oversee the work of the borings personally. It is planned to have a qualified archaeologist take my place to do this operation, and to make a report on the findings. Prof. John Sanders evidenced interest in examining continuous core samples from the borings, and would like to be included in this research from a professional point of view. He is a sedimentologist as well as geologist. To my knowledge and experience, this would be the first time at least for Red Hook that an academic geologist has been called in for assistance with the soils investigations. It is apparent that the city geologists have little time aside from their own professional duties for academic researches.

It was a memorable occasion to see the stratigraphy of the Wisconsin glaciation in situ and to learn from Professor Sanders the importance of the section to science.

On a matter closer to us in time, I had made inquiry before making my survey of the possibility of making several shallow strata cuts along the proposed pipeline route, using a bull dozer to cut an initial swath and a backhoe to make the shallow cuts. According to Mr. Nobriga, there appeared to be a negative block against the idea. We have some idea of what may be encountered from our investigations in the cut at Regulator No. 12, but this is a small sample.

Geography and the Palaeoenvironment

The area of our concern lies with the precinct of the Red Hook neighborhood of Brooklyn designated as Ward 6. The Red Hook area is also sometimes known as South Brooklyn. The latter name was given to this geographical district to distinguish it from the main Brooklyn town, which was situated around Brooklyn Heights and the Fulton Street ferry. The Dutch gave the name "Red Hook" to this area, from the color of the bluffs fronting on New York Bay and the East River. Red Hook took in that part of the terrain, mainly flatlands and meadows, to Gowanus creek. The sand hills of the bluffs, formerly situated at about present Court and Sigourney Streets, were known to the Dutch as "Rood Hoogtus," or "Red Heights," according to one historian (Stiles, 1867, Vol. 1, p. 67).

Governor's or Nutten Island was very likely originally connected with Red Hook point. Prior to the American Revolution, it is said that cattle were driven from Brooklyn to Governor's Island, which at that time was separated by a very narrow channel, called Buttermilk Channel in later years.

This part of western Long Island fronting on the East River is generally flat in aspect, with a gentle slope down to the river. In former times, there were winding creeks, salt marshes, swamps and islands laced through the area. It lies in the lee of the hilly ridge to the south found in the Prospect Park area of Brooklyn, which forms the western terminus of the last continental glaciation in northeastern North America. This was called the Wisconsin glaciation. To the north of this marshland and meadow complex is the river facing sandy bluff known as Brooklyn Heights today.

The New York City region including Brooklyn has had a very interesting geological history. This is, for us here, most interesting toward the end of the Last Glaciation. Schuberth (1968, pp. 191-193) indicates that there were three glacial lakes in our area. These were called "proglacial" lakes because they were dammed in front of the Wisconsin glacier by the terminal moraine which lay athwart New Jersey, Staten Island and across to Long Island. At the height of

this glaciation, which appears to have been quite formidable, the coldest period was about 19,000 years ago. It was following this period that the ice began to melt, releasing its waters to the sea down to the present time. The three lakes, trapped as they were by the linear mound of glacier debris dumped by the continental glacier, began to increase in size as the glacier retreated (Newman et al, 1969, p. 557). The lakes were called Lake Hackensack, Lake Hudson, and Lake Flushing. Lakes Hudson and Flushing were connected. Lakes Hudson and Hackensack were similarly connected since they were blocked to the north by the then retreating 9,000 foot mass of ice. The lower areas of Manhattan Island were covered by Lake Hudson. These lakes lasted for thousands of years. There is documentation (Schuberth, 1968) that 80 feet of glacial clay accumulated at the bottom of Glacial Lake Passaic to the west. There was a rebound to the earth's crust, or upwarping, when this region was relieved of its tremendous tonnage of ice. This rebound is still going on in northern North America. In Scandinavia, where the same phenomenon is occurring today, it is reported that there is a rise of almost one meter per century in Fennoscandia. Schuberth (1968, p. 195) says that there was a 67 foot upwarp in the New York area. Streams and rivers were again rejuvenated, and the Hudson River eventually broke through what must have been a weak point between Staten and Long Islands. The shore line of Glacial Lake Hudson was probably a 100 feet higher than the present shoreline. Schuberth (1968, p. 196) reports that a layer of peat was found some 45 feet below sea level at Barclay, Vesey and Washington Streets in lower Manhattan. Vegetation found in the deposit included juniper trees (*Juniperus communis*) as well as other macrofossil remains. Junipers grow best in a kind of marshy and swampy kind of environment. Such fossil remains, as well as microfossils or pollen remains, are extremely useful as indicators of the nature of the contemporary climate.

Sanders (1974, p. 23) observes that the New York area had been glaciated not once but several times. However, at present writing the exact number of glaciations is still un-

known. Sanders, on several bases of reasoning, proposes to assign the well known Ronkonkoma and Harbor Hill deposits of the Long Island terminal moraine to the early part of the Wisconsin rather than to the late part, as presently judged. Moreover, Sanders (1974, p. 24) believes that from provenance indicators, "neither of the tills deposited by the Harbor Hill and Ronkonkoma glaciers came from the NNE; both of these tills were deposited by glaciers that flowed regionally from the NW." Thus, in the New York City area, according to Sanders, there was an early Wisconsin period glaciation which came from the northwestern direction, which was later followed by a later Wisconsin period glaciation which came from the north-northeast. The latter direction is the traditionally accepted route to which the accumulation of terminal morainal debris is attributed to on Long Island.

Edwards and Merrill (1977, p. 13, Fig. 9) observe that there was presumably a forebulge of the earth's crust in front of the Wisconsin glacier in the New York area. They believe that there was a substantial area, now under water, was exposed for a relatively long period of time both before and following the Wisconsin glacial maximum.

From Eisenberg's (1978, p. 19) synthesis of various reports, the ice sheet began to recede before 15,000 years ago and possibly as early as 17,000 years ago. The combination of the glacial meltwater and the crustal modification led to the origin of Lake Hudson, presumably no later than 15,000 years ago. Sometime before 12,000 years ago, the dam of morainal deposits to the south was breached and the lakes drained off to the sea. With the rise in sea level, the water began to back up, and soon after the breaching, the Hudson River became an estuary as far north as Newburgh.

During the height of the glaciation, when the available moisture was locked up in the continental glaciers, the sea level dropped to as much as about 400 feet below the present sea level. This gave us a vast continental shelf, far to the east of its present location.

Among other tangible evidences of the last glaciation in our area, are the difficulties of construction on glaciated deposits. Parsons(1966,p.43) goes into the piling difficulties in the New York area. He notes that most instrumental in affecting the soil stratigraphy are the sediments left by glacial Lakes Hudson and Flushing in the local region. The Red Hook area lies within the reaches of Lake Hudson. Underlying the recent surfacial deposits in the areas formerly covered by the glacial lakes are variable thicknesses of sand, varved silt, and till overlying rock. In engineer's parlance (a term not familiar to geologists) is a varved silt which is commonly called "bull's liver," a kind of soil which appears to pose serious problems to engineering constructions. Also of weighty and serious concern in construction are the unpredictable inclusions of organic silt and peat in the deposits. There may be variations of such deposits found immediately behind the terminal moraine as in the Red Hook area, which may compound the difficulties especially since these variations can occur in a small area.

On a speculative note, it is very possible that the peat found in soil borings may have nothing to do with marine shorelines, but may be reflective of glacial lakes origin, or part of an embayment behind the terminal moraine.

Prehistoric Indian Occupations

Concerning Indian occupation in prehistoric times, we have no real hard information from this area. Our only information comes from neighboring parts of Brooklyn and Staten Island from my own experience in local archaeological researches in the New York City area (Smith, 1950). The city grew too rapidly and by the time archaeological studies came of age at the turn of the 20th century in New York, nearly all of the sites in the urban areas were destroyed or covered over with landfill. The latter is an intriguing thought, since the shoreline areas of New York may preserve invaluable archaeological evidence of Indian occupation sealed under old landfills. It is possible that there were ancient fishing stations to the east of

Columbia Street probably in line with Hicks Street. It is feared that the Brooklyn-Queens Expressway may have obliterated any of this evidence however.

In this part of Brooklyn, the local Indians at the time of the early colonists were called the Canarsies. There were a number of maize lands and village sites in Brooklyn which were mapped by Bolton (1922). This is also noted by Church et al (n.d.) and Solecki (n.d.). The marsh lands must have been a very valuable hunting and resource area for the Indians, who obtained shellfish from the region, as well as birds, fish and furred animals. The salt marshes were useful to the early colonists for the hay it produced.

Our best information regarding Palaeoindian sites in this region comes from Staten Island across the harbor. The major site there is called the Port Mobil site, made known through Ritchie (1969). Port Mobil lies on the Arthur Kill (Eisenberg, 1978, p.123). According to a communication by the Queens College geologist Walter Newman to Eisenberg, the Arthur Kill was a narrow brackish stream about 25 m. below its present level between about 12,000 and 10,500 years ago.

Another researcher, Herbert Kraft (1977, pp. 1-19), locates and describes the Port Mobil site in southern Staten Island. The Port Mobil site is actually three small contiguous sites in Kreischerville. According to Kraft, extracting from a preliminary report by Prof. Bert Salwen of New York University and his students, in the upper part of the stratigraphy was a stratum of blue-grey clay or clayey pit about 12 inches thick. This clay appears to be of some geological interest, especially since the upper part of the borings in the project area reveal dark colored clays. However, it is premature to make any conclusions regarding connections, although there may well be such ties in the geological history.

The presence of the Port Mobil site associated with an ancient landform is of high theoretical interest because it would appear to mark the first evidences of man in our area of study. Certainly there were other prehistoric occupations following this in these environs, best evidenced again on Staten Island where local collectors and occasional profession-

al archaeologists have pieced together a respectable chronology of prehistoric occupations. However, in the Red Hook area, unfortunately up to this time we have a blank until the historic period. Fortunately some of the early land grants included mention of Indian maize lands, villages and burial sites to the east of Hicks Street.

There was mention of Indian maize lands in the Lubbertsen 1640 grant. These lands lay close to his property. They were situated between Atlantic and Baltic Streets (Stiles, 1967, Vol. I, p. 64). On the wall map of Brooklyn compiled by C.W. Nenning, a cartographer for the Supreme Court Documents and Records Division in 1950, hanging in the James Kelly Institute at St. Francis College is located the Indian corn fields. They lay within the Cobble Hill Historic District, from Atlantic Avenue to Degraw Street, and from Hicks to Court Street. Mr. Nenning also locates on his map the Werpos Indian village, which was to the south and east of the maize fields nearby. The Indian burial ground according to the same map lay between Baltic and Butler streets in the area of Court Street.

We have the description of two early travelers to the New York area, Jaspas Dankers and Peter Sluyter (Murphy, 1867), who stayed with a settler named De Hart in the Gowanus district in 1636. They described the native inhabitants as well as one of their homes, which was a long house measuring about 60 feet long and 14 or 15 feet wide (Murphy, 1867, pp. 124-5).

History of the Red Hook Area

The land ownership in the Red Hook area dates from the earliest times in Dutch history. The first owner we have record of was Frederick Lubbertsen (or Lubbertse) who was granted a patent in 1640 from the Dutch governor in New Amsterdam (Stiles, 1867, Vol. 1, p. 62). His holdings took in the whole neck of land between the East River and Gowanus Creek. This neck was formerly known as the "neck of the Brookland," or "Lubbertsen's Neck." The neck is unrecognizable today, hidden on modern overlay maps as shadowy islands, marshes, creeks and indentations, all overrun by landfill dating from the middle of the 19th century. In 1652, the patents for lands granted by Director General Van Twiller were annulled and the land

was available for colonists(Anon., p.8). The land between the Wallabout and Gowanus Bays was the first to be open for plantations of moderate size. The rents were payable annually to the West Indian Company after they had their plantations under cultivation for ten years. The Patentees and Freeholders of Brooklyn sold the Red Hook neck to Stephanus Van Cortlandt on Aug. 10, 1695 (Furman, 1824, p. 11). The area contained about 50 acres. The original Dutch title was confirmed earlier by the English governors Nicolls and Dongan. The Corson and Seabring families appeared as land owners in Red Hook toward the end of the 17th century. The Corsons (or Corsen) were step-sons of Lubbertsen, and that is how they came into the land (Stiles, 1867, Vol. I, p. 66). Corson conveyed this land to Sebring in 1698. Stephanus Van Cortland comes into the picture with the purchase of about 50 or more acres of land westward of the original Frederick Lubbertsen patent in 1695. Van Cortland's heirs sold the land to Matthias Van Dyke in 1712 (Stiles, 1867, Vol. I, p. 61). The Van Dykes continued to own the Red Hook land in the 18th century. The southern part of the hook was a high hill covered over with locust trees, poplar, cedar and sassafras. The Matthias Van Dyke property was sold to the Red Hook Building Company in 1834, a real estate development company (they had them in those days too!). Like some modern ventures, they failed, and were taken over by the Atlantic Dock Company the next year. This was the company which built the enormous (for its time) Atlantic Dock Basin, and was incorporated in 1840. They finished the land filling, cutting, etc. of the topography in Red Hook which was begun in 1835 by Dikeman, Waring and Underhill. The object was to reclaim potentially valuable real estate by filling up the neighboring mill ponds, marshes and low lying lands. The marshes were supposedly conducive to the pestilences such as yellow fever which arose in their neighborhood. In filling in the lands, the ecological balance was undoubtedly disturbed, affecting the nesting places of birds, as well as the habitat of the shore and marsh loving animals harbored in the area. This was a kind of earlier Pelham Bay Park, Bronx tragedy, and on the other side of New York Bay, the Richmond Creek landfill

project on Staten Island.

The Parmenus Johnson estate lay between the river and Joralemon Lane, with property extending from Baltic Street nearly to Congress Street. Johnson became very wealthy from the real estate boom in the 1820's. His neighbor, Ralph Patchen, had a farm which extended from about Congress Street to District Street. The Patchen's had a dock at the foot of Atlantic Street on the East River. Farm Plan 30 in the County Clerk's Office, Brooklyn, and various other maps including of course the famous Lt. Ratzer map of 1776-7 show that much of Columbia Street was under water in the project area. The high water line ran east of this street close to Hicks Street. There was a point of land which jutted westward in the vicinity of Irving Street, just south of Butler or Harrison Street. Upon this point was situated one of the ten grain mills of Brooklyn. It was variously called the Red Mill, Cornell's Mill, Seabring's Mill and Cornelius Seabring's Mill. This was a tide mill, one of such mills which were in use in the city up to the 1830's, and indeed, some were in use in later years. These tide mills on the old flatlands of Bushwick and Brooklyn gave a charming aspect to the local scenery, and must have been important focal points for the local people. These mills were operated mainly for the grinding of grain. The tide rose and fell about five feet in this area, generating the power to turn the mill wheels. Cornell's mill was built on the patent of Frederick Lubbertsen by John March, acting on contract for Cornelius Seabring and Peter Corsen (Vroom) in 1689. The spot chosen for the mill was on the spit of land at the constriction between the mainland of Brooklyn and the low island to the west called Locust Island. The narrow body of water, like an isthmus, was called "Graver's Kil". According to Stiles (1867, Vol. I, p. 66), the name Graver's Kil was of Dutch derivation. The word "grave" came from the verb "graaven", to scrape or clean. This body of water was a very convenient place to turn up the bottoms of boats for cleaning and re-caulking the timbers. Stiles (op. cit., p. 66) notes that there were two agreements between a John Marsh of New Jersey and Corsen and Seabring regarding the construction of the mill. For the privilege of construct-

ing the mill some "700 feet of good canoe wood, one half inch thick, to both Sebring and Corseen, so long as the mill remained there" (Stiles, op. cit.). John Cornell became the sole owner of the Red Mill in the late 18th century. He must have rendered excellent service, for his works enjoyed an enviable reputation, which even the English appreciated (Stiles, op. cit. p. 307). The Ratzer map of 1776 puts the mill in line with Irving and Columbia Streets, and more or less between Columbia and Tiffany Streets. Corsen sold his plantation containing about 100 acres to Seabring.

No pictures have been found of the Red Mill, although Professor Arthur Konop of St. Francis College recalls having seen a picture in the library. However, a view of another Seabrings Mill, called Luquiere's Mill, known as Isaac Seabrings Mill on the Ratzer map, was found on a small cove and creek near the head of Gowanus Bay. This was built by Seabrings before 1776 (Bergen, n.d.).

The operations of the sewer construction will in no way affect the archaeological remains of this mill as presently projected. This mill site should bear investigation in the future, since the parcel of land upon which it is presently to have been built is presently an open lot at the junction of Columbia and Irving Streets. The lot is on the east side of Columbia Street. A later contemporary with the Red Mill was Patchen's Dock, which lay between Atlantic and Amity Streets. Columbia Street was not yet laid. The Alexander Map of Brooklyn, Kings County, Long Island, printed in 1834 gives us a good fix on the dates. It shows a "Mill Bldg." at about present Irving and Columbia Streets. The mill had been standing some 145 years up to the making of the map, and possibly some years beyond. Hence we can assume that the structure was made of reasonably solid material, presumably with a stone foundation at least. Herbert and Tolford's map of 1834 similarly shows the Red Mill (or Cornell's Mill) next to Cornell's Mill Pond.

The condition of the natural shore line remained practically unchanged for a long period before 1800, with the exception

of natural erosion and accretional changes.

As indicated above, it appears that the initial land reclamation was focused on the low lying marshlands and mill ponds first. The depth of the landfill in the area of Atlantic Avenue west of Columbia Street (up to 25 feet) indicates that deeper water was reached offshore when it became an economic necessity. The point at the river end of Atlantic Avenue was Patchen's Dock, which covered about two blocks. It was the later terminus for the Long Island Railroad, and the ferry point for the South Ferry to Manhattan (Stiles, 1869, Vol. II, p. 24).

The matter of the source of the landfill is an interesting question. Naturally, the cheapest and most convenient landfill was desired. We are reminded (personal communication from Prof. Arthur Konop, St. Francis College) that the southern extension of Governor's Island was built up entirely from the fill of the New York Subway system (I.R.T.) in the early 1900's). We know from the records that the booming real estate development of the Brooklyn Heights area in response to the housing crunch (even then!) on lower Manhattan necessitated much grading and leveling. It is presumed that a good part of this unwanted soil found its way to the river as a convenient dump. However, this was probably not really a fully planned activity, and it is very likely that the river fill came from other sources. In our project area, it has not been proven, but it would appear that the fill of the Amity Street to Degraw Avenue area came from a two pronged direction, from the north and the south, almost simultaneously.

From the north, we start with Pierrepont's distillery at Joralemon Street and the ca. 1824 surge of building activity. "Vast mounds of earth" vanished under the pick and shovel in advance of the pushing through of streets and avenues (Stiles, 1884, p. 141). This made in fact what had been "paper streets" on the maps of the day. The railroad which pushed down to the river on Atlantic Avenue must have been responsible for much of the land fill. This construction originally had its tracks laid on the ground surface. But because of public outcry against the noise and dirt of its passage, it

was decided to sink the railroad in a deep trench and cover it over with an arched roof, leaving some outlets for air. The Long Island Railroad Company put the "tunnel" through Atlantic Avenue in 1844 (Stiles, 1869, Vol. II, pp. 58,275). No record has been found of the fact as yet in our researches (Clark, 1910; Anonymous, 1906; Anonymous, James A. Kelly Institute, St. Francis College, no date) but there is a consensus among historians that the fill from the tunnel was simply haled to the end of Atlantic Avenue and dumped into the cove and river, filling the shoreline out to its present lines. The maps indicate that by 1838, land fill had progressed to the point that the cove between Atlantic Avenue and the end of Joralemon Street was filled, and for all purposes had vanished. We do not know how much of the land fill found its way to the south of Patchen's Dock on Atlantic Avenue-Amity Street, but there was probably some spill out.

From the other direction, from the south, we have better documentation. We know that real estate developers began to fill in the mill ponds and the low lying marshlands and creeks in 1835, removing the hilly prominence at Red Hook (Stiles, 1869, Vol. II, p. 159-160). Due in large measure to the energies of one individual, Colonel Daniel Richards, the rural character of South Brooklyn was broken in 1840. Under his genius, the newly organized Atlantic Dock Company (which was incorporated for this sole purpose) began to construct pier and terminal facilities where the Atlantic Basin is today. The company took over in the land filling operations where the bankrupt real estate development company left off. The company must have had a responsive audience in the public with their plans for construction. Landfills were recommended to control the epidemic diseases that occasionally took heavy toll of the Brooklyn population. It was claimed that the meadows to the west of Cobble Hill (i.e. in the sewer project area) were the cause of most of the deaths (Stiles, 1867, Vol. II, p. 285). The cholera epidemic of 1849 reportedly killed off some 600 people in Brooklyn, and was in the main attributable to the crowding of the inhabitants near low marshy ground. Filled

land was like found land, very cheap, and unlike the uplands, affordable for occupation by commerce. The Atlantic Dock Company, incorporated in 1839, began the task of changing the landscape with the building of the Atlantic Docks in 1841. According to the New York Port Authority publication, progress was evidenced by the construction of seven hundred buildings in the Sixth Ward or South Brooklyn in the space of two years, 1848 and 1849. One can only imagine the turmoil created by all this construction in a vast tract of land, probably poorly drained and bleak in aspect. Indicative of the striking changes made in the area, streets paved with cobblestones struck out like a rash down the old "paper streets." We should note that the Columbia Street sewer project area was on the northern fringe of the precincts of the Atlantic Dock Company. It was left to the New York Dock Company, organized in 1901, to handle the great volume of business on this portion of the waterfront north of the Atlantic basin. We note that the streets in this area were begun to be paved as early as 1847. Columbia Street later boasted a railroad line from Atlantic Avenue to Red Hook, and the subordinate streets leading down to the river were being paved with sturdy cobble stones by the middle of the last century. Mr. Richards, who we have seen was the prime mover of the Atlantic Dock Company, petitioned the common council of the city of Brooklyn for permission to open 35 streets in the vicinity of the docks. Richards and his associates also proposed to open a large navigable canal from Gowanus Bay to Douglass Street through the center of the meadows in order to empty the sewers from the elevated grounds nearby. The great object of this was to remove the great bugaboo, the fever causing marsh miasmas, and to help business prosper. Being confirmed and dedicated businessmen, we can be sure where their priorities lay in this case. One should visit the infamous Gowanus Canal today to see the result of this venture, and to view the gases languidly boiling up to the water surface to realize the damage done.

After the Gowanus Canal was built during the middle of the 19th century and after the Civil War, it became even then

a cesspool of sewage which could not be adequately removed from this standing body of water. To combat the noxious and horrible smelling water, the Gowanus Canal Flushing Tunnel was built between the years 1905 and 1911. It ran from its head near Douglass Street to Degraw Street a distance of a mile and a half through a tunnel to the East River. The tunnel was about 12 feet in diameter, and was punched through by a then novel method of tunnel excavation. The canal has a dead end, and the only current flowing in it is generated by the tidal flow, which has a height of about five feet. The smell was very noticeable at a distance of almost a mile along the sides of the canal. The smell was so bad in 1904 that the health of those living nearby was deemed to be imperiled. The outlet was made at Degraw Street to the East River. This work is now abandoned (Steers, 1910; Engineering Record, Vols. 57,64)..

Map Study and the Block Records, Street Pavings

Much information can be found in old atlases, maps and related publications. The block records are especially useful, since they give us bits of information not to be found on the maps, such as sub-surface data (cellars and basements), as well as changes of ownerships. They trace chronological relationships in finer detail than the maps, which everyone knows are out of date even while the cartographer is filling in the details. The Rock Line Map, Borough of Brooklyn (1935) gives us some relevant elevation data. The elevation above sea level of Columbia Street from Amity to Degraw Streets is measured to be about from 11.5 to 13.5 feet. There is about a five to seven foot drop down to the East River at the end of the streets within the project area. The elevation at the end of the street at the pier on Amity Street is given as 4.6 feet, and at the other end, at Degraw Street, the elevation of the street above sea level is given as 4.1 feet.

As noted above, information from the block records was taken for the purpose of finding specific information about building construction and type of construction, ownerships, and whether or not the buildings had cellars. Since the land lay so close to the water, it was conjectured the perhaps the land surface was too close to the sea level for cellars. However, the city planners must have had this in mind, with the building of the

bulkheads as well as the comparatively high street elevation at least toward Columbia Street. This would have allowed plenty of height above the presumed water table depth.

The Block Records

Data from Block Records 293 indicates that the exterior of the water line between Amity and Congress Streets was established in 1836. The bulkhead line was fixed in 1843 as 596 feet from Columbia Street. The Brooklyn Benevolent Association owned some property in this block according to the records of 1951, when it was formerly the property of Cornelius Heeney. According to Block Record 298, the firm of Gaffney and Keegan leased a store with floors and a cellar of a house at 42 Congress Street located 190 feet from Columbia Street.

Block Record 303 shows that Warren Street was laid down by the Commissioners in 1845. George Wood, William F and Frederick Have-meyer gave permission in 1846 to developers to construct docks, wharfs, bulkheads and piers in the East River in front of their lands. The former high water line ran some distance east of Columbia Street. The Delaware and Hudson Canal Company bought property on the block between Warren and Baltic Streets. This land was transferred to J.P. Robinson, who put up store houses in these blocks, and thus noted on the maps.

According to Block Records No. 308, a Johnson Wood and Have-meyer jointly owned the property from Baltic Street to Kane Street (Kane Street was formerly called Harrison Street, and before that it was called Butler Street). The Hartford Coal Company bought a lot on this block in 1857 on Columbia Street, and in 1868 the Phoenix Warehousing Company bought a lot on Harrison Street some 288 feet from Columbia Street. The property was resold in 1867. The description of the property mentions piers, bulkheads and building structures. According to the same block record, there is mention of wharfs, docks and piers in use in 1870. In 1888 there is a note of a brick building between Baltic and Harrison Streets.

In Block Record No. 314 which takes in the block between Harrison to Irving (formerly Chelsea) Streets, we learn that the old Corssen-Cornell property was sold in 1833. There was an area survey in 1838 by Tolford and Day, and in 1860, the

Atlantic Dock Company bought some property on the block. There is mention of a house on the block owned by the late John Cornell. The firm of Marx and Rawolle located on Irving Street in 1890 about 300 feet from Van Brunt Street, and extending about 100 feet on Irving Street. There was a store at 144 Columbia Street in 1894 (at Columbia and Irving Streets) which had a cellar. This is very close to the site of the Red Mill, which we think must have been a few rods east of this location.

Block No. 316 which covers Irving to Sedgwick Street (formerly New Street) has the same history as in Block No. 314. The Atlantic Dock Company bought property on this block in 1861. The Oil Seed Pressing Company was established on Irving Place in 1890, which eventually occupied Nos. 78,80,82 and 84 Irving Street. The Amalga Soap Company bought property on Sedgwick Street in 1891. They leased buildings at No. 164 Columbia Street in 1894. The Columbia Chemical works was established on Sedgwick Street in 1891. The firm of Hills Brothers and Company was established on Irving Street in 1893, where they expanded their business. The other businesses on the block were similarly commercial enterprises.

Block No. 318 takes in Sedgwick to Degraw Streets. It has virtually the same history as Blocks Nos. 314 and 316. The Atlantic Dock Company purchased property on the block in 1860. In 1889, J.J. Nichols Manufacturing Company was established on Sedgwick Street.

Street Pavings

This information is derived from a publication treasured in the Department of Transportation, 40 Worth Street, called "Data on Street Pavings", annotated by Leevan M. Burt, 1940 (Table 1).

The costs of paving varied according to the kind of materials used. Granite block, including Belgian block, and cobble cost \$ 2.00 per square yard. The blocks were laid on sand. Concrete paving cost \$ 6.00 per square yard. Hence despite the cost of man power it took to make the stone blocks, transporting them, and laying them in place by hand, it was still cheaper by far to use granite blocks for paving in the early days of the latter part of the 19th century at least. And from the looks of the streets around town, it would appear that the

cobbled streets are in better shape today than the asphalted and concreted streets laid down fifty and more years later.

Columbia Street was paved in stages between Atlantic and Hamilton Avenues. Granite block Gr. No. 1, on 6 inches of old concrete was used, with 5 inches of new concrete presumably later. The first stretch between Atlantic Avenue to Baltic Street was laid down in 1843. The second stretch between Baltic and Kane Streets was laid down in 1845. The third stretch between Kane and Union was laid down in 1846, and the final stretch between Union to Hamilton was laid down in 1847.

From the street paving reports, it is seen that it did not take very long for the city fathers to have the "paper" streets realized in solid fact. We note that Columbia Street was laid down from north to south. The side streets between Atlantic Avenue and Hamilton Avenue were laid down after a few years respite. Some streets within the area of the survey were given priority for some unknown reason. For instance, Congress Street was G&P (graded and paved?) in 1847. Degraw Street, which must have been an important street since it follows Cornell's Path, was G&P in 1848. Irving, Sedgwick and Warren Streets were G&P in 1852, four years later. Kane Street seems to have been neglected. It was paved 20 years later, in 1873, while Baltic Street evidently had to be repaved at about the same time (1872). The only figure we have for Amity Street paving was in 1902.

These street pavings of course reflected the work of a number of factors, some of which were certainly political, since the area lay in part of Brooklyn which saw many conflicting aspirations of interested citizenry. In any case, the traffic on these streets must have been heavy, even though the map records indicate sparse residential habitations. Most of the area was taken up by storehouses, railroad yards, lumber yards, etc. The record shows that the streets were all repaved between 1903 and 1921, with the majority of the jobs done before the end of the first World War. Some of the cobble stones are still to be seen on Columbia Street where the asphalt has worn down or eroded back to the cobblestone level. The double steel tracks of the street car or train are still partially exposed on Columbia Street. Cobble stone paving was seen in my survey on Warren Street west from Columbia Street.

Irving Street was covered over with asphalt.

Map Studies, Miscellaneous

There are a large number of atlas s and maps which can be referenced with regard to this project. The following is a sample of the documents consulted in the literature search done at various institutions.

Probably the most quoted and illustrated map is the beautiful rendition by Lt. B. Ratzer, "Plan of City of New York in North America Surveyed in the Years 1766 and 1767." The copy published by J.H. Colton, New York, 1853 shows Seabring's Mill and Cornell's Mill Pond. There is shown a mill dam between Locust Island and the mainland. The map shows two roads converging on Seabring's Mill. It indicates the mill on the Graver's Kil. Just to the east of the mill are indicated two structures on either side of the road. Some distance to the north is another structure, a distance from the shore. This building is located about halfway between Seabring's Mill and present Joramemon Street.

The next map of interest to us is the "Map Showing the Original High and Low Grounds Salt Marsh and Shore Lines in the City of Brooklyn from the Original Government Surveys Made in 1776-7. Prepared to Accompany Report of the Board of Health 1875-6". It indicates that the project area was totally under water (i.e. between high and low water lines), except for the extreme southern point where it touches Irving and Degraw Streets. It is illustrated in this report as Fig. 9.

An extremely fortunate find was discovered on the map shelf of the Long Island Historical Society. This is a "Copy of Ancient Map in possession of a descendant of the Hannes or Hans Bergen", published in McCloskey's Manual 1854. The map, drawn prior to 1750 according to the legend, shows the patent of Frederick Lubbertse of 1640, as well as other prominent features. It shows the principal houses of the early period, and other details such as as one of the boundaries of the "Indian Corn Land." We are please to find the location of Sebring's Mill on the East River, showing the structure in frontal view. It appeared to have been a one story building, with an upper story in a gabeled

roof(Fig. 8).

The Egbert L. Viele map, 1874, "Topographical Atlas of the City of New York", which is an overlay map showing the original high and low grounds, and salt marshes and shore lines from the original government surveys made in 1776-7 is a useful document for pin pointing historic locations with regard to the present street plans. It is rather like the Board of Health map, 1875-6 quoted above. The "Map of Brooklyn, King's County, L.I." by Alexander Martin 1834 (Fig.10) shows Seabring's Mill as "Van Dyke's Mill", which may reflect a change of ownership. This map shows only one building in the neighborhood of the mill by this date, suggesting that the other indicated on the 18th century map had disappeared. Patchen's Dock is prominently shown located between Amity Street and Atlantic Avenue. Columbia Street was not yet laid-- it is shown as lying off shore from Hicks Street.

Of the later period maps, we have the Cundy map, published by Dripps in 1850. This map shows the water dockage facilities occupying the whole block almost west of Columbia Street between Harrison and Baltic Streets. The Atlantic Docks were in place by then. Several buildings are spotted on the map between Congress and Amity Streets west of Columbia Street. Van Brunt Street is shown on the map with several buildings indicated. The same situation is shown for Warren and Baltic Streets. The block between Baltic and Harrison Street is shown as a dock area. The block between Harrison and Irving Streets is shown as practically blank with the exception of the presence of four buildings near Columbia Street. The block between Irving and Sedgwick Streets is shown as a blank. There are two long buildings indicated between Sedgwick and Degraw Streets at the corner of Degraw and Columbia Streets. These buildings are in an L shape.

The Perris Map of 1855 shows the situation in good detail. Starting at Amity Street, it shows a brick structure at Amity and Columbia Streets. Tracing the route of the projected pipeline south from Amity Street, the line first crosses the Mosmun and Phyfe Lumber Yard, then goes through the Walter and

Broker Coal Yard fronting on Congress Street, then enters and crosses another coal yard. Crossing to Warren Street the line goes through an empty lot, after which it crosses the Johnson and Shannon Lumber Yard. There are some wooden structures shown flanking the yard to the east. The line then crosses Baltic Street at an empty lot, and skirts one red brick of relatively modest size at Harrison Street. Between Harrison and Sedgwick Streets the line crosses another empty lot, thence on to Degraw Street, crossing still another empty lot en route. It skirts some red brick houses on the north side of Degraw Street. So far as can be ascertained from this map, the pipe line will not encounter any houses built before 1855, with the exception of possibly on Degraw Street itself.

The map makers must have been very busy men in the middle of the 19th century in Brooklyn. The Map of the City of Brooklyn in the Brooklyn Common Council Manual for 1859/60 shows Columbia Street, but no docks. Just the next year, the Map of the Consolidated City of Brooklyn, 1861, by A. Brown Co. of New York, shows docks at the river front of Congress and Amity Streets.

The Atlas of Long Island by F.W. Beers in 1873 shows railroad tracks running from Atlantic Street to Red Hook on Columbia Street, which indicates that this street had become an important route. In the same map we see that the land had been filled in, and that the Atlantic Boat basin was in place. Robinson's Atlas of Brooklyn, 1886, a source of information for many researchers, shows that the project area lies in Block 3. It gives elevations which correspond generally well with the Rock Line Map, Borough of Brooklyn. I took the sea elevation in front one of the berthed ships on May 5th, taking a measurement of 6.9 feet from the parking lot of the Port Authority. Robinson's atlas shows buildings between Amity and Columbia Street and Congress Street which are indicated as Robinson's stores, of brick. The area between Congress and Warren Streets is shown as empty lots. Robinson's Congress brick stores are shown between Warren and Baltic Streets alongside empty lots. Between Baltic and Harrison Streets are the Baltic stores of

brick, along side empty lots. Between Harrison and Irving Streets we find a mix of empty lots and brick structures. There is a large empty lot between Irving and Sedgwick Streets shown on the map. We find private brick houses and empty lots clustered between Sedgwick and Degraw Streets. Thus, in a period of about 30 years, the area appears to have assumed some character of neighborhood, although there appear to have been many empty lots which were good for sand lots games. However, the character of the structures indicates that this was definitely a class B neighborhood, a working man's neighborhood.

The Desk Atlas of the Borough of Brooklyn, City of New York, Vol. 1, 1920, shows that the land between Amity Street and Congress Street west of Columbia Street by this time was owned by the New York Dock Company. Presumably this enterprise had cleaned out the previous standing structures to accommodate their own facilities. The block between Congress and Warren Streets is shown as having empty lots and some houses with the inclusion of a hay and grain storage building. A machine shop is shown on the northern side of the block between Warren and Baltic Streets, with railroad tracks occupying the southern half of this block. Presumably whatever had been standing on this block before had been removed. The block between Baltic to Harrison Streets was occupied almost entirely by a linear maze of railroad tracks. A lumber yard, an automobile wrecking (?) yard and some other structures was located on the block between Harrison and Irving Streets. There were some residential homes evidently as well as a wholesale druggist on the block between Irving and Sedgwick Streets. Residential homes are indicated between Sedgwick and Degraw Streets.

In summation, it is clear that changes were going on rather rapidly in the project area toward the end of the 19th century and the early part of the 20th century. It would appear that most of the residential houses were built about this time. It should be pointed out that curiously enough, the residential houses clustered toward the southern end of the line, in the neighborhood of Irving, Sedgwick and Degraw Streets. It is

not necessary to be a sleuth to see at once that there was good reason for this location. This locale sat on honest solid ground, which can be confirmed by a glance at the map. The elevations are a couple feet higher than the area to the north (at ca. 13 feet), which certainly would make a difference in having a dry cellar over not having one. Also, in building on the original ground surface, the constructors did not have to worry about foundations sinking in the fill. Of course, this is inference, but we believe that our case is a valid one.

Kopper (n.d., p. 11) says that he had made a building-by-building and a lot-by-lot inventory of all of the construction along the original sewer line route on Columbia Street and its alternate (emphasis mine) during his survey. He says he paid particular attention to buildings that might have qualified them for inclusion in the National Register of Historic Places, but evidently none met the criteria in his estimation.

He notes that about half of the sewer line route is occupied presently by the modern Port Authority of New York and New Jersey piers and the parking lot adjacent to them. He observed as of June, 1981, that the area between Congress Street and Degraw Street in the project area was already vacant land filled with rubble. No mention is made of the Port Authority building fronting on Columbia Street and Congress Street, nor of the Water-front Commission structures next door to the south at Kane and Columbia Street. There are some buildings standing between Irving and Degraw Streets on Columbia Street including commercial and residential buildings and stores, of various sorts and in stages of dilapidation. Kopper illustrates his report with a number of photographs showing some of the buildings, which he places approximately from the 40's to the 1850's. From the documentary evidence, it would appear that this is a bit too early. Kopper identified by house number some fifteen structures, all evidently on Columbia Street. Of these, he notes that No. 184 Columbia Street, a three story house with a store on the first floor is located at Columbia and Degraw Street. He dates it to about the year 1840. This house and others in its immediate vicinity were built on what had formerly been

Locust Island, based upon my own findings. Kopper (n.d., p.3) concludes that the project area from his survey "has a low sensitivity" with regard to prehistoric and historic cultural resources, and that "construction would not imperil cultural resources of any period on the surface or in the sub-surface."

In order to check the present status of the area with regard to historic structures, I visited the Landmarks Preservation Commission offices on May 19th, and conferred with a Mr. Robert Gadsden concerning the question. He told me that while they were interested in the buildings to the south of Degraw Street, including the old warehouses and homes, he did not think there was anything of preservation value in the project area on Columbia Street. The closest area designated as a historic district is the Cobble Hill Historic District (page 61 of the publication by the Landmarks Preservation Commission of the City of New York, called "A Guide to New York City Landmarks"). This area is to the east of Hicks Street to Court Street, and between Atlantic Avenue and Degraw Streets.

The report of the Environmental Data Corporation of Fairfield, New Jersey dated Feb. 23, 1984 is a very instructive analysis regarding the structures north from Congress street to Atlantic Avenue. It is part of a two part report (the other to cover the buildings on Columbia Street south of Congress Street) was written as part of the Contract 1B-1 project. Among the structures examined were two four story brick buildings, Nos. 63 and 65 Columbia Street at the junction of Congress and Columbia Streets. No. 63 (Block 299, Lot 7) was declared unsafe by the Borough of Brooklyn in 1974, and is presently boarded up and uninhabited. It has approximate plan dimensions of 28 feet by 54 feet. No. 65 Columbia Street (Block 299, Lot 7) next to No. 63 is also a four story building with plan dimensions of approximately 21 feet by 70 feet. Like No. 63, this building was declared unsafe by the Borough of Brooklyn in 1981. Part of the roof is missing, and the building is in general in a very unstable condition. The sidewalk directly in front of the building has a number of cracks between the individual stone slabs, and a void in excess of 6 feet can be seen below. This may be a vault.

The New York Daily News dated Jan. 7, 1977 had a story about the Red Hook sewer project and its impact on Columbia Street. There was a serious problem with buildings collapsing along its excavated route. One man was killed when a building collapsed on him. The work was halted on the trench on President Street between Columbia and Van Brunt Streets. A number of buildings had to be shored up in order to keep them from falling down.

The Port Authority area is a relatively new enterprise, dating only a couple decades in ownership. It is said that in the interest of cost saving, the goods will be containerized, as they are at Port Newark.

Shipwrecks

Kopper (n.d.) reports that there were no shipwrecks in the project area, quoting a couple sources. However, there was a ship disaster a short distance to the north at or near the foot or present Joralemon Street. This occurred during the American Revolution, when a British Man of War, presumably became loose of its moorings during a storm and was driven ashore. There she was abandoned, and the local residents made use of the free timbers (Stiles, 1869, Vol. II, p.132). There is no record that we know of regarding beached ships that might have been used as part of the land fill operations here as at Water Street in Manhattan.

Field Trips

I made three field trips to the project area, totaling four hours on May 6th, four hours on May 7th, three hours on May 14th, or 11 hours in all.

The first trip was taken in company with Mr. Christie Nobriga, Mr. James Heyden, and Mr. Edward Curtin. Like myself, Mr. Curtin was new to the area. We walked the length of the project, from the regulator site at Amity and Columbia Street to Degraw Street. I took a number of photographs from various points along the walking tour. I observed that there were absolutely no structures along the proposed alternate route of the sewer pipe line. One could see the whole route from end to end without any obstructions. The line of the route north of Kane Street lay in the parking lot of the

Port Authority parking lot. Between Kane Street and Degraw Street, the southern limit of the project, there was rubble consisting mainly of red bricks. Workmen were installing high wire fences around the blocks in the southern part of this tract, surrounding the block with fencing. This was being put up to discourage illegal dumping in the empty lot by night time operators. While we were there, a huge mound of black odious earthy material was being removed by a bulldozer and trucks. At Degraw Street, we noted that there were some standing structures on the northwest corner of Degraw Street. There was a store with residential apartments above which Kopper (n.d.) had illustrated in his report. It was still standing flanked by neighboring structures. But the building had evidently suffered since the time Kopper had photographed it. On the return to our starting point, I noted that there was a heap of soil covering about half an acre near the Mason and Hanger trailer. This soil, about 7 feet high, had been collected from the excavations in Atlantic and Columbia Streets.

My next field trip was a collecting trip. Dr. Rose L. Solecki accompanied me and we collected and surveyed together. We walked around and over the mound of soil next to the trailer. We noted great clumps of peat, and pasty gray clay in the mound. The surface collecting proved to be sparse. We found one white clay pipestem about an inch and a half long, probably of late 19th century manufacture, a couple of bricks probably from the mid-19th century, one small fragment of china ware, six fragments of clam shells, and one oyster shell of small size. We then went to the no. 12 regulator, and observed the work in progress on the installation of the steel sheeting. I took several photographs of the operations. At the regulator excavation, I made a couple cross sections of the deposits to the east and west sides of the excavation. The stratigraphy on the west side in the proximity of what appeared to be a building foundation was as follows: Three inches of asphalt lying over ca. five inches of crushed stones, which in turn lay over about a 8 inch thickness of hard packed soil with crushed stones. This

lay over a stone foundation measuring about 2 feet thick, which was held together by what seemed to be lime mortar. The elevation of this foundation from the bottom of the cut to the base of the pavement preparation was nearly 3 feet. There was a jumble of bricks to the south side of the foundation directly connected with it. One of the bricks I examined looked like it could be dated from about the middle of the 19th century, or ca. 1850.

On the opposite side of the excavation by the regulator we measured the thickness of the street. There was an asphalt cap measuring about 3 inches lying over about 13 inches of concrete. This lay directly on a deposit of fine light brown sand.

The third field trip was taken in company with Prof. John Sanders of the Department of Geology at Barnard College. Prof. Sanders is a sedimentologist as well as geologist. One of his interests is the local geological history, particularly on Long Island. Thus he was greatly interested in seeing a section of soil that would date from the last glaciation, or the Wisconsin period in this area. Accompanied by Mr. Christie Nobriga, we went into the Atlantic Avenue trench by the west end. The depth there was about 25 feet. The bottom of the trench was a clay deposit. Prof. Sanders collected some of the peat we found at Station 0+95 for transmittal to Prof. Broecker at Columbia University for carbon-14 dating (see Appendix 1). We had a clam digger take out two scoops of soil so that we could see the stratigraphy. There was a deposit of red brown till lying over gray sand, which in turn lay over the peat. The peat was found at the base of the cut. Prof. Sanders thought that the gray sand and the peat belonged to the Wantagh Formation of the Wisconsin glaciation. This would be the earlier part of the glaciation. He also thought that this represented the result of the glaciation that came from the northwest direction from the New Jersey area. It could date as much as 40,000 years old. We took some photographs in black and white and in color at this station. Prof. Sanders collected some soil for analysis from this section as well as from the other two stations. At Station 0+95 Prof. Sanders felt sure

he could see proof confirming his hypotheses of two glacial episodes, each from different directions. Above the lower section Prof. Sanders felt that there was a change in the direction of the later glaciation to the northern origin. From the first station we walked on about 60 feet to the second station, Station 2+05 which was at a depth of about 15 feet below the street level. We cleaned back the face of a cut to get a fresh exposure. There we found a horizon of yellowish brown soil. Lastly we continued on to the station which was situated toward the end of the trench to the east. This was called Station 400, and we examined deposits which lay about 10 feet below the street level. The material was composed of fill soil and debris.

Prof. Sanders was especially glad that we were able to retrieve, in addition to the peat from station 0+95, some fragments of wood. The latter would be fine material for carbon-14 dating, better than peat.

While Prof. Sanders discussed the geological situation of the locale with Mr. Nobriga, I took the opportunity to make another round survey walking the area. I noted that Columbia Street is cobbled its length, and was later asphalted over the stones. Patches of the asphalt have worn away exposing large areas of the cobbles stones as well as the double rail track, still embedded, and probably usable, in the street.

Between Baltic and Congress fronting on Columbia Street is the Port Authority Piers Administration Building. Between Baltic and Kane Streets is the Waterfront Commission Building.

I took photographs of the street and the buildings on Columbia Street, as well as the corners of the separate streets on Columbia Street. I paid particular attention to the spot where the Red Mill probably stood to at least 1834 and probably beyond that time. This was presumably at the intersection of Irving and Columbia Streets, in from the meeting of these two streets to the east toward Tiffany Street. At present the site is an empty lot full of debris. It may be possible to sink a test in this lot in the future to determine the nature

of the underlying strata. This was the only item of historic or archaeological interest that has potential in this area so far as I could tell from my literature search. However, it is out of the line of the projected sewer excavation, and the work will not endanger the subsurface remains, assuming that they are still in situ.

The Soil Borings

The soil samples were examined at the Municipal Building in Manhattan at the Bureau of Public Works, Sub-surface Division. These samples were taken as part of Job No. 1545. There were seven borings in all, from Degraw to Kane Street, following the alternate proposed route for the sewer.

The first layer encountered was fill, which consisted of sand, silt, gravel etc. I found particles of red bricks, charcoal and organics in some of the earth from this horizon. Also encountered in some of the samples were cinders, bits of glass and some particles of wood. This indicated that there was certainly occupational remains of human habitation or use in this area. But we cannot tell whether or not the deposit had been derived from elsewhere. Surprisingly, the depth of the fill deposit was relatively shallow, going down to only about 5 feet as a rule. Below this was a stratum of red/brown silt, sand which evidenced some lensing and thickening in the boring samples. No artifactual remains or traces were found in this horizon nor in the deposits below. The borings went down to a depth of about 41 feet.

Conclusions

From the literature and documents search, it appears that this area in the main, with the exception of that portion of the project area which lies south of Irving Street, had been within the high water mark in prehistoric and early colonial times. It was not until about the second quarter of the 19th century that the Columbia Street area began to be filled in and the land reclaimed from the river. The land fill seems to have been a two pronged affair, from the south and from the north. Completion of the land filling seems to have been completed about the 1840's, when Columbia Street was laid

down. An impression gained from the literature search is that a large part of the area had remained in open lots for a very long time, and that when building operations did start, the residential homes appeared to cluster to the south, on what had been originally dry land, in the neighborhood of Sedgwick and Degraw Streets. In the northern area, the land was taken over by store houses, lumber yards, etc. There appears to have been considerable ware house construction, which may have obliterated any remains of former buildings. The ribbon of train tracks down the middle of the area to the river must have also destroyed any former building remains.

The only structure reported in these environs of historic interest appears to be the Red Mill, which stood near the junction of Irving and Columbia Streets, and somewhat to the east toward Tiffany Street. However, it is outside the present reach of the proposed sewer alignment, and thus cannot be considered for serious consideration here. On the other hand, it would be of interest to the Landmarks Preservation Commission to keep track of the site for the future, in case new building ventures are planned for the empty lot.

While the old maize fields are so tantalizingly close, they are also outside the range of the present water control project. In fact, there does not appear to be any indication of prehistoric occupation in the Columbia Street area.

In summation, from all avenues of literary and documentary evidence, plus the limited amount of information derived from the seven borings samples I have examined, I am forced to conclude that the proposed sewer trench will have minimal impact on the cultural resources of the proposed project area. It would have been of advantage to have made some observations via test trenches, but such access appears to be not without problems. On the other hand, from the borings, it appears that the fill horizon was a mixture of soil, and not reflective of any definite patterns.

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Table 1

Street	Materials Used	Street Dimensions	Dates Completed
Amity Street from Columbia to bulkhead on the East River	6 in. concrete 1902 4 in. concrete (new)	Width 34 ft. Length 370 ft.	August 1921
Congress Street from Columbia to the East River	Granite block, 6 in. concrete. G&P 1847	Width 30 ft. Length 569 ft.	Aug. 1919
Warren Street from Columbia to the East River	Granite block, Gr 1, 6 in. concrete. G&P 1852	Width 24 ft. Length 858 ft.	Aug. 1921
Baltic Street from Col- umbia to East River	Granite block, Gr. 2 Repaved 1872. G&P --?	Width 24 ft. Length 741 ft.	1907
Kane Street from Colum- bia to bulkhead	Granite block, Gr. 1 6 in. concrete G&P 1852	Width 30 ft. Length 858 ft.	Aug. 1921
Irving Street from Van Brunt to Columbia	Foundation ca. 1852 Medina block, 6 in. concrete paved	Width 20 ft. Length 569 ft.	1905
Sedgwick, Van Brunt to Columbia Street	Medina block. PC about 1852. 6 in. concrete	Width 30 ft. Length 597 ft.	1905
Degraw Street from Columbia to East River	G&P 1848. Paved from East River to Van Brunt, Medina block.	Width 30 ft. Length 597 ft.	1903

• Taken from List of Paved Streets in the Borough of Brooklyn, City of New York, 1950.
Annotated by L.M. Burt.

16 May 1984

36

Department of Geology

To: W. S. Broecker

From: Ralph Solecki & J. E. Sanders

Subj: Wood sample and peat for ^{14}C date (accepting your kind offer to RC)

This sample comes from the Brooklyn sewer excavation (Red Hook area, Atlantic Avenue near Pier 7) and was collected by us on Monday, 14 May 1984. The enclosed sketch section shows the stratigraphic relationships, based on what was visible plus what lies below (based on borings). (Thicknesses approximate)

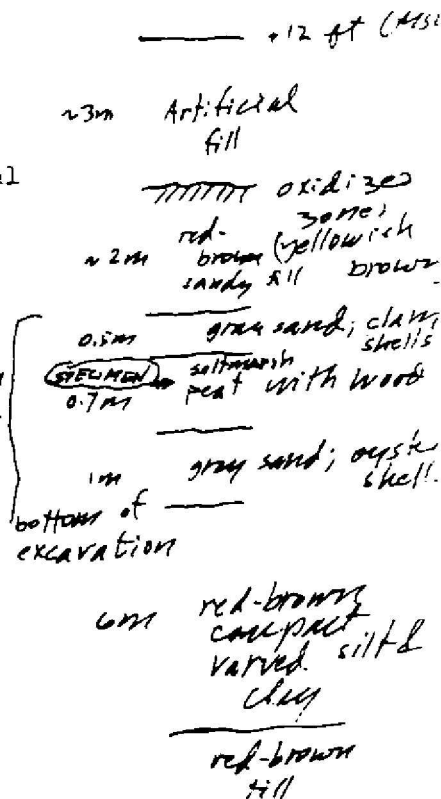
The Wantagh Formation (equals "20-foot clay" of UGGS) is here both overlain and underlain by red-brown tills (\pm outwash) that were deposited by glaciers flowing regionally from the NNW (across the Hudson Valley), both of which I think are older than the most-recent glacial deposits left by ice that flowed from the NNE, thus came down the Hudson valley and are not red in localities E of the Hudson River. In the excavation, the youngest natural feature is an oxidized zone on top of the upper red-brown till. Above that is artificial fill.

If an age of 18,000 to about 13,000 BP is correct for the non-red glacial deposits from the last ice (i. e., down-the-Hudson flow; not present in the excavation), then the next-older till (the upper red one) might be about 28,000 yr old and the peat may be ~40,000. It could, of course be older, but I doubt that it can be much younger.

We collected much more of the peat but send here all the wood we found.

Whatever the date proves to be, it will be immensely valuable to the local Pleistocene stratigraphy. This is the first potentially datable material I have found associated with the succession of red-brown tills in the New York region.

In its type locality, the Wantagh Formation is overlain and underlain by outwash sands (no till) and lacks saltmarsh peat. Datable samples of



Description of the Plates (all photographs by Ralph Solecki)

1. View west from the Brooklyn-Queens Expressway toward the East River at Atlantic Avenue. The sewer trench curves at this point turning south at Columbia Street in the foreground.
2. Looking toward the southwest, in the direction of the proposed sewer trench, which is to cut across the Port Authority parking lot behind the crane. The street in the foreground is Columbia Street.
3. Workman cutting a section of pier timber for dendroanalysis at Columbia University. Mr. Christie Nobriga is steadying the timber. Photo taken in the Port Authority lot.
4. Two of the large gas container ships berthed temporarily at the Port Authority dock at the foot of Amity Street. The Manhattan skyline of buildings is in the background.
5. Looking north along the line of the proposed pipe line route in the Port Authority parking lot. In the rear behind the single car is the low heap of earth taken from the Columbia Street and Atlantic Avenue excavations.
6. Looking northeast over the area (to the right) through which the proposed pipe line will cut, at the foot of Amity Street. The cranes are part of the sewer project.
7. Looking south in the Port Authority parking lot over the proposed route of the sewer cut. From left to right are Mr. James Heyden and Mr. Christie Nobriga and Mr. Edward Curtin. In the distance is the terminus of the proposed trench at Degraw Street, marked by the residential buildings.
8. View looking south from Kane Street toward Degraw Street in the distance on the route of the proposed sewer cut. The block is fenced in to prevent illicit "moonlight" dumping. The field is strewn with building rubble.
9. Installing the wire fence at Irving Street as a protective measure against illicit "moonlight" dumping. The bulldozer in the rear is cleaning up the remains of one such load dumped in the street. Looking east to the docks.
10. Looking south toward Degraw Street. The proposed sewer trench will cut approximately to the left of the open lot on Degraw Street. The rubble-strewn field is shown here.

Plates

11. Looking north toward Atlantic Avenue from Amity Street over the regulator no. 12, and the sewer trench being cut to the west side of Columbia Street (on the right). The machine is driving in the ca. 42 feet long steel sheets.
12. The construction of regulator no. 12 at the junction of Columbia and Amity Streets. Looking east of north toward Atlantic Avenue.
13. Dr. Rose L. Solecki of Columbia University measuring the depth of the deposits just south of the no. 12 regulator cut at the junction of Columbia and Amity Streets. Columbia Street behind the barrier, looking east.
14. Dr. Ralph Solecki of Columbia University measuring the depth of the cut just south of the no. 12 regulator at the junction of Amity and Columbia Streets.
15. No. 63 Columbia Street on the northeast corner of Columbia Street, one of the several buildings described by the Environmental Data Corporation of Fairfield, New Jersey. These buildings are in various stages of dilapidation as seen here. Looking south east from near the no. 12 regulator site.
16. Looking northeast at the corner of Columbia and Baltic Streets, showing the character of the neighborhood in the project area.
17. The empty lot at the junction of Irving Street with Columbia Street. Somewhere in the rear of this lot is the presumed site of the Red Mill, which stood there over 150 years on the Graver Kil. This mill was also called Seabring's or Cornell's Mill. It lies just outside the line of the proposed sewer cut. Looking east from the corner on Columbia and Irving Street.
18. Looking east into the sewer trench on the south side of Atlantic Avenue near Columbia Street. Depth ca. 25 feet.
19. Rhizome plants evidence in the peat at the base of the sewer trench in Atlantic Avenue. Samples of this peat were taken for radio-carbon 14 analysis at Columbia University.
19. Prof. John Sanders of the Geology Department at Barnard College taking peat samples for analysis in the base of the trench in Atlantic Avenue. Mr. Christie Nobriga holding the bag.

Plates

21. The peat exposure at the 25 foot depth in the Atlantic Avenue trench. The cut was made with the clam digger. The slabs of material at the height of the shovel handle are large chunks of peat. Looking east at Station 0+95. Depth below road level.
22. Prof. Ralph Solecki of Columbia University holding a pebble found in situ under the peat level in the section cut by the clam digger at Station 0+95.
23. Prof. John Sanders pointing to the contact between the red brown till above and the gray sand below at Station 2+05. The depth below the ground surface is about 15 feet.
24. The contact zone of the red brown till and the gray sand and the contact between the gray sand and the underlying peat. According to Prof. Sanders, the sand and the peat belong to the Wantagh Formation of the Last Glaciation (Wisconsin). Taken at Station 2+05, looking east in the Atlantic Avenue trench.
25. Detail view of Photograph Plate No. 24 showing the contact zones of the red brown till, the gray sand, and the peat.
26. Detail of peat at Station 2+05 at the side of the trench.
27. Looking toward Station 400 eastward in the Atlantic Avenue trench. The trench walls are sheeted in steel, and trussed with steel beams. The width of the trench is about 15 feet.
28. Mid 19th cent. fill deposits at a depth of about 10 feet below the road surface in the Atlantic Avenue trench. Fill overlies Pleistocene soils at Station 400.
28. Mid 19th cent. fill evidenced in the trench in Atlantic Avenue at Station 400 at a depth of about 10 feet below the street level. Seen in this view are the fragments of wood and other organic material etc. incorporated in the fill.

Figures

1. Site location map taken from the Hagstrom Atlas.
2. The location plan of the borings on Job No. 1545.
3. The proposed alternate route of Contract 1B-1 and 1B-2 from Amity Street to Degraw Street.
4. Stratigraphy found in the borings on Job No. 1545 in the alternate route of Contract 1B-1 and 1B-2.
5. The approximate locations of the borings to be taken on the new alternate route between Amity Street and Kane Street.
6. The location of the Port Mobil Palaeoindian site on the future Staten Island. From H. Kraft, 1977.
7. The Development of the Proglacial Lakes in the New York City area. From L. Eisenberg, 1978.
8. The T.G. Bergen map showing the location of the Seabring Mill.
9. The overlay map showing the position of the high and low water lines with relation to the project area. From the Report of the Board of Health 1875-6.
10. Detail of the project area taken from the Map of Brooklyn, King's County, L.I. by Alexander Martin, 1834.
11. Luqueer's or Master's Mill, one of the Seabring Mills, in the Gowanus area. Taken from Brooklyn, L.I. One Hundred Years (1916).
12. Map of the Battle of Long Island. L.I. Historical Society, 1878.
13. Detail Map of the Battle of Long Island. L.I. Historical Society, 1869.
14. Enlarged detail Map of the Battle of Long Island. L.I. Historical Society, 1869.
15. From the block records. Map of 1851, showing the property of John La Farge between Congress Street and Warren Street to the former low water line. Note that the low mark is ca. 156 feet and 206 feet respectively from the western side of Columbia Street.
16. The Cornell property in 1833. Included is the area south of Harrison Street within the project limits. The low and high water lines are in error in this drawing, an example of real estate tactics (?). The land filling operations in this area had not begun at this time.

Figures

17. Description of the Cornell property on the occasion of its sale in 1833. Taken from the block records in the L.I. Historical Society.
18. Same as 17.
19. The Atlantic Docks. From Old Brooklyn in Early Photographs 1865-1929. Willam Younger, Dover, 1978. This view shows the ships at the docks in 1878.
19. Two sections taken at the trench sides at regulator no. 12 at the junction of Columbia and Amity Streets.



PLATE 1



PLATE 2

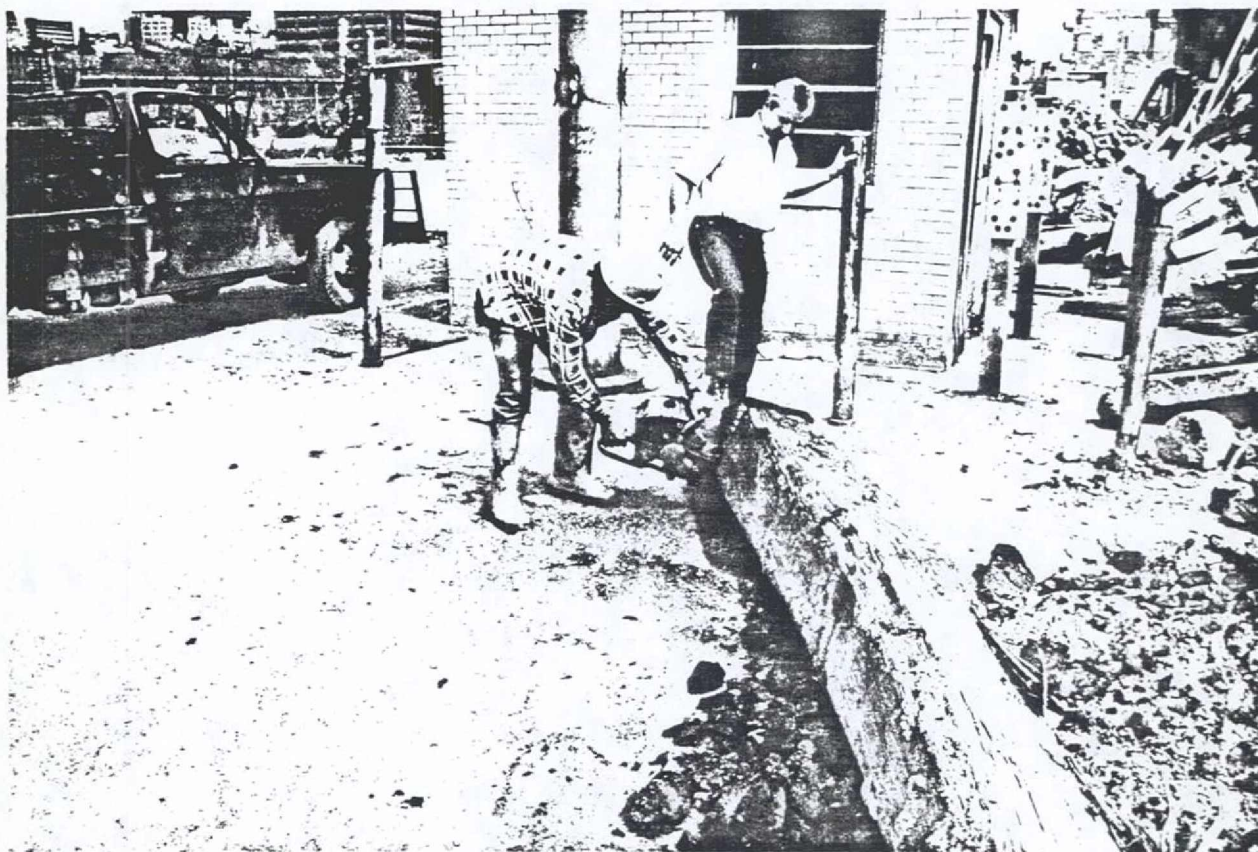


PLATE 3

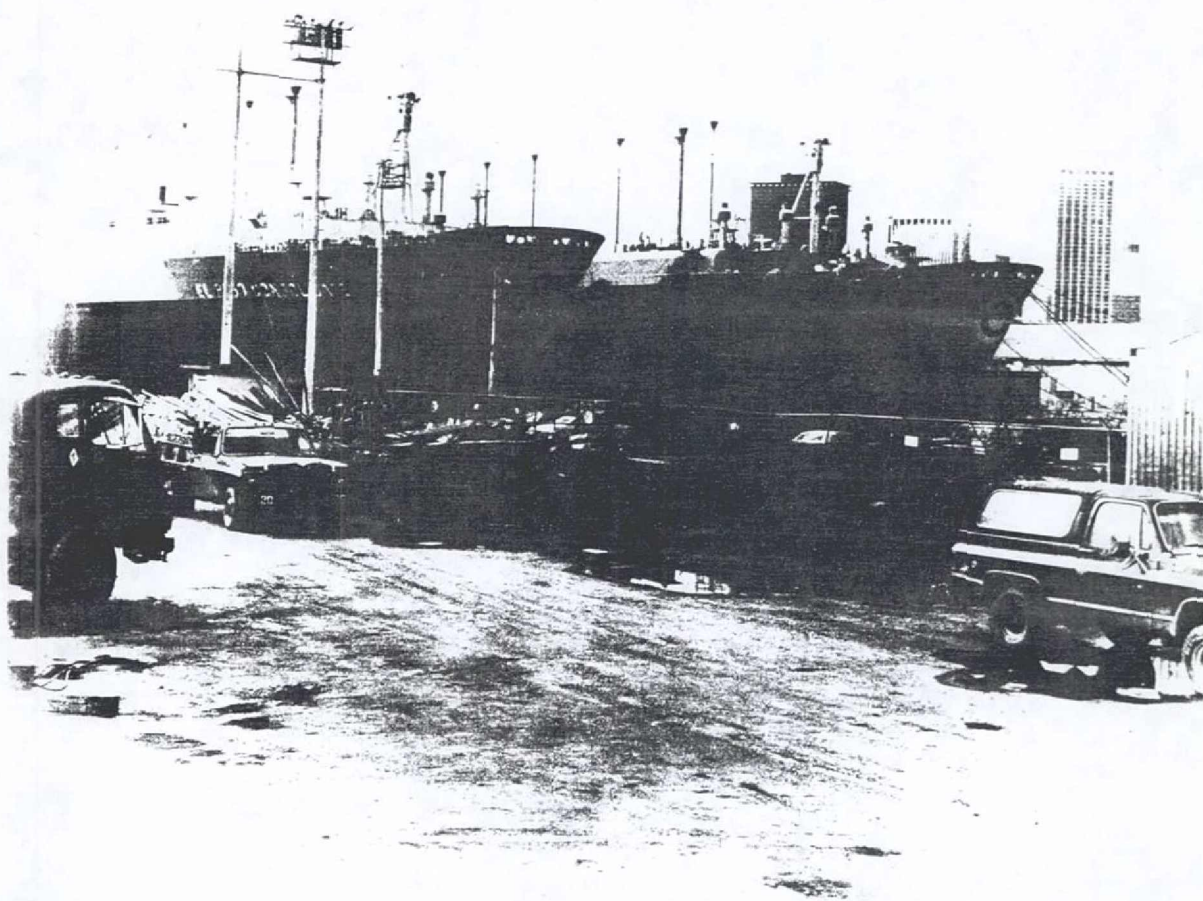


PLATE 4



PLATE 5



PLATE 6



PLATE 7

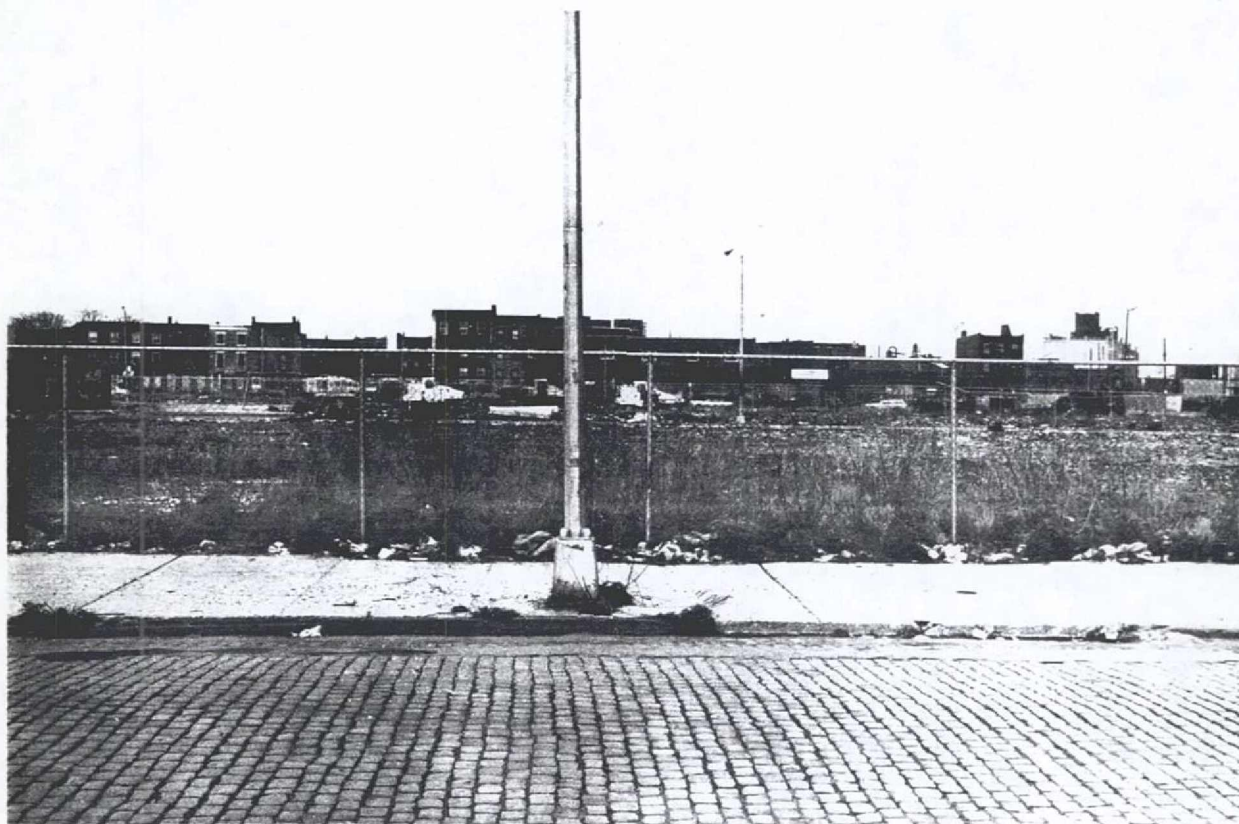


PLATE 8

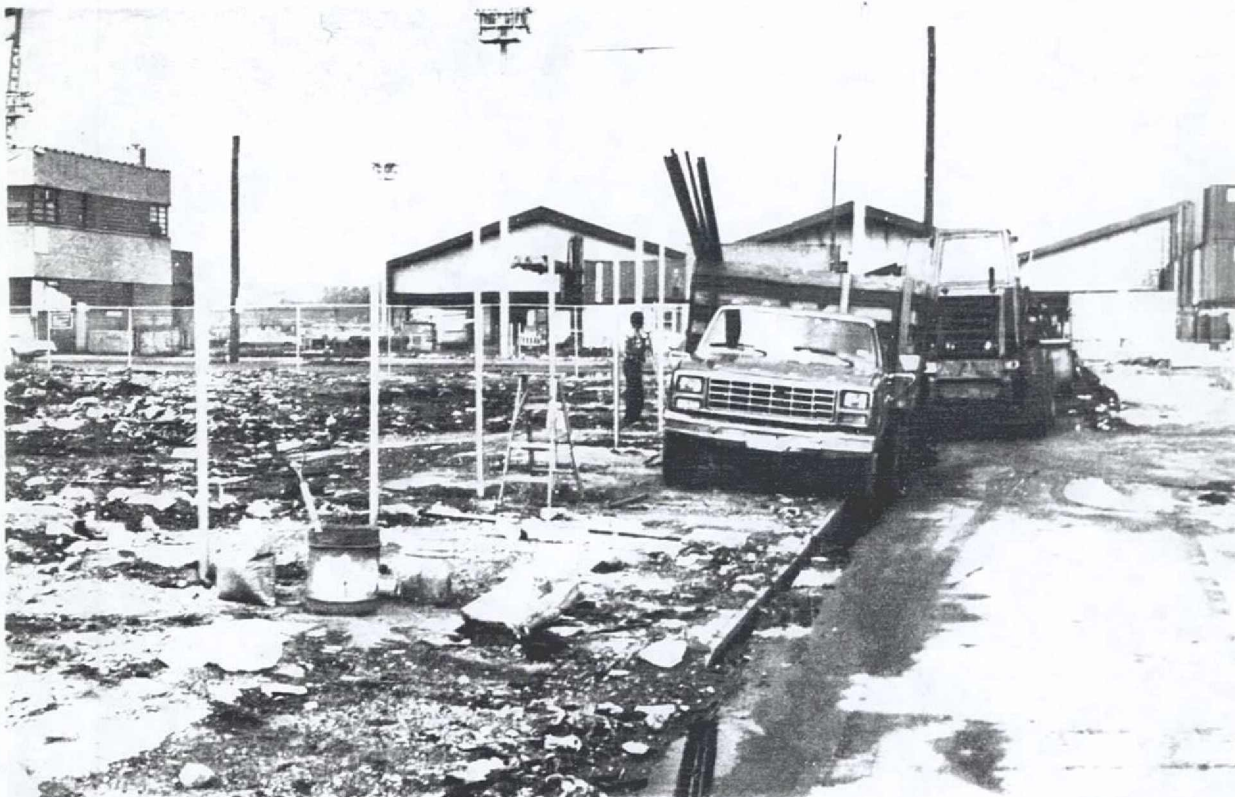


PLATE 9



PLATE 10



PLATE 11

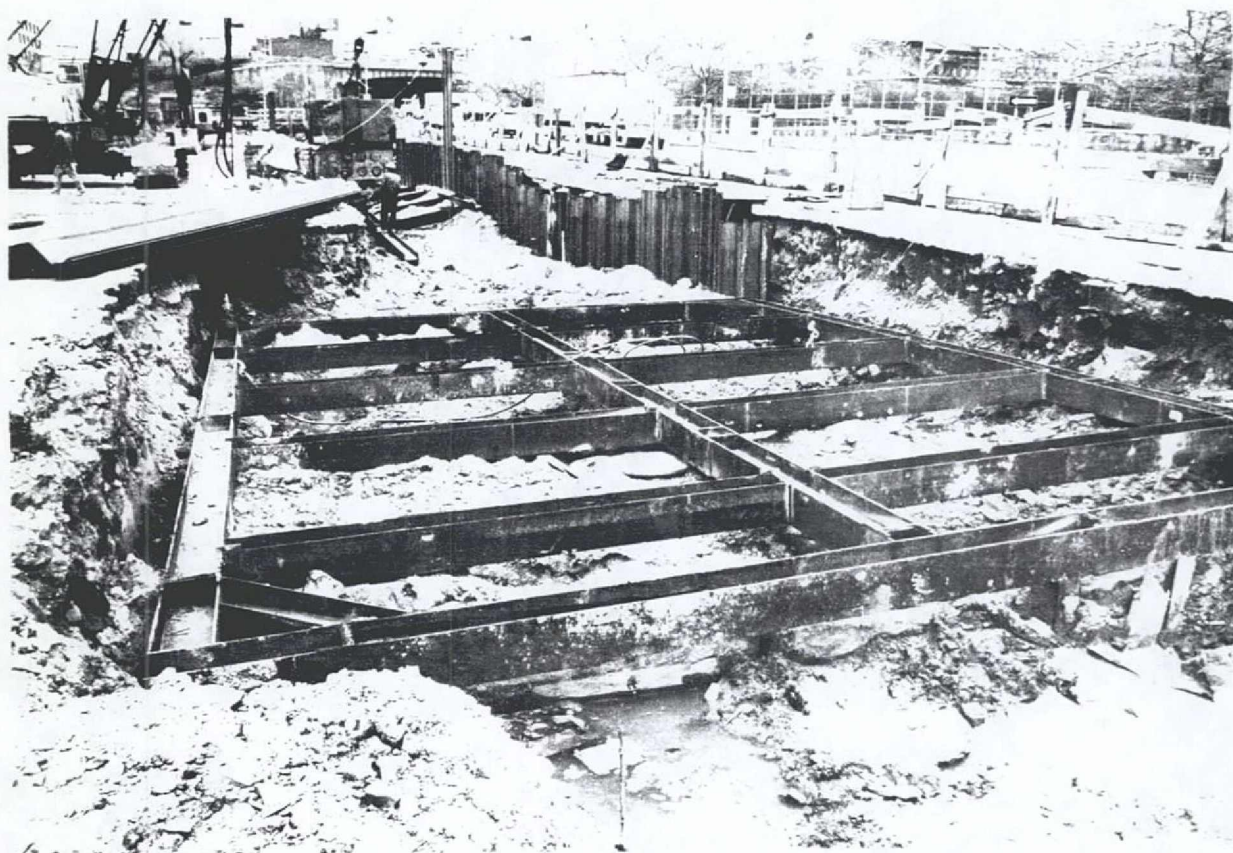


PLATE 12



PLATE 14



PLATE 15



PLATE 16

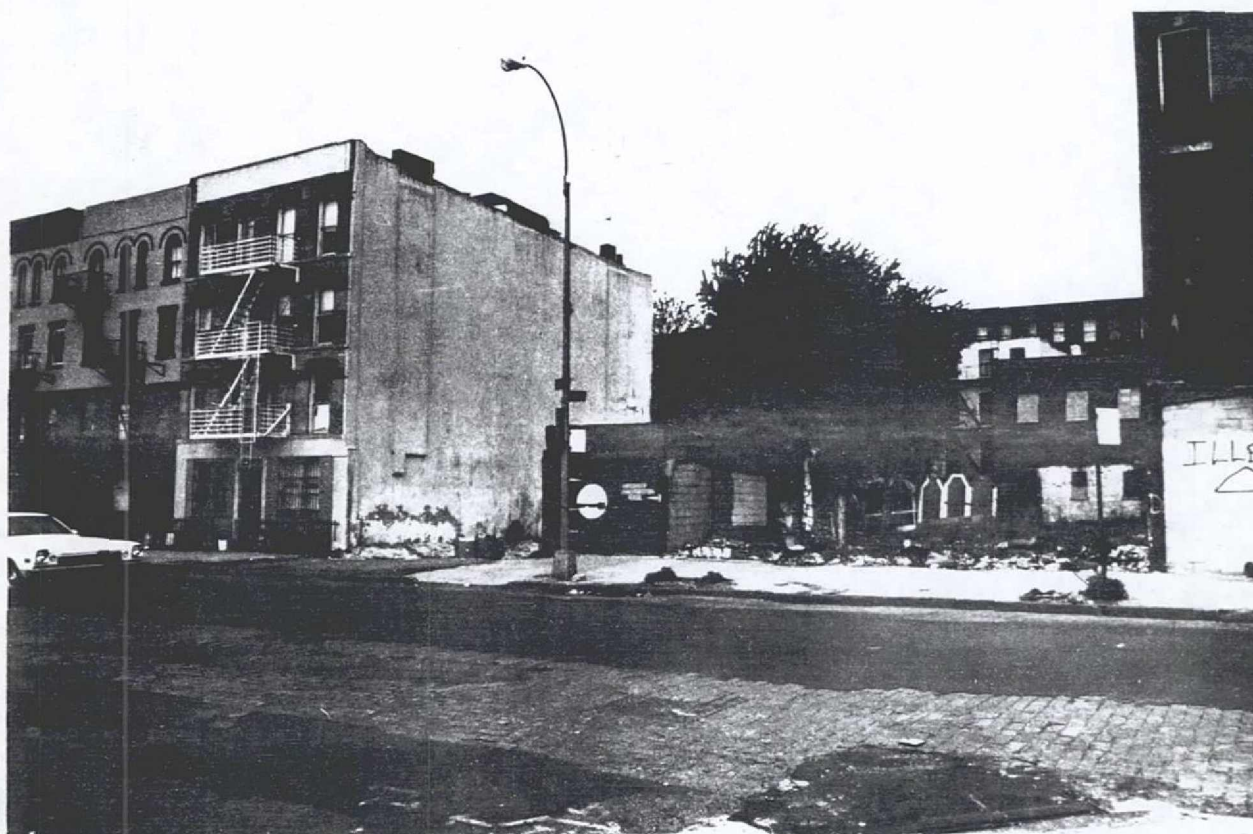


PLATE 17

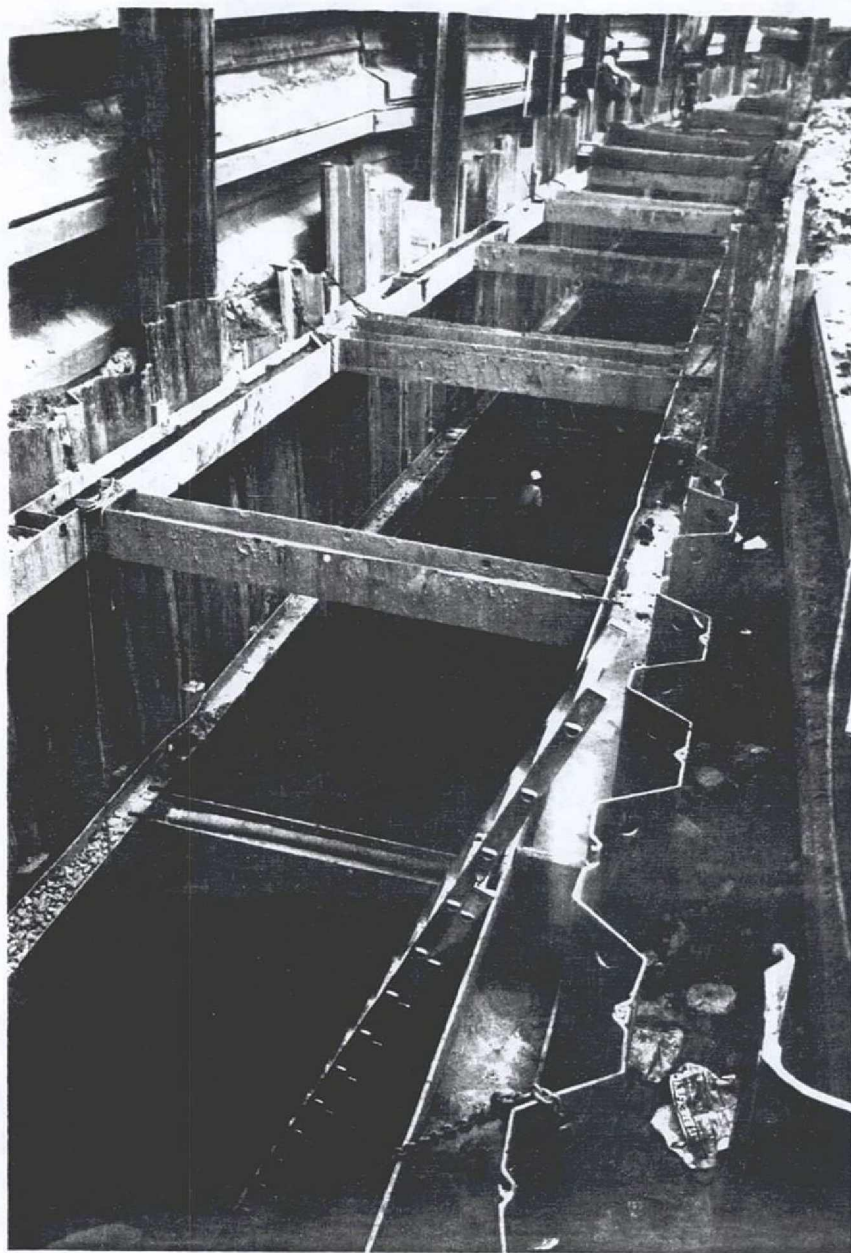


PLATE 18

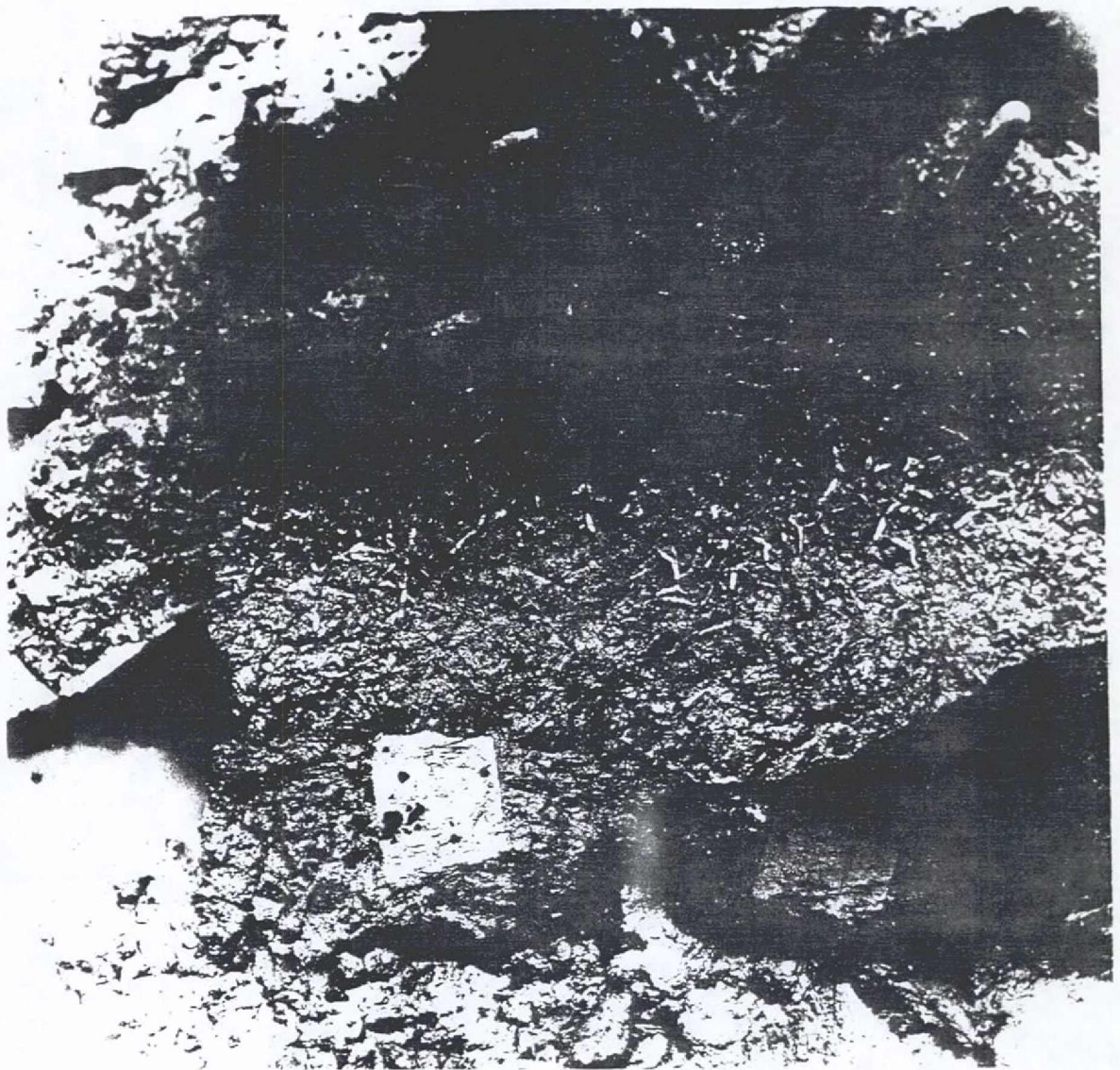


PLATE 19

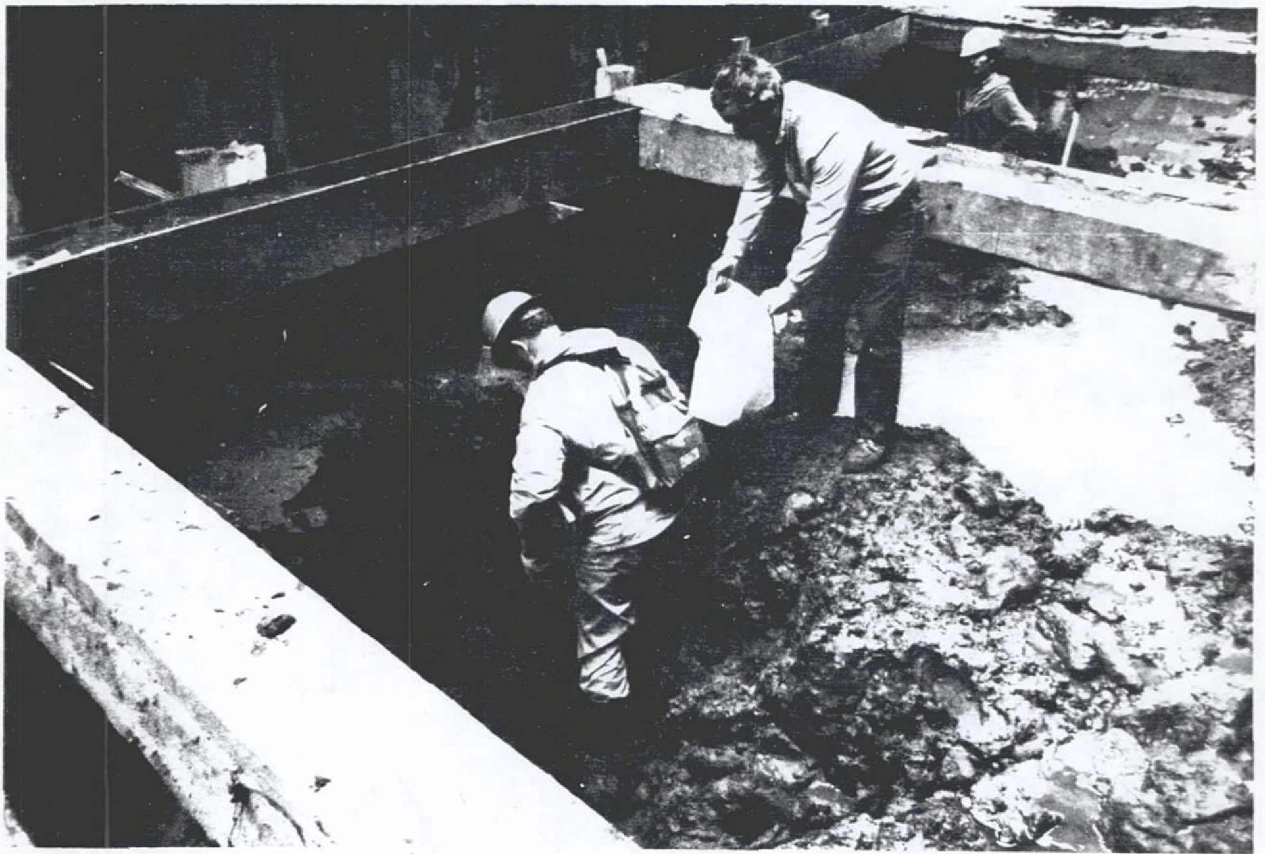


PLATE 20



PLATE 21



PLATE 22



Red
Brown
Till

GREY
SAND

PEAT

PLATE 23

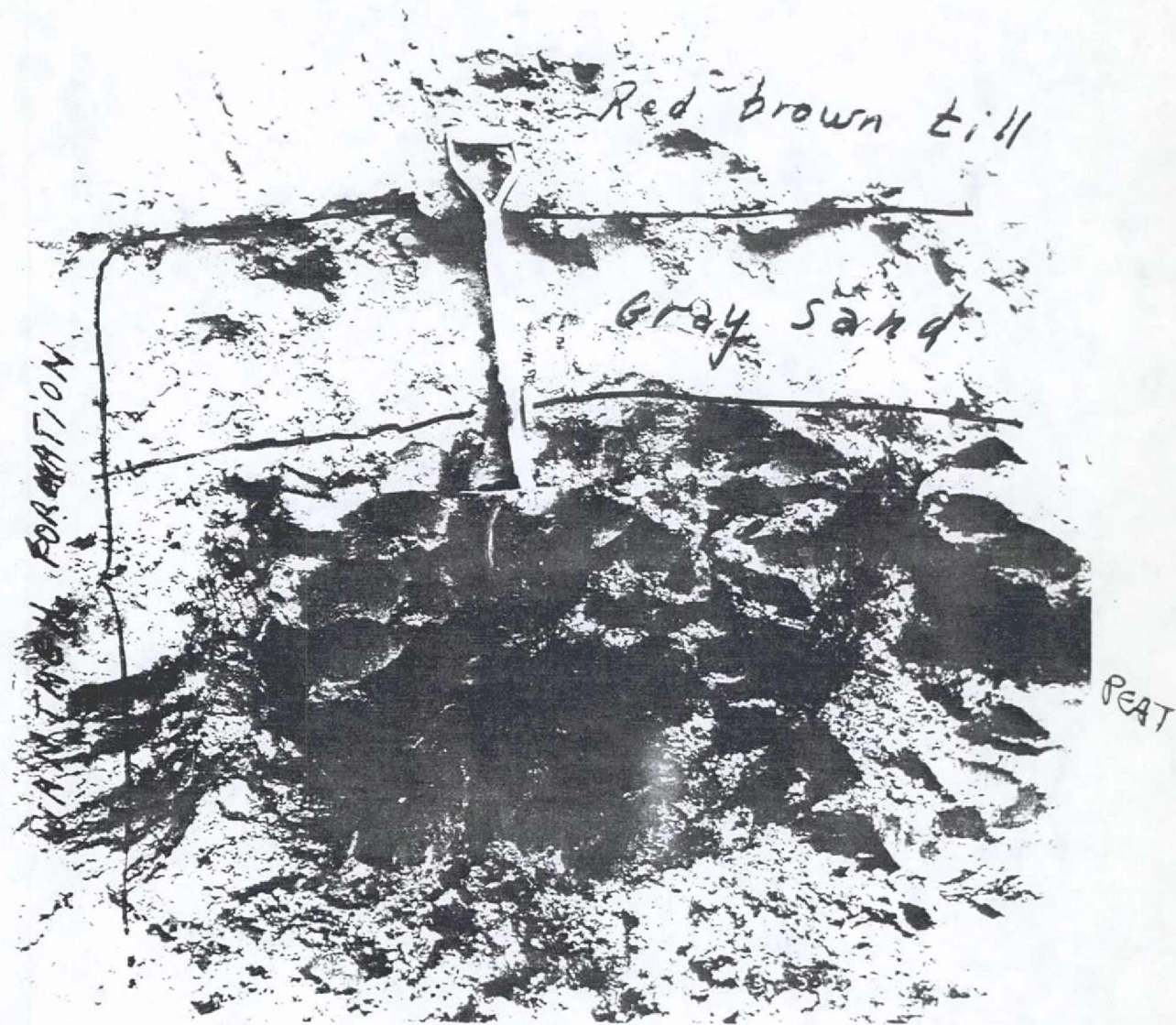


PLATE 24

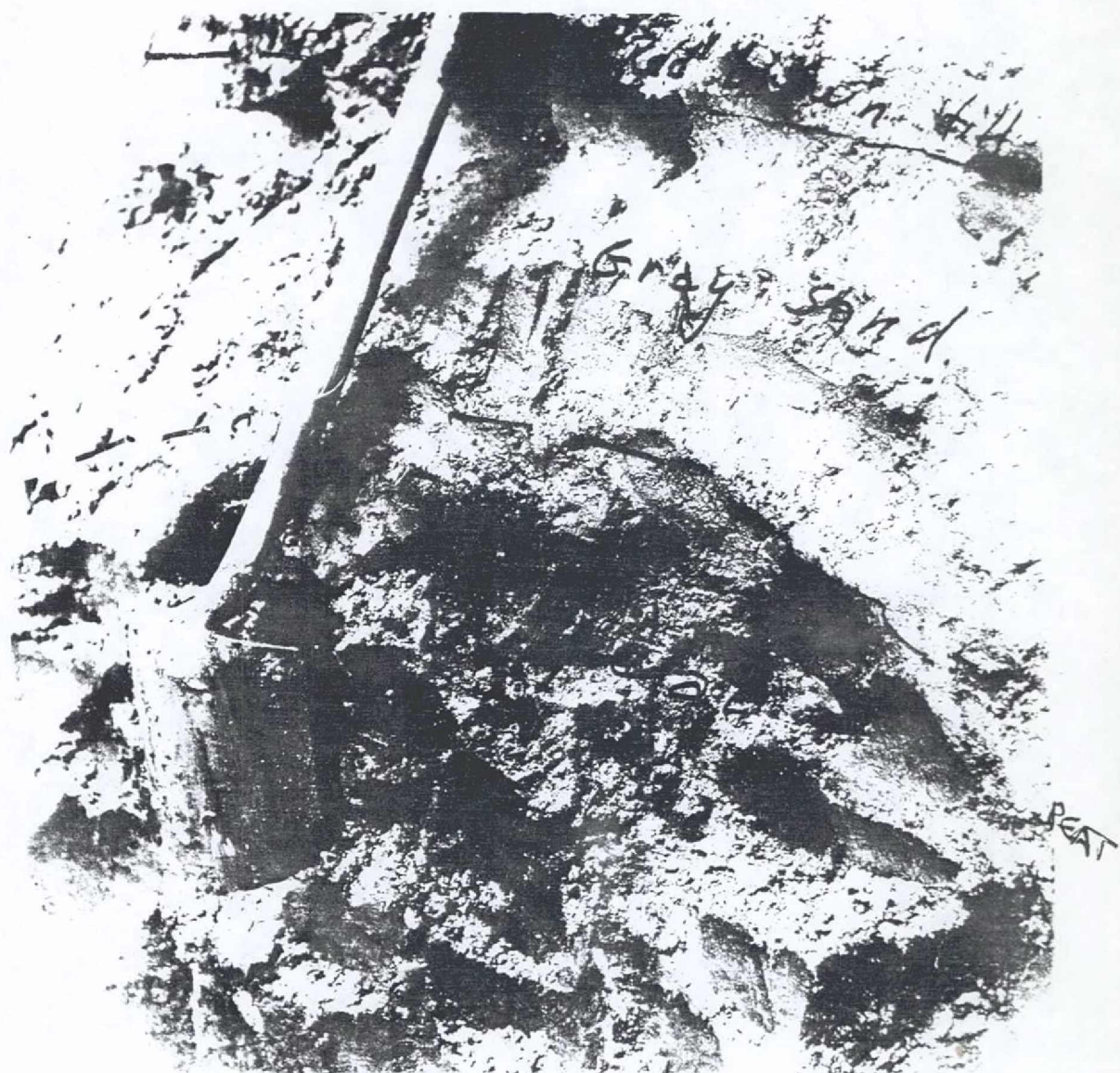


PLATE 25



PLATE 26



PLATE 27

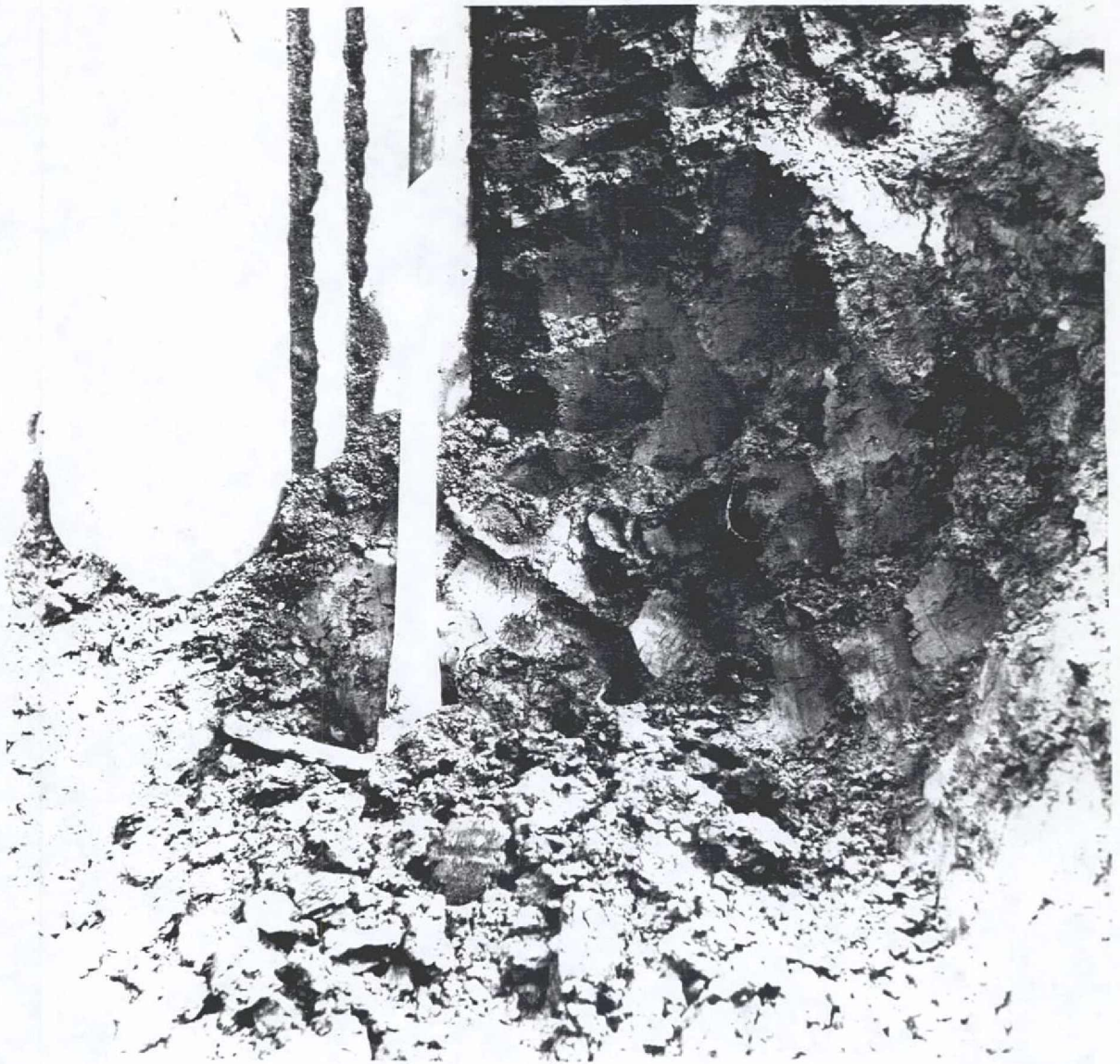


PLATE 28

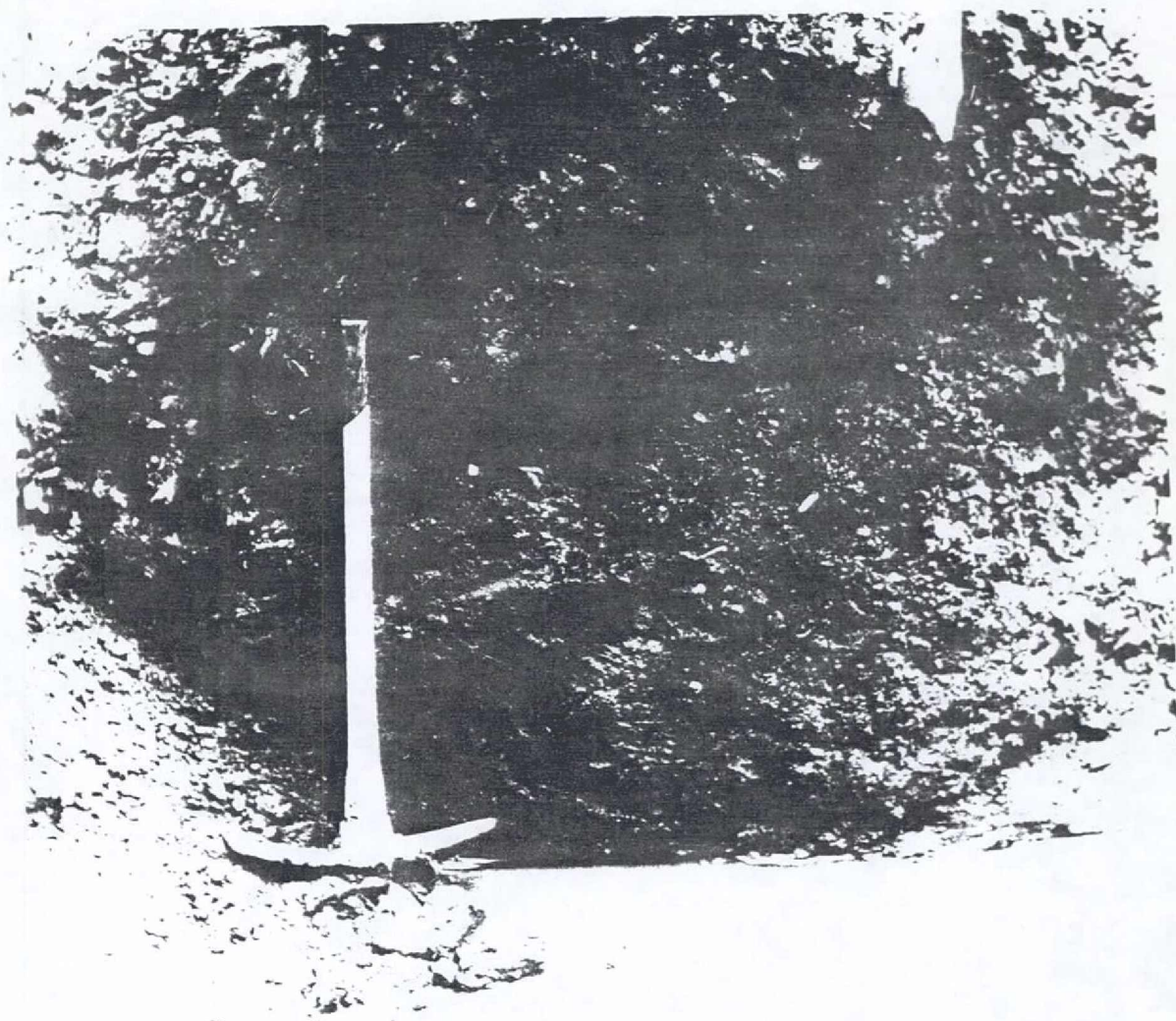
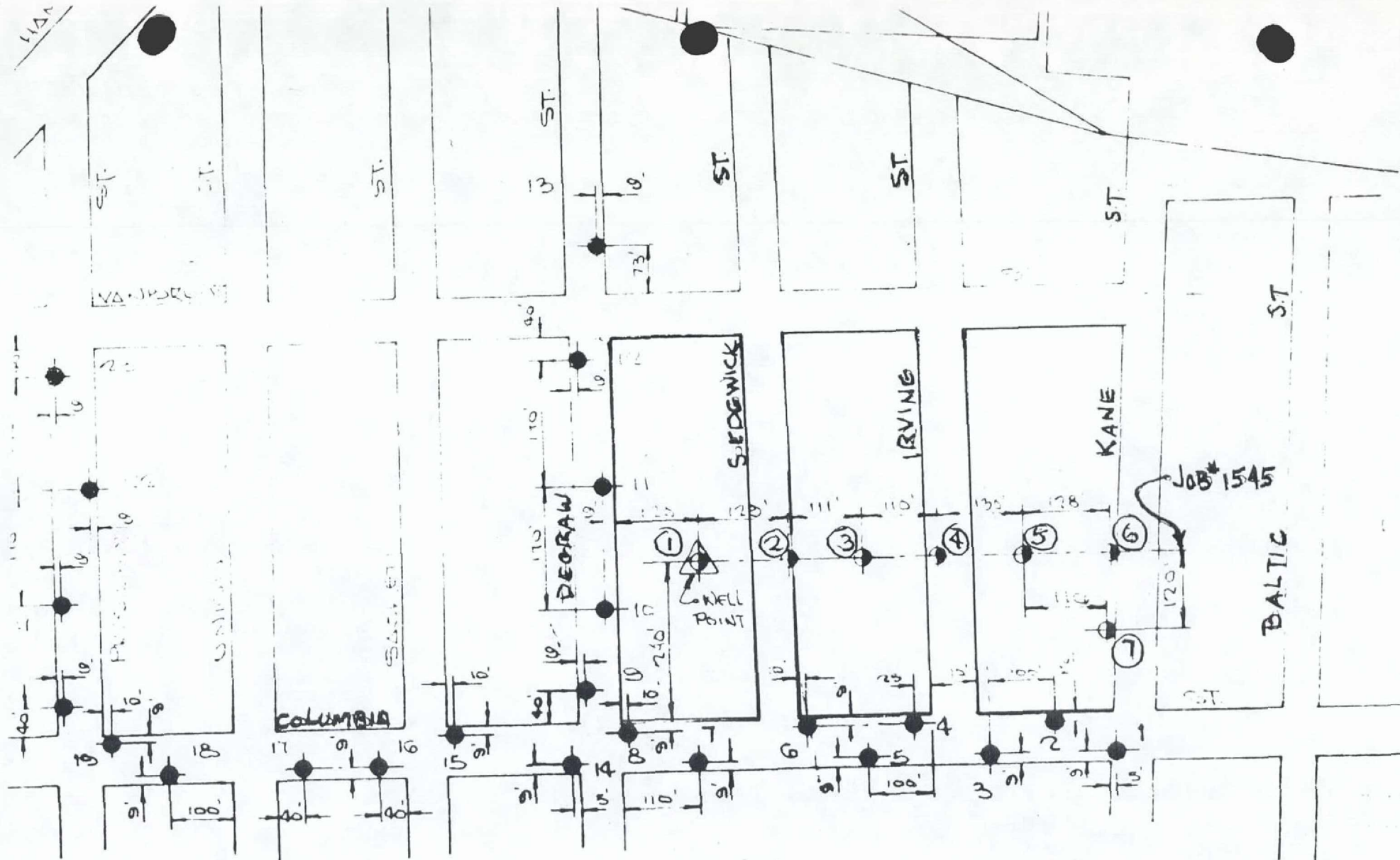


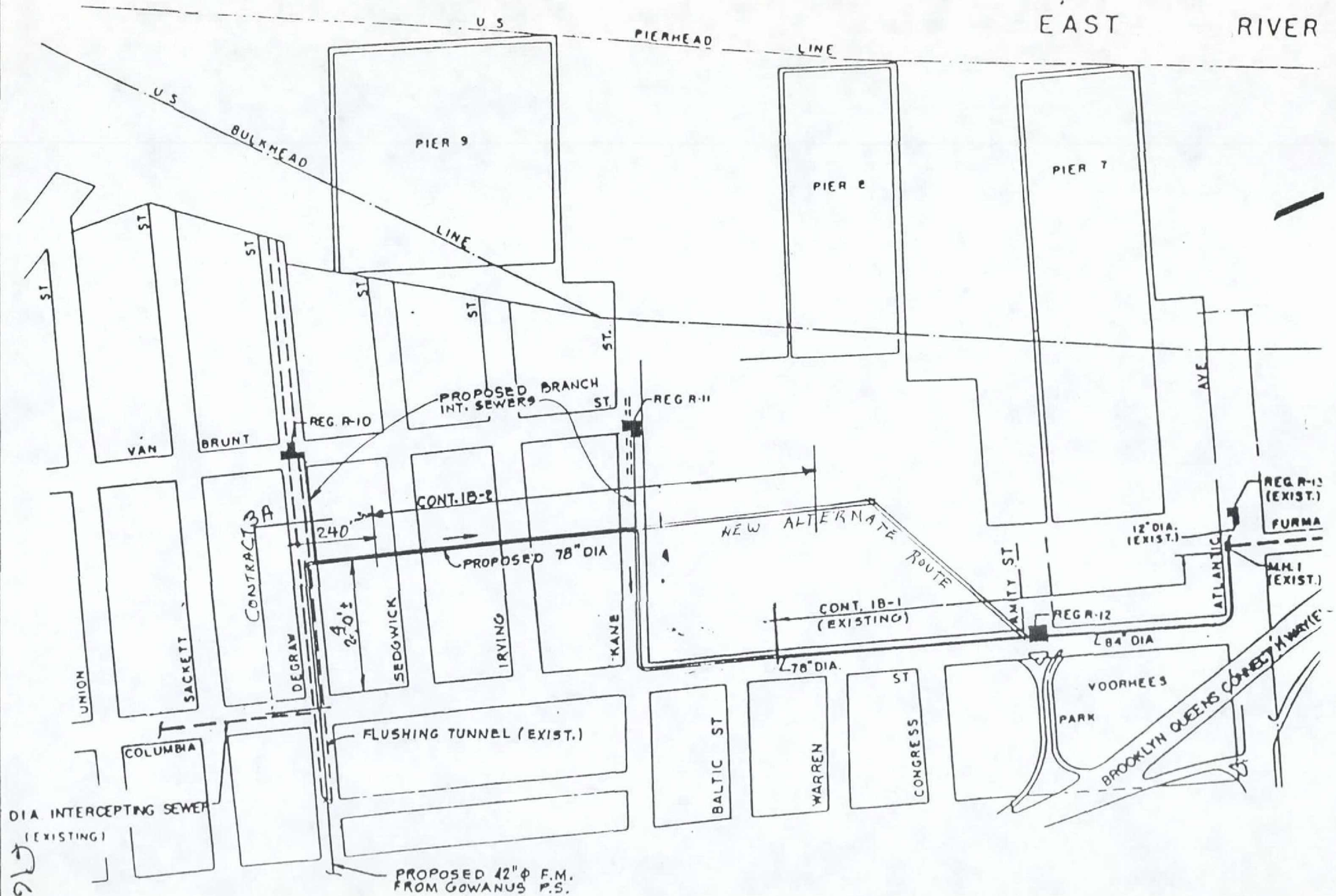
PLATE 29

LOCATION PLAN

SCALE: 1" = 200'



EAST RIVER



KEY PLAN
N.T.S.

26.3

1	2	3	4	5	6	7
surf elev. 11.8	surf elev. 11.3	surf elev. 11.7	surf elev. 10.5	surf elev. 10.3	surf elev. 9.7	surf elev. 10.2
F F-C Brown sand, some gravel, trace to little silt 11-65 trace wood one etc. Brown silt, trace fine sand (O.Hier) POSSIBLE FILL 11-65 DARK GRAY Organic silt, trace to some clay, trace to some fine sand, trace to little peat (O.L-OH) 11-65 Fine Brown sand, trace to little silt (SP-SM) 8-65 very fine Brown sand, some silt (SM) 8-65 Bulls Liver F-M Brown sand, trace to little silt trace gravel (SP-SM) 7-65 very fine Red/Brown sand, some silt (SP) 8-65 Bulls Liver	F F-C Brown sand, some gravel, trace to little silt 11-65 trace wood one etc. Brown silt, trace fine sand (O.Hier) POSSIBLE FILL 11-65 DARK GRAY Organic silt, trace to some clay, trace to some fine sand, trace to little peat (O.L-OH) 11-65 Fine Brown sand, trace to little silt (SP-SM) 8-65 very fine Brown sand, some silt (SM) 8-65 Bulls Liver F-M Brown sand, trace to little silt trace gravel (SP-SM) 7-65 very fine Red/Brown sand, some silt (SP) 8-65 Bulls Liver	F F-C Brown sand, some gravel, trace to little silt 11-65 trace wood one etc. Brown silt, trace fine sand (O.Hier) POSSIBLE FILL 11-65 DARK GRAY Organic silt, trace to some clay, trace to some fine sand, trace to little peat (O.L-OH) 11-65 Fine Brown sand, trace to little silt (SP-SM) 8-65 very fine Brown sand, some silt (SM) 8-65 Bulls Liver F-M Brown sand, trace to little silt trace gravel (SP-SM) 7-65 very fine Red/Brown sand, some silt (SP) 8-65 Bulls Liver	F F-C Brown sand, some gravel, trace to little silt 11-65 trace wood one etc. Brown silt, trace fine sand (O.Hier) POSSIBLE FILL 11-65 DARK GRAY Organic silt, trace to some clay, trace to some fine sand, trace to little peat (O.L-OH) 11-65 Fine Brown sand, trace to little silt (SP-SM) 8-65 very fine Brown sand, some silt (SM) 8-65 Bulls Liver F-M Brown sand, trace to little silt trace gravel (SP-SM) 7-65 very fine Red/Brown sand, some silt (SP) 8-65 Bulls Liver	F F-C Brown sand, some gravel, trace to little silt 11-65 trace wood one etc. Brown silt, trace fine sand (O.Hier) POSSIBLE FILL 11-65 DARK GRAY Organic silt, trace to some clay, trace to some fine sand, trace to little peat (O.L-OH) 11-65 Fine Brown sand, trace to little silt (SP-SM) 8-65 very fine Brown sand, some silt (SM) 8-65 Bulls Liver F-M Brown sand, trace to little silt trace gravel (SP-SM) 7-65 very fine Red/Brown sand, some silt (SP) 8-65 Bulls Liver	F F-C Brown sand, some gravel, trace to little silt 11-65 trace wood one etc. Brown silt, trace fine sand (O.Hier) POSSIBLE FILL 11-65 DARK GRAY Organic silt, trace to some clay, trace to some fine sand, trace to little peat (O.L-OH) 11-65 Fine Brown sand, trace to little silt (SP-SM) 8-65 very fine Brown sand, some silt (SM) 8-65 Bulls Liver F-M Brown sand, trace to little silt trace gravel (SP-SM) 7-65 very fine Red/Brown sand, some silt (SP) 8-65 Bulls Liver	F F-C Brown sand, some gravel, trace to little silt 11-65 trace wood one etc. Brown silt, trace fine sand (O.Hier) POSSIBLE FILL 11-65 DARK GRAY Organic silt, trace to some clay, trace to some fine sand, trace to little peat (O.L-OH) 11-65 Fine Brown sand, trace to little silt (SP-SM) 8-65 very fine Brown sand, some silt (SM) 8-65 Bulls Liver F-M Brown sand, trace to little silt trace gravel (SP-SM) 7-65 very fine Red/Brown sand, some silt (SP) 8-65 Bulls Liver

Fig. 4.

LEGEND

- DENOTES APPROX. LOCATION OF NEW BORINGS

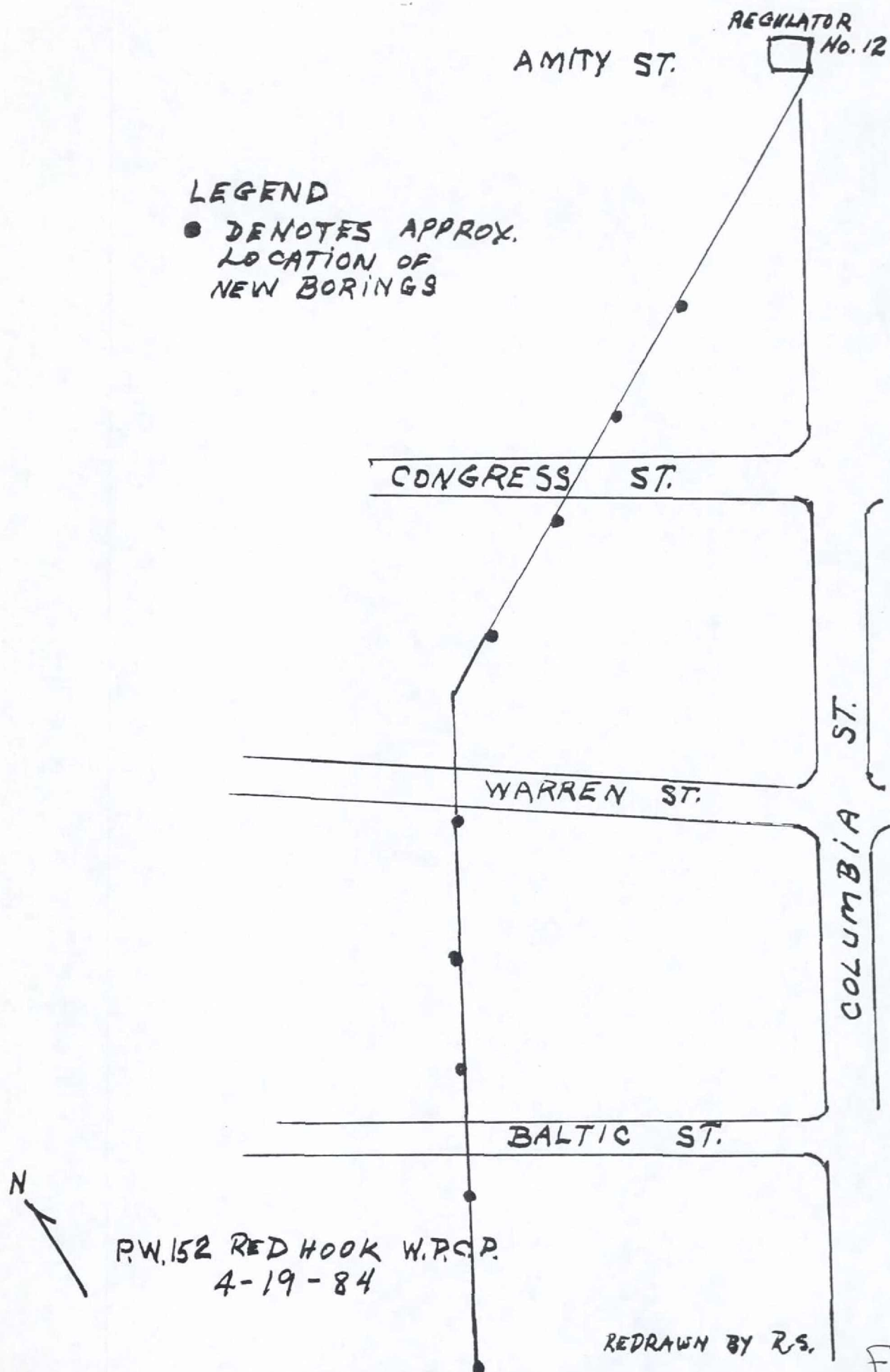
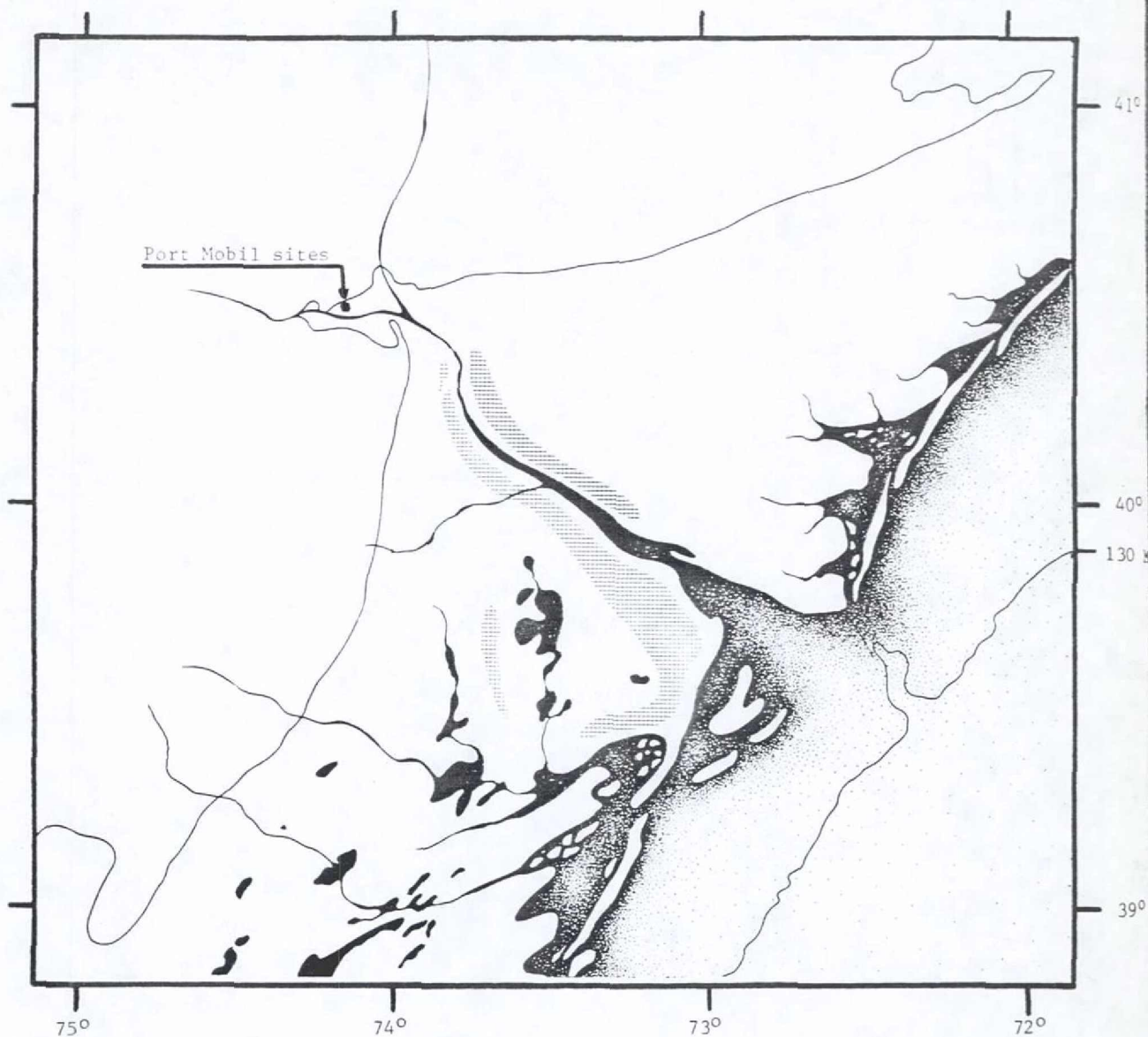


FIG. 5

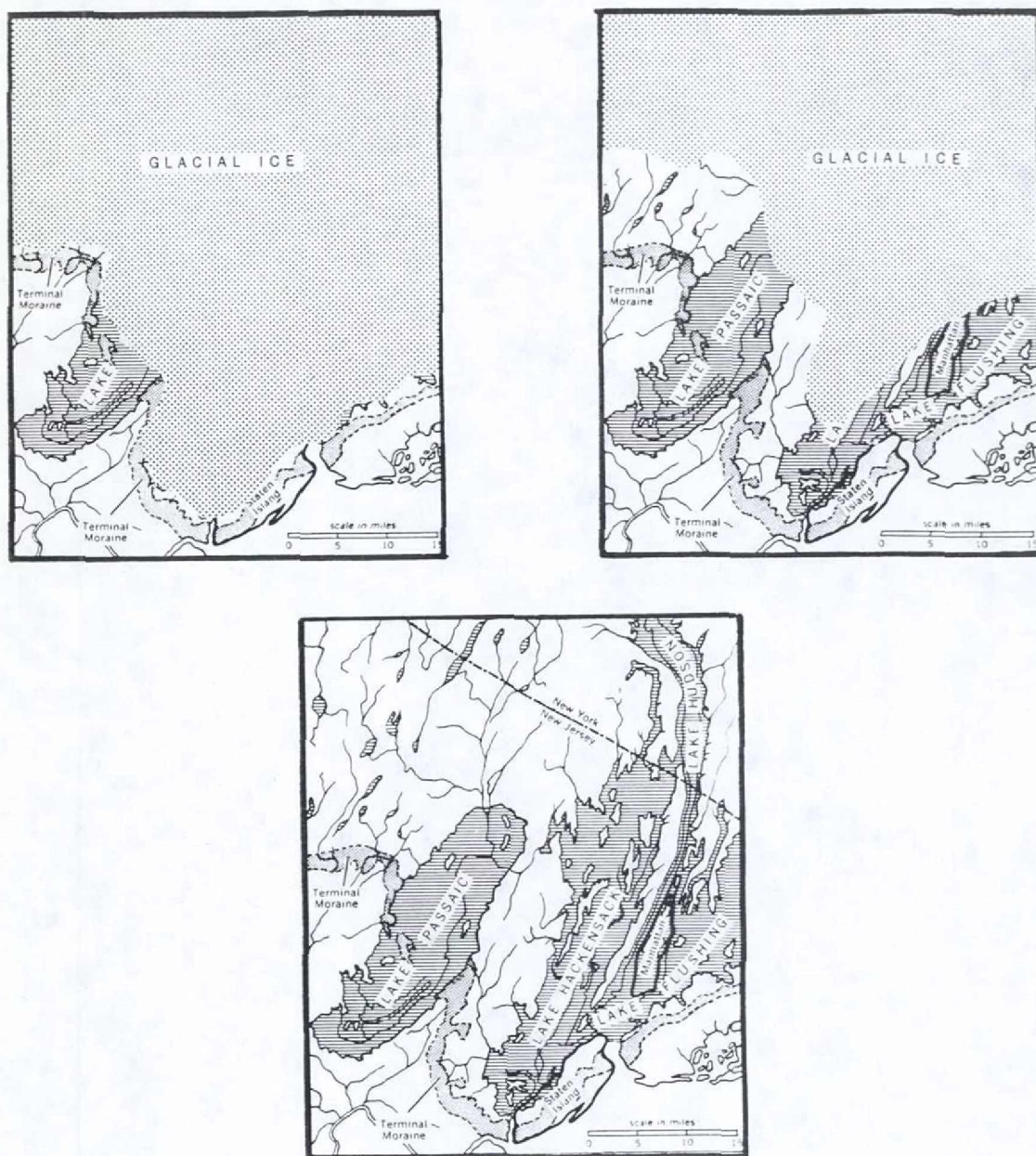


Map 3. Exposed continental shelf as it may have been 10,000-11,000 B.P. The Port Mobil site is shown at the western end of the then exposed Hudson Trench. Map courtesy of Dr. Robert Edwards, Woods Hole Oceanographic Institution.

When one reflects upon the slim chances of preservation and/or retrieval of faunal remains from the now submerged ocean floor and realizes how seldom such finds are reported, it becomes a matter of speculation as to how munificent such a coastal ecosystem might have been, and how intensively it could have been exploited by the Paleo-Indians. It is my personal belief that numerous Paleo-Indian sites were once situated at or near the rivers, lakes and lagoons on the exposed continental shelf, and that such sites were subsequently submerged and destroyed as a result of glacial melting and gradually rising ocean levels (Map 2).

The Port Mobil site may have been one such fishing-hunting-gathering site. It is located on a bluff overlooking a river that probably flowed, then as now, into the Hudson trench. This site has survived inundation only because it was farther inland and elevated above the sea level that gradually eradicated all of the more low lying coastal sites (Map 3).

THE PHYSICAL ENVIRONMENT



Three Maps Showing Development of Proglacial Lakes Passaic, Hackensack, Hudson and Flushing

(After Schuberth 1968: fig. 70)

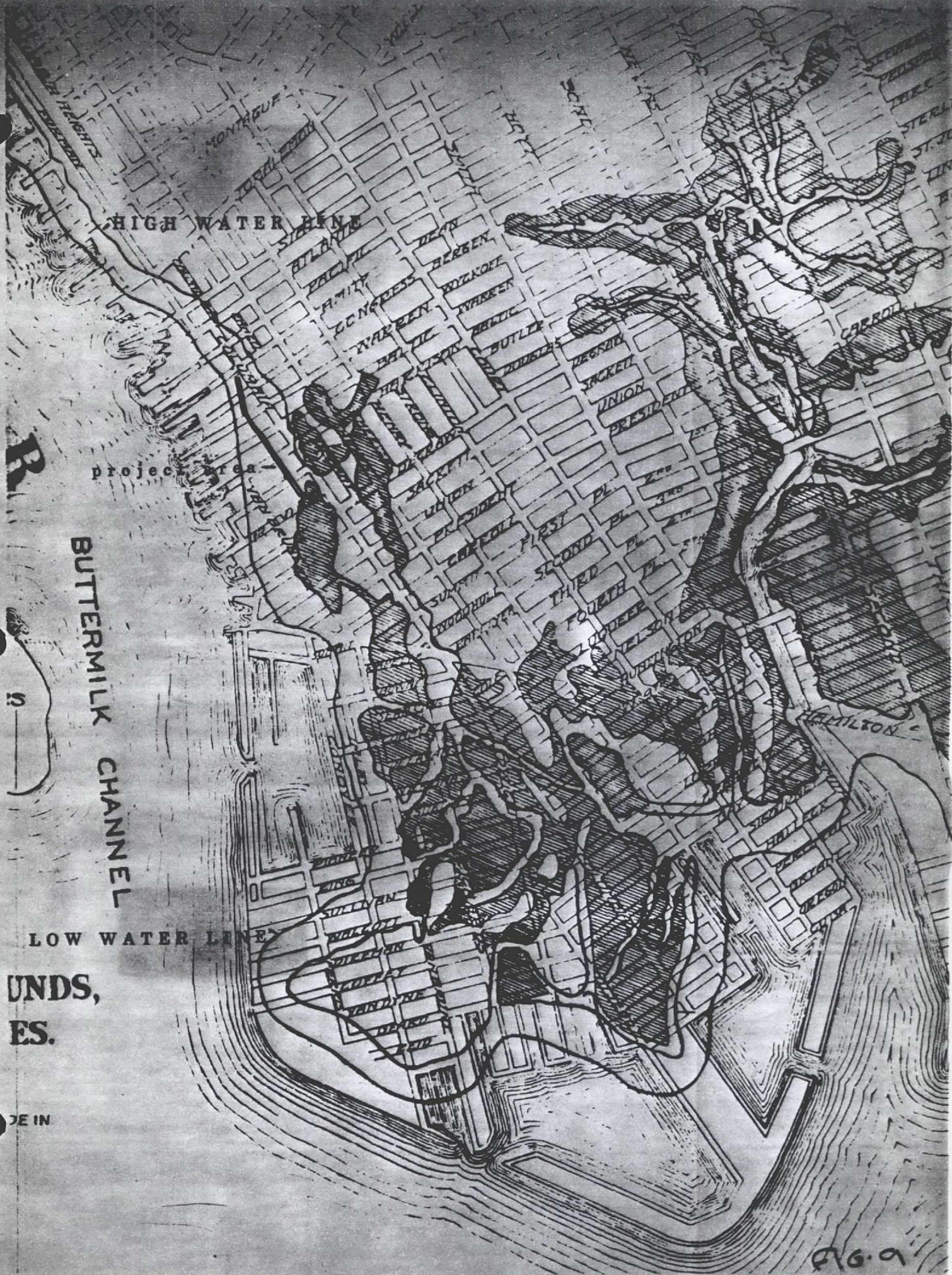
**COPY OF AN
ANCIENT MAP**

in possession of a descendant of the
HANNES OR HANS BERGEN
whose house is located thereon

made by T.G. BERGEN.

The writing marked * is not on the original.
No date or Surveyors name on the Map, but
probably made prior to 1750.

Scale reduced one half.



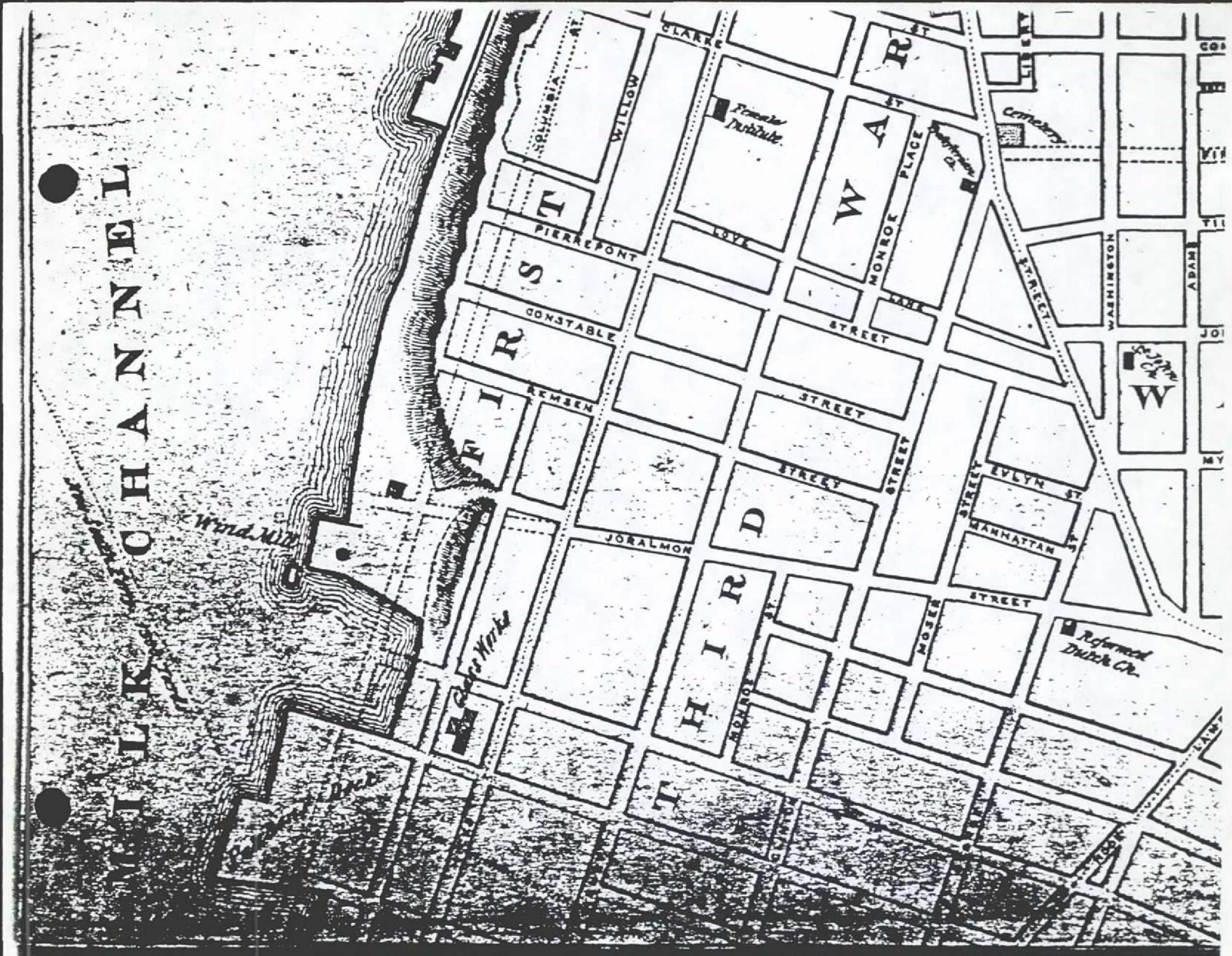
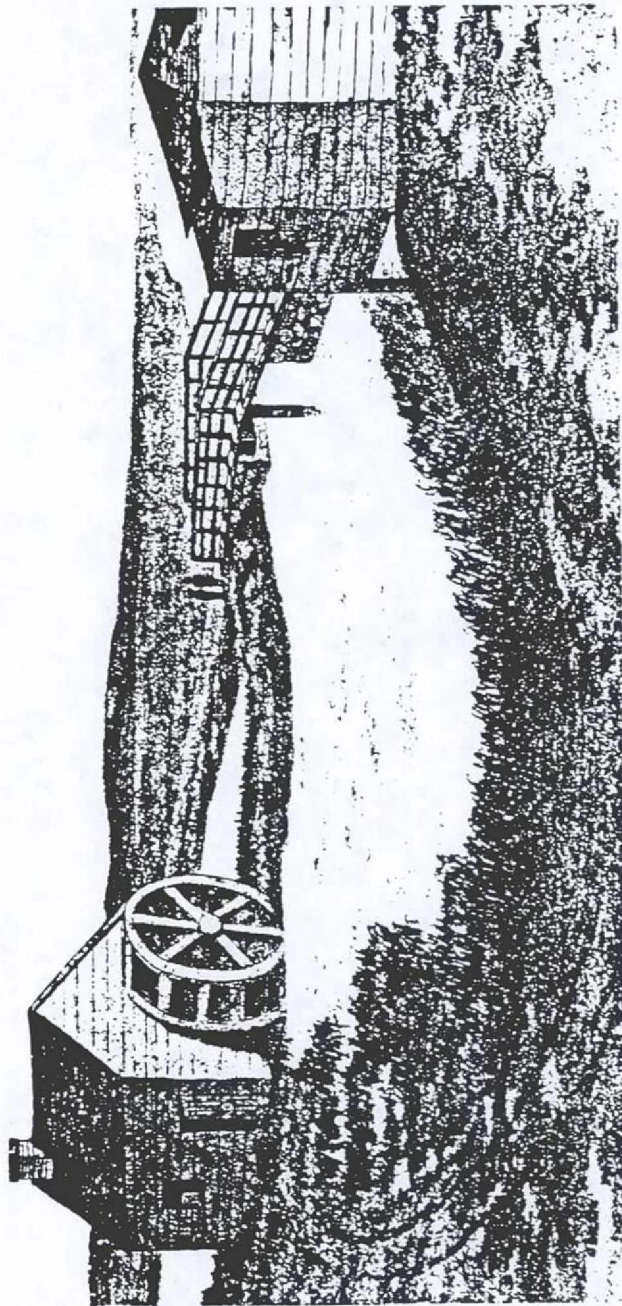


FIG. 10

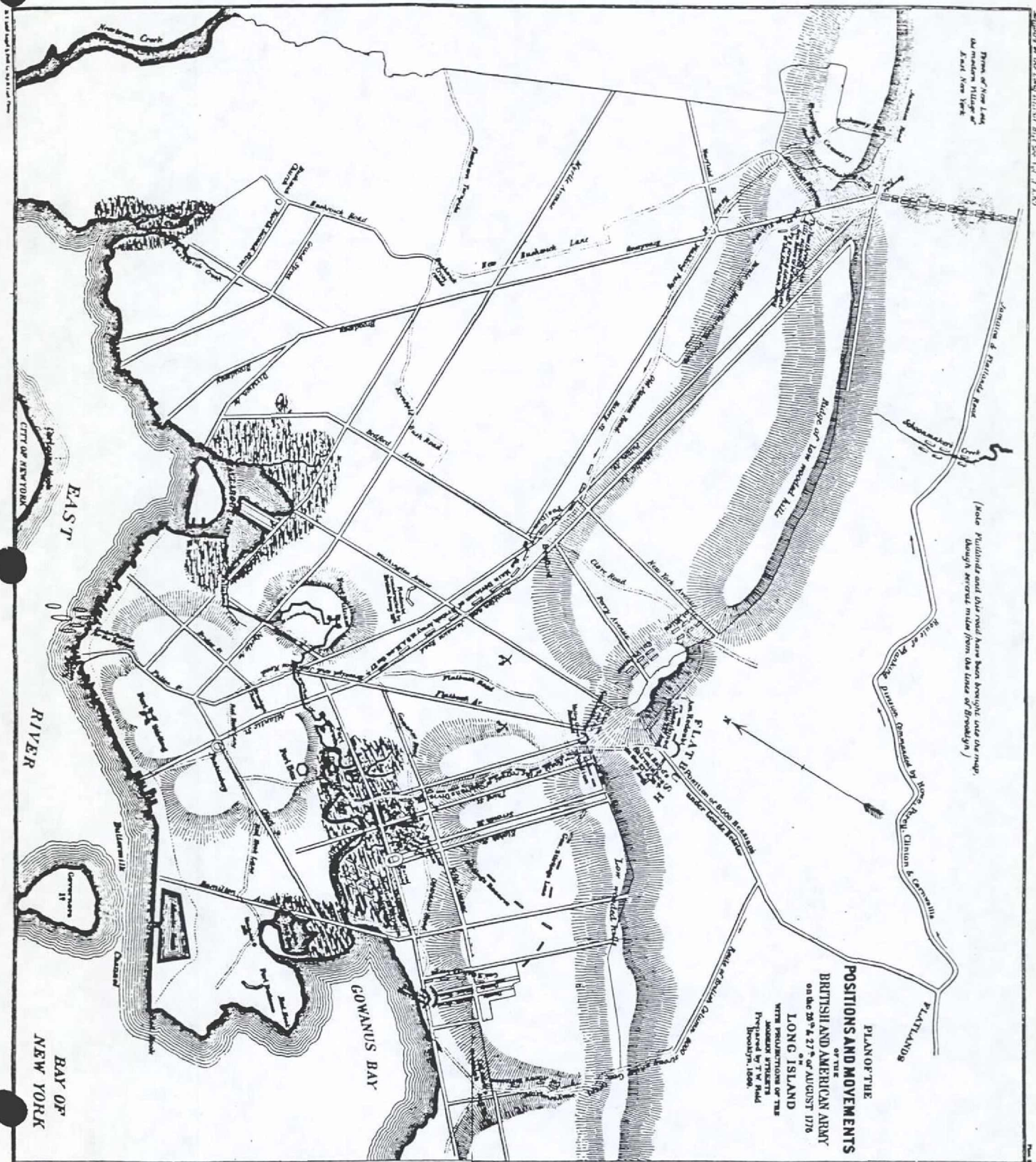


LACQUEER'S OR MASTER'S MILL—1868.



Map of the Battle of Long Island, fought August 27th, 1776.

From Prof. Johnston's Campaign of 1776. Published by Long Island Historical Society, Brooklyn, N. Y., 1878.



Map of the Battle of Long Island, fought August 27th, 1776.

From Field's History of the Battle. Published by the Long Island Historical Society, Brooklyn, N. Y., 1869.

GOWANUS RAY

Source: Field 1869

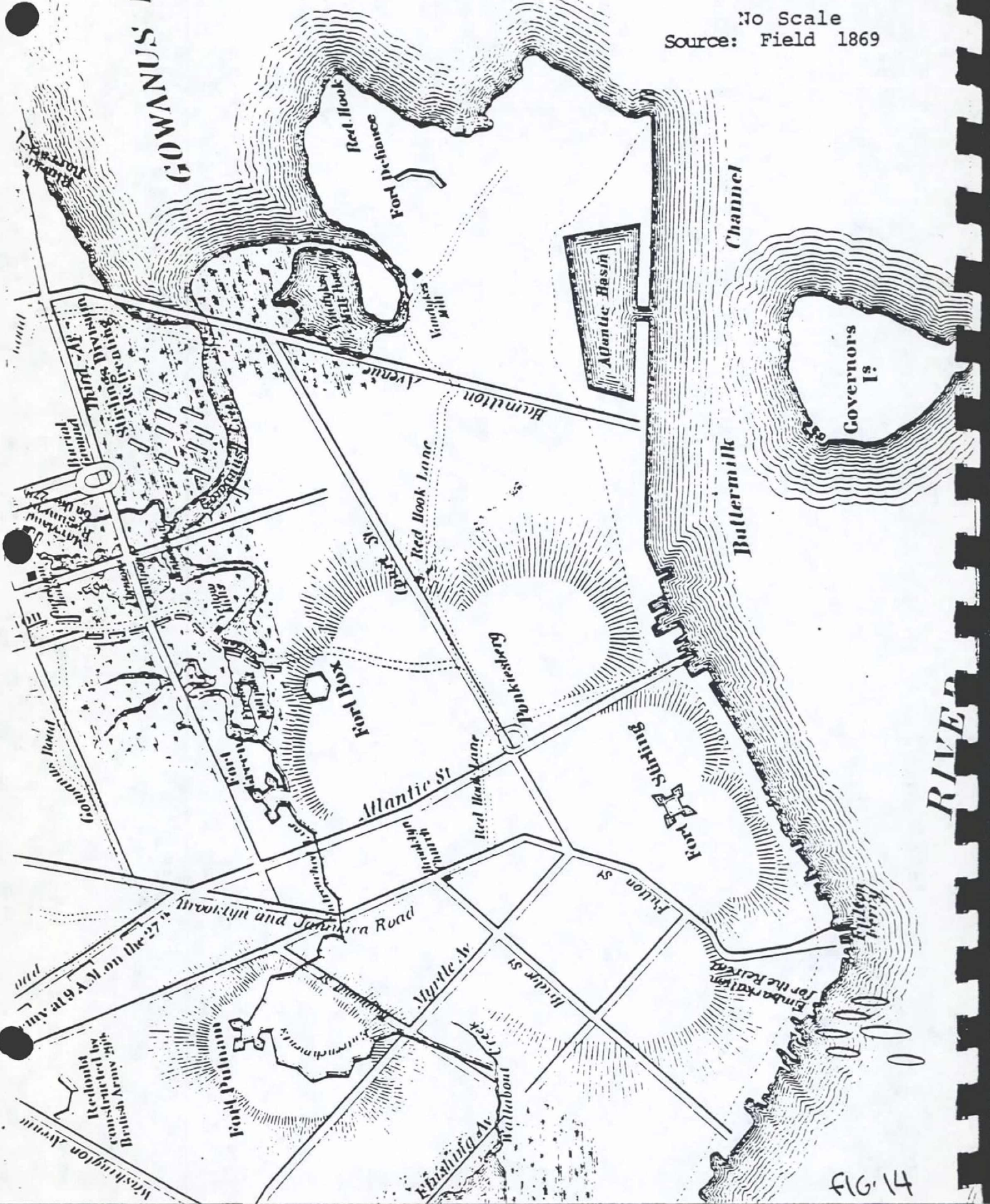


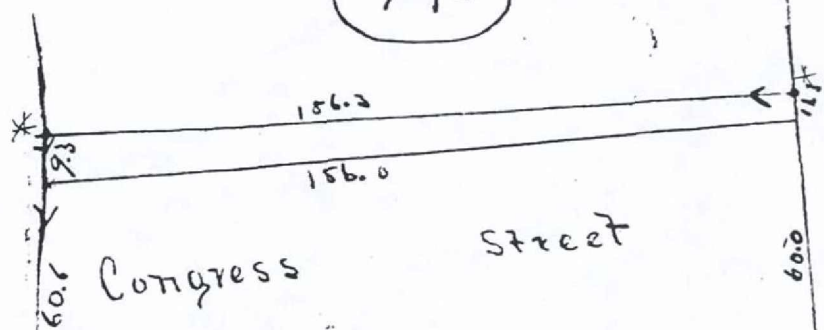
FIG. 14

①

con. from Lib. 242 Cons. page 389

(copy diagram page 391)
Amity St.

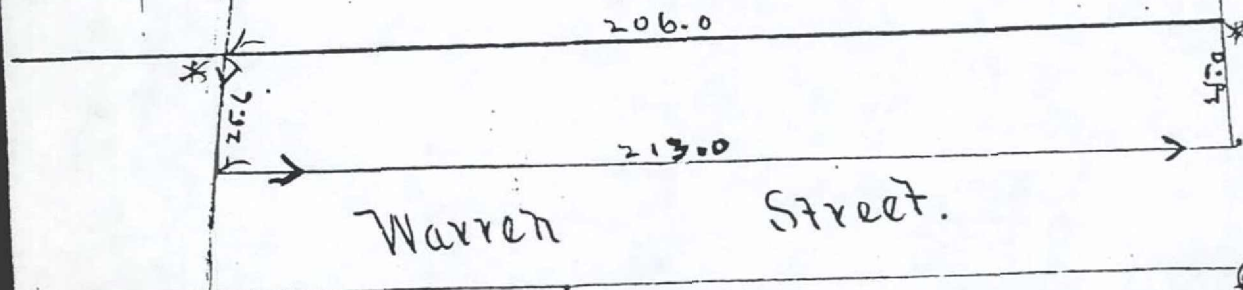
293



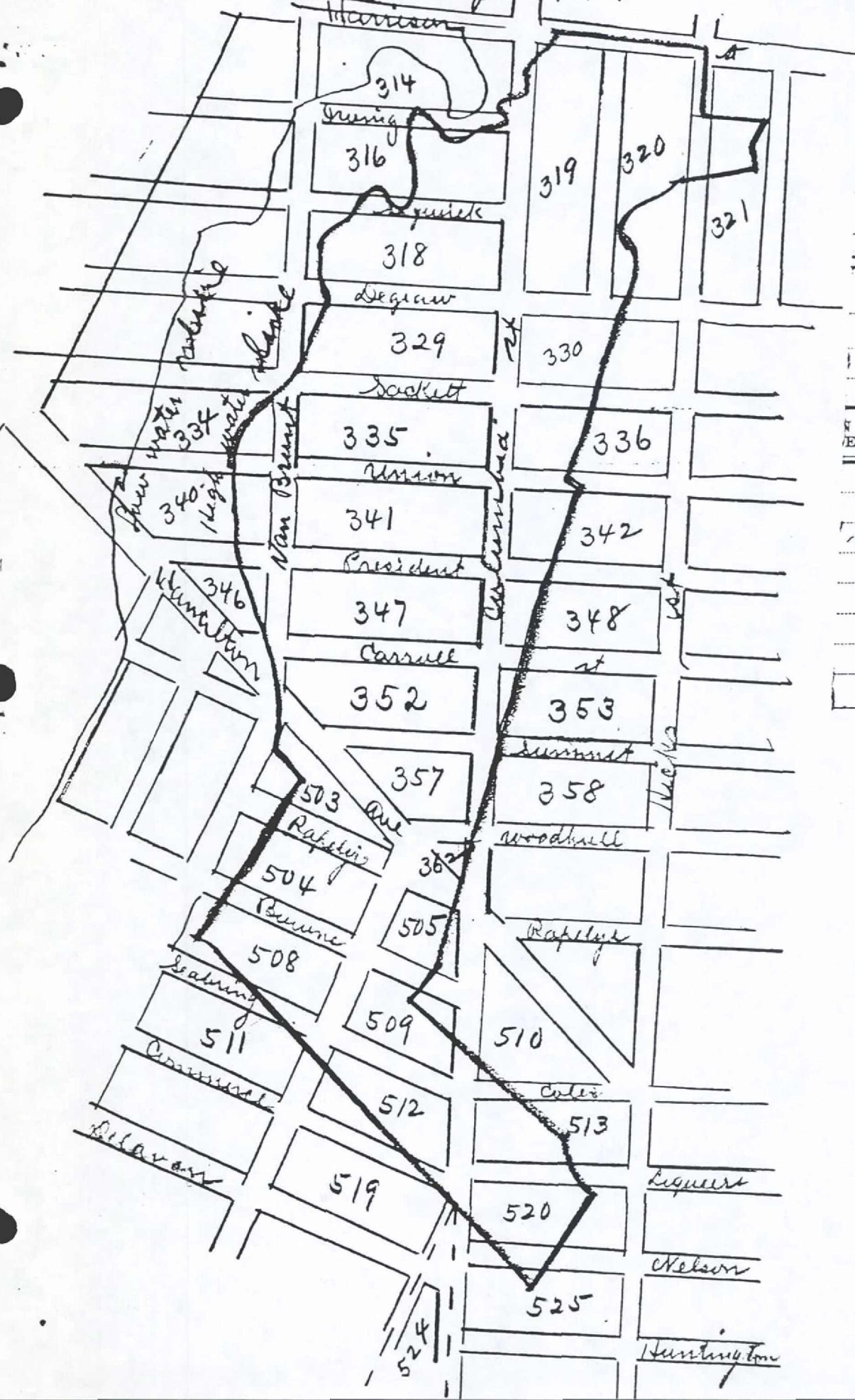
298

Van Buren Street

former low water mark



Columbia Street



CONVEYANCE		
ED.	LIBER	PAGE
133	35	4
	40.	106

③

[F6.17]

Continuation of Libers. 55 of Cons Page 486 Sheet ②

Beginning at a point in the centre of Butler St
at the Margin of the East River or New York Bay
at high water mark and running thence in a
Wly and S'Wly direction along the margin of the
said river or bay at high water mark to land
now or late of one Worthington thence along Worthingtons
land.

S 32° - E 2 chains and 70 links thence

S 61° - W 7 " 85 " along Worthingtons land
to Gowanus ditch "

S'ly along said ditch to another certain ditch by
land of Nicholas Luqueers "

N 56° 50' E 4 chains 40 links along last mentioned ditch "

N 6° 40' W 30 links "

N 5° - E 50 " "

N 14° - E 65 " "

N 15° 30' W 60 " "

N 32° - W 1 chain 48 links "

N 27° 15' W — 52 " to land now or late of Charles Hoyt "

N 18° 15' W 7 " 88 " along said Hoyt's land to
the said Mill pond "

E'ly along said land and Mill pond to a
certain Stone Wall "

N 35° 45' E 16 chains 80 links "

N 45° 15' E 5 " 40 " all along said wall to
land now or late of the heirs
of Lincoln Cornell (decd) "

N 46° 20' W 40 links to the Mill pond and thence along
Mill pond & the land of the heirs Simon Cornell (decd) and
land of William Philip and of

Heosea Webster, Philip Reid, Amasa Wright and Webster
Wright to the land of the said party of the second
part &c

Cornell Registry

4
continuation of Liber 55 Page 486

Sheet 3

N 67° E 4 chains 29 links along said Webster & Wrights land
to land of Nassau Whiting Factory thence

N 16° 30' E - 2 " 29 links

N 59° 30' E 90 " to the centre of Cornell Street "

N 62° W 3 chains 22 links along the centre of Cornell
Street to the centre of Hicks St "

N 25° 15' E 3 chains 94 links along the centre of Hicks St
to the centre of Butler St "

N 62° W 7 chains 15 links along the centre of Butler St
to the margin of the River or Bay aforesaid
the place of beginning.

Containing 57 Acres More or less

Together with the right and privilege of the parties
of first part of in and to the water and the
land under the water lying and being in
front of the said premises.

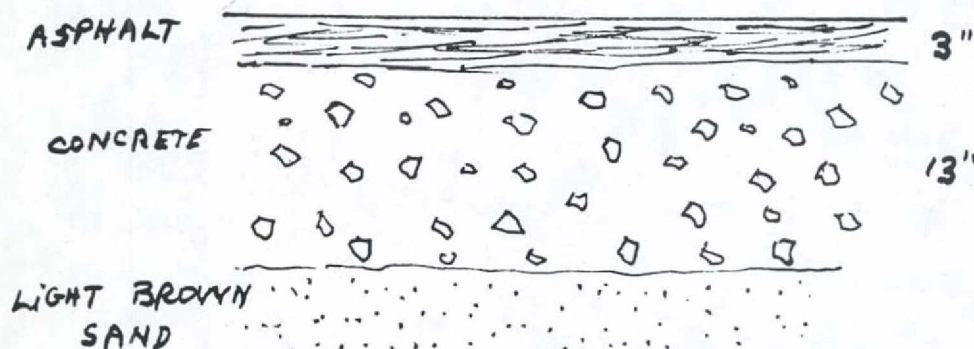
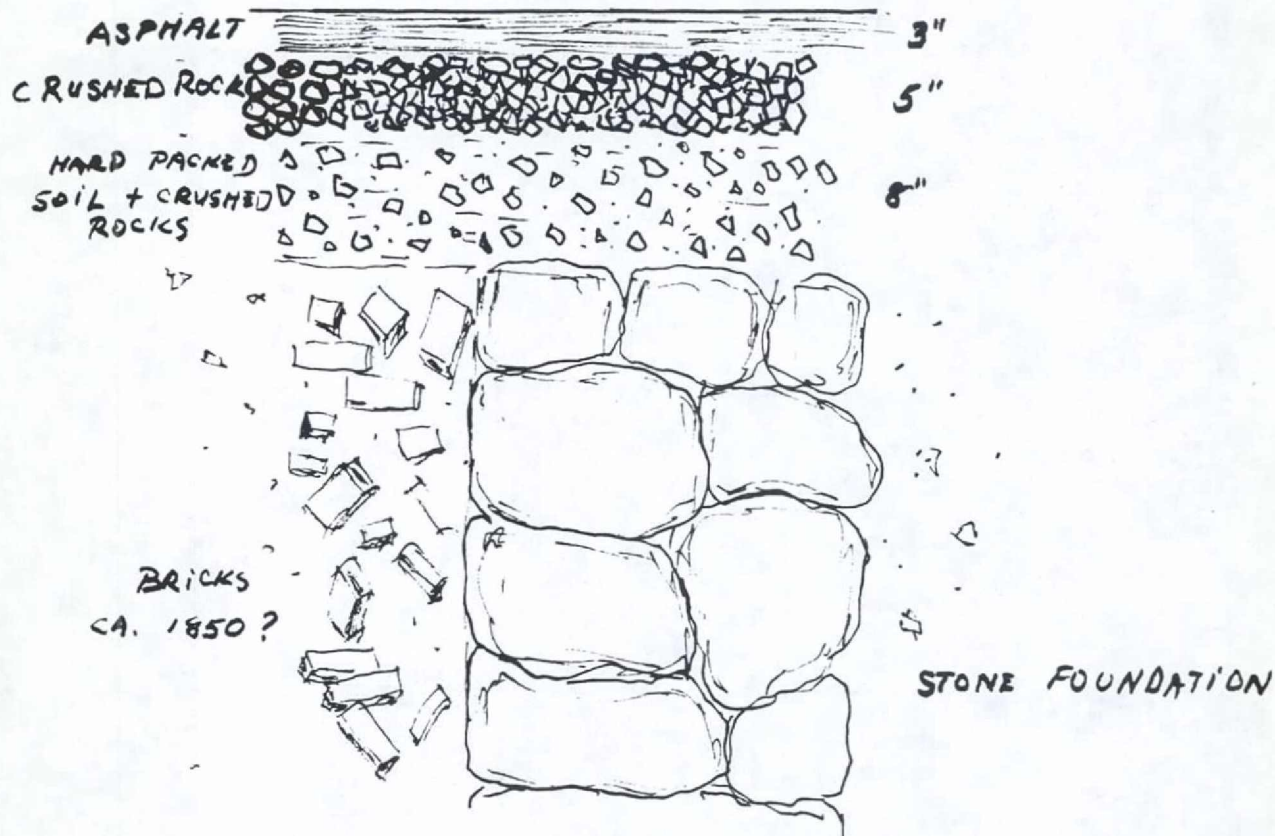
Being the same premises conveyed by Sarah
Cornell and the children of John Cornell (dec'd)
to Charles Kelsey and Anson Blake

John A Taylor's title was derived through a declar-
ation of trust See Liber 71 Cons Page 107.



FIG. 19

WEST SIDE Ca. 20' SOUTH REGULATOR #12 ON AMITY STREET



EAST SIDE CUT ON COLUMBIA STREET
Ca. 20' SOUTH REGULATOR #12