January 2012

Prepared for:

Skanska USA
Building, Inc.

Phase II Archaeological Testing
Test Areas 6 and 7
Brooklyn Bridge Park Project

Brooklyn, New York

Prepared by:

URS

Burlington, New Jersey

Phase II Archaeological Testing
Test Areas 6 and 7
Brooklyn Bridge Park Project

Brooklyn, New York

Prepared for:

Skanska USA Building Inc.
136 Madison Avenue, 11th Floor
New York, New York 10016

Prepared by:

Alyssa Loorya, M.A., RPA

URS Corporation
437 High Street
Burlington, New Jersey 08016
609-386-5444

January 2012

Abstract

URS Corporation (URS) conducted Phase II archaeological testing on a portion of the Brooklyn Bridge Park site located in the city of New York, borough of Brooklyn (Kings County), along Furman Street. The project entails the development of a 70-acre park along a 1.3-mile section of the East River waterfront, between Atlantic Avenue and Jay Street. A Phase IA archaeological assessment by Historical Perspectives, Inc., and Raber Associates (2005) revealed that the project area had the potential to contain buried archaeological resources related to the eighteenth- and nineteenth-century development of the Brooklyn waterfront. These resources included warehouse building foundations, a flourmill, a Revolutionary period ship and wooden cribbing, as well as bulkheads and piers associated with landfilling activities.

Phase IB archaeological testing, conducted by URS, occurred from February 25 and March 26, 2008, and October 27 and November 10, 2008, to determine the presence or absence, type, and extent of the potential resources. URS' field investigations tested seven of nine identified areas and recommended Phase II investigations in two areas (Test Areas 6 and 7). Test Areas 6 and 7 retained a high degree of archaeological integrity and potential. Test Area 6 uncovered schist foundation remains associated with mid- to late-nineteenth-century warehouse structures that once stood in this area. The foundation remains in Test Area 7, likely associated with the nineteenth-century Jewell Brothers flour mill complex, were the most substantial identified within the project area. This area appeared to retain the highest degree of archaeological integrity, revealing significant foundation remains, artifacts, what appears to have been an intact surface, and a heretofore previously unseen (in New York City archaeology) intact piece of nineteenth-century infrastructure. The resources uncovered in Test Areas 6 and 7 were determined to be potentially significant. Based on the report, the New York State Historic Preservation Office (NY SHPO) and the New York City Landmarks Preservation Commission (LPC) determined that further testing and documentary research was warranted.

Phase II investigations occurred from November 11, 2008 to December 19, 2008 in the vicinity of Pier 1, at the northern portion of the project area. Testing consisted of mechanical excavation, with manual excavation as warranted, and documentation of the uncovered cultural resources in Test Areas 6 and 7. Supporting documentary research was conducted at several area institutions.

The results of the excavation within Test Area 6 indicated that the foundation remains associated with the DeForrest Storage Warehouses (later the Martin Stores) do not appear eligible for listing in the National Register of Historic Places. This assessment is based on the fact that the little recovered material collected from rubble/fill contexts shows no definitive associative link with the warehouses. In addition, testing exposed a large area of foundation remains sufficient enough to provide the necessary information to formulate cogent interpretations as to building layout and the techniques used in its construction. Further fieldwork in this portion of the project area would simply result in the recovery of redundant information.

The investigation of Test Area 7 demonstrated that the foundation remains associated with the Jewell Brothers Brooklyn City Mills appear eligible for listing in the National Register of Historic Places. Although field investigations were relegated to those specific areas proposed for

the construction of a guardhouse and utility corridor, there is a high potential to uncover other resources related to the development of this historically significant mill. Phase IB and Phase II archaeological investigations indicated that intact foundation remnants are located relatively close to the modern day surface, within 16 to 24 inches. Consequently, it is very likely that additional foundation remains are also present in adjacent areas not tested during the Phase IB or II investigations, leaving remnants of the nineteenth-century landscape intact beneath the surface. No further excavations are recommended because testing has provided all necessary information by fully excavating and documenting all exposed resources within the area that would be impacted during proposed construction activities. However, any changes to the current construction plans that involve subsurface disturbance below 16 inches in the immediate vicinity of the mill complex would require either archaeological monitoring or testing prior to the commencement of any construction activities.

Table of Contents

List of Figures

Figure **Page**

List of Photographs

Photograph **Page**

List of Photographs (Cont'd)

Photograph **Page**

List of Photographs (Cont'd)

Photograph **Page**

1
Introduction and Project Description

URS Corporation (URS) conducted Phase II archaeological testing on a portion of the Brooklyn Bridge Park site located in the City of New York, borough of Brooklyn (Kings County), along Furman Street. The Empire State Development Corporation (ESDC), in conjunction with its subsidiary, the Brooklyn Bridge Park Development Corporation (BBPDC), is undertaking the creation of a 70-acre park along a 1.3-mile section of the East River Waterfront, between Atlantic Avenue and Jay Street (Figure 1.1). A Phase IA archaeological assessment by Historical Perspectives, Inc., and Raber Associates (2005) revealed that the project area had the potential to contain buried archaeological resources related to the eighteenth and nineteenth century development of the Brooklyn waterfront. These resources included warehouse building foundations, a flourmill, a Revolutionary period ship and wooden cribbing, as well as bulkheads and piers associated with landfilling activities.

Phase II investigations occurred from November 11 to December 19, 2008, in the vicinity of Pier 1 at the northern portion of the project area, within Test Areas 6 and 7. The two test areas are located along Furman Street at the corner and south of Old Fulton Street. The project area is bounded by Atlantic Avenue to the south, Old Fulton Street to the north, Furman Street to the east, and the East River to the west (Figure 1.2). Testing consisted of mechanical excavation, with manual excavation as warranted, and documentation of the uncovered cultural resources in these two areas. Supporting documentary research was conducted at several institutions including the New York Public Library, the Brooklyn Public Library, the New York Historical Society, and the New York City Archives. In addition to the field investigations and documentary research, an open house was held for the neighborhood and public at large on December 7, 2008 (Photograph 1.1). A tour, along with informational handouts, was given of the exposed foundational remains.

Phase IB archaeological testing, conducted by URS, occurred from February 25 and March 26, 2008 and October 27 and November 10, 2008[1] to determine the presence or absence, type, and extent of potential resources. The archaeological testing protocol, developed by AKRF, was based on the planned construction activities, to identify any archaeological resources; define the area limits of these resources and cultural affiliations of the components represented; determine the density and distribution of intact archaeological deposits within the each of the test areas; and identify the types of retrievable archaeological remains (AKRF, Inc. 2007). URS' field investigations tested seven of nine identified areas and recommended Phase II investigations in Test Areas 6 and 7.

Test Areas 6 and 7 retained a high degree of archaeological integrity and potential. Test Area 6, historically the area of DeForrest Storage, revealed foundation remains that did not appear to correspond with the results of the background research or any of the historic maps within the Phase IA report. Building material, architectural features, provided indications that this locale could possibly contain resources dating earlier than the mid- to late-nineteenth-century

1. Please see *Phase IB Archaeological Testing Test Areas 1, 2, 3, 4, 5, 6, and 7 Brooklyn Bridge Park Project* (Loorya 2009), on file with NY SHPO and LPC, for information regarding the Phase IB testing.

Figure 1.1 Location of Brooklyn Bridge Park Project site (Source: Maptech 1998).

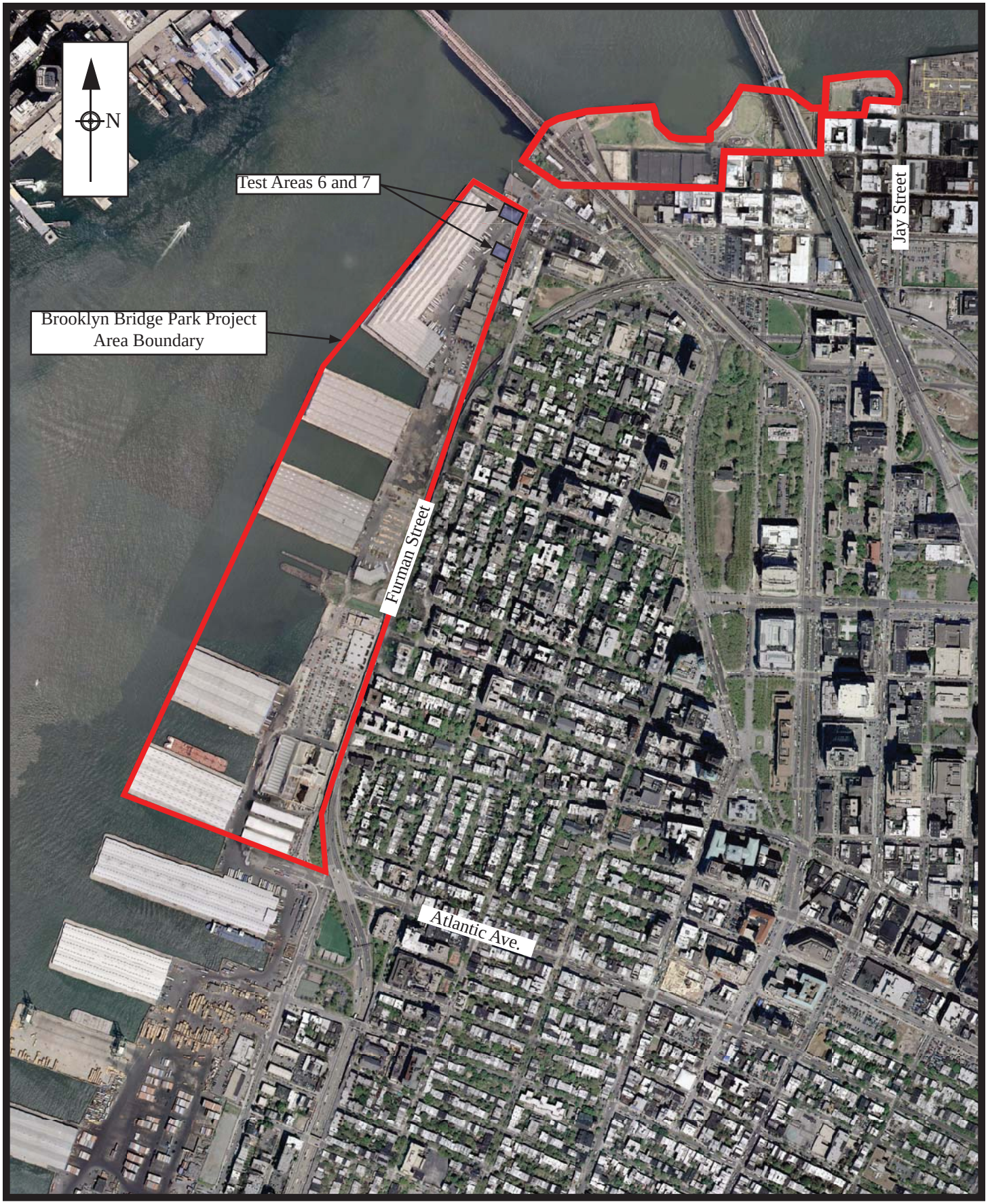


Figure 1.2 Portion of Brooklyn Bridge Project undergoing Phase II archaeological investigation (Source: NY, NY MyTopo 2008).

Photograph 1.1 Public open house.

warehouse structures in the area. Two foundation remains, on apparent differing orientations, were uncovered within several feet of one another. Both were constructed of schist stones, mortared with a plain sand mortar common to the turn of the nineteenth century. These are of a different size and construction than the other structural remains found on site to date and are more common to Manhattan construction of the late eighteenth to early nineteenth centuries.

The foundation remains in Test Area 7, likely associated with the nineteenth century Jewell Brothers flourmill complex, were the most substantial identified within the project area. This area appeared to retain the highest degree of archaeological integrity, revealing significant foundation remains, artifacts, what appears to have been an intact surface, and a heretofore previously unseen (in New York City archaeology) intact piece of nineteenth-century infrastructure. Artifacts came from several areas and levels within Test Area 7 including a significant ash layer, as well as a layer precipitated by decayed wood pieces at 6 feet below surface.

Resources uncovered in Test Areas 6 and 7 during the Phase IB archaeological testing were potentially significant and raised questions regarding the construction and function of the resources. Based on URS' recommendations, the Office of Parks, Recreation, and Historic Preservation (OPRHP) and the New York City Landmarks Preservation Commission (LPC) determined that further testing and documentary research was warranted. Testing would consist of additional backhoe trenching supplemented by manual excavation, as necessary. In Test Area 6, a larger area would be stripped and the space between the two foundations would be exposed to determine the relationship between the two foundation walls, their extent, function, and potential recovery of artifact surfaces. In Test Area 7, a section north of the previously uncovered conduit would be exposed to determine if there is additional infrastructure associated with this conduit. Exposing a wider area alongside the conduit would allow for better observation of the weep holes and the construction of the conduit to determine if it was made for drainage purposes. If the original and sole purpose of this conduit was drainage, it is an infrastructural form that has not yet been documented within New York City. At the recommendation of Douglas Mackey (OPRHP), a larger area of the mill foundation walls would also be exposed to determine the integrity and the extent of the complex. This additional area was to be tested in the planned location of the new water and electric lines, whose installation could severely impact any potential resources associated with the mill.

All work was conducted in accordance the National Historic Preservation Act of 1966, as amended, and the Advisory Council on Historic Preservation's "Protection of Historic and Cultural Properties" (36 CFR 800). This study was conducted pursuant to the Standards for Cultural Resources Investigations and the Curation of Archaeological Collections in New York State (NYAC 1994), as well as the State Historic Preservation Office Phase I Archaeological Report Format Requirements prepared by the Office of Parks, Recreation, and Historic Preservation (OPRHP 2005), and pursuant to guidelines established by the New York City Landmarks Preservation Commission (LPC) established for Phase IB archaeological work in New York City, dated April 12, 2002. The Principal Investigator for the project was Alyssa Loorya, RPA. Eileen Krall and Daniel Eichinger assisted Ms. Loorya in the field. Edward Morin served as Principal Archaeologist and reviewed the content of the report. Scott Hood assisted with the graphics, and Paul Elwork edited the text for style and consistency.

2
Environmental Context

The following chapter is taken from the *Phase IB Archaeological Testing Test Areas 1, 2, 3, 4, 5, 6, and 7 Brooklyn Bridge Park Project* (Loorya 2009).

PHYSIOGRAPHY AND GEOLOGY

The project area falls within the Atlantic Coastal Plain physiographic province. Coastal plain sediments in New York City consist of unconsolidated deposits of Late Cretaceous age, eroded from the higher New England Upland to the west and deposited in low-lying coastal areas. In Brooklyn and Queens, these materials sit on top of the eroded crystalline rock surface. Deposits from the Pleistocene, the ice age that began around 1.6 million years ago, blanketed most of New York City. These unconsolidated materials were left behind after several advances and retreats of the ice sheets in the northern hemisphere. Glacial deposits are commonly divided into two types: till and outwash. Glacial till refers to those materials deposited directly by the flowing ice. Till characteristically exhibits a wide range in particle size, from clay to boulder. Till deposits lack stratification and can be as much as several hundred feet deep. These deposits are shallower in areas where the ice has done more scraping of the bedrock, commonly with harder, more resistant types of rock. Glacial outwash is deposited by glacial meltwater. A narrower range of particle size generally characterizes outwash deposits and stratification is common (New York Soil Survey Staff 2005).

Glaciation within the project area has provided most of the surficial materials and shaped the landscape. Glaciation leaves behind two types of till deposits. The first are terminal moraine deposits, which are basically elongated ridges and strings of hills that form along the edges of the glacier and are left in its wake. The second are ground moraine deposits, which are till deposits left beneath the glacier's path (Rogers et al. 1986).

The southernmost extent of the ice sheet that crossed New York City deposited two terminal moraines, which form the spines of the two eastern forks of Long Island. The southernmost and older of the two is called the Ronkonkoma Moraine. The northernmost, which overrides the Ronkonkoma in north-central Long Island, is the Harbor Hill moraine. This deposit extends across Queens and Brooklyn and over onto Staten Island at Fort Wadsworth. Material in these terminal moraines ranges from unsorted till to local deposits of roughly stratified and sorted sand and gravel. South of the terminal moraine on Long Island and Staten Island, streams of glacial meltwater flowed south, creating a gently sloping outwash plain of stratified and sorted gravel, sand, and silt (New York Soil Survey Staff 2005). The specific underlying geology of the project area consists of Cenozoic/Quaternary aged deposits that consist of unsorted till from terminal moraines, gravel, mud, and sand. These deposits are from both glacial (moraines) and post-glacial sources, such as meltwater (New York State Department of Transportation 1989).

Approximately 11,000 years ago, the climate warmed and the Holocene, or post-glacial, epoch began. The ice sheet retreated to its current location, and the sea level rose to its current elevation. Erosional forces have since modified the outwash plain to create the present-day shoreline. Wave action and human-construction projects created barrier islands, and offshore

winds have piled up sand into dunes. Organic materials and tide-carried sediments have accumulated to form tidal marshes (New York Soil Survey Staff 2005).

UNDERLYING SOILS

Project area soils fall within the Pavement and Buildings, Wet Substratum-LaGuardia-Ebbets Complex (0–8% slopes). This complex is characterized by level to gently sloping urbanized areas, which are filled with a mixture of natural soils and construction debris that covers former swamps, tidal marsh, or other water sources. Impervious buildings and pavement that cap a mixture of anthropogenic soils of varying coarseness cover 50–80% of these areas (New York Soil Survey Staff 2005).

HYDROLOGY AND ELEVATIONS

Drainage for the project area is provided by the East River, which is also the western border of the project area. The East River flows southward and enters the Upper New York Bay approximately 2.3 miles from the project area. Elevations within the project area vary from 0–10 feet (0-3.05 meters) above mean sea level (amsl).

CURRENT SETTING

The project area consisted of asphalt and concrete parking lots associated with the non-operative piers along the East River (Photographs 2.1 and 2.2).

Photograph 2.1 Test Area 6 existing conditions, looking northeast.

Photograph 2.2 Test Area 7 existing conditions, view looking west.

3
Methodology

HISTORICAL RESEARCH

Supporting documentary research was conducted at several institutions including the New York Public Library, the Brooklyn Public Library, the New York Historical Society and the New York City Archives.

ARCHAEOLOGICAL FIELDWORK

The first task of the Phase II fieldwork consisted of marking out the locations of the proposed test trenches within each of the test areas. These were located to overlap with the earlier Phase IB test trenches. The asphalt, concrete, and/or cement surface was then saw cut to facilitate its removal. A backhoe was utilized to remove the asphalt, concrete, and/or cement surfaces, as well as any modern overburden or disturbed fill deposits.

All trench material consisted of deposits of recent origin or that had been subjected to extensive disruption. Therefore, no fill was screened, although diagnostic artifacts were retained on a selective basis.

Soil removed from the trenches was stored at a safe distance from the edge of each trench.[1] If a trench was left open overnight, orange construction fencing was erected around its perimeter at least 10 feet from the edge of the trench. In addition, a temporary erosion-control system (hay bales) was placed around all back dirt piles left standing for more than eight hours. Upon completion of the excavation of each test trench, scale drawings and digital Imagegraphs were produced of representative wall profiles and any encountered archaeological features (foundations, culverts, structural elements, etc.). The locations of all trenches were documented via a Trimble Geo XT handheld GPS unit. Following the complete documentation of each trench and its contents, the removed soil was replaced in 1-to-2-foot increments and firmly tamped with a mechanical plate tamper. Clean fill was utilized to bring the former trenches up to grade and tamped flat.

LABORATORY PROCESSING AND ANALYSIS

All recovered artifacts were bagged according to provenience (trench number and stratum). Upon arrival at the URS facility in Burlington, New Jersey, artifact processing was initiated. Technicians processed the artifacts using standard archaeological techniques: artifacts were washed either using soft-bristle brushes and a mild, non-ionic detergent or a Branson 5510 ultrasonic cleanser. Following cleaning, the artifacts were air-dried on racks and then marked according to New York State Museum guidelines.

1. OSHA trenching guidelines were strictly followed in order to ensure the safety of the archaeological team. At no time did archaeological personnel enter a trench unless safety guidelines were in place.

After the cleaning and marking of the artifacts, a basic level of analysis was utilized to identify the following characteristics of artifacts: form (e.g., nail); general functional group (e.g., architectural); material composition (e.g., metal – iron); manufacturing technique (e.g., cut, hand-headed); date of manufacture (e.g., 1790–1830); makers' marks, if present; and number of artifacts with these characteristics in the context. Information pertaining to ware type and decoration is noted for ceramic artifacts, as this is necessary for accurate dating. Analysts entered this data directly into an Access database. Each line of data received its own entry number. This entry number was placed on the plastic (4-millimeter-thick polyethylene) bags with zipper-locking closures that will house the artifacts; each entry was bagged separately in order to facilitate retrieval of artifacts for exhibit or study if applicable. An additional field flags objects suitable for exhibition. A backup file was automatically created and stored at the close of each working day.

4
Results of Field Testing

TEST AREA 6

This area is located immediately north of Buildings 18–22 (National Cold Storage Building) and west of Furman Street (Figure 4.1). Local residents most recently used it as a parking lot. The surface layer was particularly dense, composed of 4–6 inches of asphalt atop an 18-inch-thick concrete slab. Beneath this, several stratigraphic layers were exposed, including a distinct ash layer.

During Phase IB testing, 2-foot-thick stone foundation walls were uncovered at 2 feet below surface. The walls were constructed of cut schist stone bound with a plain sand mortar. The mortar suggested an early-nineteenth-century date, based on similar construction seen elsewhere within New York City and the experience of Skanska architect Andrew Schroder. The area between the walls was filled with post-demolition rubble. The foundations encountered in Trenches 6.1 and 6.2 (Features 11, 12, and 13) were of identical composition (Appendix A). It appeared that the foundation remains represented two distinct buildings on different orientations. Along the northern wall of Trench 6.2, two unidentified 1.3-x-1.1-foot rectangular openings were built into the wall. Along the western wall, a similar opening had been filled in with uncut mortared stone. Questions about the construction date and techniques led to a recommendation for further investigation.

Phase II Investigation

Phase II testing was designed to expand upon and overlap with Trenches 6.1 and 6.2. Trench 6.3[1] was situated between the previous trenches and eventually encompassed a 55-x-80-foot area (4,400 square feet) on an east-west orientation (Figure 4.2). The soils and stratigraphy were identical to those uncovered in Trenches 6.1 and 6.2. Once again, foundation walls were encountered at 1.8–2 feet below the modern surface.

The exposure of a larger area revealed that although the foundations uncovered in the Phase IB investigation represented two distinct buildings, they were on the same and not different orientations (Photograph 4.1). Two distinct north-south oriented walls (Features 22 and 24) and four east-west oriented walls (Features 11, 12, 13, and 23) were uncovered (Figure 4.3) (see Appendix A). These walls were connected in sequence, constructed of cut schist stone with a plain sand mortar. Some areas contained brick built atop the stone (Photograph 4.2).

A bricked-up doorway was uncovered along the north-south oriented wall (Photograph 4.3), what would have been the western wall of the structure. A modern utility line, oriented on a northeastern diagonal, was intrusive toward the eastern end of the trench and was topped by a cement slab.

1. Trench and feature numbers are consecutive from the Phase IB testing.

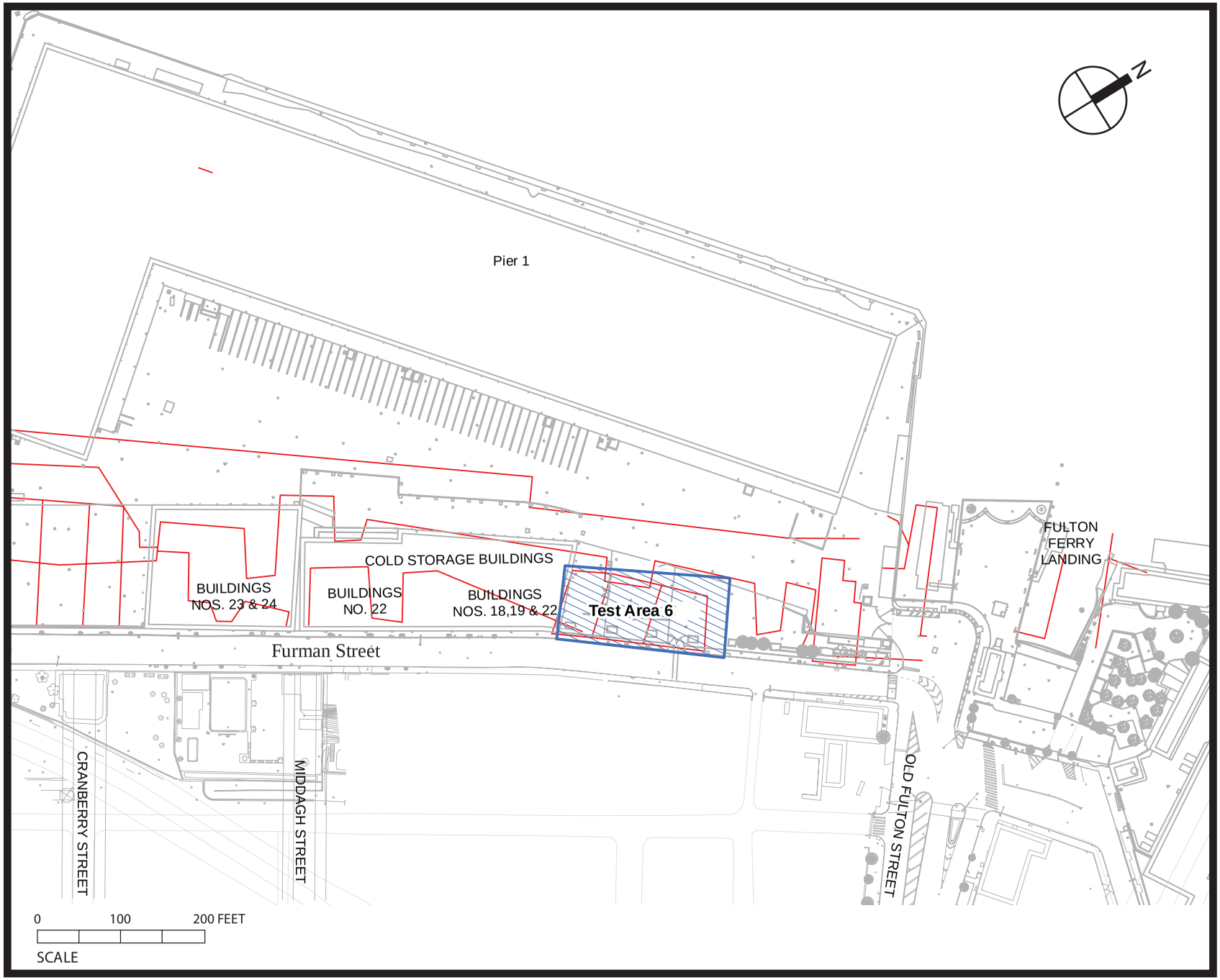


Figure 4.1 Location of Test Area 6 and immediate vicinity.

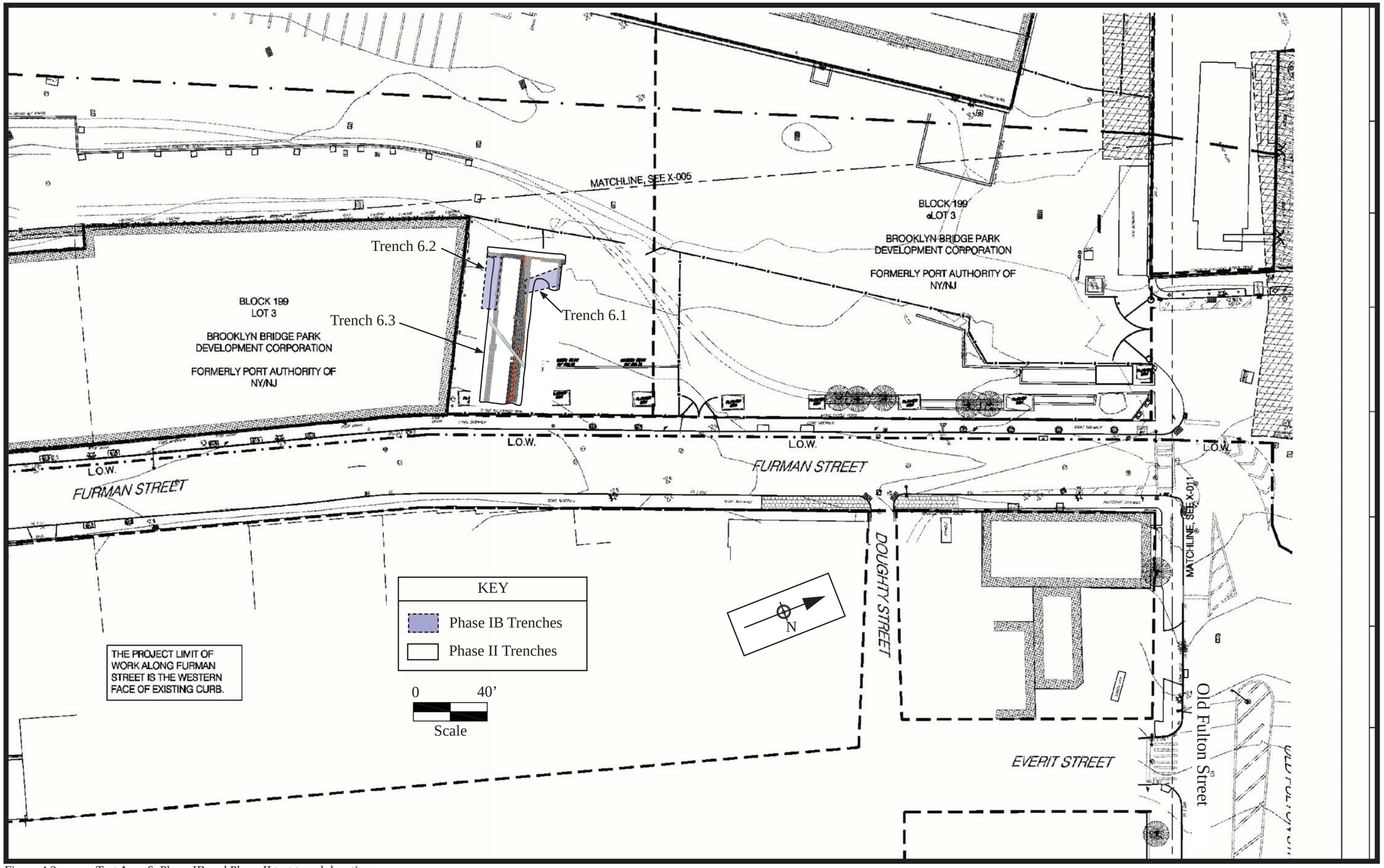


Figure 4.2 Test Area 6, Phase IB and Phase II test trench locations.

Photograph 4.1 Test Area 6, Feature 22 foundation walls, looking northeast.

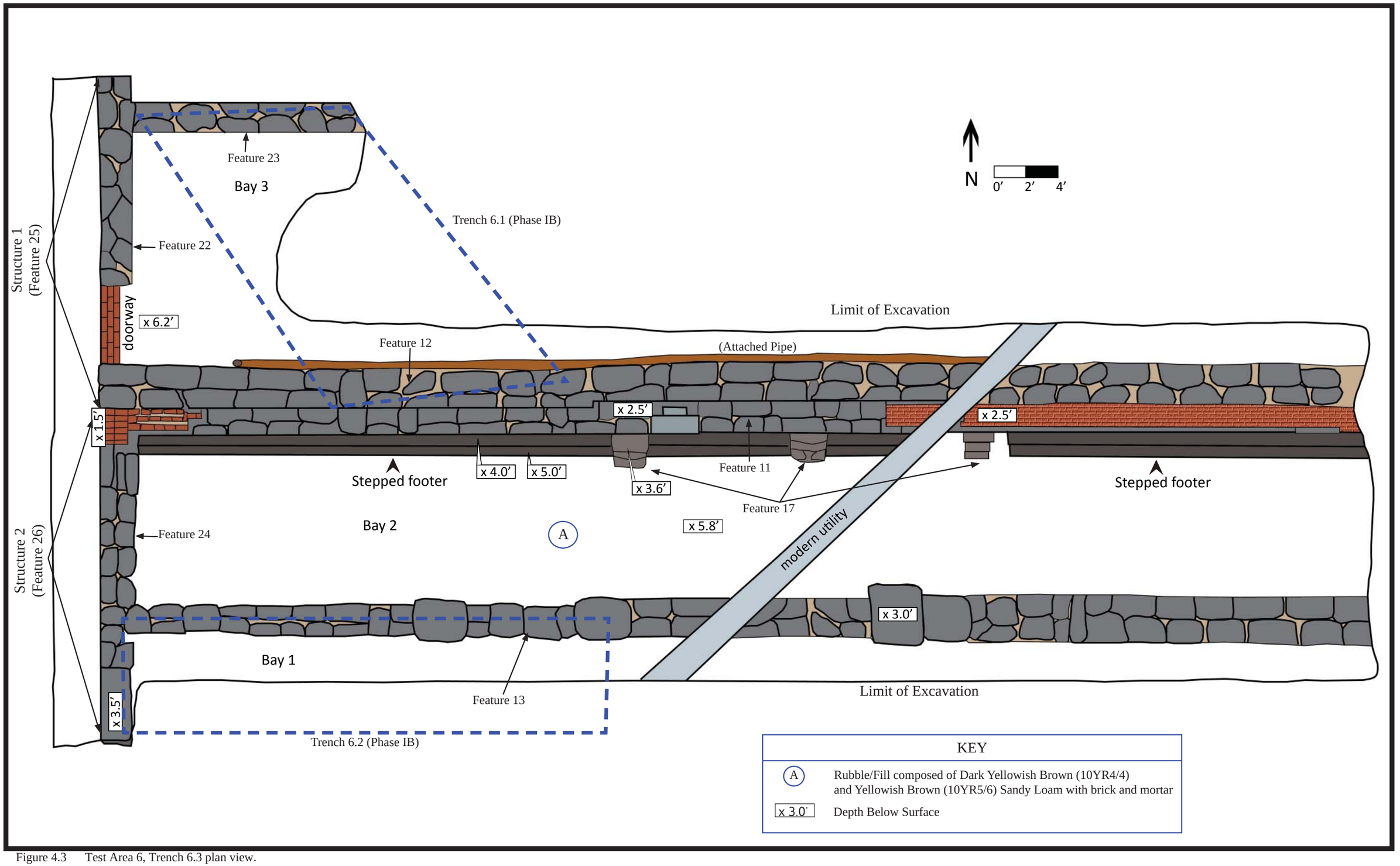


Figure 4.3 Test Area 6, Trench 6.3 plan view.

Photograph 4.2 Test Area 6, Feature 22, schist foundation wall with stepped footers and brick wall built atop the foundation, looking northwest.

Photograph 4.3 Test Area 6, Feature 22, bricked-up doorway, looking west.

The exposure of a larger area revealed that Features 11, 12, and 22 formed one continuous structure. This continuous structure was designated as Structure 2 (see Figure 4.3; Photograph 4.4). It appears that the east-west oriented wall (Feature 11) formed basement divisions, or bays, for the structure. However, there was no means of egress between the bays. This suggests that access would have been via the first floor of the structure. A bricked-up doorway was uncovered along the southern end of a north-south oriented wall (Feature 22), what would have been the western wall of the structure (see Photograph 4.3). The doorway measures 5 feet wide and would have been associated with Bay 3 on the plan view schematic (see Figure 4.3). The base of the doorway was located at 6.2 feet below ground surface, identifying the nineteenth-century basement level of the structure as being approximately 6 feet below modern grade. It also indicates that there was access to the outside and the waterfront from this level.

The wall between Structures 1 and 2 appears to be two separately constructed walls, each comprising the outside or exterior wall of a structure and later a party wall (i.e., separate buildings/addresses) (Photograph 4.5). It is double the width of the other walls exposed and there are slight differences in the construction of either half of the wall supporting this conclusion. Both halves of the wall are constructed of cut schist stone. However, the southern half of the wall (Feature 23) is constructed of stones that are fairly uniform, while the northern half (Feature 12) is composed of stones of varying size and shape. The mortar along the northern half does not appear to have the same compaction or density as the mortar along the southern half of the wall.

The entire length from the western wall to approximately 5 feet from the property line at Furman Street was excavated between Features 11, 23, and 24 (Photograph 4.6), or would have formed Bay 2 of Structure 1 immediately adjacent to the National Cold Storage building (see Figure 4.3; see Photograph 4.6). Along the southernmost wall (Feature 11), two rectangular openings—measuring 1.3 x 1.1 feet and extending through to the other side of the wall—were observed (Photograph 4.7). There also appears to have been two additional similar openings along the wall that had been closed some time after their construction.

Along the northern wall (Feature 23) of Structure 1, two similarly constructed rectangular openings were also observed. Unlike those on the southern wall, these were not open to the other side or to what would be the basement of the adjoining structure (Photograph 4.8). These openings were abutted against and blocked, or closed, by the neighboring foundation wall. The top of the opening is comprised of a stone slab with an opening. There is no evidence of brick having been built atop this area of the foundation, and it could have aligned to lie between the joists of the interior wall (Photograph 4.9). It is hypothesized that these openings facilitated some form of airflow within the structure. They were probably retrofitted after the southern wall of Structure 2 was against the northern wall of Structure 1, indicating that it post-dates Structure 1.

Along the southern half of the center/party wall are stepped footers (Photographs 4.2 and 4.10). These extend 18 inches and run the length of the wall. At 9-foot intervals at the mid-section of the wall were three larger footers comprised of 30-inch-wide stone blocks and extending 24 inches. These footers further suggest this was a load-bearing exterior wall. Unmarked red bricks are built atop the wall, possibly remnant of the above surface walls of the structure. The red brick exterior would be fitting to the building style in the area during the nineteenth century (Figures 4.4 and 4.5; Photograph 4.11).

Photograph 4.4 Feature 22 schist foundation walls, looking northeast.

Photograph 4.5 Test Area 6, Features 12 and 13, wall referred to as the center/party wall between two buildings, looking east.

Photograph 4.6 Test Area 6, Feature 25 (Structure 1), length of the structure excavated as seen from Furman Street, looking west.

Photograph 4.7 Test Area 6, Feature 25 (Structure 1), rectangular openings built into the foundation wall, looking southeast.

Photograph 4.8 Test Area 6, Feature 25 (Structure 1), close-up of rectangular opening along the southern half of the center/party foundation wall, looking north.

Photograph 4.9 Test Area 6, Feature 25 (Structure 1), top of rectangular opening along the southern half of the center/party foundation wall, looking west.

Photograph 4.10 Test Area 6, Feature 17, one of three stepped footers along the southern half of the center/party foundation wall, looking northeast.

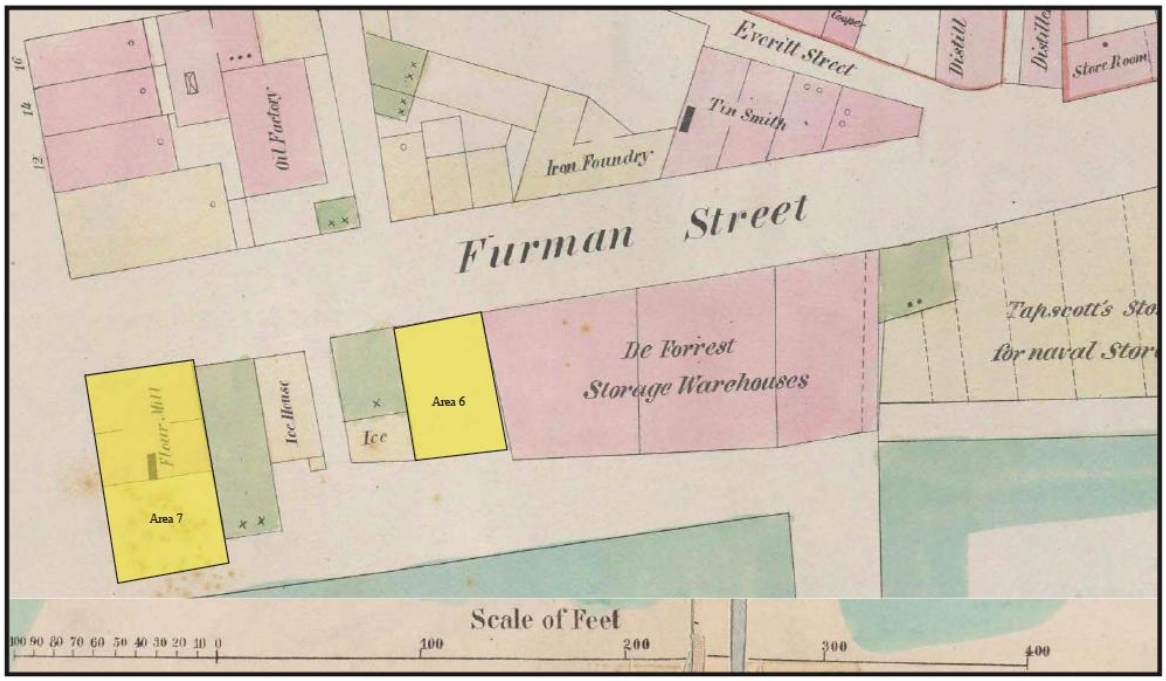


Figure 4.4 Test Areas 6 and 7 in 1855. Map legend indicates areas in pink are brick buildings (Perris 1855).

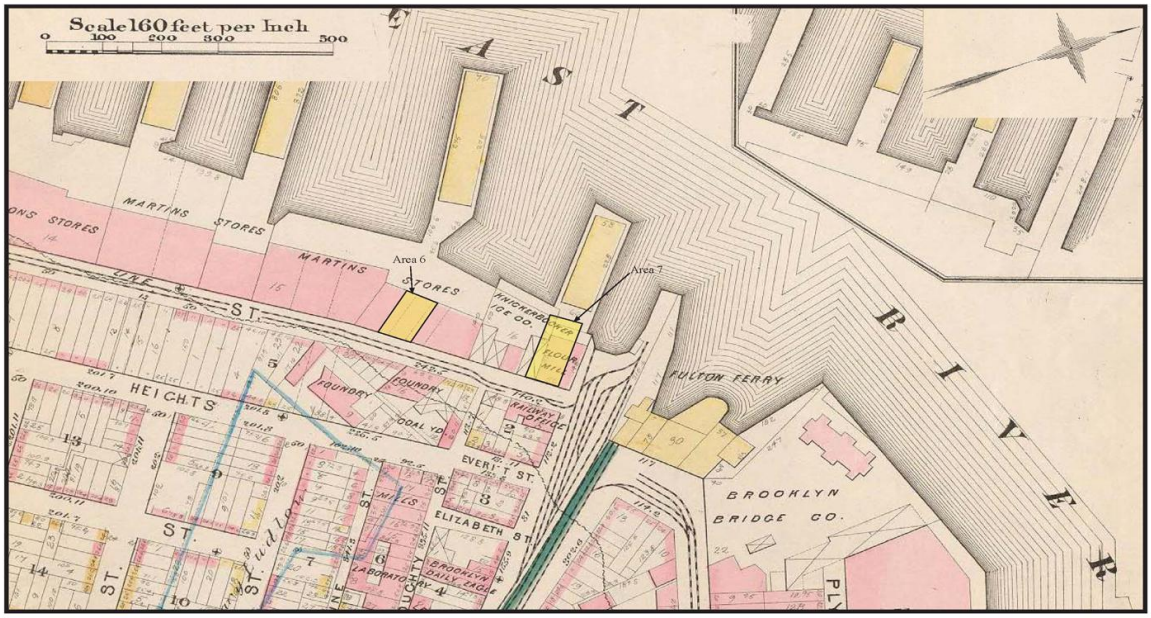


Figure 4.5 Test Areas 6 and 7 in 1880. Map legend indicates pink areas are brick or stone buildings (Bromley 1880).

Photograph 4.11 West side of Furman Street, looking north from the vicinity of Montague Street. This image is representative of the area in the mid to late nineteenth century (Eugene L. Armbruster collection, April 1925).

To date, this is the only area within that project area where stone foundations have been uncovered. It was hypothesized that stone foundation walls could have aided some form of cold storage. This type of stone was commonly used in the area for root cellars or cisterns (Ricciardi 1997). For comparative purposes, a survey of the basement of the still extant neighboring National Cold Storage building was conducted. This building had also been constructed during the same period for DeForrest Storage (Perris 1855). Unfortunately, the construction was not comparable to what has been uncovered in Structures 1 and 2. The National Cold Storage building has a brick foundation, similar to the other foundations uncovered on site. There is no evidence of the basement level subdivision or the rectangular openings observed in Structure 1 (Feature 25). While this does not negate the possibility that the structures were used for some form of cold storage, it reiterates that these structures utilized different building techniques and materials.

Many of the stores (warehouses) in the area dealt with perishable items or other materials that would benefit from cool temperature storage. Deforest Stores dealt with hides and wool among other items.

Within a temperate zone, such as Brooklyn, a fairly uniform temperature can be maintained in all seasons through non-mechanical, and non-chemical means. The proper use of materials and design in cellar construction has long been utilized within the northeast to effect storage of perishable goods and other materials (Cooper 1905:17). The use of stone as a construction material, combined with adequate/appropriate ventilation was standard for "cold storage" prior to the innovation and widespread use of refrigerant via mechanical means (Cooper 1905; Ricciardi 1997).

The most common method for cooling large-scale rooms was to place ice over the area to be cooled. Ventilation was a key component with air being induced to circulate over the ice and down to the storage room. It was preferred to facilitate the movement of air within the area to be cooled as opposed to allowing the entry of outside air. These storage areas had minimal doorway entries and a heavy iron door with a tight seal was common (Cooper 1905:17–18).

Ventilation of cold storage rooms was effected in various ways. Ventilating shafts located in the ceiling of storage rooms were often used as a means to effect a change of air (Siebel 1899:186). If properly constructed, ventilating shafts will meet all ventilation requirements. It is noted that the best location for these air ducts is within each room through the sidewall near the ceiling (Siebel 1899; Cooper 1905). The following diagrams show recommended construction and placement for airflow (Figures 4.6 and 4.7). These diagrams show construction consistent with that exposed in the foundation walls of Test Area 6 (Photograph 4.12).

A walking survey of the area surrounding the then extant National Cold Storage building allowed observation of a rectangular opening in the sidewalk along the foundation of the building (Photograph 4.13), corresponding to open spaces within the foundation of the building. The similarity between this feature and those observed in the excavated foundations further suggests that they facilitate some form of airflow.

During the excavation of Trench 6.3, groundwater was observed at 6 feet below surface with an average of 2 feet between the low- and high-tide water level. This is at the same elevation as

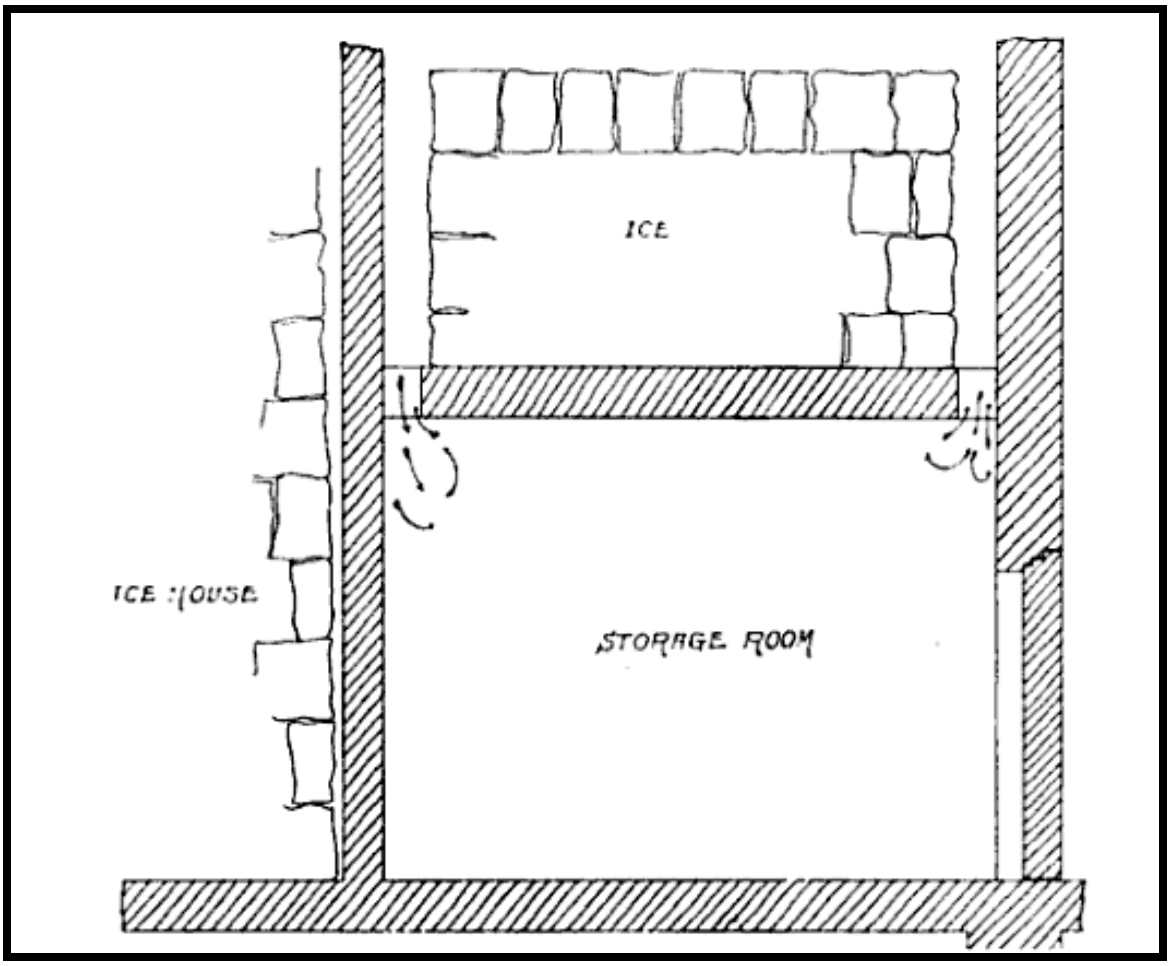


Figure 4.6 Diagram of air flow for cold storage.

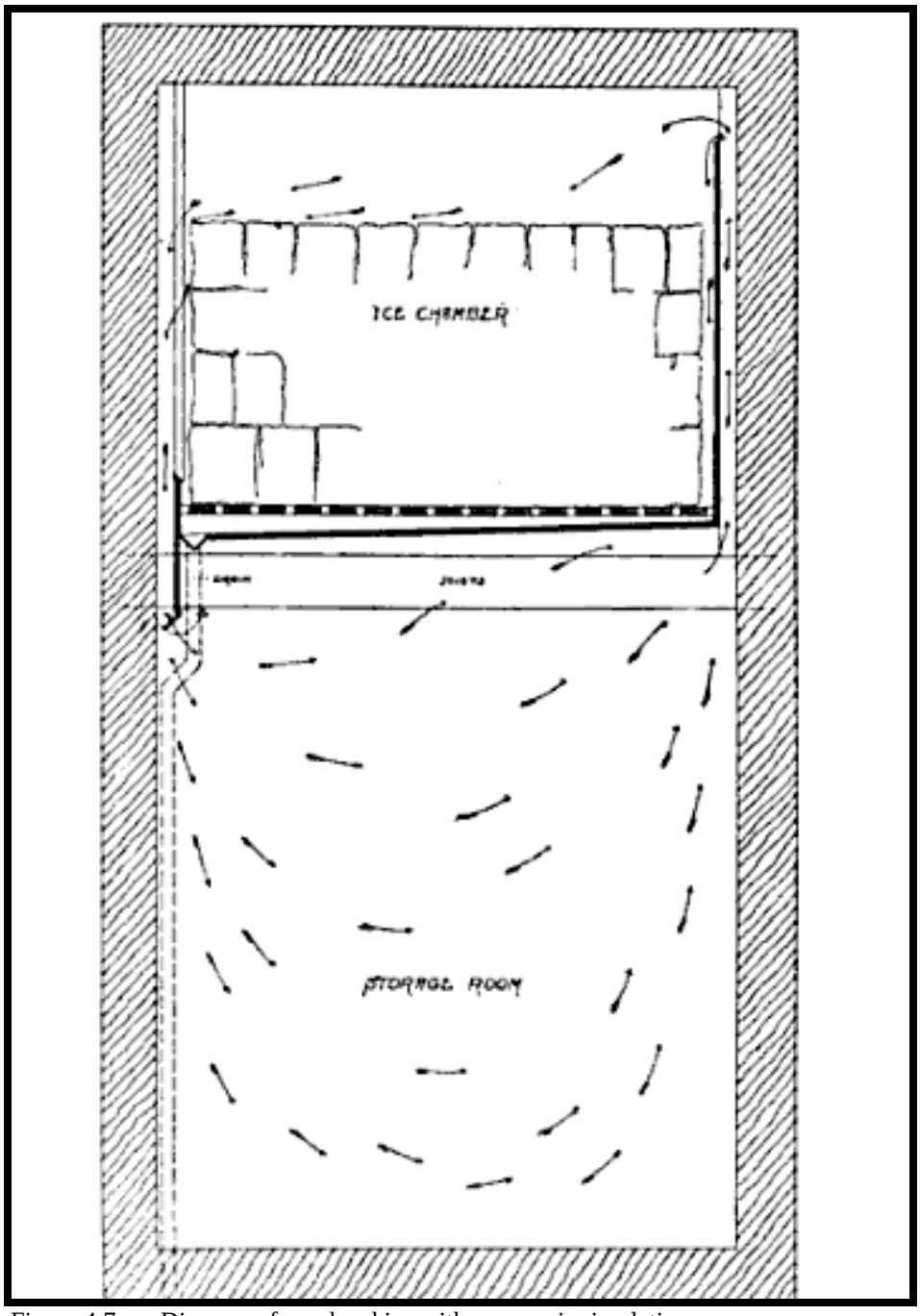


Figure 4.7 Diagram of overhead ice with proper air circulation.

Photograph 4.12 Composite image displaying the side and top of ventilation openings within the foundation wall. This is consistent with the design in diagrams featured in Figures 4.6 and 4.7.

Photograph 4.13 Sidewalk vent alongside the National Cold Storage Building.

what is believed to be the basement level of these two structures. Calculating for rising sea levels (the East River has risen at an approximate rate of 3–5 millimeters a year since 1850), the nineteenth-century tide level is estimated to be approximately 24 inches lower than present day (U.S. Army Corps of Engineers, personal communications). This places both basement surfaces slightly above high tide, although the foundation walls extend well below that point.

Excavation within Trench 6.3 extended throughout to a depth of approximately 6 feet below ground surface, except for a section at the eastern end of the trench. Utilizing a mechanical pump to remove water, this area was excavated to test for the depth of the foundation. Even at low tide, the excavated area rapidly filled with water. The bottom of the foundation walls was exposed at 9 feet below ground surface. Construction technique and materials were identical throughout.

The area within the foundation walls had been filled with rubble, including some bricks stamped "Washburn." The Washburn Brothers Company operated out of Glasco, New York, from 1890 to 1938 (Gurcke 1987: 313). This brick was not original to the structure. The Washburn bricks are different in size and composition from the bricks mortared and built onto the foundation wall. The Washburn bricks were all "clean" brick with no evidence of mortar. The brick appears to have been deposited in association with other rubble during demolition of the structures. Demolition appears to have, at least partially, consisted of knocking the structures walls into the basement. No distinct, or significant, artifact layers were uncovered. Few artifacts (n=10) were recovered, but included among them are bottle glass and nineteenth-century pottery shards (Photographs 4.14 and 4.15; see Appendix B).

As proposed in the Phase IB report, the exposed stone foundation walls represent two different structures, though they are continuous in the manner of rowhouse construction. The perceived differing orientation was perceptual in relation to the National Cold Storage buildings. There is a 20-degree difference in the orientation between the buildings and the foundation walls uncovered. This can be observed in the 1880 Bromley map (see Figure 4.4).

Documentary research and map analysis confirms that the foundations uncovered are those documented on maps dating from 1855 to 1907. Based on the 1855 Perris map, the DeForrest Storage Warehouses, constructed of brick, occupied this area (see Figure 4.3). By 1880, they were known as Martin's Stores, owned by Martin and Fay at 30 Furman Street. Martin's Stores occupied what would have been buildings 13 through 22 (New York City Directories 1870 to 1898). The foundations uncovered represent the remnants of buildings 16 and 17.

TEST AREA 7

This area is located east of Pier 1, immediately adjacent to the corner of Old Fulton and Furman Streets at the northern boundary of the project site (Figure 4.8). During the Phase IB testing, two test trenches were excavated exposing approximately 720 square feet. Testing showed some evidence of modern disturbance, but demonstrated that the area retained a significant degree of archaeological integrity. Excavations in two test trenches, Trench 7.1 measuring 11 x 44 feet on a north-south orientation and Trench 7.2 measuring 6 x 40 feet on an east-west orientation, uncovered brick foundation walls less than 2 feet below surface (Figure 4.9). All of the bricks were unmarked, except for two marked "Brooklyn Fireworks Company Brick No. 2." The brick

Photograph 4.14 Test Area 6, whiteware mug.

Photograph 4.15 Test Area 6, embossed Obermeyer & Liebmann bottle. The Obermeyer & Liebmann brewery operated in Brooklyn from 1868 until 1924.

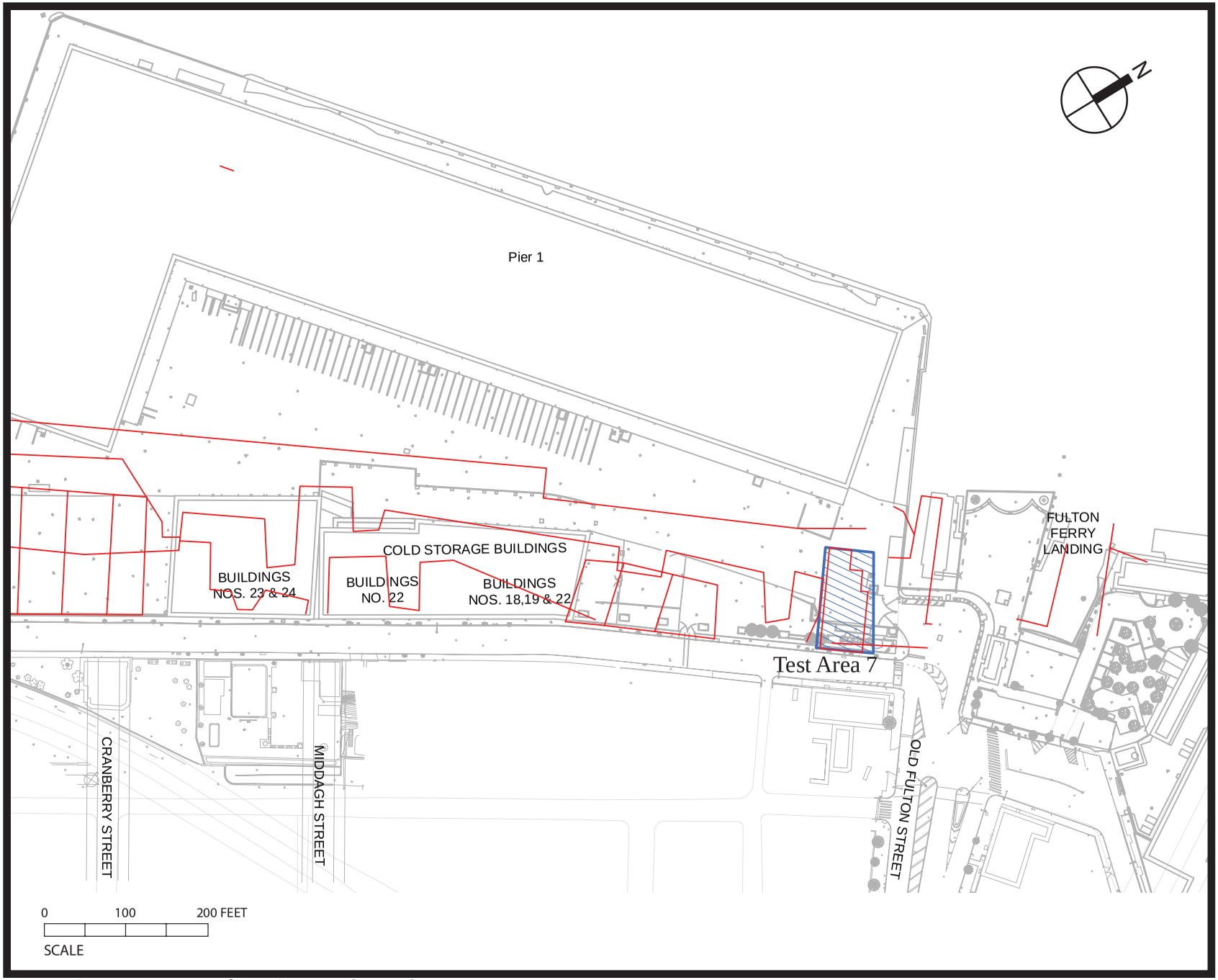


Figure 4.8 Location of Test Area 7 and immediate vicinity.

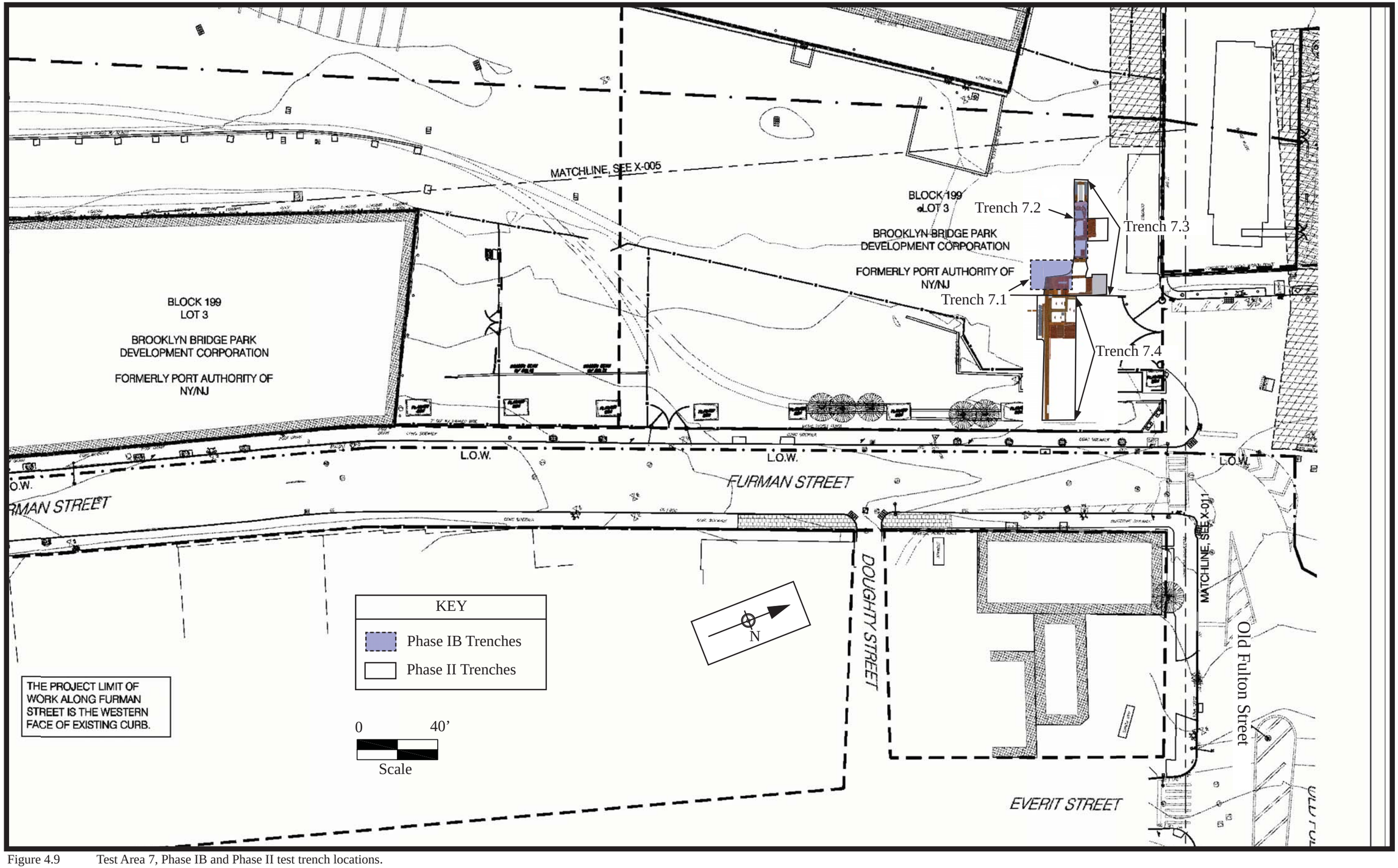


Figure 4.9 Test Area 7, Phase IB and Phase II test trench locations.

and mortar suggested a mid-nineteenth-century date. An unexplained brick conduit with weep holes that allowed water to enter at high tide was also uncovered. Artifacts were uncovered from several areas including a layer precipitated by decayed wood at 6 feet below surface.

Based upon maps and other information in the Phase IA study, these uncovered remains were likely associated with the nineteenth-century Jewell Brothers Flour Mill. Questions were raised as to the functional purpose of the conduit, as well as the extent of the mill complex. Based on the findings of the Phase IB investigations and in consultation with OPRHP and LPC, Phase II testing was recommended.

Phase II Investigations

There were four goals of the Phase II investigations in Test Area 7. The first was to further investigate the conduit that extended from the foundation towards the East River. The second was to expose and record any mill foundations in the planned location of the guardhouse. The third was to expose and document any mill foundation remains that may be present within the planned area of utility work associated with the guardhouse. The fourth was to supplement the belowground investigation with a limited and focused documentary study of the property and nineteenth-century milling. The first three goals were accomplished by excavating two trenches oriented east-west (see Figure 4.9). Trench 7.3 measured 31 x 58 feet, encompassing and expanding upon an area previously exposed, while Trench 7.4 measured 19 x 62.5 feet. The area of Trench 7.4 was slated for new utility installation and was oriented in a direct line with the mill foundations. Overall, the two trenches exposed 2,985.5 square feet.

All of the foundation and infrastructural remains in this area are identified as Feature 14 (Photograph 4.16). They are the remnants of the Jewell Brothers Flour Mills complex, also known as the Brooklyn City Flour Mills, established 1852–1853. The property was rebuilt and/or expanded throughout the last half of the nineteenth century.

Trench 7.3 was placed to further investigate the brick conduit and to examine and record any mill remains in the area of the proposed guardhouse. The trench re-exposed and uncovered additional sections of the mill complex, revealing a series of foundation walls that appear to represent extensions to the rear of the mill building (Figure 4.10; Photographs 4.17 and 4.18). In several areas, brick floor surfaces were uncovered at approximately 5 feet below surface. These floor surfaces likely represent the basement level of the structure (Photograph 4.19). Excavations did not occur beneath the brick floor surface due to tide issues. At high tide, water rose in several areas and covered the exposed floor within the trench up to 2–3 feet deep. A large rectangular base constructed of brick occupies the western end of Trench 7.3. The surface of the base is multi-leveled with a tiered pad and two channels. Both channels are cement slipped. One of the channels is recessed 1.5 feet and slopes from the center of the base toward its edge. The edge of the base is situated 2.5 feet above the brick floor (Photographs 4.20 and 4.21).

Excavation continued westward toward the East River to re-expose the area of the conduit (Conduit 1) identified during the Phase IB testing. A concrete floor surface was first encountered prior to discovering the conduit. Machine excavation continued in order to determine what was beneath this surface. The removal of the concrete revealed what was then believed to be a brick basement floor. A water-filled conduit was encountered when the backhoe broke through the

Photograph 4.16 Test Area 7, section of mill complex (Feature 14), looking east.

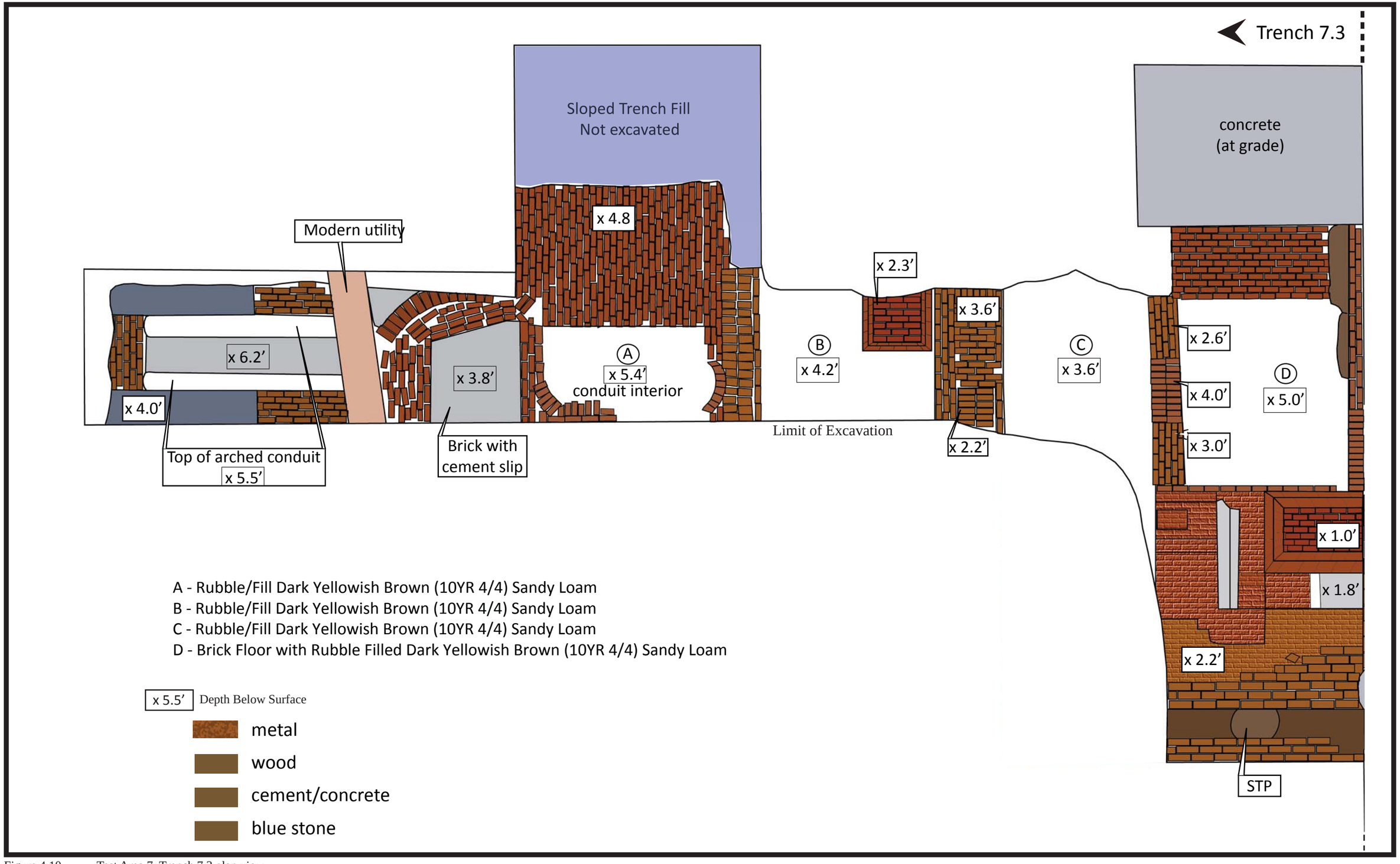


Figure 4.10 Test Area 7, Trench 7.3 plan view.

Photograph 4.17 Test Area 7, hand clearing basement floor of mill complex (Feature 14), looking west.

Photograph 4.18 Test Area 7, brick floor, looking north.

Photograph 4.19 Test Area 7, possible support base for boiler, looking south.

Photograph 4.20 Test Area 7, brick base with channels inset, looking south. The channeled area is constructed of fire-brick and faced with cement.

Photograph 4.21 Test Area 7, original conduit exposed during Phase IB testing, looking east.

brick (see Photograph 4.21). What was thought to have been a brick floor turned out to be the top of a brick-lined conduit. Therefore, a portion of Trench 7.3 was positioned to expose more of the outside or northern edge of the conduit. An additional area of the previously identified concrete "floor" was removed and a second conduit (Conduit 2) was uncovered to the north, abutting the original one (Photograph 4.22). Both were located at 4.8 feet below surface. The discovery of this second conduit raised the question of whether or not these were the only two conduits or additional ones may be present in sequence. Testing constraints (limited to areas of proposed disturbance) did not allow for further investigation.

The top brick surfaces of both conduits are on level with, or comprise part of, the exposed basement floor in this area. A small section along the top of the second conduit, at the point where it meets the mill foundation, was opened. As with the first conduit, there was no outlet to the interior of mill structure. They both appeared to have dead-ended into a north/south oriented brick wall (Photograph 4.23). Debris within the Conduit 2, including a modern foil chip bag, confirms that it remains open to the East River. An examination of the original conduit's (Conduit 1) interior indicated that unlike the newly discovered conduit, it had been sealed off to the East River with a brick wall at some point in time (Photograph 4.24). The wall sealing the conduit appears to post-date its construction, since it utilized another construction method and a different type of brick.

Additional excavation toward the west uncovered a continuation of the brick basement floor, an intrusion from a modern utility line, and the continuation of the conduits. In total, an approximately 30-foot length of the conduits was exposed between the Phase IB and Phase II investigations. At 18 feet west of where they abut the brick foundation wall, the two conduits have diverged from one another and lie 1.5 feet apart. The area between the conduits contains a brick floor with a cement slip recessed 6–8 inches. The area above the conduits is covered with large bluestone slabs that extend 1.6 feet from the trench walls (Photograph 4.25). The western end of the trench is 29.6 feet from the point where the conduits meet the foundation wall. Better observation of the weep holes, first encountered during the Phase IB investigation, showed them to be rectangular spaces built into the construction of the conduit's wall.

A portion of the floor area above the conduits exhibited a circular brick pattern (Photograph 4.26). Measurements extrapolated a diameter of 9.7 feet for the brick circle. A portion of the central area within this circle has a cement slip over the brick. The floor area continues under the south wall of the trench. Due to the density of the cement slip, it was not possible to deconstruct the surface area within the circular brick pattern. It was situated at the point where the two conduits begin to diverge. It is unclear if this area once provided access to the conduits below.

Trench 7.4 measured 62.5 x 19 feet and began from the eastern edge of Trench 7.3 (see Figure 4.5). It exposed the eastern edge of the brick base and almost the full length of the primary mill structure's southern foundation wall (Figure 4.11; Photograph 4.27). A brick floor was uncovered at 5 feet below surface, representing the basement of the building (Photographs 4.27 and 4. 28). While almost the complete east to west length of the building was exposed, only 16 feet of its width along Furman Street was excavated to allow for continued access to the Old Fulton Street entrance to the property.

Based upon the area exposed, the basement of the main building was subdivided into a minimum of two sections, one large open section and a small room at the southwestern end of the main

Photograph 4.22 Test Area 7, brick floor and sidewall of newly discovered conduit, looking north.

Photograph 4.23 Test Area 7, interior of original conduit discovered during Phase IB testing. Second conduit lies beneath brick surface, looking south.

Photograph 4.24 Test Area 7, interior of original conduit with brick wall sealing it off, looking west.

Photograph 4.25 Test Area 7, area between the two conduits showing diversion, looking east.

Photograph 4.26 Test Area 7, circular brick pattern with rectangular interior brick pattern covered in cement slip above the two conduits, looking north.

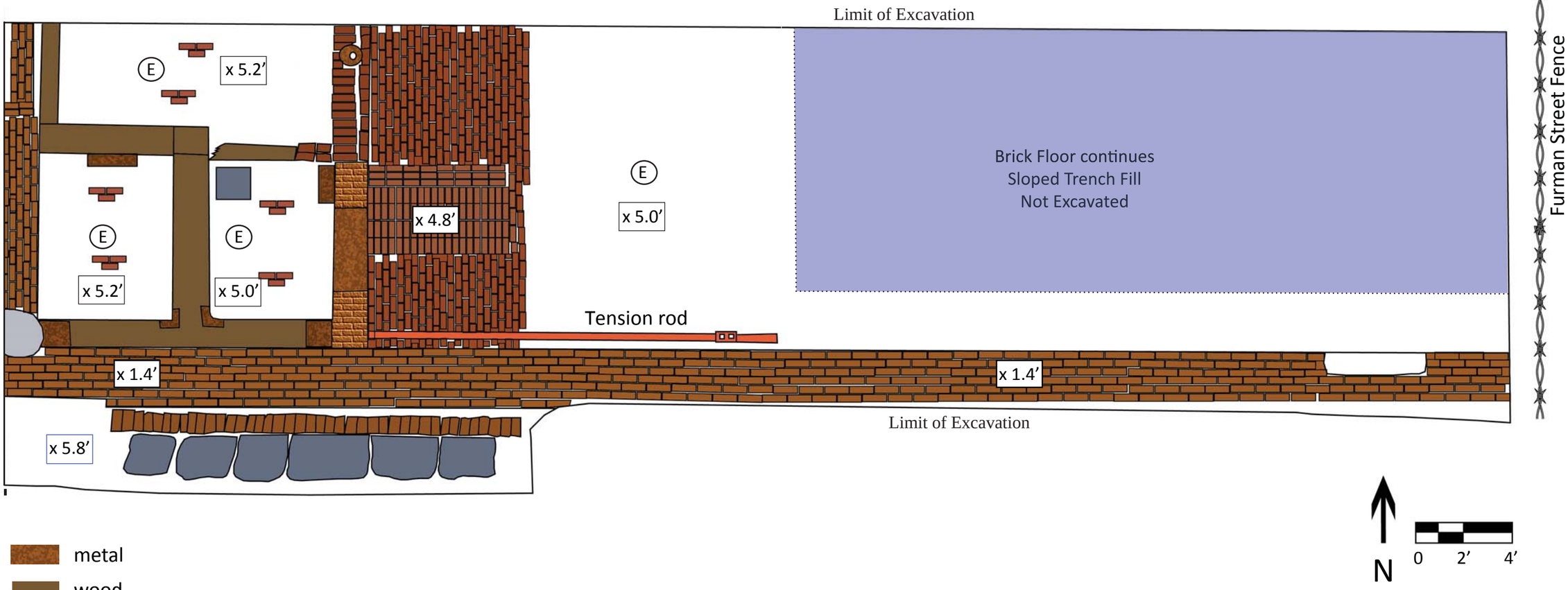


Figure 4.11 Test Area 7, Trench 7.4 plan view.

Photograph 4.27 Test Area 7, Trench 7.4, aerial view of eastern mill foundations (Feature 14), looking east.

Photograph 4.28 Test Area 7, Trench 7.4, eastern end of mill foundations, looking northeast.

structure with a corridor along the northern side of the small room (Photographs 4.29 and 4.30). There could have been additional subdivisions in the northern half of the basement, but this area was not excavated because it was not in the area of potential effects. The larger portion of the basement area was devoid of any specific features other than a brick floor and a tension rod with turnbuckle that extended over 30 feet in length. The rod ran along the southern foundation wall and likely ran the entire length of the southern wall (Photographs 4.31 and 4.32). It was observed inset into the floor beneath the wooden beams within the small room. The foundation wall itself exhibited several areas with structural cracks (Photograph 4.33). The exterior of the southern wall was abutted by what appears to be a later foundation wall. Adjacent to this were several stepped bluestone slabs (Photograph 4.34). This immediate area had been filled with clean sand from earlier nearby utility work, which collapsed following inclement weather and could not be investigated further due to safety concerns.

The room at the southwestern corner is adjacent to the large brick base within Trench 7.3. It contains three large timbers above the brick floor (Photograph 4.35). The timbers are bracketed with large iron spikes (Photographs 4.36 and 4.37). One timber is positioned two feet from the floor supported on a short brick wall two courses wide (Photograph 4.38). Two doorways were present, one entering the room and one entering the corridor. This entry contains hardware that could have been used to secure a hatchway style door (Photographs 4.39). The western wall of the room is constructed of brick and metal. Two iron rods were threaded through the wall at opposite ends and in line with small rectangular recesses built into the wall. There were four recesses in total—two toward the top of the wall and two at the floor. The recesses at the floor are open to the other side (Photographs 4.40 and 4.41).

The small room exhibits evidence of fire usage and damage. Fire scarring was observed on the foundation walls and the floor was covered with a fine textured layer of soot. Two small areas of the floor bricks were removed revealing charcoal and ash to have fallen and become lodged in between and beneath the floor surface (see Photograph 4.36). A limited number of artifact remains (*n*=19) were uncovered from this area. They included early ceramic electrical insulators and a number of bottles (see Appendix B). The majority of the bottles were for water and beer, along with a few medicinal bottles. All date to the later half of the nineteenth to early twentieth centuries. Several local breweries and/or bottlers are represented in the assemblage including U.S. Bottling Company at 98 Wyckoff Street, Brooklyn, New York, and India Wharf Brewing Company.

FLOUR MILL AND MILLING

Gristmills were a common site along Brooklyn's southern and western shores from settlement into the early twentieth century. Most often located along the banks of Brooklyn's many tidal inlets, they were traditionally water powered. The mills utilized the tide and water wheel to power the machinery.

With the advent of the industrial revolution, milling operations changed. Steam-powered engines allowed for increased productivity, but they were highly volatile. The Jewell Brothers Brooklyn City Flour Mills was always steam powered. Another advantage of steam power was that it was not dependent on the tide. Therefore, mills could be located anywhere, provided there was

Photograph 4.29 Test Area 7, Trench 7.4, basement level at the southwestern end trench, looking southwest.

Photograph 4.30 Test Area 7, Trench 7.4, basement level corridor north of the small room at the southwestern corner of the mill building, looking west.

Photograph 4.31 Test Area 7, Trench 7.4, basement surface of main mill structure, looking southeast. Note structural crack in the foundation wall can be seen to the right.

Photograph 4.32 Test Area 7, Trench 7.4, basement area of main mill structure, looking west. A tension rod with turnbuckle runs along the southern foundation wall.

Photograph 4.33 Test Area 7, Trench 7.4, one of several structural cracks observed in the foundation wall, looking south. Boiler explosions, known to have occurred in this area of the mill, likely caused this damage.

Photograph 4.34 Test Area 7, Trench 7.4, exterior southern foundation wall of the mill structure, looking east. shorter brick wall and stepped blue stone are a separate construction.

Photograph 4.35 Test Area 7, Trench 7.4, room at southwestern end of basement of main mill structure, aerial view of eastern mill foundations, looking east.

Photograph 4.36 Test Area 7, Trench 7.4, iron brackets securing wooden beams in the basement of main mill structure, looking south.

Photograph 4.37 Test Area 7, Trench 7.4, iron brackets securing wooden beams in the basement of the main mill structure, looking southwest.

Photograph 4.38 Test Area 7, Trench 7.4, one of three large wooden beams framing a small room in the basement of the main mill structure, looking north.

Photograph 4.39 Test Area 7, Trench 7.4, part of a doorframe leading to what appears to be a corridor in the main mill structure, looking northeast.

Photograph 4.40 Test Area 7, Trench 7.4, interior wall composed of iron and brick, looking east.

Photograph 4.41 Test Area 7, Trench 7.4, interior wall composed of iron and brick, looking southwest.

regular access to a water supply. In the case of Jewell Brothers, it allowed them to locate along a major port.

The steam-powered mill used steam engines to power rotating stones, which would later be replaced by heavy steel rollers, for grinding. The required components to operate a steam-powered mill included boilers, engines, and milling machinery. In 1882, Jewell Brothers used three drop-flue pattern boilers measuring 21 x 7 feet (*Brooklyn Daily Eagle*, February 16, 1882, p. 4). The typical boiler consisted of a large tank with several flues for exhaust. The boiler was suspended in some manner to allow for fire to heat the water within. To create steam, a minimum temperature of 210 degrees Fahrenheit is required.

The following images (Figures 4.12 and 4.13) depict typical boiler installations.

SITE-SPECIFIC HISTORY

Historical documentary research has been helpful in identifying aspects of the exposed features associated with the mill complex (Feature 14).

Obadiah Jackson erected a building on this location in 1834. He used the structure as a grocery and storage facility. According to an 1855 map, the building measured 60 x 60 feet and housed a boiler at its western end. The building was attached to a frame structure (Perris 1855) (see Figure 4.4). What would become Jewell Bothers, also known as Brooklyn City (Flour) Mills, first occupied this site in 1853. F. E. Smith and Theodore E. Jewell incorporated Smith & Jewel Milling in 1852, while located in the Williamsburg section of Brooklyn. They purchased the building at 2-4-6 Fulton Street less than a year later.

Throughout its history, the business suffered a series of losses due to accidents. The first known accident occurred in July 1860. A fire, believed to have begun with one of the engines, destroyed the building, built in 1853. The fast-moving fire enveloped the building, destroying all its contents within two hours. The mill was described as the most extensive of its kind within the city. The building occupied 24 feet of frontage along Fulton Street and 100 feet along Furman Street, with two engines operating round the clock. Damages were estimated to have cost $50,000 (*Brooklyn Daily Eagle*, July 7, 1860, p.3). The company, collecting on insurance, rebuilt. A November 1860 ad sought bricklayers for immediate hire.

Another accident occurred on October 19, 1864. At this time, the mill was operating 23 hours a day producing 470 to 490 barrels of flour per day. An article reporting the incident described the mill with some detail. The five-story building constructed after the 1860 fire measured 65 x 58 feet. The fifth story, where the fire was believed to have started, contained a carpentry shop and some light machinery. The third and fourth floors were used for grain and flour storage, and the second floor stored barreled flour. The main floor served as a general storeroom, while the cellar was used as a cooperage. According to the article, some machinery operated on every floor of the building. This was not unusual, as seen in a cross-section of a typical mill (Figure 4.14). Damages from this incident were estimated at $150,000 (*Brooklyn Daily Eagle*, October 19, 1864). Despite the losses, the company rebuilt and expanded their operation.

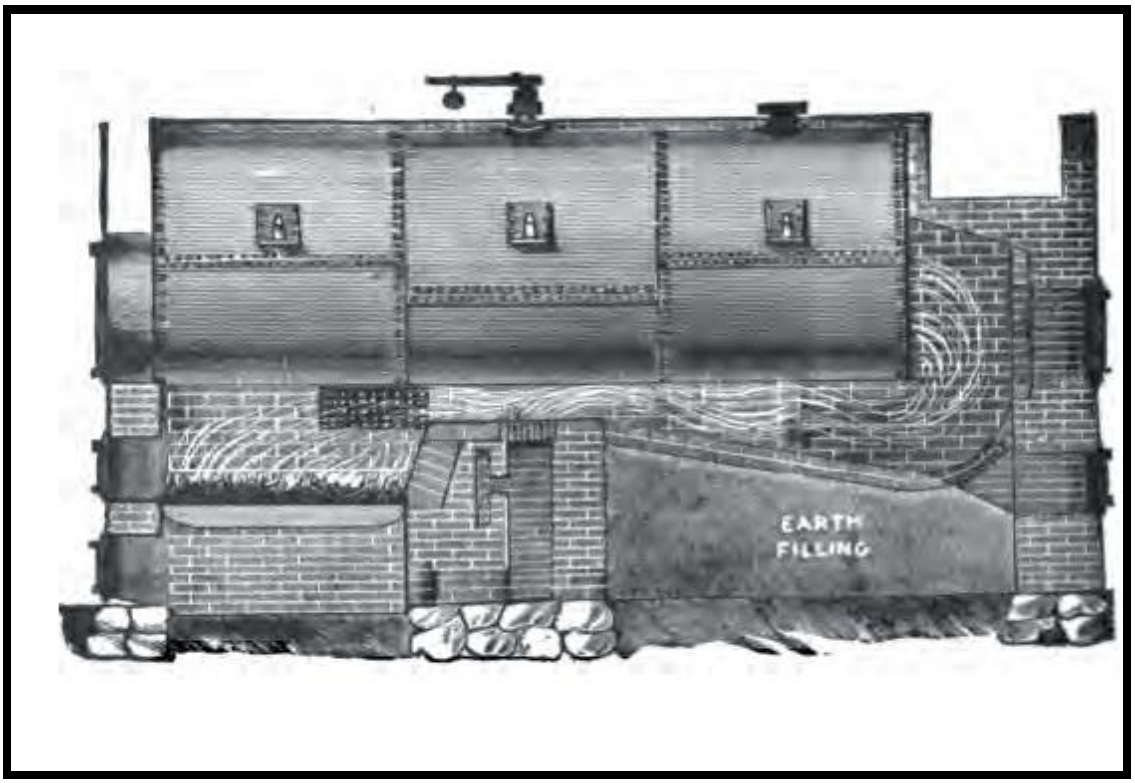


Figure 4.12 Return tubular boiler. Note brick pedestal areas and vented hatches on either sidewall (Grimshaw 1888:110).

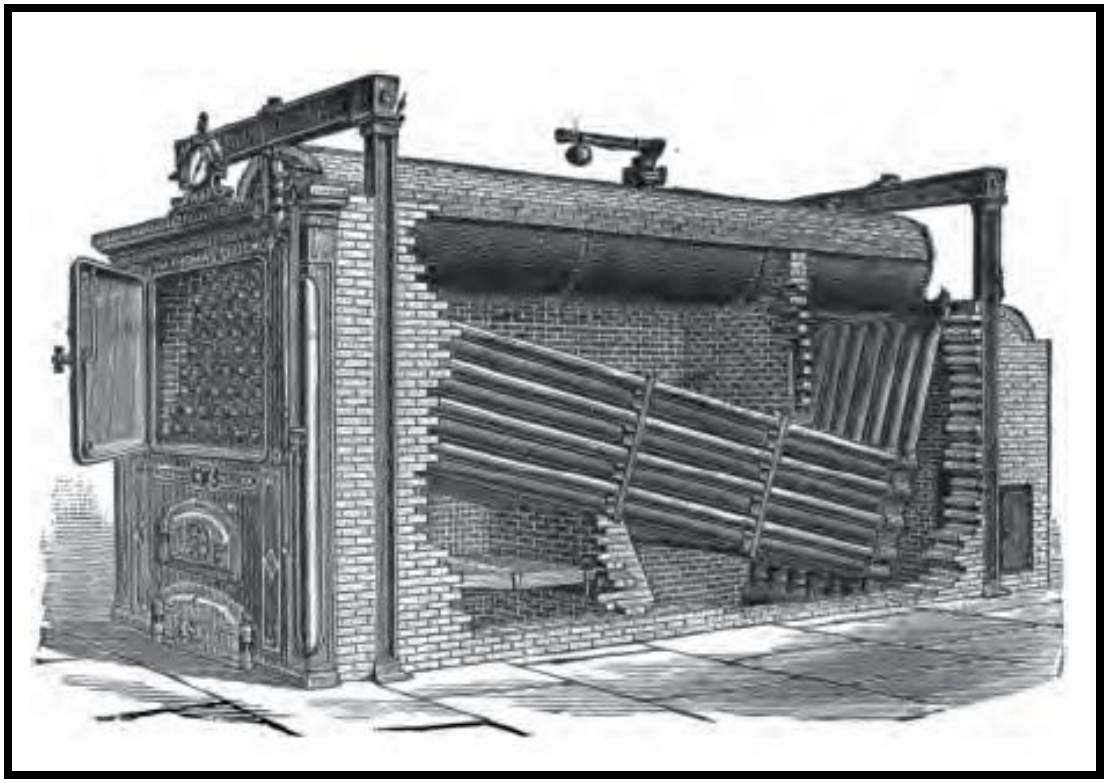


Figure 4.13 Boiler setting (Grimshaw 1888:57).

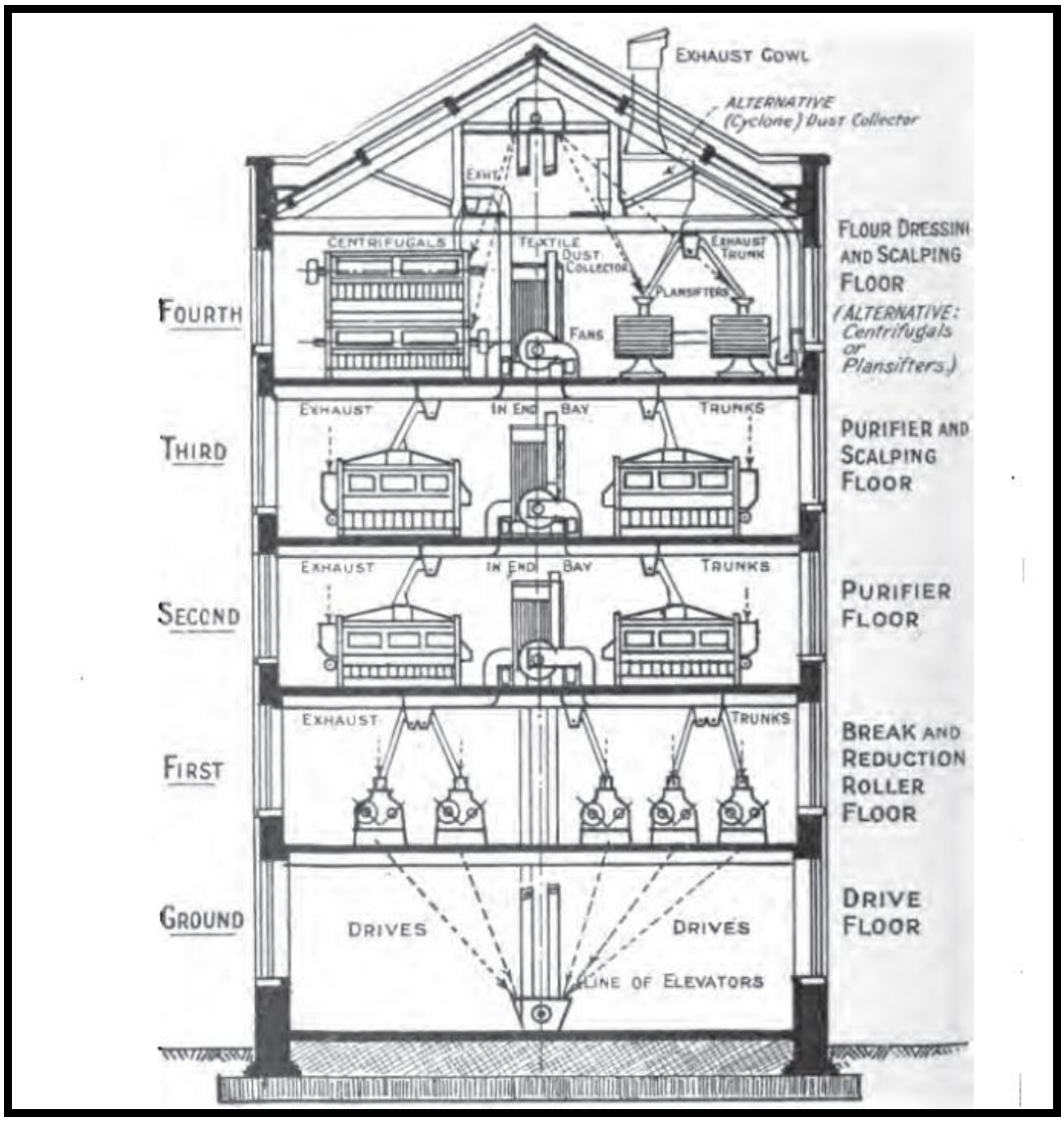


Figure 4.14 Cross-section of a flour mill (Amos 1920:182).

A year after the fire, in 1865, Mr. Jewell died and left his share of the company to his two elder sons Edward and Herbert. Mr. Jewell's partner Mr. Smith withdrew from the firm, which was then renamed Jewell Brothers. The Jewell Brothers Brooklyn City Mills continued as one of the largest establishments of its kind in the country. Located in a prime location for merchants and shipping, opposite Fulton Ferry, the company undertook a larger expansion in 1876. This expansion included the construction of Jewell's Dock, which allowed for greater waterway access of grain shipments and exports. The dock was also used by a large number of excursion steamboats during the summer months (*New York Times*, January 1, 1878, and *Brooklyn Daily Eagle*, January 2, 1878, p. 4). Despite being one of the largest establishments in the trade, the $50,000 expense of the dock led to financial troubles for the company. In January 1878, Jewell Brothers suspended operations for a short time.

Another disaster happened on February 16, 1882, when a large explosion occurred at the site. According to news accounts and the police inquiry, Mr. Jewell inquired about obtaining more steam power from the boilers from the engineer Gilbert Stevens. It was surmised that Mr. Stevens experimented with this request. The result led to an explosion that sent debris up over 200 feet into the air, shaking the main building and killing Mr. Stevens. His co-worker, who was collecting coal from the cellar of the main building, was injured along with several others (*Brooklyn Daily Eagle*, February 16, 1882, p. 4).

The article and police report provided a description of the mill. The chimney for the mill was described as massive, towering 120 feet. It was located at the southern end of the structure. The engine room was a separate, but attached, one-story 25-x-35-foot brick building at the rear of the main building housing three large steam engines (*Brooklyn Daily Eagle*, February 16, 1882, p. 4).

This incident placed further financial strain on the company. Though offset by insurance monies, the cost of this reconstruction was in addition to the already in-progress construction of another mill, located on Hamilton Avenue (*Brooklyn Daily Eagle*, February 17, 1882, p. 4).

INTERPRETATIONS

Based on documentary analysis, Feature 14 represents the remains of the Brooklyn City Flour Mills. The extensive foundation remains represent several aspects of the construction and operation of the mill. The area within Trench 7.4 is remnant of the main mill building, reconstructed in 1882. It would appear that in the various phases of reconstruction, the foundation remains were salvaged or reused. This is a supposition based upon evidence of fire scarring and structural cracks.

Machine and hand excavation exposed a 61-foot section of the main building's southern foundation wall to the large brick base (Figure 4.15). The small room at the rear of the basement likely housed a boiler and/or furnace. The brick base formed part of the engine room, and the series of stepped brick platforms and low walls would have facilitated boiler supports (Grimshaw 1888; Michael O'Connell, licensed plumber and owner of Repair Plumbing, New York, personal communication 2009).

The function of the conduits was more problematic. There is no evidence of any outlet between the structure and the conduits in the exposed areas. However, such an outlet could yet exist in

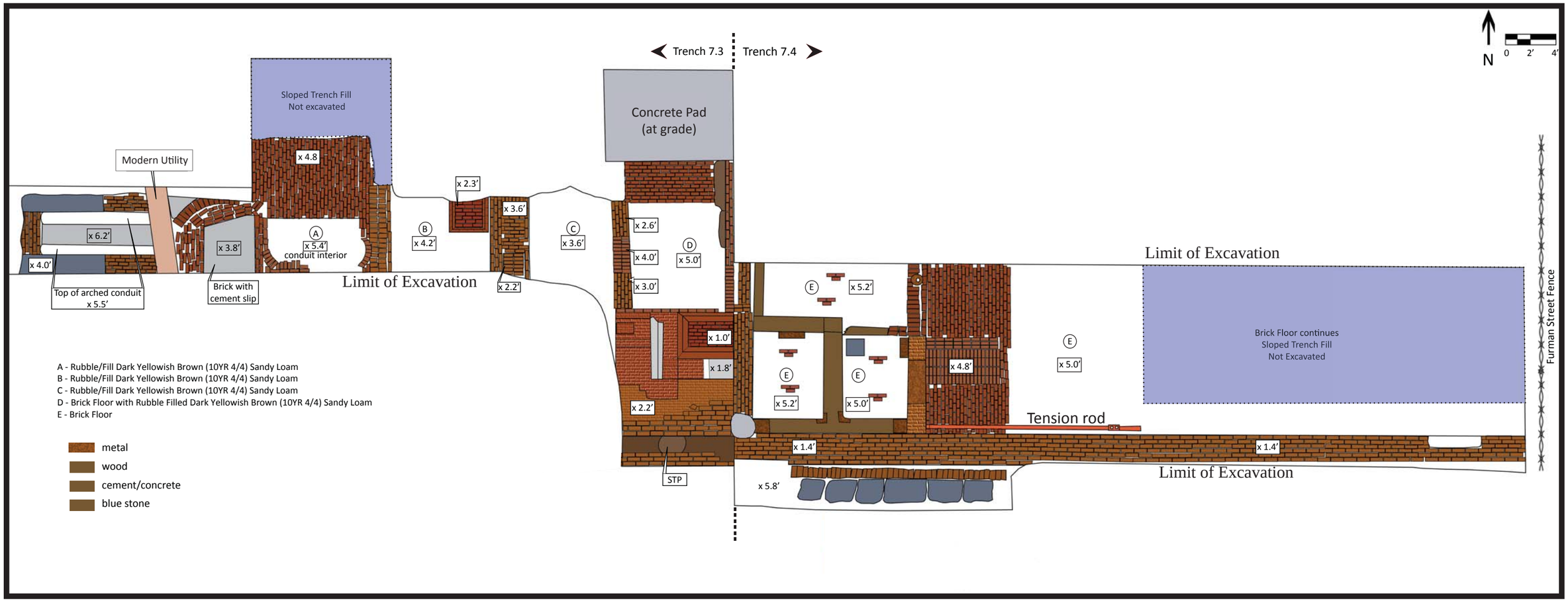


Figure 4.15 Test Area 7, Feature 14, mill complex plan view.

unexcavated adjacent areas. There is also the possibility that access was available within the perimeter of the circle defined by the bricks laid above the conduits. This area also remained unexcavated.

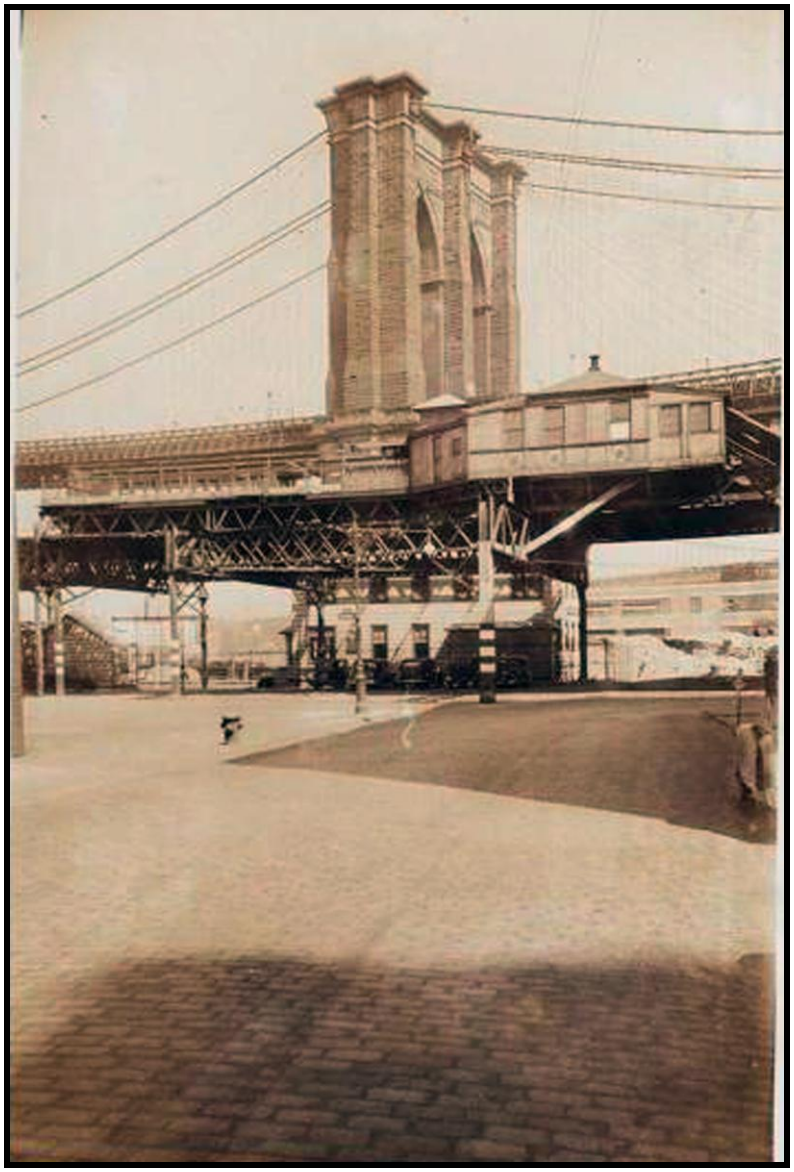
The conduits were not used for water intake because salt water cannot be used in steam boilers. Additionally, the pitch of the conduits, decidedly sloped downwards toward the East River, would preclude them from being any form of water intake. These likely facilitated some form of wastewater removal though the mechanism or means of the waste water entering the conduits remains undetermined.

Divers on site to assess the stability of the seawall noted circular openings in the seawall that appeared to be in line with the conduits exposed (Phoenix Marine, personal communication 2008). They also observed additional similar circular openings along the seawall throughout the area. Therefore, it is likely that similar conduits exist throughout the property. Recent surveys throughout the Gowanus Canal have observed similar openings along the shoreline. According to information DEP archaeologist John Vetter provided, these were illegal sewer outlets (personal communication 2011) (Photograph 4.42). Businesses may have established illegal sewer connections to avoid paying associated fees. Additionally, restrictions against dumping wastewater within the East River, or other bodies of water, may have been less stringent in the nineteenth century. The East River was a common receptacle for trash deposition by Manhattan residents during the first half of the nineteenth century (Minutes of the Common Council 1784–1831; Burrows and Wallace 2000; Cantwell and Wall 2003).

The remains uncovered in Test Trenches 7.3 and 7.4 represent the post-1882 configuration of the mill. Based on the archaeology and Sanborn Insurance maps the building measured 60 x 70 feet and the engine room measured 60 x 27 feet (Sanborn 1888 and 1904). Additional descriptive details are not available. An image of the area from the early twentieth century shows the post-1882 construction (Photograph 4.43). The mill was no longer operating in such a capacity as early as 1908. A second photograph shows the area some time after the building was demolished (Photograph 4.44).

Photograph 4.42 Example of nineteenth-century sewer outlet along the Gowanus Canal, Brooklyn.

Photograph 4.43 Brooklyn City Flour Mills, corner of Furman and Fulton Streets looking southwest circa 1880 or 1908 (Eugene L. Armbruster Collection, no date). The photographer's text associated with this photo reads: "Fulton Street, at the N.W. corner of Furman Street. A view of the Brooklyn City Flour Mills, owned by Jewell Brothers, who organized the Jewell Milling Company in 1880. (This site no longer serves as a mill in 1908). On the opposite corner (S.W.), was a railroad terminus for passengers from and to New York. The Brooklyn Bridge was still under construction. Circa 1880."



Photograph 4.44 This image shows the area of the mill property in 1937, looking north (Percy Loomis Sperr, April 1937). The structure had been demolished by this time.

5
Conclusions and Recommendations

The combined results of the Phase IA and IB archaeological work determined that Test Areas 6 and 7 retained a strong potential for the recovery of significant cultural resources. Therefore, Phase II testing was recommended and approved by the Office of Parks, Recreation, and Historic Preservation (ORPRHP) and the New York City Landmarks Preservation Commission (LPC).

TEST AREA 6

The field investigation was designed to expand upon and overlap with Trenches 6.1 and 6.2, excavated during the Phase IB investigation. Trench 6.3 was situated between the previous trenches and eventually encompassed a 55-x-80-foot area (4,400 square feet) on an east-west orientation (see Figure 4.3). Historic background research and map analysis conducted during the Phase II investigation confirms that the stone foundations uncovered in Test Area 6 are those documented on maps dating from 1855 to 1907. The foundations are remnant of Buildings 16 and 17 of the DeForrest Storage Warehouses, later known as Martin's Stores (see Figure 4.3, Structures 2 and 1); they were used for the import and export of various goods. The foundation walls represent warehouses in a rowhouse style of construction. These continuous foundation remains represent two of four structures once present in this immediate area. In both cases, the basement was subdivided into two spaces (bays) with no direct access between them from the lower or basement level. The pass through openings built into the foundation walls of Building 17 (Structure 1), are believed to have facilitated airflow and ventilation for cold storage within the basement level. The one remaining question is why the foundations of Buildings 16 and 17 are constructed of a different material (stone) than the other foundation remains uncovered in Test Area 7 and the other test areas located within the Brooklyn Bridge Park Project site investigated during earlier Phase IB work. In addition, a visual survey of the adjacent National Cold Storage Building complex (Buildings 18–22) indicated that the foundations also consisted of brick (Photograph 5.1). Since the DeForrest warehouses were constructed shortly after this area was landfilled, stone might have been utilized in order to provide a more stable surface for the brick superstructure. It also may simply have been the preferred material of choice by either the owner(s) or contractor. A brick foundation may have been used for the National Cold Storage Building complex because either the fill could have been more consolidated or become more compacted over the years, given that the complex was built between 1912 and 1915.

The Phase II field effort successfully exposed and recorded the foundation remains associated with the earliest known warehouse along the Brooklyn waterfront located within the project area. Although historic artifacts (n=11) were recovered, no intact, significant archaeological deposits were encountered from Test Trench 6.3 (see Appendix B). All artifacts were recovered from rubble/fill deposits. The date ranges of the artifacts span a relatively large time frame. A wine bottle base (1730–1860) and a creamware sherd (1770–1825) are the earliest artifacts recovered from the interior deposit of the two structures. The remaining artifacts consist of five whiteware ceramic sherds, a stoneware sewer pipe fragment, one pipe stem fragment, and three glass bottle fragments with a date range of 1820 to the present.

Photograph 5.1 Test Area 6, Cold Storage Building with brick foundations, looking south

The results of the excavation indicate that individually the foundation remains associated with the DeForrest Storage Warehouses (later the Martin's Stores) do not appear eligible for listing in the National Register of Historic Places. This assessment is based on the fact that the little recovered material was collected from rubble/fill contexts and showed no definitive associative link with the warehouses. In addition, testing exposed a large area of foundation remains sufficient enough to provide the necessary information to formulate cogent interpretations as to building layout and the techniques used in its construction. No further fieldwork is recommended for this area.

TEST AREA 7

Research on historic maps and background information in the Phase IA study determined that the conduit and foundation remains uncovered in the Phase IB investigation were associated with the nineteenth-century Jewell Brothers Flour Mills. Questions were raised as to the functional purpose of the conduit, as well as the extent of the mill complex. There were four goals of the Phase II investigation in Test Area 7. The first was to further investigate the conduit, uncovered during the Phase IB investigation, which extended from the foundation towards the East River. The second was to expose and record any mill foundations in the planned location of the guardhouse. The third was to expose and document any mill foundation remains that may be present within the planned area of utility work associated with the guardhouse. The fourth was to supplement the belowground investigation with a limited and focused documentary study of the property and nineteenth-century milling.

A limited documentary study undertaken as part of the Phase II investigation identified the Jewell Brothers Flour Mills as one of the largest and most extensive operations of its type within New York City. The mill operated round the clock, employing an average of 30 persons, producing several hundred barrels of flour a day. The mill was operated via steam power, known to be highly volatile. As a result, several damaging accidents occurred throughout the mill's history. On at least three occasions—in 1860, 1864, and 1882—the mill building was destroyed. The reconstruction following the 1882 incident appears to be the last incarnation of the mill. The building was demolished in 1915. The various historic documents and archaeological field investigations also demonstrated that the mill continued to reuse the same general footprint, repairing any damage to the foundation walls. The areas uncovered are remnant of both the main building and the engine room. The steam-powered mill would have required regular access to large amounts of fresh cold water for its operation, as well as a means of disposing of waste and water runoff. It is the latter that was likely facilitated by the conduits uncovered beneath the western portion of the site. The termination outlet in the East River is similar to illegal sewer outlets observed throughout the Gowanus Canal in Brooklyn.

No historic artifacts were recovered from Test Trench 7.3. However, Test Trench 7.4 yielded a total of 19 historic artifacts, consisting of 11 bottle fragments, two porcelain insulators, two wire fragments, one whiteware sherd, one porcelain sherd, one porcelain door knob, and one window fragment, but no intact, significant archaeological deposits (see Appendix B). As in Test Trench 6.3, all of the artifacts were recovered from rubble/fill deposits. The date ranges of the artifacts span a relatively large time frame: 1730 to the present.

The results of the excavation indicated that the foundation remains associated with the Jewell Brothers Brooklyn City Mills are significant and eligible, along with any other extant elements associated with the mill, for listing in the National Register of Historic Places under Criterion D. The archaeological remnants of the mill have yielded important information to the industrial history of the New York City area, specifically steam-powered milling in the nineteenth century. The mill, one of the largest in the area, was an active participant in the industry and commerce of New York City. It enabled its growth during the nineteenth century and in turn contributed to New York's larger national impact.

Although field investigations were relegated to those specific areas proposed for the construction of a guardhouse and utility corridor, there is a high potential to uncover other resources related to the development of this historically significant mill. While no further excavations are recommended in the areas already tested as part of the Phase II investigations, any changes to the current construction plans that involve subsurface disturbance below 16 inches should be archaeologically monitored or tested prior to the commencement of any construction activities. Additional mill remains and more intensive historical research may provide further information on the technological changes that occurred within the mill and on the industry as a whole; what commercial factors were linked to these changes; how spaced was used in and around the mill, particularly in terms of activity areas; and where it ranked in terms of size and scale of operation in comparison with other mills within the region.

The foundation remains and features exposed throughout the Phase IB and Phase II projects are located relatively close to the modern day surface, within 18 to 24 inches. It is likely that additional foundation remains and features are also present in areas not tested in the project area. Any impacts greater than 18 inches will likely expose the nineteenth-century landscape intact beneath the surface. Though individually these resources may not be National Register eligible, the larger Brooklyn Bridge Park site, the former historic waterfront, potentially meets National Register criteria A and B (National Parks Service 1966 as amended).

Criteria A

This area was an active participant in the commerce of the nineteenth century that enabled the growth of New York City. The warehouses along the Brooklyn Waterfront were often partnered with stores and firms across the river and many maintained offices in lower Manhattan. It is generally acknowledged that the industrial and commercial growth of New York City in the nineteenth century had a larger national impact. The site borders the National Register Fulton Ferry Historic District, which includes the Empire Stores. The Empire Stores are recognized for their contribution to the industrial and commercial growth of New York City in the nineteenth century.

Criteria B

The site still has the potential to provide additional information in the form of archaeological and architectural resources relative to the Revolutionary War through to the turn of the twentieth century. The remnant of the nineteenth-century waterfront remains relatively intact beneath the present-day surface. Based on available information, this is largely comprised of architectural

features and a small number of artifact remains. However, the potential remains to uncover other resources related to the development and occupation of the area, including additional architectural resources and landfill materials.

The potential for new or additional information for areas outside of Test Areas 6 and 7 must be weighed via several factors. The project plans currently call for the removal of the existing paved surface. Testing has demonstrated this surface to be anywhere from 12 to 18 inches thick. Removal of the surface places the nineteenth-century foundation elements within inches of exposure. Any proposed work that requires an impact beyond the surface removal may impact potential foundation remains. With regard to the potential to gain additional significant information, further investigation in the form of archaeological testing or monitoring would document additional architectural features, stratigraphy, and any potential artifact deposits. However, excavations beyond the 6-foot level would be hindered due to the high water table and therefore impractical.

Considering the high water table, the proposed construction footprint, and the information already gathered during the Phase I and II portions of the project, it is not recommended that further Phase II testing or full-scale Phase III archaeological mitigation be undertaken in the areas already tested. However, the Phase I and II projects demonstrated that the architectural and archaeological remains buried within Brooklyn Bridge Park are potentially eligible for inclusion on the National Register of Historic Places as an archaeological/historic district. As there remains a potential for the recovery of information, it is recommended that further archaeological monitoring of the excavation portions of the Brooklyn Bridge Park project be undertaken. Monitoring will allow for the documentation of additional information. If significant in situ remains are uncovered, construction excavation can be halted and archaeological excavation undertaken in the specific area of discovery. Based on the existing building foundations, the site formation processes, and the current water table, archaeological monitoring will allow for the greatest opportunity to record information on the site.

References Cited

AKRF, Inc.
2007 *Archaeological Testing Protocol: Brooklyn Bridge Park, Brooklyn, Kings County, New York*. Prepared for the Brooklyn Bridge Development Corporation.

Amos, Percy A.
1920 *Processes of Flour Manufacture.* Longmans, Green & Co., London and New York.

Brooklyn Daily Eagle
1860 The Brooklyn City Mills Destroyed by Fire. July 7: 3.

1864 Burning of the City Flour Mills. October 19: 2.

1878 Heavy Failure: The Firm of Jewell Brothers in Difficulty. January 2: 4.

1882 A Disastrous Boiler Explosion at Jewell's Mills. February 16: 4.

1882 The Explosion: Casualties Resulting from the Flour Mills Disaster. February 17: 4.

Burrows, Edwin G., and Mike Wallace
2000 *Gotham: A History of New York to 1898*. Oxford University Press.

Cantwell, Anne-Marie, and Diana Wall
2003 *Unearthing Gotham: The Archaeology of New York City.* Yale University Press.

Cooper, Madison
1905 *Practical Cold Storage.* Nickerson and Collins, Chicago.

Evans, Oliver
1860 *Young Millwright and Millers Guide*. Blanchard & Lea, Philadelphia.

Grimshaw, Robert
1888 *The Steam Boiler Catechism: A Practical Book for Steam Engineers, and for Firemen, Owners and Makers of Boilers of Any Kind.* Woolfall, Clark & Zagulla, New York.

Gurcke, Karl
1987 *Bricks and Brickmaking. A Handbook for Historical Archaeology*. The University of Idaho Press, Moscow, Idaho.

Halliwell, William
1904 *The Technics of Flour Milling: A Handbook for Millers.* Straker Bros. Ltd, London.

Historical Perspectives, Inc. and Raber Associates
2005 *Phase IA Archaeological Assessment: Brooklyn Bridge Park Blocks 1, 7, 16, 25, 26, 45, 199, 208, 245, 258 and Portions of Pearl, Washington, New Dock, Fulton, and Joralemon Streets and Atlantic Avenue Bounded Roughly by Atlantic Avenue, Jay Street, and the East River, Brooklyn, Kings County, New York*. Prepared for AKRF, Inc., New York.

New York Times
1860 Building Entirely Destroyed. July 9.

1878 Suspension of Jewell Brothers. January 1.

Lain & Co.
1889 *Brooklyn Directory 1888–1889.* Lain & Co, Brooklyn, New York.

1890 *Brooklyn Directory 1889–1890.* Lain & Co, Brooklyn, New York.

Ricciardi, Christopher
1997 *From Private to Public: The Changing Landscape of Van Cortlandt Park; Bronx, New York in the Nineteenth Century*. On file, Syracuse University, Syracuse, New York.

Siebel, J. E.
1899 *Compend of Mechanical Refrigeration.* H. S. Rich & Co, Chicago.

Stiles, Henry R.
1869 *A History of the City of Brooklyn, Vol. II.* Published by Subscription, Brooklyn, New York.

URS
2009 *Phase IB Archaeological Testing Test Areas 1, 2, 3, 4, 5, 6, and 7 Brooklyn Bridge Park Project, Brooklyn, New York.* Prepared for Skanska USA Building, Inc.

Appendix A
Feature List

Feature List

Feature	Location	Feature Type	Horizontal Shape	Historic Period
11	Test Area 6 Test Trench 6.1	Northern East/West Wall – Structure 2	Linear	DeForrest Storage Warehouses/Martin's Stores Circa 1855-1907
12	Test Area 6 Test Trenches 6.1 and 6.3	Southern East/West Wall – Structure 1	Linear	DeForrest Storage Warehouses/Martin's Stores Circa 1855-1907
13	Test Area 6 Test Trenches 6.2 and 6.3	Interior East/West Wall – Structure 2	Linear	DeForrest Storage Warehouses/Martin's Stores Circa 1855-1907
14	Test Area 7 Test Trenches 7.1, 7.2, 7.3 and 7.4	Mill complex	Linear	Brooklyn City Flour Mills/Jewell Brothers Brooklyn City Flour Mills 1853-1910
17	Test Area 6 Test Trench 6.3	Stone Stepped Footers Associated with Feature 11	Linear	Brooklyn City Flour Mills/Jewell Brothers Brooklyn City Flour Mills 1853-1910
22	Test Area 6 Test Trench 6.3	Western Exterior Wall – Structure 1	Linear	DeForrest Storage Warehouses/Martin's Stores Circa 1855-1907
23	Test Area 6 Test Trenches 6.1 and 6.3	Interior East/West Wall - Structure 1	Linear	DeForrest Storage Warehouses/Martin's Stores Circa 1855-1907
24	Test Area 6 Test Trench 6.3	Western Exterior Wall - Structure 2	Linear	DeForrest Storage Warehouses/Martin's Stores Circa 1855-1907
25	Test Area 6 Test Trenches 6.1 and 6.3	Structure 1 - Warehouse	Linear	DeForrest Storage Warehouses/Martin's Stores Circa 1855-1907
26	Test Area 6 Test Trenches 6.2 and 6.3	Structure 2 - Warehouse	Linear	DeForrest Storage Warehouses/Martin's Stores Circa 1855-1907

Appendix B
Artifact Inventory

Brooklyn Bridge Park Phase II

FS#	Provenience	Count	H/P	Class	Material	Object	Typology	Surface/ Decoration	Element	Comments	Begin Date	End Date
6	Feature 22	1	Historic	Ceramic	Clay	Pipe Stem	White Ball Clay	Undecorated		burnt		
6	Feature 22	1	Historic	Ceramic	Refined Earthenware	Sherd	Creamware	Painted	Rim	two of hand painted red bands	1770	1825
6	Feature 22	1	Historic	Ceramic	Refined Earthenware	Sherd	Whiteware	Dipt		entire exterior is a light blue color	1820	1930
6	Feature 22	1	Historic	Ceramic	Refined Earthenware	Saucer Sherd	Whiteware	Undecorated	Base		1930	2008
6	Feature 22	1	Historic	Ceramic	Refined Earthenware	Mug Sherd	Hotel Ware	Undecorated	Rim/Body	probably a coffee mug	1870	2008
6	Feature 22	1	Historic	Ceramic	Refined Earthenware	Coffee Cup	Whiteware	Printed	Rim/Body/Base	Printing has a Flag with CSS Co., this is the emblem for Cunard Steamship Company, merges with White Star in 1935. The printing is blurry. Height (length) and Diam (width) are recorded in inches.	1878	1934
6	Feature 22	1	Historic	Ceramic	Stoneware	Sewer Pipe		Glazed	Collar			
6	Feature 22	3	Historic	Glass	Common Glass	Bottle	Machine Made	Embossed	Body/Base	3 mending fragments, Embossed "Obermeyer & Leibmann, New York City" "Registered, This Bottle Not To Be Used Refilled or Sold Must Be Returned". This brewery operated in Brooklyn from 1868-1924 when it was sold to Leibmann Breweries.	1889	1924
6	Feature 22	1	Historic	Glass	Common Glass	Bottle, Wine	Dip Mold	Undecorated	Base	Pontil mark in Kick-Up	1730	1860
7	Trench 7.4	1	Historic	Ceramic	Porcelain	Insulator			Complete	rectangular in shape. Embossed "PAT JUNE 14 1892 P&S"	1892	2008
7	Trench 7.4	1	Historic	Ceramic	Porcelain	Insulator			Fragment	circular in shape, has a rusted screw attached		
7	Trench 7.4	1	Historic	Ceramic	Porcelain	Door Knob	Hard Paste Porcelain		Fragment			
7	Trench 7.4	1	Historic	Ceramic	Porcelain	Plate Sherd	Hard Paste Porcelain	Undecorated	Base	might be Hotel Ware		
7	Trench 7.4	1	Historic	Ceramic	Refined Earthenware	Sherd	Whiteware	Flow Printed	Rim	Shallow Dish or small bowl	1845	1915
7	Trench 7.4	1	Historic	Glass	Common Glass	Medicine Bottle	Mold Blown		Neck	Tooled Lip	1825	1920
7	Trench 7.4	1	Historic	Glass		Window Glass			Fragment	thick glass, might be shelving		
7	Trench 7.4	1	Historic	Glass	Non Lead	Bottle	Mold Blown		Complete	Panel bottle. Base embossed "WT & Co". Whitall-Tatum glass plant, Millville NJ	1889	1930
7	Trench 7.4	2	Historic	Metal	Iron	Wire Fragment						

FS#	Provenience	Count	H/P	Class	Material	Object	Typology	Surface/ Decoration	Element	Comments	Begin Date	End Date
7	Trench 7.4	1	Historic	Glass	Common Glass	Bottle	Mold Blown		Complete	three-piece mold with blob top, Embossed "US Bottling Co. 98 Wyckoff St Brooklyn NY". Could not find information on this company.	1840	1920
7	Trench 7.4	1	Historic	Glass	Common Glass	Bottle	Mold Blown	Embossed	Complete	Two-piece mold with blob top, Embossed "India Wharf Brewing Co. Brooklyn, NY". Base "A"' "ABC" and "774". The brewery operated under this name from 1889 until 1920 at 436 Atlantic Ave.	1889	1920
7	Trench 7.4	1	Historic	Glass	Common Glass	Bottle	Mold Blown	Embossed	Complete	Two-piece mold, tooled rim. Embossed "Derenthal & Schalk 217 & 219 21st St. S. Brooklyn, NY". "D&S Logo", "Registerd 1890" Could not find information on this company.	1890	
7	Trench 7.4	1	Historic	Glass	Non Lead	Bottle	Mold Blown	Embossed	Complete	Two-piece mold, Embossed "trade Mark", "Anheuser Busch Brew ASN Co. St. Louis MO" "Thimig Bottling Co. Brooklyn". On base "J Bro's 14". Thimig formed a partnership with Aneuser Busch in 1891.	1891	
7	Trench 7.4	1	Historic	Glass	Non Lead	Bottle	Mold Blown	Embossed	Complete	Two-Piece mold, embossed "Dr. JT Poock 409 First Street Hoboken, NJ". Could not find any additional information		
7	Trench 7.4	2	Historic	Glass	Non Lead	Bottle	Unidentified	Embossed	Body/Base	mend. Embossed "Mutual Bottling Co. 127, 129, 131 Boerum Place Brooklyn, NY" logo, "Registered". Mutual mostly bottled soda.		
7	Trench 7.4	1	Historic	Glass	Common Glass	Bottle	Mold Blown	Embossed	Body/Base	Cobalt blue, Two-piece mold, Embossed "Bromo-Seltzer Emerson Drug Co. Baltimore MD"	1891	
7	Trench 7.4	1	Historic	Glass	Common Glass	Bottle	Mold Blown		Complete	Two-piece mold, Probably had a paper label		