NEW YORK CITY ENVIRONMENTAL QUALITY REVIEW
REVISED ENVIRONMENTAL ASSESSMENT STATEMENT AND SUPPLEMENTAL REPORT

45 BROAD STREET DEVELOPMENT
45 BROAD STREET
BOROUGH OF MANHATTAN

Prepared For:

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Lead Agency:

New York City Department of City Planning (DCP)
120 Broadway, 31st Floor, New York, NY 10271

CEQR Number: 18DCP063M
8 June 2018

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(CITY ENVIRONMENTAL QUALITY REVIEW)

City Environmental Quality Review
ENVIRONMENTAL ASSESSMENT STATEMENT (EAS) FULL FORM

Please fill out and submit to the appropriate agency (see instructions)

Part I: GENERAL INFORMATION

PROJECT NAME 45 Broad Street

1. *Reference Numbers*

CEQR REFERENCE NUMBER (to be assigned by lead agency)	BSA REFERENCE NUMBER (if applicable)
18DCP063M	N/A
ULURP REFERENCE NUMBER (if applicable)	OTHER REFERENCE NUMBER(S) (if applicable)
180063ZSM	(*e.g.*, legislative intro, CAPA) N/A

2a. *Lead Agency Information*			**2b. *Applicant Information***		
NAME OF LEAD AGENCY			NAME OF APPLICANT		
Department of City Planning			Madison 45 Broad Development LLC		
NAME OF LEAD AGENCY CONTACT PERSON			NAME OF APPLICANT'S REPRESENTATIVE OR CONTACT PERSON		
Robert Dobruskin			Anthony Labozzetta		
ADDRESS 120 Broadway – 31st Floor			ADDRESS 105 Madison Avenue, 9th Floor		
CITY New York	STATE NY	ZIP 10271	CITY New York	STATE NY	ZIP 10016
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3. *Action Classification and Type*

SEQRA Classification

☐ UNLISTED ☒ TYPE I: Specify Category (see 6 NYCRR 617.4 and NYC Executive Order 91 of 1977, as amended): 6 NYCRR 617.4(b)(9)

Action Type (refer to Chapter 2, "Establishing the Analysis Framework" for guidance)

☒ LOCALIZED ACTION, SITE SPECIFIC ☐ LOCALIZED ACTION, SMALL AREA ☐ GENERIC ACTION

4. *Project Description*

Madison 45 Broad Development LLC (the "Applicant") is requesting approval of a special permit from the City Planning Commission (CPC), pursuant to the New York City Zoning Resolution (ZR) §91-251 of the Special Lower Manhattan District (LM), Article IX, Chapter 1, for a floor area bonus in exchange for subway improvements (ZR §74-634) (the "Proposed Action"). The Proposed Action would permit additional floor area on a single zoning lot at 45 Broad Street (Block 25, Tax Lots 7 and 10) in the Financial District of the Borough of Manhattan, Community District 1 (the "Project Site"). Approval of the Proposed Action (a special permit for a Floor Area Ratio (FAR) bonus up to 3.00) would facilitate a 1,115-foot (80-floor), approximately 478,209-gross-square-foot (gsf) commercial/residential building on Lot 7 (the "Development Site") at an FAR of 14.05; the existing 93,894-gsf, 3.95-FAR, community facility building (the "Existing Building") on Lot 10 would remain as is. The total development on the Project Site would include approximately 572,103 gsf of commercial, residential, and community facility space built at a total FAR of 17.99. The proposed subway improvements at the Broad Street Station of the Nassau Street (J/Z) subway line would consist of the installation of two Americans with Disabilities Act (ADA) compliant elevators that would provide access to the southbound and northbound subway platforms, and improvements to the ingress and egress at two control areas at the connecting Wall Street Station of the Lexington Avenue (4/5) subway line. The Project Site is in the Wall Street Historic District and is classified a Type I Action under SEQRA.

Project Location

BOROUGH Manhattan	COMMUNITY DISTRICT(S) 1	STREET ADDRESS 45 Broad Street
TAX BLOCK(S) AND LOT(S) Block 25, Lots 7 and 10		ZIP CODE 10004

DESCRIPTION OF PROPERTY BY BOUNDING OR CROSS STREETS The Project Site is bounded by the 21-story Broad Exchange Building to the north; a 20-story office building and a 44-story commercial/residential building to the east (fronting William Street); a 31-story office building to the south; and Broad Street to the west.

EXISTING ZONING DISTRICT, INCLUDING SPECIAL ZONING DISTRICT DESIGNATION, IF ANY	ZONING SECTIONAL MAP NUMBER
C5-5, Special Lower Manhattan District (LM) and Historic and Commercial Core Sub-district	12b

5. *Required Actions or Approvals* (check all that apply)

***City Planning Commission*:** ☒ YES ☐ NO ☒ UNIFORM LAND USE REVIEW PROCEDURE (ULURP)

☐ CITY MAP AMENDMENT	☐ ZONING CERTIFICATION	☐ CONCESSION
☐ ZONING MAP AMENDMENT	☐ ZONING AUTHORIZATION	☐ UDAAP
☐ ZONING TEXT AMENDMENT	☐ ACQUISITION—REAL PROPERTY	☐ REVOCABLE CONSENT
☐ SITE SELECTION—PUBLIC FACILITY	☐ DISPOSITION—REAL PROPERTY	☐ FRANCHISE
☐ HOUSING PLAN & PROJECT	☐ OTHER, explain:	

☒ SPECIAL PERMIT (if appropriate, specify type: ☐ modification; ☐ renewal; ☒ other); EXPIRATION DATE:

SPECIFY AFFECTED SECTIONS OF THE ZONING RESOLUTION ZR §91-251 and ZR §74-634

***Board of Standards and Appeals*:** ☐ YES ☒ NO
☐ VARIANCE (use)
☐ VARIANCE (bulk)
☐ SPECIAL PERMIT (if appropriate, specify type: ☐ modification; ☐ renewal; ☐ other); EXPIRATION DATE:
SPECIFY AFFECTED SECTIONS OF THE ZONING RESOLUTION

***Department of Environmental Protection*:** ☐ YES ☒ NO If "yes," specify:

Other City Approvals Subject to CEQR (check all that apply)
☐ LEGISLATION
☐ RULEMAKING
☐ CONSTRUCTION OF PUBLIC FACILITIES
☐ 384(b)(4) APPROVAL
☐ OTHER, explain:
☐ FUNDING OF CONSTRUCTION, specify:
☐ POLICY OR PLAN, specify:
☐ FUNDING OF PROGRAMS, specify:
☐ PERMITS, specify:

Other City Approvals Not Subject to CEQR (check all that apply)
☐ PERMITS FROM DOT'S OFFICE OF CONSTRUCTION MITIGATION AND COORDINATION (OCMC)
☒ LANDMARKS PRESERVATION COMMISSION APPROVAL
☐ OTHER, explain:

***State or Federal Actions/Approvals/Funding*:** ☐ YES ☒ NO If "yes," specify:

6. *Site Description:* *The directly affected area consists of the project site and the area subject to any change in regulatory controls. Except where otherwise indicated, provide the following information with regard to the directly affected area.*

***Graphics*:** *The following graphics must be attached and each box must be checked off before the EAS is complete. Each map must clearly depict the boundaries of the directly affected area or areas and indicate a 400-foot radius drawn from the outer boundaries of the project site. Maps may not exceed 11 x 17 inches in size and, for paper filings, must be folded to 8.5 x 11 inches.*
☒ SITE LOCATION MAP ☒ ZONING MAP ☒ SANBORN OR OTHER LAND USE MAP
☒ TAX MAP ☐ FOR LARGE AREAS OR MULTIPLE SITES, A GIS SHAPE FILE THAT DEFINES THE PROJECT SITE(S)
☒ PHOTOGRAPHS OF THE PROJECT SITE TAKEN WITHIN 6 MONTHS OF EAS SUBMISSION AND KEYED TO THE SITE LOCATION MAP

Physical Setting (both developed and undeveloped areas)[1]
Total directly affected area (sq. ft.): 23,797 sf (Lots 7 and 10)
Waterbody area (sq. ft.) and type: N/A
Roads, buildings, and other paved surfaces (sq. ft.): N/A
Other, describe (sq. ft.): N/A

7. *Physical Dimensions and Scale of Project* (if the project affects multiple sites, provide the total development facilitated by the action)[2]
SIZE OF PROJECT TO BE DEVELOPED (gross square feet): 478,209 gsf
NUMBER OF BUILDINGS: 1
GROSS FLOOR AREA OF EACH BUILDING (sq. ft.): 478,209 gsf
HEIGHT OF EACH BUILDING (ft.): 1,115 feet
NUMBER OF STORIES OF EACH BUILDING: 80
Does the proposed project involve changes in zoning on one or more sites? ☐ YES ☒ NO
If "yes," specify: The total square feet owned or controlled by the applicant: N/A
The total square feet not owned or controlled by the applicant: N/A
Does the proposed project involve in-ground excavation or subsurface disturbance, including, but not limited to foundation work, pilings, utility lines, or grading? ☒ YES ☐ NO
If "yes," indicate the estimated area and volume dimensions of subsurface disturbance (if known):
AREA OF TEMPORARY DISTURBANCE: 23,797 sq. ft. (width x length) VOLUME OF DISTURBANCE: 761,504 cubic ft. (width x length x depth)
AREA OF PERMANENT DISTURBANCE: 23,797 sq. ft. width x length)

8. *Analysis Year* CEQR Technical Manual Chapter 2
ANTICIPATED BUILD YEAR (date the project would be completed and operational): 2020
ANTICIPATED PERIOD OF CONSTRUCTION IN MONTHS: 37[3]
WOULD THE PROJECT BE IMPLEMENTED IN A SINGLE PHASE? ☒ YES ☐ NO IF MULTIPLE PHASES, HOW MANY? N/A
BRIEFLY DESCRIBE PHASES AND CONSTRUCTION SCHEDULE: Development of the proposed building would occur in a single phase, and construction commence as soon as the requested special permit is granted and upon receiving the necessary permits thereafter.

9. *Predominant Land Use in the Vicinity of the Project* (check all that apply)
☒ RESIDENTIAL ☐ MANUFACTURING ☒ COMMERCIAL ☐ PARK/FOREST/OPEN SPACE ☐ OTHER, specify:

[1] This area does not include the sidewalk area affected by the Broad Street (J/Z line) and Wall Street (4/5 line) subway station improvements.
[2] Ibid.
[3] The anticipated construction period for the With-Action building would be approximately 37 months, which is the same as construction period for the as-of-right building. Upon approval of the Proposed Action, and prior to the commencement of construction, the internal design of the as-of-right building would be reconfigured to utilize the 3.00 FAR bonus. The improvements to the subway stations facilitated by the Proposed Action would not exceed a construction period of 24 months.

ATTACHMENT A: PROJECT DESCRIPTION

INTRODUCTION

Madison 45 Broad Development LLC (the "Applicant") is requesting approval of a special permit from the City Planning Commission (CPC), pursuant to New York City Zoning Resolution (ZR) §91-251 (Special permit for subway station improvements) of the Special Lower Manhattan (LM) District, Article IX, Chapter 1, for a Floor Area Ratio (FAR) bonus of up to 3.00 to facilitate development of a commercial/residential building in connection with subway station improvements at the Broad Street (Nassau Street J/Z line) and Wall Street (Lexington Avenue 4/5 line) subway stations, which are connected via an underground passageway (ZR §74-634: Subway station improvements in Downtown Brooklyn and in Commercial Districts of 10 FAR and above in Manhattan) (the "Proposed Action").[4, 5]

The existing C5-5 zoning district on the Project Site (Block 25, Tax Lots 7 and 10) permits development at a maximum FAR of 15.00 for commercial and community facility uses, and residential use is permitted at a maximum FAR of 12.00 with the provision of recreation space.[6] Approval of the special permit for a floor area bonus of up to an additional 3.00 FAR on the Project Site would facilitate a proposed 14.05 FAR mixed-use building on the Development Site (Block 25, Lot 7), which would consist of residential use at an FAR of 11.54 FAR and commercial use at an FAR of 2.51 (the "Proposed Project"). The existing community facility use (a school building) built at an FAR of 3.95 on Lot 10 would remain as is. The total development on the Project Site would include approximately 572,103 gross square feet (gsf) of commercial, residential, and community facility space built at a total FAR of 17.99. As noted above, the existing C5-5 zoning district permits residential use at a maximum of 12.00; therefore, the Proposed Project's 11.54 residential FAR would be permitted as-of-right. The floor area bonus (3.00 FAR) on the Project Site, in exchange for subway station improvements, would increase the total floor area permitted on the Project Site, but would not increase the permitted as-of-right residential floor area.[7]

The Proposed Action would facilitate construction of a 1,115-foot tall (80 floors), approximately 478,209 gross-square-foot (gsf), commercial/residential building at 45 Broad Street (Block 25, Lot 7) in the Financial District of the Borough of Manhattan, Community District 1 (Figures 1 and 2). The proposed mixed-use building would include (i) approximately 62,006 gsf of commercial office space on floors 1 through 10; (ii) approximately 407,477 gsf of residential space on floor 1 (a residential lobby) and floors 11 through 80 (Figures 3); and (iii) approximately 8,726 gsf of outdoor

[4] **ZR §91-251** (Special permit for subway station improvements) states that within the Special Lower Manhattan District, CPC may grant, by special permit, an FAR bonus for zoning lots that provide subway station improvements, pursuant to the provisions of ZR §74-634 (referenced below).
[5] **ZR §74-634** (Subway station improvements in Downtown Brooklyn and in Commercial Districts of 10 FAR and above in Manhattan) states that CPC may grant, by special permit, an FAR bonus not to exceed 20 percent of the maximum FAR permitted by the underlying zoning district for developments located on zoning lots where major improvements to adjacent subway stations are provided in accordance with the provisions of this Section.
[6] Commercial and/or community facility floor area can be increased by 20 percent with the provision of a public plaza.
[7] C5-5 zoning district permits development at a maximum FAR of 15.00, therefore, pursuant to ZR §74-634, the FAR bonus would be limited to a maximum of 3.00 (20 percent). For the purpose of constructing a conservative analysis, the Proposed Project in the With-Action Condition utilizes the maximum permitted FAR bonus of 3.00.

space on floors 12, 33, and 53.[8] The existing 93,894-gsf community facility building on Lot 10 would remain as is.

The proposed subway station improvements would consist of (i) the installation of two Americans with Disabilities Act (ADA) compliant elevators at the Broad Street Station of the Nassau Street (J/Z) subway line that would provide access from Broad Street to the southbound and northbound subway platforms, and (ii) improvements to the ingress and egress at two control areas at the connecting Wall Street Station of the Lexington Avenue 4/5 subway line (Figures 4 through 6).

DIRECTLY AFFECTED AREA

For purposes of this environmental review, the "Directly Affected Area" comprises three sub-areas (Figure 2): "Project Site," "Development Site," and "Subway Stations." These sub-areas are defined as follows:

Project Site

The approximately 23,797-square-foot (sf) Project Site comprises a single zoning lot located at 45 Broad Street in the Financial District of Lower Manhattan. As shown in Figure 7, the Project Site comprises two tax lots on Block 25: Tax Lot 7 (12,602 sf) and Tax Lot 10 (11,195 sf). In 2007, Tax Lots 7 and 10 were merged to form a single zoning lot and Tax Lot 10's excess development rights were transferred to Tax Lot 7.[9,10] Tax Lot 7 is currently vacant and Tax Lot 10 is currently occupied by the 9-story, approximately 93,894-gsf Leman Manhattan Preparatory School building, which is listed on the State and National Register of Historic Places (S/NR).

The Project Site is bounded by a 21-story office building (Broad Exchange Building) to the north; a 20-story office building and a 44-story commercial/residential building to the east (fronting William Street); a 31-story office building the south; and Broad Street to the west. The streets bounding Block 25 include Broad Street to the west; Exchange Place to the north; William Street to the east; and Beaver Street to the south. These streets are part of the Street Plan of New Amsterdam and Colonial New York, which is a New York City Landmark (NYCL) designated by the Landmarks Preservation Commission (LPC). Broad Street is a two-way street that runs north-south between Wall and South streets and is entirely pedestrianized between Pine and Beaver Streets.

Development Site

The Development Site (Tax Lot 7) is currently vacant and was formerly occupied by an 8-story, approximately 70,000-sf office building (Wells Fargo) that was demolished in 2007. The Development Site is zoned C5-5 and is in the Special Lower Manhattan District (LM) and the Historic and Commercial Core Subdistrict. The C5-5 zoning district permits development at a maximum FAR of 15.00 for commercial and community facility uses. Residential uses are limited to

[8]In the With-Action Condition, the residential gross square footage includes approximately 56,447 gsf of mechanical space on floors 2, 11, 11M, 34, 34M, 52, and 77 through 80.
[9]Declaration of Zoning Lot Restrictions dated February 26, 2007 (CRFN 2007000122083).
[10]Zoning Lot Development and Easement Agreement (ZLDEA), dated January 26, 2007 (CRFN 2007000122089). According to the ZLDEA, Lot 10's Utilized Development Rights, reflecting the development rights used by the building existing on lot 10 total 93,894 sf, and the transferred development rights total 75,156 sf.

a maximum FAR of 10.00, which may be increased to 12.00 in the Special Lower Manhattan District as-of-right by providing recreation space (ZR § Section 91-23). The C5-5 zoning district is a non-contextual district in which a building occupied by commercial, residential, or community facility uses may be configured as a tower.[11]

Subway Stations

The Broad Street Station of the Nassau Street J/Z subway line is at the intersection of Broad Street and Exchange Place, adjacent to the Development Site. As shown in Figure 5, the Broad Street Station entrances for the J/Z subway line are on Broad Street at the intersection of Exchange Place. The proposed subway station elevators would be constructed within the sidewalk and road rights-of-way on the west and east sides of Broad Street. One elevator is proposed to be located on the southwest corner of Broad Street and Exchange Place and the other elevator is proposed to be located at the northeast corner. The proposed elevators would not be physically connected to the proposed development project at 45 Broad Street.

The Wall Street Station of the Lexington Avenue 4/5 subway line is on Broadway between Wall Street and Rector Street. The proposed improvements to the ingress and egress control areas would be implemented at the station entrances (Figures 4 through 6).

DESCRIPTION OF THE PROPOSED ACTION

The Proposed Action is the approval of a special permit pursuant to ZR §91-25 for a floor area bonus in exchange for subway improvements (ZR §74-634). The total additional floor area permitted on the zoning lot would be governed by ZR §91-22 (Floor Area Increase Regulations) and would be limited to a maximum FAR bonus of 3.00. The maximum FAR permitted under the existing C5-5 zoning district is 15.00 for commercial and community facility uses that can be increased by 20 percent with the provision of a public plaza. Residential uses are permitted up to an FAR of 12.00 with the provision of recreation space.

Approval of the special permit would provide a bonus of up to 3.00 FAR and thereby permit development at a maximum FAR of 18.00 on the Project Site. With the existing 3.95 FAR community facility use (school building) on Lot 10, the total FAR available for the proposed building would be limited to 14.05; residential FAR would remain limited to 12.00, which is permitted as-of-right in the existing C5-5 zoning district.

PROPOSED PROJECT

Development Project

The requested special permit would facilitate construction of a 1,115-foot (80-floor), approximately 478,209-gsf, commercial/residential building (14.05 FAR) on the Development Site (the "Development Project"). The proposed mixed-use building would include (i) approximately 62,006 gsf of commercial space on the floors 1 through 10 (2.51 FAR), (ii) approximately 407,477 gsf of residential space on floor 1 (a residential lobby) and floors 11 through 80 (11.70 FAR), and (iii)

[11] A tower is a portion of a building that penetrates the sky exposure plane and is allowed only in specified high-density areas of the city. A tower may be occupied by residential, commercial or community facility uses.

approximately 8,726 gsf of outdoor space on floors 12, 33, and 53.[12] The existing 93,894-gsf community facility building built at an FAR of 3.95 on Lot 10 would remain as is.

Subway Station Improvements

The Proposed Project also includes subway station improvements to the Broad Street J/Z subway station and the connecting Wall Street Station of the Lexington Avenue 4/5 line ("Subway Station Improvements").

Broad Street Station (Nassau Street J/Z subway line)

The proposed Subway Station Improvements would consist of the installation of two elevators at the Broad Street Station (J/Z line) that would provide access from Broad Street to the southbound and northbound subway platforms. As shown in Figure 5, one elevator is proposed to be located on the southwest corner of Broad Street and Exchange Place, and the other elevator is proposed to be located at the northeast corner. The proposed elevators would conform to ADA accessibility guidelines as set forth in ANSI A117.1, Section 4.10 (Elevators) and would be constructed pursuant to agreements with the New York City Transit Authority (NYCTA). The ADA accessibility guidelines for elevators provide specific requirements for the design and operation of elevators that would ensure that the proposed elevators at the Broad Street Station would be accessible to individuals with disabilities. The LPC has approved sidewalk modifications at the intersection of the two landmarked streets (Broad Street and Exchange Place) needed to accommodate the two proposed ADA elevators.[13] The proposed modifications include (i) a curb extension at the northeast and southwest corners, and (ii) cutting back the curb line by 2 feet, 6 inches at the southeast corner, which would ensure that Broad Street would remain 24 feet wide.[14] The proposed elevators would not be physically connected to the proposed 80-floor building.

Wall Street Station (Lexington Avenue 4/5 subway line)

The proposed Subway Station Improvements would also include improvements to the Wall Street Station (4/5 line) that is connected to the Broad Street Station. NYCTA has identified the need to improve ingress and egress equipment at two control areas (R204B and R204A) at the connecting Wall Street Station of the Lexington Avenue 4/5 line (Figure 6). These control areas have seven High Exit and Entrance Turnstiles (HEETs) that severely restrict passenger movement, each allowing for a maximum of 17 persons per minute (ppm) to enter and 36 ppm to exit. The control area R204B has 3 HEETs, accommodating 51 ppm entering and 108 ppm exiting the control area; and control area R204A has 4 HEETs, accommodating 68 ppm entering and 144 ppm exiting the control area. In order to increase both ingress and egress in normal station functioning and emergency egress, the proposed Subway Station Improvements also include replacement of each HEET with one typical Automatic Fare Control (AFC) turnstile for a total of seven new AFC units. Each AFC unit would increase passenger movement to 27 ppm to enter and 43 ppm to exit, greatly reducing the time it takes for passengers to leave the station after discharging from the train. The

[12] Of the total residential gross floor area, approximately 56,447 gsf would be dedicated to mechanical space on floors 2, 11, 11M, 34, 34M, 52, and floors 77 through 80.
[13] New York City Landmarks Preservation Commission, *Binding Report*, Docket #: 192370, 8/30/2016 ("Attachment A")
[14] http://newyorkyimby.com/2016/07/45-broad-street-supertall-coming-with-new-subway-elevators-financial-district.html (Accessed December 13, 2016).

installation of AFC units would increase the ingress and egress capacity at control area R204B to 81 ppm entering (+30 ppm over existing) and 129 ppm exiting (+21 ppm over existing); and at control area R204A to 108 ppm entering (+40 ppm over existing) and 172 ppm exiting (+28 ppm over existing). These proposed improvements would reduce the time it takes for passengers to leave the Wall Street Station after discharging from the train.

In addition, NYCT has requested that, as part of this work, the control area railings be removed and replaced with ones that are more consistent with the main control areas that reflect the historic nature of the station (Appendix B, "Proposed Subway Improvements").

SURROUNDING AREA

As shown in Figure 8, land uses within 400 feet of the Directly Affected Area (the "Study Area") include primarily commercial and commercial/residential buildings, including high-rise office buildings with ground floor retail space and high-rise residential towers with commercial and office space on lower floors. As shown in Figure 9, the entire Study Area is in a C5-5 zoning district and is in the Special LM District. The Study Area is also in the S/NR-listed Wall Street Historic District (WSHD), which is not an LPC-designated historic district. There are 79 LPC and S/NR designated historic landmarks in the Study Area. Included among these historic resources is the LPC-designated Street Plan of New Amsterdam and Colonial New York that comprises all of the streets adjacent to Block 25; the 21-story Broad Exchange Building at 25 Broad Street; the American Bank Note Company Office Building at 70 Broad Street; the New York Stock Exchange at 8-18 Broad Street; the J.P. Morgan & Co. Building at 23 Wall Street; the National City Bank Building at 55 Wall Street; the City Bank-Farmers Trust Company Building at 20 Exchange Place; and Delmonico's Building at 56 Beaver Street. The location of these historic resources is shown in Figure 14 and described in Attachment F, "Historic and Cultural Resources."

The Study Area is well served by public transit, including subway lines J/Z at Broad Street, 2/3 at Wall Street, and 4/5 at Wall Street and Broadway; and 17 MTA bus lines. The subway station entrance for the Broad Street J/Z Subway Line is on Broad Street at the intersection of Exchange Place, adjacent to the Project Site. The Project Site is also located within walking distance of the 1 and R subway lines at South Ferry and Whitehall Street, respectively, as well as the Staten Island Ferry. The public transit network is shown in Figure 15 in Attachment H, "Transportation."

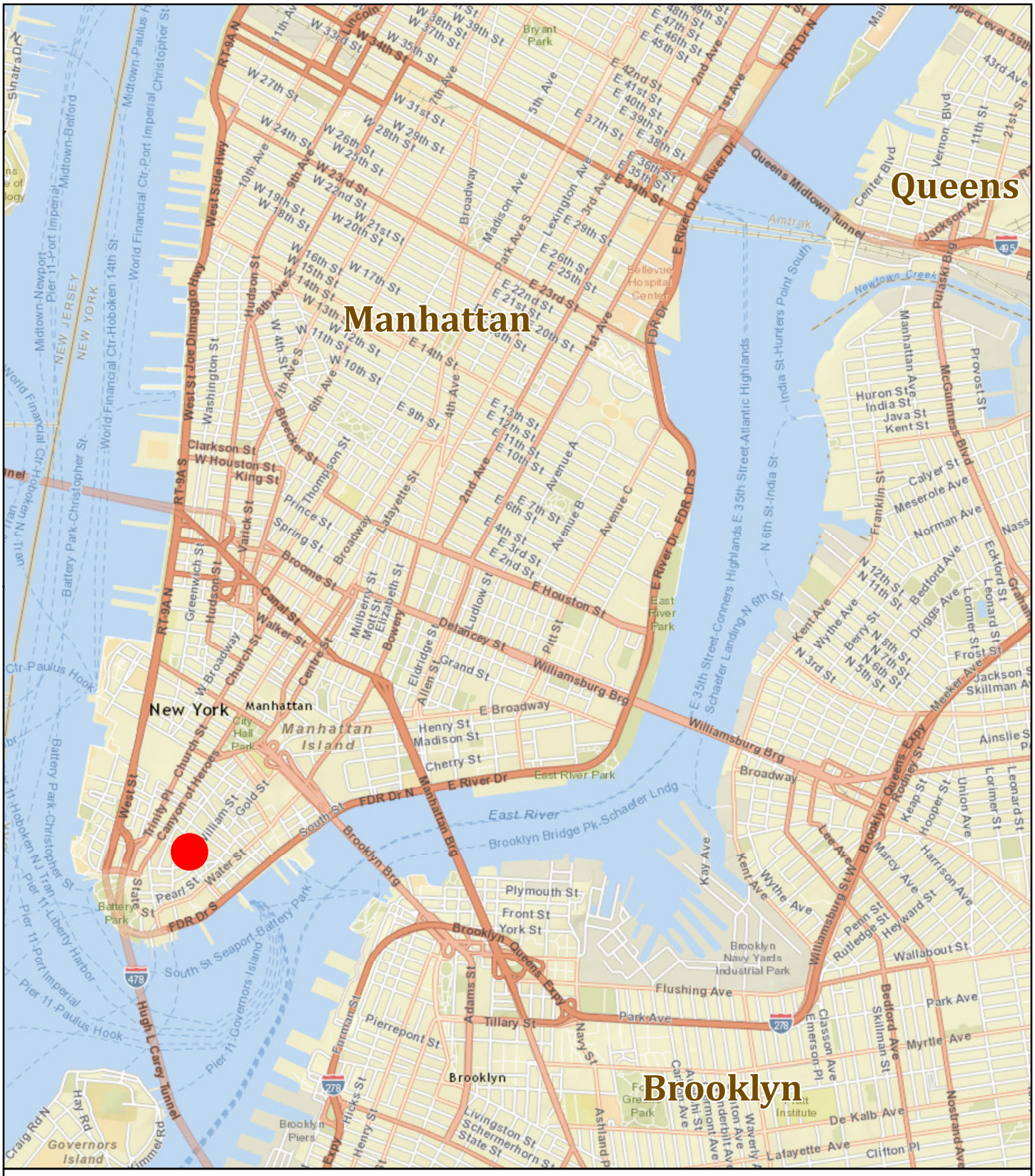


FIGURE 1: REGIONAL LOCATION MAP
45 BROAD STREET DEVELOPMENT

FINANCIAL DISTRICT
MANHATTAN, NY

LANGAN

Map Reference: ESRI Basemap

FIGURE 2: PROJECT LOCATION MAP
45 BROAD STREET DEVELOPMENT

0 100 200 400 Feet

N

Directly Affected Area

- Project Site
- Development Site
- Subway Stations
- Study Area (400-foot radius)

FINANCIAL DISTRICT
MANHATTAN, NY

LANGAN

Map Reference: ESRI Basemap; NYC Department of City Planning MapPLUTO

For Illustrative Purposes Only

FIGURE 3: DEVELOPMENT PROJECT SITE ELEVATION
45 BROAD STREET DEVELOPMENT

FINANCIAL DISTRICT
MANHATTAN, NY

LANGAN

Source: CetraRuddy Architecture DPC

For Illustrative Purposes Only

FIGURE 4: LOCATION OF SUBWAY STATIONS
45 BROAD STREET DEVELOPMENT

Project Site
Development Site
Pedestrian-Only Zones
Subway Station
Subway Station Platform
Subway Station Entrance

FINANCIAL DISTRICT
MANHATTAN, NY

LANGAN

Map Reference: Metropolitan Transportation Authority (MTA)

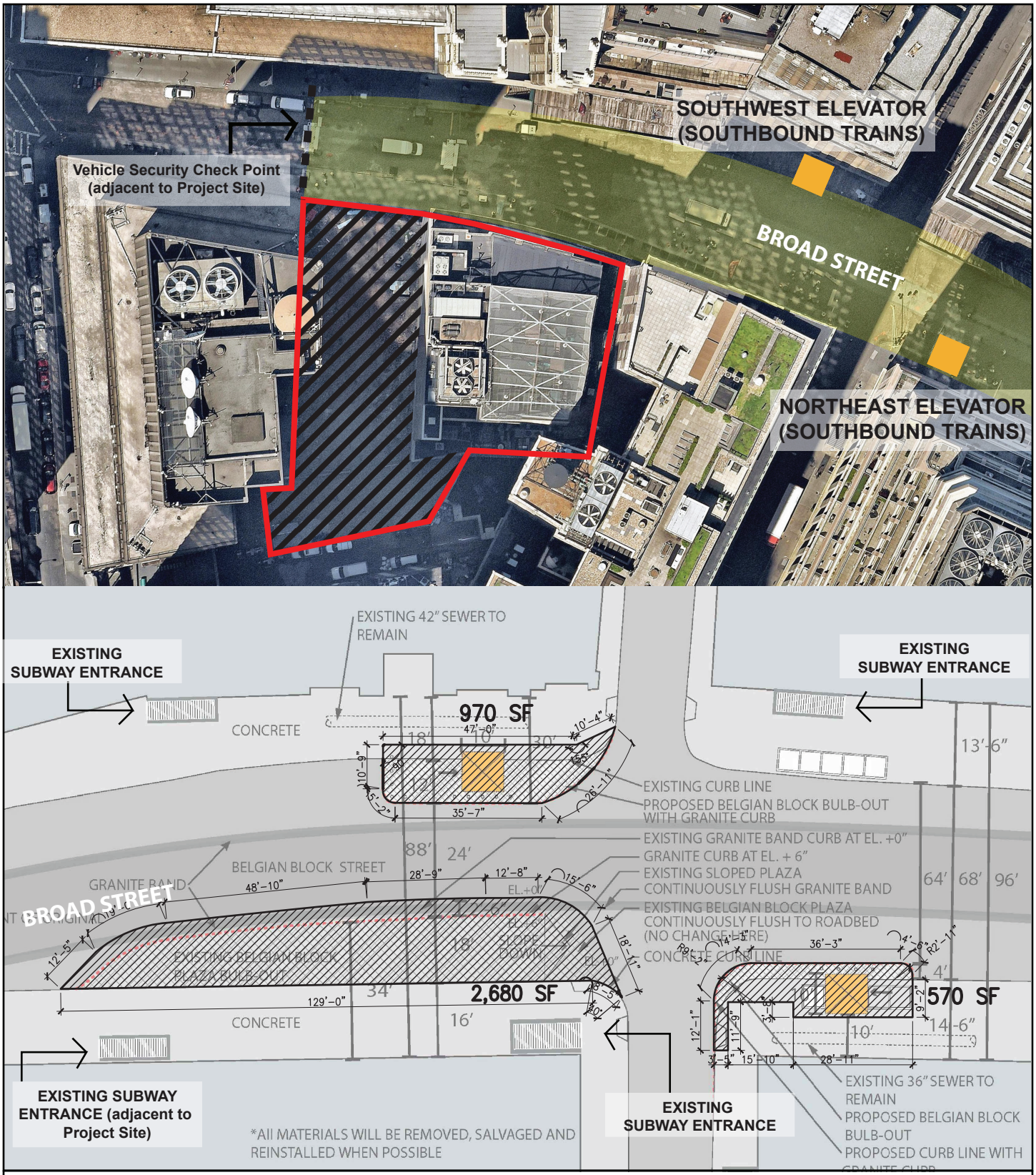


FIGURE 5: PROPOSED ADA COMPLIANT ELEVATORS

45 BROAD STREET DEVELOPMENT

For Illustrative Purposes Only

N

Project Site

Development Site

Proposed Elevators

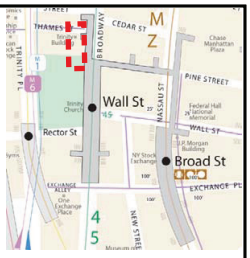
Pedestrian-Only Protected Zone

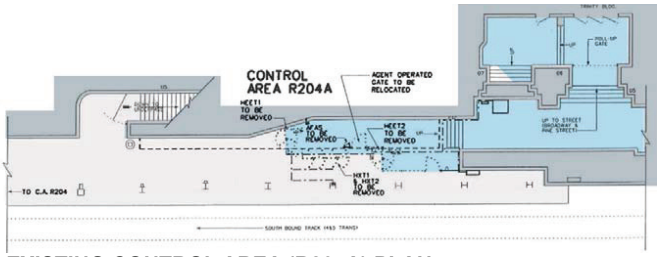
FINANCIAL DISTRICT
MANHATTAN, NY

LANGAN

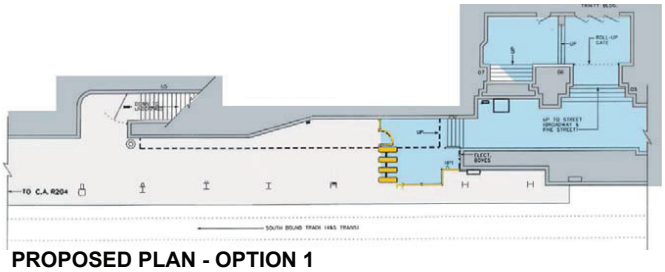
Map Reference: Nearmap Aerial Image; Landmarks Preservation Commission (LPC) Presentation (July 26, 2016)

EXISTING AND PROPOSED CONTROL AREA R204A FARE ARRAY REALIGNMENT

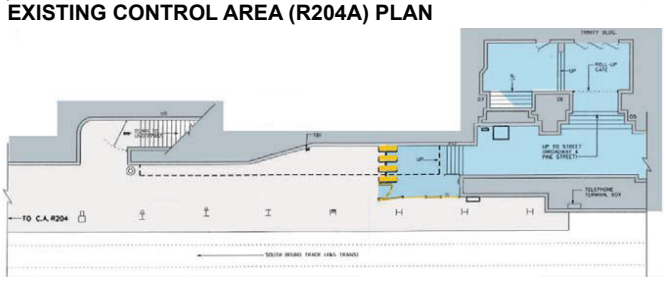




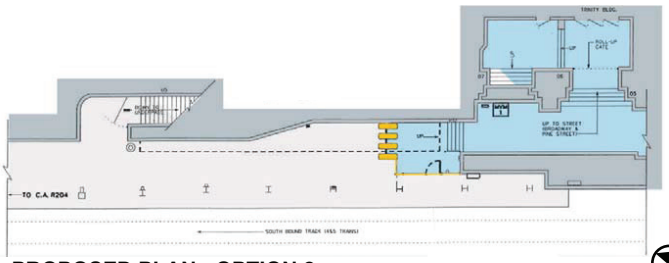
EXISTING CONTROL AREA (R204A) PLAN



PROPOSED PLAN - OPTION 1

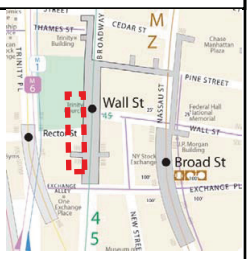


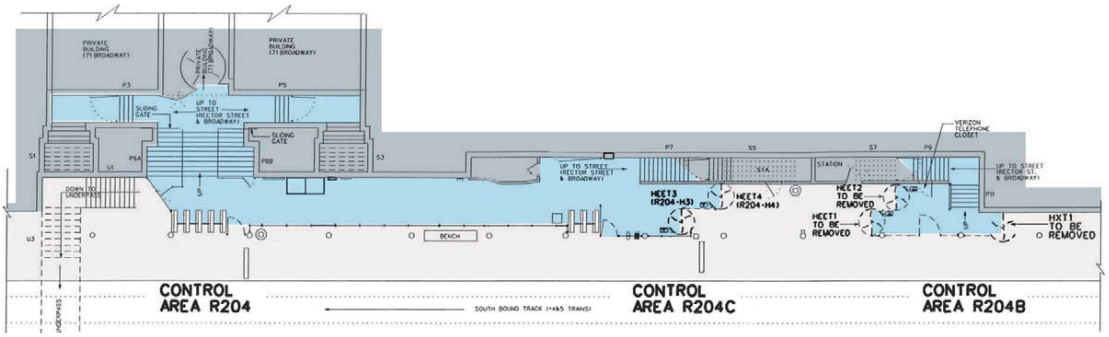
PROPOSED PLAN - OPTION 2



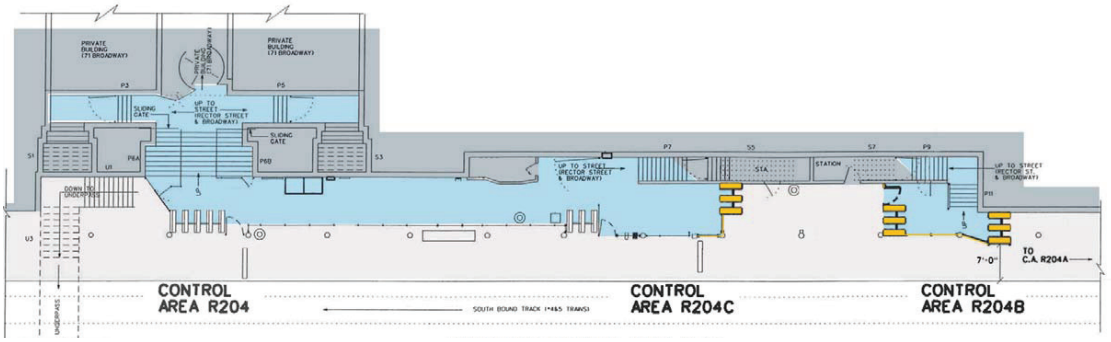
PROPOSED PLAN - OPTION 2

EXISTING AND PROPOSED CONTROL AREA R204B FARE ARRAY REALIGNMENT





EXISTING CONTROL AREA (R204B) PLAN



PROPOSED PLAN

For Illustrative Purposes Only

FIGURE 6: PROPOSED WALL STREET STATION SUBWAY IMPROVEMENTS

45 BROAD STREET DEVELOPMENT

Existing High Exit and Entrance Turnstiles (HEETs)

Proposed Automatic Fare Control (AFC) Turnstile

Location of R204A and R204B Control Areas

FINANCIAL DISTRICT
MANHATTAN, NY

LANGAN

Map Reference: Urbahn Architects

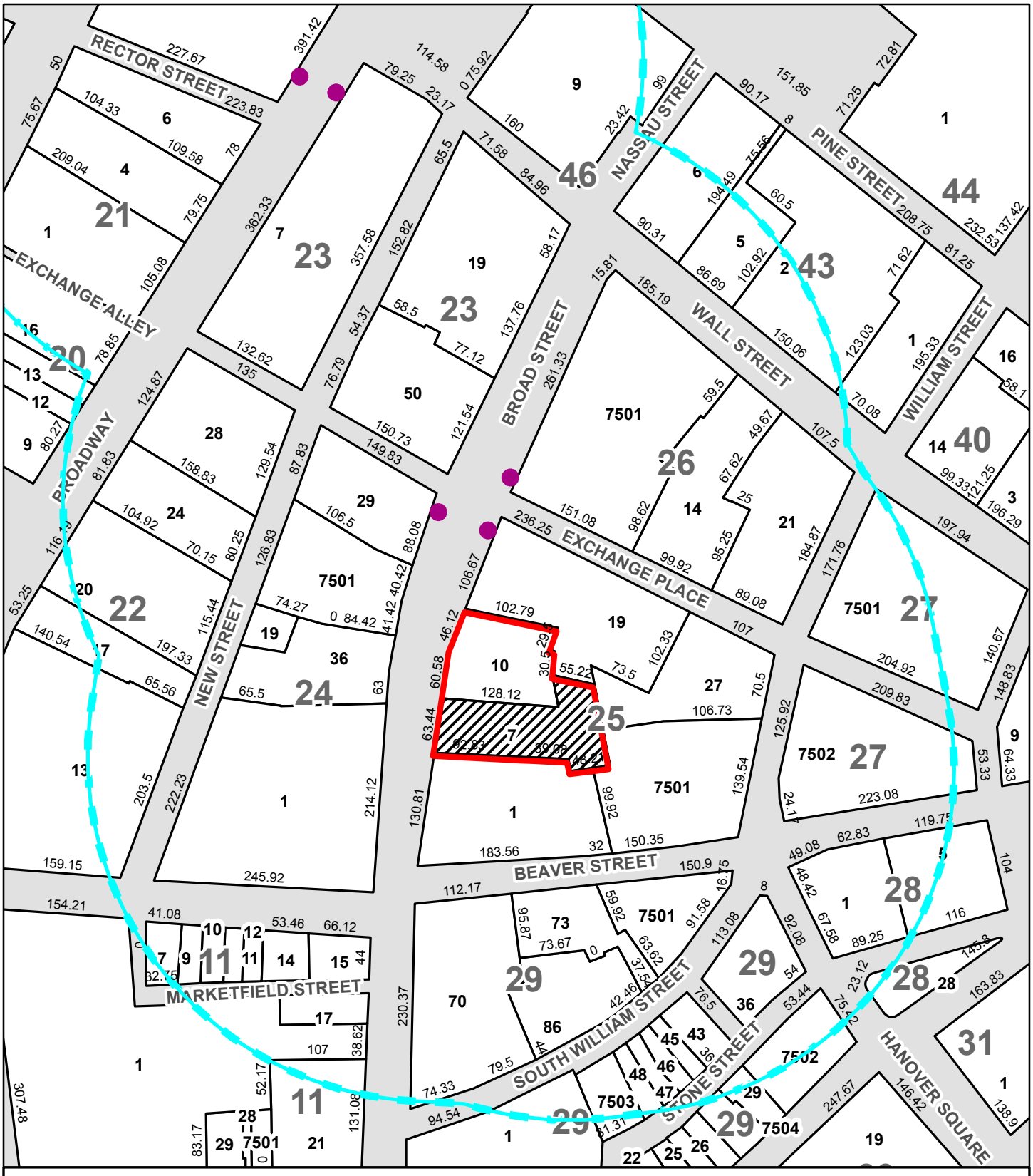


FIGURE 7: TAX MAP
45 BROAD STREET DEVELOPMENT

FINANCIAL DISTRICT
MANHATTAN, NY

LANGAN

Map Reference: NYC Department of City Planning MapPLUTO

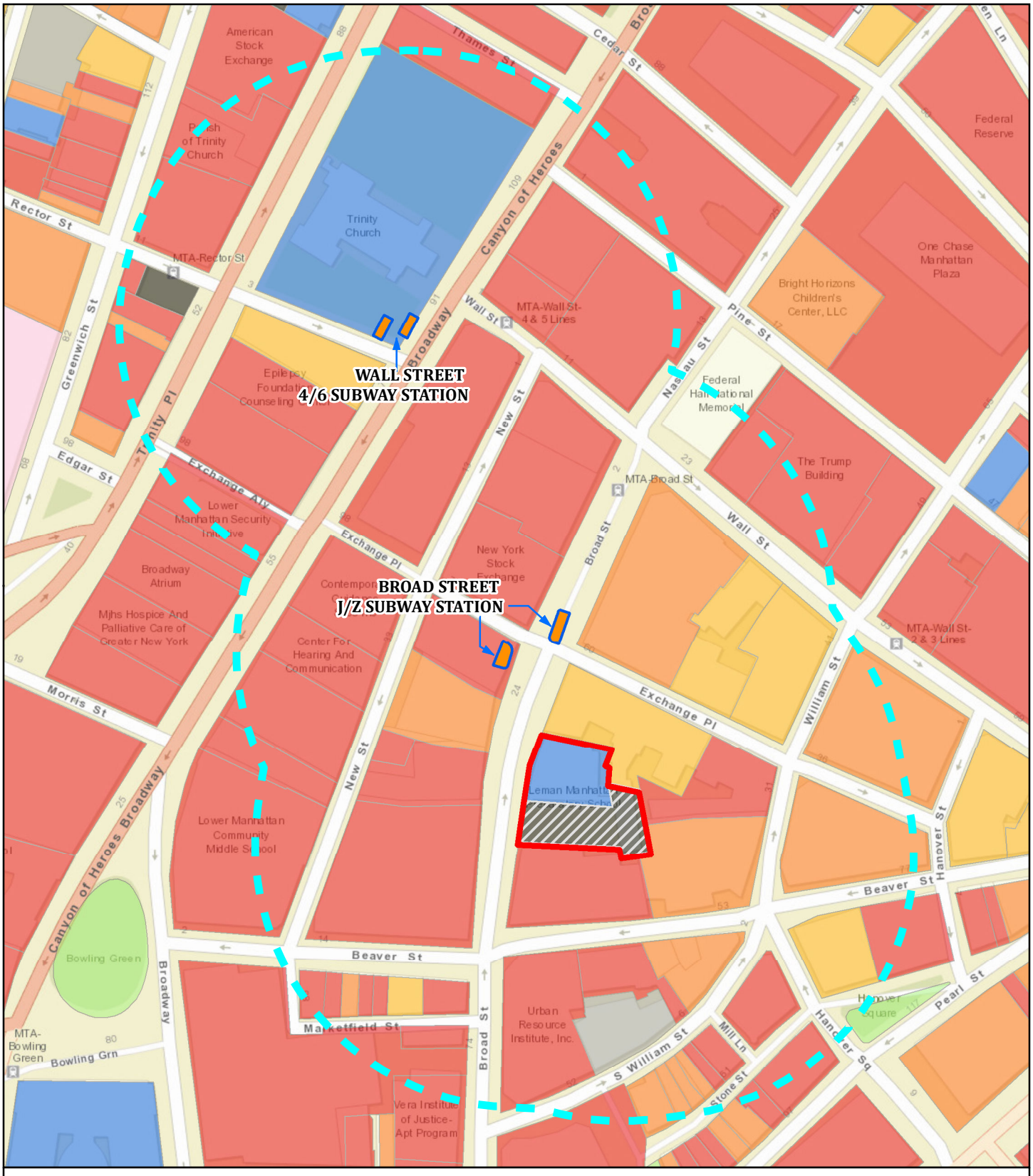


FIGURE 8: LAND USE MAP
45 BROAD STREET DEVELOPMENT
FINANCIAL DISTRICT
MANHATTAN, NY

Study Area (400-foot radius)

0 100 200 400 Feet

N

Directly Affected Area
- Project Site
- Development Site
- Subway Stations

Land Use
- One & Two Family Residences
- Multifamily Walkup Residences
- Multifamily Elevator Residences
- Mixed Residential/Commercial
- Commercial/Office
- Industrial/Manufacturing
- Transportation/Utility
- Public Facilities/Institutions
- Open Space
- Parking
- Vacant Land

LANGAN

Map Reference: ESRI Basemap; NYC Department of City Planning MapPLUTO

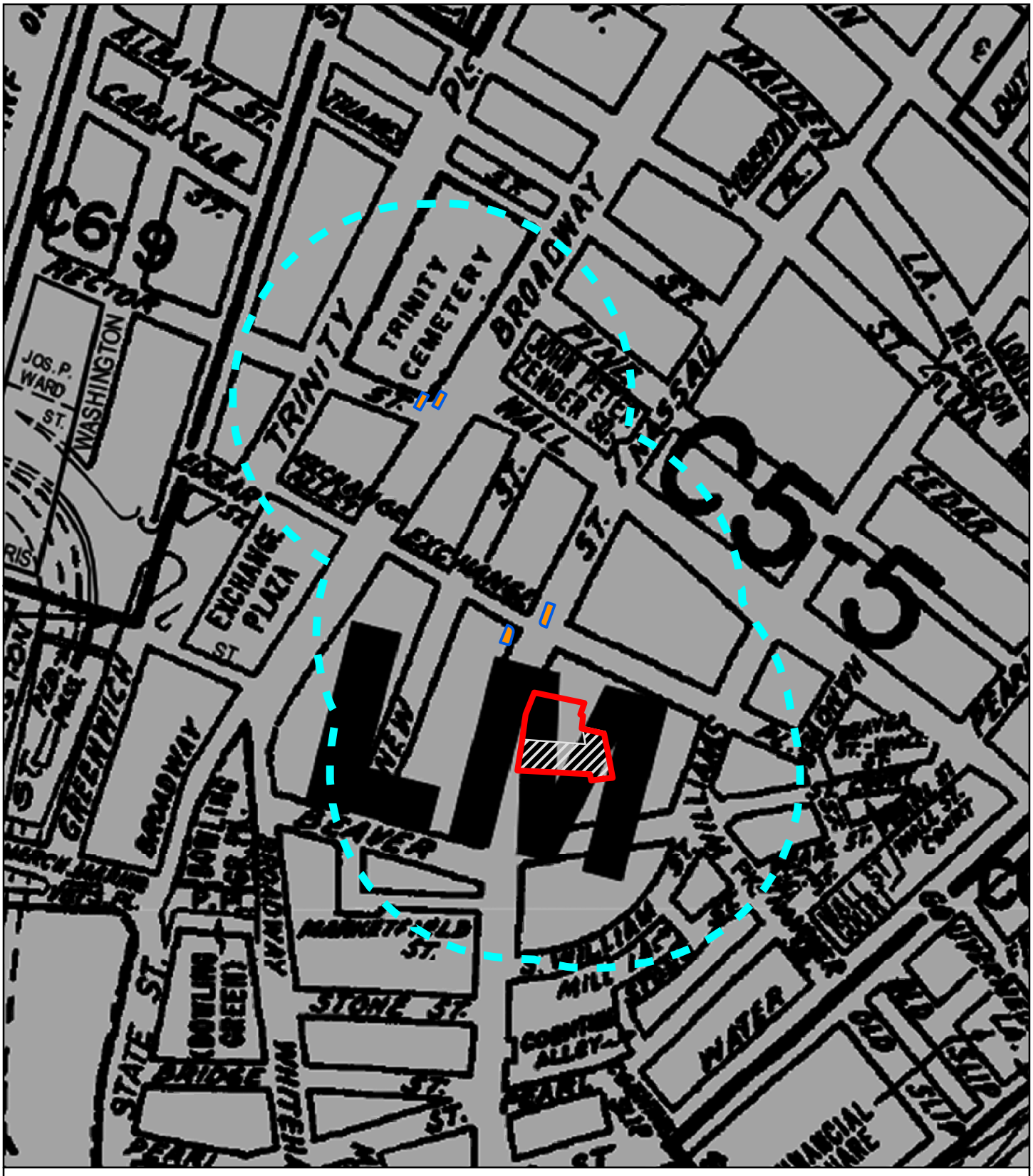


FIGURE 9: EXISTING ZONING MAP
45 BROAD STREET DEVELOPMENT
FINANCIAL DISTRICT
MANHATTAN, NY

Map Reference: NYC Department of City Planning Zoning Map No. 12b

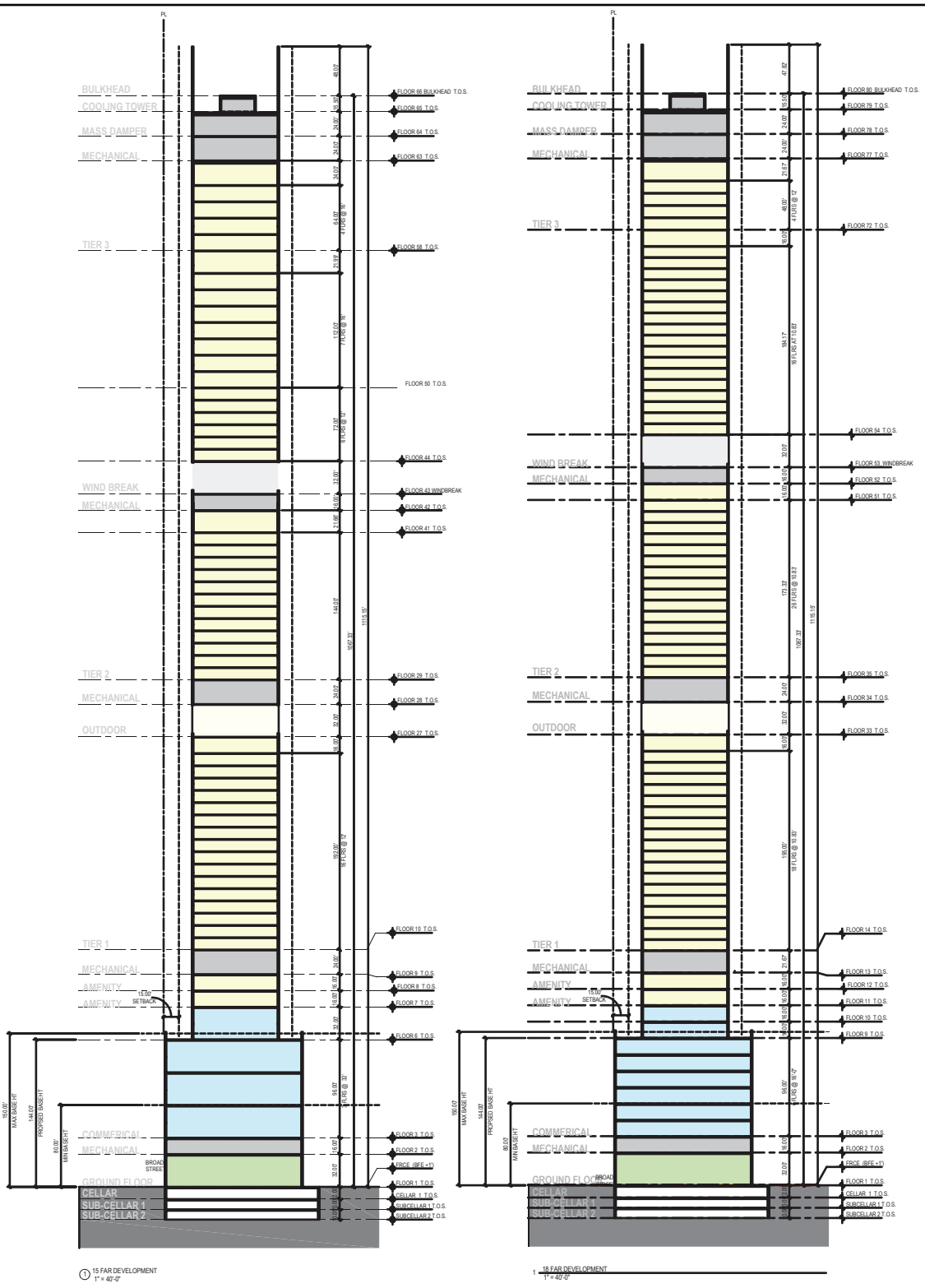


FIGURE 10: NO ACTION AND WITH-ACTION ELEVATIONS

For Illustrative Purposes Only

45 BROAD STREET DEVELOPMENT

FINANCIAL DISTRICT
MANHATTAN, NY

LANGAN

Source: CetraRuddy Architecture DPC

DESCRIPTION OF EXISTING AND PROPOSED CONDITIONS

The information requested in this table applies to the directly affected area. The directly affected area consists of the project site and the area subject to any change in regulatory control. The increment is the difference between the No-Action and the With-Action conditions.

	EXISTING CONDITION	NO-ACTION CONDITION	WITH-ACTION CONDITION	INCREMENT
LAND USE				
Residential	☐ YES ☒ NO	☒ YES ☐ NO	☒ YES ☐ NO	
If "yes," specify the following:				
Describe type of residential structures		Apartments	Apartments	
No. of dwelling units		172	206	34
No. of low- to moderate-income units		0	0	0
Gross floor area (sq. ft.)		341,743 gsf	407,477 gsf	65,734 gsf
Commercial	☐ YES ☒ NO	☒ YES ☐ NO	☒ YES ☐ NO	
If "yes," specify the following:				
Describe type (retail, office, other)		Retail and Offices	Retail and Offices	
Gross floor area (sq. ft.)		30,488 gsf	62,006 gsf	31,518 gsf
Manufacturing/Industrial	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	
If "yes," specify the following:				
Type of use				
Gross floor area (sq. ft.)				
Open storage area (sq. ft.)				
If any unenclosed activities, specify:				
Community Facility	☒ YES ☐ NO	☒ YES ☐ NO	☒ YES ☐ NO	
If "yes," specify the following:				
Type	School	School	School	
Gross floor area (sq. ft.)	93,894 gsf	93,894 gsf	93,894 gsf	0 gsf
Vacant Land	☒ YES ☐ NO	☐ YES ☒ NO	☐ YES ☒ NO	
If "yes," describe:	Lot 7 is vacant			
Publicly Accessible Open Space	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	
If "yes," specify type (mapped City, State, or Federal parkland, wetland—mapped or otherwise known, other):				
Other Land Uses	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	
If "yes," describe:				
PARKING				
Garages	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	
If "yes," specify the following:				
No. of public spaces				
No. of accessory spaces				
Operating hours				
Attended or non-attended				
Lots	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	
If "yes," specify the following:				
No. of public spaces				
No. of accessory spaces				
Other (includes street parking)	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	
If "yes," describe:				

	EXISTING CONDITION	NO-ACTION CONDITION	WITH-ACTION CONDITION	INCREMENT
POPULATION				
Residents	☐ YES ☒ NO	☒ YES ☐ NO	☒ YES ☐ NO	
If "yes," specify number:	0	366	439	72
Briefly explain how the number of residents was calculated:	Average household size of a renter-occupied unit for Manhattan Census Tract 9 is 2.13 (US Census Bureau, American Community Survey; Selected Housing Characteristics 2010-2014 American Community Survey 5-Year Estimates)			
Businesses	☐ YES ☒ NO	☒ YES ☐ NO	☒ YES ☐ NO	
If "yes," specify the following:				
No. and type	None	Retail and School	Retail and School	
No. and type of workers by business	0	405	499	95
No. and type of non-residents who are not workers				
Briefly explain how the number of businesses was calculated:	The number of employees is based on 1 employee per 300 gsf of community facility (school) space, and 3 employees per 1,000 gsf of retail space.			
Other (students, visitors, concert-goers, *etc.*)	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	
If any, specify type and number:				
Briefly explain how the number was calculated:				
ZONING				
Zoning classification	C5-5	C5-5	C5-5 with FAR Bonus	C5-5
Maximum amount of floor area that can be developed	356,955 zsf	356,955 zsf	428,346 zsf	71,391zsf
Predominant land use and zoning classifications within land use study area(s) or a 400 ft. radius of proposed project	The 400-foot Study Area includes commercial and commercial/residential buildings, which include high-rise office buildings with ground floor retail uses and high-rise residential towers with commercial and office uses on lower floors. The Study Area also includes numerous privately owned public spaces and historic landmarks. The entire Study Area is located in a C5-5 zoning district and the Special Lower Manhattan District (LM).	The 400-foot Study Area includes commercial and commercial/residential buildings, which include high-rise office buildings with ground floor retail uses and high-rise residential towers with commercial and office uses on lower floors. The Study Area also includes numerous privately owned public spaces and historic landmarks. The entire Study Area is located in a C5-5 zoning district and the Special Lower Manhattan District (LM).	The 400-foot Study Area includes commercial and commercial/residential buildings, which include high-rise office buildings with ground floor retail uses and high-rise residential towers with commercial and office uses on lower floors. The Study Area also includes numerous privately owned public spaces and historic landmarks. The entire Study Area is located in a C5-5 zoning district and the Special Lower Manhattan District (LM).	

Attach any additional information that may be needed to describe the project.

If your project involves changes that affect one or more sites not associated with a specific development, it is generally appropriate to include total development projections in the above table and attach separate tables outlining the reasonable development scenarios for each site.

Part II: TECHNICAL ANALYSIS

INSTRUCTIONS: For each of the analysis categories listed in this section, assess the proposed project's impacts based on the thresholds and criteria presented in the CEQR Technical Manual. Check each box that applies.

- If the proposed project can be demonstrated not to meet or exceed the threshold, check the "no" box.
- If the proposed project will meet or exceed the threshold, or if this cannot be determined, check the "yes" box.
- For each "yes" response, provide additional analyses (and, if needed, attach supporting information) based on guidance in the CEQR Technical Manual to determine whether the potential for significant impacts exists. Please note that a "yes" answer does not mean that an EIS must be prepared—it means that more information may be required for the lead agency to make a determination of significance.
- The lead agency, upon reviewing Part II, may require an applicant to provide additional information to support the Full EAS Form. For example, if a question is answered "no," an agency may request a short explanation for this response.

	YES	NO
1. *LAND USE, ZONING, AND PUBLIC POLICY*: CEQR Technical Manual Chapter 4		
(a) Would the proposed project result in a change in land use different from surrounding land uses? *See Attachment C*	☐	☒
(b) Would the proposed project result in a change in zoning different from surrounding zoning?	☐	☒
(c) Is there the potential to affect an applicable public policy?	☐	☒
○ If "yes," to (a), (b), and/or (c), complete a preliminary assessment and attach.		
(d) Is the project a large, publicly sponsored project?	☐	☒
○ If "yes," complete a PlaNYC assessment and attach.		
(e) Is any part of the directly affected area within the City's Waterfront Revitalization Program boundaries? *See Appendix C for the Coastal Assessment Form (CAF).*	☒	☐
○ If "yes," complete the Consistency Assessment Form.		
2. *SOCIOECONOMIC CONDITIONS*: CEQR Technical Manual Chapter 5		
(a) Would the proposed project:		
○ Generate a net increase of more than 200 residential units *or* 200,000 square feet of commercial space?	☐	☒
▪ If "yes," answer *both* questions 2(b)(ii) and 2(b)(iv) below.		
○ Directly displace 500 or more residents?	☐	☒
▪ If "yes," answer questions 2(b)(i), 2(b)(ii), and 2(b)(iv) below.		
○ Directly displace more than 100 employees?	☐	☒
▪ If "yes," answer questions under 2(b)(iii) and 2(b)(iv) below.		
○ Affect conditions in a specific industry?	☐	☒
▪ If "yes," answer question 2(b)(v) below.		
(b) If "yes" to any of the above, attach supporting information to answer the relevant questions below. If "no" was checked for each category above, the remaining questions in this technical area do not need to be answered.		
i. Direct Residential Displacement		
○ If more than 500 residents would be displaced, would these residents represent more than 5% of the primary study area population?	☐	☐
○ If "yes," is the average income of the directly displaced population markedly lower than the average income of the rest of the study area population?	☐	☐
ii. Indirect Residential Displacement		
○ Would expected average incomes of the new population exceed the average incomes of study area populations?	☐	☐
○ If "yes:"		
▪ Would the population of the primary study area increase by more than 10 percent?	☐	☐
▪ Would the population of the primary study area increase by more than 5 percent in an area where there is the potential to accelerate trends toward increasing rents?	☐	☐
○ If "yes" to either of the preceding questions, would more than 5 percent of all housing units be renter-occupied and unprotected?	☐	☐
iii. Direct Business Displacement		
○ Do any of the displaced businesses provide goods or services that otherwise would not be found within the trade area, either under existing conditions or in the future with the proposed project?	☐	☐
○ Is any category of business to be displaced the subject of other regulations or publicly adopted plans to preserve, enhance, or otherwise protect it?	☐	☐
iv. Indirect Business Displacement		
○ Would the project potentially introduce trends that make it difficult for businesses to remain in the area?	☐	☐

	YES	NO
○ Would the project capture retail sales in a particular category of goods to the extent that the market for such goods would become saturated, potentially resulting in vacancies and disinvestment on neighborhood commercial streets?	☐	☐
v. Effects on Industry		
○ Would the project significantly affect business conditions in any industry or any category of businesses within or outside the study area?	☐	☐
○ Would the project indirectly substantially reduce employment or impair the economic viability in the industry or category of businesses?	☐	☐
3. *COMMUNITY FACILITIES*: CEQR Technical Manual Chapter 6		
(a) Direct Effects		
○ Would the project directly eliminate, displace, or alter public or publicly funded community facilities such as educational facilities, libraries, health care facilities, day care centers, police stations, or fire stations?	☐	☒
(b) Indirect Effects		
i. Child Care Centers		
○ Would the project result in 20 or more eligible children under age 6, based on the number of low or low/moderate income residential units? (See Table 6-1 in Chapter 6)	☐	☒
○ If "yes," would the project result in a collective utilization rate of the group child care/Head Start centers in the study area that is greater than 100 percent?	☐	☐
○ If "yes," would the project increase the collective utilization rate by 5 percent or more from the No-Action scenario?	☐	☐
ii. Libraries		
○ Would the project result in a 5 percent or more increase in the ratio of residential units to library branches? (See Table 6-1 in Chapter 6)	☐	☒
○ If "yes," would the project increase the study area population by 5 percent or more from the No-Action levels?	☐	☐
○ If "yes," would the additional population impair the delivery of library services in the study area?	☐	☐
iii. Public Schools		
○ Would the project result in 50 or more elementary or middle school students, or 150 or more high school students based on number of residential units? (See Table 6-1 in Chapter 6)	☐	☒
○ If "yes," would the project result in a collective utilization rate of the elementary and/or intermediate schools in the study area that is equal to or greater than 100 percent?	☐	☐
○ If "yes," would the project increase this collective utilization rate by 5 percent or more from the No-Action scenario?	☐	☐
iv. Health Care Facilities		
○ Would the project result in the introduction of a sizeable new neighborhood?	☐	☒
○ If "yes," would the project affect the operation of health care facilities in the area?	☐	☐
v. Fire and Police Protection		
○ Would the project result in the introduction of a sizeable new neighborhood?	☐	☒
○ If "yes," would the project affect the operation of fire or police protection in the area?	☐	☐
4. *OPEN SPACE*: CEQR Technical Manual Chapter 7		
(a) Would the project change or eliminate existing open space?	☐	☒
(b) Is the project located within an under-served area in the Bronx, Brooklyn, Manhattan, Queens, or Staten Island?	☐	☒
(c) If "yes," would the project generate more than 50 additional residents or 125 additional employees?	☐	☐
(d) Is the project located within a well-served area in the Bronx, Brooklyn, Manhattan, Queens, or Staten Island?	☐	☒
(e) If "yes," would the project generate more than 350 additional residents or 750 additional employees?	☐	☐
(f) If the project is located in an area that is neither under-served nor well-served, would it generate more than 200 additional residents or 500 additional employees?	☐	☒
(g) If "yes" to questions (c), (e), or (f) above, attach supporting information to answer the following:		
○ If in an under-served area, would the project result in a decrease in the open space ratio by more than 1 percent?	☐	☐
○ If in an area that is not under-served, would the project result in a decrease in the open space ratio by more than 5 percent? See Attachment D	☐	☒
○ If "yes," are there qualitative considerations, such as the quality of open space, that need to be considered? Please specify:	☐	☐
5. *SHADOWS*: CEQR Technical Manual Chapter 8		
(a) Would the proposed project result in a net height increase of any structure of 50 feet or more?	☒	☐
(b) Would the proposed project result in any increase in structure height and be located adjacent to or across the street from a sunlight-sensitive resource?	☒	☐

	YES	NO
(c) If "yes" to either of the above questions, attach supporting information explaining whether the project's shadow would reach any sunlight-sensitive resource at any time of the year. See Attachment E		
6. *HISTORIC AND CULTURAL RESOURCES*: CEQR Technical Manual Chapter 9		
(a) Does the proposed project site or an adjacent site contain any architectural and/or archaeological resource that is eligible for or has been designated (or is calendared for consideration) as a New York City Landmark, Interior Landmark or Scenic Landmark; that is listed or eligible for listing on the New York State or National Register of Historic Places; or that is within a designated or eligible New York City, New York State or National Register Historic District? (See the GIS System for Archaeology and National Register to confirm)	☒	☐
(b) Would the proposed project involve construction resulting in in-ground disturbance to an area not previously excavated?	☐	☒
(c) If "yes" to either of the above, list any identified architectural and/or archaeological resources and attach supporting information on whether the proposed project would potentially affect any architectural or archeological resources. See Attachment E.		
7. *URBAN DESIGN AND VISUAL RESOURCES*: CEQR Technical Manual Chapter 10		
(a) Would the proposed project introduce a new building, a new building height, or result in any substantial physical alteration to the streetscape or public space in the vicinity of the proposed project that is not currently allowed by existing zoning?	☐	☒
(b) Would the proposed project result in obstruction of publicly accessible views to visual resources not currently allowed by existing zoning?	☐	☒
(c) If "yes" to either of the above, please provide the information requested in Chapter 10.		
8. *NATURAL RESOURCES*: CEQR Technical Manual Chapter 11		
(a) Does the proposed project site or a site adjacent to the project contain natural resources as defined in Section 100 of Chapter 11?	☐	☒
○ If "yes," list the resources and attach supporting information on whether the project would affect any of these resources.		
(b) Is any part of the directly affected area within the Jamaica Bay Watershed?	☐	☒
○ If "yes," complete the Jamaica Bay Watershed Form and submit according to its instructions.		
9. *HAZARDOUS MATERIALS*: CEQR Technical Manual Chapter 12		
(a) Would the proposed project allow commercial or residential uses in an area that is currently, or was historically, a manufacturing area that involved hazardous materials?	☐	☒
(b) Does the proposed project site have existing institutional controls (*e.g.*, (E) designation or Restrictive Declaration) relating to hazardous materials that preclude the potential for significant adverse impacts?	☐	☒
(c) Would the project require soil disturbance in a manufacturing area or any development on or near a manufacturing area or existing/historic facilities listed in Appendix 1 (including nonconforming uses)?	☐	☒
(d) Would the project result in the development of a site where there is reason to suspect the presence of hazardous materials, contamination, illegal dumping or fill, or fill material of unknown origin?	☐	☒
(e) Would the project result in development on or near a site that has or had underground and/or aboveground storage tanks (*e.g.*, gas stations, oil storage facilities, heating oil storage)?	☐	☒
(f) Would the project result in renovation of interior existing space on a site with the potential for compromised air quality; vapor intrusion from either on-site or off-site sources; or the presence of asbestos, PCBs, mercury or lead-based paint?	☐	☒
(g) Would the project result in development on or near a site with potential hazardous materials issues such as government-listed voluntary cleanup/brownfield site, current or former power generation/transmission facilities, coal gasification or gas storage sites, railroad tracks or rights-of-way, or municipal incinerators?	☐	☒
(h) Has a Phase I Environmental Site Assessment been performed for the site?	☒	☐
○ If "yes," were Recognized Environmental Conditions (RECs) identified? Briefly identify:	☒	☐
(i) Based on the Phase I Assessment, is a Phase II Investigation needed? *See Attachment G and Appendix F*	☐	☒
10. *WATER AND SEWER INFRASTRUCTURE*: CEQR Technical Manual Chapter 13		
(a) Would the project result in water demand of more than one million gallons per day? 69,300.50 gallons per day	☐	☒
(b) If the proposed project located in a combined sewer area, would it result in at least 1,000 residential units or 250,000 square feet or more of commercial space in Manhattan, or at least 400 residential units or 150,000 square feet or more of commercial space in the Bronx, Brooklyn, Staten Island, or Queens?	☐	☒
(c) If the proposed project located in a separately sewered area, would it result in the same or greater development than that listed in Table 13-1 in Chapter 13?	☐	☐
(d) Would the project involve development on a site that is 5 acres or larger where the amount of impervious surface would increase?	☐	☒
(e) If the project is located within the Jamaica Bay Watershed or in certain specific drainage areas, including Bronx River, Coney Island Creek, Flushing Bay and Creek, Gowanus Canal, Hutchinson River, Newtown Creek, or Westchester Creek, would it involve development on a site that is 1 acre or larger where the amount of impervious surface would increase?	☐	☐
(f) Would the proposed project be located in an area that is partially sewered or currently unsewered?	☐	☒

	YES	NO
(g) Is the project proposing an industrial facility or activity that would contribute industrial discharges to a Wastewater Treatment Plant and/or contribute contaminated stormwater to a separate storm sewer system?	☐	☒
(h) Would the project involve construction of a new stormwater outfall that requires federal and/or state permits?	☐	☒
(i) If "yes" to any of the above, conduct the appropriate preliminary analyses and attach supporting documentation.		
11. *SOLID WASTE AND SANITATION SERVICES*: CEQR Technical Manual Chapter 14		
(a) Using Table 14-1 in Chapter 14, the project's projected operational solid waste generation is estimated to be (pounds per week):		
○ Would the proposed project have the potential to generate 100,000 pounds (50 tons) or more of solid waste per week? 22,154.70 pounds per week	☐	☒
(b) Would the proposed project involve a reduction in capacity at a solid waste management facility used for refuse or recyclables generated within the City?	☐	☒
○ If "yes," would the proposed project comply with the City's Solid Waste Management Plan?	☐	☐
12. *ENERGY*: CEQR Technical Manual Chapter 15		
(a) Using energy modeling or Table 15-1 in Chapter 15, the project's projected energy use is estimated to be (annual BTUs): 65,039 MBTUs		
(b) Would the proposed project affect the transmission or generation of energy?	☐	☒
13. *TRANSPORTATION*: CEQR Technical Manual Chapter 16		
(a) Would the proposed project exceed any threshold identified in Table 16-1 in Chapter 16?	☒	☐
(b) If "yes," conduct the appropriate screening analyses, attach back up data as needed for each stage, and answer the following questions:		
○ Would the proposed project result in 50 or more Passenger Car Equivalents (PCEs) per project peak hour?	☐	☒
If "yes," would the proposed project result in 50 or more vehicle trips per project peak hour at any given intersection? ***It should be noted that the lead agency may require further analysis of intersections of concern even when a project generates fewer than 50 vehicles in the peak hour. See Subsection 313 of Chapter 16 for more information.*	☐	☐
○ Would the proposed project result in more than 200 subway/rail or bus trips per project peak hour?	☐	☒
If "yes," would the proposed project result, per project peak hour, in 50 or more bus trips on a single line (in one direction) or 200 subway/rail trips per station or line?	☐	☐
○ Would the proposed project result in more than 200 pedestrian trips per project peak hour?	☐	☒
If "yes," would the proposed project result in more than 200 pedestrian trips per project peak hour to any given pedestrian or transit element, crosswalk, subway stair, or bus stop?	☐	☐
14. *AIR QUALITY*: CEQR Technical Manual Chapter 17		
(a) *Mobile Sources*: Would the proposed project result in the conditions outlined in Section 210 in Chapter 17?	☐	☒
(b) *Stationary Sources*: Would the proposed project result in the conditions outlined in Section 220 in Chapter 17?	☐	☒
○ If "yes," would the proposed project exceed the thresholds in Figure 17-3, Stationary Source Screen Graph in Chapter 17? (Attach graph as needed)	☐	☐
(c) Does the proposed project involve multiple buildings on the project site?	☐	☒
(d) Does the proposed project require federal approvals, support, licensing, or permits subject to conformity requirements?	☐	☒
(e) Does the proposed project site have existing institutional controls (*e.g.*, (E) designation or Restrictive Declaration) relating to air quality that preclude the potential for significant adverse impacts?	☐	☒
(f) If "yes" to any of the above, conduct the appropriate analyses and attach any supporting documentation.		
15. *GREENHOUSE GAS EMISSIONS*: CEQR Technical Manual Chapter 18		
(a) Is the proposed project a city capital project or a power generation plant?	☐	☒
(b) Would the proposed project fundamentally change the City's solid waste management system?	☐	☒
(c) Would the proposed project result in the development of 350,000 square feet or more?	☒	☐
(d) If "yes" to any of the above, would the project require a GHG emission assessment based on guidance in Chapter 18?	☐	☒
○ If "yes," would the project result in inconsistencies with the City's GHG reduction goal? (See Local Law 22 of 2008; § 24-803 of the Administrative Code of the City of New York). Please attach supporting documentation.	☐	☐
16. *NOISE*: CEQR Technical Manual Chapter 19		
(a) Would the proposed project generate or reroute vehicular traffic?	☐	☒
(b) Would the proposed project introduce new or additional receptors (see Section 124 in Chapter 19) near heavily trafficked roadways, within one horizontal mile of an existing or proposed flight path, or within 1,500 feet of an existing or proposed rail line with a direct line of site to that rail line?	☐	☒
(c) Would the proposed project cause a stationary noise source to operate within 1,500 feet of a receptor with a direct line of sight to that receptor or introduce receptors into an area with high ambient stationary noise?	☐	☒

	YES	NO
(d) Does the proposed project site have existing institutional controls (*e.g.*, (E) designation or Restrictive Declaration) relating to noise that preclude the potential for significant adverse impacts?	☐	☒
(e) If "yes" to any of the above, conduct the appropriate analyses and attach any supporting documentation.		
17. *PUBLIC HEALTH*: CEQR Technical Manual Chapter 20		
(a) Based upon the analyses conducted, do any of the following technical areas require a detailed analysis: Air Quality; Hazardous Materials; Noise?	☐	☒
(b) If "yes," explain why an assessment of public health is or is not warranted based on the guidance in Chapter 20, "Public Health." Attach a preliminary analysis, if necessary.		
18. *NEIGHBORHOOD CHARACTER*: CEQR Technical Manual Chapter 21		
(a) Based upon the analyses conducted, do any of the following technical areas require a detailed analysis: Land Use, Zoning, and Public Policy; Socioeconomic Conditions; Open Space; Historic and Cultural Resources; Urban Design and Visual Resources; Shadows; Transportation; Noise?	☐	☒
(b) If "yes," explain why an assessment of neighborhood character is or is not warranted based on the guidance in Chapter 21, "Neighborhood Character." Attach a preliminary analysis, if necessary.		
19. *CONSTRUCTION*: CEQR Technical Manual Chapter 22		
(a) Would the project's construction activities involve:		
○ Construction activities lasting longer than two years?	☐	☒
○ Construction activities within a Central Business District or along an arterial highway or major thoroughfare?	☒	☐
○ Closing, narrowing, or otherwise impeding traffic, transit, or pedestrian elements (roadways, parking spaces, bicycle routes, sidewalks, crosswalks, corners, *etc.*)?	☐	☒
○ Construction of multiple buildings where there is a potential for on-site receptors on buildings completed before the final build-out?	☐	☒
○ The operation of several pieces of diesel equipment in a single location at peak construction?	☐	☒
○ Closure of a community facility or disruption in its services?	☐	☒
○ Activities within 400 feet of a historic or cultural resource?	☒	☐
○ Disturbance of a site containing or adjacent to a site containing natural resources?	☐	☒
○ Construction on multiple development sites in the same geographic area, such that there is the potential for several construction timelines to overlap or last for more than two years overall?	☐	☒
(b) If any boxes are checked "yes," explain why a preliminary construction assessment is or is not warranted based on the guidance in Chapter 22, "Construction." It should be noted that the nature and extent of any commitment to use the Best Available Technology for construction equipment or Best Management Practices for construction activities should be considered when making this determination.		

20. *APPLICANT'S CERTIFICATION*

I swear or affirm under oath and subject to the penalties for perjury that the information provided in this Environmental Assessment Statement (EAS) is true and accurate to the best of my knowledge and belief, based upon my personal knowledge and familiarity with the information described herein and after examination of the pertinent books and records and/or after inquiry of persons who have personal knowledge of such information or who have examined pertinent books and records.

Still under oath, I further swear or affirm that I make this statement in my capacity as the applicant or representative of the entity that seeks the permits, approvals, funding, or other governmental action(s) described in this EAS.

APPLICANT/REPRESENTATIVE NAME	SIGNATURE	DATE
Robert R. Kulikowski		November 22, 2017

PLEASE NOTE THAT APPLICANTS MAY BE REQUIRED TO SUBSTANTIATE RESPONSES IN THIS FORM AT THE DISCRETION OF THE LEAD AGENCY SO THAT IT MAY SUPPORT ITS DETERMINATION OF SIGNIFICANCE.

Part III: DETERMINATION OF SIGNIFICANCE (To Be Completed by Lead Agency)

INSTRUCTIONS: In completing Part III, the lead agency should consult 6 NYCRR 617.7 and 43 RCNY § 6-06 (Executive Order 91 or 1977, as amended), which contain the State and City criteria for determining significance.

1. For each of the impact categories listed below, consider whether the project may have a significant adverse effect on the environment, taking into account its (a) location; (b) probability of occurring; (c) duration; (d) irreversibility; (e) geographic scope; and (f) magnitude.

IMPACT CATEGORY	Potentially Significant Adverse Impact: YES	NO
Land Use, Zoning, and Public Policy	☐	☒
Socioeconomic Conditions	☐	☒
Community Facilities and Services	☐	☒
Open Space	☐	☒
Shadows	☐	☒
Historic and Cultural Resources	☐	☒
Urban Design/Visual Resources	☐	☒
Natural Resources	☐	☒
Hazardous Materials	☐	☒
Water and Sewer Infrastructure	☐	☒
Solid Waste and Sanitation Services	☐	☒
Energy	☐	☒
Transportation	☐	☒
Air Quality	☐	☒
Greenhouse Gas Emissions	☐	☒
Noise	☐	☒
Public Health	☐	☒
Neighborhood Character	☐	☒
Construction	☐	☒

2. Are there any aspects of the project relevant to the determination of whether the project may have a significant impact on the environment, such as combined or cumulative impacts, that were not fully covered by other responses and supporting materials? ☐ YES ☒ NO

If there are such impacts, attach an explanation stating whether, as a result of them, the project may have a significant impact on the environment.

3. Check determination to be issued by the lead agency:

☐ **Positive Declaration**: If the lead agency has determined that the project may have a significant impact on the environment, and if a Conditional Negative Declaration is not appropriate, then the lead agency issues a *Positive Declaration* and prepares a draft Scope of Work for the Environmental Impact Statement (EIS).

☐ **Conditional Negative Declaration:** A *Conditional Negative Declaration* (CND) may be appropriate if there is a private applicant for an Unlisted action AND when conditions imposed by the lead agency will modify the proposed project so that no significant adverse environmental impacts would result. The CND is prepared as a separate document and is subject to the requirements of 6 NYCRR Part 617.

☒ **Negative Declaration:** If the lead agency has determined that the project would not result in potentially significant adverse environmental impacts, then the lead agency issues a *Negative Declaration*. The *Negative Declaration* may be prepared as a separate document (see template) or using the embedded Negative Declaration on the next page.

4. ***LEAD AGENCY'S CERTIFICATION***

TITLE	LEAD AGENCY
Director, Environmental Assessment and Review Division	NYC Department of City Planning
NAME	DATE
Robert Dobruskin, AICP	June 8, 2018

SIGNATURE Robert Dobruskin

PART II: ENVIRONMENTAL (CEQR) ANALYSIS

ATTACHMENT B: CEQR ANALYSIS FRAMEWORK

INTRODUCTION

The Proposed Action is approval of a special permit by the City Planning Commission (CPC), pursuant to New York City Zoning Resolution (ZR) §91-251 (special permit for subway station improvements) of the Special Lower Manhattan (LM) District, Article IX, Chapter 1, for a floor area bonus (ZR §74-634: Subway station improvements in Downtown Brooklyn and in Commercial Districts of 10 Floor Area Ratio (FAR) and above in Manhattan). Approval of the special permit is a discretionary action subject to review under City Environmental Quality Review (CEQR), which is New York City's process for implementing the New York State Environmental Quality Review Act (SEQRA), by which City agencies review proposed discretionary actions to identify and disclose the potential effects those actions may have on the environment. This Environmental Assessment Statement (EAS) has been prepared pursuant to Mayoral Executive Order No. 91 of 1977, as amended, the CEQR Rules of Procedure found at Title 62 RCNY Chapter 5 and the implementing regulations for SEQRA found at 6 NYCRR Part 617. This EAS will inform the New York City Department of City Planning (DCP), acting as lead agency on behalf of CPC, in making the determination as to whether the Proposed Action would result in significant adverse environmental impacts and require further environmental quality review.

ANALYSIS FRAMEWORK

The framework for the EAS analysis is based on the guidelines established in the March 2014 Edition of the CEQR Technical Manual (*CEQR Technical Manual*). For each technical area, the *CEQR Technical Manual* defines thresholds that, if met or exceeded, typically require a detailed analysis. Accordingly, preliminary screening analyses were conducted for all applicable CEQR technical areas to determine if detailed analyses would be necessary. The following sections of this EAS report provide additional analyses and information for technical categories listed in Part II of the EAS for which CEQR thresholds were determined to have been met or exceeded, or if supplemental information is needed to complete the analysis.

In order to assess the potential effects of the Proposed Action, a Reasonable Worst Case Development Scenario (RWCDS) was developed for both the Future Without the Proposed Action (the "No-Action Condition") and the Future With the Proposed Action (the "With-Action Condition)" for Build Year 2020. The future With-Action Condition identifies the extent, type, and location of development that would be expected to occur by the end of 2020 as a result of the Proposed Action. The future No-Action Condition identifies development projections for 2020 absent the Proposed Action. The incremental difference between the No-Action and With-Action conditions serves as the basis for assessing the potential environmental impacts of the Proposed Action.

Build Year

Development of the Proposed Project would occur in a single phase. It is anticipated that all components of the Proposed Project would be complete and operational by 2020. Accordingly, for the purposes of this environmental review, an analysis year of 2020 will be used to assess the potential effects of the Proposed Action (the "Build Year").

REASONABLE WORST CASE DEVELOPMENT SCENARIO (RWCDS)

A Reasonable Worst Case Development Scenario (RWCDS) is broadly defined as the potential development under both the future No-Action and With-Action conditions that is used to determine the change in permitted development created by a discretionary action. A RWCDS for both the No-Action Condition and With-Action Condition was developed for Build Year 2020.

No-Action Condition

Development Project

In the No-Action Condition, the special permit for a floor area bonus (3.00 FAR) would not be granted, and the Development Site (Lot 7) would be developed pursuant to the underlying C5-5 zoning district and Special LM District requirements. As shown in Table B-1, the existing C5-5 zoning district on the Project Site permits residential use at a maximum FAR of 12.00, with the provision of recreation space; commercial and community facility uses are permitted at a maximum FAR of 15.00 and can be increased by 20 percent with the provision of a public plaza.[15] The No-Action Condition would include a new 10.99 FAR residential/commercial building on the Development Site with residential use at an FAR of 9.79 and commercial use at an FAR of 1.20; the existing 3.95 FAR community facility building on Lot 10 would remain as is. The total development on the Project Site in the No-Action Condition would include residential, commercial, and community facility uses at a total FAR of 14.94.

As shown in Table B-2, in the No-Action Condition, the Development Site (Lot 7) would be developed with a 1,115-foot (66-floor), approximately 380,957-gsf commercial/residential building at an FAR of 10.99. The existing 9-story, approximately 93,894-gsf school building on Lot 10 would remain as is. The proposed No-Action building on the Development Site (Lot 7) would include (i) approximately 30,488 gsf of commercial space on the floor 1 and floors 3 through 6; (ii) approximately 341,743 gsf of residential space (172 units) on floors 7 through 66; and (iii) approximately 8,726 gsf of outdoor space on floors 7, 27, and 43.[16]

The proposed building in the No-Action Condition would have a maximum building height of approximately 1,115 feet above the mean curb level. As shown in Figure 9, floor 1 and floors 3 through 6 (commercial space) would have floor-to-ceiling heights of 32 feet; and the upper residential floors would have floor-to-ceiling heights of 12 feet on floors 7 through 49, and 16 feet on floors 50 through 66.[17]

Subway Station Improvements

In the No-Action Condition, the proposed subway station improvements would not be implemented, and both the Broad Street and Wall Street subway stations would remain as under existing conditions. The Broad Street J/Z subway station does not currently have passenger

[15] A tower is a portion of a building that penetrates the sky exposure plane and is allowed only in specified high-density areas of the city. A tower may be occupied by residential, commercial or community facility uses.
[16] The residential gross square footage of the No-Action building includes approximately 49,858 gsf mechanical space on floors 2, 9, 28, 28M, 42, and 63 through 66.
[17] The outdoor space on floors 27 and 43 would have a floor-to-ceiling height of 32 feet.

elevators and is accessible only via narrow stairway entrances on Broad Street and Exchange Place (Figure 4). The two ingress/egress control areas (R204B and R204A) at the Wall Street Station currently have High Exit and Entrance Turnstiles (HEETs) that severely restrict passenger movement (Figure 4). These conditions would not be improved or otherwise altered under the No-Action Condition.

With-Action Condition

Development Project

In the With-Action Condition, the special permit for a floor area bonus (up to 3.00 FAR) would be granted in exchange for subway station improvements at the Broad Street J/Z station and connecting Wall Street station of the Lexington Avenue 4/5 line.

As shown in Table B-1, pursuant to the special permit, the With-Action Condition would include (i) the Proposed Project, which comprises a 14.05 FAR mixed-use building on the Development Site (Lot 7) consisting of residential use at an FAR of 11.54 and commercial use at an FAR of 2.51, and (ii) the 3.95-FAR school building on Lot 10, which would remain as is. The total development on the Project Site in the With-Action Condition would include residential, commercial, and community facility uses at a total FAR of 17.99.[18] The proposed 11.54 residential FAR in the With-Action Condition is permitted as-of-right under the existing C5-5 zoning district. The floor area bonus (3.00 FAR) in exchange for subway station improvements in the With-Action Condition would increase the total floor area permitted on the Project Site, but would not increase the allowed as-of-right residential floor area.[19]

As shown in Table B-2, in the With-Action Condition, the Development Site (Lot 7) would be developed with a 1,115-foot (80-floor), approximately 478,209-gsf commercial/residential building. The existing 9-story, approximately 93,894-gsf school building on Tax Lot 10 would remain. The proposed mixed-use building on the Development Site (Lot 7) would include (i) approximately 62,006 gsf of commercial space on floor 1 and floors 3 through 10; (ii) approximately 407,477 gsf of residential space on floors 11 through 80; and (iii) approximately 8,726 gsf of outdoor space on floors 12, 33, and 53.[20]

As shown in Figure 9, the maximum building height and overall building dimensions would remain the same in the No-Action Condition and With-Action Condition, with reductions in floor-to-ceiling heights on the residential floors generally from 12 feet to 10.83 feet at lower levels and from 16 feet to 10.83 feet or 12 feet at upper levels. At the building base, floor-to-ceiling heights would be reduced from 32 feet to 16 feet.[21]

[18] Note: Total FAR value may not sum due to rounding.
[19] Pursuant to ZR §74-634, CPC may grant, by special permit, an FAR bonus not to exceed 20 percent of the basic maximum FAR permitted by the underlying district regulations. C5-5 zoning district permits a maximum FAR of 15.00, therefore limiting an FAR bonus pursuant to ZR §74-634 to a maximum of 3.00. For the purpose of constructing a conservative analysis, the With-Action Condition utilizes the maximum permitted FAR bonus of 3.00.
[20] The residential square footage in the Proposed Project includes approximately 56,447 gsf mechanical spaces on floors 2, 11, 11M, 34, 34M, 52, and floors 77 through 80.
[21] The Applicant has advised that its decision to maintain the same building form and heights for the No-Action building and With-Action building is based on a number of considerations, as follows:

Table B-1: Maximum Permitted Zoning Floor Area and Proposed Zoning Floor Area (ZSF)

	No-Action Condition	With-Action Condition
Maximum Permitted Zoning Floor Area		
Commercial/Community Facility ZSF	356,955	428,346
Residential ZSF	285,564	285,564
Commercial/Community Facility FAR	15.00	18.00
Residential FAR	12.00	12.00
Maximum FAR Permitted	**15.00**	**18.00**
Maximum Proposed Zoning Floor Area		
Commercial ZSF (Lot 7)	28,664	59,749
Residential ZSF (Lot 7)	232,887	274,568
Community Facility ZSF (Lot 10)	93,894	93,894
Proposed Commercial FAR (Lot 7)	1.20	2.51
Residential FAR (Lot 7)	9.79	11.54
Community Facility FAR (Lot 10)	3.95	3.95
Total FAR Proposed	**14.94**	**17.99**

Subway Station Improvements

In the With-Action Condition, the proposed Subway Station Improvements would be implemented and consist of (i) the installation of two Americans with Disabilities Act (ADA) compliant elevators at the Broad Street J/Z subway station that would provide access from Broad Street to the

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First, the proposed building – whether under the No-Action Condition or the With-Action Condition – must achieve a considerable height in order to be successful. This is because the height and proximity of surrounding buildings require that the development include a tall base or podium (consisting of lobby, commercial, mechanical, and amenity floors) in order to lift the first 15 to 20 residential floors to a height sufficient to allow light, air, and views, and to avoid a 'canyon-like' effect, which would make these units unattractive and significantly reduce their sale value. The proposed 1,115-foot building height would therefore remain a feature of the development even if the Subway Improvement Bonus is not approved.

Second, the Applicant has determined that, in the event the Subway Improvement Bonus is approved, adding to the building height would not be justified on an economic basis. The costs of building higher than 1,115 feet would be very significant, while saleable square footage would be reduced as the floor plate continues to shrink at the higher heights without a concomitant ability to reduce the size of the core. The Applicant has determined that any pricing premium that might be available for higher floors would not be sufficient to outweigh these disadvantages, and that any further height increase with use of bonus floor area would not be pursued.

The Applicant has determined that the floor-to-ceiling height and configuration of the With-Action Condition reflect a development that will respond to market demand and be economically viable while avoiding the difficulties that would result from increasing building height to incorporate bonus floor area.

The Applicant obtained a New Building Permit in May 2017 (DOB Job No. 121190772) for a 1,115-foot as-of-right building and intends to proceed with foundations work and perform other early stage construction pursuant to that permit. In the event that the special permit is approved, the bonus floor area will be incorporated in the building during the course of construction, pursuant to an amended building permit. However, as discussed above, the incorporation of bonus floor area in the building would not result in any change to the building height and overall building dimensions. The Applicant has stated that it is prepared to commit in the Restrictive Declaration that would accompany the subway improvement special permit that the height of any building that incorporates bonus floor area would not exceed 1,115 feet.

southbound and northbound subway platforms (Figure 5), and (ii) ingress and egress improvements at two control areas (R204B and R204A) at the connecting Wall Street subway station of the Lexington Avenue 4/5 line, including the replacement of the existing High Exit and Entrance Turnstiles (HEETs) with one typical Automatic Fare Control (AFC) turnstile for a total of seven new AFC units. Each AFC unit would greatly increase passenger movement by reducing the time it takes for passengers to leave the station after discharging from the train. In addition, NYCT has requested that, as part of this work, the control area railings be removed and replaced with ones that are more consistent with the main control areas that reflect the historic nature of the station (Figures 4 through 6).

Incremental Difference: No-Action and With-Action Conditions

The incremental difference between the No-Action Condition and With-Action Condition provides the basis by which the potential environmental impacts of the Proposed Action are evaluated.

Development Project

As shown in Table B-2, the With-Action Condition would result in a net *increment* of 97,252 gsf of development on the Project Site, which includes a net *increase* of 31,518 gsf of commercial space and a net increase of 65,734 gsf of residential space (34 dwelling units). As described above, there would be no incremental building height increase or change in building envelope between the No-Action Condition and the With-Action Condition.

Table B-2: No-Action and With-Action Conditions

Land Use (Use Group)	No-Action Condition (gsf) [1]	With-Action Condition (gsf)[2]	Increment (gsf)
Existing Community Facility (Lot 10)	**93,894**	**93,894**	**0**
Proposed Building (Lot 7 – Development Site)	**380,957**	**478,209**	**97,252**
Residential	341,743	407,477	65,734
Residential Units	*172*	*206*	*34*
Commercial	30,488	62,006	31,518
Outdoor Space	8,726	8,726	0
Building Height	1,115 feet (66 floors)	1,115 feet (80 floors)	0 feet

Source: Based on the development program provided by the Applicant.
Notes:
[1] In the No-Action Condition, the residential gross square footage includes approximately 49,858 gsf of mechanical space on floors 2, 9, 28, 28M, 42, and 63 through 66 of the proposed building.
[2] In the With-Action Condition, the residential gross square footage includes approximately 56,447 gsf of mechanical space on floors 2, 11, 11M, 34, 34M, 52, 77, 78, 78M, 79, and 80 of the proposed building.

Subway Station Improvements

There are no quantitative incremental differences between the No-Action Condition and With-Action Condition associated with the proposed Subway Station Improvements. However, where appropriate, a qualitative assessment is provided.

ATTACHMENT C: LAND USE, ZONING AND PUBLIC POLICY

INTRODUCTION

According to *CEQR Technical Manual* guidelines, a land use analysis assesses the uses and development trends in the area that may be affected by a proposed project and determines whether the proposed project is compatible with those conditions or may affect them. Similarly, the analysis considers the project's compliance with, and effect on, the area's zoning and other applicable public policies.

The Proposed Action is a special permit pursuant to the New York City Zoning Resolution (ZR) Section (§) 91-251 of the Special Lower Manhattan District (LM), Article IX, Chapter 1, for a floor area bonus in exchange for subway improvements (ZR §74-634). The Proposed Action would permit additional floor area, limited to a maximum Floor Area Ratio (FAR) bonus of 3.00, on the Project Site, which would facilitate a 1,115-foot (80-floor), approximately 478,209-gross-square-foot (gsf) commercial/residential building on the Development Site, built at an FAR of 14.54. The existing 3.95-FAR, 93,894-gsf community facility building on a portion of the Project Site (Lot 10) would remain as is. The proposed improvements at the Broad Street J/Z subway station would consist of the installation of two Americans with Disabilities Act (ADA) compliant elevators that would provide public access from Broad Street to the southbound and northbound subway platforms. In addition, the two control areas for ingress and egress at the connecting Wall Street Station of the Lexington Avenue line would be improved by replacing the existing High Exit and Entrance Turnstiles (HEETs) with typical Automatic Fare Control (AFC) for a total of seven new AFC units. These improvements would increase passenger movement by reducing the time it takes for passengers to leave the station after discharging from the train.

According to the *CEQR Technical Manual*, a detailed assessment of land use, zoning, and public policy is appropriate if an action would result in a significant change in land use or would substantially affect regulations or policies governing land use. The C5-5 zoning district permits development at a maximum FAR of 15.0 for commercial and community facility uses. Because the Proposed Action would result in the approval of a Special Permit allowing an additional FAR of 3.00 for commercial and community facility uses on the Project Site than permitted under the existing C5-5 zoning regulations without the Special Permit, a preliminary assessment of land use and zoning is warranted. A detailed public policy analysis was also prepared to determine the potential for the Proposed Action to alter or conflict with applicable public policies. The land use, zoning, and public policy analysis in this chapter (i) describes uses and development trends in the area that may be affected by a Proposed Action; (ii) describes the zoning and public policies that guide development; and (iii) determines whether a Proposed Action is compatible with those conditions and policies or whether it may adversely affect them.

METHODOLOGY

The analysis methodology is based on the guidelines in the *CEQR Technical Manual* and involves an assessment of the Proposed Action's consistency with existing land use patterns and development trends, zoning regulations, and applicable public policies.

The land use, zoning, and public policy analysis considers a 400-foot radius around the Project Site (the "Study Area"). Existing conditions within the Study Area were identified through field studies and research of available resources, including the New York City Department of City Planning's (DCP) Land Use & CEQR Application Tracking System (LUCATS) and Primary Land Use Tax Lot Output (PLUTO™) data files; the New York City Mayor's Office of Environmental Coordination's (MOEC) CEQR Access; and the Manhattan Community District 1 website. The ZR and DCP's web-based Zoning and Land Use Application (ZOLA) were utilized to identify and describe existing zoning districts in the Study Area and for the zoning evaluation of the No-Action and With-Action conditions. Relevant public policy documents were examined to assist in identifying and describing existing public policies that have the potential to affect the Project Site and Study Area.

LAND USE

Existing Conditions

The Project Site is a single zoning lot at 45 Broad Street in the Financial District in Lower Manhattan, Community District 1, and comprises two tax lots on Block 25: Lot 7 (the Development Site) and Lot 10. The Development Site is currently vacant and was formerly occupied by an 8-story, approximately 70,000-gsf office building (Wells Fargo) that was demolished in 2007. Lot 10 is occupied by a 9-story, approximately 93,894-gsf Leman Manhattan Preparatory School building, which is listed on the State and National Register of Historic Places (S/NR).

The Project Site is bounded by a 21-story commercial/residential building to the north (Broad Exchange Building); a 20-story office building (Lord's Court Building) and a 44-story commercial/residential building to the east (fronting William Street); a 31-story office building the south; and Broad Street to the west. The streets bounding Block 25 include Exchange Place to the north; William Street to the east; Beaver Street to the south; and Broad Street to the west. The Project Site is in the Special LM District's Historic and Commercial Core Subdistrict as well as the Wall Street Historic District (WSHD), which is listed on the S/NR but is not an LPC-designated historic district. The Broad Exchange Building is an LPC-designated New York City Landmark (NYCL) and listed on the S/NR; the Lord's Court Building is listed on the S/NR; the 31-story office building at 55 Broad Street to the south of the Project Site is listed on the S/NR as a non-contributing historic resource. There are a total of 79 historic resources in the Study Area that are LPC-designated NYCLs and/or listed on the S/NR. Notable landmarks include the LPC-designated Street Plan of New Amsterdam and Colonial New York that comprises all the streets bounding Block 25; the existing 9-story building on the Project Site (Leman Preparatory School); the Wall Street Historic District (WSHD) that encompasses the Project Site; the Stone Street Historic District (SSHD) to the south; the 21-story Broad Exchange Building at 25 Broad Street adjacent to the northern boundary of the Project Site; the Equitable Trust Company at 15 Broad Street; the J.P. Morgan & Co. Building at 23 Wall Street; the New York Stock Exchange at 8-18 Broad Street; the American Bank Note Company Office Building at 70 Broad Street; the Maritime Exchange Building at 80 Broad Street; the First National City Bank Building at 55 Wall Street; the City Bank-Farmers Trust Company Building at 20 Exchange Place; and Delmonico's Building at 56 Beaver Street. A detailed description of all existing historic and cultural resources within the Study Area is included in Attachment E, "Historic and Cultural Resources."

As shown in Figure 8, the predominant land uses within the Study Area include commercial, specifically high-rise office buildings with ground floor retail and restaurant use, and commercial/residential buildings. The Study Area also includes five multifamily elevator residential buildings, two public facility/institutional uses, and a public parking garage. The Leman Manhattan Preparatory School on the Project Site and the Trinity Church on Broadway and Wall Street are the only public facility/institutional use. A 7-story public parking garage is located at 14 South William Street and contains partial ground floor commercial uses.

The Study Area is well served by public transit, including subway lines J/Z at Broad Street, 2/3 at Wall Street, and 4/5 at Wall Street and Broadway; and 17 bus lines (M20; M15; and 15 Staten Island express bus lines). The subway station entrance for the Broad Street J/Z subway line is adjacent to the Project Site on Broad Street at Exchange Place. The Project Site is also a short walk to the 1 and R subway lines at South Ferry and Whitehall Street, respectively, as well as the Staten Island Ferry.

No-Action Condition

In the No-Action Condition, the special permit for a floor area bonus (up to 3.00 FAR) would not be granted, and the Project Site would be developed pursuant to the existing C5-5 zoning district and Special LM District regulations. The existing 9-story, school building would remain unchanged on Lot 10, and the Development Site would be developed with a 1,115-foot (66-floor) commercial/residential building.

The existing C5-5 zoning district on the Project Site permits residential uses (Use Groups 1 and 2) as well as a variety of commercial and community facility uses (Use Groups 3, 4, 5, 6, 9, 10, and 11).[22] The Special LM District requirements dictate the location and height of street walls, which are applicable to specific streets within the special district as shown on Map 4: Designated Retail Streets (ZR§ 91-A4). Broad Street is classified as a "Type 2A Street," which would require the No-Action building to be built up to the property line along Broad Street and to extend along the entire street frontage of the zoning lot not occupied by existing buildings to a minimum base height of 85 feet and a maximum base height of 150 feet. The Special LM District requirements applicable to Designated Retail Streets do not apply to the Project Site; however the curb cut prohibitions on Broad Street do apply.

In the No-Action Condition, the Development Site (Tax Lot 7) would be developed with a 1,115-foot (66-floor), approximately 380,957-gsf commercial/residential building at an FAR of 10.99. The proposed building would include (i) approximately 30,488 gsf of commercial space on the ground floor and floors 3 through 6, at an FAR of 1.20; (ii) approximately 341,743 gsf of residential space (approximately 172 units) on floors 7 through 66, at an FAR of 9.79; and (iii) approximately 8,726 gsf of outdoor space on floors 7, 27, and 43.[23] The 9-story, approximately 93,894-gsf school building (Leman Preparatory School) with an FAR of 3.95 on Lot 10 would remain as is. The proposed building in the No-Action Condition would have a maximum building height of approximately 1,115 feet above the mean curb level.

[22] ZR §32-11 through §32-15; ZR §32-18 through §32-20; ZR §91-11.
[23] The residential gross square footage of the No-Action building includes approximately 49,858 gsf of mechanical space on floors 2, 9, 28, 28M, 42, and 63 through 66.

The proposed commercial and residential uses would be consistent with the existing commercial and commercial/residential buildings in the surrounding neighborhood.

Absent the Proposed Action, there would be no improvements to the Broad Street J/Z and Wall Street 4/5 subway stations.

With-Action Condition

In the With-Action Condition, the special permit for a floor area bonus (up to 3.00 FAR) would be granted. For the purpose of constructing a conservative analysis, the With-Action Condition utilizes the maximum permitted FAR bonus of 3.00.

Pursuant to the special permit, in the With-Action Condition, the currently vacant Development Site would be developed with a 1,115-foot (80-floor), approximately 478,209-gsf commercial/residential building at an FAR of 14.05. The 9-story, approximately 93,894-gsf school building (3.95 FAR) on Lot 10 would remain as is. The Development Project would include approximately 407,477 gsf of residential space (approximately 206 dwelling units) on floors 11 through 80 at an FAR of 11.54, and approximately 62,006 gsf of commercial space on the ground floor and floors 3 through 10 at an FAR of 2.51.[24] The proposed land uses in the With-Action Condition are permitted as-of-right under the existing C5-5 zoning district. The floor area bonus (up to 3.00 FAR) in exchange for subway station improvements in the With-Action Condition would increase the total floor area permitted on the Project Site, but would not increase the permitted as-of-right residential floor area, which is permitted up to a maximum FAR of 12.00.

As described above, the predominant land uses in the Study Area include commercial/office and commercial/residential buildings. Under the With-Action Condition, the Development Site would be developed with a mixed-use building that would include commercial use on the lower floors and residential on the upper floors. The total development on the Project Site would be consistent with these existing commercial/residential buildings in the Study Area.

The Proposed Project would also include subway station improvements to the Broad Street J/Z subway station and the connecting Wall Street 4/5 subway station. A detailed description of the proposed subway improvements is provided in in Attachment A, "Project Description."

Conclusion

The Project Site is in the Financial District in Lower Manhattan, which is primarily defined by high-rise office buildings and ground floor commercial uses. The Study Area also contains high-rise residential buildings.

The Proposed Action would facilitate a high-rise mixed-use building on the Development Site, which would include ground floor commercial uses that would activate Broad Street and enhance the pedestrian experience at the street level with additional retail uses. Furthermore, the approximately 206 proposed residential units would increase the Study Area's population by approximately 443 residents. The increased residential population in the area would contribute

[24] The residential square footage in the With-Action building (Proposed Project) includes approximately 56,447 gsf mechanical spaces on floors 2, 11, 11M, 34, 34M, 52, and floors 77 through 80.

significantly to a local customer base for existing and future retail uses that would, in turn, help to create a more active downtown. The Proposed Action would not result in a change of land uses as compared to the No-Action Condition, would not directly displace any current land uses resulting in an adverse impact on the surrounding uses, and would not generate land uses that would be incompatible with current land uses in the Study Area. Based on this information, the Proposed Action would not result in any significant adverse land use impacts; therefore, no further analysis is warranted.

ZONING

Existing Conditions

As shown in Figure 9, the entire 400-foot Study Area is mapped with a C5-5 commercial zoning district, and is within the Special LM District and the Historic and Commercial Core Subdistrict.[25]

The C5-5 zoning district permits development at a maximum FAR of 15.00 for commercial and community facility uses, which can be increased by 20 percent with the provision of a public plaza; residential uses are permitted to a maximum FAR of 12.00 with the provision of recreation space. The C5-5 zoning district is a non-contextual district; there is no maximum building height. However, buildings within a C5-5 district must be set within a sky exposure plane that begins at a street wall height of 85 feet and then slopes inwards towards the zoning lot. Under C5-5 regulations, a building occupied by commercial, residential, or community facility uses may be configured as a tower.[26] All commercial uses in C5 zoning districts are exempt from off-street parking requirements.

Special Lower Manhattan District (LM)

The Special LM District was designated by the LPC in 1998 and includes the area of Manhattan south of Murray Street, City Hall Park, and the Brooklyn Bridge; the district does not include Battery Park City. The Special LM District comprises two subdistricts: the Historic and Commercial Core and the South Street Seaport Subdistrict. The Project Site is located within the Historic and Commercial Core Subdistrict. Under the Special LM District regulations (ZR §91-31), the building base height is determined by the type of street a building fronts. The Project Site is on Broad Street, which is defined as a Type 2A street (Map 2 in Appendix A of the ZR). Buildings that front a Type 2A street must extend along the entire street frontage of the zoning lot to a minimum base height of 85 feet, with the maximum base height limited to 150 feet. Furthermore, at least 70 percent of the aggregate street width of the street wall is required to be located at the street line. Under ZR §91-32, development on a zoning lot between 15,001 and 30,000 square feet (sf) is required to set back 15 feet after the maximum building base height. Under ZR §91-33, above the maximum base height permitted, up to a height of 300 feet, the maximum lot coverage of any zoning lot shall be 65 percent.

[25] ZR §91-52; Article IX, Chapter 1, Appendix A, Maps 4 and 5.
[26] Pursuant to ZR §91-23, with additional recreation space, residential uses are permitted at a maximum FAR of 12.

The Historic and Commercial Core Subdistrict is bounded by Whitehall Street and Broadway to the west, Wall Street to the north, and Water Street to the south. The purpose of the subdistrict is to promote compatible development with existing buildings that border the landmarked street plan.

No-Action Condition

In the No-Action Condition, the special permit for a floor area bonus (up to 3.00 FAR) would not be granted, and the Development Site would be developed as-of-right pursuant to the existing C5-5 zoning district and the Special LM District regulations. The existing 9-story school building on Lot 10 would remain as is.

The existing C5-5 zoning district on the Project Site permits development at a maximum FAR of 15.00 for commercial and community facility uses; and residential uses are permitted to a maximum FAR of 12.00, with the addition of recreation space. The No-Action Condition would include a proposed 10.99-FAR commercial/residential building on the Development Site (Lot 7), comprising residential use at an FAR of 9.79 and commercial use at an FAR of 1.20; the existing 3.95-FAR community facility building on Lot 10 would remain as is.

The proposed 66-floor, 380,957-gsf commercial/residential building in the No-Action Condition would include (i) approximately 30,488 gsf of commercial space on the ground floor and floors 3 through 6; (ii) approximately 341,743 gsf of residential space on floor 1 (a residential lobby) and floors 7 through 66 (approximately 172 dwelling units); and (iii) approximately 8,726 gsf of outdoor space on floors 7, 27, and 43.[27] The proposed building in the No-Action Condition would have a maximum building height of approximately 1,115 feet above the mean curb level.

Absent the Proposed Action, there would be no improvements to the Broad Street (J/Z line) and Wall Street (4/5 line) subway stations.

With-Action Condition

In the With-Action Condition, the special permit for a floor area bonus would be granted in exchange for Broad Street subway station improvements consisting of the installation of two ADA-compliant elevators and improvements to the fare control area of the Wall Street station of the Lexington Avenue line. The total additional floor area permitted on the Project Site would be governed by ZR §91-22 (Floor Area Increase Regulations) and would be limited to a maximum FAR bonus of 3.00. The existing C5-5 zoning district regulations permit development at a maximum FAR of 15.00 for commercial and community facility uses; residential uses are permitted to a maximum FAR of 12.00. The proposed special permit would increase the total permitted FAR on the Project Site by up to 3.00, resulting in a total permitted FAR of 18.00 for commercial and community facility uses. The as-of-right permitted residential FAR (12.00 FAR) would remain unchanged. The proposed development in the With-Action Condition would conform to height and bulk regulations of the C5-5 zoning district. For the purpose of constructing a conservative analysis, the With-Action Condition utilizes the maximum permitted FAR bonus of 3.00.

[27] The residential gross square footage in the No-Action building includes approximately 49,858 gsf mechanical space on floors 2, 9, 28, 28M, 42, and 63 through 66.

Pursuant to the Proposed Action, the With-Action Condition would include a 14.05-FAR, mixed-use building on the Development Site, which would include residential use at an FAR of 11.54 and commercial use at an FAR of 2.51. The existing 3.95-FAR school building on Lot 10 would remain as is. The proposed 11.54 residential FAR in the With-Action Condition is permitted as-of-right under the existing C5-5 zoning district regulations; the floor area bonus (3.00 FAR) in exchange for subway station improvements in the With-Action Condition would increase the total floor area permitted on the Project Site, but would not increase the permitted as-of-right residential floor area.

In the With-Action Condition, the Proposed Project would include a 1,115-foot (80-floor), approximately 478,209-gsf mixed-use building on the Development Site (Lot 7), which would comprise (i) approximately 407,477 gsf of residential space (approximately 206 dwelling units) on floor 1 (a residential lobby) and floors 11 through 80; (ii) approximately 62,006 gsf of commercial space on the ground floor and floors 3 through 10; and (iii) approximately 8,726 gsf of outdoor space on floors 12, 33, and 53.[28] As shown in Figure 4, the proposed With-Action building would have a maximum height of 1,115 feet above mean curb level—the same height as the No-Action building.[29]

The Proposed Project would also include subway station improvements to the Broad Street Station (J/Z line) and the connecting Wall Street Station (4/5 line). A detailed description of the proposed subway improvements is provided in in Attachment A, "Project Description."

Conclusion

The Proposed Action would result in an increase in total permitted FAR on the Project Site (up to a 3.00 FAR bonus) in exchange for subway station improvements; however the FAR increase would not increase the permitted as-of-right residential floor area. The Development Project, facilitated by the City Planning Commission (CPC) granted special permit, would conform to the existing C5-5 zoning district uses and dimensional regulations, as well as the applicable Special LM District regulations. The proposed building height and bulk in the With-Action Condition would be identical to the building height and bulk in the No-Action Condition. Therefore, the Development Project would be consistent with development patterns defining the built environment in the Study Area. In addition, the proposed ADA-compliant elevators on Broad Street at the intersection of Exchange Place on southwest and northeast corners would provide access to the Broad Street Station (J/Z line) southbound and northbound platforms, respectively. The installation of the ADA-compliant elevators would make the Broad Street Station (J/Z line) accessible for persons with disabilities and foster efficient passenger access to trains for all subway riders. The proposed Wall Street Station subway improvements would increase passenger movement by reducing the time it takes for passengers to leave the station after discharging from the train.

Based on this information, the Proposed Action would not result in any significant adverse zoning impacts; therefore, no further analysis is warranted.

[28] The residential square footage of the With-Action building (Proposed Project) includes approximately 56,447 gsf mechanical space on floors 2, 11, 11M, 34, 34M, 52, and floors 77 through 80.
[29] The typical floor-to-ceiling height in the With-Action building is reconfigured to 10.83 and 12 feet, from 12 and 16 feet, respectively, in the No-Action building, thereby resulting in no increase in the proposed maximum building height.

PUBLIC POLICY

According to the *CEQR Technical Manual*, a proposed project that would be located within areas governed by public policies controlling land use, or that has the potential to substantially affect land use regulation or policy controlling land use, requires an analysis of public policy. A preliminary assessment of public policy should identify and describe any public policies, including formal plans or published reports that pertain to the study area. If the proposed action could potentially alter or conflict with identified policies, a detailed assessment should be conducted; otherwise, no further analysis of public policy is necessary.

Public policies applicable in the Study Area include *One New York: The Plan for a Strong and Just City* (OneNYC) and New York City's Waterfront Revitalization Program (WRP).

OneNYC

OneNYC, originally released as PlaNYC in 2007, is a development policy document designed to address the City's long-term challenges, including a projected population of 9 million residents by 2040, changing climate conditions, an evolving economy, and aging infrastructure. OneNYC was released in 2015 to address New York City's long-term challenges previously identified in PlaNYC, the City's previous long-term plan. OneNYC builds upon PlaNYC and focuses on four guiding principles: growth, equity, sustainability, and resiliency.

The Proposed Action is consistent with several initiatives identified in OneNYC. These goals fall under Vision 1, to create the world's most dynamic urban economy. Under Vision 1, the Proposed Project would support the goals of "Housing" and "Thriving Neighborhoods."

Housing

Goal: New Yorkers will have access to affordable, high-quality housing coupled with robust infrastructure and neighborhood services.

OneNYC aims to increase the overall supply of all types of new housing, and coordinate with regional partners to stimulate production of more housing to meet demand to ensure all New Yorkers have access to housing they can afford.[30]

The Proposed Action would support the following sub-goals under this initiative:

- Efforts by the private market to produce 160,000 units of market-rate housing over ten years to accommodate a growing population; and
- Efforts to create new housing and jobs throughout the region.

The Proposed Action would result in 34 additional dwelling units. By creating new housing, the Proposed Action would support accommodating a growing population, easing supply constraints, and offsetting loss in the housing market as units are taken offline, demolished, or converted to non-residential units. In addition, the Proposed Action would create additional housing options

[30] OneNYC – http://www1.nyc.gov/html/onenyc/visions/thriving/goal-3.html (Accessed December 8, 2016)

within commuting distance to Lower Manhattan, which would help strengthen the City's economy while increasing local options for places to live for the City's workforce.

Thriving Neighborhoods

Goal: New York City's neighborhoods will continue to thrive and be well served.

OneNYC identifies three core principles for guiding the City's neighborhood planning efforts: (i) supporting vibrant, mixed-use communities that align transit, housing, and jobs and offer residents access to essential retail and services; (ii) proactively planning for current and future growth; and (iii) engaging New Yorkers in the planning process.[31] In particular, OneNYC outlines how neighborhood planning, including zoning changes, has the potential to create a wide range of opportunities for mixed-use neighborhoods.

In the With-Action Condition, the special permit for a floor area bonus (up to 3.00 FAR) would be granted in exchange for Broad Street subway station improvements consisting of the installation of two ADA-compliant elevators and replacement of HEETs in the fare control area of the connected Lexington Avenue line Wall Street station. The development facilitated by the Proposed Action is designed to provide the area with increased office space and ground floor commercial uses that would activate the Project Site at the street level and enhance the pedestrian experience. Furthermore, the approximately 206 residential units proposed in the With-Action Condition would provide the area with additional housing and add approximately 443 residents to the area.[32] The increased residential population in the area would significantly contribute to a local customer base for existing and future retail uses that would, in turn, create a more vibrant downtown.

Based on this information, the Proposed Action is consistent with the policies of OneNYC.

New York Waterfront Revitalization Program (WRP) (WRP # 17-162)

As shown in Figure 11, the Project Site is within the New York City regulated Coastal Zone and is subject to review for its consistency with the policies of the City's WRP.

The WRP is the City's principal coastal management tool. Originally adopted in 1989 and subsequently revised, the WRP establishes the City's policies for development and use of the waterfront, while also providing a framework for evaluating consistency of all discretionary actions in the coastal zone with WRP policies. The WRP underwent City Council approved revisions on October 30, 2013. On February 3, 2016, the New York State Department of State (NYSDOS) approved revisions to the WRP. The revisions to the WRP proactively advance the long-term goals laid out in *Vision 2020: The New York City Comprehensive Waterfront Plan,* released in 2011. The plan promotes a range of ecological objectives and strategies, facilitates interagency review of permitting to preserve and enhance maritime infrastructure, and supports a thriving, sustainable working waterfront. In addition, these revisions solidify New York City's leadership in the area of sustainability and climate resilience planning.

[31] *OneNYC* – http://www1.nyc.gov/html/onenyc/visions/thriving/goal-4.html (Accessed December 9, 2016)
[32] The projected number of residents is based on the average household size of 2.15 for a renter-occupied unit in Manhattan Census Tract 9 (US Census Bureau, American Community Survey)

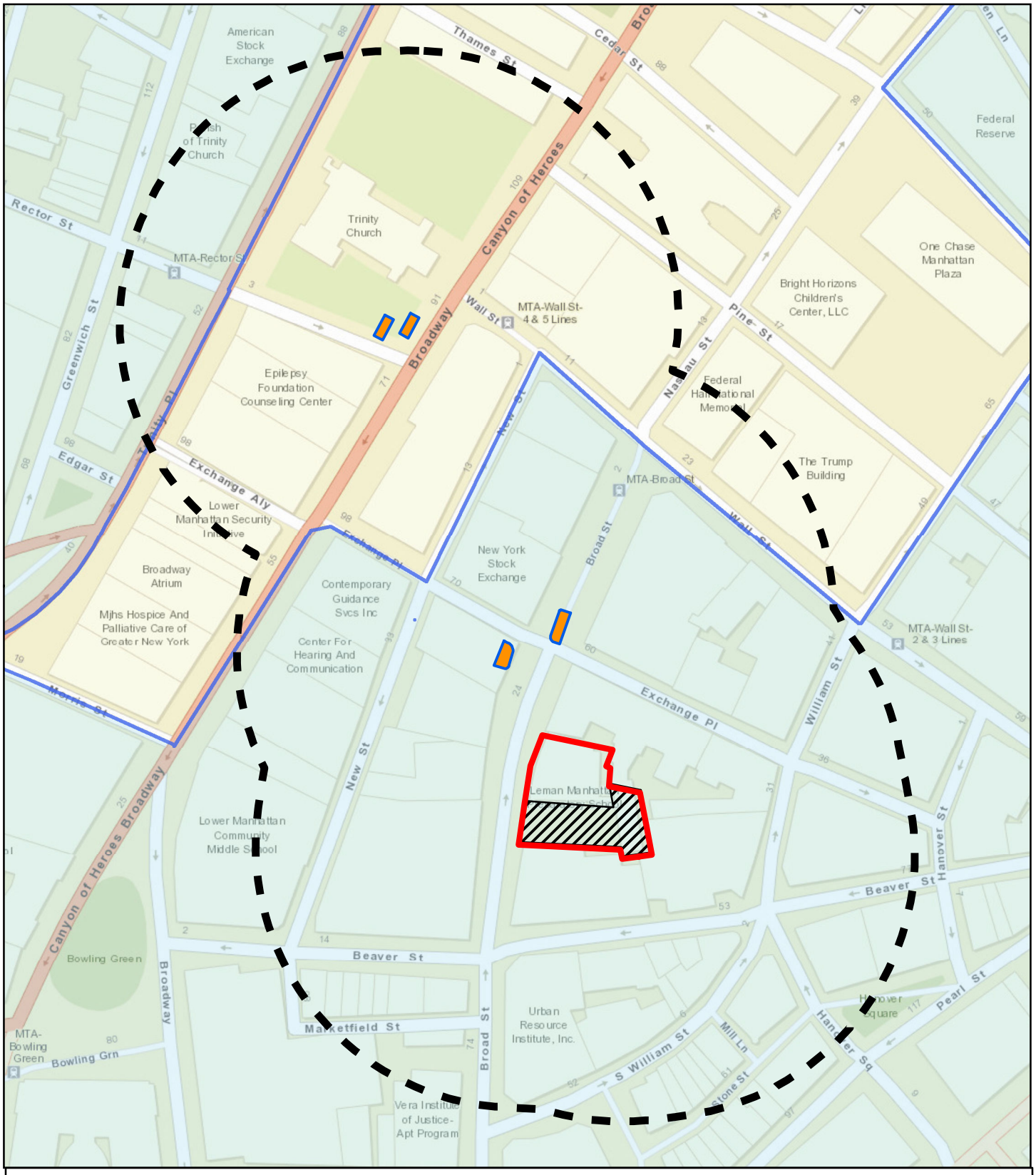


FIGURE 11: COASTAL ZONE BOUNDARY MAP
45 BROAD STREET DEVELOPMENT

0 100 200 400 Feet

N

Directly Affected Area

- Project Site
- Development Site
- Subway Stations
- Study Area (400-foot radius)
- Coastal Zone

FINANCIAL DISTRICT
MANHATTAN, NY

LANGAN

Map Reference: ESRI Basemap; NYC Department of City Planning MapPLUTO

Coastal Assessment

A preliminary evaluation of the Proposed Action's consistency with the policies of the City's WRP was undertaken in accordance with the guidelines of the *CEQR Technical Manual*. This preliminary evaluation required completion of the Consistency Assessment Form (CAF), which was developed by DCP to help applicants identify which WRP policies apply to a specific action. The questions in the CAF are designed to screen out those policies that would have no bearing on a consistency determination for a proposed action. For questions that "promote" or "hinder" the WRP policy, or for which an answer is ambiguous, an assessment as to the proposed action's consistency with the noted policy or policies is required. The CAF is included in Appendix C, "Coastal Assessment Form." The CAF and supporting WRP documentation will be submitted to DCP's Waterfront Division for review for consistency concurrence.

According to the WRP and as identified in Section C of the CAF, the following policies warranted further evaluation: 1.1, 1.2, 1.3, 6.2, 10.1, and 10.2.

Policy 1.1: Encourage commercial and residential redevelopment in appropriate coastal zone areas.

The Proposed Action would facilitate the construction of a 1,115-foot (80-floor), 478,209-gsf mixed-use building in the Financial District of Manhattan. The building facilitated by the Proposed Action would include commercial use on the lower floors, and residential use on the upper floors. Therefore, the Proposed Action would encourage and facilitate residential and commercial development on a currently vacant property within the City's coastal zone. Moreover, the Project Site is not located within a Significant Maritime or Industrial area, and it does not have any characteristic or significant natural features.

Therefore, the Proposed Action would promote this policy.

Policy 1.2: Encourage non-industrial development that enlivens the waterfront and attracts the public.

The Proposed Action would encourage non-industrial uses by facilitating the development of a new 478,209-gsf mixed-use building, which would include commercial use on floors 1 through 10, and residential use on floor 1 (a residential lobby) and floors 11 through 80.[33] While the Project Site is not located along the New York City waterfront, the commercial uses proposed as part of the Development Project would enliven the surrounding area by increasing pedestrian activity at the street level.

Therefore, the Proposed Action would promote this policy.

[33] The total floor area of the With-Action building (Proposed Project) includes approximately 56,447 gsf mechanical space on floors 2, 11, 11M, 34, 34M, 52, and floors 77 through 80; and approximately 8,726 gsf of outdoor space such as, a garden, an outdoor terrace space, and a wind break on floors 12, 33, and 53.

Policy 1.3: Encourage redevelopment in the Coastal Zone where public facilities and infrastructure are adequate or will be developed.

The Proposed Action would facilitate a commercial/residential development at a density that would be compatible with the bulk of the surrounding area. The Project Site is well served by public transit, with access to the J/Z subway lines at Broad Street Station; the 2/3 subway lines at Wall Street Station; the 4/5 subway lines at Wall Street and Broadway stations; and 17 bus lines (M20; M15; and 15 Staten Island express bus lines) within approximately 1,000 feet. The Broad Street Station of the Nassau Street J/Z subway line is Place adjacent to the Project Site at the intersection of Broad Street and Exchange. The Project Site is also located within walking distance to the 1 and R subway lines at South Ferry and Whitehall Street stations, respectively, as well as the Staten Island Ferry. The Proposed Action would increase the total permitted FAR on the Project Site, in exchange for subway station improvements, which would consist of the installation of two ADA-compliant elevators at the Broad Street Station (J/Z line) and two control areas at the connecting Wall Street Station (4/5 line). The proposed subway improvements to the Broad Street Station would provide access from Broad Street to the southbound and northbound subway platforms.

In addition to the existing public transit infrastructure, there is an existing 9-story, approximately 93,894-sf public facility (the Leman Manhattan Preparatory School building) on the Project Site. Other schools in the area include Millennium High School and Battery Park City School, both of which are located within 0.66 miles of the Project Site.

Therefore, the Proposed Action would promote this policy.

Policy 1.5: Integrate consideration of climate change and sea level rise into the planning and design of waterfront residential and commercial development, pursuant to WRP Policy 6.2.

The Proposed Action would facilitate a commercial/residential development within Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) zones. According to the 2015 Preliminary FIRMs, the Project Site falls within Zone AE and the 0.2 percent annual chance flood hazard zone (Figure 11).[34,35] In addition to the flood hazard areas, FEMA includes the Limit of Moderate Wave Action (LiMWA) on FIRMs, allowing communities and individuals to better understand the flood risks to their property.[36] The Project Site is not located near the LiMWA, indicating that the Project Site is not subject to additional significant risk during a 1-percent-annual-chance flood event.

The Proposed Project would conform to building codes and has considered climate change and sea level rise pursuant to WRP Policy 6.2. Please refer to the Policy 6.2 discussion below for further information.

Therefore this Proposed Action would promote this policy.

[34] An area of high flood risk is subject to inundation by the 1percent annual-chance flood event.
[35] Areas of moderate flood risk within the 0.2 percent annual chance floodplain; or areas of 1percent annual chance flooding where average depths are less than 1 foot, where the drainage area is less than 1 square mile, or areas protected from this flood level by a levee.
[36] The LiMWA is the inland limit of the area expected to receive 1.5-foot or great breaking waves during the 1-percent-annual-chance flood event.

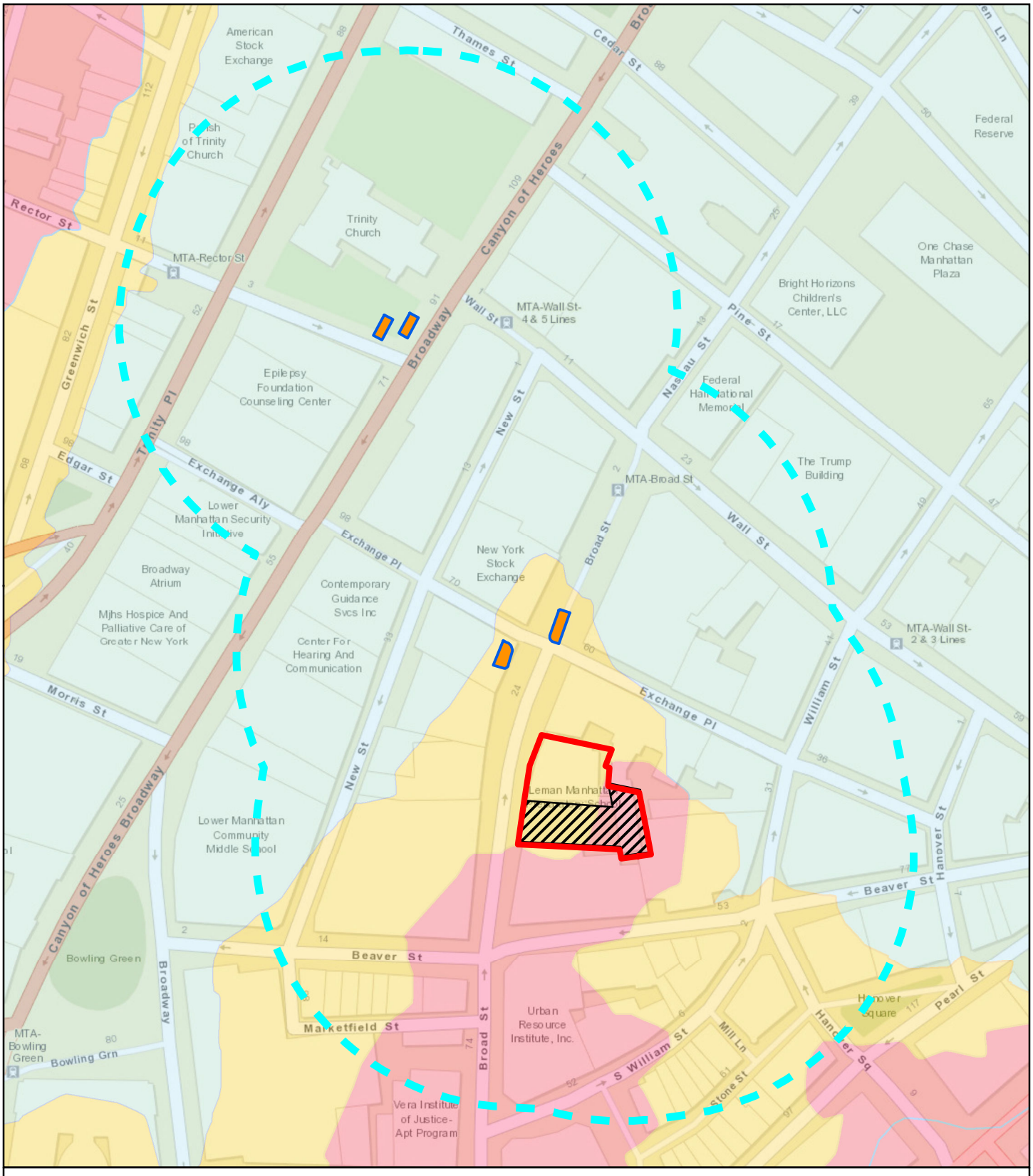


FIGURE 12: FEMA FIRM MAP
45 BROAD STREET DEVELOPMENT

FINANCIAL DISTRICT
MANHATTAN, NY

0 100 200 400 Feet

N

Directly Affected Area

- Project Site
- Development Site
- Subway Stations

Flood Zones

- Zone AE (1% Annual Chance Flood Hazard)
- 0.2% Annual Chance Flood Hazard
- Zone X

LANGAN

Map Reference: ESRI Basemap; FEMA PFIRM 2015

Policy 6.1: Minimize losses from flooding and erosion by employing non-structural and structural management measures appropriate to the site, the use of the property to be protected, and the surrounding area.

The Project Site is located within the 100-year floodplain (Figure 12). A majority of the Project Site is located within the 0.2 Annual Chance Flood Hazard Zone. The eastern portion of the Project Site is located within the Flood Zone AE, which has a base flood elevation (BFE) 11 feet NAVD88. The building facilitated by the Proposed Action would be designed to Flood Zone AE, with the Design Flood Elevation (DFE) at 12 NAVD88.[37] The design of the proposed project would comply with the New York City Building Code, which details construction requirements within the 100-year floodplain for each applicable building category.

The Proposed Action would facilitate a building with three "cellar" floors, which would be built below the DFE elevation of 12 feet NAVD88. These floors consist of mechanical rooms, storage cages, a recreational facility that includes a pool and other residential amenities. One electrical closet is located at the southwestern portion of Sub-Cellar 1. All other utilities are located on Sub-Cellar 2 including the gas meter room, elevator control room, fuel oil room, sump ejector room, and electrical closet. These levels would be protected by a caisson foundation consistent with 2014 City Building Code requirements. All utilities and equipment below the DFE are located within the dry flood-proof enclosure. By complying with the 2014 City Building Code requirements, the Development Project would be at a reduced risk of damage from coastal flood hazards. Therefore, the Proposed Project would meet WRP objectives of reducing risks of damage from current and future coastal hazards.

Therefore, the Proposed Action would promote this policy.

Policy 6.2: Integrate consideration of the latest New York City projections of climate change and sea level rise (as published in New York City Panel on Climate Change 2015 Report, Chapter 2: Sea Level Rise and Coastal Storms) into the planning and design of projects in the city's Coastal Zone.

As discussed above, the Project Site is at a base flood elevation (BFE) of 11 feet NAVD88. The average elevation of the ground floor commercial/residential, cellar floor recreational facility, critical infrastructure, and the subway elevators are at or below the elevation of the current 1 percent chance floodplain, and will be for their lifespan under all sea level rise projections. By the highest estimate (90th percentile) taken from the New York City Panel on Climate Change 2015 Report, Chapter 2, "Sea Level Rise and Coastal Storms," the BFE for the Project Site may rise approximately 11.80 feet NAVD88 in 2020, 13.50 Feet NAVD88 in 2050, and 15.83 feet NAVD88 in 2080. Under the 90th percentile projections, the proposed commercial and residential amenity spaces would be below the BFE and DFE in the 100 year storm event. The Development Project has three "cellar" floors totaling 32 feet below grade, which would be lower than the BFE of 11 feet NAVD88 and the DFE of 12 feet NAVD88. However, the Development Project is designed in accordance with the 2014 New York City Building Code. The proposed building would feature a

[37] The DFE (also known as the FRCE) is a new zoning datum that is used as the basis for zoning calculations in flood zones. This is determined by using the elevation shown on the latest FEMA flood maps and adding the additional freeboard elevation that is required by the Building Code for your building type.

caisson and pile foundation, encompassing the three "cellar" floors.[38] All critical infrastructure including, but not limited to, electricity connections, generators and fuel, communications, and elevators would be designed to withstand flooding up to the DFE (12 feet NAVD88). In addition, portions of the proposed building at grade used for building access are wet flood-proofed per ASCE 24-05. There is no direct ingress or egress to subgrade cellar floors from outside the proposed building. The Proposed Action would not substantially affect flood levels in the surrounding area In addition, the proposed ADA-compliant elevators at the Broad Street Station (J/Z line) would be flood-proofed in compliance with New York City Building Code. The elevators would be equipped with sump pumps to eject water in the event of flooding. The applicant would be responsible for elevator maintenance either through direct performance of maintenance activities or funding of work by NYCTA. Coastal storms could bring high winds in addition to the flood hazards described above. The Project Site is not within a Coastal A or V zone.

Therefore, the Proposed Project would comply with applicable flood mitigation requirements and would promote this policy.

Policy 8.2: Incorporate public access into new public and private development where compatible with proposed land use and coastal location.

The Project Site is not a waterfront property and is not located directly along NYC's coastal waters; the Project Site is located approximately 0.25 miles from the waterfront. The Proposed Action would not adversely affect the future development of public access to any coastal waters along the NYC waterfront.

Therefore, the Proposed Action would neither promote nor hinder this policy.

Policy 10.1: Retain and preserve historic resources, and enhance resources significant to the coastal culture of New York City.

The Project Site is within the S/NR-designated WSHD. As described in Attachment E, "Historic and Cultural Resources," there are 79 LPC- and S/NR-designated individual historic resources in the 400-foot Study Area, including the 9-story building on the Project Site (the Lehman Preparatory School on Lot 10). In addition, all streets bounding Block 25 are part of the Street Plan of New Amsterdam and Colonial New York, and Landmarks Preservation Commission (LPC)-designated historic resource. All construction activities on the Development Site and at the Broad Street Station would follow the guidelines and procedures of New York City's DOB PPN#10/88 to avoid any damage to any historic structures within 90 feet.

In addition, an LPC approved Construction Protection Plan (CPP) would be developed to ensure the protection of adjacent historic structures during construction. LPC has approved sidewalk modifications at the intersection of the two landmarked streets (Broad Street and Exchange Place) needed to accommodate the two proposed ADA-compliant elevators at the Broad Street Station.

Therefore, the Proposed Action would not hinder this this policy.

[38] A caisson foundation is a watertight retaining structure, often consisting of a prefabricated hollow box or cylinder sunk into the ground to some desired depth and then filled with concrete thus forming a foundation.

Policy 10.2: Protect and preserve archaeological resources and artifacts.

The Project Site is located in an area designated as archaeologically sensitive by the New York State Historic Preservation Office (SHPO).

The Proposed Action would involve the protection and preservation of archaeological resources and artifacts and, therefore, would promote this policy.

Conclusion

Based on the coastal consistency analysis, the Proposed Action is consistent with all applicable policies of the WRP; therefore, no further analysis is required.

ATTACHMENT D: SHADOWS

INTRODUCTION

According to the *CEQR Technical Manual*, a shadow assessment is appropriate when a proposed action would result in new structure(s) or additions to existing structure(s) that is greater than 50 feet in height and/or adjacent to an existing sunlight-sensitive resource. The *CEQR Technical Manual* defines a shadow as a condition that results when a building or other built structure blocks the sunlight that would otherwise directly reach a certain area, space, or feature. An adverse shadow impact would occur when a shadow from a proposed project falls on a publicly accessible open space, historic landscape, or other historic resource that depends on sunlight for its enjoyment by the public, or their architecture and historic integrity (*e.g.,* stained glass windows), or if the shadow falls on an important natural feature and adversely affects its use and/or important landscaping and vegetation. Shadows occurring on other non-significant buildings (city streets, sidewalks, other buildings, and privately open space resources) or within an hour and a half of sunrise or sunset generally are not considered significant under City Environmental Quality Review (CEQR).

METHODOLOGY

The analysis methodology is based on the guidelines of the *CEQR Technical Manual*, which includes conducting a preliminary assessment to determine whether the incremental shadows resulting from a proposed project could reach any sunlight-sensitive resource at any time of year. According to the *CEQR Technical Manual*, an incremental shadow is the additional, or new, shadow that a building or other built structure resulting from a proposed project would cast on a sunlight-sensitive resource during the year.

PRELIMINARY SCREENING ASSESSMENT

In the With-Action Condition, the Proposed Action would facilitate an approximately 1,115-foot (80-floor), commercial/residential building on the Development Site; this is greater than the CEQR threshold of 50 feet. However, the proposed 66-floor, commercial/residential building in the No-Action Condition would also have a building height of 1,115 feet and would be identical in bulk to the building in the With-Action Condition. Therefore, the Proposed Action would not result in any incremental building height or change in building envelope between the No-Action and With-Action conditions; thus, the Proposed Project would not result in incremental shadows.[39]

Based on this information, the Proposed Action would not result in any significant adverse shadow impacts on the sunlight-sensitive resources in the vicinity of the Project Site.

[39] The typical floor-to-ceiling height of the upper residential floors in the With-Action building is reconfigured to 10.83 and 12 feet, from 12 and 16 feet, respectively, in the No-Action building, and at the building base to 16 feet from 32 feet in the No-Action building; thereby resulting in no increase in the proposed maximum building height.

ATTACHMENT E: HISTORIC AND CULTURAL RESOURCES

INTRODUCTION

The *CEQR Technical Manual* identifies architectural resources as historically important buildings, structures, objects, sites, and districts. These include buildings and properties designated as a New York City Landmark (NYCL) by the New York City Landmarks Preservation Commission (LPC); properties listed on the State/National Register of Historic Places (S/NR) or contained within a district listed on or formally determined eligible for S/NR listing; properties recommended by the New York State Board for listing on the S/NR; National Historic Landmarks (NHL) designated by the U.S. Secretary of the Interior; and properties not identified by one of the programs listed above, but that meet their eligibility requirements by the New York State Historic Preservation Office (SHPO).

According to the *CEQR Technical Manual*, a historic district is a geographically definable area that possesses a significant concentration of associated buildings, structures, urban landscape features, or archaeological sites, united historically or aesthetically by plan and design or physical development and historical and/or architectural relationships. In Title 36 of the Code of Federal Regulations Part 60 (36 CFR Part 60), the U.S. Secretary of the Interior has established criteria for listing on the S/NR that consider whether the significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association. Further, it is determined if resources are associated with (i) events that have made a significant contribution to the broad patterns of our history; or (ii) the lives of persons significant in our history; or that (iii) embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or (iv) that have yielded, or may be likely to yield, information important in prehistory or history.[40]

Archaeological resources are defined in the *CEQR Technical Manual* as physical remains, usually subsurface, such as burials, foundations, artifacts, wells, and privies of the prehistoric, Native American, and historic periods.

According to the *CEQR Technical Manual*, an assessment of potential impacts on architectural resources is typically required if a proposed project would result in the following:

- New construction, demolition, or significant physical alteration to any building, structure, or object;
- A change of scale, visual prominence, or visual context of an historic resource. The *CEQR Technical Manual* describes visual prominence as generally the way in which a historic resource is viewed. Visual context is the character of the surrounding built or natural environment;

[40] 36 CFR Part 60.4, Criteria for Evaluation

- Additions to or significant removal, grading, or replanting of significant historic landscape features;
- Screening or elimination of publicly accessible views; or
- Introduction of significant new shadows or significant lengthening of the duration of shadows on an historic landscape or on an historic structure that depends on sunlight.

METHODOLOGY

Based on *CEQR Technical Manual* guidelines, the first step in evaluating if a proposed project may affect historic resources is to consider what area the project might affect and then identify historic resources, whether officially recognized or eligible for such recognition, within that area. Accordingly, to assess the potential impacts of the Proposed Action on historic resources, an inventory of historic resources within a 400-foot radius of the Project Site (the "Study Area") was compiled using SHPO's *Cultural Resource Information System (CRIS)* database and LPC's *Discover NYC Landmarks* online map. The inventory was supported through consultation with LPC in the form of an environmental review request for comment on the architectural and archaeological significance of the Proposed Project and potential historic resources in the Study Area. All correspondence with LPC is included in Appendix D, "Agency Correspondence," and a description of each historic resource in the Study Area is provided in Appendix E, "Historic and Cultural Resources."

EXISTING CONDITIONS

As listed in Table E-1 and shown in Figure 13, the Study Area contains 79 historic resources that are designated as NYCLs by LPC, and/or listed on the S/NR. These historic resources include the Street Plan of New Amsterdam (11 street segments), historic lampposts (Lamppost 3, 4, 5, and 6), two historic districts (Wall Street and Stone Street historic districts), the IRT Subway System Underground Interior at Wall Street Station (Lexington Avenue 4/5 Line), and 74 buildings (Appendix E, "Historic and Cultural Resources"). LPC confirmed that this list of historic resources is accurate (LPC letter dated 16 December 2016, Appendix D).

Table E-1: Historic and Cultural Resources

Map No.	Historic Resource	Location (New York, NY)	Designation
1	Street Plan of New Amsterdam and Colonial New York	(a) Exchange Place Between Broadway and Hanover Street; New Street Between Wall Street and Marketfield; (b) Exchange Place Between Broadway and Hanover Street; Broad Street Between Wall and Pearl Streets (c) Exchange Place Between Broadway and Hanover Street; William Street Between Wall And Beaver Streets; (d) Beaver Street Between Broadway and Pearl Street; William Street, South William Street and Hanover Square; (e) Beaver Street Between Broadway and Pearl Street; Broad Street Between Wall and Pearl Streets; (f) Beaver Street Between Broadway and Pearl Street; New Street Between Wall and Marketfield; (g) Mill Lane Between South William and Stone Street; Stone Street Between Whitehall and Hanover Square; (h) Wall Street between Broadway and Pearl Street; Broad Street between Wall and Pearl Streets;	Designated NYC Individual Landmark (LP-1235)

Table E-1 (continued): Historic and Cultural Resources

Map No.	Historic Resource	Location (New York, NY)	Designation
1	Street Plan of New Amsterdam and Colonial New York	(i) Broadway between Wall and Beaver Streets; Exchange Place between Broadway and Hanover Street; (j) Wall Street between Broadway and Pearl Street; Broadway between Wall Street and Beaver Street; (k) Wall Street between Broadway and Pearl Street; New Street between Wall Street and Beaver Street;	Designated NYC Individual Landmark (LP-1235)
2	Wall Street Historic District	Bounded by Maiden Lane, Pearl, Bridge, and Greenwich streets	S/NR Listed (2007)
3	Stone Street Historic District	Bounded by South William Street, William Street, Pearl Street and Coenties Slip	Designated NYC Historic District (LP-9945) NR Listed (04/28/1997) SR Listed (06/23/1980)
4(a)	Historic Street Lamppost 3	Adjacent to 24 Beaver Street	Designated LPC Landmark (LP-1961)
4(b)	Historic Street Lamppost 4	Adjacent to 50 Broadway	
4(c)	Historic Street Lamppost 5	Adjacent to 80 Broadway	
4(d)	Historic Street Lamppost 6	Adjacent to 10 Pine Street (120 Broadway)	
5	Broad Exchange Building	25 Broad Street	Designated LPC Landmark (LP-2074) S/NR Listed
6	Lee, Higginson Bank Building (on the Project Site)	37-41 Broad Street	S/NR Listed
7	American Bureau of Shipping (demolished previously on the Development Site)	45 Broad Street	S/NR Listed
8	55 Broad Street (non-contributing)	55 Broad Street	S/NR Listed (non-contributing)
9	Lord's Court Building	40 Exchange Place	S/NR Listed
10	J. P. Morgan & Co. Building	23 Wall Street/15 Broad Street	Designated LPC Landmark (LP-0039) S/NR Listed
11	Equitable Trust Company	15 Broad Street	S/NR Listed
12	New York Stock Exchange	11 Wall Street	S/NR Listed
13	New York Stock Exchange	2 Broad Street	Designated LPC Landmark (LP-1529)
14	20 Broad Street	20 Broad Street	S/NR Listed
15	Continental Bank Building	30 Broad Street	S/NR Listed
16	Office Building (non-contributing)	40 Broad Street	S/NR Listed (1982; non-conforming)
17	50 Broad Street	50 Broad Street	S/NR Listed
18	FCC 621 (non-contributing)	60 Broad Street	S/NR Listed
19	American Bank Note Company Office Building	70 Broad Street	Designated LPC Landmark (LP-1955) S/NR Listed
20	74 Broad Street	74 Broad Street	S/NR Listed
21	Maritime Exchange Building	80 Broad Street	S/NR Listed
22	Former International Telephone Building	75 Broad Street	S/NR Listed
23	Kerr Steamship Co. Building	44 Beaver Street	S/NR Listed
24	Delmonico's Building (non-contributing)	48 Beaver Street	S/NR Listed (non-contributing)
25	Delmonico's Building (non-contributing)	52 Beaver Street	S/NR Listed (non-contributing)
26	Delmonico's Building (non-contributing)	54-56 Beaver Street	Designated LPC Landmark (LP-1944) S/NR Listed (non-contributing)
27	Delmonico's Restaurant	2-6 South William Street	S/NR Listed
28	J. & W. Seligman & Company Building/Lehman Brothers Building	1 William Street	Designated LPC Landmark (LP-1943) S/NR Listed
29	Office; American Board of Trades	9-11 South William Street	S/NR Listed
30	Business; now bar and restaurant (Stone Street Historic District)	13 South William Street	S/NR Listed
31	Business; now restaurant and offices	15 South William Street	S/NR Listed

Table E-1 (continued): Historic and Cultural Resources

Map No.	Historic Resource	Location (New York, NY)	Designation
32	Business; now Art Gallery/Offices	17 South William Street	S/NR Listed
33	Business	19 South William Street	S/NR Listed
34	Business	21-23 South William Street	S/NR Listed
35	Parking Garage (non-contributing)	26 South William Street	S/NR Listed (non-contributing)
36	Commercial Building	44 Stone Street	S/NR Listed
37	Commercial Building	46 Stone Street	S/NR Listed
38	Commercial Building	48 Stone Street	S/NR Listed
39	Commercial Building	50 Stone Street	S/NR Listed
40	Commercial Building	52 Stone Street	S/NR Listed
41	The Customs House on Pearl Street	54-56 Stone Street	S/NR Listed
42	Commercial Building	58 Stone Street	S/NR Listed
43	India House (Private Club)	60 Stone Street	S/NR Listed
44	India House (Private Club)	62 Stone Street	S/NR Listed
45	India House (Private Club)	64 Stone Street	S/NR Listed
46	India House (Private Club)	66 Stone Street	S/NR Listed
47	New York Cotton Exchange (India House)	1 Hanover Square	Designated LPC Landmark (LP-0042) S/NR Listed
48	Commercial building	95 Pearl Street	S/NR Listed
49	(non-contributing)	5 Hanover Square	S/NR Listed (non-contributing)
50	New York Cotton Exchange	3 Hanover Square	S/NR Listed
51	City Bank-Farmers Trust Company Building	20 Exchange Place	Designated LPC Landmark (LP-1941) S/NR Listed
52	First National City Bank (Merchants' Exchange)	55 Wall Street	Designated LPC Landmark (LP-00040); Also Interior Designation (LP-1979); and S/NR Listed
53	Trust Company of America	37 Wall Street	S/NR Listed
54	Atlantic Insurance Group	45 Wall Street	S/NR Listed
55	Standard Oil Building	26 Broadway	Designated LPC Landmark (LP-1930) S/NR Listed
56	Office Building by 1896 by Clinton & Russel	32 Broadway	S/NR Listed
57	Office building	42 Broadway	S/NR Listed
58	Exchange Court (non-contributing)	52 Broadway	S/NR Listed (non-contributing)
59	44 New Street	44 New Street	S/NR Listed
60	16 Beaver Street	16 Beaver Street	S/NR Listed
61	Fusco's Restaurant	18 Beaver St	S/NR Listed
62	20 Beaver Street	20 Beaver Street	S/NR Listed
63	(non-contributing)	22 Beaver Street	S/NR Listed (non-contributing)
64	(non-contributing)	24 Beaver Street	S/NR Listed (non-contributing)
65	Stock Quotation Telegraph Co.	26 Beaver Street	S/NR Listed
66	IRT Subway System Underground Interior (Wall Street Lexington Avenue Line Station)	Wall Street and Broadway	Designated LPC Landmark (LP-1096)
67	American Express Company Building	61 - 65 Broadway	Designated LPC Landmark (LP-1932) S/NR Listed
68	Empire Building	69 Broadway	Designated LPC Landmark (LP-1933) S/NR Listed
69	Trinity Church and Graveyard	75 Broadway	Designated LPC Landmark (LP-0048) S/NR Listed
70	Trinity Building	111 Broadway	Designated LPC Landmark (LP-1557) S/NR Listed
71	American Surety Company Building	96 Broadway	Designated LPC Landmark (LP-1934) S/NR Listed
72	First National City Bank Building	2 Wall Street	S/NR Listed
73	1 Wall Street Building	58 Broadway	Designated LPC Landmark (LP-2029)

Table E-1 (continued): Historic and Cultural Resources

Map No.	Historic Resource	Location (New York, NY)	Designation
74	14 Wall Street Building	14 Wall Street	Designated LPC Landmark (LP-1949) S/NR Listed
75	Federal Hall	26 Wall Street	
76	Federal Hall National Memorial	28 Wall Street	S/NR Listed
77	United States Assay Office; Seaman's Bank of Savings	30 Wall Street	S/NR Listed
78	Bank of Manhattan Company Building	40 Wall Street	S/NR Listed
79	One Exchange Place	55 Broadway	S/NR Listed

***Source**: SHPO's Cultural Resource Information System (CRIS) https://cris.parks.ny.gov/ Accessed on December 12, 2016; and LPC's Discover NYC Landmarks Online Map- http://nyclpc.maps.arcgis.com/apps/webappviewer/index.html?id=93a88691cace4067828b1eede432022b (Accessed on November 16, 2017.*

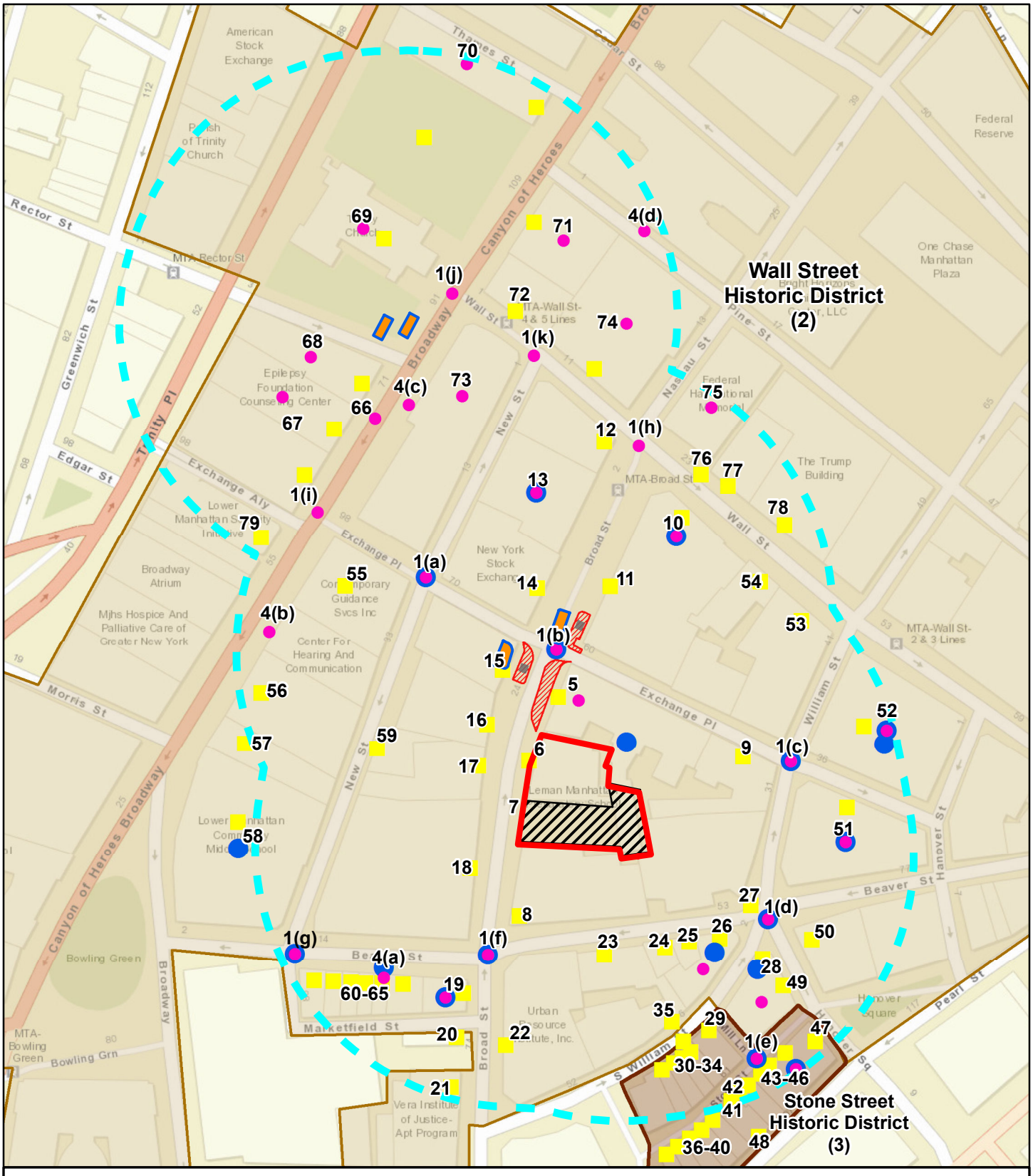


FIGURE 13: HISTORIC AND CULTURAL RESOURCES
45 BROAD STREET DEVELOPMENT

FINANCIAL DISTRICT
MANHATTAN, NY

LANGAN

Map Reference: NYC Department of City Planning MapPLUTO; NYC Landmarks Preservation Commission (LPC); New York State Historic Preservation Office (SHPO)

ASSESSMENT

The following section assesses the Proposed Action's potential to result in significant adverse impacts on architectural and archeological resources.

Architectural Resources – Direct Impacts

According to the *CEQR Technical Manual*, direct impacts on architectural resources occur when a project results in new construction, demolition, or significant physical alteration to any landmarked or landmark eligible historic building, structure, or object.

Development Project

The Proposed Project would include the construction of an approximately 478,209-gsf commercial/residential building on Block 25, Lot 7 (the "Development Site") (Figure 7). As described in Attachment B, "CEQR Analysis Framework," the With-Action building would be identical in height and bulk to the as-of-right building in the No-Action Condition. The Proposed Action would result in an internal reconfiguration of the floor area only.

Based on its letter dated 16 December 2016, LPC confirmed that the Development Site is within the S/NR listed Wall St. Historic District. The Development Site is also directly adjacent to (i) the S/NR listed Lee, Higginson & Company Bank Building at 41 Broad Street; the Broad Exchange Building at 25 Broad Street (S/NR and LPC listed); and the LPC designated Street Plan of New Amsterdam and Colonial New York.

The Development Site is completely vacant and contains no architecturally significant resources. Therefore, the Proposed Action would not result in new construction, demolition, or significant physical alteration to any landmarked or landmark eligible historic building, structure, or object.

Further, all construction activities on the Development Site would follow the guidelines and procedures of the NYC DOB's PPN#10/88 to avoid any damage to any historic structures within 90 feet, including the Lee, Higginson & Company building, the Broad Exchange Building and the Lord's Court Building. In addition, an LPC-approved Construction Protection Plan (CPP) would be developed to ensure the protection of adjacent historic structures during construction.

Based on this information, the Proposed Action would not result in any potentially significant direct impacts on architectural resources.

Subway Station Improvements

The Proposed Project also includes subway station improvements to the Broad Street J/Z subway station adjacent to the Project Site at Broad Street and Exchange Place, as well as improvements to the two control areas for ingress and egress at the connecting Wall Street Station on the Lexington Avenue line. The Broad Street improvement would consist of the installation of two ADA-compliant elevators at the Broad Street J/Z subway station that would provide access from Broad Street to the southbound and northbound subway platforms. As described in Attachment A, "Project Description," one elevator is proposed to be located on the southwest corner of Broad Street and Exchange Place and the other is proposed to be located at the northeast corner (Figure 13).

Improvements to the connecting Wall Street Station of the Lexington Avenue line would include the replacement of the High Exit and Entrance Turnstiles with one typical Automatic Fare Control (AFC) turnstile for a total of seven new AFCs.

As stated in its Binding Report dated 30 August 2016 (Docket #192370, Appendix D), LPC, at the Public Meeting of 26 July 2016, approved the proposed subway station improvements, concluding that the installation of the elevator bulkheads and alteration to the sidewalk and curbs would not significantly alter the character of the street bed or otherwise permanently affect the street pattern, and that the proposed work would not diminish the special architectural and historic character of the Street Plan of New Amsterdam and Colonial New York Individual Landmark.

Based on these findings, LPC determined the proposed work to be appropriate and issued a positive report.

Architectural Resources – Indirect Impacts

According to the *CEQR Technical Manual*, a project may result in adverse indirect impacts on historic resources when it affects its context or visual prominence and if the change is likely to alter or eliminate the significant characteristics of the resource that make it an important resource. Indirect impacts include those that result from construction, action-generated shadows, or other effects on historic resources in the study area once construction is completed.

Development Project

The Proposed Action would facilitate construction of a 1,115-foot (80-floor) commercial/residential building on the Development Site, which is the same height as the 1,115-foot (66-floor) as-of-right building in the No-Action Condition; it would result only in an internal reconfiguration of floors to provide the additional floor area. Because the With-Action building envelope would be identical to that of the as-of-right building in the No-Action Condition, the Proposed Action would not result in any effects to the context or visual prominence of the adjacent historic buildings along Broad Street, including the adjacent Lee, Higginson & Company Bank Building (an S/NR-listed historic building). The With-Action building would conform to the as-of-right building street wall, building height, and setbacks; therefore, the Proposed Action would not alter existing view corridors or alter any historic resource's setting or visual relationship with the streetscape within the 400-foot Study Area.

Further, as described in Attachment E, "Shadows," because of the identical building envelopes in both the No-Action and With-Action conditions, the Proposed Action would not introduce any new incremental shadows.

Subway Station Improvements

The proposed improvements to the Broad Street subway station and the connecting Wall Street subway station are described above. As stated in its Binding Report dated 30 August 2016 (Docket #192370, Appendix D), LPC, at the Public Meeting of 26 July 2016, approved the proposed Broad Street subway station improvements, concluding that the installation of the elevator bulkheads and alteration to the sidewalk and curbs would not significantly alter the character of the street bed or

otherwise permanently affect the street pattern, and that the proposed work would not diminish the special architectural and historic character of the Street Plan of New Amsterdam and Colonial New York Individual Landmark. Further, because the proposed improvements to the connecting Wall Street subway station would be limited to the replacement of the High Exit and Entrance Turnstiles with Automatic Fare Control (AFC) turnstiles, there is no potential for indirect impacts on historic resources.

Based on this information, the Proposed Action would not result in any potentially significant indirect impacts on architectural resources.

Archaeological Resources

Development Project

As described in Attachment B, "Analysis Framework," the Proposed Action would not result in any incremental building height increase or change in building envelope; it would result only in an internal reconfiguration of floors to provide the additional floor area. The With-Action building would not necessitate borings or foundations deeper than that which would be required for an as-of-right building in the No-Action Condition.

Because the proposed Development Project facilitated by the Proposed Action would not generate any incremental increase in in-ground disturbance between the No-Action Condition and With-Action Condition, an analysis of potential archaeological impacts is not required.

Subway Station Improvements

The proposed subway station improvements would consist of the installation of two elevators that would provide ADA access from Broad Street to the southbound and northbound subway platforms. The proposed elevators would be constructed within the sidewalk and road rights-of-way on the west and east sides of Broad Street. One elevator is proposed to be located on the southwest corner of Broad Street and Exchange Place and the other elevator is proposed to be located at the northeast corner. The proposed elevators would not be physically connected to the proposed development project at 45 Broad Street.

Construction of the proposed elevators would not result in in-ground disturbance to an area that has not been previously excavated. The area immediately below the sidewalks and road bed contains the subway structure, which spans from property line to property line. Above the subway station roof, the below-grade area is laced with subway vent structures and multiple utilities, including two large sanitary sewers and water, gas, electric, and communication lines either directly buried or in concrete duct banks.

Because the proposed Subway Station Improvements facilitated by the Proposed Action would not result in any in-ground disturbance to an area that has not been previously excavated, an analysis of potential archaeological impacts is not required for these sites.

ATTACHMENT F: URBAN DESIGN

INTRODUCTION

This section assesses the potential effects on urban design and visual resources that could occur as a result of the Proposed Action. According to the *CEQR Technical Manual*, a preliminary assessment of urban design and visual resources is appropriate when there is the potential for a pedestrian to observe, from street level, a physical alteration beyond that allowed by the existing zoning, including (i) projects that permit the modification of yard, height, and setback requirements; and (ii) projects that result in an increase in built floor area beyond what would be allowed as-of-right or in the No-Action Condition. City Environmental Quality Review (CEQR) requires a detailed analysis for projects that would result in substantial alterations to the streetscape of the neighborhood by noticeably changing the scale of buildings.

ASSESSMENT

The Proposed Action is the approval of a special permit for a floor area bonus (up to 3.00 Floor Area Ratio (FAR)) on the Project Site in exchange for Broad Street subway station improvements consisting of the installation of two Americans with Disabilities Act (ADA) compliant elevators and improvements to fare control areas at the connected Wall Street station of the Lexington Avenue line. However, the *CEQR Technical Manual* states that, "There is no need to conduct an urban design analysis if a proposed project would be constructed within existing zoning envelopes, and would not result in physical changes beyond the bulk and form permitted as-of-right."

As described in Attachment B, "Analysis Framework," the proposed building in the With-Action Condition would be identical to that of the No-Action building in terms of height, setbacks, and lot coverage. The additional 3.00 FAR granted through the special permit would not result in any physical alteration to the building in the With-Action Condition as compared to the No-Action Condition. Rather, the additional 3.00 FAR would allow for an additional 14 floors within the With-Action building; this additional floor area would be achieved by reconfiguring the floor-to-ceiling heights in the With-Action building. The residential floor-to-ceiling heights would be reduced from 12 feet to 10.83 feet at lower levels and from 16 feet to 10.83 feet or 12 feet at upper levels. At the building base, the floor-to-ceiling heights of the commercial floors would be reduced from 32 feet in the No-Action building to 16 feet in the With-Action building. Therefore, there would be no incremental increase in the building height or bulk between the No-Action and With-Action conditions.

Because the With-Action and No-Action building envelopes would be identical, an urban design and visual resources assessment is not required (Figure 10). This was confirmed in the New York City Department of City Planning's (DCP) ID Meeting Record dated April 19, 2016.

Therefore, a detailed analysis of the Proposed Action's potential impacts on urban design is not warranted.

ATTACHMENT G: HAZARDOUS MATERIALS

INTRODUCTION

The *CEQR Technical Manual* defines hazardous materials as any substances that pose a threat to human health or the environment. Substances that can be of concern include, but are not limited to, heavy metals, volatile and semi volatile organic compounds (VOCs, including petroleum constituents and chlorinated solvents, and SVOCs), methane, polychlorinated biphenyls (PCBs), and hazardous wastes (defined as substances that are chemically active, ignitable, corrosive, or toxic).

The potential for significant impacts from hazardous materials occurs when hazardous materials exist on a site and an action would increase pathways to their exposure to humans and the environment, or an action would introduce new activities or processes using hazardous materials. Because the Proposed Project would involve excavation on a vacant site, it has the potential to increase exposure pathways to humans and the environment to hazardous materials.

ASSESSMENT

The Proposed Action is the approval of a special permit for a floor area bonus (up to 3.00 FAR) on the Project Site in exchange for Broad Street J/Z subway station improvements consisting of the installation of two ADA-compliant elevators and improvements to fare control areas at the connected Wall Street station of the Lexington Avenue 4/5 line.

As described in Attachment B, "Analysis Framework," the Proposed Action would not result in any incremental building height increase or change in building envelope; it would result only in an internal reconfiguration of floors to achieve the increased floor area. The Proposed Action would not generate any additional in-ground disturbance to an area that has not been previously excavated. Further, the Project Site is not in an area that is currently, or was historically, a manufacturing area that involved hazardous materials. There are no institutional controls (*e.g.,* (E) designation or Restrictive Declaration) relating to hazardous materials, and there is no reason to suspect the presence of hazardous materials, contamination, illegal dumping or fill, fill materials of unknown origin, or underground and/or aboveground storage tanks within the Project Site.[41]

The proposed subway station improvements would consist of the installation of two elevators that would provide ADA access from Broad Street to the southbound and northbound subway platforms. The proposed elevators would be constructed within the sidewalk and road rights-of-way on the west and east sides of Broad Street. One elevator is proposed to be located on the southwest corner of Broad Street and Exchange Place and the other elevator is proposed to be located at the northeast corner. The proposed elevators would not be physically connected to the proposed development project at 45 Broad Street.

[41] A Phase I Environmental Site Assessment (ESA) ("Phase I ESA") was conducted on the Development Site (Block 25, Lot 7) in July 2015 by Langan Engineering, Environmental, Surveying, and Landscape Architecture, DPC (Langan) to determine whether the site might contain contamination from either past or present activities on the site or as a result of activities on adjacent or nearby properties. A Phase I ESA discloses potential Recognized Environmental Conditions (RECs), if any, and determines whether further building and subsurface investigation is warranted as part of a Phase II Environmental Site Investigation (ESI) to confirm the presence and extent of the contamination.

Construction of the proposed elevators would not result in in-ground disturbance to an area that has not been previously excavated. The area immediately below the sidewalks and road bed contains the subway structure, which spans from property line to property line. Above the subway station roof, the below-grade area is laced with subway vent structures and multiple utilities, including two large sanitary sewers and water, gas, electric, and communication lines either directly buried or in concrete duct banks.

Further, construction of the proposed elevators would not take place in an area that is currently, or was historically, a manufacturing area that involved hazardous materials. There are no institutional controls (*e.g.,* (E) designation or Restrictive Declaration) relating to hazardous materials, and there is no reason to suspect the presence of hazardous materials, contamination, illegal dumping or fill, fill materials of unknown origin, or underground and/or aboveground storage tanks within the site of the proposed subway elevators.

Because the Proposed Action would not result in any additional in-ground disturbance to an area that has not been previously excavated, a detailed Hazardous Materials analysis is not required.

ATTACHMENT H: TRANSPORTATION

INTRODUCTION

The Proposed Action is the approval of a special permit from the City Planning Commission (CPC), pursuant to New York City Zoning Resolution (ZR) §91-251 (Special permit for subway station improvements) of the Special Lower Manhattan District, Article IX, Chapter 1, for a floor area bonus in exchange for subway station improvements (ZR §74-634: Subway station improvements in Downtown Brooklyn and in Commercial Districts of 10 FAR and above in Manhattan) (the "Proposed Action"). The Proposed Action would affect an approximately 23,798-square-foot (sf) Project Site located at 45 Broad Street in the Financial District in Lower Manhattan (Figure 1). The Project Site is a single zoning lot consisting of two tax lots—Block 25, Lots 7 and 10.[42] Lot 7 is currently vacant and Lot 10 is currently occupied by the 9-story, approximately 93,894-sf Leman Manhattan Preparatory School building. As shown in Figure 2, the Project Site is bounded by a 21-story office building (Broad Exchange Building) to the north; a 20-story office building and a 44-story commercial/residential building to the east (fronting William Street); a 31-story office building the south; and Broad Street to the west.

The Proposed Action would facilitate construction of an approximately 1,115-foot, 80-floor commercial/residential building in the With-Action Condition (the "Development Project"), which would become fully operational by the year 2020 (the "Build Year"). The Proposed Action would generate additional person and vehicle trips through the Study Area intersections, pedestrian facilities, and transit services. The Proposed Project would also include subway station improvements to the Broad Street J/Z subway station, which would consist of the installation of two elevators at the Broad Street J/Z subway station that would provide access from Broad Street to the southbound and northbound subway platforms. In addition, the two control areas for ingress and egress at the connecting Wall Street Station on the Lexington Avenue line would be improved by replacing the existing High Exit & Entrance Turnstiles (HEETs) with the typical Automatic Fare Control (AFC) turnstiles for a total of seven new AFCs. These improvements would increase passenger movement by reducing the time it takes for passengers to leave the station after discharging from the train.

METHODOLOGY

For transportation analysis purposes, the incremental difference in trip generation between the No-Action and the With-Action conditions provides the basis for assessing transportation conditions in the study area (the "Net Incremental Trips.") As discussed in Attachment B, "CEQR Analysis Framework," the With-Action Condition would result in a net increase of 34 dwelling units and 31,518 gross square feet (gsf) of commercial space (Table B-2 in Attachment B, "CEQR Analysis Framework") as compared to the No-Action Condition. The incremental commercial space under the Proposed Action would include four floors of office space.

[42] In 2007, Tax Lot 7 (12,602 sf) and Tax Lot 10 (11,195 sf) were merged to form a single zoning lot and Tax Lot 10's excess development rights were transferred to Tax Lot 7(based on the Declaration of Zoning Lot Restrictions dated February 26, 2007 (CRFN 2007000122083), and Zoning Lot Development and Easement Agreement (ZLDEA), dated January 26, 2007 (CRFN 2007000122089)).

Preliminary Transportation Screening Assessment (Trip Generation Assessment)

According to the *CEQR Technical Manual*, a preliminary trip generation assessment was prepared following a two-tier screening process to determine if a quantified analysis of transportation conditions is warranted (Level 1 and Level 2 screening assessment).

A Level 1 (Project Trip Generation) Screening Assessment estimates the volume of person and vehicle trips attributable to the Proposed Project in the With-Action Condition for all analysis peak hours. According to the *CEQR Technical Manual*, if the increment in the With-Action Condition is expected to result in fewer than 50 peak hour vehicle trips and fewer than 200 peak hour transit or pedestrian trips, further quantified analysis is not warranted. If these Level 1 screening thresholds are exceeded, a detailed trip assignment – Level 2 (Project Trip Generation) Screening Assessment is performed, which assigns the trips to specific intersections, bus routes, subway lines, or parking spaces. The Level 2 Detailed Screening Assessment estimates the incremental trips that could be incurred at specific transportation elements (specific intersections, bus routes, subway lines, and/or parking spaces) in order to identify potential locations for further analyses. If the result of the Level 2 trip assignments demonstrate that the Proposed Action would generate an increment of 50 or more peak hour vehicle trips at an intersection; 200 or more peak hour subway trips at a station; 50 or more peak hour bus trips in one direction along a bus route; or 200 or more peak hour pedestrian trips traversing a pedestrian element, then further quantified analysis may be warranted to assess transportation conditions in the study area.

LEVEL 1 SCREENING ASSESSMENT

A Level 1 screening assessment for the Proposed Action was conducted to determine if the increment in the With-Action Condition would exceed CEQR thresholds for conducting quantified transportation analysis. A trip generation analysis was conducted for the weekday AM, midday, PM, and Saturday midday peak hours. Trip estimates were developed for the residential and commercial components using the incremental differences in the building program between the No-Action and With-Action conditions. The transportation planning assumptions used in the trip generation analysis are summarized in Table H-1 and are based on information provided in the *CEQR Technical Manual*, *East Midtown Rezoning FEIS 2013* (CEQR No. 13DCP011M), *2010-2014 U.S. Census Bureau's American Community Survey* (ACS) database, and *West Harlem Rezoning FEIS 2012* (CEQR No. 12DCP070M).

Table H-2 shows the Net Incremental Trips generated at the Project Site as a result of the Proposed Action. The Proposed Project is estimated to generate approximately 91, 92, 104, and 46 net incremental person trips, and 11, 7, 12, and 3 net incremental vehicle trips during the weekday AM, midday, PM, and Saturday midday peak hours, respectively.

Table H-1: Transportation Planning Assumptions

Use	Office (GSF) 31,518				Residential (DU) 34			
Total Daily Person Trip	(1) Weekday 18 Trips/DU		SAT 3.9		(1) Weekday 8.075 Trips/DU		SAT 9.6	
Trip Linkage	0%				0%			
Net Daily Person Trip	Weekday 18 Trips/DU		SAT 3.9		Weekday 8 Trips/DU		SAT 10	
Temporal	(1)				(1)			
	AM	**MD**	**PM**	**SAT**	**AM**	**MD**	**PM**	**SAT**
	12.0%	15.0%	14.0%	17.0%	10.0%	5.0%	11.0%	8.0%
Direction	(4)				(4)			
In	96%	48%	5%	54%	15%	50%	70%	57%
Out	4%	52%	95%	46%	85%	50%	30%	43%
Total	100%	100%	100%	100%	100%	100%	100%	100%
Modal Split	(3)(5)				(2)			
	AM	**MD**	**PM**	**SAT**	**AM**	**MD**	**PM**	**SAT**
Auto	12.6%	2.0%	12.6%	2.0%	4.0%	4.0%	4.0%	4.0%
Taxi	1.3%	3.0%	1.3%	3.0%	0.9%	0.9%	0.9%	0.9%
Subway	50.8%	6.0%	50.8%	6.0%	63.4%	63.4%	63.4%	63.4%
Bus	12.2%	6.0%	12.2%	6.0%	1.2%	1.2%	1.2%	1.2%
Railroad	16.0%	0.0%	16.0%	0.0%	0.9%	0.9%	0.9%	0.9%
Ferry	2.6%	0.0%	2.6%	0.0%	0.0%	0.0%	0.0%	0.0%
Bicycle	0.3%	0.0%	0.3%	0.0%	0.1%	0.1%	0.1%	0.1%
Walk	4.1%	83.0%	4.1%	83.0%	29.4%	29.4%	29.4%	29.4%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Vehicle Occupancy	(3)(4)				(2)(4)			
Auto	1.14				1.01			
Taxi	1.40				1.40			
Daily Delivery Trip Generation Rate	(1) Weekday 0.32 Delivery Trips/DU		SAT 0.01		(1) Weekday 0.06 Delivery Trips/DU		SAT 0.02	
Delivery Temporal	(1)				(1)			
	AM	**MD**	**PM**	**SAT**	**AM**	**MD**	**PM**	**SAT**
	10.0%	11.0%	2.0%	11.0%	12.0%	9.0%	2.0%	9.0%
Delivery Direction	(1)				(1)			
In	50%	50%	50%	50%	50%	50%	50%	50%
Out	50%	50%	50%	50%	50%	50%	50%	50%
Total	100%	100%	100%	100%	100%	100%	100%	100%

Sources:
1. 2014 CEQR Technical Manual
2. Journey to Work, U.S. Census Bureau, American Community (Tracts 7 and 9)
3. Reverse Journey to Work, U.S. Census Bureau, American Community Survey 2006-2010 Five-year estimates. Special Tabulation: Census Transportation Planning (Tracts 7 and 9)
4. First Avenue Properties Rezoning, FEIS, 2008, CEQR # 06DCP039M
5. Hudson Square Rezoning, FEIS, 2013, CEQR # 12DCP045 was used for midday and Saturday modal splits

Table H-2: Net Incremental - Transportation Demand Forecast

Use	Peak Hour	In/ Out	Person Trips								Vehicle Trips			
			Auto	Taxi	Subway	Bus	Railroad	Ferry	Walk	Total	Auto	Taxi	Delivery	Total
Office (GSF)	Weekday AM	In	8	1	31	7	10	2	2	60	7	1	0	8
		Out	0	0	1	0	0	0	0	3	0	1	0	1
		Total	8	1	32	8	10	2	3	63	7	1	1	9
	Weekday Midday	In	1	1	2	2	0	0	31	38	1	2	1	3
		Out	1	1	2	2	0	0	34	41	1	2	1	3
		Total	2	2	5	5	0	0	65	78	1	3	1	6
	Weekday PM	In	0	0	2	0	1	0	0	4	0	1	0	1
		Out	9	1	35	8	11	2	3	69	8	1	0	8
		Total	9	1	37	9	12	2	3	73	8	1	0	10
	Saturday Midday	In	0	0	1	1	0	0	9	10	0	0	0	1
		Out	0	0	1	1	0	0	7	9	0	0	0	1
		Total	0	1	1	1	0	0	16	19	0	1	0	1
Residential (DU)	Weekday AM	In	0	0	3	0	0	0	1	4	0	0	0	0
		Out	1	0	15	0	0	0	7	23	1	0	0	1
		Total	1	0	17	0	0	0	8	27	1	0	0	2
	Weekday Midday	In	0	0	4	0	0	0	2	7	0	0	0	0
		Out	0	0	4	0	0	0	2	7	0	0	0	0
		Total	1	0	9	0	0	0	4	14	1	0	0	1
	Weekday PM	In	1	0	13	0	0	0	6	21	1	0	0	1
		Out	0	0	6	0	0	0	3	9	0	0	0	1
		Total	1	0	19	0	0	0	9	30	1	0	0	2
	Saturday Midday	In	1	0	9	0	0	0	4	15	1	0	0	1
		Out	0	0	7	0	0	0	3	11	0	0	0	1
		Total	1	0	17	0	0	0	8	26	1	0	0	1
Total	Weekday AM	In	8	1	33	7	10	2	4	64	7	1	1	8
		Out	1	0	16	1	1	0	7	26	1	1	1	3
		Total	9	1	49	8	10	2	11	91	8	2	1	11
	Weekday Midday	In	1	1	7	2	0	0	33	44	1	2	1	3
		Out	1	1	7	3	0	0	36	48	1	2	1	3
		Total	2	2	13	5	0	0	69	92	2	4	1	7
	Weekday PM	In	1	0	15	1	1	0	6	25	1	1	0	2
		Out	9	1	41	9	11	2	6	78	8	1	0	9
		Total	10	1	56	9	12	2	12	104	9	2	0	12
	Saturday Midday	In	1	0	10	1	0	0	13	25	1	1	0	1
		Out	1	0	8	1	0	0	11	20	1	1	0	1
		Total	1	1	18	1	0	0	24	46	1	1	0	3

***Note**: In and Out volumes may not sum to Total volumes due to rounding.*

Traffic

As presented in Table H-2, the net incremental vehicle trips would not exceed the CEQR Level 1 trip generation threshold during the four peak periods. In total, the net incremental vehicle trips would be approximately 11, 7, 12, and 3 during the weekday AM, midday, PM, and Saturday midday peak hours, respectively. Therefore, the Proposed Action would not result in any significant adverse impacts on traffic conditions in the study area, and no additional analysis is warranted.

Transit

As shown in Figure 14, the Project Site is well served by public transit, including subway lines 1 at Rector Street, R/W at Rector Street Station, 4/5 at Wall Street Station, J/Z at Broad Street, 2/3 at Wall Street, A/C at Fulton Street, and the E at Chambers Street; and 23 bus lines (M15; M15-SBS; M20; M55; x1, x3, x4, x8, x10, x12, x14, x17, x17A, x19, x27 and x28 Staten Island express bus lines; BM1, BM2, BM3, BM4 and BxM18 Brooklyn express bus lines; and QM7, QM8, QM11 and QM25 Queens express bus lines). The closest subway station is the Broad Street J/Z subway line on Broad Street at the intersection of Exchange Place, adjacent to the Project Site. The M15 and M15-SBS bus lines run along Water Street two-blocks east, with bus stops at Water Street and Wall Street; the M20 bus line runs along Battery Place, two-blocks west and south, with a bus stop at Bowling Green; the M55 bus line runs along Broadway, two-blocks west and south, with a bus stop at Bowling Green; 12 express bus lines (BxM18, x1, x3, x4, x10, x11, x12, x17, x17A, x19, x27 and x28) run along Broadway, with bus stops approximately two blocks south and west between Exchange Place and Bowling Green; and 11 express bus lines (BM1, BM2, BM3, BM4, QM7, QM8, QM11, QM25, x8, x14 and x15) run along Water Street, with bus stops approximately two blocks south and east between Broad Street and Wall Street. In addition, the Project Site is also located within a short walking distance to 2 regional rail lines at the PATH station near the World Trade Center and 13 ferry lines at the World Financial Center, Pier 11, and Staten Island Ferry Landings

As shown in Table H-2, the net incremental transit trips would not exceed the CEQR Level 1 trip generation threshold during the four peak periods. In total, the net incremental transit trips would be approximately 49, 13, 56, and 18 subway trips, and 8, 5, 9, and 1 bus trips during the weekday AM, midday, PM, and Saturday midday peak hours, respectively. Therefore, the Proposed Action would not result in any significant adverse impacts on transit conditions in the study area, and no additional analysis is warranted.

Pedestrian

As shown in Table H-2, the net incremental person trips would not exceed the CEQR Level 1 trip generation threshold during the four peak periods. In total, the net incremental person trips would be approximately 91, 92, 104, and 46 during the weekday AM, midday, PM, and Saturday midday peak hours, respectively. Therefore, the Proposed Action would not result in any significant adverse impacts on pedestrian conditions in the study area, and no additional analysis is warranted.

PROPOSED SUBWAY STATION IMPROVEMENTS

The With-Action Condition also includes subway station improvements to the Broad Street J/Z subway station, which would consist of the installation of two elevators at the Broad Street J/Z

subway station that would provide access from Broad Street to the southbound and northbound subway platforms. As shown in Figure 5, included in Attachment A, "Project Description," one elevator is proposed to be located on the southwest corner of Broad Street and Exchange Place, and the other elevator is proposed to be located at the northeast corner. The proposed elevators would conform to the Americans with Disabilities Act (ADA) accessibility guidelines as set forth in ANSI A117.1, Section 4.10 (Elevators), and would be designed in consultation with the Metropolitan Transit Authority (MTA) and the New York City Public Design Commission (PDC).

In order to accommodate the proposed elevators, the Landmarks Preservation Commission (LPC) approved proposed sidewalk modifications at the intersection of the two landmarked streets (Broad Street and Exchange Place) (Figure 5).[43] The proposed modifications include (i) a curb extension at the northeast and southwest corners and (ii) cutting back the curb line by two feet, six inches at the southeast corner; this would ensure that Broad Street would remain 24 feet wide.[44] The proposed elevators would not be connected physically to the proposed floor building.

In addition, the two control areas for ingress and egress at the connecting Wall Street Station on the Lexington Avenue line would be improved by replacing the existing High Exit & Entrance Turnstiles (HEETs) with the typical Automatic Fare Control (AFC) units for a total of seven new AFCs. These improvements would increase passenger movement by reducing the time it takes for passengers to leave the station after discharging from the train.

CONCLUSION

Based on the results of the Level 1 Transportation Screening Assessment, the Proposed Action would not exceed CEQR thresholds for undertaking detailed traffic, parking, pedestrian, and transit analyses during any of the given peak hours. Therefore, the Proposed Action would not result in significant adverse impacts on the traffic, parking, pedestrian, and transit conditions in the study area.

The installation of the two proposed elevators and AFC turnstiles is not anticipated to adversely affect the pedestrian circulation in the study area. The proposed modifications involving curb extension at the northeast and southwest corners on Broad Street are anticipated to be sufficient for pedestrian circulation. Furthermore, given that Broad Street is a pedestrian protected street, it is anticipated that there will be enough space available for pedestrian circulation around the corners after the installation of the two proposed elevators.

[43] New York City Landmarks Preservation Commission, *Binding Report*, Docket #: 192370, 8/30/2016 ("Attachment A")
[44] **Error! Hyperlink reference not valid.** http://newyorkyimby.com/2016/07/45-broad-street-supertall-coming-with-new-subway-elevators-financial-district.html (Accessed December 13, 2016)

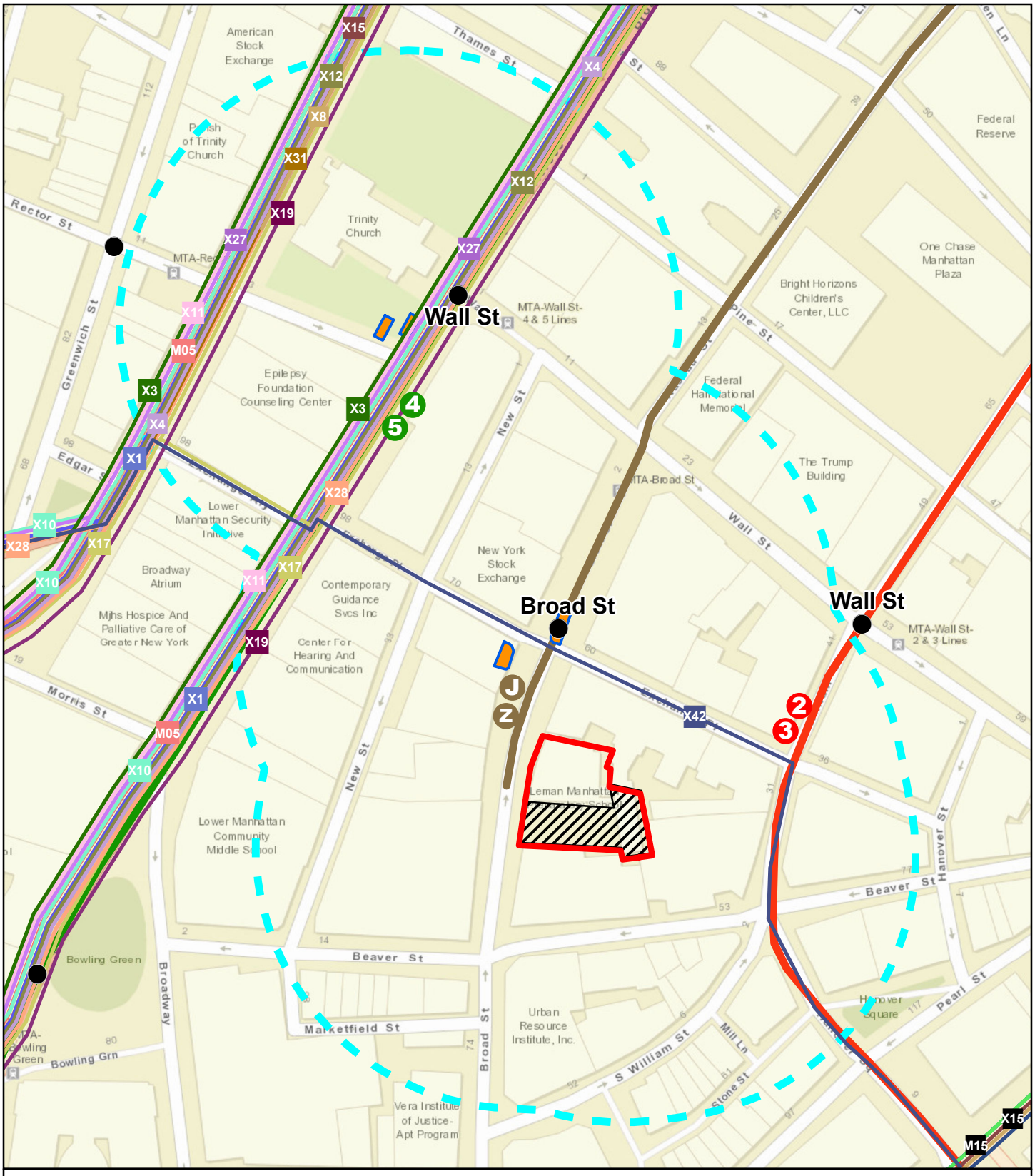


FIGURE 14: TRANSIT MAP DEVELOPMENT
45 BROAD STREET DEVELOPMENT

0 100 200 400 Feet

N

Project Site
Development Site
Subway Stations
Study Area (400-foot radius)

Subway Stations
20 Bus Routes

Subway Routes
4/5 J/Z 2/3

FINANCIAL DISTRICT
MANHATTAN, NY

LANGAN

Map Reference: ESRI Basemap; MTA Subway and Bus Map

ATTACHMENT I: AIR QUALITY

INTRODUCTION

According to the guidelines provided in the *CEQR Technical Manual*, an air quality analysis is conducted in order to assess the effect of a proposed action on ambient air quality (*i.e.,* the quality of the surrounding air), or effects on a proposed project because of ambient air quality. Air quality can be affected by mobile sources (pollutants produced by motor vehicles), and by stationary sources (pollutants produced by fixed facilities). According to the *CEQR Technical Manual*, an air quality assessment should be carried out for actions that can result in either significant adverse mobile source or stationary source air quality impacts.

The transportation analysis in Attachment H, "Transportation" concluded that the Proposed Action would not result in potentially significant adverse impacts on vehicular traffic, parking, or transit conditions in the Study Area. Therefore, mobile sources were not considered in this air quality assessment.

This section evaluates the potential for significant adverse air quality impacts that may result from stationary sources generated by the Proposed Action and the potential adverse impacts from surrounding existing sources.

It should be noted that, as described in Attachment B, "Analysis Framework," the proposed building in the With-Action Condition would be identical to that of the No-Action building in terms of height, setbacks, and lot coverage. The additional 3.00 FAR bonus would allow for an additional 14 floors within the building; this additional floor area is provided by reconfiguring the floor-to-ceiling heights in the With-Action building (to 10.83 feet from 16 or 12 feet for residential floors and to 16 feet from 32 feet for the commercial floors at the base of the building)Therefore, there would be no incremental increase in the building height or bulk between the No-Action and With-Action conditions.

METHODOLOGY

The analysis methodology is based on the guidelines in the *CEQR Technical Manual.* The first step in performing an air quality analysis is to determine the appropriate study area. Study areas for the analysis of stationary source impacts depend on the magnitude of the pollutant emission rates from the new source(s), the relative harmfulness of the compounds emitted, the characteristics of the systems that would discharge such pollutants (*e.g.,* stack heights, stack exhaust velocities), and the surrounding topography relative to these sources (*e.g.,* tall residential buildings near shorter stacks).

The preliminary screening analysis includes buildings with heights similar to or greater than the stack on the Development Site within a 400-foot radius of the Project Site. In addition, the Proposed Action was also evaluated for potential air quality impacts from stationary sources, including the project's heat and hot water (HVAC) sources, and large or major sources within a 1,000-foot radius of the Project Site. No existing industrial sources were identified for analysis.

Individual Heat and Hot Water Systems

A screening analysis was performed to assess air quality impacts associated with emissions from heat and hot water systems for the Proposed Action. The methodology described in the *CEQR Technical Manual* was used for the analysis and considered potential significant adverse impacts on sensitive uses (*e.g.,* existing residences and developments under construction).

The methodology determines the threshold of development size below which the proposed action would not have significant adverse impacts. The screening procedures utilize information regarding the type of fuel to be used, the maximum development size, and the HVAC exhaust stack height(s) to evaluate whether a potentially significant adverse impact may occur. Based on the distance from the project site to the nearest building of similar or greater height, if the maximum development size is greater than the threshold size in the *CEQR Technical Manual*, there is the potential for significant air quality impacts and, therefore, a refined dispersion modeling analysis would be required. Otherwise, the source passes the screening analysis, and no further analysis is necessary.

Because the Development Project's HVAC systems design is undetermined at this time, the Development Project was evaluated against the nearest existing or proposed residential development of a similar or greater height. The maximum floor area from the Reasonable Worst Case Development Scenario (RWCDS) was used as input for the screening analysis. Although the Proposed Project may Applicant intends to use natural gas as the sole source of fuel, the preliminary screening assessment assumes that fuel oil #2 could be used.

Large or Major Sources

There are two buildings within 1,000 feet of the Project Site that currently have Title V operating permits through the New York State Department of Environmental Coordination (NYSDEC):

- One Water Street (Permit ID: 2-6206-00053/00003). This facility has two co-generator units burning natural gas with an oxidizing catalyst for NOx emission controls; and

- 55 Water Street (Permit ID: 2-6206-01474/00001). This facility has up to 14 diesel fueled generators that may be used in a non-emergency curtailment mode (peak shaving), according to the permit. Upon further investigation and retrieval of actual operating conditions, it was determined that a maximum NOx emission scenario actually used would be equivalent to only 11 of the 14 generators operating at 40 percent load in the curtailment mode. The site at 55 Water Street has an annual NOx limit of 24.9 tons per year. Operation of the 11 generators at 40 percent load would reach the NOx limit within 192 operating hours. The annual emissions were adjusted for this maximum operating time per year.

After compiling the information on these facilities, maximum potential pollutant concentrations at the Project Site – at various heights above grade – were evaluated with a refined modeling analysis.

Annual NO_2 concentrations from the major sources were estimated using a NO_2 to NO_x ratio of 0.75, as described in the EPA's Guideline on Air Quality Models at 40 CFR part 51 Appendix W, Section 5.2.4.10. One-hour average NO_2 concentrations were estimated using AERMOD model's Plume

Volume Molar Ratio Method (PVMRM) module to analyze chemical transformation within the model. An initial NO_2 to NO_x ratio of 10 percent at the source exhaust stack was assumed, which is considered representative for the combustion engines evaluated.

The refined modeling analysis was performed using the latest version of the AERMOD model and five years of meteorological data (2012-2016) from La Guardia International Airport and concurrent upper air data from Brookhaven, New York. The AERMOD model was run with and without building downwash as described in the *CEQR Technical Manual*. The building downwash case used building dimensions suitable for each of the two major sources. Discrete receptors (*i.e.,* locations at which concentrations were calculated) were placed at the Project Site with 66-foot (20-meter) spacing vertically.

Predicted worst case impacts on the Project Site were compared with NAAQS limits for 1-hour and annual NO_2 concentrations and to the de minimis criteria for $PM_{2.5}$ for 24 hour and annual averaging times as described in the *CEQR Technical Manual*. These limits and incremental values represent the airborne concentrations that determine whether the Project Site could be significantly impacted by the two nearby major sources of existing air pollution.

ASSESSMENT

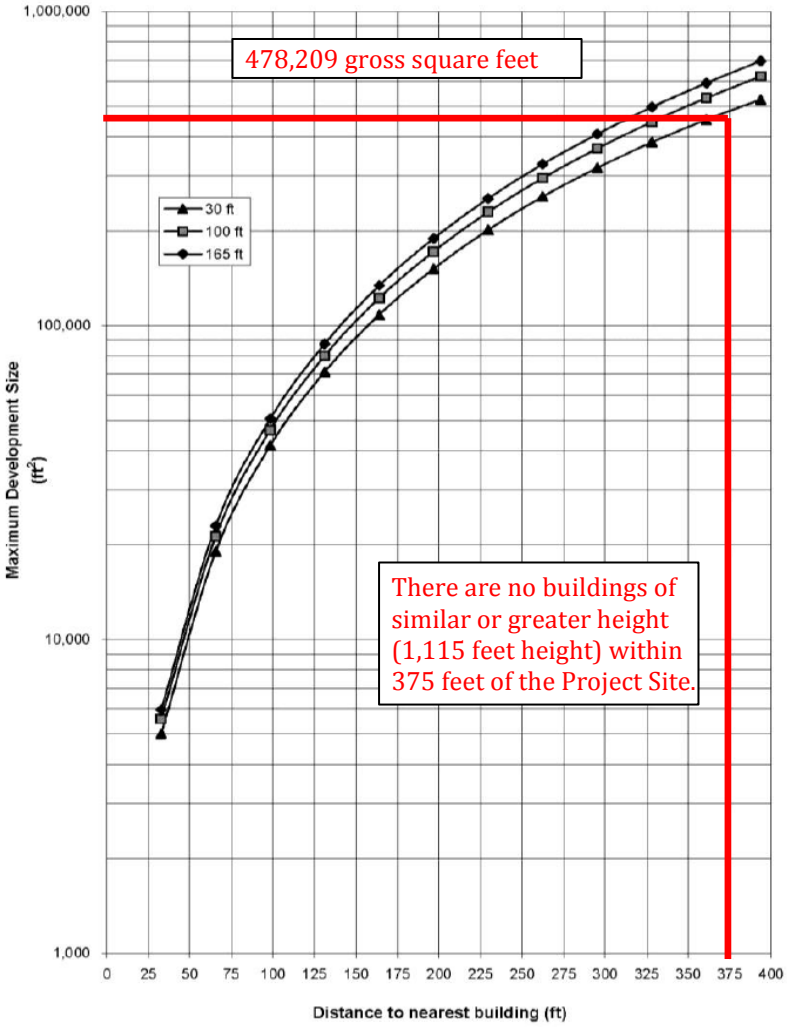
Screening Analysis – Individual HVAC Systems

The first step in the analysis of the HVAC systems for the Proposed Project is to consider impacts following the screening procedures outlined in the *CEQR Technical Manual* to determine the potential for significant adverse impacts on existing developments as well as "project-on-project impacts." The nearest existing building and/or proposed development of a similar or greater height relative to the emission release height for the Proposed Project's HVAC exhaust source was considered as the potential receptor for the screening evaluation. Because the Proposed Action comprises only a single building on a single development site, a "project-on-project" HVAC systems analysis is not necessary.

Impacts from individual HVAC systems would be of concern if there are buildings that are taller than or of similar height as the Proposed Project. The Proposed Project's height is 1,115 feet; there are no existing buildings of similar or greater height within the 400-foot Study Area.

Figure 17-5 from the Air Quality Appendix of the *CEQR Technical Manual* was used for the preliminary screening analysis. Based on the Development Project's total floor area of 478,209 gross square feet (gsf), a minimum distance of **375** feet is assigned between the Development Project and any nearby buildings of similar or taller height. However, because there are no existing buildings of similar or greater height in the Study Area, the individual HVAC Systems screening analysis does not exceed CEQR thresholds. Potential significant adverse impacts due to individual boiler stack emissions are not anticipated and, therefore, no further analysis is warranted.

Image I-1: HVAC Preliminary Screening for Fuel Oil#2



Large or Major Sources

There are two existing buildings within 1,000 feet of the Project Site that currently have Title V operating permits through NYS DEC: One Water Street and 55 Water Street. Exhausts at both sources were assumed to be operating, so the contributions of each were combined in a worst-case cumulative analysis. A detailed analysis for these major sources was performed using the AERMOD model to determine their potential for significant adverse impacts on the Proposed Project.

The impacts were analyzed for NO_2 and $PM_{2.5}$. Background, NAAQS limits, and de minimis criteria increment limit values are shown in Table I-1.

Table I-1: Background, NAAQS, and De Minimis Increment Values for NO2 and PM2.5

Location	Station	Pollutant	Averaging period	Units	Background level	NAAQS/de Minimis Criteria
Manhattan	Division Street	$PM_{2.5}$	24-hour	$\mu g/m^3$	21.6	6.7
Manhattan	Division Street	$PM_{2.5}$	Annual	$\mu g/m^3$	8.8 (2016)	0.3
Queens	Queens College 2	NO_2	1-hour	$\mu g/m^3$	112	188
Queens	Queens College 2	NO_2	Annual	$\mu g/m^3$	19.4	100

The background concentrations represent the most recent three-year average for 24-hour average $PM_{2.5}$ measurements, the three-year average of the 98th percentile of daily maximums for the 1-hour NO_2 value, and the 5-year average of the annual NO_2 measurements.[45] Note that for the NO_2 1-hour calculations, seasonal and hourly average background values for NO_2 and ozone were used in the AERMOD model with the PVMRM algorithm, as described in the methodology section above.

The maximum NO_2 and $PM_{2.5}$ predicted concentrations at the Project Site associated with the two Title V sources are shown in Table I-2. The no-building downwash case produced higher concentrations than the building downwash case. Table I-2 shows the maximum no-building downwash results. All predicted concentrations are below their respective NAAQS de minimis crtieria values. Therefore, no potentially significant adverse air quality impacts associated with One Water Street and 55 Water Street are anticipated and, therefore, no further analysis is warranted.

Table I-2: Maximum Predicted Impacts from Existing Major Title V Sources

Pollutant	Averaging Period	AERMOD Model Impact ($\mu g/m^3$)	NAAQS or Increment Limit ($\mu g/m^3$)
NO_2	1-hour	185	188
NO_2	Annual	20.4	100
$PM_{2.5}$	24-hour	6.5	6.7 increment
$PM_{2.5}$	Annual	0.06	0.3 increment

CONCLUSION

The Proposed Action is not anticipated to result in any potentially significant adverse stationary source air quality impacts. Therefore, no further analysis is required.

[45] These background values were obtained from the NYSDEC (https://www.epa.gov/outdoor-air-quality-data).

ATTACHMENT J: CONSTRUCTION

INTRODUCTION

According to the *CEQR Technical Manual*, construction activities, although temporary, may sometimes result in significant impacts. Construction duration, which is a critical measure to determine a project's potential for adverse impacts during construction, is categorized as short-term (less than two years) and long-term (two or more years). Where the duration of construction is expected to be short-term, any impacts resulting from the short-term construction generally do not require a detailed assessment. However, there are instances where a potential impact may be of short duration, but nonetheless significant, because it raises specific issues of concern. In addition, there are technical areas such as air quality, where the duration of construction alone is not a sufficient indicator of the need for a detailed assessment, and other factors should be considered.

ASSESSMENT

The Proposed Action is the approval of a special permit for a floor area bonus (up to 3.00 FAR) on the Project Site in exchange for subway station improvements consisting of the installation of two Americans with Disabilities Act (ADA) compliant elevators at the Broad Street J/Z subway station and improvements to fare control areas at the connected Wall Street station of the Lexington Avenue 4/5 line. Construction of the Proposed Project is anticipated to begin as soon as the special permit is granted, with all components complete and operational by 2020 (Build Year).

As described in Attachment B, "Analysis Framework," the proposed building in the With-Action Condition would be identical to that of the No-Action building in terms of height, setbacks, and lot coverage. The additional 3.00 FAR would allow for an additional 14 floors within the building; this additional floor area is provided by reconfiguring the floor-to-ceiling heights in the With-Action building (to 10.83 feet from 12 and 16 feet for residential floors and to 16 feet from 32 feet for the commercial floors at the base of the building). Therefore, there would be no incremental increase in the building height or bulk between the No-Action and With-Action conditions.

The Proposed Project would be built in a single phase over a period of 37 months. However, because the Proposed Action would result in only an internal reconfiguration of the floor area, there would be no incremental increase in the construction timeline between the No-Action Condition and With-Action Condition. Further, the construction timeline for the subway station improvements is not anticipated to exceed 24 months.

Because the Proposed Action would not result in an incremental increase in the construction timeline that would exceed 24 months, an assessment of potential impacts related to construction activities is not warranted.

PART III: APPENDICES

APPENDIX A: PROJECT SITE PHOTOGRAPHS

FIGURE A-1: PHOTOGRAPH LOCATION MAP
45 BROAD STREET

FINANCIAL DISTRICT
MANHATTAN, NY

Project Site
Development Site
Study Area (400-foot radius)

Photograph Locations
1 → Project Site and Study Area
18 → Historic Landmark

N

LANGAN

Source: ESRI Basemap

Photograph 1: Directly across the Project Site on Broad Street

Photograph 2: Directly across the Project Site on Broad Street, looking southeast towards the Development Site

Photograph 3: At Beaver Street, looking north on Broad Street; the Existing 9-story school building and Development Site to the right.

Photograph 4: At Exchange Place, looking south on Broad Street; the Existing 9-story school building and Development Site to the left.

Photograph 5: Looking south on Broad Street, between Exchange Place and Beaver Street)pedestrian-only protected street)

Photograph 6: At Exchange Place, looking north on Broad Street towards Wall Street; pedestrian-only protected street area

Photograph 7: At Wall Street, looking south on Broad Street towards Exchange Place; pedestrian-only protected street area

Photograph 8: Looking west on Wall Street, at the intersection of Broad Street and Wall Street (pedestrian-only street)

Photograph 9: Looking east on Exchange Place, at the intersection of Broad Street and Exchange Place

Photograph 10: Looking west on Exchange Place, at the intersection of William Street and Exchange Place

Photograph 11: Looking east on Beaver Street, at the intersection of New Street and Beaver Street

Photograph 12: Looking west on Beaver Street, at the intersection of William Street and Beaver Street

Photograph 13: J.P. Morgan & Co. and Equitable Trust Co. historic building at 23 Wall Street/15 Broad Street (south-east corner of Broad and Wall streets)

Photograph 14: The New York Stock Exchange Buildign - historic building at 2 Broad Street (southwest corner of Broad and Wall streets)

Photograph 15: Historic building at 20 Broad Street (northwest corner of Broad Street and Exchange Place)

Photograph 16: Continental Bank Building - historic building at 30 Broad Street (southwest corner of Broad Street and Exchange Place)

Photograph 17: Broad Exchange Building - historic building at 25 Broad Street (southeast corner of Broad Street and Exchange Place)

Photograph 18: Lee, Higginson Bank Building - historic building at 37-41 Broad Street (on the Project Site)

Photograph 19: Historic building at 50 Broad Street (opposite the Project Site)

Photograph 20: American Bank Note Building - historic building at 70 Broad Street (southwest corner of Broad and Beaver streets)

Photograph 21: Former Telephone Exchange Building - historic building at 75 Broad Street (southeast corner of Broad and Beaver streets)

Photograph 22: Trust Company of America Building - historic building at 37 Wall Street

Photograph 23: Atlantic Insurance Group Building - historic building at 45 Wall Street

Photograph 24: First National Bank Building - historic building at 53-55 Wall Street (southeast corner of Wall and William Streets)

Photograph 25: Delmonico's Restaurant - historic building at 48 Beaver Street (southwest corner of Braver and William streets)

Photograph 26: Lehman Brothers Building - historic building at 1 William Street (intersection of South William Street and Hanover Square)

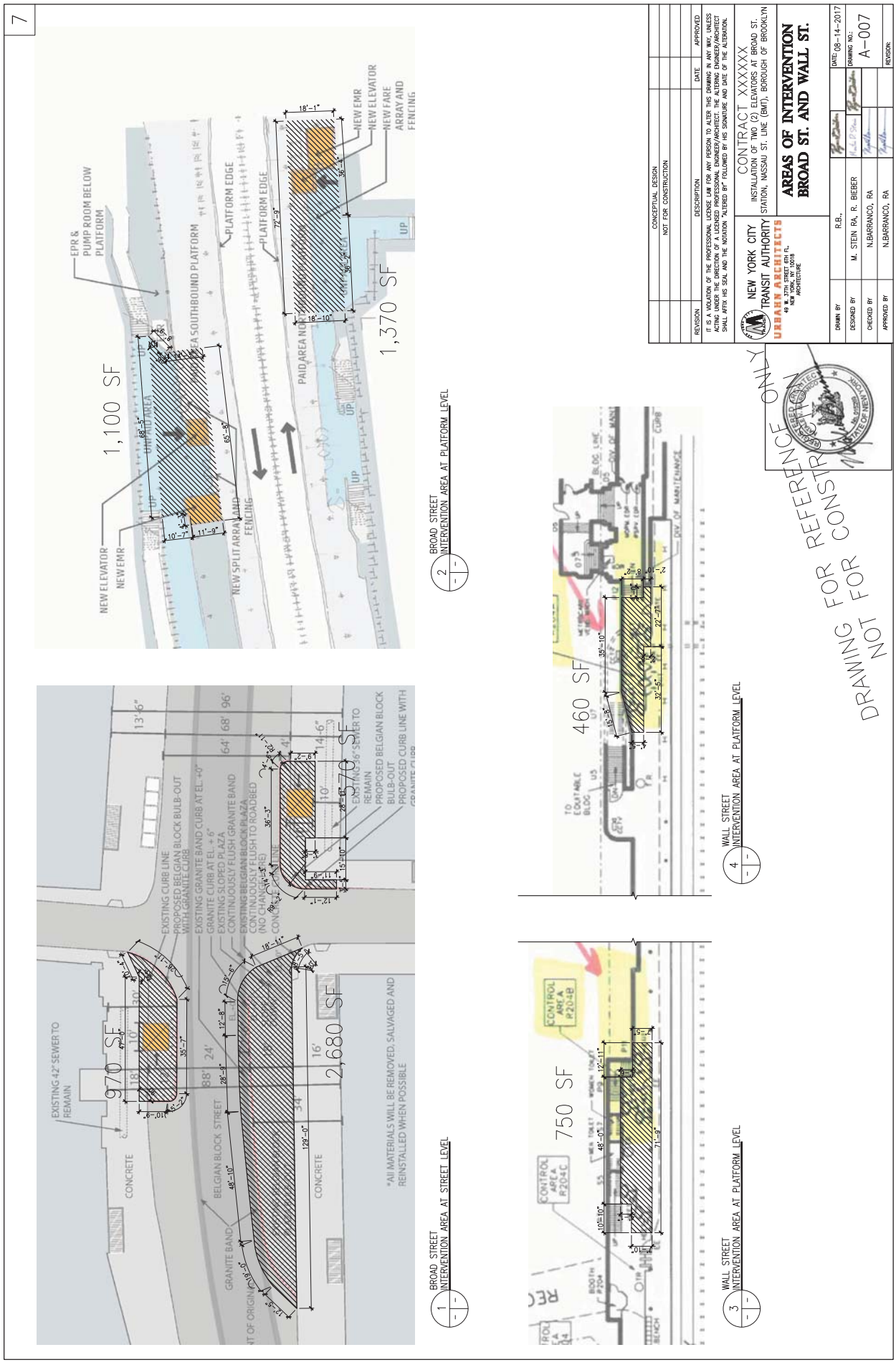
Photograph 27: NY Cotton Exchange - historic building at 3 Hanover Square (intersection of Hanover Square and Stone Street)

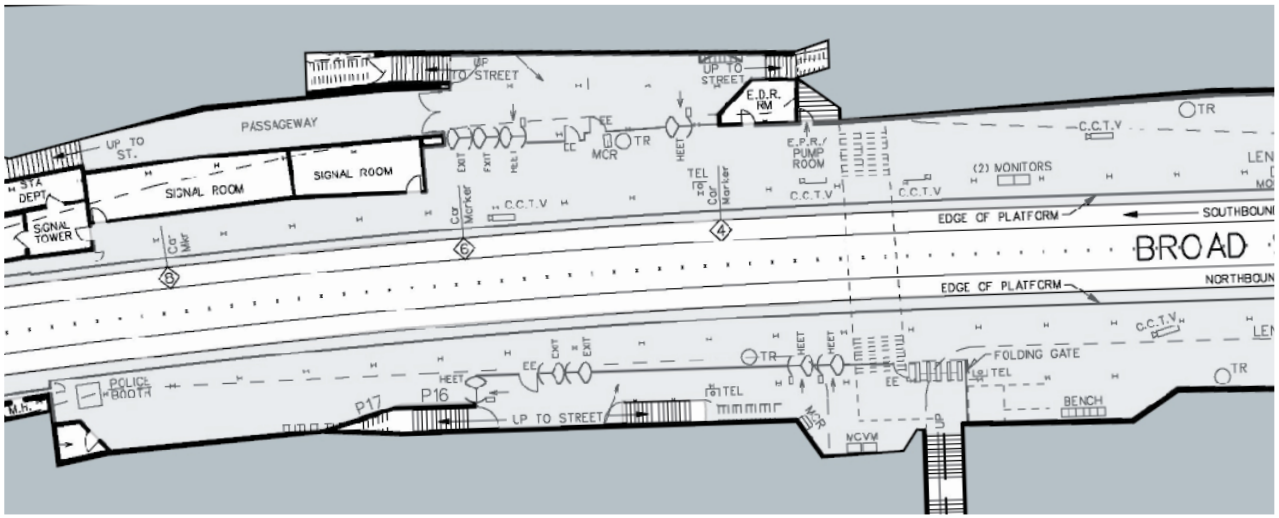
Photograph 28: India House - historic building at 1 Hanover Square (Hanover Square, between Stone Pearl streets)

Photograph 29: The Customs House - historic building at 54-56 Stone Street (between Mill Lane and Coenties Alley)

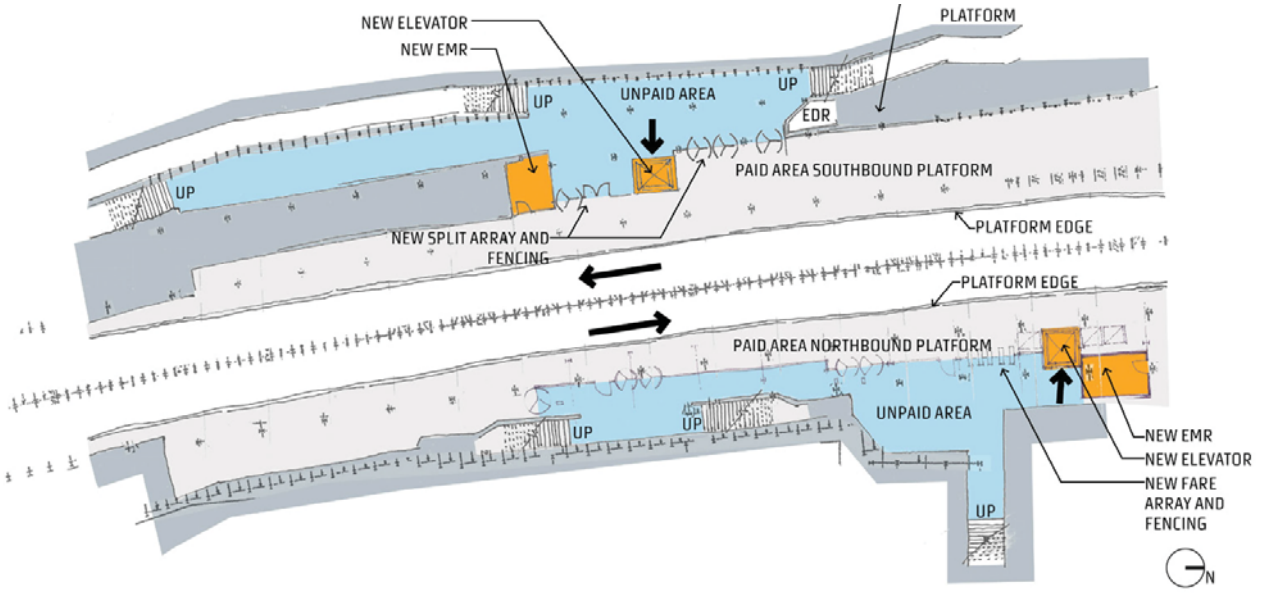
Photograph 30: Standard Oil Building - historic building at 26 Broadway (northwest corner of Beaver and New streets)

APPENDIX B: PROPOSED SUBWAY IMPROVEMENTS


7
1,100 SF
1,370 SF
EPR & PUMP ROOM BELOW PLATFORM
NEW ELEVATOR
NEW EMR
NEW SOUTHBOUND PLATFORM
PLATFORM EDGE
NEW SPLIT ARRAY AND FENCING
NEW FARE ARRAY AND FENCING
UNPAID AREA
PAID AREA NORTHBOUND PLATFORM
UP
1 - BROAD STREET INTERVENTION AREA AT STREET LEVEL
2 - BROAD STREET INTERVENTION AREA AT PLATFORM LEVEL
970 SF
2,680 SF
370 SF
EXISTING 42" SEWER TO REMAIN
EXISTING CURB LINE
PROPOSED BELGIAN BLOCK BULB-OUT WITH GRANITE CURB
EXISTING GRANITE BAND CURB AT EL. +40'
GRANITE CURB AT EL. + 6"
EXISTING SLOPED PLAZA CONTINUOUSLY FLUSH GRANITE BAND
EXISTING BELGIAN BLOCK PLAZA CONTINUOUSLY FLUSH TO ROADBED (NO CHANGE IN GRADE)
EXISTING 36" SEWER TO REMAIN
PROPOSED BELGIAN BLOCK BULB-OUT
PROPOSED CURB LINE WITH GRANITE CURB
CONCRETE
BELGIAN BLOCK STREET
GRANITE BAND
*ALL MATERIALS WILL BE REMOVED, SALVAGED AND REINSTALLED WHEN POSSIBLE
3 - WALL STREET INTERVENTION AREA AT STREET LEVEL
750 SF
CONTROL AREA R204C
CONTROL AREA R204E
4 - WALL STREET INTERVENTION AREA AT PLATFORM LEVEL
460 SF
CONCEPTUAL DESIGN
NOT FOR CONSTRUCTION
REVISION
DESCRIPTION
DATE
APPROVED
IT IS A VIOLATION OF THE PROFESSIONAL LICENSE LAW FOR ANY PERSON TO ALTER THIS DRAWING IN ANY WAY, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR LICENSED ARCHITECT. THE ALTERING ENGINEER OR ARCHITECT SHALL AFFIX HIS SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE AND DATE OF THE ALTERATION.
NEW YORK CITY TRANSIT AUTHORITY
URBANARCHITECTS
49 W. 27TH STREET, 8TH FL. NEW YORK, NY 10016
ARCHITECTURE
CONTRACT XXXXXX
INSTALLATION OF TWO (2) ELEVATORS AT BROAD ST. STATION, NASSAU ST. LINE (BMT), BOROUGH OF BROOKLYN
AREAS OF INTERVENTION
BROAD ST. AND WALL ST.
DRAWN BY R.B.,
DESIGNED BY M. STEIN RA, R. BIEBER
CHECKED BY N.BARRANCO, RA
APPROVED BY N.BARRANCO, RA
DATE: 08-14-2017
DRAWING NO.: A-007
REVISION:
DRAWING FOR REFERENCE ONLY
NOT FOR CONSTRUCTION

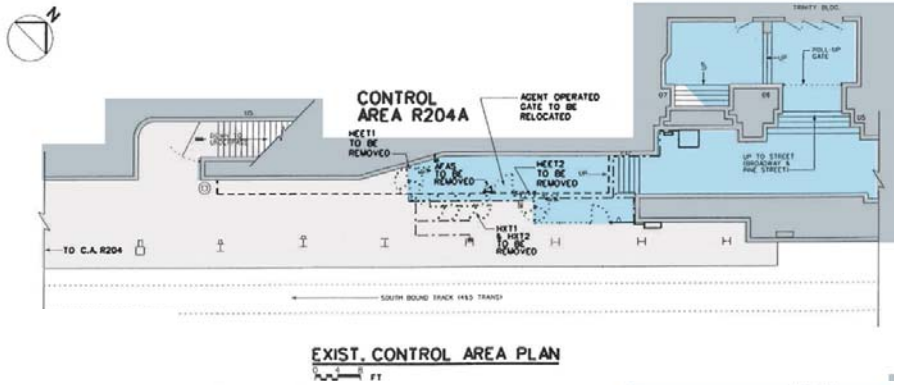


EXISTING PLATFORM

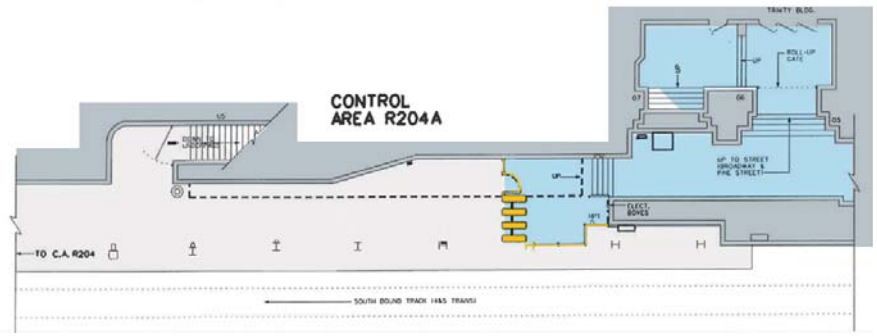


PROPOSED PLATFORM

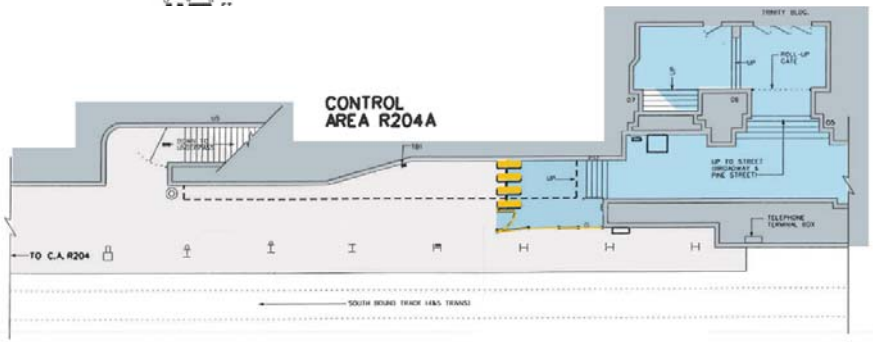
EXISTING AND PROPOSED PLATFORM PLANS



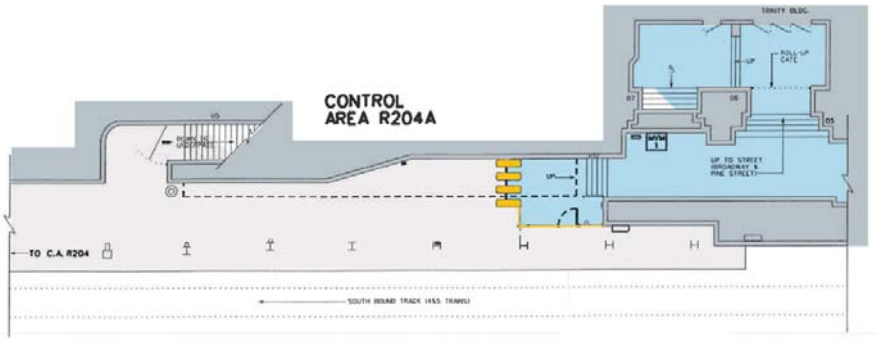
EXIST. CONTROL AREA PLAN



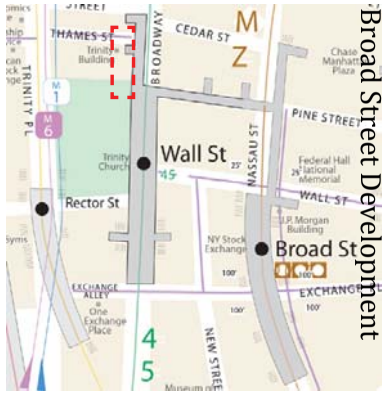
PROPOSED CONTROL AREA PLAN (OPTION-I)



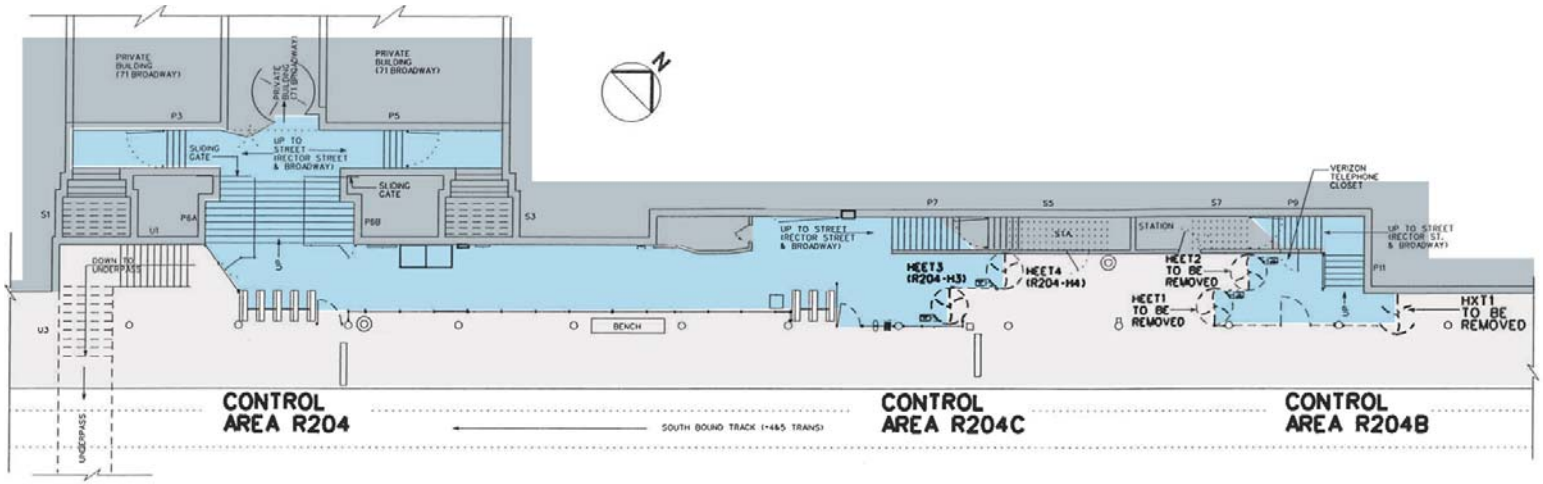
PROPOSED CONTROL AREA PLAN (OPTION-II)



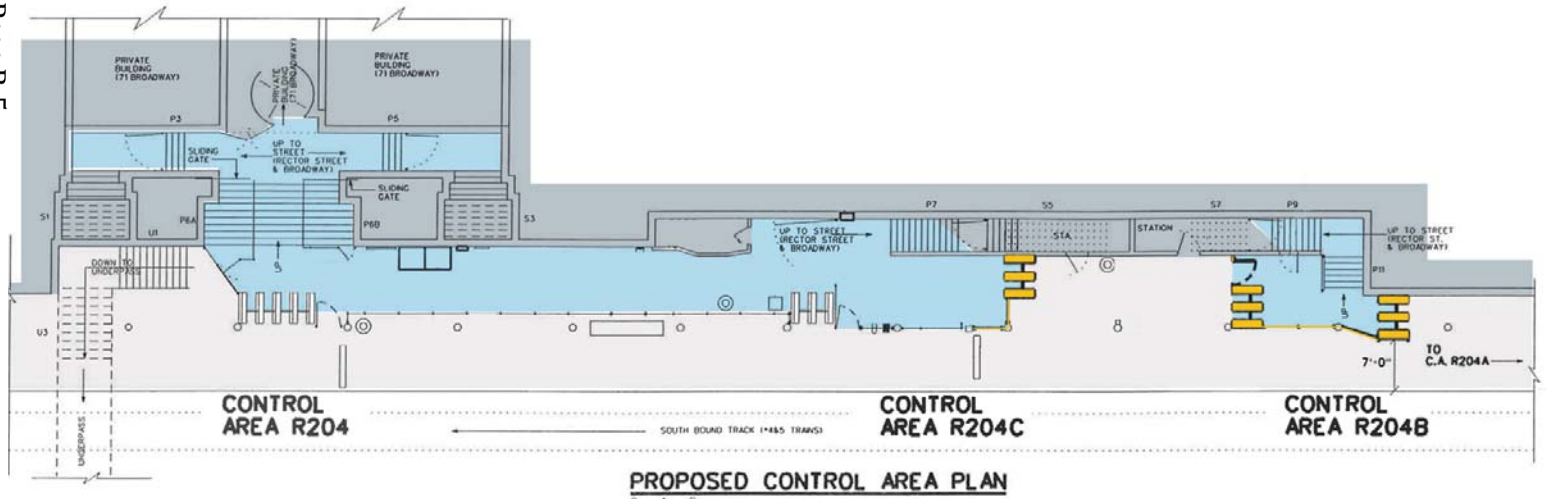
PROPOSED CONTROL AREA PLAN (OPTION-III)



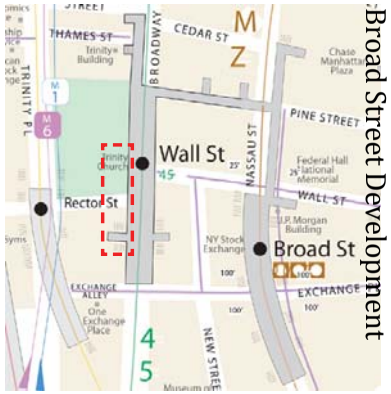
EXISTING AND PROPOSED CONTROL AREA R204A FARE ARRAY REALIGNMENT AT WALL ST STATION



EXIST. CONTROL AREA PLAN



PROPOSED CONTROL AREA PLAN



EXISTING AND PROPOSED CONTROL AREA R204 , R204B , R204C FARE ARRAY REALIGNMENT AT WALL ST STATION

APPENDIX C: COASTAL ASSESSMENT FORM (CAF)

FOR INTERNAL USE ONLY
Date Received: _____

WRP No. _____
DOS No. _____

NEW YORK CITY WATERFRONT REVITALIZATION PROGRAM
Consistency Assessment Form

Proposed actions that are subject to CEQR, ULURP or other local, state or federal discretionary review procedures, and that are within New York City's Coastal Zone, must be reviewed and assessed for their consistency with the *New York City Waterfront Revitalization Program (WRP)* which has been approved as part of the State's Coastal Management Program.

This form is intended to assist an applicant in certifying that the proposed activity is consistent with the WRP. It should be completed when the local, state, or federal application is prepared. The completed form and accompanying information will be used by the New York State Department of State, the New York City Department of City Planning, or other city or state agencies in their review of the applicant's certification of consistency.

A. APPLICANT INFORMATION

Name of Applicant: Madison 45 Broad Development LLC

Name of Applicant Representative: Robert R. Kulikowski

Address: 105 Madison Avenue, New York, New York 10016

Telephone: _____ Email: _____

Project site owner (if different than above): _____

B. PROPOSED ACTIVITY

If more space is needed, include as an attachment.

1. Brief description of activity

Madison 45 Broad Development LLC (the "Applicant") is requesting approval of a special permit from the City Planning Commission (CPC), pursuant to the New York City Zoning Resolution (ZR) §91-251 of the Special Lower Manhattan District (LM), Article IX, Chapter 1, for a floor area bonus in exchange for subway improvements (ZR §74-634) (the "Proposed Action"). The Proposed Action would permit additional floor area on a single zoning lot at 45 Broad Street (Block 25, Tax Lots 7 and 10) in the Financial District of the Borough of Manhattan, Community District 1 (the "Project Site"). Approval of the Proposed Action (a special permit for a Floor Area Ratio (FAR) bonus up to 3.00) would facilitate a 1,115-foot (80-floor), approximately 478,209-gross-square-foot (gsf) commercial/residential building on Lot 7 (the "Development Site") at an FAR of 14.05; the existing 93,894-gsf, 3.95-FAR, community facility building (the "Existing Building") on Lot 10 would remain as is. The total development on the Project Site would include approximately 572,103 gsf of commercial, residential, and community facility space built at a total FAR of 17.99. The proposed subway improvements at the Broad Street J/Z subway station would consist of the installation of two Americans with Disabilities Act (ADA) compliant elevators that would provide access to the southbound and northbound subway platforms, and improvements to the ingress and egress at two control areas at the connecting Wall Street Station.

2. Purpose of activity

1) To facilitate a mixed-use development with ground floor retail, office space on upper floors, and a residential tower.
2) Provide ADA accessibility to the northbound and southbound platforms of the Broad Street J/Z subway station, including ADA accessibility between the station platform, the mezzanine, and the street; and
3) To improve ingress and egress at two control areas (R204B and R204A) at the connecting Wall Street Station of the Lexington Avenue 4/5 line. These control areas have High Exit and Entrance Turnstiles (HEETs) that severely restrict passenger movement.
The Broad Street J/Z subway station is located on Broad Street between Wall Street and Exchange Place; it serves the J train (Nassau Street Local) at all times and the Z train (Nassau Street Express) during rush hours in the peak direction on weekdays. Both trains run between the Jamaica Center station in Queens and the Broad Street station in Manhattan, passing through Brooklyn between Cypress Hill/Jamaica Avenue and Marcy Avenue and Broadway. The Broad Street J/Z subway station has three entrances/exits at the platform level leading to the mezzanine level; and one entrance/exit staircase at the mezzanine level in north end of the station leading to the street at the southeast corner of Wall and Broad streets. There was another staircase leading to the southwest corner of Wall and Broad streets, outside of the New York Stock Exchange that was closed after the September 11, 2001 attacks. Even though Broad Street J/Z subway station is a busy subway station and directly connects the Financial District to Queens and Brooklyn, it is currently not accessible for people with disabilities or who use wheelchairs. However, under the NYC Zoning Resolution (ZR §91-251), the Broad Street J/Z subway station is one of 14 subway stations listed for improvements within Lower Manhattan.

C. PROJECT LOCATION

Borough: Manhattan Tax Block/Lot(s): 25/7, 10

Street Address: 45 Broad Street

Name of water body (if located on the waterfront): _____

D. REQUIRED ACTIONS OR APPROVALS

Check all that apply.

City Actions/Approvals/Funding

City Planning Commission ☐ Yes ☐ No

- ☐ City Map Amendment
- ☐ Zoning Map Amendment
- ☐ Zoning Text Amendment
- ☐ Site Selection – Public Facility
- ☐ Housing Plan & Project
- ☑ Special Permit
  (if appropriate, specify type: ☐ Modification ☐ Renewal ☐ other) Expiration Date: _____
- ☐ Zoning Certification
- ☐ Zoning Authorizations
- ☐ Acquisition – Real Property
- ☐ Disposition – Real Property
- ☐ Other, explain: _____
- ☐ Concession
- ☐ UDAAP
- ☐ Revocable Consent
- ☐ Franchise

Board of Standards and Appeals ☐ Yes ☐ No

- ☐ Variance (use)
- ☐ Variance (bulk)
- ☐ Special Permit
  (if appropriate, specify type: ☐ Modification ☐ Renewal ☐ other) Expiration Date: _____

Other City Approvals

- ☐ Legislation
- ☐ Rulemaking
- ☐ Construction of Public Facilities
- ☐ 384 (b) (4) Approval
- ☐ Other, explain: _____
- ☐ Funding for Construction, specify: _____
- ☐ Policy or Plan, specify: _____
- ☐ Funding of Program, specify: _____
- ☐ Permits, specify: _____

State Actions/Approvals/Funding

- ☐ State permit or license, specify Agency: _____ Permit type and number: _____
- ☐ Funding for Construction, specify: _____
- ☐ Funding of a Program, specify: _____
- ☐ Other, explain: _____

Federal Actions/Approvals/Funding

- ☐ Federal permit or license, specify Agency: _____ Permit type and number: _____
- ☐ Funding for Construction, specify: _____
- ☐ Funding of a Program, specify: _____
- ☐ Other, explain: _____

Is this being reviewed in conjunction with a Joint Application for Permits? ☐ Yes ☐ No

E. LOCATION QUESTIONS

1.	Does the project require a waterfront site?	☐ Yes	☑ No
2.	Would the action result in a physical alteration to a waterfront site, including land along the shoreline, land under water or coastal waters?	☐ Yes	☑ No
3.	Is the project located on publicly owned land or receiving public assistance?	☐ Yes	☑ No
4.	Is the project located within a FEMA 1% annual chance floodplain? *(6.2)*	☑ Yes	☐ No
5.	Is the project located within a FEMA 0.2% annual chance floodplain? *(6.2)*	☑ Yes	☐ No
6.	Is the project located adjacent to or within a special area designation? *See Maps – Part III of the NYC WRP. If so, check appropriate boxes below and evaluate policies noted in parentheses as part of WRP Policy Assessment (Section F).*	☐ Yes	☑ No

☐ Significant Maritime and Industrial Area (SMIA) (*2.1*)
☐ Special Natural Waterfront Area (SNWA) (*4.1*)
☐ Priority Martine Activity Zone (PMAZ) (*3.5*)
☐ Recognized Ecological Complex (REC) (*4.4*)
☐ West Shore Ecologically Sensitive Maritime and Industrial Area (ESMIA) (*2.2, 4.2*)

F. WRP POLICY ASSESSMENT

Review the project or action for consistency with the WRP policies. For each policy, check Promote, Hinder *or* Not Applicable (N/A). *For more information about consistency review process and determination, see* ***Part I*** *of the NYC Waterfront Revitalization Program. When assessing each policy, review the full policy language, including all sub-policies, contained within* ***Part II*** *of the WRP. The relevance of each applicable policy may vary depending upon the project type and where it is located (i.e. if it is located within one of the special area designations).*

For those policies checked Promote *or* Hinder, *provide a written statement on a separate page that assesses the effects of the proposed activity on the relevant policies or standards. If the project or action promotes a policy, explain how the action would be consistent with the goals of the policy. If it hinders a policy, consideration should be given toward any practical means of altering or modifying the project to eliminate the hindrance. Policies that would be advanced by the project should be balanced against those that would be hindered by the project. If reasonable modifications to eliminate the hindrance are not possible, consideration should be given as to whether the hindrance is of such a degree as to be substantial, and if so, those adverse effects should be mitigated to the extent practicable.*

		Promote	Hinder	N/A
1	**Support and facilitate commercial and residential redevelopment in areas well-suited to such development.**	☑	☐	☐
1.1	Encourage commercial and residential redevelopment in appropriate Coastal Zone areas.	☑	☐	☐
1.2	Encourage non-industrial development with uses and design features that enliven the waterfront and attract the public.	☑	☐	☐
1.3	Encourage redevelopment in the Coastal Zone where public facilities and infrastructure are adequate or will be developed.	☑	☐	☐
1.4	In areas adjacent to SMIAs, ensure new residential development maximizes compatibility with existing adjacent maritime and industrial uses.	☐	☐	☑
1.5	Integrate consideration of climate change and sea level rise into the planning and design of waterfront residential and commercial development, pursuant to WRP Policy 6.2.	☑	☐	☐

		Promote	Hinder	N/A
2	**Support water-dependent and industrial uses in New York City coastal areas that are well-suited to their continued operation.**	☐	☐	☑
2.1	Promote water-dependent and industrial uses in Significant Maritime and Industrial Areas.	☐	☐	☑
2.2	Encourage a compatible relationship between working waterfront uses, upland development and natural resources within the Ecologically Sensitive Maritime and Industrial Area.	☐	☐	☑
2.3	Encourage working waterfront uses at appropriate sites outside the Significant Maritime and Industrial Areas or Ecologically Sensitive Maritime Industrial Area.	☐	☐	☑
2.4	Provide infrastructure improvements necessary to support working waterfront uses.	☐	☐	☑
2.5	Incorporate consideration of climate change and sea level rise into the planning and design of waterfront industrial development and infrastructure, pursuant to WRP Policy 6.2.	☐	☐	☑
3	**Promote use of New York City's waterways for commercial and recreational boating and water-dependent transportation.**	☐	☐	☑
3.1.	Support and encourage in-water recreational activities in suitable locations.	☐	☐	☑
3.2	Support and encourage recreational, educational and commercial boating in New York City's maritime centers.	☐	☐	☑
3.3	Minimize conflicts between recreational boating and commercial ship operations.	☐	☐	☑
3.4	Minimize impact of commercial and recreational boating activities on the aquatic environment and surrounding land and water uses.	☐	☐	☑
3.5	In Priority Marine Activity Zones, support the ongoing maintenance of maritime infrastructure for water-dependent uses.	☐	☐	☑
4	**Protect and restore the quality and function of ecological systems within the New York City coastal area.**	☐	☐	☑
4.1	Protect and restore the ecological quality and component habitats and resources within the Special Natural Waterfront Areas.	☐	☐	☑
4.2	Protect and restore the ecological quality and component habitats and resources within the Ecologically Sensitive Maritime and Industrial Area.	☐	☐	☑
4.3	Protect designated Significant Coastal Fish and Wildlife Habitats.	☐	☐	☑
4.4	Identify, remediate and restore ecological functions within Recognized Ecological Complexes.	☐	☐	☑
4.5	Protect and restore tidal and freshwater wetlands.	☐	☐	☑
4.6	In addition to wetlands, seek opportunities to create a mosaic of habitats with high ecological value and function that provide environmental and societal benefits. Restoration should strive to incorporate multiple habitat characteristics to achieve the greatest ecological benefit at a single location.	☐	☐	☑
4.7	Protect vulnerable plant, fish and wildlife species, and rare ecological communities. Design and develop land and water uses to maximize their integration or compatibility with the identified ecological community.	☐	☐	☑
4.8	Maintain and protect living aquatic resources.	☐	☐	☑

		Promote	Hinder	N/A
5	**Protect and improve water quality in the New York City coastal area.**	☐	☐	☑
5.1	Manage direct or indirect discharges to waterbodies.	☐	☐	☑
5.2	Protect the quality of New York City's waters by managing activities that generate nonpoint source pollution.	☐	☐	☑
5.3	Protect water quality when excavating or placing fill in navigable waters and in or near marshes, estuaries, tidal marshes, and wetlands.	☐	☐	☑
5.4	Protect the quality and quantity of groundwater, streams, and the sources of water for wetlands.	☐	☐	☑
5.5	Protect and improve water quality through cost-effective grey-infrastructure and in-water ecological strategies.	☐	☐	☑
6	**Minimize loss of life, structures, infrastructure, and natural resources caused by flooding and erosion, and increase resilience to future conditions created by climate change.**	☐	☐	☑
6.1	Minimize losses from flooding and erosion by employing non-structural and structural management measures appropriate to the site, the use of the property to be protected, and the surrounding area.	☑	☐	☐
6.2	Integrate consideration of the latest New York City projections of climate change and sea level rise (as published in *New York City Panel on Climate Change 2015 Report, Chapter 2: Sea Level Rise and Coastal Storms*) into the planning and design of projects in the city's Coastal Zone.	☑	☐	☐
6.3	Direct public funding for flood prevention or erosion control measures to those locations where the investment will yield significant public benefit.	☐	☐	☑
6.4	Protect and preserve non-renewable sources of sand for beach nourishment.	☐	☐	☑
7	**Minimize environmental degradation and negative impacts on public health from solid waste, toxic pollutants, hazardous materials, and industrial materials that may pose risks to the environment and public health and safety.**	☐	☐	☑
7.1	Manage solid waste material, hazardous wastes, toxic pollutants, substances hazardous to the environment, and the unenclosed storage of industrial materials to protect public health, control pollution and prevent degradation of coastal ecosystems.	☐	☐	☑
7.2	Prevent and remediate discharge of petroleum products.	☐	☐	☑
7.3	Transport solid waste and hazardous materials and site solid and hazardous waste facilities in a manner that minimizes potential degradation of coastal resources.	☐	☐	☑
8	**Provide public access to, from, and along New York City's coastal waters.**	☐	☐	☑
8.1	Preserve, protect, maintain, and enhance physical, visual and recreational access to the waterfront.	☐	☐	☑
8.2	Incorporate public access into new public and private development where compatible with proposed land use and coastal location.	☑	☐	☐
8.3	Provide visual access to the waterfront where physically practical.	☐	☐	☑
8.4	Preserve and develop waterfront open space and recreation on publicly owned land at suitable locations.	☐	☐	☑

		Promote	Hinder	N/A
8.5	Preserve the public interest in and use of lands and waters held in public trust by the State and City.	☐	☐	☑
8.6	Design waterfront public spaces to encourage the waterfront's identity and encourage stewardship.	☐	☐	☑
9	**Protect scenic resources that contribute to the visual quality of the New York City coastal area.**	☐	☐	☑
9.1	Protect and improve visual quality associated with New York City's urban context and the historic and working waterfront.	☐	☐	☑
9.2	Protect and enhance scenic values associated with natural resources.	☐	☐	☑
10	**Protect, preserve, and enhance resources significant to the historical, archaeological, architectural, and cultural legacy of the New York City coastal area.**	☑	☐	☐
10.1	Retain and preserve historic resources, and enhance resources significant to the coastal culture of New York City.	☑	☐	☐
10.2	Protect and preserve archaeological resources and artifacts.	☑	☐	☐

G. CERTIFICATION

The applicant or agent must certify that the proposed activity is consistent with New York City's approved Local Waterfront Revitalization Program, pursuant to New York State's Coastal Management Program. If this certification cannot be made, the proposed activity shall not be undertaken. If this certification can be made, complete this Section.

"The proposed activity complies with New York State's approved Coastal Management Program as expressed in New York City's approved Local Waterfront Revitalization Program, pursuant to New York State's Coastal Management Program, and will be conducted in a manner consistent with such program."

Applicant/Agent's Name: Madison 45 Broad Development LLC

Address: 105 Madison Ave, New York, NY 10016

Telephone: (212) 577-7335 Email: alabozzetta@madisonequities.com

Applicant/Agent's Signature: 

Date: 11/22/2017

Submission Requirements

For all actions requiring City Planning Commission approval, materials should be submitted to the Department of City Planning.

For local actions not requiring City Planning Commission review, the applicant or agent shall submit materials to the Lead Agency responsible for environmental review. A copy should also be sent to the Department of City Planning.

For State actions or funding, the Lead Agency responsible for environmental review should transmit its WRP consistency assessment to the Department of City Planning.

For Federal direct actions, funding, or permits applications, including Joint Applicants for Permits, the applicant or agent shall also submit a copy of this completed form along with his/her application to the NYS Department of State Office of Planning and Development and other relevant state and federal agencies. A copy of the application should be provided to the NYC Department of City Planning.

The Department of City Planning is also available for consultation and advisement regarding WRP consistency procedural matters.

New York City Department of City Planning
Waterfront and Open Space Division
120 Broadway, 31st Floor
New York, New York 10271
212-720-3525
wrp@planning.nyc.gov
www.nyc.gov/wrp

New York State Department of State
Office of Planning and Development
Suite 1010
One Commerce Place, 99 Washington Avenue
Albany, New York 12231-0001
(518) 474-6000
www.dos.ny.gov/opd/programs/consistency

Applicant Checklist

- ☐ Copy of original signed NYC Consistency Assessment Form
- ☐ Attachment with consistency assessment statements for all relevant policies
- ☐ For Joint Applications for Permits, one (1) copy of the complete application package
- ☐ Environmental Review documents
- ☐ Drawings (plans, sections, elevations), surveys, photographs, maps, or other information or materials which would support the certification of consistency and are not included in other documents submitted. All drawings should be clearly labeled and at a scale that is legible.

New York City Waterfront Revitalization Program (WRP)
Consistency Assessment Form (CAF)
Section C – Coastal Assessment
45 Broad Street
Manhattan, New York

This document provides an assessment of the effects of the proposed project relevant to New York City Waterfront Revitalization Program policies and standards identified in Section C of the attached Consistency Assessment Form. The relevant policies and applicable standards are listed below in bold and are followed by compliance statements describing how the proposed activities would be consistent with the goals of the policies and standards.

According to the WRP and as identified in Section C of the CAF, the following policies warranted further evaluation: 1.1, 1.2, 1.3, 6.2, 10.1, and 10.2.

Based on the coastal consistency analysis, the Proposed Action is consistent with all applicable policies of the WRP; therefore, no further analysis is required.

Policy 1.1: Encourage commercial and residential redevelopment in appropriate coastal zone areas.

The Proposed Action would facilitate the construction of a 1,115-foot (80-floor), 478,209-gsf mixed-use building in the Financial District of Manhattan. The building facilitated by the Proposed Action would include commercial use on the lower floors, and residential use on the upper floors. Therefore, the Proposed Action would encourage and facilitate residential and commercial development on a currently vacant property within the City's coastal zone. Moreover, the Project Site is not located within a Significant Maritime or Industrial area, and it does not have any characteristic or significant natural features.

Therefore, the Proposed Action would promote this policy.

Policy 1.2: Encourage non-industrial development that enlivens the waterfront and attracts the public.

The Proposed Action would encourage non-industrial uses by facilitating the development of a new 478,209-gsf mixed-use building, which would include commercial use on floors 1 through 10, and residential use on floor 1 (a residential lobby) and floors 11 through 80.[1] While the Project Site is not located along the New York City waterfront, the commercial uses proposed as part of the Development Project would enliven the surrounding area by increasing pedestrian activity at the street level.

Therefore, the Proposed Action would promote this policy.

[1] The total floor area of the With-Action building (Proposed Project) includes approximately 56,447 gsf mechanical space on floors 2, 11, 11M, 34, 34M, 52, and floors 77 through 80; and approximately 8,726 gsf of outdoor space such as, a garden, an outdoor terrace space, and a wind break on floors 12, 33, and 53.

Policy 1.3: Encourage redevelopment in the Coastal Zone where public facilities and infrastructure are adequate or will be developed.

The Proposed Action would facilitate a commercial/residential development at a density that would be compatible with the bulk of the surrounding area. The Project Site is well served by public transit, with access to the J/Z subway lines at Broad Street Station; the 2/3 subway lines at Wall Street Station; the 4/5 subway lines at Wall Street and Broadway stations; and 17 bus lines (M20; M15; and 15 Staten Island express bus lines) within approximately 1,000 feet. The Broad Street Station of the Nassau Street J/Z subway line is Place adjacent to the Project Site at the intersection of Broad Street and Exchange. The Project Site is also located within walking distance to the 1 and R subway lines at South Ferry and Whitehall Street stations, respectively, as well as the Staten Island Ferry. The Proposed Action would increase the total permitted FAR on the Project Site, in exchange for subway station improvements, which would consist of the installation of two ADA-compliant elevators at the Broad Street Station (J/Z line) and two control areas at the connecting Wall Street Station (4/5 line). The proposed subway improvements to the Broad Street Station would provide access from Broad Street to the southbound and northbound subway platforms.

In addition to the existing public transit infrastructure, there is an existing 9-story, approximately 93,894-sf public facility (the Leman Manhattan Preparatory School building) on the Project Site. Other schools in the area include Millennium High School and Battery Park City School, both of which are located within 0.66 miles of the Project Site.

Therefore, the Proposed Action would promote this policy.

Policy 1.5: Integrate consideration of climate change and sea level rise into the planning and design of waterfront residential and commercial development, pursuant to WRP Policy 6.2.

The Proposed Action would facilitate a commercial/residential development within Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) zones. According to the 2015 Preliminary FIRMs, the Project Site falls within Zone AE and the 0.2 percent annual chance flood hazard zone (Figure 11).[2,3] In addition to the flood hazard areas, FEMA includes the Limit of Moderate Wave Action (LiMWA) on FIRMs, allowing communities and individuals to better understand the flood risks to their property.[4] The Project Site is not located near the LiMWA, indicating that the Project Site is not subject to additional significant risk during a 1-percent-annual-chance flood event.

The Proposed Project would conform to building codes and has considered climate change and sea level rise pursuant to WRP Policy 6.2. Please refer to the Policy 6.2 discussion below for further information.

Therefore this Proposed Action would promote this policy.

[2] An area of high flood risk is subject to inundation by the 1percent annual-chance flood event.
[3] Areas of moderate flood risk within the 0.2 percent annual chance floodplain; or areas of 1percent annual chance flooding where average depths are less than 1 foot, where the drainage area is less than 1 square mile, or areas protected from this flood level by a levee.
[4] The LiMWA is the inland limit of the area expected to receive 1.5-foot or great breaking waves during the 1-percent-annual-chance flood event.

Policy 6.1: Minimize losses from flooding and erosion by employing non-structural and structural management measures appropriate to the site, the use of the property to be protected, and the surrounding area.

The Project Site is located within the 100-year floodplain (Figure 12). A majority of the Project Site is located within the 0.2 Annual Chance Flood Hazard Zone. The eastern portion of the Project Site is located within the Flood Zone AE, which has a base flood elevation (BFE) 11 feet NAVD88. The building facilitated by the Proposed Action would be designed to Flood Zone AE, with the Design Flood Elevation (DFE) at 12 NAVD88.[5] The design of the proposed project would comply with the New York City Building Code, which details construction requirements within the 100-year floodplain for each applicable building category.

The Proposed Action would facilitate a building with three "cellar" floors, which would be built below the DFE elevation of 12 feet NAVD88. These floors consist of mechanical rooms, storage cages, a recreational facility that includes a pool and other residential amenities. One electrical closet is located at the southwestern portion of Sub-Cellar 1. All other utilities are located on Sub-Cellar 2 including the gas meter room, elevator control room, fuel oil room, sump ejector room, and electrical closet. These levels would be protected by a caisson foundation consistent with 2014 City Building Code requirements. All utilities and equipment below the DFE are located within the dry flood-proof enclosure. By complying with the 2014 City Building Code requirements, the Development Project would be at a reduced risk of damage from coastal flood hazards. Therefore, the Proposed Project would meet WRP objectives of reducing risks of damage from current and future coastal hazards.

Therefore, the Proposed Action would promote this policy.

Policy 6.2: Integrate consideration of the latest New York City projections of climate change and sea level rise (as published in New York City Panel on Climate Change 2015 Report, Chapter 2: Sea Level Rise and Coastal Storms) into the planning and design of projects in the city's Coastal Zone.

As discussed above, the Project Site is at a base flood elevation (BFE) of 11 feet NAVD88. The average elevation of the ground floor commercial/residential, cellar floor recreational facility, critical infrastructure, and the subway elevators are at or below the elevation of the current 1 percent chance floodplain, and will be for their lifespan under all sea level rise projections. By the highest estimate (90th percentile) taken from the New York City Panel on Climate Change 2015 Report, Chapter 2, "Sea Level Rise and Coastal Storms," the BFE for the Project Site may rise approximately 11.80 feet NAVD88 in 2020, 13.50 Feet NAVD88 in 2050, and 15.83 feet NAVD88 in 2080. Under the 90th percentile projections, the proposed commercial and residential amenity spaces would be below the BFE and DFE in the 100 year storm event. The Development Project has three "cellar" floors totaling 32 feet below grade, which would be lower than the BFE of 11 feet NAVD88 and the DFE of 12 feet NAVD88. However, the Development Project is designed in accordance with the 2014 New York City Building Code. The proposed building would feature a

[5] The DFE (also known as the FRCE) is a new zoning datum that is used as the basis for zoning calculations in flood zones. This is determined by using the elevation shown on the latest FEMA flood maps and adding the additional freeboard elevation that is required by the Building Code for your building type.

caisson and pile foundation, encompassing the three "cellar" floors.[6] All critical infrastructure including, but not limited to, electricity connections, generators and fuel, communications, and elevators would be designed to withstand flooding up to the DFE (12 feet NAVD88). In addition, portions of the proposed building at grade used for building access are wet flood-proofed per ASCE 24-05. There is no direct ingress or egress to subgrade cellar floors from outside the proposed building. The Proposed Action would not substantially affect flood levels in the surrounding area In addition, the proposed ADA-compliant elevators at the Broad Street Station (J/Z line) would be flood-proofed in compliance with New York City Building Code. The elevators would be equipped with sump pumps to eject water in the event of flooding. The applicant would be responsible for elevator maintenance either through direct performance of maintenance activities or funding of work by NYCTA. Coastal storms could bring high winds in addition to the flood hazards described above. The Project Site is not within a Coastal A or V zone.

Therefore, the Proposed Project would comply with applicable flood mitigation requirements and would promote this policy.

Policy 8.2: Incorporate public access into new public and private development where compatible with proposed land use and coastal location.

The Project Site is not a waterfront property and is not located directly along NYC's coastal waters; the Project Site is located approximately 0.25 miles from the waterfront. The Proposed Action would not adversely affect the future development of public access to any coastal waters along the NYC waterfront.

Therefore, the Proposed Action would neither promote nor hinder this policy.

Policy 10.1: Retain and preserve historic resources, and enhance resources significant to the coastal culture of New York City.

The Project Site is within the S/NR-designated WSHD. As described in Attachment E, "Historic and Cultural Resources," there are 79 LPC- and S/NR-designated individual historic resources in the 400-foot Study Area, including the 9-story building on the Project Site (the Lehman Preparatory School on Lot 10). In addition, all streets bounding Block 25 are part of the Street Plan of New Amsterdam and Colonial New York, and Landmarks Preservation Commission (LPC)-designated historic resource. All construction activities on the Development Site and at the Broad Street Station would follow the guidelines and procedures of New York City's DOB PPN#10/88 to avoid any damage to any historic structures within 90 feet.

In addition, an LPC approved Construction Protection Plan (CPP) would be developed to ensure the protection of adjacent historic structures during construction. LPC has approved sidewalk modifications at the intersection of the two landmarked streets (Broad Street and Exchange Place) needed to accommodate the two proposed ADA-compliant elevators at the Broad Street Station.

Therefore, the Proposed Action would not hinder this this policy.

[6] A caisson foundation is a watertight retaining structure, often consisting of a prefabricated hollow box or cylinder sunk into the ground to some desired depth and then filled with concrete thus forming a foundation.

Policy 10.2: Protect and preserve archaeological resources and artifacts.

The Project Site is located in an area designated as archaeologically sensitive by the New York State Historic Preservation Office (SHPO).

The Proposed Action would involve the protection and preservation of archaeological resources and artifacts and, therefore, would promote this policy.

CONCLUSION

Based on the coastal consistency analysis, the Proposed Action is consistent with all applicable policies of the WRP; therefore, no further analysis is required.

APPENDIX D: AGENCY CORRESPONDENCE

LANGAN

Technical Excellence
Practical Experience
Client Responsiveness

09 December 2016

Gina Santucci
Environmental Review Coordinator
NYC Landmarks Preservation Commission
One Centre Street
9th Floor, North
New York, New York 10007

Re: 45 Broad Street Development Project
Block 25, Lots 7 and 10
Borough of Manhattan, Community District 1
Langan Project No.: 170394201

Dear Ms. Santucci:

On behalf of Madison Equities (the "Applicant"), Langan Engineering, Environmental, Surveying and Landscape Architecture, DPC (Langan) requests information as to the likelihood that the proposed mixed use development project at 45 Broad Street (Block 25, Lots 7 and 10) ("Project Site") (Figures 1, 2, and 3) would result in significant adverse impacts to archaeological or historic resources in the Project Area. This request is made as part of a City Environmental Quality Review (CEQR) Environmental Assessment Statement (EAS).

The Proposed Action is a City Planning Commission (CPC) special permit that would permit additional floor area on a single zoning lot at 45 Broad Street, and would facilitate construction of an 80-story, approximately 464,293 gross square foot (gsf) mixed-use building on the Project Site (the "Proposed Development").

The Project Site is comprised of two tax lots (Lot 7 and 10) totaling approximately 23,798 square feet (sf), and is bounded by Broad Street to the west; a 21-story mixed-use building (Broad Exchange Building) to the north; a 20-story office building and a 44-story mixed-use building to the east (fronting William Street); and a 31-story office building to the south. Lot 7 (the "Development Site") is currently vacant and was formerly occupied by an 8-story, approximately 70,000 sf office building (Wells Fargo) that was demolished in 2007. Lot 10 is currently occupied by a 9-story, approximately 93,894 sf Leman Manhattan Preparatory School. The Proposed Development Project would not occur on Lot 10.

The streets bounding Block 25 include Broad Street to the west; Exchange Place to the north; William Street to the east; and Beaver Street to the south. All of the streets are part of the

Street Plan of New Amsterdam and Colonial New York, which is a New York City Landmark (NYCL) designated by the Landmarks Preservation Commission (LPC).

As shown in Figure 4, the Project Site and Study Area are in the Special Lower Manhattan District and the State and National Register of Historic Places (S/NR) designated Wall Street Historic District (WSHD). There are 69 LPC or S/NR designated historic landmarks in the Study Area. In order to assist LPC, Langan has compiled an inventory of the historic resources within a 400-foot radius of the Project Site using the Department of City Planning (DCP) PLUTO database and New York State Historic Preservation Office's (SHPO) Cultural Resource Information System (CRIS) database.

Please indicate if there are properties in addition to the ones listed in Table 1 (attached) that have architectural or archaeological significance.

We look forward to your review of the project. If you should have any questions regarding this matter, please do not hesitate to contact me at (212) 479-5503 or via email at MKeane@langan.com.

Thank you for your assistance.

Sincerely,

Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.

Michael R. Keane, AICP
Senior Environmental Planner

MRK/rk
Enclosure(s):
Regional Location Map, Site Location Map, List of Historic and Cultural Resources, Photograph Location Map, and Site Photographs

cc: Robert Kulikowski – Langan

NYC Landmarks Preservation Commission

1 Centre Street
9th Floor North
New York, NY 10007

Voice (212)-669-7700
Fax (212)-669-7960
http://nyc.gov/landmarks

ENVIRONMENTAL REVIEW

Project number: DEPARTMENT OF CITY PLANNING / LA-CEQR-M
Project: ADDRESS: 45 BROAD STREET, BBL: 1000250007
Date received: 12/12/2016

Comments: as indicated below. Properties that are individually LPC designated or in LPC historic districts require permits from the LPC Preservation department. Properties that are S/NR listed or S/NR eligible require consultation with SHPO if there are State or Federal permits or funding required as part of the action.

ADDRESS: 45 BROAD STREET, BBL: 1000250007

Comments:

The project site is within the S/NR listed Wall St. Historic District. The site is also directly adjacent to the north to the S/NR listed Lee, Higginson & Company Bank Building at 41 Broad St. (lot 10). The lot is also adjacent at the east to the Broad Exchange Building at 25 Broad St., which is S/NR and LPC listed. Adjacent to the lot and west of it is the LPC designated Street Plan of New Amsterdam and Colonial New York.

The list of historic resources dated 12/9/16 is acceptable.

LPC review of archaeological sensitivity models and historic maps indicates that there is potential for the recovery of remains from Colonial and Native American occupation on the project site. Accordingly, the Commission recommends that an archaeological documentary study be performed for this site to clarify these initial findings and provide the threshold for the next level of review, if such review is necessary (see CEQR Technical Manual 2014).

Gina Santucci 12/16/2016

SIGNATURE DATE
Gina Santucci, Environmental Review Coordinator

File Name: 31994_FSO_DNP_12152016.doc

LANGAN

Technical Excellence
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Client Responsiveness

07 March 2017

Ms. Gina Santucci
Environmental Review Coordinator
The New York City Landmarks Preservation Commission
1 Centre Street, 9N
New York, NY 10007

Re: 45 Broad Street Development Project
Block 25, Lots 7 and 10
Borough of Manhattan, Community District 1
New York, NY
Langan Project No. 170394201
LPC File Name: 31994_FSO_DNP_12152016

Dear Ms. Santucci:

On behalf of Madison 45 Broad Development LLC (the "Applicant"), Langan Engineering, Environmental, Surveying and Landscape Architecture, DPC (Langan) is responding to the Landmarks Preservation Commission (LPC) letter dated 16 December 2016, recommending an archaeological documentary study for the above-referenced project. The Proposed Action is a City Planning Commission (CPC) special permit that would permit additional floor area on a single zoning lot at 45 Broad Street (Block 25, Lots 7 and 10) ("Project Site"), and would facilitate construction of an 80-story, approximately 464,293 gross square foot (gsf) mixed-use building on the Project Site.

SITE LOCATION AND DESCRIPTION

The Project Site is comprised of two tax lots (Lots 7 and 10) totaling approximately 23,798 square feet (sf), and is bounded by Broad Street to the west; a 21-story mixed-use building (Broad Exchange Building) to the north; a 20-story office building and a 44-story mixed-use building to the east (fronting William Street); and a 31-story office building to the south. Lot 7 (the "Development Site") was formerly occupied by an 8-story, approximately 70,000 sf office building that was demolished in 2007. Lot 10 is currently occupied by the 9-story, approximately 93,894 sf Leman Manhattan Preparatory School. The Proposed Development Project would occur on Lot 7 and the Leman Manhattan Preparatory School would remain on Lot 10.

The streets bounding Block 25 include Broad Street to the west; Exchange Place to the north; William Street to the east; and Beaver Street to the south. These streets are part of the Street Plan of New Amsterdam and Colonial New York, which is a New York City Landmark (NYCL) designated by the Landmarks Preservation Commission (LPC).

The Project Site is in the Special Lower Manhattan District and part of the State and National Register of Historic Places (S/NR) listed Wall Street Historic District (WSHD). CRIS also indicates that 45 Broad

Street was the American Bureau of Shipping and was listed on theS/NR in 2007. Furthermore, CRIS indicates that the Project Site is in an archeologically sensitive area.

RESEARCH

According to map research, the Project Site was occupied as early as 1894; the 1894 Sanborn Insurance Map shows a four-story building with a basement on the site. By 1923 the building had been demolished and developed with an 8-story structure (constructed in 1920) labeled the Offices for the Combustion Engineering Building, which also included a basement. By 1977, the 8-story structure on the western portion of the property had been renamed the American Bureau of Shipping. The 8-story building was demolished in 2007.

SUBSURFACE INVESTIGATIONS

Two separate geotechnical investigations were conducted on the Project Site:

In 2007, six borings (B-1 through B-6) were drilled as part of the subsurface exploration. The borings were advanced to between 59 and 65 feet below grade. The upper 10 feet of each boring were drilled without sampling to permit the boring to be advanced through demolition debris and the remnant cellar floor slab. Beginning at approximately 10 feet below the existing site grade, and at 5-foot intervals thereafter, samples were retrieved. Recovered soil samples were visually examined and classified in the field in accordance with the Building Code. Soil classifications, N-values, and other field observations were recorded on field logs.

In 2016, two borings (B-7 and B-8) were drilled in the rear of the lot during the 2016 supplemental subsurface exploration program. Both borings were advanced to 55 feet below grade. The upper 10 feet of each boring were drilled without sampling to permit the boring to be advanced through demolition debris and the remnant cellar floor slab. Beginning at approximately 10 feet below the existing site grade, and at 5-foot intervals thereafter, samples were retrieved. Recovered soil samples were visually examined and classified in the field in accordance with the Building Code, Soil classification, N-values, and other field observations were recorded on field logs.

SUBSURFACE CONDITIONS

The subsurface conditions generally consist of approximately 13 to 17 feet of uncontrolled fill and demolition debris, approximately 21 to 27 feet of silt with discontinuous sand and clay seams, and approximately 3 to 15 feet of decomposed rock. Schist bedrock was encountered approximately 38 to 49 feet below grade. Stabilized groundwater levels were observed at depths of about 13.5 feet in 2016 and 20 feet in 2007.

The geotechnical reports further indicate that the basement slab, walls, and foundation piles remain, and that the hole is backfilled with recycled-concrete aggregate sandy backfill that was imported following demolition of the building. The former slab is approximately 11 to 13 feet below current grade. The slab sits either directly on silt or in some areas with one to two feet of fill that was placed in connection with construction of the 1920 building or residual historical fill that predates the 1920 building.

CONCLUSION

The Project Site was likely occupied prior to the 4-story building depicted on the 1894 Sanborn Insurance map. The 4-story building was likely removed in its entirety because no observations or any other indications of the former slab were made. The 1920 building was larger than the 4-story building and, therefore, would have required a more robust foundation; in fact, the former building's concrete slab was observed at approximately 11 to 13 feet below current grade during subsurface investigations. The soils beneath the concrete slab were further disturbed by the construction of pile caps, which extend to approximately 13 to 15 feet below grade, and installation of caissons, which extend to bedrock.

Based on the above information, disturbance to pre-contact period archeological resources has more than likely occurred as a result of the buildings that formerly occupied the site. Therefore, the potential to recover intact, undisturbed pre-contact period deposits *in situ* is low and further investigation of pre-contact period archeological resources is not warranted.

Sincerely,
Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.

Michael Audin, RPA
Principal Archaeologist

Robert Kulikowski, Ph.D.
Senior Director - Environmental Planning

Enclosures: 2016, Langan, Amended Geotechnical Engineering Study for 45 Broad Street

cc: Anthony Labozzetta, Andrew Manton, Andrew Harris (Madison Equities)
David Karnovsky (Fried Frank)
Michael Keane, Gerald Nicholls, Tasos Papathanasiou (Langan)

References Cited

Geismar, Joan
2003 New York Stock Exchange Security and Streetscape Improvements Stage IA Archaeological Assessment, Prepared for AKRF, Inc. On File at the New York City Landmarks Preservation Commission.

Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.
2016 Amended Geotechnical Engineering Study for 45 Broad Street, New York, New York.

NYC Landmarks Preservation Commission
1 Centre Street
9th Floor North
New York, NY 10007
Voice (212)-669-7700
Fax (212)-669-7960
http://nyc.gov/landmarks

ENVIRONMENTAL REVIEW

Project number: DEPARTMENT OF CITY PLANNING / LA-CEQR-M
Project: 45 BROAD STREET 1000250007
Date received: 3/9/2017

Comments:

The LPC is in receipt of additional information from the applicant dated 3/7/17 in response to LPC's recommendation of 12/16/16 for an archaeological documentary study.

Colonial wells and privy features typically can extend 18 to 20 feet below present grade and thus be beneath the building basements of historic record. LPC review of archaeological sensitivity models and historic maps indicates that there is potential for the recovery of remains from Colonial occupation on the project site. Accordingly, the Commission recommends that an archaeological documentary study be performed for this site to clarify these initial findings and provide the threshold for the next level of review, if such review is necessary (see CEQR Technical Manual 2014).

Gina Santucci 3/17/2017

SIGNATURE DATE
Gina Santucci, Environmental Review Coordinator

File Name: 31994_FSO_DNP_03132017.doc

Landmarks Preservation Commission
1 Centre Street
9th Floor North
New York, NY 10007
Voice (212)-669-7700
Fax (212)-669-7960
http://nyc.gov/landmarks

ARCHAEOLOGY

Project number: DEPARTMENT OF CITY PLANNING / LA-CEQR-M
Project: **45 Broad Street**
Date received: 8/14/2017

Comments: as indicated below. Properties that are individually LPC designated or in LPC historic districts require permits from the LPC Preservation department. Properties that are S/NR listed or S/NR eligible require consultation with SHPO if there are State or Federal permits or funding required as part of the action.

This document only contains Archaeological review findings. If your request also requires Architecture review, the findings from that review will come in a separate document.

Comments: The LPC is in receipt of the revised, "Phase 1A Archaeological Study for 45 Broad Street, Borough of Manhattan, New York, New York," dated August 2017 and prepared by Langan Engineering and the, "Scope of Work for Archaeological Monitoring During Support of Excavation Pre-Trenching," dated August 2017 and prepared by Langan Engineering.

The LPC concurs with findings of the August 2017 revised Phase 1A. Please submit a bound copy of the report as well as a pdf to the LPC for our archives.

The LPC also concurs with the monitoring proposal for the Support of Excavation Pre-Trenching. We note that this work may not proceed until the Restrictive Declaration has been executed and that this monitoring plan is ONLY for the Support of Excavation Trenching and that once the Restrictive Declaration is executed, the LPC will issue the appropriate Notices as defined by the declaration for the SOE archaeological monitoring work to proceed. In addition, the scope for testing the rest of the site must be submitted before that work may proceed.

8/17/2017

SIGNATURE DATE
Amanda Sutphin, Director of Archaeology

File Name: 31994_FSO_ALS_08162017.doc

THE NEW YORK CITY LANDMARKS PRESERVATION COMMISSION
1 CENTRE STREET 9TH FLOOR NORTH NEW YORK NY 10007
TEL: 212 669-7700 FAX: 212 669-7780

BINDING REPORT

ISSUE DATE:	DOCKET #:	CRB #:
08/30/2016	192370	CRB 19-2476

ADDRESS:	BOROUGH:	BLOCK/LOT:
NEW AMSTERDAM Street Plan of New Amsterdam and Colonial New York INDIVIDUAL LANDMARK	MANHATTAN	777 / 777

To the Mayor, the Council, and the Manhattan Borough Commissioner NYC Department of Transportation

This report is issued pursuant to Sections 3020 and 854 (h) of the New York City Charter and Section 25-318 of the Administrative Code of the City of New York, which require a report from the Landmarks Preservation Commission for certain plans for the construction, reconstruction, alteration, or demolition of any improvement or proposed improvement which is owned by the City or is to be constructed upon property owned by the City and is or is to be located on a landmark site or in a historic district or which contains an interior landmark.

The Landmarks Preservation Commission, at the Public Meeting of July 26, 2016, following the Public Hearing of the same date, voted to issue a positive report to install two (2) elevators and related streetbed alterations; as put forward in your application completed on June 30, 2016, and as you were notified in Status Update Letter 19-1066 issued on July 27, 2016.

The proposal, as approved, consists of the construction of two (2) metal and glass elevator with canopies, measuring 13' high, at the southwest and northeast corner of Broad Street and Exchange Place; the construction of a "bulb-out," featuring Belgian block paving, a granite curb, and hexagonal metal bollards finished black; at the southeast corner, resetting the existing commemorative granite band 2'6" to the east, maintaining the materials and slope of the existing Belgian block paving, and relocating the five (5) concrete benches to the east following the proposed curb line. The proposal was shown on eighteen (18) presentation slides, titled "addition of ada accessible elevators on Broad Street" dated July 26, 2016, prepared by Urbahn Architects, and submitted as components of the application, and presented at the Public Meeting and Public Hearing.

In reviewing this proposal, the Commission noted that the designation report for the Street Plan of New Amsterdam and Colonial New York describes this pattern of streets as the only remaining above-ground physical evidence of the Dutch presence in Manhattan, and a striking reminder of New York's colonial history. The Commission also noted that Binding Commission Report 04-5342 (LPC 04-4350) for a master plan governing the future installation of security devices and streetscape improvements on Wall

Street, Exchange Place, New Street and Broad Street, was issued February 27, 2004.

With regard to this proposal, the Commission found that the proposed work will provide barrier-free access to the Broad Street subway station; that the installation of elevator bulkheads and alteration to the sidewalk and curbs will not significantly alter the character of the street bed or otherwise permanently affect the street pattern which is the significant feature of this individual designation; that while altering the street bed along Broad Street will affect the historic width of the street beds in a limited area, the location and appearance of the streets and their boundaries will be clearly marked by maintaining the curb lines and existing paving material; that the proposed Belgian blocks, salvaged granite curbs, and steel bollards will match the existing paving, curbs, and bollards in the streetscape and therefore will not call undue attention to the work; that all of these alterations are reversible and the street beds could be restored should the opportunity ever arise; and that the proposed work will not diminish the special architectural and historic character of the Street Plan of New Amsterdam and Colonial New York Individual Landmark. Based on these findings, the Commission determined the proposed work to be appropriate to this Individual Landmark, and voted to issue a positive report.

However, in voting to grant this approval, the Commission required the applicant with staff to modify the curb of the southeast sidewalk "bulb-out" by cutting it back to the east to the maximum extent possible to the historic curb line; and that two complete sets of filing drawings be submitted for review and approval by the staff of the Commission. Subsequently on August 25, 2016, the staff received twenty (20) drawings dated July 26, 2016, prepared by Urbahn Architects, and a written statement dated as received August 30, 2016 prepared Jacqueline Peu-Duvallon Historic Preservation Consulting. Accordingly, the staff reviewed these drawings and noted that the existing and proposed conditions of the "bulb-out" were not accurately reflected in the presentation drawings and that the corrected drawings of the proposal will maintain the design and proportions of the sidewalk and streetscape previously approved in the Masterplan. Based on this and the above findings, the drawings have been marked approved by the Landmarks Preservation Commission with a perforated seal, and this Binding Commission Report is being issued.

This report is issued on the basis of the building and site conditions described in the application and disclosed during the review process. By accepting this permit, the applicant agrees to notify the Commission if the actual building or site conditions vary or if original or historic building fabric is discovered. The Commission reserves the right to amend or revoke this permit, upon written notice to the applicant, in the event that the actual building or site conditions are materially different from those described in the application or disclosed during the review process.

All approved drawings are marked approved by the Commission with a perforated seal indicating the date of approval. The work is limited to what is contained in the perforated documents. Other work or amendments to this filing must be reviewed and approved separately. This report constitutes the permit; a copy must be prominently displayed at the site while work is in progress. Please direct inquiries to Egbert Stolk.

Meenakshi Srinivasan/sc

Meenakshi Srinivasan
Chair

cc: Jared Knowles, Director of Preservation / LPC

APPENDIX E: HISTORIC AND CULTURAL RESOURCES

APPENDIX E: HISTORIC AND CULTURAL RESOURCES

ARCHITECTURAL RESOURCES

Street Plan of New Amsterdam and Colonial New York (No. 1)

The Street Plan of New Amsterdam and Colonial New York includes all or parts of the street plan of lower Manhattan south of Wall Street that were designated as a NYCL by LPC in 1983 (LP-1235). These include all or parts of Beaver Street, Bridge Street, Broad Street, Broadway, Exchange Place, Hanover Square, Hanover Street, Marketfield Street, Mill Lane, New Street, Pearl Street, South William Street, Wall Street, Whitehall Street, and William Street. The Dutch Settlement of Manhattan (known as "New Amsterdam") developed the street plan of lower Manhattan in the 17th century. Only minor alterations have been made to the street plan in the last three centuries.

Historic Districts

Wall Street Historic District (No. 2)

The Development Site is located in the Wall Street Historic District (WSHD) and has been listed on the S/NR (S/NR No. 06NR05647) since 2007. The WSHD, which encompasses part of or all of 36 city blocks in the inner core of New York City's Financial District in Lower Manhattan, is roughly bounded by Liberty Street and Maiden Lane to the north, Pearl Street to the east, Bridge and South William Street to the south, and Greenwich Street to the west. The WSHD includes historic buildings that are listed on the S/NR and/or are LPC-designated NYCLs. The WSHD is not an LPC-designated historic district.[1]

Stone Street Historic District (No. 3)

The Stone Street Historic District (SSHD) was designated in 1996 and was listed on the NR in 1997 and the SR in 1999. The SSHD is bounded by South William Street to the northwest; Mill Lane and Hanover Square to the northeast; Pearl Street to the southeast; and Coenties Alley to the southwest. The historic district was named after Stone Street, a cobblestone street that cuts across the historic district and is a pedestrian-only street. Low-scale buildings built in the 1830s on narrow winding streets characterize the district. All streets within the SSHD are part of the Street Plan for New Amsterdam and Colonial New York, a designated NYC Individual Landmark (LP-1235). The SSHD consists of 14 historic buildings, built in the late 1830s, and are listed on the S/NR.[2]

[1] *Wall Street Historic District (S*/NR No. 06NR05647), https://architecturaltrust.org/easements/about-the-trust/trust-protected-communities/historic-districts-in-new-york/wall-street-historic-district/ (Accessed November 28, 2016).

[2] LPC, *Stone Street Historic District Designation Report*, (http://www.nyc.gov/html/lpc/downloads/pdf/reports/stone_street_historic_district.pdf) (Accessed November 28, 2016).

Historic Lamppost 3 (No. 4)

Lamppost 3 is adjacent to 24 Beaver Street between Broad and New Streets and was designated a NYCL by LPC in 1997 (LP – 01961). Lamppost 3 is the first type of bishop's crook post, made from a single iron casting up to the crook section, a garland on the fluted shaft and a short ladder rest. In the design of Lamppost 3, the garland and ladder rest were eliminated, and lengths of plain iron pipe at the top of the shaft were incorporated.

Historic Buildings within the Study Area

The Study Area includes 61 buildings that are listed on the S/NR and/or are LPC-designated NYCLs. Seventeen historic buildings are located along Broad Street; 14 buildings are listed on the S/NR and 2 buildings are LPC-designated NYCLs and listed on the S/NR, and 1 building is an LPC-designated NYCL. The American Bureau of Shipping (No. 7) at 45 Broad Street is listed on the S/NR; however, the property is currently vacant and is not analyzed in this assessment. The buildings located at 55 Broad Street (No. 8), 40 Broad Street (No. 16), and 60 Broad Street (No. 18) are listed on the S/NR as non-contributing resources, and are not included in the discussion below.[3]

Broad Exchange Building (No. 5)

The Broad Exchange Building, adjacent to the north of the Development Site, has been listed on the S/NR since 1998, and an LPC-designated NYCL since 2000. The 21-story building is bounded by Exchange Place to the north, William Street to the east, the Development Site's northern boundary to the south, and Broad Street to the west. Built in 1902 by architects Clinton and Russell, the Broad Exchange Building is composed of three parts: a 3-story granite base, a 14-story shaft of brick with terra cotta trim, and a 3-story capital of terra cotta, with copper cornice. Formerly a commercial office tower, the Broad Exchange Building currently contains luxury residential condominiums.[4]

Lee, Higginson & Company Bank Building (Leman Manhattan Preparatory School Building) (No. 6)

The Lee, Higginson & Company Bank Building, directly north of the Development Site, has been listed on the S/NR since 2006 and currently houses the Leman Manhattan Preparatory school. The 9-story building is bounded by the LPC-designated and S/NR-listed, 21-story Broad Exchange Building to the north; an S/NR-listed, 20-story Lord's Court Building, and a 44-story commercial/residential building to the east (fronting William Street); the vacant Development Site (Lot 7) to the south; and Broad Street to the west.

[3] A non-contributing building, site, structure, or object does not add to the historical associations, historic architectural qualities, or archeological values for which a property is significant based on the following: (i) it was not present during the period of time that the property achieved its significance; (ii) it does not relate to the documented significance of the property; and (iii) due to alterations, disturbances, additions, or other changes, it no longer possesses historical integrity or is capable of yielding important information relevant to the significance of the property. (Source: https://www.nps.gov/nr/publications/bulletins/arch/pt5.htm; Accessed August 17, 2017).

[4] http://www.hoffarch.com/assets/25-Broad-Street.pdf (Accessed August 17, 2017).

Lord's Court Building (No. 9)

The Lord's Court Building is a 20-story office building located at the corner William Street and Exchange Place; it has been listed on the S/NR since 2007.

J.P. Morgan & Co. Building (No. 10)

The J.P. Morgan & Co. Building at 23 Wall Street is a NYCL designated by LPC in 1965 and has been listed on the S/NR since 1972. The four-story building is located at the southeast intersection of Broad Street and Wall Street. Built in 1913, the building was designed by Trowbridge & Livingston in the neoclassical style of architecture.[5]

The Equitable Trust Company (No. 11)

The Equitable Trust Company building, listed on the S/NR since 2007, is a 42-story building at 15 Broad Street on the block north of the Project Site. The building wraps around the low-rise, S/NR-listed J. P. Morgan & Co building at 23 Wall Street to the north, and has frontage on three streets: Wall Street to the north, Exchange Place to the south, and Broad Street to the east. To the east is a 26-story, S/NR-eligible office building at 43 Exchange Place. Built in 1882 and designed by Trowbridge & Livingston in the neoclassical style of architecture, the Equitable Trust Company building has a defined base with a large mass that rises up behind the 23 Wall Street and sets back in a series of steps above the 19th floor. The building façade is made of granite, limestone, and brick.[6]

New York Stock Exchange (Nos. 12, 13, and 14)

The New York Stock Exchange includes three buildings on a single block bounded by Wall Street to the north, Broad Street to the east, Exchange Place to the south, and New Street to the west. The 27-story (20 Broad Street) and 23-story building (11 Wall Street) have been listed on the S/NR since 2007; the 23-story building located at 8-18 Broad Street was designated a NYCL by LPC in 1985. All three buildings were built between 1901 and 1903 in the neoclassical style of architecture.[7] The buildings at 2 Broad Street and 11 Wall Street were designed by architect George B. Post and feature a dominant portico.[8]

The Continental Bank (No. 15)

The Continental Bank building at 30 Broad Street, northwest of the Development Site has been listed on the S/NR since 2006. The 46-story building is bounded by Exchange Place to

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[5] Landmarks Preservation Commission (LPC) designation report (L P-0039) dated December 21, 1965; http://s-media.nyc.gov/agencies/lpc/lp/0039.pdf (Accessed August 17, 2017)

[6] New York State Office of Parks, Recreation & Historic Preservation (OPRHP) https://cris.parks.ny.gov/Uploads/ViewDoc.aspx?mode=A&token=0fi0AMqKR1QvRP5AiXPNkUjW1bBMAlE4M9a/PfyAmBd8Chd8+omm/LbPJfMVfC9nLQdAdG33dnM6CMNVJriPZMmMmMG5fhKjAU65uilB+QsZqHL3Y2CMLUmUomtqu9M+&q=false (Accessed August 18, 2017)

[7] Wall Street Historic District, National Register of Historic Places Registration Form (NPS Form No. 10-900); October 1990 (http://architecturaltrust.org/~architec/wp-content/uploads/2013/06/Report_NR_Wall_Street.pdf; Accessed August 17, 2017)

[8] LPC designation report (L P-1529) dated July 9, 1985 (http://s-media.nyc.gov/agencies/lpc/lp/1529.pdf; Accessed August 17, 2017)

the north, Broad Street to the east, a 31-story building at 40 Broad Street (listed on S/NR as a non-contributing resource) to the south, and New Street to the west. Designed by architects Morris and O'Connor in the art deco style of architecture, the building was completed in 1932 and consists of spandrel panels of brown brick in the mid-façade and is clad in limestone.

50 Broad Street (No. 17)

The 20-story office building at 50 Broad Street (across the Project Site to the west) has been listed on the S/NR since 2006. The building is bounded by a 31-story building at 40 Broad Street to the north (listed on the S/NR as a non-contributing resource), Broad Street to the east, a 38-story building at 60 Broad Street to the south (listed on the S/NR a non-contributing resource), and New Street to the west. The office building opened in 1913 and features original terracotta ceilings.

The American Bank Note Company Headquarters (No. 19)

The American Bank Note Company Headquarters building at 70 Broad Street was designated a NYCL by LPC in 1997 and has been listed on the S/NR since 1999. The five-story granite building sits on a narrow lot which is bounded by Beaver Street to the north, Broad Street to the east, Marketfield Street to the south, and the Stock Quotation Telegraph Co. building at 26 Beaver Street (listed on the S/NR) to the west. Built in 1907-1908 in the neoclassical style of architecture, the building features columns, continuous window bays, and classical carvings.[9]

74 Broad Street (No. 20)

The six-story commercial/office building at 74 Broad Street has been listed on the S/NR since 2006. The building is bounded by Marketfield Street to the north, Broad Street to the east, the 35-story Maritime Exchange Building (listed on the S/NR) to the south, and a 32-story office building to the west.

Maritime Exchange Building (No. 21)

The 35-story Maritime Exchange Building at 80 Broad Street has been listed on the S/NR since 2007. The building is bounded by an S/NR-listed, 6-story office building at 74 Broad Street to the north, Broad Street to the east, Stone Street to the south, and a 32-story office building to the west. Built in 1931, the building was designed by architect Sloan & Robertson in the art deco style of architecture.

Former International Telephone Building (No. 22)

The 35-story Former International Telephone Building at 75 Broad Street, on the block to the south of the Project Site, has been listed on the S/NR since 2007. The building is bounded by Beaver Street to the north; two buildings, 12- and 8-stories, at 44 Beaver Street

[9] LPC designation report (L P-1955) dated June 24, 1997 (http://s-media.nyc.gov/agencies/lpc/lp/1955.pdf; Accessed August 18, 2017)

and 14 South William Street, respectively, to the east; South William Street to the south, and Broad Street to the west. The building was built in 1929 as the headquarters for the International Telephone and Telegraph Corporation.

ARCHAEOLOGICAL RESOURCES

The Development Site is within an archaeologically sensitive area, as identified in SHPO's CRIS database. In its letters dated 16 December 2016 and 17 March 2017 (Appendix D), LPC confirmed that, based on its review of archaeological sensitivity models and historic maps, there is potential for the recovery of remains of Colonial and Native American occupation on the Development Site. Therefore, as recommended by LPC, a Phase 1A Archaeological Documentary Study ("Phase 1A Study") was performed at the Development Site in July 2017.

Based on the Phase 1A Study, because of the moderate archaeological sensitivity for truncated historic shaft features and the low archaeological sensitivity for other 17th- to 18th-century historic features, archaeological monitoring is recommended during excavation of the subsurface areas of sensitivity. Accordingly, a "Scope of Work for Archaeological Monitoring during Support of Excavation (SOE) Pre-Trenching," dated August 2017, was developed in consultation with LPC. In its letter dated 17 August 2017, LPC concurred with the findings of the Phase 1A Study and the SOE pre-trenching monitoring plan (Appendix D). Both reports are in Appendix E, "Phase 1A Archaeological Study and Pre-trenching Monitoring Plan."

On 25 August 2017, LPC approved a restrictive declaration ensuring that the subsurface monitoring protocols established in the SOE pre-trenching monitoring plan will be followed. Further, the restrictive declaration ensures that additional excavation of the remainder of the site will require preparation and approval by LPC of a monitoring plan.

PHASE IA ARCHAEOLOGICAL STUDY
For 45 Broad Street
Borough of Manhattan,
New York City, New York

Prepared For:

Madison Equities
105 Madison Avenue, 9th Floor
New York, New York 10016

For Submission to:

New York City Landmarks Preservation Commission
Municipal Building
1 Centre Street, Ninth Floor North
New York, NY 10007

Prepared By:

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New York, New York 10001

April 2017
Revised May 2017
Revised June 2017
Revised July 24 2017
Revised August 2017
170394201

LANGAN

MANAGEMENT SUMMARY

SHPO Project Review Number): **N/A**
Involved State and Federal Agencies: **Not Yet Determined**
Phase of Survey: **Phase IA Archaeological Survey**

Location Information
- Location: **45 Broad Street**
- Minor Civil Division: **Borough of Manhattan, City of New York**
- County: **New York**

Survey Area
- Length: **East to west approximately 175 feet**
- Width: **North to south approximately 125 feet**
- Number of Acres Surveyed: **Approximately 0.25**
- USGS 7.5 Minute Quadrangle Map: **Jersey City**

Archaeological Survey Overview
- Number & Interval of Shovel Tests: **N/A**
- Number & Size of Units: **N/A**
- Width of Plowed Strips: **N/A**
- Surface Survey Transect Interval: **N/A**

Results of Archaeological Survey
- Number & Name of Pre-Contact Sites Identified: **N/A**
- Number & Name of Historic Sites Identified: **N/A**
- Number & Name of Sites Recommended for Phase n/Avoidance: **N/A**

Report Authors(s): **Michael Audin, RPA and Katherine French, RPA, Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C., 360 West 31st Street, Eighth Floor, New York, NY 10001**

Date of Report: **April 2017; Revised May, June, July, and ~~July~~August 2017**

EXECUTIVE SUMMARY

On behalf of Madison Equities, we have prepared this Phase IA Archaeological Survey as part of the City Environmental Quality Review (CEQR) of the proposed development at 45 Broad Street, New York, New York. The New York City (NYC) Landmarks Preservation Commission (LPC) requested the survey in their CEQR review memorandum dated 17 March 2017.

The proposed development is an 80-story, about 464,000 gross square foot (gsf) mixed-use tower. The project site comprises two tax lots (Block 25, Lots 7 and 10) with a total area of 23,798 square feet (sf). The site is bounded by Broad Street to the west, a 21-story mixed-use building (Broad Exchange Building) to the north, a 20-story office building and 44-story mixed-use building to the east and a 31-story office building to the south. An 8-story approximately 70,000 sf office building (Wells Fargo) formerly occupied Lot 7; the building was demolished in 2007. A 9-story approximately 94,000 sf building (Leman Manhattan Preparatory School) currently occupies Lot 10. The proposed development would not occur on Lot 10.

The archaeological Area of Potential Effect (archaeological-APE) for the project is defined as areas of the site where proposed ground disturbance has the potential to disturb archaeological resources. The archaeological-APE consists of the entirety of Lot 7.

Our research included reviewing:

- cultural resource surveys available online in the NYC Cultural Resource Information System (CRIS),
- archaeology reports available in the NYC LPC online archive,
- tax assessment records at the NYC Municipal online archives,
- census records via Ancestry.com,
- NYC City Directories, historic maps and aerial photographs via an EDR (edrnet.com) records search,
- historical maps available online from the New York City Public Library, the New York University Library and the David Rumsey Map Collection, and
- geotechnical investigations performed for redevelopment of the site.

The site is located in an archaeologically sensitive area according to the CRIS. The research determined that the site is ~~covered in~~located within one-quarter mile of eight previous archaeological surveys, and that five known historic archaeological sites are located within one-quarter mile of the project site.

The historic maps, atlases and aerial photographs revealed that the site was occupied by colonists as early as the mid-seventeenth century and has been continuously occupied since. The site was initially used as a sheep pasture with buildings fronting Broad Street, and later alternated between residential and commercial use during the subsequent centuries.

Geotechnical investigations (test borings and test pits) confirm the subsurface within the entire footprint of Lot 7 has ~~been disturbed~~experienced disturbance by past developments. This covers the entire archaeological-APE. –Most recently, the two 20th –century buildings were demolished and the debris used to backfill the basements.

Considering the research above we conclude the following:

1. Because of the past basement construction (now filled with demolition debris), there is no potential for significant cultural resources above the existing concrete basement slabs. The slabs are at depths of 13 feet on the western portion of the site (Area 1), and 11 feet on the eastern portion of the site (Area 2). These two areas are delineated on Figure 20.
2. There is a moderate sensitivity for truncated shaft features (wells or privies) below the existing concrete basement slabs (below 13 feet in Area 1 and below 11 feet in Area 2). Given the depths of the previous basement disturbance, there is low sensitivity for other types of 17th- and 18th-century archaeological features, however, it is possible that these types of features could have survived the previous disturbance and are preserved under the concrete slab.
3. ~~Shaft~~These types of features ~~and the~~or associated artifacts ~~contained within~~ have the potential to be classified as "significant" under the National Park Service's National Register Criteria A through D, as Colonial shaft features or other types of 17th- and 18th century features and could:
    a. provide information concerning the transition from Dutch to English rule (Criterion A);
    b. provide information concerning Cornelis van Ruyven, a prominent Dutch leader, and the first alderman under English rule (Criterion B);
    c. display unique or characteristic construction for the time period (Criterion C); or,
    d. have significant potential to yield further information of historical importance (Criterion D).

Because of the moderate archaeological sensitivity for truncated historic shaft features and the low archaeological sensitivity for other 17th- to 18th-century historic features, Langan recommends archaeological monitoring of any excavation extending more than 13 feet below grade in the western two-thirds of the site (Area 1) and more than 11 feet below grade in the eastern third of the site (Area 2~~.~~). An archaeological testing/monitoring plan and protocol will be developed in consultation with LPC for ~~any~~ excavation below these depths. Archaeological testing/monitoring ~~should continue for any excavation below these depths until~~will conclude when culturally sterile ~~(native) soils are exposed~~soil is reached across the ~~site and no shaft features are identified~~project site.

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APPENDICES

1.0 INTRODUCTION

Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C. (Langan) was retained by Madison Equities to conduct a Phase IA Archaeological Survey for the proposed development at 45 Broad Street, Lower Manhattan, New York. The New York City Landmarks Preservation Commission (LPC) required the survey as part of the City Environmental Quality Review (CEQR) process due to an elevated potential for Native American or Colonial occupation at the Project Site. The purpose of this survey is to determine the archaeological sensitivity and, if necessary, make recommendations for field testing for the project's Area of Potential Effect (archaeological-APE). Madison Equities is proposing construction of an 80-story, approximately 464,293 gross square foot (gsf) mixed-use building on the Project Site. A site location map and recent aerial photograph are included as Figures 1 and 2 respectively.

All work for this project was performed in accordance with the Secretary of the Interior Standards and Guidelines for Archaeology and Historic Preservation 1983; the amended Procedures for the Protection of Historic and Cultural Properties, as set forth in 36 CFR 800; New York State Historic Preservation Act of 1980, Section 14.09 and New York State Historic Preservation Office (SHPO) guidelines, SHPO's *Phase I Archaeological Report Format Requirements* (2005); LPC's *Guidelines for Archaeological Work in New York City* (2002); and the *CEQR Technical Manual* (2014). The Langan cultural resource specialists who performed the investigations and prepared the report meet or exceed the criteria outlined in 36 CFR 66.3(b) (2) and 36 CFR 61. Résumés of the key personnel are presented in Appendix A.

1.1 Site and Project Description

The Project Site is comprised of two tax lots (Block 25; Lots 7 and 10) totaling approximately 23,798 square feet (sf). The Project Site is bounded by Broad Street to the west, a 21-story mixed-use building (Broad Exchange Building) to the north, a 20-story office building and a 44-story mixed-use building to the east (fronting William Street) and a 31-story office building to the south (Figure 3). Lot 7 (the "Development Site") was formerly occupied by an 8-story, approximately 70,000 sf office building (Wells Fargo) that was demolished in 2007. Lot 10 is currently occupied by the 9-story, approximately 93,894 sf Leman Manhattan Preparatory School. The Proposed Development Project would not occur on Lot 10.

1.2 Area of Potential Effect

The archaeological Area of Potential Effect (archaeological-APE) includes locations of possible archaeological sensitivity that may be potentially impacted by the construction or that may experience effects once construction is completed. Included in the archaeological-APE are all locations where the project may result in ground disturbance, areas where the elements of the project may be visible and where the activity may result in changes to traffic patterns, land use and public access. Project effects on historic resources can include both physical effects and contextual effects. Physical effects could include physical destruction, demolition, damage or alteration of a historic resource. Contextual effects can include isolation of a property from its surrounding environment, the introduction of visual or audible elements that are out of

character with the property or that alter its setting and context or elimination of publicly accessible views to the resource.

The APE is defined in 36 CFR 800.16(d) as "the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking." The archaeological-APE delineated for archaeology is described below.

The archaeological-APE was defined as Tax Lot 7 (Figure 3).

Map References: USGS 7.5' Topographic Maps provided by ArcGIS Online.

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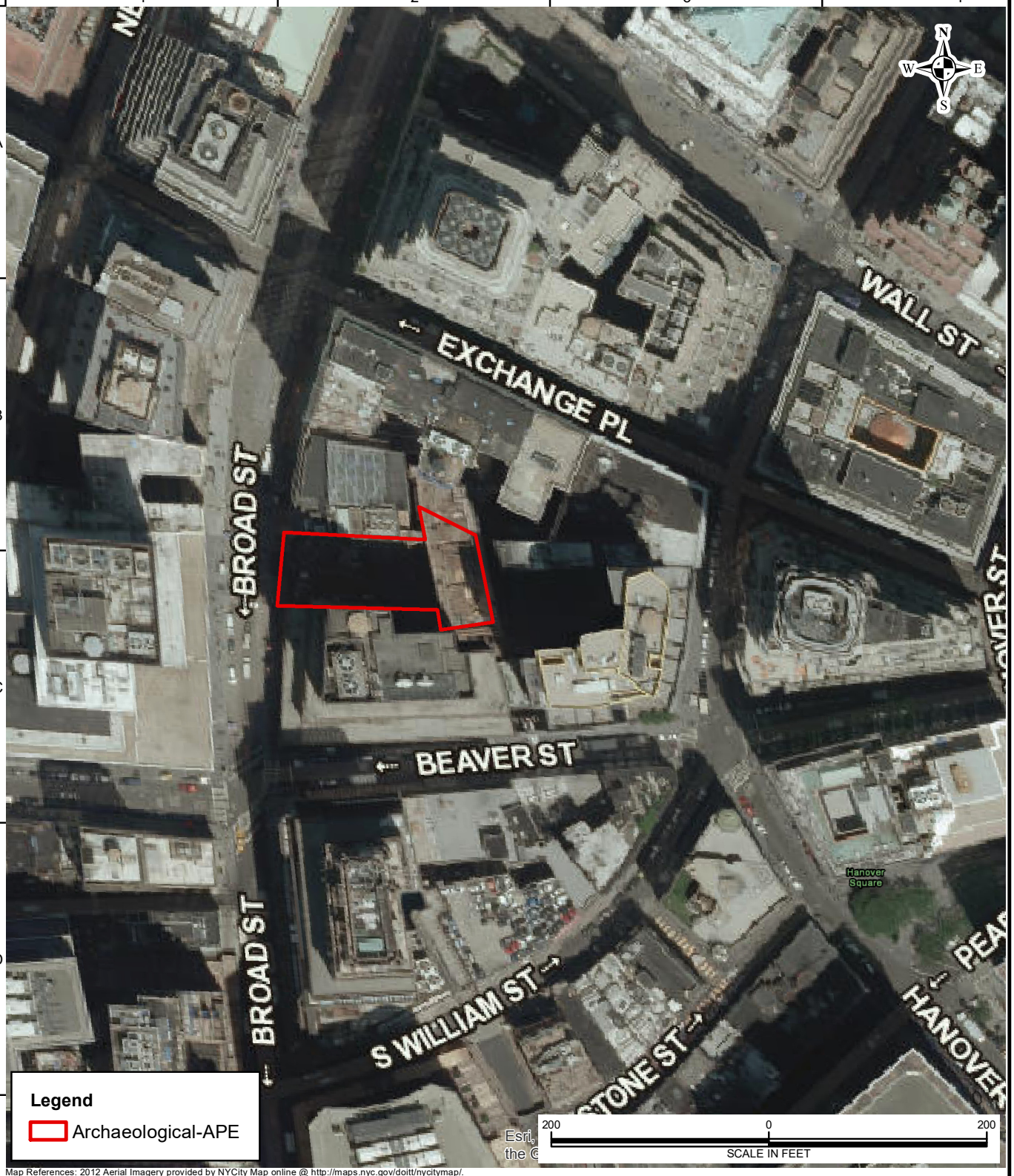
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project	45 BROAD STREET
	BLOCK NO. 25, LOT NO. 7
	CITY OF NEW YORK NEW YORK
Drawing Title	USGS SITE LOCATION MAP
Project No.	170394201
Date	4/17/2017
Scale	SEE ABOVE
Drawn By	MA
Figure	1



Map References: 2012 Aerial Imagery provided by NYCity Map online @ http://maps.nyc.gov/doitt/nycitymap/.

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Project
45 BROAD STREET
BLOCK NO. 25, LOT NO. 7
CITY OF NEW YORK NEW YORK

Drawing Title
2012 AERIAL PHOTOGRAPH

Project No.	170394201
Date	4/17/2017
Scale	SEE ABOVE
Drawn By	MA
Figure	2

Map References: Aerial Imagery provided by ArcGIS Online.

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Project	Drawing Title	Project No.	Figure
45 BROAD STREET BLOCK NO. 25, LOT NO. 7 CITY OF NEW YORK NEW YORK	TAX MAP	170394201	3
		Date: 4/17/2017	
		Scale: SEE ABOVE	
		Drawn By: MA	

2.0 RESEARCH GOALS AND DESIGN

This chapter describes the general research goals and design for the assessment of the significance of archaeological resources to determine potential eligibility for nomination to the National Register of Historic Places.

2.1 Archaeology

The preliminary Phase 1A archaeological survey begins with identifying the areas where project activities have the potential to affect archaeological sites through below ground disturbance. Such areas are referred to as the archaeological-APE, which is described in Section 1.2. After defining the archaeological-APE, documentary research is conducted to determine which locations could have been used during prehistoric (Native American) or historic times. The research assists in identifying areas where intact archaeological evidence, foundations, structural remains, Native American artifacts or activity areas might be present. A site visit or reconnaissance is then conducted to observe the existing conditions and determine the extent to which the original topography is still present and the effects that landscape alterations may have had on potential archaeological resources. Archaeologically sensitive areas based on topographic features, vegetation and soils are noted, as well as any disturbances that would compromise archaeological resources. The result of the site visit is to determine whether archaeological testing is necessary and, if so, to develop an appropriate testing strategy.

If additional archaeological testing is required, then the project advances to the Phase IB survey level. Phase IB subsurface archaeological testing (Phase I level) is then conducted in archaeologically sensitive locations in the archaeological-APE to identify whether potentially significant archaeological resources are present. The presence of a potentially significant Native American or historic period site requires a subsequent survey (Phase II level) to evaluate the significance or importance of the identified site, unless the site can be avoided.

LPC uses the National Register Criteria to evaluate site significance. These criteria are described in detail in Section 2.3. An archaeological site typically has to have the potential to yield important new information in history or prehistory to be considered significant (National Register of Historic Places Criterion D). Evaluations for significance are dependent upon the quality of archaeological data retrieved from the ground, the integrity or intactness of the deposits, prior research activities in the region and the development of historic or prehistoric contexts that identify gaps in archaeological research that further work at the site might address.

2.2 Historic Architecture

An APE for architecture was not delineated as part of this Phase IA survey.

2.3 National Register of Historic Places Criteria

LPC's determinations of significance are based on the National Register of Historic Places Criteria. Properties listed on or determined eligible for listing on the National Register can be both architectural and archaeological resources. Significant historic properties include districts,

structures, objects or sites that are at least 50 years in age and which meet at least one National Register criterion. Criteria used in the evaluation process are specified in 36 CFR Part 63. To be eligible for inclusion in the National Register of Historic Places, a historic property or properties must possess:

> "The quality of significance in American History, architecture, archaeology, engineering, and culture [that] is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and:
>
> (A) that are associated with events that have made a significant contribution to the broad patterns of our history, or
>
> (B) that are associated with the lives of persons significant in our past, or
>
> (C) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components lack individual distinction, or
>
> (D) that have yielded, or may be likely to yield, information important in prehistory or history. (36 CFR 60.4)"

There are several criteria considerations. Ordinarily, cemeteries, birthplaces or graves of historical figures; properties owned by religious institutions or used for religious purposes; structures that have been moved from their original locations; reconstructed historic buildings; properties primarily commemorative in nature and properties that have achieved significance within the past 50 years shall not be considered eligible for the National Register. However, such properties will qualify if they are integral parts of districts that do meet the criteria, or if they fall within the following categories:

> (A) a religious property deriving primary significance from architectural or artistic distinction or historical importance, or
>
> (B) a building or structure, removed from its original location but which is significant primarily for architectural value, or which is the surviving structure most importantly associated with a historic person or event, or
>
> (C) a birthplace or grave of a historical figure of outstanding importance if there is no other appropriate site or building directly associated with his/her productive life, or
>
> (D) a cemetery which derives its primary significance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events, or

(E) a reconstructed building when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and when no other building or structure with the same association has survived, or

(F) a property primarily commemorative in intent if design, age, tradition, or symbolic value has invested it with its own historic significance, or

(G) a property achieving significance within the past 50 years if it is of exceptional importance. (36 CFR 60.4)

The physical characteristics and historic significance of the overall property are examined when conducting National Register evaluations. While a property in its entirety may be considered eligible based on Criteria A, B, C and/or D, specific data is also required for individual components therein based on date, function, history, physical characteristics and other information. Resources that do not relate in a significant way to the overall property may contribute if they independently meet the National Register criteria.

A contributing building, site, structure or object adds to the historic architectural qualities, historic associations, or archeological values for which a property is significant because a) it was present during the period of significance and possesses historic integrity reflecting its character at that time or is capable of yielding important information about the period, or b) it independently meets the National Register criteria. A noncontributing building, site, structure or object does not add to the historic architectural qualities, historic associations or archeological values for which a property is significant because a) it was not present during the period of significance; b) due to alterations, disturbances, additions or other changes, it no longer possesses historic integrity reflecting its character at that time or is incapable of yielding important information about the period or c) it does not independently meet the National Register criteria.

In addition to meeting one of the four criteria, historic resources must retain two of seven types of historical integrity. The ability of the property to communicate historic significance is how integrity is measured. The categories of integrity include location, design, setting, materials, workmanship, feeling and association. Integrity evaluation is explained in Section VIII of the US DOI NPS bulletin "How to Apply the National Register Criteria for Evaluation" (Shrimpton 1990, Revised 2002).

2.4 Mitigation of Adverse Effects

If significant archaeological resources are identified during these stages of investigation, then a mitigation strategy must be developed if the resource will be impacted by proposed development. The most common mitigation strategies are avoidance through project redesign or data retrieval through comprehensive scientific excavation. The latter strategy also involves the conservation and curation of all artifacts associated with any contributing significant resource. The appropriate mitigation strategy or combination of strategies is determined between the site developer and the consulting archaeologist with the input and ultimate approval of LPC.

3.0 ENVIRONMENTAL SETTINGS

This chapter briefly describes the ecological characteristics of the archaeological-APE, including physiography, geology, soils and flora and fauna of the area. The project is located in New York County in the Financial District neighborhood of the Borough of Manhattan. New York County is coterminous with the Borough of Manhattan, which includes Manhattan Island, Marble Hill and several islands off of Manhattan Island. The total area of Manhattan is 33.6 square miles, of which approximately 23 square miles is land area. The county is the most densely populated county in the United States with over 1.6 million inhabitants. Manhattan Island is surrounded by the Hudson River to the west, the East River to the east and south, the Harlem River to the north and east and Upper New York Bay to the south.

3.1 Physiography and Geology

The archaeological-APE is located in the southern tip of Manhattan Island, approximately 1625 feet north of South Ferry nearly equidistant between the East and Hudson Rivers. Based on the known limits of Pleistocene glaciation to the west, the archaeological-APE has been near or within the furthest extent of continental glacial ice three times over the last 2.4 million years. The most recent glacial advance to reach the area was that of the Late Wisconsinan (Woodfordian Stage), which reached its maximum extent at Perth Amboy, 21 miles south of the archaeological-APE, between 20,000 and 22,5000 years before present (BP).

Because immense volumes of global water were temporarily contained in world-wide continental ice masses at the last glacial maximum, global eustatic sea level fell by as much as 125 meters (Fairbanks 1989) and the exposed coastal plain in the area of New York City and northern New Jersey extended as much as 60 miles east of the present shoreline. Advancing glacial ice is responsible for overriding and rounding the resistant schists underlying Manhattan.

Recession of the ice margin from the Perth Amboy area commenced at around 20,000 BP (Stanford and Harper 1991). Drainage of impounded meltwater in the lower Hudson Valley finally occurred with the breaching of the terminal moraine, possibly as a result of catastrophic release of meltwater from the Great Lakes basin. The timing of the breakthrough at the moraine is not well established; Donnelly et al. place it at around 13,350 years BP (Donnelly et al. 2005).With release of the Lake Hudson impoundment, the ancestral Hudson River was free to flow in a manner much like its present configuration.

On Manhattan Island the wasting of the Wisconsinan glacial ice exposed a surface comprising areas of scoured bedrock, glacial till of various thickness and probably some localized ponded or glaciolacustrine deposits. Urbanization and industrialization have obscured the surface of most of the island, including the archaeological-APE (Cadwell et al. 1989).

3.2 Topography

The archaeological-APE is currently a flat, vacant lot. The lot includes a large area of sand and construction debris (brick, rebar, etc.). The eastern boundary of the site is a paved alleyway. The western site boundary is on grade with Broad Street. The eastern portion of the site is slightly raised above the alley forming the eastern boundary of the site.

3.3 Soils

In a collaborative effort, the U.S. Dept. of Agriculture Natural Resources Conservation Service, the New York City Soil and Water Conservation District and the Cornell University Agricultural Experiment Station conducted the soil mapping of Manhattan Island (New York City Soil Survey Staff 2005). The mapping for large swaths of the city reflects the effects of urbanization.

The archaeological-APE is comprised of two subtypes of urban land. Approximately 60% of the western archaeological-APE is classified as *Urban Land, tidal marsh substratum, 0 to 3 percent slopes*. The remaining eastern portion is classified as *Urban Land, outwash substratum, 3 to 8 percent slopes* (Figure 4). Both soil types are classified as very high run-off soils that are not considered to be prime farmland.

3.4 Climate

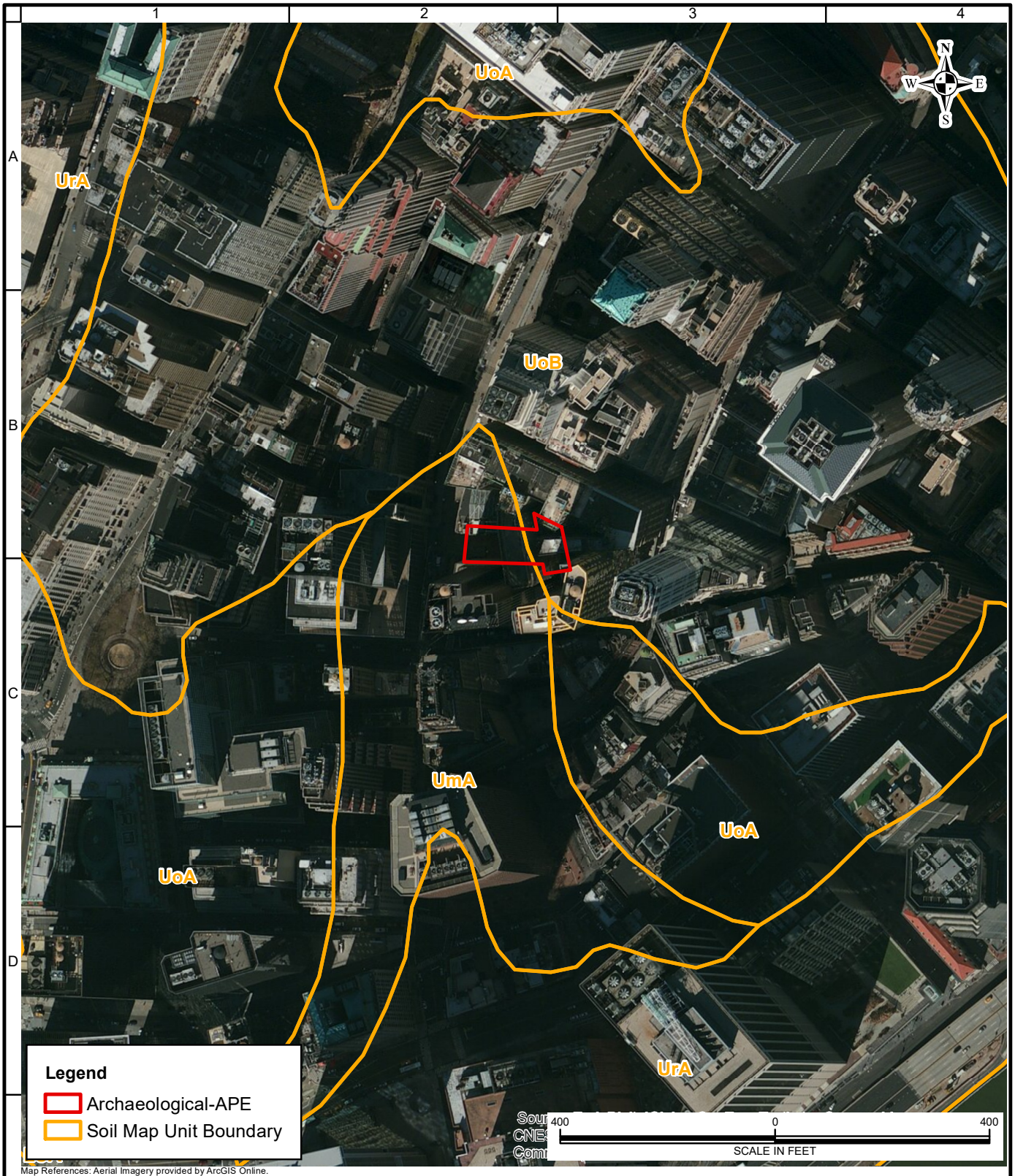
The climate of Manhattan Island is classified as humid continental. The temperature varies considerably throughout the year—cold in the winter and hot during the summer. The average annual temperature is estimated at 53 degrees Fahrenheit. Winters are milder in New York City compared to the rest of the state, with average temperatures around the freezing point. The urban development of Manhattan has led to a heat island where temperatures stay higher overnight compared to the suburban and rural surrounding areas. Summers are sunny and warm with the summer daytime temperatures usually between the upper 70s and middle 80s Fahrenheit. Snowfall in Manhattan can range between 25 and 35 inches per year. The total average annual precipitation approaches 50 inches, with the heaviest rains occurring during May and June.

3.5 Flora and Fauna

Floral and faunal conditions contribute to the soil formation and its quality and contribute to the overall ecological conditions of the area. Ecological conditions, in turn, stimulate human activity. Vegetation also has an effect on erosion by limiting the runoff rate and increasing the available water capacity. Overall, all these ecological conditions impact the possibility for human adaptations within the ecosystem by limiting or encouraging past and present activities.

Intensive historic development and dense population of Manhattan Island has irrevocably altered the environment and ecosystem of the Project Area. Environmental reconstructions, such as the comprehensive reconstruction produced by the Wildlife Conservation Society's Mannahatta project, demonstrate that human groups living on Manhattan in the Hudson estuary would have been able to support themselves in the past either through hunting, foraging or subsistence farming.

The animal species currently thriving in Manhattan are well adapted to the urban landscape. Prior to development, Manhattan Island supported a thriving and diverse ecosystem combining salt and freshwater marshes, beaches and forested areas. Habitat diversity contributed to a diverse food base for prehistoric people. Species that contributed to the diet of the Lenape people who



Map References: Aerial Imagery provided by ArcGIS Online.

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Project	Drawing Title	Project No.	Figure
45 BROAD STREET BLOCK NO. 25, LOT NO. 7 CITY OF NEW YORK NEW YORK	SOIL MAP	170394201 Date 4/17/2017 Scale SEE ABOVE Drawn By MA	4

lived in the area at the point of European Contact include jack-in-the-pulpits, hickory, chestnuts, goosefoot, common persimmons, wild berry plants (e.g., strawberry, hackberry, blackberry, blueberry, cranberry), Jerusalem artichokes, cattails and wild grapes. In addition, a number of plant fibers were exploited for craft production or building trades, including Indian Hemp, Tulip trees, milkweed, elm, and American basswood (Sanderson 2009).

Terrestrial mammals contributed to the indigenous subsistence patterns by providing a variety of biologically and economically significant items such as meat, furs, hide, marrow, bones, and antler. In this context, information on animal species and their distribution within the ecosystem contribute significantly to comprehensive interpretations of the archaeological record. The Manhattan Lenape were known to hunt white-tailed deer for meat, hides and antlers, as well as black bears as a source of grease for cooking and ointments. The Hudson River and the proximity of the coast also provided access to both marine and freshwater resources, including various fish species (e.g. shad, herring, cod, weakfish, bluefish, sturgeon), shellfish (e.g. blue mussels, lobsters, crabs), bivalves (e.g. oysters and clams), waterfowl (e.g. ducks, geese), amphibians (frogs, turtles) and water snakes (Sanderson 2009).

Temperature, sea level changes and industrial development substantially changed the environment of Lower Manhattan during the Holocene. Environmental reconstructions of past conditions support the assumption that human groups could have found favorable ecological and climatic conditions within the site in the past.

4.0 BACKGROUND RESEARCH

Preliminary research performed on the New York State Cultural Resource Information System (CRIS) website indicates the archaeological-APE is located within the Wall Street Historic District. Additional background research was conducted using the LPC online database of cultural resource reports to locate previously identified cultural resources and to evaluate previously unidentified cultural resources. The research revealed that one previous cultural resource survey was conducted in the vicinity of the archaeological-APE. Primary and secondary research, including a review of historic maps and aerial photographs, was conducted using evidence from an EDR record search, the New York Public Library and the David Rumsey Online Cartography Collection. The results of the background research concerning prior archaeological surveys, historic resources, prehistoric resources, the historic map search and review of tax assessment documents are reported below.

4.1 Archaeology

An 11 April 2017 search of the New York State CRIS identified five recorded archaeological sites and eight previous archaeological surveys within a one-quarter-mile radius of the archaeological-APE. According to the CRIS, the streets bounding Block 25 are part of the Street Plan of New Amsterdam and Colonial New York, which is a New York City Landmark (NYCL). The archaeological-APE is in the Special Lower Manhattan District and part of the State and National Register of Historic Places (SRHP/NRHP) listed Wall Street Historic District (WSHD). CRIS also revealed that 45 Broad Street was the site of the American Bureau of Shipping and was listed on the SRHP in January 2007 and on the NRHP in February 2007, although the building was demolished this same year. Furthermore, CRIS revealed that the project site is in an archeologically sensitive area.

Previously Recorded Archaeological Sites

Table 1 summarizes the five archaeological sites present within the one-quarter-mile buffer. The list of sites includes 5 historic site and no prehistoric sites. None of the archaeological sites have been determined eligible for the State or National Registers.

Table 1 – Archaeological sites within one-quarter mile of the archaeological-APE.

NYS OPRHP Site #/Name	S/NR Eligibility	Distance/Direction from archaeological-APE (ft)	Time Period	Site Type
06101.013876/Federal Hall Archaeological Site	Undetermined	550/North	Historic	Early 18th Century Federal Hall site
06101.001272/Historic Land Fill Site	Undetermined	750/South	Historic	Very early historic fill (17th Century)
06101.001282/Ronson Project Site (Pearl Bridge & Whitehall)	Undetermined	800/South	Historic	Original Dutch period surfaces underlying 19th Century historic foundations

NYS OPRHP Site #/Name	S/NR Eligibility	Distance/Direction from archaeological-APE (ft)	Time Period	Site Type
06101.001283/Barclay's Bank Site/100 Water Street Site	Undetermined	975/East	Historic	18th and 19th Century material; Dutch and English
06101.001284/Block 35, The Assay Site	Undetermined	1000/Southeast	Historic	Historic landfill site; Revolutionary War Cannon recovered from fill

Previous Archaeological Surveys

A total of eight archaeological survey projects have been conducted within a one-quarter-mile radius of the archaeological-APE. The location and results of these surveys are described below.

The first survey is *Stage IA Archaeological Assessment, New York Stock Exchange Security and Streetscape Improvements* by Joan Geismar, submitted June 2003. The current archaeological-APE is located within the survey area, which included background research and the excavation of seven machine-assisted test pits; however, the focus of the assessment was on sidewalks and streets and did not include the lot at 45 Broad Street. This assessment was completed in advance of permanent security improvements to ensure the safety of this potentially sensitive area in Post-9/11 Manhattan. These improvements include fixed and moveable street bollards and/or manned security checkpoints on Broad Street, Exchange Place, Nassau Street, New Street and Wall Street, which are located on the sidewalks and in the streets. The section of Broad Street just west of the archaeological-APE was identified as an area of no archaeological sensitivity (Geismar 2003, p. 4).

The second survey is entitled *Stage 1A Documentary Study, "The William," 15 William Street, New York, NY* prepared by Historic Perspectives, Inc (HPI) in 2005. This survey is located 250 feet east of the current project's archaeological-APE. This report was never reviewed by LPC, as the project was abandoned by the applicant. The authors found that two historic properties—the original site of the 19th century Delmonico's restaurant and the 17th century Red Lion Brewery—were originally located within the archaeological-APE, although the superstructures of both were destroyed by fire or demolished. The authors determined that any subsurface remains of the Red Lion Brewery would be potentially significant. Given the documented disturbance at the site, including site grading and intervening development, the most likely surviving evidence was predicted to comprise truncated shaft features associated with the brewery, such as wells and privies. Further archaeological testing was recommended prior to issuance of construction permits, although the project was abandoned instead.

The third survey is *Phase IB Archaeological Monitoring Investigation, Streetscapes Improvement Project, Stone Street Historic District, Borough of Manhattan, New York City, New York* by Tracker Archaeology Services in 2000. This survey took place 475 feet southeast of the current project's archaeological-APE and consisted of background research and monitoring the excavation of test trenches. Subsurface investigations included the excavation of 41 test trenches down to 5 feet below grade in Stone Street, Coenties Alley, Pearl Street,

South William Street, William Street and Hanover Square. All tests showed disturbed soil profiles, except for a small area of Pearl Street which had *in situ* historic deposits. Archaeological monitoring was conducted by LPC staff in targeted areas, in particular for deeper excavation of planned catch basins. One stone wall was identified at Catch Basin 2. An exploratory test unit was excavated adjacent to the stone wall, but no significant artifact deposits or additional features were identified. No further archaeological work or documentation was recommended for the project.

The fourth survey is a multi-phase project—Phase IA, IB and archaeological monitoring—at the Federal Hall. These surveys are located 550 feet to the north of the current project's archaeological-APE. The archaeological monitoring report summarizes all phases of survey and is entitled *Archaeological Monitoring, Federal Hall National Memorial, Borough of Manhattan, New York County, New York.* It was submitted by Hartgen Archaeological Associates, Inc., in 2005. Phase IB level testing occurred during the excavation of geotechnical test pits in the basement of the New York Custom House, which currently stands on the property atop the demolished early eighteenth-century original Federal Hall building. Based on the recovery of historic artifacts, archaeological monitoring was recommended during any additional excavation. During archaeological monitoring, Hartgen identified several features, including a drain and a brick pier. However, none of the identified resources were assessed to retain significant data potential. No further archaeological work was recommended for the project.

The fifth survey is entitled *Stage IA Archaeological Study for Proposed Improvements to Coenties Slip for the Office-Trading Facility at 55 Water Street, New York, New York* by HPI, submitted in 2001. This survey is located approximately 800 feet south-by-southeast of the current project's archaeological-APE. The authors determined that the project site has the potential to contain several types of archaeological resources, including evidence of the historic shoreline, landfill and landfill retention structures, foundations of 17th-century fortifications, evidence for 18th-century markets and 19th-century transportation remains. The archaeological potential for these types of features increases deeper than 8 feet below the current street grade. The authors recommended archaeological monitoring for deep excavations at the project site.

The sixth survey is entitled *Narrative Notes from a Field Trip to Visit Excavations at the Battery, New York City* (Huey 2006). This report describes archaeological work located 975 feet southwest of current project's archaeological-APE. Paul Huey of New York State OPRHP visited ongoing archaeological investigations led by Linda Stone at the intersection of Pearl and State Streets. Excavations uncovered a stone wall with associated timber cribbing that was likely part of the original battery wall, dated to the late 17th century or a later phase in the mid-18th century. Additional historical research was recommended to determine to which construction phase the wall and timber belong. In addition, the author recommends preservation of this exposed section of battery wall.

The seventh survey, entitled *Railroad and Abandoned Trolley Facilities Research Report* was submitted by URS in 2017. This southwest end of this linear survey is located 1000 feet southeast of the current project's archaeological-APE. The purpose of the survey was to identify if any abandoned railroad tracks or associated features remain along Front Street

between Old Slip to John Street. Subsurface investigations included test pit excavation and borings. No remains of trolley tracks or associated features were identified in the test pits.

The eighth survey is entitled *Stage 1A Archaeological Assessment Addendum, Block 69, Lots 1, 4-7, 10, 14, 28, 30, Manhattan, New York* and was written by HPI in 2004. This survey is located 1250 feet northeast of the current project's archaeological-APE. This survey report was not available on the CRIS system or from the LPC archaeological online report database.

4.2 Prehistoric Context

The prehistoric context or cultural history for New York City and its vicinity is constantly changing whenever new evidence is discovered. In general, the cultural history of pre-contact period Native Americans in New York City is divided into three broad time periods, followed by a period of European Contact: Paleo-Indian 11,500 – 10,000 years before present (BP), Archaic 10,000 – 3,700 years BP, Woodland 3,700 years BP – 500 BP and Contact 400 – 250 years BP (Cantwell and Wall 2001). The Archaic and Woodland periods are further divided into three sub-periods: Early, Middle and Late. These time periods have been described in several publications (Ritchie 1980; Chesler 1982; Kraft 1986, 2001; Custer 1996; Cantwell and Wall 2001) and therefore are not repeated in detail in this report. A brief prehistoric background for the Lower Hudson Estuary (New York City and northern New Jersey) is summarized in Table 1 below.

Table 2 - Overview of New York City Prehistory

Time Frame	Period	Characteristics
11,500 BP to 10,000 BP	Paleo-Indian	Highly mobile Band-level society (50 or less) Large game hunting and generalized foraging Fluted projectile points; usually jasper or chart Environment: cold, wet, mosaic of mixed grasslands with rapid sea level rise.
10,000 BP to 8,000 BP	Early Archaic	Highly mobile Band-level society Possible exploitation of more diverse food resources, smaller game, fishing Corner-notched and stemmed points (Kirk) More types of stone tools Spear-thrower technology Environment: cold drier than present, rapid sea level rise, extension of hardwood forests
8,000 BP to 6,000 BP	Middle Archaic	Band-level society Large and small camps, stratified reverie settlement system Hunter-gathers with intensification of resource use Use of shell fish documented in the region Bifurcate points and stemmed points (Neville) Use of more varied litchi materials and tool categories

		Environment: warm and wet
6,000 BP to 2,700 BP	Late Archaic	Social differentiations Increased sedentism Intensive use of local materials Broad spear, narrow-stemmed, fishtail points Extensive trade network for exotic raw materials Change in vessel technology – soapstone bowels Mortuary ceremonialism Environment: warmer, dryer than present, sea level rise
2,700 BP to 2,000 BP	Early Woodland	Band-level society with first evidence of community identity Shellfish exploitation Extensive trade network for exotic raw materials Experimentation and early use of ceramics Mortuary ceremonialism Environment: cool and wet
2,000 BP to 1,000 BP	Middle Woodland	Hunter-gatherers, seasonal fusion/fission of social groups Large and small camps Increase in type and kinds of ceramics Large scale exploitation of seasonal resources Mortuary ceremonialism
1,100 BP to 400 BP	Late Woodland	Territories of the Proto-Lenape/Unami, Algonkian ideology Foraging, limited agriculture in portions of southern NJ Unfortified hamlets, camps and smaller territories Triangular projectile points – bow and arrow Use of cobble cherts and jasper Cord decorated and incised ceramics Environment: modern; sea level rise remains factor
400 BP to 250 BP	Contact	Continue aspects of Algonkian ideology European Contact and initial colonization

4.3 Historic Context

European exploration of the New York City area dates to 1524, when Giovanni da Verrazano first sailed into New York Harbor. Contact and trade, although sporadic at first, was established between the indigenous inhabitants, a population of the broader Munsee Delaware Indians known today as the Lenape. The Dutch established a settlement in 1624. European expansion led to increased violence with the indigenous population, and competition for European goods also increased conflict between Munsee Delaware Indian groups (Cantwell and Wall 2001). The New Amsterdam settlers constructed a series of defenses for protection from attacks,

including the first phase of the battery and a wall along the northern border of the settlement at modern Wall Street.

After the Dutch settled Lower Manhattan, they planned a series of canals. The location of modern Broad Street was originally a stream surrounded by low-lying, swampy topography, and a canal was planned for this location in 1642. By 1664, the Dutch settlers dug a canal into this area ~~which~~that extended north past the archaeological-APE to Exchange Place (Geismar 2003). This canal was also known as "the Graft" (Rothschild 2008). The modern Lower Manhattan street plan dates to the early settlement of New Amsterdam, although some streets were originally envisioned or developed as canals. After the English conquest of 1664, the Broad Street canal was filled in and paved in 1676, although it was not named as such until 1692 (Geismar 2003; Rothschild 2008).

Early residential building in New Amsterdam concentrated around the fort in the southwestern tip of Manhattan, and later around the municipal building, or Stadt Huys. However, after the draining of the Broad Street swamp and the creation of the canal, residential building expanded into the area of the current project's archaeological-APE. Much of the surviving evidence for everyday early Colonial life in New Amsterdam and the transition to English cultural hegemony comes from the excavation of shaft features associated with residential dwellings, such as wells and privies from Lower Manhattan. Common finds include clay tobacco pipes, ceramics, glass artifacts, toiletry items and food waste. This evidence suggests that Dutch material life continued in popularity in Lower Manhattan for many decades after English rule (Cantwell and Wall 2001, pp. 181-187).

New York City experienced an explosion in population during the eighteenth century, growing from approximately 4,900 inhabitants in 1698 to 33,000 by 1800 (Rosenwaike 1972; Rothschild 1990). Development extended the city of New York north from the original New Amsterdam settlement. However, Lower Manhattan continued to be a fashionable place to live well into the mid-eighteenth century, particularly Lower Broadway (Rothschild 1990). By the late eighteenth century, Lower Manhattan's population was concentrated in six ethnic groups: Dutch, English, French Huguenots, newly arrived Germans and Scots and a small Jewish population (ibid).

The neighborhood surrounding the archaeological-APE changed drastically after the Great Fire of 1835, which destroyed most of the early Dutch structures in Lower Manhattan, including those along Broad Street. Over 700 structures were destroyed in the fire, and most of the area was rebuilt in the Greek Revival style in vogue at the time (Cantwell and Wall 2001).

The block containing the archaeological-APE is today considered to be in the heart of the Financial District of Manhattan. The neighborhood includes the New York Stock Exchange, the Federal Reserve Bank of New York, Federal Hall (former US Custom House), the Chamber of Commerce building and many skyscrapers housing international corporations and financial institutions.

4.4 Land Use History of the Archaeological-APE

Langan reviewed several lines of evidence concerning the historic land use of the archaeological-APE. This includes reviewing available historic maps and atlases, tax assessments and published New York City Directories. This section concludes with a summary of site land use based on these multiple lines of evidence.

4.4.1 Historic Map Review

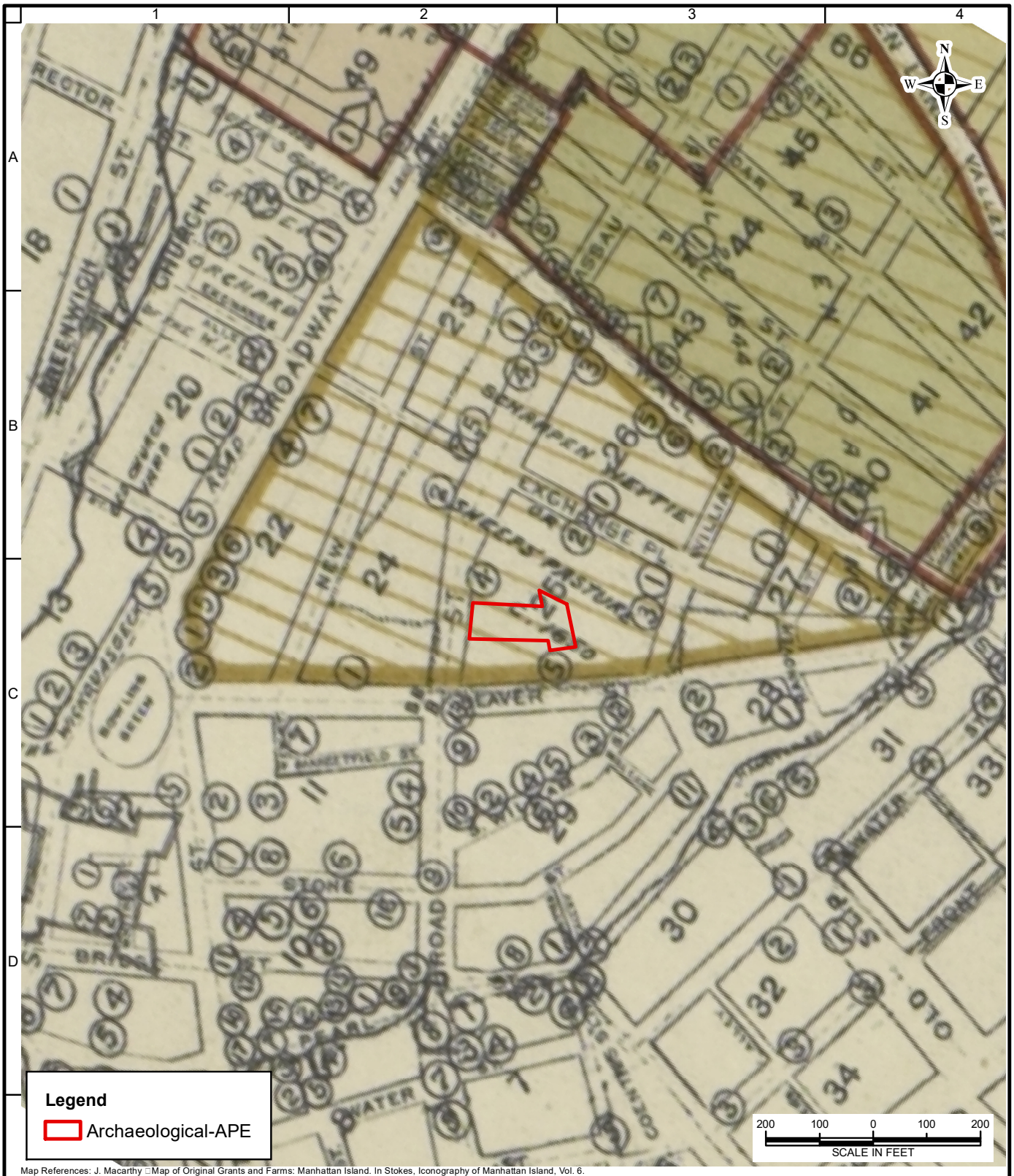
Langan reviewed historical maps and atlases depicting the archaeological-APE and its surroundings from *c.* 1650-1686, *c.* 1650-1664, 1660, 1730, 1767, 1798, 1828, 1852, 1862, 1865, 1879, 1894, 1923 and 1950. In addition, aerial photographs from 2008 and 2012 were also reviewed.

The Macarthy *Map of Original Grants and Farms: Manhattan Island* was included in Volume 6 of Stokes's *Iconography of Manhattan Island,* but was drafted *c.* 1928 (Figure 5). This map shows land grants that date earlier than 1686, although the information associated with the archaeological-APE dates to *c.* 1650. The entirety of the archaeological-APE block is identified as "Schappen Weytie" or "Sheeps' Pasture" as of 1650.

The Stokes's *Map of Dutch Land Grants from* Volume II of the *Iconography of Manhattan Island* shows pre-1664 land grants, and was drafted 1914-1918 (Figure 6). The lot fronting de Princes Graft (Broad Street) is owned by Cornelis Van Ruyven as of April, 1654. The eastern half of the archaeological-APE crosses plots owned by Bryan Newton (alternately spelled Brian Nuton) as of September, 1651 and Johannes de la Montagne as of April 1651. These latter two lots front The Ditch or Prince Street (modern Beaver Street).

The 1660 I.N. Phelps Stokes *Castello Plan of New Amsterdam,* redrafted in 1916 by J. Wolcott Adams, shows the archaeological-APE as a residential area with two houses facing modern day Broad Street and a third structure behind, set back from the street (Figure 7). A full discussion of the ownership evidence for these structures is found in Section 4.4.4. Based on information from Stokes's *Iconography of Manhattan,* at least one of these structures belong to Cornelius van Ruyven. A second structure was likely constructed by Jacob Strycker, although may have been occupied by an unknown renter. It is unclear whether the third structure belonged to van Ruyven or Strycker. The Castello Plan also shows that Broad Street between modern Beaver Street and Exchange Place is entirely residential, with residences and green spaces lining both sides of the street. Green spaces and gardens extended behind the residences, which may still be used as pastureland for sheep. Broad Street is shown as a canal extending from the East River nearly to Exchange Place, and paved on both sides. The settlement of New Amsterdam only included the southern tip of Manhattan north to the defensive wall along modern Wall Street.

The 1730 T. MacCoun Map entitled *New York, the English colonial city* shows the block of the archaeological-APE in the same general layout seen today (Figure 8). The block is surrounded by Garden Street (modern Exchange Place) to the north, Smith Street (modern William Street) to the east, Princes Street (modern Beaver Street) to the south, and Broad Street to the west with no sign of the preceding canal. The map depicts religious, civic, defensive and market



Map References: J. Macarthy □Map of Original Grants and Farms: Manhattan Island. In Stokes, Iconography of Manhattan Island, Vol. 6.

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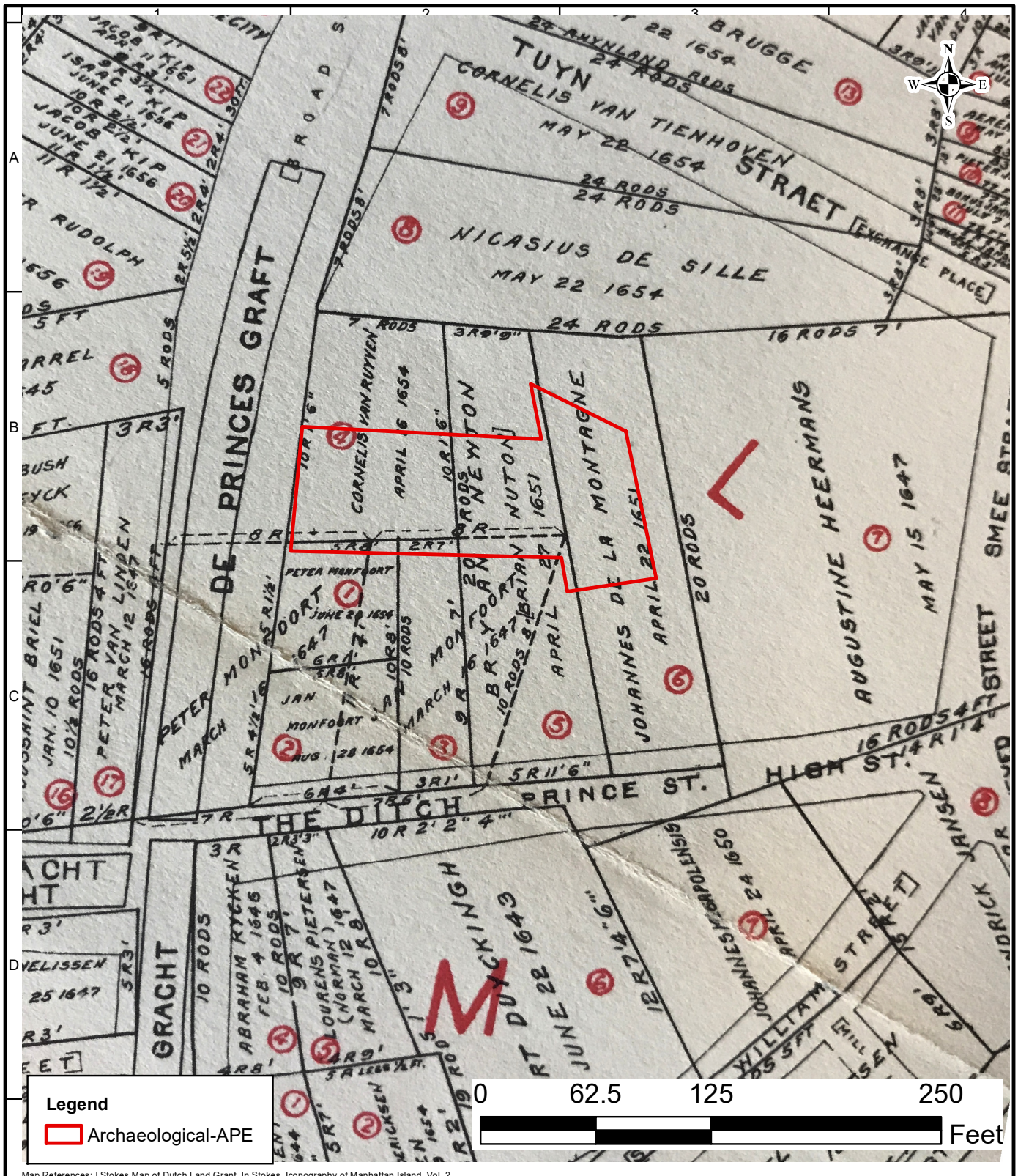

Map References: I Stokes Map of Dutch Land Grant. In Stokes, Iconography of Manhattan Island, Vol. 2.

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Map References: 1660 Redraft of the Castello Plan, New Amsterdam provided by NYC Public Library.

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Map References: 1730 T. MacCoun "New York, the English colonial city" provided by NY Public Library.

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Project No.	170394201
Date	6/21/2017
Scale	SEE ABOVE
Drawn By	KMF
Figure	8

institutions in Lower Manhattan. The Old Dutch Church is shown on the block to the north of the archaeological-APE, with a Jewish Synagogue on the block to the south. A well called the "Tunis De Kay's Well" is shown to the southwest of the archaeological-APE. The map does not provide any information about development within the archaeological-APE. Development of Lower Manhattan has pushed north beyond Wall Street.

The 1767 B. Ratzer *Plan of the City of New York in North America, surveyed in the years 1766 & 1767* shows the archaeological-APE as similar to the 1730 map (Figure 9). The map does not provide any additional information concerning specific development within the archaeological-APE. The Old Dutch Church and Jewish Synagogue located north and south of the archaeological-APE are depicted, although not labeled as such. The street names are consistent with those of the 1730 map. Development continues to spread north on Manhattan Island, with planned development depicted on the map as far north as the modern Lower East Side.

The 1798 D. Longworth Plan of the City of New York does not provide any additional information concerning specific development within the archaeological-APE (Figure 10). The Old Dutch Church and Jewish Synagogue located north and south of the archaeological-APE are depicted. Modern Exchange place is still depicted as "Garden Street, but William Street and Beaver (spelled "Bever") Street have assumed their modern names. Planned development continues to spread north on Manhattan Island into the modern Lower East Side, with paper streets depicted as far north as Houston (identified as North Street).

The 1828 J.F. Morin Plan of the City of New York and of the Island (Figure 11) shows the archaeological-APE within street blocks that are the same as the modern street. The map does not provide information on residential or privately-owned commercial development. Therefore, this map provides little detail relating to occupation of the site. There is a single building pictured in the northeast corner of the block at the intersection of Exchange Place and William Street, but this location is outside of the archaeological-APE.

The 1852 M. Dripps Map of That Part of The City and County of New York Extending Northward to Fiftieth Street (Figure 12) depicts the city block with the archaeological-APE divided into lots, although none of the lots are labeled with ownership information. In addition, the map shows an alley extending north from Beaver Street alongside the eastern archaeological-APE boundary. The western portion of the archaeological-APE, facing Broad Street, is developed. The central portion of the archaeological-APE appears undeveloped, perhaps an open court. The eastern portion of the archaeological-APE is also developed. This structure is adjacent to the rear of buildings on lots facing Exchange Place.

The 1862 William Perris Map of the City of New York depicts the same lot divisions as on the 1852 Dripps map (Figure 13). The western half of the archaeological-APE encompasses two brick or stone stores classified as a first hazardous class, which includes businesses such as bakers, brewers and private stables. These buildings span 43-47 Broad Street. There is no development shown in the central portion of the archaeological-APE, possibly an open court or atrium. The eastern portion of the court is also shaded as a brick or stone store. This building is located in the rear of both 39-45 Broad Street and 52 Exchange Place. The eastern boundary of the archaeological-APE is an alleyway that links Beaver Street with "Lord's Court," an open court in the center of the block. All of the adjacent lots also include first hazardous class brick or

Map References: 1767 B. Ratzer Plan of the city of New York in North America: surveyed in the years 1766 & 1767 provided by NYC Public Library.

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Project	Drawing Title	Project No.	Figure
45 BROAD STREET BLOCK NO. 25, LOT NO. 7 CITY OF NEW YORK NEW YORK	1767 RATZER PLAN	170394201	9
		Date 6/21/2017	
		Scale SEE ABOVE	
		Drawn By KMF	

Map References: 1798 D. Longworth Plan of the City of New York provided by NYC Public Library.

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Map References: 1828 J.F. Morin Plan of the City of New York and of the Island provided by NYC Public Library.

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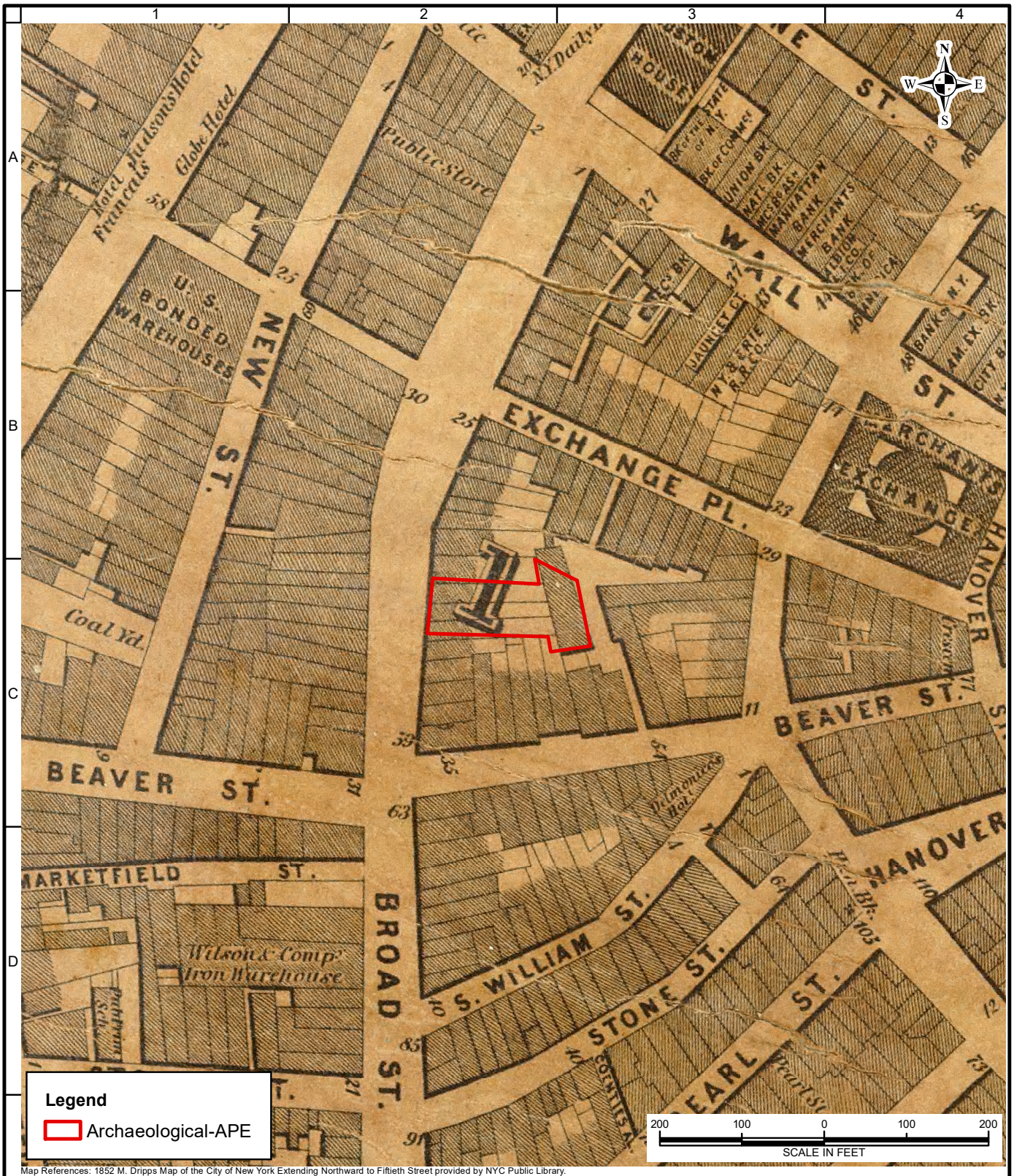

Map References: 1852 M. Dripps Map of the City of New York Extending Northward to Fiftieth Street provided by NYC Public Library.

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Project	45 BROAD STREET
	BLOCK NO. 25, LOT NO. 7
	CITY OF NEW YORK NEW YORK
Drawing Title	1852 M. DRIPPS MAP OF THE CITY OF NEW YORK
Project No.	170394201
Date	4/17/2017
Scale	SEE ABOVE
Drawn By	MA
Figure	12

Map References: 1862 William Perris Maps of New York City provided by NYC Public Library.

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stone stores. There are no residential dwellings on the same block as the archaeological-APE or across Broad Street.

The 1865 E.L. Viele *Sanitary and Topographical Map of the City and Island of New York* showing the generalized topography of Manhattan Island depicts the western limit of the archaeological-APE as within the low topography of Broad Street (Figure 14). Broad Street was originally an inlet extending from the East River Wall Street but was filled in the late seventeenth century. The central and eastern archaeological-APE slopes up away from Broad Street. This area of low topography extends beyond the limits of the Broad Canal up to Wall Street.

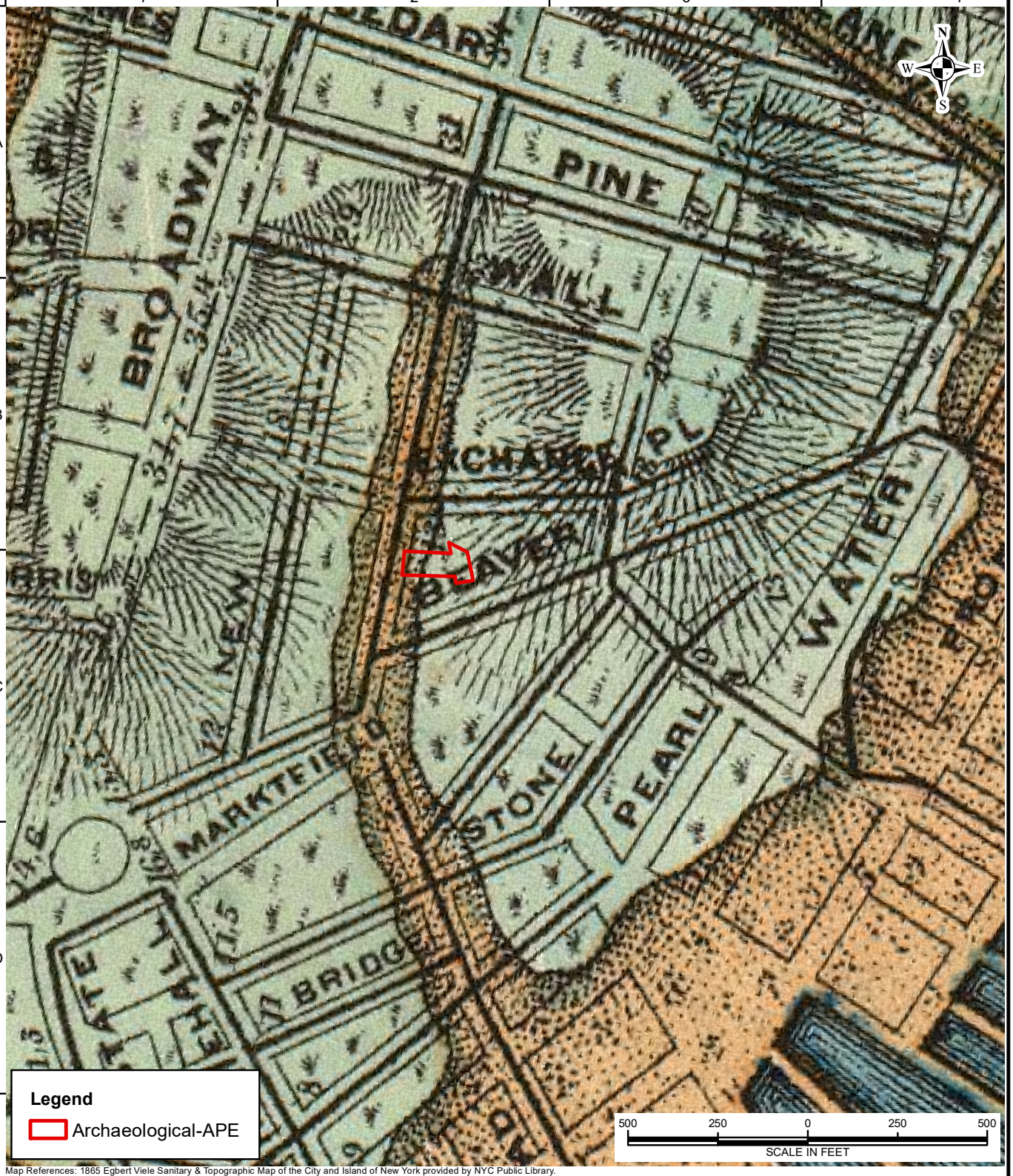
The 1879 G.W. Bromley & E. Robinson Atlas of the Entire City of New York depicts the lot divisions on the archaeological-APE's block (Figure 15). There is no detailed information concerning development on or adjacent to the archaeological-APE. Delmonico's Restaurant is depicted southeast of the archaeological-APE on the corner of William and Beaver Streets. The New York Custom House is also shown northeast of the archaeological-APE at Exchange Place and William Street.

The 1894 Sanborn Fire Insurance Map depicts the archaeological-APE as containing a four-story brick building encompassing 43-47 Broad Street (Figure 16). A separate four-story building is located on the eastern portion of the archaeological-APE to the rear of 41-47 Broad Street and 52 Exchange Place. The eastern archaeological-APE boundary is the alleyway connecting Lord's Court to Beaver Street.

The 1923 Sanborn Fire Insurance Map depicts an 8-story construction built in 1920 labelled "Offices Combustion Engineering Building" encompassing the western two-thirds of the archaeological-APE (Figure 17). The building was constructed of reinforced concrete with brick and tile curtain walls. The building had three elevators and skylights. The building located on the eastern third of the archaeological-APE is to the rear of 41-47 Broad Street and the "Broad Exchange Building," built in 1899, which also spans the entire northwest corner of the city block. This building is not designated as containing a basement. The eastern archaeological-APE boundary is still an alleyway connecting Beaver Street to an open court in the center of the city block.

The 1950 Sanborn Fire Insurance Map (Figure 18) shows the same 8-story building on the western two-thirds of the archaeological-APE as depicted on the 1923 map. The eastern archaeological-APE remains to the rear of the 43-47 Broad Street structures and 25 Broad Street "Broad Exchange Building" complex. There is still no indication that this structure has a basement. The building to the north of the archaeological-APE is a bank and office building, and the building to the south is the Manufacturers Trust Company Building.

The 2008 aerial photograph (Figure 19) confirms that the 8-story building on the western two-thirds of the archaeological-APE was demolished and is now a vacant lot with construction trailers and trucks present on site. The building on the eastern third of the archaeological-APE is still present.



Map References: 1865 Egbert Viele Sanitary & Topographic Map of the City and Island of New York provided by NYC Public Library.

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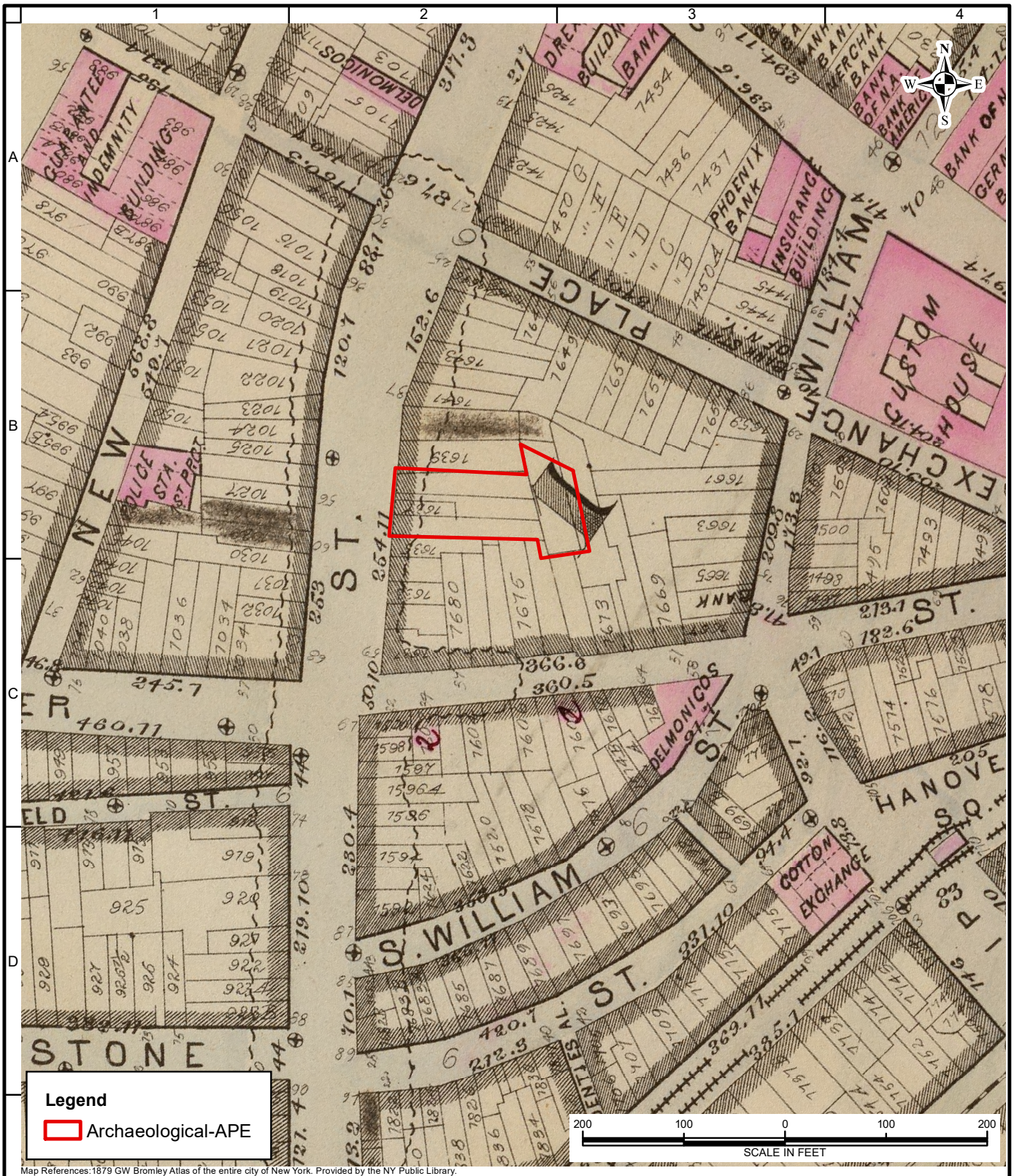
Project	45 BROAD STREET
	BLOCK NO. 25, LOT NO. 7
	CITY OF NEW YORK NEW YORK
Drawing Title	1865 E. VIELE SANITARY & TOPO MAP
Project No.	170394201
Date	4/17/2017
Scale	SEE ABOVE
Drawn By	MA
Figure	14



Map References:1879 GW Bromley Atlas of the entire city of New York. Provided by the NY Public Library.

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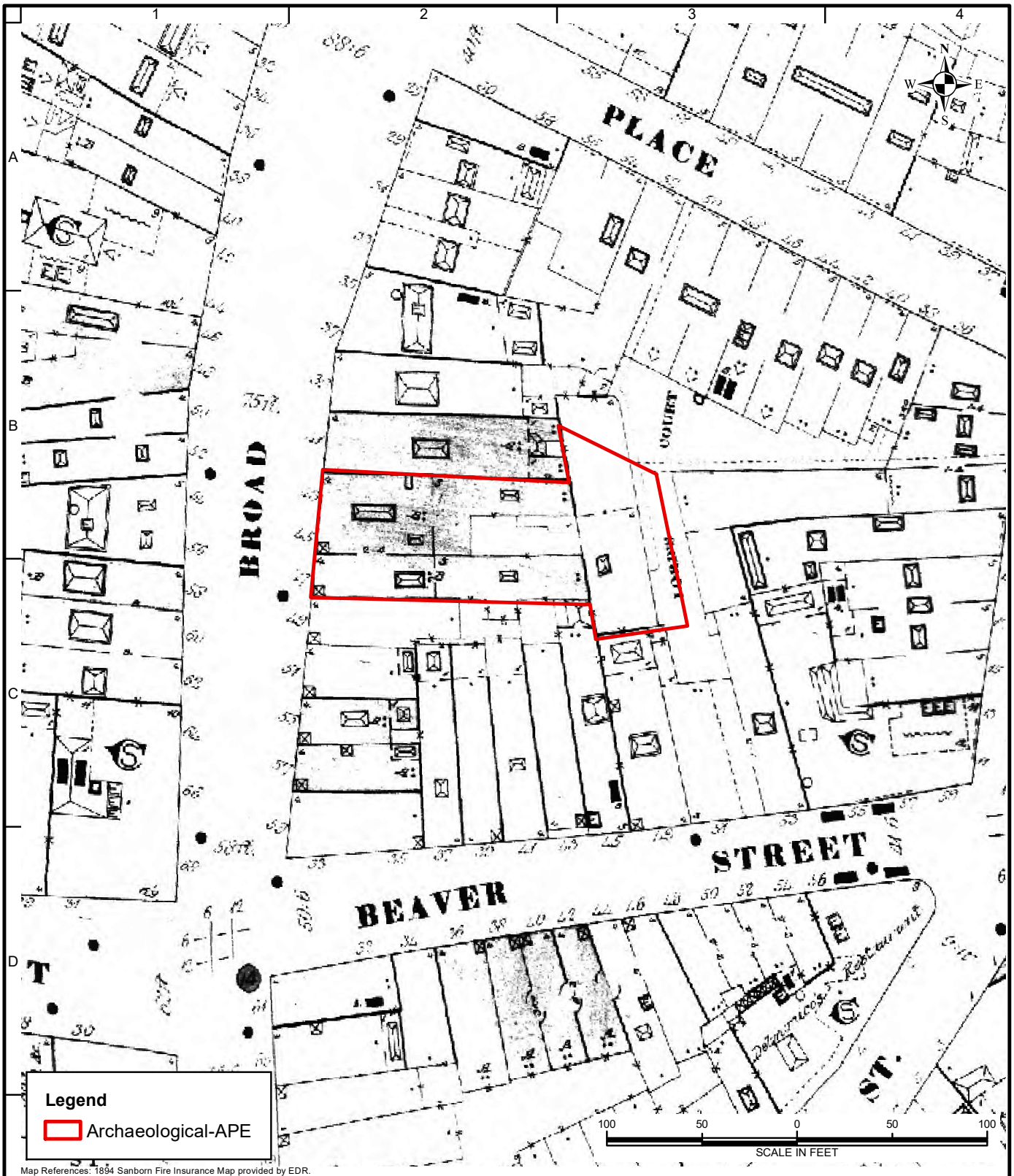
Project	Drawing Title	Project No.	Figure
45 BROAD STREET BLOCK NO. 25, LOT NO. 7 CITY OF NEW YORK NEW YORK	1879 GW BROMLEY MAP	170394201	15
		Date 4/17/2017	
		Scale SEE ABOVE	
		Drawn By MA	



Map References: 1894 Sanborn Fire Insurance Map provided by EDR.

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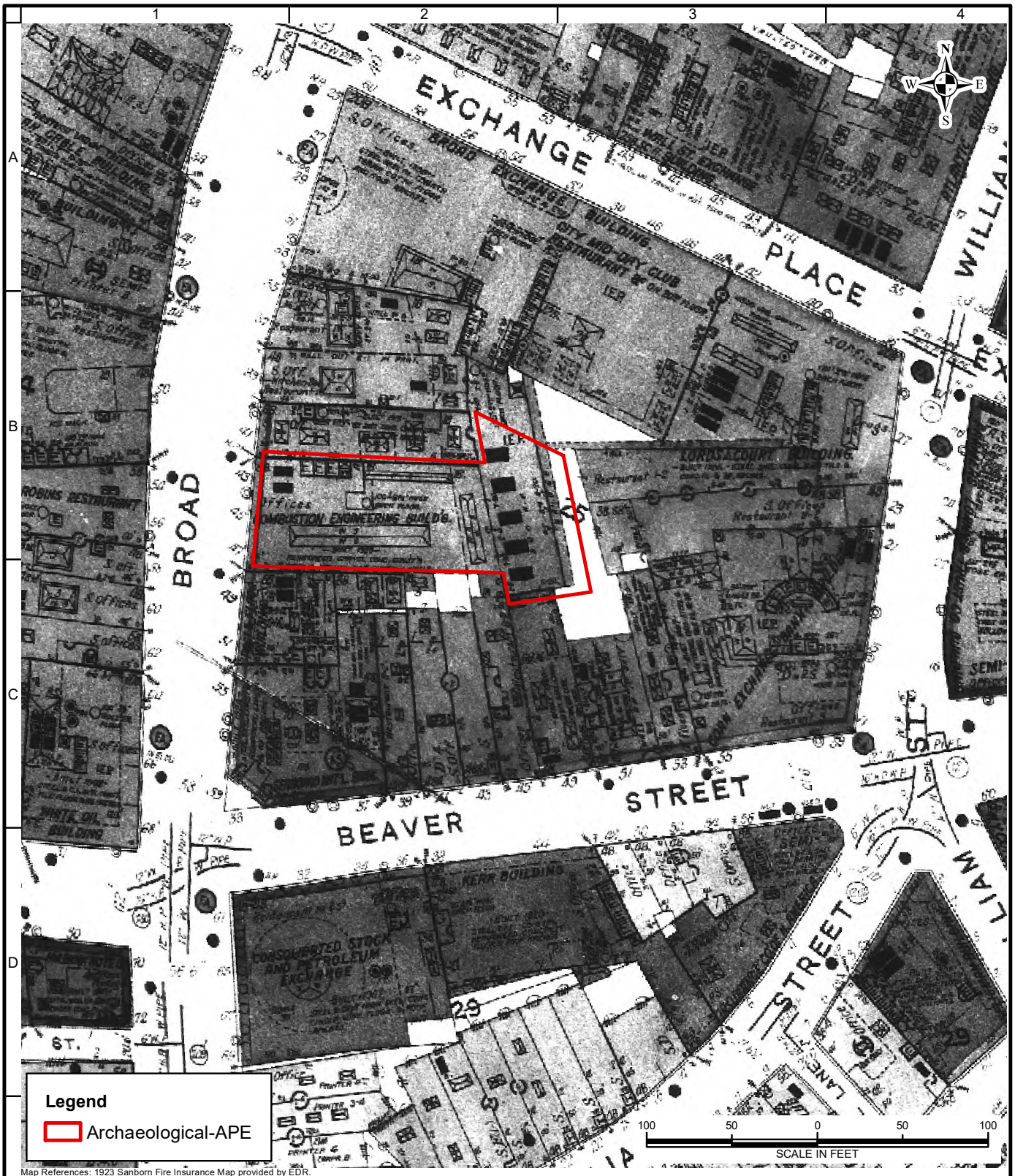
Project	45 BROAD STREET BLOCK NO. 25, LOT NO. 7 CITY OF NEW YORK NEW YORK
Drawing Title	1894 SANBORN FIRE INSURANCE MAP
Project No.	170394201
Date	4/17/2017
Scale	SEE ABOVE
Drawn By	MA
Figure	16



Map References: 1923 Sanborn Fire Insurance Map provided by EDR.

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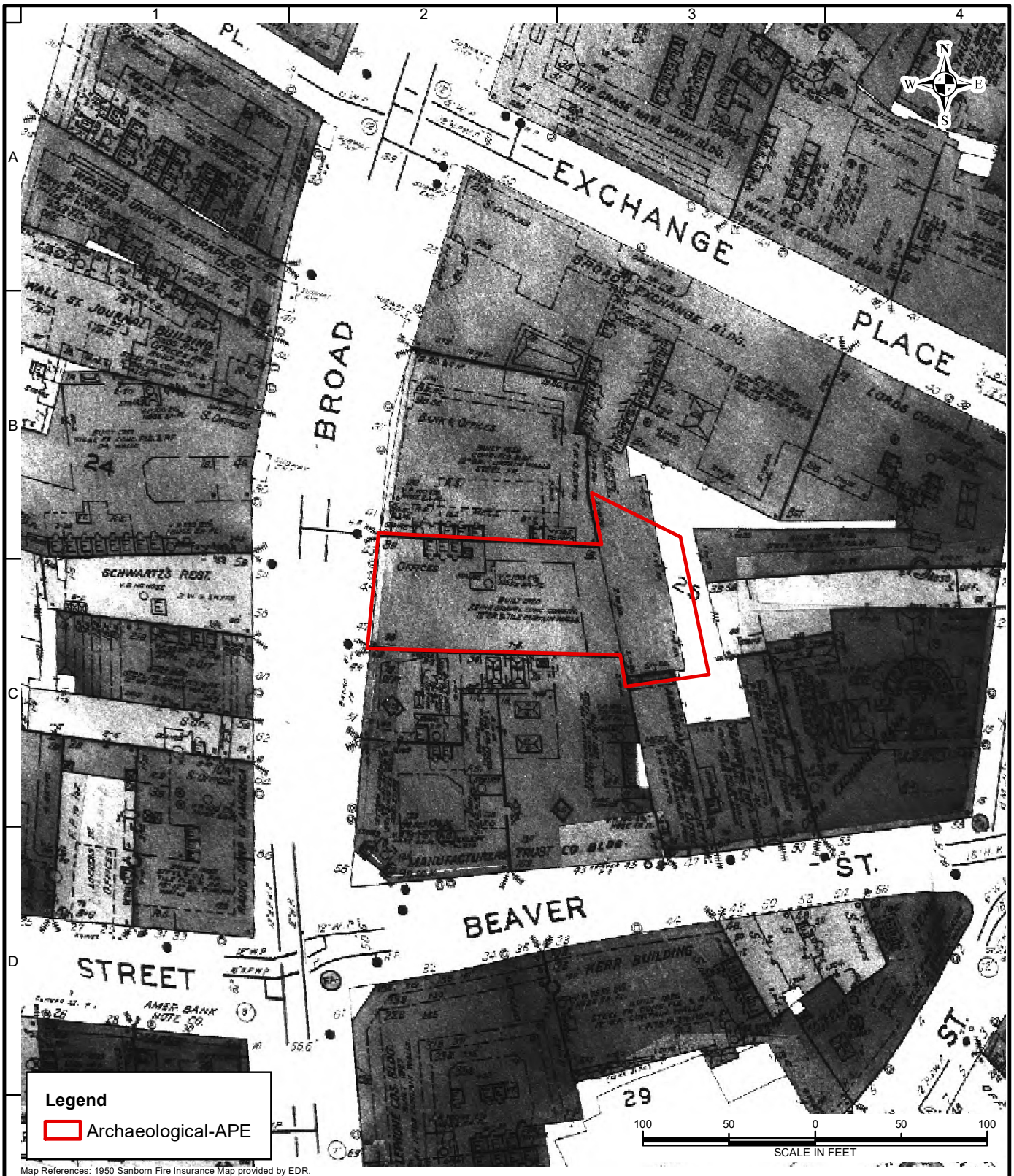
Project	45 BROAD STREET
	BLOCK NO. 25, LOT NO. 7
	CITY OF NEW YORK NEW YORK
Drawing Title	1923 SANBORN FIRE INSURANCE MAP
Project No.	170394201
Date	4/17/2017
Scale	SEE ABOVE
Drawn By	MA
Figure	17



Map References: 1950 Sanborn Fire Insurance Map provided by EDR.

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Project	Drawing Title	Project No.	Figure
45 BROAD STREET BLOCK NO. 25, LOT NO. 7 CITY OF NEW YORK NEW YORK	1950 SANBORN FIRE INSURANCE MAP	170394201	18
		Date 4/17/2017	
		Scale SEE ABOVE	
		Drawn By MA	

Map References: 2008 Aerial Photograph provided by NYCity Map online @ http://maps.nyc.gov/doitt/nycitymap/.

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Project
45 BROAD STREET
BLOCK NO. 25, LOT NO. 7
CITY OF NEW YORK NEW YORK

Drawing Title
2008 AERIAL PHOTOGRAPH

Project No.	170394201
Date	4/17/2017
Scale	SEE ABOVE
Drawn By	MA
Figure	19

The 2012 aerial photograph (Figure 2) shows that the archaeological-APE is entirely vacant. The vacant lot at 45 Broad Street remains, and the building to its rear has also been demolished and is a vacant lot.

The results of the map review demonstrate that the project site was occupied as early as the 1650s and was a mixed-use block consisting of residences and sheep pasture, Early development consistently concentrated on Broad Street. Subsurface disturbance in the western two-thirds of the archaeological-APE is documented by 1923 when the site was redeveloped to include an 8-story structure (constructed in 1920) labeled the Offices for the Combustion Engineering Building, which included a basement. Further research showed that this 8-story building was demolished in 2007, as confirmed by the 2008 aerial photograph. There is also evidence for development on the eastern third of the archaeological-APE; however, a basement is not noted.

4.4.2 Tax Assessment Review

Langan reviewed tax assessment records at the NYC Municipal Archives on May 26, 2017. The results are summarized in Table 3.

Table 3 – Summary of municipal tax assessment evidence for land use at 43-47 Broad Street.

Assessment Year	Street Number	Owner	Property Use	Comment
1808	45	Wandle Ham (sp?)	Not Listed	
	47	John N. Luff	Not Listed	
1810	45	Wandle Ham (sp?)	Not Listed	Henry Dodge listed as occupant
	47	John N. Luff	Not Listed	John Carver and John Howell listed as occupants
1813	45	John N. Luff	House	
	47	John N. Luff	House	
1816-1818	45	John N. Luff	House	
	47	William H. Walsh	Shop	
1819	45	William Brown	Not Listed	
	47	William Brown	Shop	
1820	45	William Brown	House	
	47	D. Kingsland	Shop	
1821-1824	45	John D. Brown	Not Listed	
	47	D. Kingsland	Not Listed	
1825	45	Joseph Meek	Not Listed	
	47	Tunis Quick	Lot	
1826	45	Joseph Meeks	House	
	47	Tunis Quick	Lot	

1827-1828	43	Joseph Meeks	House	
	45	Joseph Meeks	House	
	47	Mrs. Breath	House	
1829-1830	43	Joseph Meeks	Lot	
	45	Joseph Meeks	Lot	
	47	Mrs. Breath	House	
1832	43-45	Joseph Meeks	House	
	47	Mrs. Breath	House	
1834	43-45	Joseph Meeks	Store	
	47	A. Rofsiere	House	
1844	43-45	Joseph Meeks	Store	
	47	A. Rosire	House	
1854	43-47	Joseph Meeks	Store	
1864	43-47	Joseph Meeks	Not Listed	Listed as 4-story buildings
1870	43-45	Walter Brush	Not listed	Listed as "Examiner for reduction"
	47	Joseph Meeks	Not Listed	Listed as "Examiner for reduction"
1873-1874	43-47	Walter Brush	Not Listed	Listed as 4-story buildings
1891-1893	43-47	Walter F. Brush	Not Listed	Listed as 4-story buildings
1895-1896	43-47	Henry A. Havermeyer	Not Listed	

4.4.3 NYC Directories and Census Review

Langan reviewed several NYC Directories available on the Internet Archive website (archive.org). The identified names as well as names gathered through the tax assessment records were cross-referenced with census records using Ancestry.com. US Federal Census records are not searchable by address until 1870.

The earliest available directory for New York City dates to 1786. This early directory lists 43 Broad Street as occupied by A. House, whose occupation is listed as baker (Franks 1786). There are no owners or occupants listed for 45-47 Broad Street in this early directory. The remaining directories reviewed overlap with the years of the tax assessments listed above and are therefore not discussed in detail here.

A. House is not listed in the 1790 Federal Census. However, there is an Elizabeth House listed as head of a family in the NYC West Voting Ward that includes 2 white females and 1 other free person.

Wandle Ham (owner 45 Broad Street) is listed in the 1810 Federal Census as the head of a large household in New York City Ward 1 consisting of 2 slaves, 3 free white males over the

age of 16, 3 free white females over the age of 10, and two other free persons. John Luff (owner 47 Broad Street) is also listed as the head of a large family that included 2 slaves, 6 males over 16 years, 2 males under 16 years, 4 females under 10 years, 1 female over 26 years.

William Brown (owner 45 Broad Street) is listed in the 1820 Federal Census as the head of a household in Ward 1 consisting of 1 male over 45 years, 2 males aged 16 to 25, 1 female over 26 years and 2 males under 16. No slaves are documented as part of the household. D. Kingsland (shop owner, 47 Broad Street) is not identified as a resident of Ward 1 in 1820. It is probable that Kingsland used the commercial space but did not stay onsite as a full-time resident.

The 1830 tax assessment lists 43-45 Broad Street as a Lot. Correspondingly, its owner, Joseph Meeks, is not listed as a resident of Ward 1. Mrs. A Breath (47 Broad Street owner) is listed as the head of a household in Ward 1, living with 3 white females aged 15 to 19, 2 free females of color aged 10 to 23, and 1 white female aged 40 to 49. Mrs. Breath was most likely a 40-something white woman with 5 female charges of differing ethnicities under the age of 23 living in her residence.

Neither owner, J. Meeks or A. Rosire, are listed in the 1840 1850 or 1860 Federal Censuses as residents of Ward 1.

The 1870 Federal Census lists a Walter F. Brush, male age 61 (born 1809), whose occupation is listed as a merchant. He is the only listed member of his household. The 1880 census provides more information concerning Brush. He is listed as a white male widower, occupied as a Provision Merchant and his place of birth and his parents' places of birth are all listed as New York.

4.4.4 Historic Land Use Summary

The earliest Dutch use of the property was as unimproved pastureland, established by 1650 (Figure 5). The following description of Block L is found in Stokes's *Iconography,* Volume 2:

> *The earliest ground-briefs in this block were those to Jan and Pieter Monfoort, dated March 16, 1647. As they neglected to improve their holdings in New Amsterdam, the Director and Council after a reasonable time had elapsed proceeded to re-grant the land. …part of Brian Newton's grant were taken from Jan Monfoort's plot; while the cutting through of the Prince's Graght (Broad Street) seriously diminished Pieter Monfoort's property* (Stokes 1915-1928, p. 393).

The earliest ownership information available for domestic occupation of the archaeological-APE is also available in Stoke's Iconography, Volume 2. The description of original land investment on Block L, No. 7 is as follows:

> *Jacob Strycker, a tailor…in company with Cornelis van Ruyven, he bought land here, in 1656 from Jacob Steendam. Van Ruyven then secured a grant for another parcel, and he and Strycker divided it between them. As he himself occupied the house of Jan Jansen Schepmoes, on Pearl Street, in 1656, it is probable this house was rented* (Stokes 1915-1928, p. 290).

This description suggests that, although it is not clear who occupied these earliest domestic residences, the archaeological-APE was used for residential purposes.

The lot fronting Broad Street was owned and occupied by Cornelis van Ruyven, a prominent Dutch citizen (Figure 6). The following description of van Ruyven is taken from Stokes's *Iconography,* Volume 2 in his description of the homes depicted on the Castello Plan (Figure 7):

> *This little house stood on land which Cornelis van Ruyven and Jacob Strycker had bought for investment (see No. 7). Van Ruyven, sent over by the West India Company as provincial secretary, assumed his duties in November, 1653. His first official signature, written on November 25th, is affixed to the grant of the excise privilege to the municipality. He remained secretary until the surrender, in 1664. He lost no time after his arrival in wooing and winning the affections and hand of Hillegond Megapolensis, the daughter of the domine, whom he married June 24, 1654. In 1663, he built for her a fine residence next door to her father's house on the Broadway. In 1674, he returned to Holland with his family, his wife's mother accompanying them. During Van Ruyven's twenty years here, he filled various positions of trust. The* Records *show many instances of his just and helpful attitude towards his fellow-townsmen, whom he served as vendue master and churchwarden. He became receiver of the West India Co., in 1657. In that capacity, after the surrender, he turned their affairs over to Governor Nicolls. He was one of the first aldermen under the English rule and was one of the prominent citizens consulted on the re-erection of the Dutch government* (Stokes 1915-1928, p. 291).

The earliest NYC directory states that 43 Broad Street was occupied as a residence in 1786. The Tax Assessment evidence demonstrates that the lots 43-45 Broad Street contained one 4-story structure and 47 Broad Street a second 4-story structure. These properties were alternately listed as residential or commercial properties from 1808 to 1891. The 1810 Federal Census shows that the white occupants of both 45 and 47 Broad Street were slave-owners and that two slaves were kept in each property. No slaves were listed as occupants past 1810, although non-white, free female occupants were listed as living in Mrs. Breath's all-female home in the 1830 Census. In other years, multiple, unrelated occupants were listed for a single address, suggesting that rooms in the buildings were rented and not solely owner occupied. These 4-story structures were replaced with an 8-story building with a concrete slab basement by 1923.

4.5 Geotechnical Studies

Three separate geotechnical investigations were conducted on the project site: 1) test borings in 2007; 2) test borings and test pits in February 2016~~,~~; and~~,~~ 3) test pits in December 2016. A summary of the geotechnical studies is presented below and the full reports are included in Appendix C.

4.5.1 Geotechnical Test Borings (2007 and 2016)

In 2007, six borings (B-1 through B-6) were drilled in Area 1 as part of the subsurface exploration for the project. The borings were advanced between 59 and 65 feet below grade. The upper 10+ feet of each boring was drilled without sampling to permit the boring to be

advanced through demolition debris and the former cellar floor slab; once past the floor slab, samples were retrieved with a 2-inch split-spoon sampler at 5-foot intervals. Recovered soil samples were visually examined and classified in the field in accordance with the Building Code. Soil classifications, N-values and other field observations were recorded on field logs.

In 2016, two borings (B-7 and B-8) were drilled in Area 2. Both borings were advanced to 55 feet below grade. The upper 12+ feet of each boring was drilled without sampling to permit the boring to be advanced through demolition debris and the former cellar floor slab. The borings confirmed the presence of a cellar slab in the rear building (not indicated on historic maps); once past the floor slab, samples were retrieved with a 2-inch split-spoon sampler at 5-foot intervals. Recovered soil samples were visually examined and classified in the field in accordance with the Building Code, Soil classification, N-values and other field observations were recorded on field logs.

4.5.2 Geotechnical Test Pits (2016)

Langan supervised the excavation of a total of five geotechnical test pits – one test in February 2016 and an additional four tests in December 2016. Test pits were excavated before Langan archaeologists were involved in the project and no archaeologists were present during excavation. In order to assess potential adverse impacts on archaeological resources to the best of our ability, Langan archaeologists reviewed all site photographs, field notes, and discussed the findings with the Langan geotechnical engineer who monitored the excavation. The results of this assessment are discussed in Section 4.5.4.

The sole purpose of the test pits was to identify foundations around the perimeter of the project site and buried foundations within the project site, such as pile caps, piles, footings and walls. The concrete slab was identified at 11 to 13 feet below grade. Above this slab, the test pits confirmed that the soils were brown coarse to fine sand fill mixed with demolition debris. Below the sand and demolition debris fill and the buried structural elements, the base of the tests ~~were~~contained a brown ~~silt~~ clayey silt. These findings are consistent with the soils encountered in the soil borings.

February 2016 Test Pit

In February 2016, Langan geotechnical engineers supervised the excavation of one test pit along the southern site boundary. The purpose of the test pit was to explore the condition of the adjacent foundations supporting 55 Broad Street. The test pit was at least partially in the area previously disturbed by the adjacent foundation construction. The test pit excavation measured 6-foot by 6-foot and was 23 feet deep. The test pit is shown in Photo 1 below. The location and complete description of the test pit is in the geotechnical report included in Appendix C.

On the 45 Broad Street property, the 9-inch thick concrete cellar slab was about 12 feet below existing grade. Underlying the concrete slab was a grayish-brown clayey silt that continued for the full depth of excavation. Groundwater was encountered at 18 feet below grade. Excavation continued to the base of the 55 Broad Street foundation pile caps, which extend to about el -

12.25 (approximately 23 feet below current grade). The test pit was backfilled with the excavated material upon completion.

No ~~cultural material or historical~~pre-20th century structural elements were reported below the existing basement slab. The only man-made material reported underlying the concrete basement slab was related to foundational elements associated with the documented 20th-century structure or the foundations of adjacent buildings. However, an archaeologist was not present to verify these findings.

Photograph 1 – Overhead view of Feb 2016 geotechnical test pit excavation. The timber shoring boards extend from current grade to the top of the concrete basement slab (12 feet below grade). After breaking through the concrete slab, hand excavation continued to 23 feet below grade through grayish-brown clayey silt. ~~No cultural material or historical structural elements were reported during this hand excavation.~~ Photo taken 2/19/2016.

December 2016 Test Pits

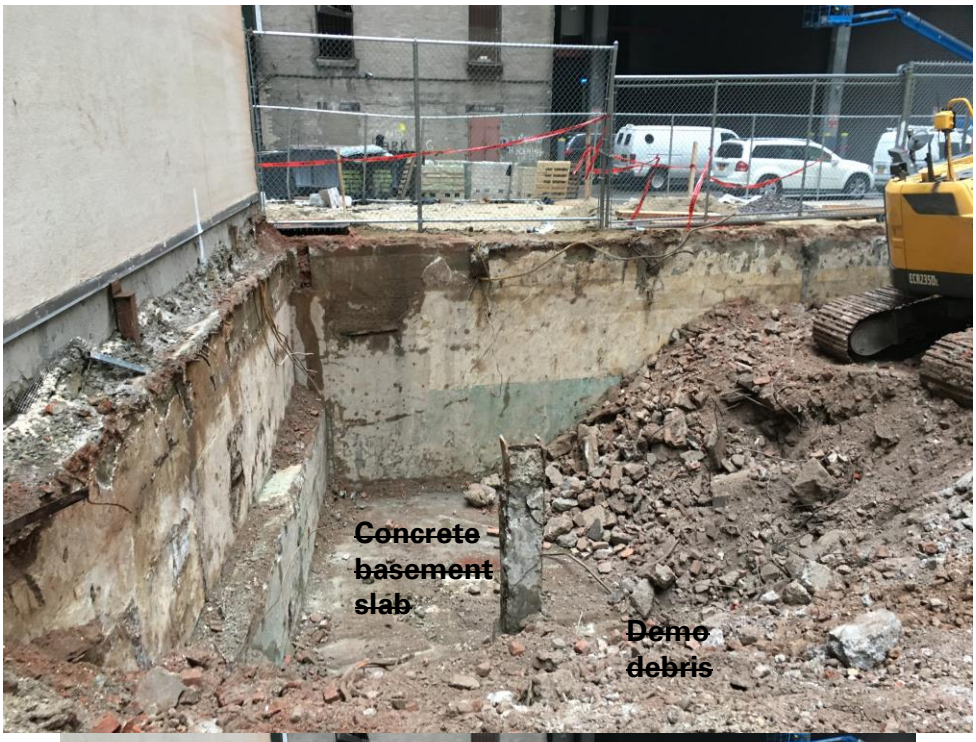
In December 2016, Langan geotechnical engineers supervised the excavation of four test pits (T-1 through T-4) as part of the geotechnical characterization of the site to inform the Support of Excavation (SOE) design. The locations and complete descriptions of the test pits are in the geotechnical report included in Appendix C.

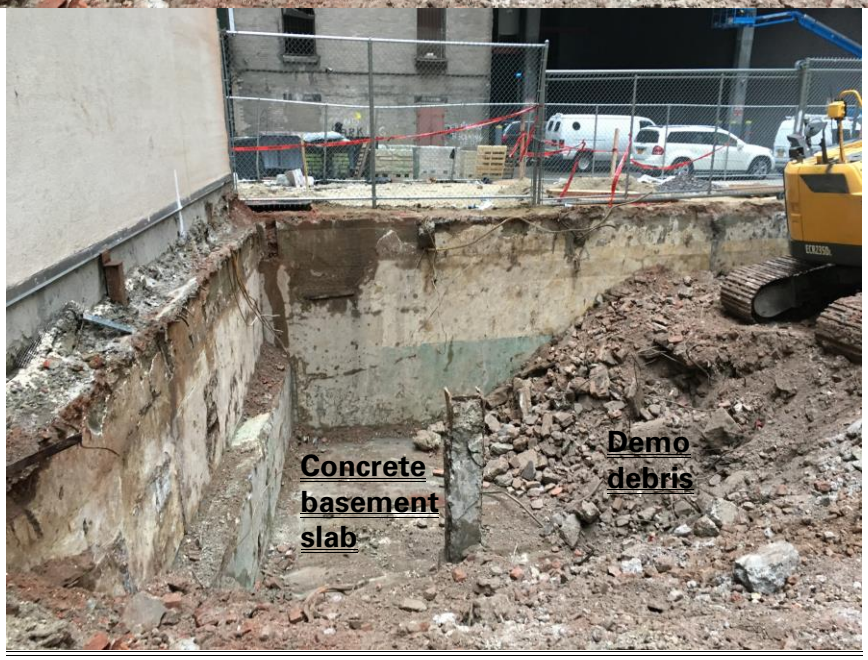
The purpose of the test pit work was to observe the type, depth, and configuration of existing and buried foundations relating to both the adjacent buildings and demolished structures in the archaeological-APE. These test pit locations were selected based on information from historic

drawings at areas expected to contain previous foundation elements. The following is a brief description of the location and purpose of each test pit.

- TP-1 was excavated at the location of a buried pile cap to observe the size of the pile cap and the type of the piles below it. TP-1 extended about 18 feet deep. Excavation was carried to and below the existing cellar slab. The excavation below the slab characterized the previous disturbance. No cultural ~~material~~materials or historical structural elements were reported below the existing basement slab by the onsite geotechnical engineer.
- TP-2 was excavated along the perimeter of the 41 Broad Street property to observe the type, depth, and configuration of the neighboring foundations. TP-2 extended down to and through the existing cellar slab to about 16 feet deep to reach the base of the neighboring foundation. The test pit was at least partially in an area previously disturbed by the 41 Broad Street foundation construction. –No cultural ~~material~~materials or historical structural elements were reported below the existing basement slab by the onsite geotechnical engineer.
- TP-3 was excavated along the perimeter of the 55 Broad Street property to observe the type, depth, and configuration of the neighboring foundations. TP-3 extended to and through the existing cellar slab to about 19 feet deep to reach the base of the neighboring foundation. The test pit was at least partially in an area previously disturbed by the 55 Broad Street foundation construction. –No cultural ~~material~~materials or historical structural elements were reported below the existing basement slab by the onsite geotechnical engineer.
- TP-4 was excavated at the location of a buried foundation wall to observe its thickness and material composition. TP-4 extended about 12 feet deep, to just below the concrete basement slab. –No cultural ~~material~~materials or historical structural elements were reported below the existing basement slab by the onsite geotechnical engineer.

The test pit excavations were all sloped (open cut) through the fill to the existing concrete slab at about 12 feet below ground surface (Photo 2). The sloped excavation occurred only in demolition debris above the concrete cellar slab. Below the slab, the test pits were much smaller in area extent and shored with trench boxes (Photo 3).





Photograph 2 – View of sloped excavation for TP-1 and TP-2, facing northeast. The sloped excavation occurred entirely above the existing cellar slab; therefore above any potentially sensitive archaeological zone. The material above the slab was demolition debris. The concrete slab is shown in the base of the sloped excavation. Photo taken 12/7/2016.


Native Soil
Concrete basement slab

Photograph 3 – View of TP-2 facing north, showing excavation through and below the concrete slab into the potentially sensitive archaeological zone, Sheeting allowed for a much more limited excavation at the archaeologically sensitive depth. ~~No cultural material or historical structural elements were reported below the existing basement slab.~~ Photograph taken 12/7/2016.

4.5.3 Geologic Subsurface Conditions

The subsurface conditions generally consist of 13 to 17 feet of demolition debris, approximately 21 to 27 feet of silt with discontinuous sand and clay seams and approximately 3 to 15 feet of decomposed rock. Schist bedrock was encountered between about 38 to 49 feet below grade. Stabilized groundwater levels were observed at depths of about 13.5 feet in 2016 and 20 feet in 2007. A more detailed description of each layer is provided below.

Fill

A layer of uncontrolled fill and demolition debris ranging in thickness between 13 and 17 feet was encountered in the borings and test pits. The upper fill generally consisted of brick, concrete and rebar debris from previous demolition at the site. The former basement floor slab was encountered approximately 12 feet below the existing site grade. This basement slab was encountered within the former footprints of both the 45 Broad Street building and the eastern rear building. Fill encountered below the basement slab generally consisted of coarse to fine sand with varying amounts of silt, gravel and debris~~.~~ associated with drilled foundational elements. The piles and pile caps from the former 20th-century structure at 45 Broad Street are ~~also~~ present below the slab at discrete locations.

Silt and Clay
A layer of silt approximately 21 to 27 feet thick was encountered below the fill layer. This silt is regionally known as "Bull's Liver" and is generally loose to medium dense with varying amounts of fine sand and clay. In a saturated state, this material has been observed to behave like a gel or even flow like liquid under shock or vibration. Discontinuous layers of fine silty sand were encountered within the silt in borings B-2, B-3, B-4 and B-8. In addition, pockets with more clay content were encountered within the silt layer in borings B-4, B-5 and B-7.

Clayey Sand
Four to seven feet thick pockets of clayey fine to coarse sand were encountered within the silt in borings B-2, B-3, B-4 and B-8. The clayey sand is generally classified as SC in accordance with USCS and is designated as Building Code Class 6 material, "loose granular soils."

Decomposed Rock
Decomposed Rock ranging in thickness between approximately 3 and 15 feet was encountered below the silt. The top of the decomposed rock was found approximately 34 to 41 feet below the existing ground surface. The decomposed rock generally consisted of micaceous silt with varying proportions of gravel and sand and gravel-sized fragments of schist.

Bedrock
The site is underlain by Manhattan schist bedrock, and the top of rock was encountered at depths of approximately 38 to 49 feet below the existing site grades.

The geotechnical reports further indicate that the basement slab, walls and foundation piles remain and that the basement is backfilled with demolition debris and recycled-concrete aggregate. The former slab is approximately 11 to 13 feet below current grade within the footprint of the site. The slab either sits directly on silt or in some areas that were filled with one to two feet of fill placed for the construction of the twentieth century buildings. In addition, the pile caps were observed below the slab foundation underlying the 45 Broad Street structure, which would have resulted in ground disturbance from their construction extending the level of disturbance to approximately 13 to 15 feet below grade.

4.5.4 Potential Impact of Test Pit Excavation on Archaeological Resources

Four of the five geotechnical test pit excavations extended into the archaeologically sensitive area (below the existing cellar slab); TP-4 stopped at the top of the concrete slab. The test pits were excavated specifically to investigate the presence of foundation elements and obstructions. Our geotechnical engineer was on-site during all excavation activities to observe conditions as the excavations progressed. The only obstructions, foundations or man-made structural elements observed in the test pits below the cellar slab were foundations (foundation walls, piles and pile caps) associated with adjacent buildings or with previous twentieth-century buildings at 45 Broad Street. The on-site observations of our geotechnical engineer confirm that there were no buried structures that resembled shaft features (e.g., wells, privies, or cisterns) or 17th- or 18th-century building foundations in the areas explored by the geotechnical test pit excavations. These findings are further supported by Langan archaeologists' review of all site photographs, field notes, and discussions with the on-site geotechnical engineer who monitored the excavation.

~~Therefore~~Based on our review of all available post-excavation information, we conclude that the test pit excavations in February and December 2016 ~~are highly unlikely to have impacted~~most likely did not impact buried archaeological structural features such as truncated historic shaft features (e.g., wells, privies, cisterns~~).~~) or 17th- or 18th-century building foundations potentially underlying the concrete slab. However, Langan archaeologists were not present during excavation and, therefore, cannot positively verify that these or other types of features or artifact concentrations were not present in culturally sensitive soil levels. Subsequent archaeological testing at the site should include re-excavating at least a quarter-section of one previously excavated test pit in order to assess, to the best of the monitoring archaeologist's ability, whether the test backfill contains any material of archaeological significance that had been disturbed by test pit excavations conducted below the level of the concrete slab.

5.0 ARCHAEOLOGICAL SURVEY

This chapter discusses the methodology and results of the Phase IA survey of the archaeological-APE. The results include an assessment of the geotechnical investigations and documentary review (Section 5.3). Section 5.2 summarizes our site visit documenting current project site conditions and reviewing any evidence of previous subsurface disturbance.

5.1 Methodology

The following information was gathered in order to determine archaeological sensitivity: prior historic and archaeological surveys, historic maps and aerial photographs and a review of the environmental and soil conditions. Archaeological sensitivity is then rated as low, moderate, high or a range.

5.2 Site Visit

A site visit was conducted on 11 April 2017. The site was photographed to document the current condition of the archaeological-APE (Photos 4 and 5). The archaeological-APE is a relatively flat, vacant lot between two Broad Street facing buildings, the shorter of which is 21 stories high. The surface of the lot is a mixture of sand and construction demolition debris, such as concrete, brick and rebar fragments.

The site is accessible from Broad Street and from an alleyway accessed on Beaver Street. The paved alleyway forms the eastern boundary of the archaeological-APE.

Photograph 4 – View of the archaeological-APE, facing west. The area is currently fenced and the surface is relatively flat, with a sloping sandy surface down to the east towards the paved alley. The photograph was taken from the alley that forms the eastern boundary of the archaeological-APE.

Photograph 5 – View of the surface of the archaeological-APE, facing west. The surface is sand with construction debris, such as concrete and brick fragments.

5.3 Assessment of Archaeological Resource Sensitivity

The assessment of archaeological resource sensitivity is based on:

- The potential for archaeological sites to exist in a given area; and
- The sensitivity of that area to contain intact cultural resources.

In areas where no sites have been documented, the potential presence of prehistoric resources is based primarily on environmental setting such as topography, proximity to water and other resources and soil quality. The potential for historic resources is usually determined through the analysis of historic sources, especially cartographic materials. The presence of roads, canals or railroads documented on historic maps usually increases the potential for historic sites.

Prehistoric Archaeological Sensitivity

The prehistoric archaeological sensitivity for the archaeological-APE is generally evaluated by the presence of level areas or slight slopes, proximity to water courses, presence of well-drained soils and proximity to previously identified prehistoric archaeological sites. The record search demonstrated that there are no confirmed prehistoric sites within one-quarter mile of the archaeological-APE.

The project site is located proximate to water from both the Hudson and East Rivers. Therefore, the archaeological-APE could have been a suitable location for prehistoric

occupation. The geotechnical investigation confirmed that previous construction in the archaeological-APE included a concrete basement extending 11 to 13 feet below current grade within the entire footprint. In addition pile caps were observed below the basement slab at 45 Broad Street, which would have resulted in ground disturbance to approximately 13 to 15 feet below grade. Finally the piles under the pile caps caused local disturbance extending to the underlying bedrock. The results of the geotechnical borings and test pits confirmed that native clay and silt underlie the basement slab and pile caps. There was no evidence of a buried A horizon that could represent a ground surface for prehistoric occupation. Considering the depth of previous disturbance, Langan concludes that there is a very low sensitivity for prehistoric cultural resources in the archaeological-APE.

Historic Archaeological Sensitivity

The potential presence of historic cultural resources within an archaeological-APE must also be weighed against ground moving activities that may destroy the contextual integrity of the site. As with prehistoric cultural resources, the sensitivity for historic period cultural resources is derived by ascertaining the probable location of a potentially significant historic site and comparing that with documented ground disturbances. Overall sensitivity to historic sites is a measure of the potential for intact cultural resources to be present within the archaeological-APE.

The historic maps, atlases and aerial photographs revealed that the site was occupied as early as the mid-seventeenth century. The site was initially used as a sheep pasture with residences fronting Broad Street, and later alternated between residential and commercial use during the nineteenth and twentieth centuries.

Significant subsurface disturbance exists on site as a result of past building construction, which has been confirmed within the entire site footprint, ~~including Area 1 (45 Broad Street, western two-thirds of archaeological-APE) and Area 2 (rear building, eastern third of archaeological-APE). Considering the~~to a depth of the ~~disturbance from the~~ basement construction. Based on the level of disturbance, Langan concludes that there is no sensitivity for ~~historic cultural resources~~archaeological materials in the archaeological-APE above the existing basement slabs (11 feet below current grade in Area 2 and 13 feet below current grade in Area 1).

However, there is ~~however, a~~ moderate ~~possibility that~~sensitivity for truncated shaft features, such as wells or privies, ~~might be preserved underlying~~and a low sensitivity for other types of 17th- to 18th-century archaeological features associated with historical occupation below the depth of the 20th-century concrete basement slab. ~~If present, these shaft features and the contents may date from any time between the early Colonial period up to the Civil War period.~~ The potential significance of these features, if present, is discussed in the next section.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Conclusion – Historic Sensitivity and Potential Significance

~~Considering~~ The archaeological-APE has experienced multiple episodes of occupation dating back to the mid-17th-century. Geotechnical investigations have confirmed the most recent depth of ~~the~~ disturbance ~~from~~to the historical basement construction of the now demolished 20th-century buildings. Based on the level of disturbance, Langan concludes that there is no sensitivity for ~~pre-historic or historic cultural resources~~archaeological features and artifact deposits in the archaeological-APE above the existing basement slabs ~~(11 feet below current grade in Area 2 and 13 feet below current grade in Area 1).~~ . However, there is a moderate sensitivity for truncated shaft features (e.g. wells or privies) and low sensitivity for other mid-17th- to ~~19th~~ 18th-century features~~,~~ below the concrete basement slab (below 13 feet in Area 1 and below 11 feet in Area 2).

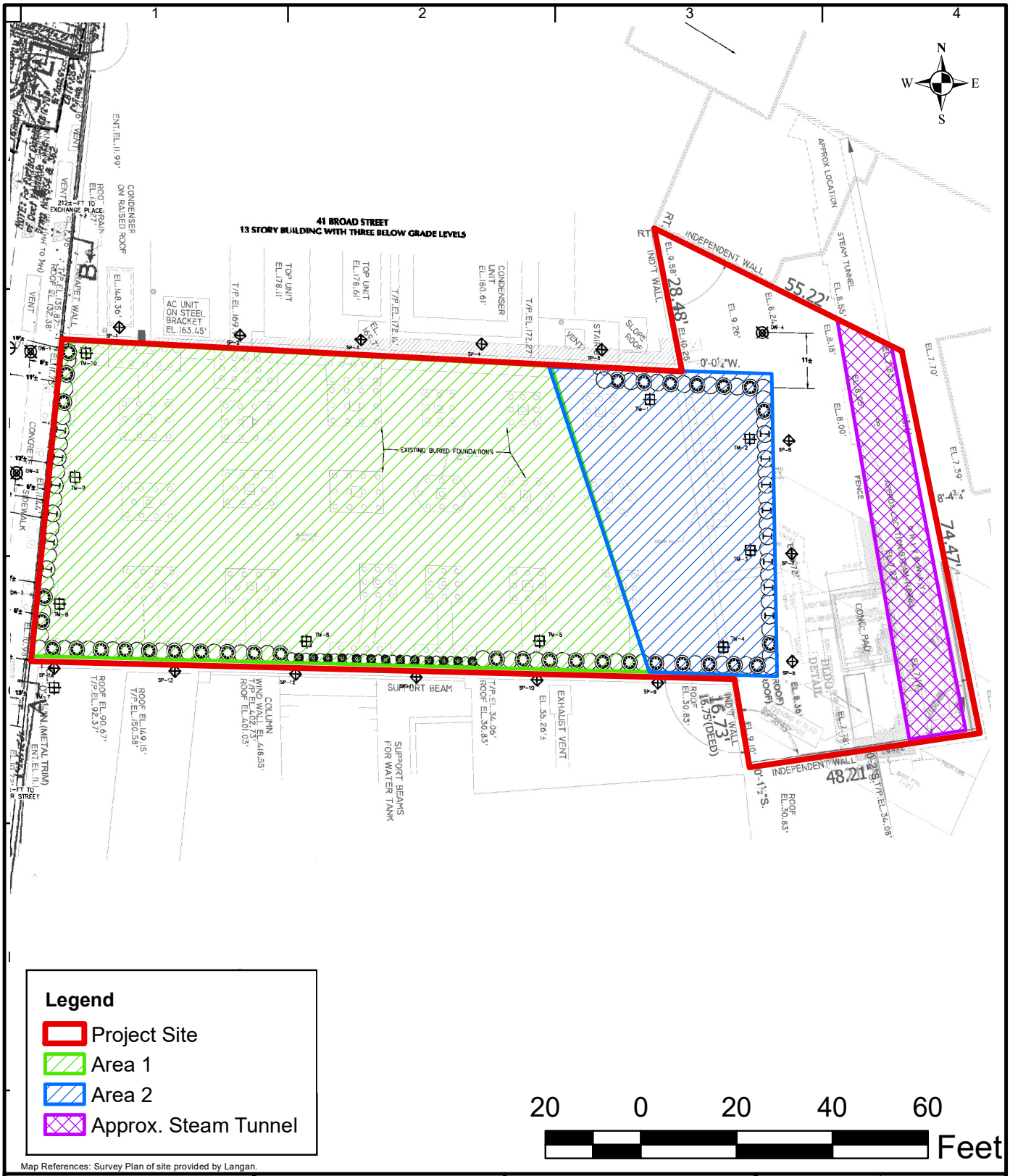
If present, shaft features and/or the contents of the shaft have the potential to provide new information on the early development of the area ranging from the early Colonial period up to the ~~mid-nineteenth~~ late-eighteenth-century, and further characterize the transition from Dutch to English rule. In the event other 17th- and 18th-century features are encountered they also may have the potential to provide new information for the Colonial (Dutch to English) time period. If identified, shaft features and the artifacts contained within have the potential to be significant under National Register Criteria A through D as follows:

1. The transition from Dutch to English Colonial rule is an event that significantly affected the broad pattern of New York City history (Criterion A).
2. Colonial shaft features could provide information concerning Cornelis van Ruyven, a prominent Dutch leader, and the first alderman under English rule (Criterion B).
3. The type of construction of identified shaft or other features could be a distinctive method of construction for the period (Criterion C).
4. The feature identified could yield information important to our understanding of history (Criterion D).

This only represents potential significance – an eligibility assessment can only be completed after archaeological features or artifacts are identified and analyzed.

Recommendation

Because of the moderate archaeological sensitivity for truncated historic shaft features and the low archaeological sensitivity for other 17th- to 18th-century historic features, Langan recommends archaeological testing or monitoring of any excavation extending more than 13 feet below grade in the western two-thirds of the site (Area 1) and more than 11 feet below grade in the eastern third of the site (Area 2). An archaeological testing/monitoring plan and protocol ~~must~~will be developed in consultation with LPC for excavation below these depths. Archaeological testing/monitoring ~~should continue for excavation below these depths until native soils are exposed~~will conclude when culturally sterile soil is reached across the project site ~~and no shaft features are identified~~.



Map References: Survey Plan of site provided by Langan.

LANGAN 300 Kimball Drive Parsippany, NJ 07054 T: 973.560.4900 F: 973.560.4901 www.langan.com Langan Engineering & Environmental Services, Inc. Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C. Langan International LLC Collectively known as Langan NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400	Project **45 BROAD STREET** BLOCK NO. 25, LOT NO. 7 CITY OF NEW YORK NEW YORK	Drawing Title **ARCHAEOLOGICAL SENSITIVITY MAP**	Project No. 170394201 Date 4/24/2017 Scale SEE ABOVE Drawn By KMF	Figure 20

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APPENDIX A

QUALIFICATIONS OF PREPARERS

LANGAN

MICHAEL AUDIN, RPA
Archaeologist / Cultural Resource Specialist

Field Crew Management
Phase I, II and III Excavation
Human Remains/Burial Excavation
Site Preparation and Survey
Historic Research
Photographer
Laboratory Analysis
Field Illustration
Report Writing and Editing
Historic American Building Surveys

EDUCATION

Hunter College: M.A. Anthropology
William Paterson University: B.A. Anthropology
Archaeological Field School: Lenape Meadows, Somerset County Parks Commission, New Jersey

YEARS EXPERIENCE: 14

SUMMARY QUALIFICATIONS

Mr. Audin is a Registered Professional Archaeologist (RPA) who meets the Secretary of the Interiors Professional standards as an archaeologist and has been reviewed by several State Historic Preservation Offices as a Principal Investigator. Mr. Audin has over 14 years of professional experience in cultural resource management. Skills include extensive problem solving, management, analytical, evaluating, and creative resolutions. Management experience includes extensive customer relations, employee development, training, scheduling and mentoring staffs up to 115 members in size.

Work experience includes coordination and implementation of environmental and cultural resource assessments include NEPA Documentation, Environmental Assessments, Environmental Impact Statements, Section 106 Assessments, Phase I, II and III Historic and Archaeological Assessments and Historic American Building Survey (HABS) photography and documentation. Created and implemented Archaeological Monitoring Plans, Scopes of Work, Research and Field Testing Plans, Programmatic Agreements, Memorandums of Agreement (MOA) and Memorandums of Understanding (MOU).

RELEVANT EXPERIENCE

Former Front Street Gas Works Site PSE&G Remediation Project, Archaeological Monitoring, city of Newark, NJ
Principal Investigator for historic site investigation for NJDEP Contaminated Site Remediation Project. Conducted research, conducted field monitoring during excavation, writing and preparation of report, edited and produced report for submission. Discovered historic dock feature.

FedEx Distribution Center Project, Phase I Archaeological Survey, Hamilton, NJ
Principal Investigator for prehistoric/historic site investigation for NJDEP Freshwater Wetlands Permit. Conducted research, assessed prehistoric/historic archaeological potential, conducted field testing, artifact analysis, writing and preparation of report, edited and produced report for submission.

FedEx Distribution Center Project, Phase I Archaeological Survey, Montgomery, NY
Principal Investigator for prehistoric/historic site investigation for NY SEQR Review. Conducted research, assessed prehistoric/historic archaeological potential, conducted field testing, artifact analysis, writing and preparation of report, edited and produced report for submission.

Pavilion at Locust Manor, Phase I Archaeological Survey, Jamaica, Queens, NY
Principal Investigator for prehistoric/historic site investigation for city housing development. Conducted research, assessed prehistoric/historic archaeological potential, conducted field testing, writing and preparation of report, edited and produced report for submission.

Interstate Blvd. Development Project, Phase I Archaeological Survey, South Brunswick, NJ
Principal Investigator for prehistoric/historic site investigation for NJDEP Freshwater Wetlands Permit for warehouse development. Conducted research, assessed prehistoric/historic archaeological potential, conducted field testing, artifact analysis, writing and preparation of report, edited and produced report for submission.

Princeton Pike Roadway Project, Phase I & II Archaeological Survey, Lawrence, NJ
Principal Investigator for prehistoric/historic site investigation for NJDEP Freshwater Wetlands Permit. Conducted research, assessed prehistoric/historic archaeological potential, conducted field testing, artifact analysis, writing and preparation of report, edited and produced report for submission.

Prasville Mills Restroom Project, Archaeological Monitoring, New Jersey
Principal Investigator for historic site investigation for NJ State Park improvements. Conducted research, assessed prehistoric/historic archaeological potential, conducted field monitoring, artifact analysis, writing and preparation of report, edited and produced report for submission.

St. Marks AME Church Cemetery Project, Queens, New York
Principal Investigator for former African American cemetery on residential development site. Designed archaeological monitoring plan and scope of work, conducted archaeological monitoring and human remains excavation for mid-19th- to mid-20th-century cemetery in Queens.

Gloucester Premium Outlets, Phase I Cultural Resource Survey, Gloucester Township, NJ
Principal Investigator for prehistoric/historic site investigation for NJDEP Freshwater Wetlands Permit for 65 acre property (36 acres shovel tested). Conducted research, assessed prehistoric/historic archaeological potential, conducted field testing, directed artifact analysis, writing and preparation of report, edited and produced report for submission.

Old St. Patrick's Cathedral Mausoleum Project, Archaeological Monitoring, New York
Principal Investigator for and archeological monitor for human remains during excavation for new mausoleum in southern part of a historic cemetery in New York City. Designed Monitoring plan, conducted monitoring for human remains during backhoe excavation, supervision of two archaeological assistants, determined method of avoidance or removal of human remains encountered and eventual reburial of disinterred remains, report writing and preparation

Washington Crossing Historic Park, Phase IB, Washington Crossing, Pennsylvania
Principal Investigator for prehistoric/historic site investigation for PHMC historic site drainage improvements. Conducted research, subsurface field testing, artifact analysis, writing and preparation of report, edited and produced report for submission.

Hallets Court Senior Housing Project, Phase I Archaeological Investigation, Queens, NY
Principal Investigator for prehistoric/historic site investigation for city housing development. Conducted research, subsurface field testing, writing and preparation of report, edited and produced report for submission.

Johnson Veterans Hospital Parking Garage Project, Phase IB Cultural Resource Investigation, Clarksburg, West Virginia
Principal Investigator for prehistoric/historic site investigation for Section 106 Compliance and NEPA checklist. Conducted field testing of APE for prehistoric/historic archaeological sites, writing and preparation of report, edited and produced report for submission

Gowanus Canal Historic Bulkhead Documentation, Brooklyn, NY
Principal Investigator for documentation of a historic bulkhead at two sites on the Gowanus Canal. Conducted field testing, photographic documentation, measured drawing, writing and preparation of report for submission.

Amtrak, High Speed Rail Improvements Project, Trenton to New Brunswick, NJ
Principal Investigator produced an archaeological sensitivity assessment and monitoring for Section 106 review of rail improvements for 23 mile section of the Northeast Corridor. Conducted research, site visits, writing and preparation of report.

Verizon Wireless Cell Tower Upgrades, Various Sites in NJ
Researcher/site reviewer for Section 106 reviews to upgrade cell tower antennas. Conducted research, site reconnaissance, writing and preparation of report.

Gowanus Canal Bulkhead Stabilization Project, Brooklyn, NY
Principal Investigator for preliminary bulkhead documentation on the Gowanus Canal. Conducted research and monitored for archaeological materials and bulkhead features during a geotechnical investigation in order to design a thorough documentation plan and investigation.

NJ Transit, Phase IA Investigation, Train Station Upgrades, Elizabeth, NJ
Principal Investigator for Phase IA Investigation. Evaluation of handicap and other facility upgrades for NJ TRANIT train station. Conducted research, site reconnaissance, writing and preparation of report, edited and produced letter report for submission NJ SHPO.

NJ Transit, Phase IA Investigation, Train Station Upgrades, Perth Amboy, NJ
Principal Investigator for Phase IA Investigation. Evaluation of handicap and other facility upgrades for NJ TRANIT train station. Conducted research, site reconnaissance, writing and preparation of report, edited and produced letter report for submission NJ SHPO.

St. Marks AME Church Cemetery Project, Queens, New York
Field director for unanticipated discovery of human remains during construction activities in former African American cemetery. Conducted archaeological monitoring and human remains excavation for mid-19th- to mid-20th-century cemetery in Queens..

Old St. Patrick's Cathedral Stabilization Project, Archaeological Monitoring, New York
Principal Investigator for and archeological monitor for Landmarks Preservation Commission permit for brick wall stabilization around the north part of a historic cemetery in New York City. Conducted research, monitoring for human remains during backhoe excavation for new concrete supports, supervision of two archaeological assistants, determined method of avoidance or removal of human remains encountered and eventual reburial of disinterred remains, report writing and preparation.

Johnson Veterans Hospital Parking Garage Project, Phase IA Cultural Resource Investigation, Clarksburg, West Virginia
Principal Investigator for prehistoric/historic site investigation for Section 106 Compliance and NEPA checklist. Conducted research, assessed prehistoric/historic archaeological potential, conducted site visit, writing and preparation of report, edited and produced report for submission.

Standard Chlorine Chemical Company, Archaeological Monitoring, Kearny, New Jersey
Principal Investigator for archaeological monitoring during construction of a 7,000 foot slurry wall as part of the Interim Action Work Plan for NJDEP and USEPA Superfund site. Conducted monitoring during backhoe trenching and screened samples for prehistoric lithic materials, writing and preparation of report, edited and produced report for submission.

Renaissance Plaza Project, Phase I, Egg Harbor City, New Jersey
Principal Investigator for prehistoric/historic site investigation for NJ Pinelands Commission. Conducted research, conducted subsurface field testing for historic features, writing and preparation of report, edited and produced report for submission.

Alpha Water Works Upgrades Project, Phase II, Alpha, New Jersey
Principal Investigator for prehistoric/historic site investigation for NJDEP Environmental Infrastructure Trust funding program. Conducted research, excavation of shovel test pits and units, laboratory analysis of artifacts, writing, preparation, editing and producing report for submission.

State University of New York, Ulster Campus, Phase I, Marbletown, New York
Principal Investigator for prehistoric/historic site investigation for NYS SEQR reviewed project. Conducted research, assessed prehistoric/historic archaeological potential, field testing, writing and preparation of report, edited and produced report for submission.

NJ Transit, Unanticipated Discovery Investigation, Market Street Garage, Paterson, NJ
Principal Investigator for unanticipated historic structure uncovered during excavation for a drainage pipe. Field work consisted of the excavation and documentation of a historic industrial feature partially exposed during excavation work. Recommended preservation in place with appropriate fill materials and submitted a technical memo to NJDEP SHPO.

EZ Automotive Services, Phase IA & IB, Robbinsville, New Jersey
Principal Investigator for prehistoric/historic site investigation for NJDEP. Conducted research, assessed prehistoric/historic archaeological potential, conducted field testing, writing and preparation of reports, edited and produced report for submission.

Old St. Patrick's Cathedral Stabilization Project, Archaeological Monitoring, New York
Principal Investigator for and archeological monitor for Landmarks Preservation Commission permit for brick wall stabilization around the south part of a historic cemetery in New York City. Conducted limited research, monitoring for human remains during backhoe excavation for new concrete supports, supervision of one archaeological assistant, determined method of avoidance or removal of human remains encountered and eventual reburial, report writing and preparation.

Former Koppers Superfund Site, Additional Phase IB, Newport, Delaware
Co-Author of Memorandum of Agreement between all interested parties for the property.

Pennsauken Country Club Water Reuse Project, Phase I, Pennsauken, New Jersey
Principal Investigator for prehistoric/historic site investigation for NJDEP Environmental Infrastructure Trust funding program. Conducted research, preparation of site, excavation of shovel test pits, laboratory analysis of artifacts, writing, preparation, editing and producing report for submission.

NYS Route 440 Pole Relocation Project, Phase IA, Staten Island, New York
Principal Investigator for prehistoric/historic site investigation for Department of Transportation NEPA documentation and Section 106 reviewed project. Conducted research, assessed prehistoric/historic archaeological potential, writing and preparation of report, edited and produced report for submission.

World Trade Center, Phase III, Potential Human Remains Recovery, Staten Island, New York
Field crew for recovery of potential human remains for the New York City Office of the Chief Medical Examiner. Conducted materials screening for human remains and artifacts relating to the 2001 attacks on the World Trade Center.

SCCC, Phase IB Cultural Resource Investigation, Kearny, New Jersey
Principal Investigator for historic investigations for NJDEP and USEPA Superfund site. Conducted additional research too prove the Jersey City Water Works was located outside of the project area and conducted backhoe trenching for historic drainage features related to the Hackensack Meadowlands, writing and preparation of report, edited and produced report for submission.

Lanning Square Elementary School, Level III HABS, Camden, New Jersey
Complier/Photographer for EO215 compliance for NJ Schools Development Authority. Conducted level III Historic American Building Survey (HABS) including photographic documentation of the Broadway Episcopal Methodist Church Parsonage to mitigate the proposed demolition of this building. The HABS was requested by the NJ HPO to satisfy the EO215 review.

Access to Regional Core (ARC), 3-D Laser Scanning, New York, New York
Field crew for documentation of historic and non-historic buildings for Section 106. Conducted 3-D laser scanning of all buildings in the project area. Collected field data of varying resolutions for buildings in project area, historic buildings were recorded at higher resolution.

Jersey City Walkway and DMAVA Park, Phase IA, Jersey City, New Jersey
Principal Investigator for prehistoric/historic site investigation for NJDEP and Section 106. Conducted research, assessed prehistoric/historic archaeological potential, monitored geotechnical sub surface investigation for archaeological remains, writing and preparation of report, edited and produced report for submission.

Route 33 Interchange Improvements, Phase I, Palmer Township, Pennsylvania
Principal Investigator for prehistoric/historic site investigation for Pennsylvania Department of Transportation and Section 106 reviewed project. Conducted research, site excavation of shovel test pits, laboratory analysis of artifacts, writing and preparation of report, and editing report for submission.

USDA, Health-Based Plant Genomics Facility, Phase IB, Cornell University, Ithaca, New York
Co-Principal Investigator for prehistoric/historic site investigation as part of a Section 106 Assessment for the addition to the Plant Genomics Laboratory Building site. Conducted research, excavation of shovel test pits, laboratory analysis of artifacts, writing and preparation of report, edited and produced report for submission.

SCCC, Phase IA Cultural Resource Investigation, Kearny, New Jersey
Principal Investigator for prehistoric/historic site investigation for NJDEP and USEPA Superfund site. Conducted research, assessed prehistoric/historic archaeological potential, writing and preparation of report, edited and produced report for submission.

GAC Adsorption Plant, Phase I, Pennsauken, New Jersey
Principal Investigator for prehistoric/historic site investigation for NJDEP Environmental Infrastructure Trust funding program. Conducted research, preparation of site, excavation of shovel test pits, laboratory analysis of artifacts, writing and preparation of report, edited and produced report for submission.

Penn Regional Business Center III, Phase I, Smithfield, Pennsylvania
Principal Investigator for prehistoric/historic site investigation for Pennsylvania Funding Grant Application. Conducted research, preparation of site, excavation of shovel test pits, laboratory analysis of artifacts, writing and preparation of report, edited and produced report for submission.

Montauk Theater, Level III HABS and Architectural Salvage Plan, Passaic, New Jersey
Principal Investigator for EO215 compliance for NJ Schools Development Authority. Conducted level III Historic American Building Survey (HABS) including photographic documentation and an architectural Salvage Plan of the Montauk Theater to mitigate the proposed demolition of this building. The HABS and Salvage Plan were requested by the NJ HPO to satisfy the EO215 review.

Former Koppers Superfund Site, Additional Phase IB, Newport, Delaware
Crew chief and OSHA Site Safety Officer for prehistoric/historic site investigation for EPA compliance for superfund site during three month phase IB auger testing conducted by 13 archaeologists. Teamed with John Milner and Associates. Work included over 1,700 phase IB augers in a tidal marsh. Additional work included field tech training, and safety oversight.

Dredge Stockpile Site, Phase I, Harmony, New Jersey
Field director, research coordinator, lab director and photographer for prehistoric/historic site investigation for Section 106 review of stockpile site for dredge materials from FEMA. Field duties include preparation of site, excavation of 32 shovel test pits and site survey. Post field work included laboratory analysis of artifacts, writing of sections of report and prepared, edited and produced report for submission.

Lowes, Phase I, Mansfield, Pennsylvania
Field director, research coordinator, lab director and photographer for prehistoric site investigation for review for big box retail store. Field duties include site preparation, excavation 60 shovel test pits of site and survey. Post field work included laboratory analysis of artifacts, writing of sections of report and prepared, edited and produced report for submission.

Former Jacobs Aircraft Engine Factory, HABS, Lower Pottsgrove, Pennsylvania
Principal Investigator/photographer for NPDES permit compliance. Conducted low level Historic American Building Survey (HABS) including photographical documenting of the former Jacobs Aircraft Engine Factory and Administrative Building to mitigate the proposed demolition of these buildings. The photographic documentation was requested by PHMC to satisfy the NPDES permit review.

Queensboro Plaza, Phase I, Long Island City, New York
Field director, research coordinator, lab director and photographer for historic site investigation for cultural resources section 106 for a NEPA assessment and LPC review for bike path in the Queensboro Plaza. Includes an archaeological assessment, field testing and architectural evaluation of the current property. Field work

included site preparation, the excavation of a two meter by two meter test pit and site survey. Post field work included laboratory analysis of artifacts, writing of sections of report and prepared, edited and produced report for submission.

Lowes, Phase IB, Montgomery, New York
Field director, research coordinator, lab director and photographer for prehistoric/historic site investigation for SEQRA review for retail store. Field work included the preparation of site, excavation of 60 shovel test pits and site survey. Post field work included laboratory analysis of artifacts, writing of sections of report, prepared, edited and produced report for submission.

Green Brook Trail, Application for Project Authorization/Preliminary Assessment, Plainfield, Green Brook, and North Plainfield, New Jersey
Principal Investigator for New Jersey Historic Preservation Act and Freshwater Wetland Permit compliance. Completed and submitted an Application for Project Authorization for Green Brook Park and Washington Park Historic District for a multi-use recreational trail. Additionally, completed a preliminary archaeological assessment for the proposed seven-mile trail, including research, analysis, and report writing.

Public School #3, Archaeological Monitoring, West New York, New Jersey
Archaeological Monitor/researcher for NJ Executive Order 215 Compliance for 1 day of archaeological monitoring for human remains and research on school site that found headstone during excavation. Post field activities included report writing for submission to state.

Former Koppers Superfund Site, Phase IB and II, Newport, Delaware
Crew chief and OSHA Site Safety Officer for EPA compliance for superfund site during six month phase IB and II field excavations conducted by 20 archaeologists, teamed with John Milner and Associates. Work included setting of testing grid and field testing of over 3000 phase IB auguring and STP units and over 180 phase II units. Additional work included lab work, field tech training, and safety oversight.

Bronx River Park, Phase IA, Bronx, New York
Research coordinator, researcher and report production for New York City Landmarks Preservation Commission Compliance. Assessed park land for prehistoric and historic archaeological potential.

USDA, Health-Based Plant Genomics Facility, Cornell University, Ithaca, NY.
Research coordinator, researcher and report production for archaeological resources Section 106 Assessment as part of a NEPA Screening on the Plant Genomics Laboratory Building site.

Weeksville Village, Phase IB testing, Brooklyn, New York
Archaeological Monitor for SEQRA review for village cultural center. Performed 1 day of field duties, with Joan Geismar. Work included monitoring of back hoe trenching for foundations and artifact deposits associated with the Huntefly Houses.

Edgewater Colony, Phase II, Edgewater, New Jersey
Field director and lab director for or EIT storm water improvements loan consisting of the preparation of a Phase II prehistoric/historic site investigation. Included the direction of two field technicians excavating a total of 8 standard test units, photographer and the coordination of lab work. Other post-field responsibilities include writing sections, preparation and production of the final report for submittal to New Jersey DEP Municipal Finance and Technical Services.

Portion of the Northeast Business Park, Phase IA, Washington Township, New Jersey
Research coordinator, researcher, and report production for New Jersey Wetlands Permit. Assessed site for prehistoric and historic archaeological sensitivity.

Creighton Farm Bridge Crossing, Phase I, Willistown, Pennsylvania
Field director, research coordinator, lab director, photographer and report preparation for Army Corps of Engineers Permit. Post field work included laboratory analysis of artifacts, assisting with the writing, prepared, edited and produced report.

Camp Laughing Water, Phase I, New Hanover and Upper Fredrick, Pennsylvania
Field director, research coordinator, lab director, photographer and report preparation for Army Corps of Engineers Permit. Post field work included laboratory analysis of artifacts, assisting with the writing, prepared, edited and produced report.

Camp Hidden Falls, Phase I, Delaware and Lehman Townships, Pennsylvania
Field director, research coordinator, lab director, photographer and report preparation for Army Corps of Engineers Permit. Post field work included laboratory analysis of artifacts, assisting with the writing, prepared, edited and produced report.

Select Sires, Phase I, Eaton, Pennsylvania
Field director, research coordinator, lab director, photographer and report preparation for Pennsylvania section 105 Permit. Post field work included laboratory analysis of artifacts, assisting with the writing, prepared, edited and produced report.

Tournament World, Phase IB, Montgomery, New York
Field director, research coordinator, lab director, and photographer for SEQRA review. Field assessment for prehistoric and historic archaeological sites. Post-field work included laboratory analysis of artifacts, assisting with the writing, prepared, edited and produced report.

Former Old First Presbyterian Church Cemetery, Phase III Data Recovery, Newark, New Jersey
Project Manager/Field Director
Responsibilities included:

- Over sight of all field activities for 2.2 acre cemetery excavation
- Preparation and implementation of a comprehensive field plan for the locating human remains and associated artifacts
- Hiring and managing a field staff of 35
- Directing and coordinating sub contractor with field staff of 30
- Directing and coordinating 4 backhoes on site to move overburden and back fill site
- Over sight of cataloging all burials and artifacts
- Laboratory analysis of artifacts
- Writing, coordinating and editing of final report

Circulations Improvement Project, Phase IA and IB, Newark, New Jersey
Field director, research coordinator, photographer and lab director for NJ Executive Order 215 Compliance. Phase I background investigation and Phase IB field testing. Work included coordinating conducting research, conducting photographic pedestrian survey site, and conducting field testing. Post field work included laboratory analysis of artifacts and preparation of the final reports. Report preparation included writing sections of the report, preparation and production of final report for submittal.

Edgewater Colony, Phase IB, Edgewater, New Jersey
Field director, research coordinator, and photographer for Environmental Infrastructure Trust Financing Program (EIT). Preparation of a Phase IB prehistoric/historic site investigation. Included the direction of three field technicians digging a total of 139 standard test pits, project coordination with the principal investigator, photographer and the coordination of lab work. Other post-field responsibilities include assisting with the writing, preparation and production of the final report.

Former Central Railroad Terminal, Archaeological Monitoring, Newark, New Jersey
Crew Chief/Project Coordinator Application for project authorization compliance of 6 week archaeological monitoring during demolition of former railroad terminal for SHPO resolution on application for project authorization. Monitor for human remains associated with the Old First Presbyterian Church cemetery, identifying, excavating, cataloging and turn over to mortician for reburial. Post field work included lab analysis of artifacts.

Regional Biocontainment Laboratory – Newark Center, University of Medicine and Dentistry of New Jersey, Newark, New Jersey – Researcher and report writer for cultural resources section of Environmental Assessment in accordance with the requirements of NEPA for the construction of a new Regional Biocontainment Laboratory under a grant form the National Institutes of Health.

USDA, Health-Based Plant Genomics Facility, Phase IA, Cornell University, Ithaca, New York
Researcher and site inspector for cultural resources section of a Section 106 Assessment as part of a NEPA Screening on the Plant Genomics Laboratory Building site. Includes an archaeological assessment and architectural evaluation of the current facility and property.

Newark Downtown Core Redevelopment and Circulations Improvement Plan, Newark, New Jersey
Responsibilities included:

- Preparing a multi-phased strategy for investigating, testing and mitigating the project area
- Conducting preliminary research regarding various aspects of the project area, including possible intact remains within the former First Presbyterian Church cemetery
- Supervising research
- Conducting field photo reconnaissance and preliminary visual assessment of all properties potentially eligible for listing on the State and National Register of Historic Places that may be impacted by the proposed project
- Contributing to the Application for Project Authorization regarding the proposed demolition of five historic structures located within the Four Corners Historic District

NJSCC School Development Program, New Jersey
Crew Chief, researcher, photographer and report writing and production for NJ Executive Order 215 Compliance and NJSCC Guidelines. Participated in the development and redevelopment of 20 new and existing school sites located throughout New Jersey. Responsibilities included:

- Conducting and overseeing background research at the New Jersey Historic Preservation Office, the New Jersey State Museum and local archives
- Conducting field photo reconnaissance and preliminary visual assessment of all properties potentially eligible for listing on the State and National Register of Historic Places that may be impacted by the proposed project
- Preparation and assistance in writing of the Cultural and Historical Resource Assessment section of Environmental Assessment and Environmental Impact Statement Reports and Phase IA background investigations

- Overseeing report production and preparing maps and figures
- Producing for internal departments/clients memos, letters and other documentation outlining potential issues and possible recommendations.

Pen Del Development, Phase IB and II, Pemberton, New Jersey
Field/Laboratory Technician of a Phase I & II prehistoric site investigation/excavation. Field responsibilities also included photographer and mapping excavation locations using GPS equipment. Laboratory Technician responsibilities included; cleaning, cataloging and photographing all artifacts. Other post-field responsibilities included assisting with the preparation and production of the final cultural resource report for submittal to New Jersey HPO.

Field School, Lenape Meadows, Phase II, Basking Ridge, New Jersey
Field and Laboratory Technician for phase II prehistoric excavation. Field work included daily preparation of site, field excavations, documentation of artifact finds, field crew management and the closing up the site for the winter. Laboratory work included cleaning, identifying, cataloging and photographic documentation of all artifacts.

Lithics Identification Project, William Paterson University, New Jersey
Volunteer. Conducted laboratory analysis, identification and cataloging, of over 5,000 stone fragments from the Wallkill River basin in Northern New Jersey, submitted to Dr. Janet Pollak. Research included identifying and cataloging human produced stone flakes and tools vs. naturally altered stone.

SELECTED PUBLICATIONS

Phase IA Cultural Resource Survey, Standard Chlorine Chemical Company Site, Interim Response Action Workplan, Town of Kearny, Hudson County, New Jersey. Michael Audin, RPA, Principal Investigator, 2009. MS on file at NJSHPO, Trenton, NJ.

Phase I Cultural Resource Investigation GAC Adsorption Plant, Pennsauken, Camden County, New Jersey. Michael Audin, RPA, Principal Investigator, 2009. MS on file at NJSHPO, Trenton, NJ.

Historic American Building Survey for the Montauk Theater, Passaic, Passaic County, New Jersey. Michael Audin, RPA, Principal Investigator, 2009. Submitted to the NJ HPO, Trenton, NJ.

Phase I Archaeological Investigation Montgomery Towne Square, Montgomery, Orange County, New York. Ludomir Lozny Principal Investigator, Michael Audin, and Sarah Hlubik, 2007. MS on file at OPRHP, Pebbles Island, NY.

Phase II Archaeological Investigation of the Edgewater Colony, Edgewater, Bergen County, New Jersey. Ludomir Lozny PI, Michael Audin, and Sarah Hlubik, 2007. MS on file at NJSHPO, Trenton, NJ.

Phase IA Archaeological Investigation Bronx River Park, Bronx, Bronx County, New York. Ludomir Lozny PI, Michael Audin, and Sarah Hlubik, 2007. MS on file NYC LPC, New York, NY.

Phase I Archaeological Survey Camp Hidden Falls, Lehman Township, Pike County, Pennsylvania. Ludomir Lozny PI, Michael Audin, and Erol Kavountzis, 2006. Ms on file at PHMC, Harrisburg, Pa.

Phase I Archaeological Investigation Eaton, Wyoming County, Pennsylvania. Ludomir Lozny PI, Michael Audin, and Erol Kavountzis, 2006. Ms on file at PHMC, Harrisburg, Pa.

Phase III Cemetery Excavation, Old First Presbyterian Church, Newark Downtown Core Redevelopment, Newark, Essex County, New Jersey. Michael Audin, Erol Kavountzis, and Sarah Hlubik, 2005. Manuscript on file at NJSHPO, Trenton NJ.

AWARDS
NJ Historic Preservation Award, Innovative Techniques in Archaeology, May 2013

PRESENTATIONS
2011 "New Jersey's Iron Coffins" presented at the Archaeological Society of New Jersey Meeting.

2009 "The Montauk Theater: Last of the Seven Passaic Theaters" presented to a William Paterson University, Class on Material Culture.

2007 "Excavations at the Old First Presbyterian Cemetery in Newark, NJ" presented to William Paterson University's Anthropology Club.

SUMMARY OF PROFESSIONAL ACTIVITIES
Mr. Audin has conducted field work in New Jersey, New York, Pennsylvania, Connecticut, Delaware and West Virginia. He is the author or co-author of over one hundred ten (110) cultural resource reports in New Jersey, New York, Pennsylvania and West Virginia. Also contributed to over 4 Environmental Impact Statements and 30 Environmental Assessments.

PROFESSIONAL DEVELOPMENT
Historic Preservation Research Course, Drew University, February 2005
OSHA 40 Hour Certified HAZWOPER Training (December, 2005) and refreshers
OSHA Site Supervisor Certified (June, 2007) and refreshers
OSHA 10-Hour Construction Certified for New York City, 2012
NJSHPO Cultural Resources Best Practices Workshop, October 2006
Preservation Planning in the Highlands, Drew University, March 2007
Section 106 Essentials Class with ACHP, July 2007
Pennsylvania Department of Transportation, Cultural Resource Handbook Class, April 2010
Federal Communications Training, Washington D.C. June 2011
Cultural Resource Essentials Series, Pennsylvania Historical & Museum Commission, July 2013

PROFESSIONAL AFFILIATIONS
Archaeological Society of New Jersey
Council for Northeast Historical Archaeology
Eastern States Archaeological Federation
Lambda Alpha National Collegiate Honors Society for Anthropology
Middle Atlantic Archaeological Conference
National Trust for Historic Preservation
New York State Archaeological Association (Lifetime Member)
Register of Professional Archaeologists
Society of American Archaeology
Society for Historical Archaeology
Society for Industrial Archaeology
The Society for Pennsylvania Archaeology

KATHERINE McCULLOUGH FRENCH, PH.D, M.PHIL, M.A., R.P.A.

Zooarchaeology
Human Remains
Burial Excavation
Artifact Analysis
Urban Archaeology
NAGPRA Compliance
Field Crew Management
Report Writing and Editing
Site Survey and Identification

SUMMARY OF QUALIFICATIONS

Dr. French is a Secretary of Interior qualified Registered Professional Archaeologist with 9+ years field, laboratory, museum, and forensic experience in the United States and Northern Europe. Work experience includes NHPA Section 106 and 110 compliance; Phase I, II, and III Archaeological Assessments; Environmental Assessments; ASMIS site visits and documentation; faunal, human remains, and artifact analysis. She received her doctorate from the Anthropology Department of New York University in January 2017.

EDUCATION

Ph.D.	2017	New York University Anthropology
M.A.	2011	New York University Anthropology
M.Phil	2008	University of Oxford, St. Cross College European Archaeology
B.A.	2006	Georgetown University Medieval Studies, Classical Archaeology Minor
Field School		Vale and Ridgeway Project, Marcham/Frilford Project, University of Oxford, UK

RELEVANT EXPERIENCE

Gowanus Canal Remediation Project and Archaeological Monitoring, Brooklyn, NY

Conducting Phase II archaeological monitoring for debris removal and dredging of the National Register eligible nineteenth century Gowanus Canal. Canal is currently a Superfund site and the remediation is coordinated by the US Environmental Protection Agency.

Southwest Park Development Phase IB and Archaeological Monitoring, Hoboken, NJ

Conducted Phase IB testing in advance of stormwater retention park development in Hoboken, NJ. Recorded footings associated with an elevated railroad, nineteenth century building foundations, and a Belgian Block cobblestone driveway. Monitored the excavation and removal of the cobblestone drive.

Nissim Avenue Phase I & II Survey, Bordentown, NJ

Assisted with Phase I survey and directed Phase II survey of archaeological resources in advance of residential development, including analysis of archaeological sensitivity, subsurface testing in areas of prehistoric sensitivity, and post-excavation laboratory work. Project area is included in the Abbott Farm National Historic Landmark.

Lincoln Industrial Park Phase IB, Piscataway, NJ

Extensive Phase IB survey on former Union Carbide/Dow Chemical property with team of HAZWOPER-qualified archaeologists to complete the testing. Initial testing in August consisted of over 900 shovel

tests. Supplemental testing in February was limited area of under 100 tests. Supervised all aspects of fieldwork, artifact analysis, and report completion.

Riverside Buildings 4 & 5 Phase IB & Archaeological Monitoring, New York City
Supervised up to seven field technicians responsible for archaeological monitoring, Phase IB shovel testing in areas of prehistoric sensitivity, and post-excavation laboratory work for a multimillion dollar development in Midtown Manhattan. Drafted memoranda and final reports for compliance with the New York City Landmark Preservation Commission's restrictive declaration.

FedEx Distribution Facility Monitoring, Montgomery, Orange County, New York Supplemental Phase IB
Monitored exploratory machine excavation of historic, nineteenth century dairy farm complex in Orange County. Sampled and recorded a number of historic features, including fence lines, well, privy, barn foundations, and homestead foundations. Supervised machine operator and assisting field archaeologist and assisted in preparation of report for submission.

Deerpark Substation Phase IB Survey, Orange County, New York
Supervised fieldwork for supplemental Phase IB. Excavated 15 shovel tests in area of prehistoric sensitivity and assisted in preparation of report for submission.

Lafayette Gardens Excavation Monitoring, Jersey City, NJ
Monitored building foundation trench excavation through location associated with the National Register listed Morris Canal.

Pavilion at Locust Manor Phase IA/IB Survey, Jamaica, Queens, NY
Contracted by the D&F Development Group. Conducted background research including maps and record search to determine prehistoric and historic sensitivity. Supervised mechanical excavation of exploratory trench and hand excavation of test pits to test for prehistoric and historic archaeology. Co-wrote (with Michael Audin) combined Phase IA/IB report, on file with New York City Landmarks Preservation Commission.

Interstate Boulevard Phase IB Survey, South Brunswick Township, NJ
Supervised field crew of up to five field technicians excavating over 300 shovel test pits in an area of prehistoric and historic sensitivity.

Princeton Pike Phase IB & Phase II Survey, Lawrence Township, NJ
Conducted subsurface testing for prehistoric cultural resources in advance of proposed road widening work alongside Princeton Pike and Lewisville Road. Co-wrote (with Michael Audin) Phase IB and Phase II compliance reports on file with New Jersey SHPO.

Corona Avenue Cemetery Monitoring, Queens, NY
Supervised testing for human remains in a historic cemetery site. Development is currently in mediation with descendent community after identifying nineteenth century burials.

Amtrak New Jersey High Speed Rail Improvement Project (NJHSRIP) Monitoring, Middlesex and Mercer Counties, NJ
Monitored mechanical excavation in areas of high prehistoric sensitivity for new catenary pole installation on the Northeast Corridor, the rail line connecting New York City and Trenton, NJ.

Prallsville Mill Complex Monitoring, Stockton, NJ
Monitored mechanical excavation for sewer, water, and electrical lines for new bathroom facility in

Historic District along the Delaware and Raritan Canal.

The Basilica of St. Patrick's Old Cathedral Cemetery Monitoring, New York City
Monitored hand excavation for mausoleum foundation in historic cemetery included on National Register. Identified both human and animal skeletal remains during the course of excavation as well as high density of nineteenth century artifacts.

Forensic Anthropology Laboratory, Office of the Chief Medical Examiner, New York, NY
Visiting Researcher training and conducting research in histological analysis of human bone, focusing on the preparation of bone thin-section slides and human/non-human osseous tissue differentiation.

Ecology of Crusading Project Excavation, Multiple Sites, Poland
Field Archaeologist researching Teutonic Order crusader sites with an international team with particularly attention paid to environmental evidence.

NAGPRA Program, Denver Museum of Nature and Science, Denver, CO
Conducted archival research and physical analyses of the human skeletal collection with no contextual information as intern working under the Anthropology Department Curatorial staff.

Vale & Ridgeway Project & Training Excavation, Marcham/Frilford, UK
Trench Supervisor 2010; Assistant Trench Supervisor 2006-2007. Responsible for teaching basic excavation principles to Undergraduate and Continuing Education students from the University of Oxford and other international university programs during the summer field season.

Phase III World Trade Center PHR (Potential Human Remains) Recovery Project, Office of the Chief Medical Examiner, New York, NY
Employed as criminalist, and worked as member of sifting team on mobile platform searching sediments excavated from Ground Zero, Lower Manhattan for 9/11 victim remains. Experience working in human remains recovery in HazMat gear with half-face respirator.

Prescribed Burn Unit Survey, Crater Lake National Park, OR
Contracted Fieldwork Director as an educational partner stationed at multiple National Park properties to survey and report archaeological and cultural resources in prescribed burn units. Led field crew consisting of NPS Intern and Tribal Monitor from the Klamath Confederated Tribes. Crew pedestrian surveyed nearly 5000 acres over a two-month field season and recorded ten new archaeological sites, both prehistoric and historic. Prepared and presented compliance report to the Park's cultural resource specialists and fire management personnel.

Prescribed Burn Unit Survey, Whiskeytown National Recreation Area, CA
Contracted Fieldwork Director as an educational partner stationed at multiple National Park properties to survey and report archaeological and cultural resources in prescribed burn units. Coordinated with Tribal Representatives and fire personnel to ensure all resources could be protected or damage mitigated during fire events. Assumed responsibility for an ongoing, significantly delayed contract. Worked closely with Klamath Network Fire Archaeologist Joe Svinarich to finish fieldwork and to get the project back on an acceptable timeline. Supervised one NPS Intern who assisted with site visits and mapping support. In total, crew pedestrian surveyed over 3600 acres and recorded 18 new historic archaeological sites. Prepared and presented compliance report to the Park's cultural resource specialists and fire management personnel.

Oxford University Archaeology Training Excavation, Marcham/Frilford, UK
Participated in a two-week field school excavating a Roman temple complex.

Bamburgh Research Project and Excavation Field School, Bamburgh, UK
Served as a volunteer excavator at an Anglo-Saxon excavation site in Northumbria. Gained experience excavating human remains at a seventh and eighth century cemetery.

OTHER TRAINING
OSHA 40 Hour HAZWOPER Training, completed July 2015, refresher July 2016

SAA Fundamentals of Budgeting for Archaeology Projects Online Course, completed March 2015

OSHA 10 Hour Construction Training, completed March 2014

Amtrak Contractor Orientation Safety Course, completed March 2014

Trained READ (Federal Inter-Agency Resource Advisor)
In May 2009 completed US Federal Interagency training at Yosemite National Park in Cultural Resource Advising within the Incident Command System during emergency incidents

Comparative Osteology
Expert in fragmentary human skeletal identification, faunal identification, and interpretation of skeletal remains.

Computer Skills
Fluent in Windows and Macintosh Operating systems, Microsoft Office Suite, Adobe Acrobat, Adobe Photoshop, and SPSS statistical analysis software. Coursework and professional experience with Adobe Illustrator, ArcGIS 10, R open source statistical software, Trimble and Garmin GPS units

RESEARCH GRANTS AND FUNDING
June 2016-July 2016, Global Research Institute Dissertation Writers Fellowship, New York University - Berlin
Funded summer program for final stage dissertation writers at the New York University Global Campus in Berlin, Germany

Sept 2014-May 2015, Lane Cooper Fellow, Graduate School of Arts and Science, New York University
Received $25,000 research fellowship from the Graduate School of Arts and Science for research on a pre-Renaissance doctoral dissertation topic.

Sept 2009-May 2014, MacCracken Fellow, New York University
Five years of full tuition, health insurance, and living stipend by the NYU Graduate School of Arts and Sciences

Jan 2013-May 2013, Global Research Institute Fellowship, New York University – London
One semester of funding for dissertation research while a researcher in residence at New York University – London's Global Research Institute.

July 2011, Antonina S. Ranieri International Scholars Fund Grant, New York University
Travel grant in support of summer fieldwork in England to participate in the Ecology of Crusading

Project's excavations in Poland

July 2010, Goodwin-Salwen Archaeological Fellowship, New York University
Travel grant in support of summer fieldwork in England to participate in the Vale & Ridgeway Project's excavation at Marcham/Frilford

Oct 2006-Jun 2008, Healy Scholar for study at St. Cross College, University of Oxford
Awarded Georgetown University's Healy Fellowship: two years of full tuition and travel/housing stipend to pursue a master's degree

TEACHING EXPERIENCE
Sept 2010-Present, Adjunct Instructor, Anthropology, New York University
Lead instructor for *Archaeology: early societies and culture* undergraduate course, Summer 2012. Laboratory instructor for *Archaeology: early societies and culture,* four semesters. Course assistant for *Interpreting the Human Skeleton* graduate-level course, one semester. Course assistant for *Faunal Analysis* graduate-level course, three semesters

July 2010, Trench Supervisor, Vale and Ridgeway Project and Training Excavation, Marcham, UK
Taught basic excavation principles to Undergraduate and Continuing Education students from the University of Oxford and other international university programs

PROFESSIONAL AFFILIATIONS
Member, British Association for Biological Anthropology and Osteoarchaeology (Since 2014)
Member, International Committee of Archaeozoology (Since 2012)
Member, Medieval Academy (since February 2011)
Member, Register of Professional Archaeologists (since July 2010)
Member, Society for American Archaeology (since January 2010)
Member, Phi Beta Kappa (inducted May 2006)
Member, Alpha Sigma Nu (inducted May 2005)

CONFERENCE PRESENTATIONS
French, K.M. 2016. "A Multiscalar Approach to Medieval Cremains: From bone microstructure to Regional Trends." *81st Annual Meeting for the Society for American Archaeology April 6-10, 2016.* Invited Podium Session: North and South: New Directions in Medieval European Archaeology.

French, K.M., V. Dominguz, and S. Mavroudas. 2015. "Prevalence of Drifting Osteons across Mammal Species. *84th Annual Meeting American Association of Physical Anthropologists, March 25-28, 2014.* Poster Presentation, Bioarchaeology Session.

French, K.M. 2014. "Graveside Feasting in Anglo-Saxon England: pagan tradition and Christian taboo." *49th International Congress on Medieval Studies May 8-11*, *2014,* Foodways Session I.

French, K.M. 2014. "Interspecies Cremations in the Pagan World: local practice or multiregional trend?" *79th Annual Meeting for the Society for American Archaeology April 23-27, 2014*, Bioarchaeology Session.

McCullough, K. 2012. "Theorizing Paganism in the Early Medieval Period." *Theoretical Archaeology Group (TAG) USA*. Buffalo, NY. Theory in Medieval Archaeology Session. Given May 24, 2012

McCullough, K. 2011. "Is there a single Early Anglo-Saxon Culture? Regional Differences in England *c.*450-600 A.D. *The Culture of Early Anglo-Saxon England.* Anglo-Saxon Studies Colloquium*,* New York, NY, New York University. Given April 29, 2011.

McCullough K. 2010. "Cattle as Wealth in Anglo-Saxon England. *What is Bettre than Gold?: Economies and Values in the Middle Ages.* Columbia University Medieval Guild, New York, NY, Columbia

University. Given October 22, 2010.

PUBLICATIONS AND LONG-TERM RESEARCH PROJECTS

French, K.M. 2016. *Multispecies Cremations in a Transitional World: evidence from early medieval England.* Unpublished Ph.D Dissertation. New York University.

Adams, Bradley and Pam Crabtree. 2011. *Comparative Skeletal Anatomy: a photographic atlas for medical examiners Second Edition*.

- Photo Editor for online supplement, labeling bone landmarks using graphic editing software. Supplement available: http://booksite.elsevier.com/9780123884374/zoomify.php

Kamesh, Z, Gosden, C. and Lock, G. (with contributions by E. Brophy, R. Coe, R. Glyde, J. Harrison, J. Kinory, P. Levick, K. McCullough, S. Ravin, J. Smallridge, and J. Walford) 2011. *The Vale and Ridgeway Project: Excavations at Marcham/Frilford: 2010 interim report*. Available at <http://www.arch.ox.ac. uk/VRP1.html>.

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- McCullough, K. 2010. *Cultural Resources Survey of Fuel Treatment Areas at Crater Lake National Park.* Report prepared for Crater Lake National Park.
- McCullough, K. 2009. *Cultural Resources Survey of Fuel Treatment Areas – Whiskeytown National Recreation Area.* Report on file at Whiskeytown N.R.A.
- Ogle, H. and K. McCullough. 2009. *Archeological Inventory of Fuel Treatment Units at Lassen Volcanic National Park.* Report on file at Lassen Volcanic National Park.

McCullough, K. 2008. Food Distribution Systems in Later Anglo-Saxon *Burhs*: the faunal evidence. Unpublished M.Phil Thesis. University of Oxford.

McCullough, K. 2006. The use of stable isotope analysis in studying the impact of the Anglo-Saxon migrations on the population of Post-Roman Britain. Unpublished Bachelor's Honors Thesis. Georgetown University.

APPENDIX B

RELEVANT COMMUNICATIONS WITH LPC

LANGAN

Technical Excellence
Practical Experience
Client Responsiveness

09 December 2016

Gina Santucci
Environmental Review Coordinator
NYC Landmarks Preservation Commission
One Centre Street
9th Floor, North
New York, New York 10007

Re: 45 Broad Street Development Project
Block 25, Lots 7 and 10
Borough of Manhattan, Community District 1
Langan Project No.: 170394201

Dear Ms. Santucci:

On behalf of Madison Equities (the "Applicant"), Langan Engineering, Environmental, Surveying and Landscape Architecture, DPC (Langan) requests information as to the likelihood that the proposed mixed use development project at 45 Broad Street (Block 25, Lots 7 and 10) ("Project Site") (Figures 1, 2, and 3) would result in significant adverse impacts to archaeological or historic resources in the Project Area. This request is made as part of a City Environmental Quality Review (CEQR) Environmental Assessment Statement (EAS).

The Proposed Action is a City Planning Commission (CPC) special permit that would permit additional floor area on a single zoning lot at 45 Broad Street, and would facilitate construction of an 80-story, approximately 464,293 gross square foot (gsf) mixed-use building on the Project Site (the "Proposed Development").

The Project Site is comprised of two tax lots (Lot 7 and 10) totaling approximately 23,798 square feet (sf), and is bounded by Broad Street to the west; a 21-story mixed-use building (Broad Exchange Building) to the north; a 20-story office building and a 44-story mixed-use building to the east (fronting William Street); and a 31-story office building to the south. Lot 7 (the "Development Site") is currently vacant and was formerly occupied by an 8-story, approximately 70,000 sf office building (Wells Fargo) that was demolished in 2007. Lot 10 is currently occupied by a 9-story, approximately 93,894 sf Leman Manhattan Preparatory School. The Proposed Development Project would not occur on Lot 10.

The streets bounding Block 25 include Broad Street to the west; Exchange Place to the north; William Street to the east; and Beaver Street to the south. All of the streets are part of the

Street Plan of New Amsterdam and Colonial New York, which is a New York City Landmark (NYCL) designated by the Landmarks Preservation Commission (LPC).

As shown in Figure 4, the Project Site and Study Area are in the Special Lower Manhattan District and the State and National Register of Historic Places (S/NR) designated Wall Street Historic District (WSHD). There are 69 LPC or S/NR designated historic landmarks in the Study Area. In order to assist LPC, Langan has compiled an inventory of the historic resources within a 400-foot radius of the Project Site using the Department of City Planning (DCP) PLUTO database and New York State Historic Preservation Office's (SHPO) Cultural Resource Information System (CRIS) database.

Please indicate if there are properties in addition to the ones listed in Table 1 (attached) that have architectural or archaeological significance.

We look forward to your review of the project. If you should have any questions regarding this matter, please do not hesitate to contact me at (212) 479-5503 or via email at MKeane@langan.com.

Thank you for your assistance.

Sincerely,

Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.

Michael R. Keane, AICP
Senior Environmental Planner

MRK/rk
Enclosure(s):
Regional Location Map, Site Location Map, List of Historic and Cultural Resources, Photograph Location Map, and Site Photographs

cc: Robert Kulikowski – Langan

ENVIRONMENTAL REVIEW

Project number: DEPARTMENT OF CITY PLANNING / LA-CEQR-M
Project: ADDRESS: 45 BROAD STREET, BBL: 1000250007
Date received: 12/12/2016

Comments: as indicated below. Properties that are individually LPC designated or in LPC historic districts require permits from the LPC Preservation department. Properties that are S/NR listed or S/NR eligible require consultation with SHPO if there are State or Federal permits or funding required as part of the action.

ADDRESS: 45 BROAD STREET, BBL: 1000250007

Comments:

The project site is within the S/NR listed Wall St. Historic District. The site is also directly adjacent to the north to the S/NR listed Lee, Higginson & Company Bank Building at 41 Broad St. (lot 10). The lot is also adjacent at the east to the Broad Exchange Building at 25 Broad St., which is S/NR and LPC listed. Adjacent to the lot and west of it is the LPC designated Street Plan of New Amsterdam and Colonial New York.

The list of historic resources dated 12/9/16 is acceptable.

LPC review of archaeological sensitivity models and historic maps indicates that there is potential for the recovery of remains from Colonial and Native American occupation on the project site. Accordingly, the Commission recommends that an archaeological documentary study be performed for this site to clarify these initial findings and provide the threshold for the next level of review, if such review is necessary (see CEQR Technical Manual 2014).

Gina Santucci 12/16/2016

SIGNATURE DATE
Gina Santucci, Environmental Review Coordinator

File Name: 31994_FSO_DNP_12152016.doc

21 February 2017

Ms. Gina Santucci
Environmental Review Coordinator
The New York City Landmarks Preservation Commission
1 Centre Street, 9N
New York, NY 10007

Re: 45 Broad Street Development Project
Block 25, Lots 7 and 10
Borough of Manhattan, Community District 1
New York, NY
Langan Project No. 170394201
LPC File Name: 31994_FSO_DNP_12152016

Dear Ms. Santucci:

On behalf of Madison Equities (the "Applicant"), Langan Engineering, Environmental, Surveying and Landscape Architecture, DPC (Langan) is responding to the Landmarks Preservation Commission (LPC) letter dated 16 December 2016, recommending an archaeological documentary study for the above-referenced project. The Proposed Action is a City Planning Commission (CPC) special permit that would permit additional floor area on a single zoning lot at 45 Broad Street, and would facilitate construction of an 80-story, approximately 464,293 gross square foot (gsf) mixed-use building on the Project Site.

SITE LOCATION AND DESCRIPTION

The streets bounding Block 25 include Broad Street to the west; Exchange Place to the north; William Street to the east; and Beaver Street to the south. All of the streets are part of the Street Plan of New Amsterdam and Colonial New York, which is a New York City Landmark (NYCL) designated by the Landmarks Preservation Commission (LPC).

PROJECT DESCRIPTION

The Project Site is comprised of two tax lots (Lot 7 and 10) totaling approximately 23,798 square feet (sf), and is bounded by Broad Street to the west; a 21-story mixed-use building (Broad Exchange Building) to the north; a 20-story office building and a 44-story mixed-use building to the east (fronting William Street); and a 31-story office building to the south. Lot 7 (the "Development Site") was formerly occupied by an 8-story, approximately 70,000 sf office building (Wells Fargo) that was demolished in 2007. Lot 10 is currently occupied by a 9-story, approximately 93,894 sf Leman Manhattan Preparatory School. The Proposed Development Project would not occur on Lot 10.

RESEARCH

According to map research the project site was occupied as early as 1894, according to the 1894 Sanborn map, by a four-story building with basement. By 1923 the building had been demolished and developed with an 8-story structure (constructed in 1920) labeled the Offices for the Combustion Engineering Building, which included a basement. By 1977, the 8-story structure on the western portion of the property had been relabeled as American Bureau of Shipping. The 8-story building was demolished in 2007.

According to the New York State Cultural Resource Information System (CRIS) the streets bounding Block 25 are part of the Street Plan of New Amsterdam and Colonial New York, which is a New York City Landmark (NYCL). The Project Site is in the Special Lower Manhattan District and part of the State and National Register of Historic Places (SRHP/NRHP) listed Wall Street Historic District (WSHD). CRIS also indicates that 45 Broad Street was the American Bureau of Shipping and was listed on the SRHP in January 2007 and on the NRHP in February 2007. Furthermore, CRIS indicates that the project site is in an archeologically sensitive area.

In addition, the 2003 *New York Stock Exchange Security and Streetscape Improvements, Stage 1A Archaeological Assessment* by Joan Geismar was reviewed. This assessment was completed permanent security improvements to ensure the safety of this potentially sensitive area in Post-9/II Manhattan. These improvements include fixed and moveable street bollards and/or manned security checkpoints on Broad Street, Exchange Place, Nassau Street, New Street and Wall Street. The focus of the assessment was on these improvements, which are located on the sidewalks and in the streets. The assessment did not include the lot at 45 Broad Street.

GEOTECHNICAL INVESTIGATIONS

Two separate geotechnical investigations were conducted on the project site, a summary of borings is presented below.

In 2007, six borings (B-1 through B-6) were drilled as part of the subsurface exploration. The borings were advanced between 59 and 65 feet below grade. The upper 10 feet of each boring was drilled without sampling to permit the boring to be advanced through demolition debris and the remnant cellar floor slab. Beginning at about 10 feet below the existing site grades and at 5-foot intervals thereafter, samples were retrieved. Recovered soil samples were visually examined and classified in the field in accordance with the Building Code. Soil classifications, N-values, and other field observations were recorded on field logs.

In 2016, two borings (B-7 and B-8) were drilled in the rear of the lot during the 2016 supplemental subsurface exploration program. Both borings were advanced to 55 feet below grade. The upper 10 feet of each boring was drilled without sampling to permit the boring to be

advanced through demolition debris and the remnant cellar floor slab. Beginning at about 10 feet below the existing site grades and at 5-foot intervals thereafter, samples were retrieved. Recovered soil samples were visually examined and classified in the field in accordance with the Building Code, Soil classification, N-values, and other field observations were recorded on field logs.

Subsurface Conditions

The subsurface conditions generally consist of approximately 13 to 17 feet of uncontrolled fill and demolition debris, approximately 21 to 27 feet of silt with discontinuous sand and clay seams, and approximately 3 to 15 feet of decomposed rock. Schist bedrock was encountered between about 38 to 49 feet below grade. Stabilized groundwater levels were observed at depths of about 13.5 feet in 2016 and 20 feet in 2007. A more detailed description of each layer is provided below.

Fill

A layer of uncontrolled fill and demolition debris ranging in thickness between 13 and 17 feet was encountered in the borings and test pits. The upper fill generally consisted of brick, concrete, and rebar debris from previous demolition at the site. The former basement floor slab was encountered approximately 12 feet below the existing site grade. Fill encountered below the basement slab generally consisted of coarse to fine sand with varying amounts of silt, gravel, and debris. The piles and pile caps from the former structure are also present below the slab.

Silt and Clay

A layer of silt approximately 21 to 27 feet thick was encountered below the fill layer. This silt is regionally known as "Bull's Liver". The silt is generally loose to medium. dense with varying amounts of fine sand and clay and in a saturated state, this silt has been observed to behave like a gel or even flow like liquid under shock or vibration. Discontinuous layers of fine silty sand were encountered within the silt in borings B-2, B-3, B-4, and B-8. In addition, pockets with more clay content were encountered within the silt layer in borings B-4, B-5, and B-7.

Clayey Sand

Four to seven feet thick pockets of clayey fine to coarse sand were encountered within the silt in borings B-2, B-3, B-4, and B-8. The clayey sand is generally classified as SC in accordance with USCS and is designated as Building Code Class 6 material, "loose granular soils."

Decomposed Rock

Decomposed Rock ranging in thickness between approximately 3 and 15 feet, was encountered below the silt. The top of the decomposed rock was found approximately 34 to 41 feet below the existing ground surface. The decomposed rock generally

consisted of micaceous silt with varying proportions of gravel and sand, and gravel-sized fragments of schist.

Bedrock
The site is underlain by Manhattan schist bedrock, and the top of rock was encountered at depths of approximately 38 to 49 feet below the existing site grades.

The geotechnical reports further indicates that the basement slab, walls and foundation piles remain and that the hole is backfilled with recycled-concrete aggregate sandy backfill that was imported following demo of the building. The former slab is approximately 11 to 13 feet below current grade. The slab either sits directly on silt or in some areas that were filled with one to two of filled placed for the construction of the 1920 building.

CONCLUSION

Occupation on the project site most likely occurred well before the 4-story building depicted on the 1894 Sanborn Insurance map. The 4-story building that existed prior to the 1920 building was likely removed in its entirety because no observations or any other indications of the former slab were made. The 1920 building was also larger and would have required a more robust foundation, which were observed at approximately 11 to 13 feet below current grade, during the geotechnical investigations. In addition, the pile caps were observed below the slab foundation which would have resulted in ground disturbance from their construction extending the level of disturbance to approximately 13 to 15 feet below grade.

Based on the above information it is highly unlikely that intact archaeological remains exist in the area of disturbance for the proposed building development. If you have any questions or comments please do not hesitate to contact me at maudin@langan.com or 973-919-1965.

Very Truly Yours,

Michael Audin, RPA
Principal Archaeologist

Enclosures: 2016, Langan, Amended Geotechnical Engineering Study for 45 Broad Street

cc:

NJ Certificate of Authorization No: 24GA27996400
\\AHRS-Server\AHRS-Data\NEW YORK\Projects\Langan\45 Broad Street\Response_Letter_Landmark_45BroadStreet.doc

References Cited

Geismar, Joan
2003 New York Stock Exchange Security and Streetscape Improvements Stage IA Archaeological Assessment, Prepared for AKRF, Inc. On File at the New York City Landmarks Preservation Commission.

Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.
2016 Amended Geotechnical Engineering Study for 45 Broad Street, New York, New York.

07 March 2017

Ms. Gina Santucci
Environmental Review Coordinator
The New York City Landmarks Preservation Commission
1 Centre Street, 9N
New York, NY 10007

Re: 45 Broad Street Development Project
Block 25, Lots 7 and 10
Borough of Manhattan, Community District 1
New York, NY
Langan Project No. 170394201
LPC File Name: 31994_FSO_DNP_12152016

Dear Ms. Santucci:

On behalf of Madison 45 Broad Development LLC (the "Applicant"), Langan Engineering, Environmental, Surveying and Landscape Architecture, DPC (Langan) is responding to the Landmarks Preservation Commission (LPC) letter dated 16 December 2016, recommending an archaeological documentary study for the above-referenced project. The Proposed Action is a City Planning Commission (CPC) special permit that would permit additional floor area on a single zoning lot at 45 Broad Street (Block 25, Lots 7 and 10) ("Project Site"), and would facilitate construction of an 80-story, approximately 464,293 gross square foot (gsf) mixed-use building on the Project Site.

SITE LOCATION AND DESCRIPTION

The Project Site is comprised of two tax lots (Lots 7 and 10) totaling approximately 23,798 square feet (sf), and is bounded by Broad Street to the west; a 21-story mixed-use building (Broad Exchange Building) to the north; a 20-story office building and a 44-story mixed-use building to the east (fronting William Street); and a 31-story office building to the south. Lot 7 (the "Development Site") was formerly occupied by an 8-story, approximately 70,000 sf office building that was demolished in 2007. Lot 10 is currently occupied by the 9-story, approximately 93,894 sf Leman Manhattan Preparatory School. The Proposed Development Project would occur on Lot 7 and the Leman Manhattan Preparatory School would remain on Lot 10.

The streets bounding Block 25 include Broad Street to the west; Exchange Place to the north; William Street to the east; and Beaver Street to the south. These streets are part of the Street Plan of New Amsterdam and Colonial New York, which is a New York City Landmark (NYCL) designated by the Landmarks Preservation Commission (LPC).

The Project Site is in the Special Lower Manhattan District and part of the State and National Register of Historic Places (S/NR) listed Wall Street Historic District (WSHD). CRIS also indicates that 45 Broad

Street was the American Bureau of Shipping and was listed on theS/NR in 2007. Furthermore, CRIS indicates that the Project Site is in an archeologically sensitive area.

RESEARCH

According to map research, the Project Site was occupied as early as 1894; the 1894 Sanborn Insurance Map shows a four-story building with a basement on the site. By 1923 the building had been demolished and developed with an 8-story structure (constructed in 1920) labeled the Offices for the Combustion Engineering Building, which also included a basement. By 1977, the 8-story structure on the western portion of the property had been renamed the American Bureau of Shipping. The 8-story building was demolished in 2007.

SUBSURFACE INVESTIGATIONS

Two separate geotechnical investigations were conducted on the Project Site:

In 2007, six borings (B-1 through B-6) were drilled as part of the subsurface exploration. The borings were advanced to between 59 and 65 feet below grade. The upper 10 feet of each boring were drilled without sampling to permit the boring to be advanced through demolition debris and the remnant cellar floor slab. Beginning at approximately 10 feet below the existing site grade, and at 5-foot intervals thereafter, samples were retrieved. Recovered soil samples were visually examined and classified in the field in accordance with the Building Code. Soil classifications, N-values, and other field observations were recorded on field logs.

In 2016, two borings (B-7 and B-8) were drilled in the rear of the lot during the 2016 supplemental subsurface exploration program. Both borings were advanced to 55 feet below grade. The upper 10 feet of each boring were drilled without sampling to permit the boring to be advanced through demolition debris and the remnant cellar floor slab. Beginning at approximately 10 feet below the existing site grade, and at 5-foot intervals thereafter, samples were retrieved. Recovered soil samples were visually examined and classified in the field in accordance with the Building Code, Soil classification, N-values, and other field observations were recorded on field logs.

SUBSURFACE CONDITIONS

The subsurface conditions generally consist of approximately 13 to 17 feet of uncontrolled fill and demolition debris, approximately 21 to 27 feet of silt with discontinuous sand and clay seams, and approximately 3 to 15 feet of decomposed rock. Schist bedrock was encountered approximately 38 to 49 feet below grade. Stabilized groundwater levels were observed at depths of about 13.5 feet in 2016 and 20 feet in 2007.

The geotechnical reports further indicate that the basement slab, walls, and foundation piles remain, and that the hole is backfilled with recycled-concrete aggregate sandy backfill that was imported following demolition of the building. The former slab is approximately 11 to 13 feet below current grade. The slab sits either directly on silt or in some areas with one to two feet of fill that was placed in connection with construction of the 1920 building or residual historical fill that predates the 1920 building.

CONCLUSION

The Project Site was likely occupied prior to the 4-story building depicted on the 1894 Sanborn Insurance map. The 4-story building was likely removed in its entirety because no observations or any other indications of the former slab were made. The 1920 building was larger than the 4-story building and, therefore, would have required a more robust foundation; in fact, the former building's concrete slab was observed at approximately 11 to 13 feet below current grade during subsurface investigations. The soils beneath the concrete slab were further disturbed by the construction of pile caps, which extend to approximately 13 to 15 feet below grade, and installation of caissons, which extend to bedrock.

Based on the above information, disturbance to pre-contact period archeological resources has more than likely occurred as a result of the buildings that formerly occupied the site. Therefore, the potential to recover intact, undisturbed pre-contact period deposits *in situ* is low and further investigation of pre-contact period archeological resources is not warranted.

Sincerely,
Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.

Michael Audin, RPA
Principal Archaeologist

Robert Kulikowski, Ph.D.
Senior Director - Environmental Planning

Enclosures: 2016, Langan, Amended Geotechnical Engineering Study for 45 Broad Street

cc: Anthony Labozzetta, Andrew Manton, Andrew Harris (Madison Equities)
David Karnovsky (Fried Frank)
Michael Keane, Gerald Nicholls, Tasos Papathanasiou (Langan)

References Cited

Geismar, Joan
2003 New York Stock Exchange Security and Streetscape Improvements Stage IA Archaeological Assessment, Prepared for AKRF, Inc. On File at the New York City Landmarks Preservation Commission.

Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.
2016 Amended Geotechnical Engineering Study for 45 Broad Street, New York, New York.

ENVIRONMENTAL REVIEW

Project number: DEPARTMENT OF CITY PLANNING / LA-CEQR-M
Project: 45 BROAD STREET 1000250007
Date received: 3/9/2017

Comments:

The LPC is in receipt of additional information from the applicant dated 3/7/17 in response to LPC's recommendation of 12/16/16 for an archaeological documentary study.

Colonial wells and privy features typically can extend 18 to 20 feet below present grade and thus be beneath the building basements of historic record. LPC review of archaeological sensitivity models and historic maps indicates that there is potential for the recovery of remains from Colonial occupation on the project site. Accordingly, the Commission recommends that an archaeological documentary study be performed for this site to clarify these initial findings and provide the threshold for the next level of review, if such review is necessary (see CEQR Technical Manual 2014).

Gina Santucci 3/17/2017

SIGNATURE DATE
Gina Santucci, Environmental Review Coordinator

File Name: 31994_FSO_DNP_03132017.doc

NYC Landmarks Preservation Commission

1 Centre Street
9th Floor North
New York, NY 10007

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Fax (212)-669-7960
http://nyc.gov/landmarks

ARCHAEOLOGY

Project number: DEPARTMENT OF CITY PLANNING / LA-CEQR-M
Project: 45 Broad Street
Date received: 5/19/2017

Comments: as indicated below. Properties that are individually LPC designated or in LPC historic districts require permits from the LPC Preservation department. Properties that are S/NR listed or S/NR eligible require consultation with SHPO if there are State or Federal permits or funding required as part of the action.

This document only contains Archaeological review findings. If your request also requires Architecture review, the findings from that review will come in a separate document.

Comments: The LPC is in receipt of the "Phase 1A Archaeological Study for 45 Broad Street, Borough of Manhattan, New York City, NY" draft report by Langan Engineering dated April 2017. Please revise to include documentation of the site's use and occupation as outlined in the LPC Guidelines for Archaeological Work and how that relates to the site's historical significance.

5/22/2017

SIGNATURE DATE
Amanda Sutphin, Director of Archaeology

File Name: 31994_FSO_JSM_05222017.doc

Landmarks Preservation Commission

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9th Floor North
New York, NY 10007

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http://nyc.gov/landmarks

ARCHAEOLOGY

Project number: DEPARTMENT OF CITY PLANNING / LA-CEQR-M
Project: **45 Broad Street**
Date received: 6/8/2017

Comments: as indicated below. Properties that are individually LPC designated or in LPC historic districts require permits from the LPC Preservation department. Properties that are S/NR listed or S/NR eligible require consultation with SHPO if there are State or Federal permits or funding required as part of the action.

This document only contains Archaeological review findings. If your request also requires Architecture review, the findings from that review will come in a separate document.

Comments: The LPC is in receipt of the revised, "Phase 1A Archaeological Study for 45 Broad Street," dated May 2017 and the, "Geotechnical Memo" dated June 7, 2017 both prepared by Langan Engineering. The Phase 1A should be revised to:

(1) Describe the test pits that were excavated in 2016, including four test pits that were excavated after the Department of City Planning process began.

(2) Include the geotechnical boring data as an appendix along with a map showing their locations.

(3) Tie the National Register criteria standards to the conclusion and assessment of archaeological sensitivity, which the section on research and goals notes would be used.

(4) Make the following emends to the report before it is made public:

- In the **historic map review**:
  - Castello Plan: There is a building behind the two houses fronting on Broad Street—are all three of these associated with Van Ruyven?
  - The text on page 19 is incorrect about the 1828 J. F. Morin *Plan of the City.* This map only indicates public/civic buildings, and therefore only indicates that the project area was not covered with such buildings and NOT that it was undeveloped. The tax and census review in the report, indicate that the project area was fully settled from the 17th century onwards.
  - There should be 18th century maps used as part of this assessment.
  - 1894 Sanborn Fire Insurance map—this map doesn't convey information about basements. The "B" in this case is a "second class brick warehouse"—the "B" meaning basement begins with the 1923 Sanborn Map (remove reference to basement in 1894 on page 32 as well).
  - The four-story building in the Hammerhead portion of the site is independent of 52 Exchange place. The dark line between the two buildings indicates an independent stand-alone wall creating a fire break. The ribbon marks indicate iron shutters on the structure on the four-story building on Lords Court rather

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than a pass through (an X) to 52 Exchange place (see image below). The iron shutters were probably on floors 3 & 4 where the two buildings met.

As for the "Geotechnical Memo" we have no further questions about the proposed description and sequencing for installing Support of Excavation. However, we note this work cannot proceed until questions about the test pits are resolved and the restrictive declaration has been executed.

6/15/2017

SIGNATURE DATE
Amanda Sutphin, Director of Archaeology

File Name: 31994_FSO_ALS_06152017.doc

Landmarks Preservation Commission

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ARCHAEOLOGY

Project number: DEPARTMENT OF CITY PLANNING / LA-CEQR-M
Project: 45 Broad Street, BBL: 1000250007
Date received: 7/3/2017

Comments: as indicated below. Properties that are individually LPC designated or in LPC historic districts require permits from the LPC Preservation department. Properties that are S/NR listed or S/NR eligible require consultation with SHPO if there are State or Federal permits or funding required as part of the action.

This document only contains Archaeological review findings. If your request also requires Architecture review, the findings from that review will come in a separate document.

Comments:

The LPC is in receipt of the revised "Phase 1A Archaeological Study for 45 Broad Street Borough of Manhattan," dated June 2017 prepared by Langan Engineering.

We note that this report still does not offer any objective analysis of the impact of the geotechnical test pits to the archaeologically sensitive areas. The conclusion continues to note that there is sensitivity below 11' and 13' and the section on the geotechnical test pits states that they extended into those levels and does not draw any conclusions about whether this work may have impacted any archaeological resources. This must be revised, again. In addition, we note that the "Conclusion and Recommendation" section of the final report should be revised to state, "sensitivity for truncated shaft features and other mid-17th to 18th Century features across the project site." The final "Recommendation" paragraph should similarly be revised to include "monitoring will conclude when culturally sterile soil is reached across the project site."

Furthermore, we remain baffled that the initial submission of the Phase 1A did not discuss the geotechnical test pits especially in light of the fact that this work was also completed by Langan, nor have we received an explanation of how this omission occurred.

Finally, the LPC does concur that the site is archaeologically sensitive and that an archaeological monitoring plan and protocol should be developed in consultation with the LPC as a next step.

We note that this monitoring plan may be developed while the Phase 1A is being revised, (although we note further consultation with LPC may be needed if the sensitivity zone is subsequently revised), and the restrictive declaration--assuming DCP's concurrence-- is executed. No site excavation may occur until the restrictive declaration is executed and no excavation may occur within the archaeologically sensitive zones until the monitoring

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plan is reviewed and approved and the Notices described in the restrictive declaration are issued by LPC. This prohibition includes additional test pits for any reason.

7/13/2017

SIGNATURE DATE
Amanda Sutphin, Director of Archaeology

File Name: 31994_FSO_JSM_07072017.doc

Landmarks Preservation Commission

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9th Floor North
New York, NY 10007

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http://nyc.gov/landmarks

ARCHAEOLOGY

Project number: DEPARTMENT OF CITY PLANNING / LA-CEQR-M
Project: 45 Broad Street, BBL: 1000250007
Date received: 7/3/2017

Comments: as indicated below. Properties that are individually LPC designated or in LPC historic districts require permits from the LPC Preservation department. Properties that are S/NR listed or S/NR eligible require consultation with SHPO if there are State or Federal permits or funding required as part of the action.

This document only contains Archaeological review findings. If your request also requires Architecture review, the findings from that review will come in a separate document.

Comments:

The LPC is in receipt of the revised "Phase 1A Archaeological Study for 45 Broad Street Borough of Manhattan," dated June 2017 prepared by Langan Engineering.

We note that this report still does not offer any objective analysis of the impact of the geotechnical test pits to the archaeologically sensitive areas. The conclusion continues to note that there is sensitivity below 11' and 13' and the section on the geotechnical test pits states that they extended into those levels and does not draw any conclusions about whether this work may have impacted any archaeological resources. This must be revised, again. In addition, we note that the "Conclusion and Recommendation" section of the final report should be revised to state, "sensitivity for truncated shaft features and other mid-17th to 18th Century features across the project site." The final "Recommendation" paragraph should similarly be revised to include "monitoring will conclude when culturally sterile soil is reached across the project site."

Furthermore, we remain baffled that the initial submission of the Phase 1A did not discuss the geotechnical test pits especially in light of the fact that this work was also completed by Langan, nor have we received an explanation of how this omission occurred.

Finally, the LPC does concur that the site is archaeologically sensitive and that an archaeological monitoring plan and protocol should be developed in consultation with the LPC as a next step.

We note that this monitoring plan may be developed while the Phase 1A is being revised, (although we note further consultation with LPC may be needed if the sensitivity zone is subsequently revised), and the restrictive declaration--assuming DCP's concurrence-- is executed. No site excavation may occur until the restrictive declaration is executed and no excavation may occur within the archaeologically sensitive zones until the monitoring

NYC Landmarks Preservation Commission

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plan is reviewed and approved and the Notices described in the restrictive declaration are issued by LPC. This prohibition includes additional test pits for any reason.

7/13/2017

SIGNATURE DATE
Amanda Sutphin, Director of Archaeology

File Name: 31994_FSO_JSM_07072017.doc

APPENDIX C

GEOTECHNICAL REPORTS AND MEMORANDA

Geotechnical Reports and Memoranda

I. Langan Report: Amended Geotechnical Engineering Study for 45 Broad Street, New York, New York. Dated 29 April 2016.
II. Langan Letter Report: Test Pit Findings and Recommendations Report, 45 Broad Street, New York, NY 10004. Dated 9 January 2017.
III. Langan Report: Updated Geotechnical Engineering Study for 45 Broad Street, New York, New York. Dated 12 May 2017.
IV. Langan Memorandum: Test Pits Excavations, 45 Broad Street, New York, New York. Dated 21 June 2017.
V. Langan Revised Figure: Approximate Test Pit Limits. Figure shows extent of geotechnical test pit sloping. Dated 28 June 2017.

AMENDED GEOTECHNICAL ENGINEERING STUDY for

45 Broad Street
New York, New York

Prepared For:

Madison 45 Broad Development LLC
105 Madison Avenue, 9th Floor
New York, New York 10016

Prepared By:

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29 April 2016
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INTRODUCTION

This amended report updates the results of our amended geotechnical engineering study for the proposed development of 45 Broad Street in Manhattan, New York. The purpose of this study was to develop recommendations for foundations and other geotechnical aspects of design and construction. Our work was performed in accordance with our approved 19 November 2015 proposal. Our study included a review of available information, field investigations, engineering evaluation, and development of geotechnical recommendations in accordance with the 2014 New York City Building Code. Amendments to our 23 November 2010 report were made to:

1. Include information from a supplementary subsurface investigation performed in January and February of 2016;
2. Account for new design drawings prepared by the architect (CetraRuddy) and subsequent discussions with the project team and Madison 45 Broad Development;
3. Account for new foundation drawings prepared by the structural engineer (WSP) in March 2016.

Elevations given are based on the survey prepared by Empire State Layout, Inc., dated 21 January 2016, and are with respect to the North American Vertical Datum (NAVD88) unless otherwise noted.

SITE DESCRIPTION

The 45 Broad Street site is on the east side of Broad Street between Exchange Place and Beaver Street in lower Manhattan, New York. The site is identified as Block 25, Lot 7 on the New York City Tax Maps and is currently vacant. The site is within the block bound by Exchange Place on the north, Beaver Street on the south, Broad Street on the west, and William Street on the east. Existing buildings are adjacent to the site on the north, south, and east. Broad Street borders the site on the west. A New York City Transit (NYCT) tunnel is located under Broad Street. A site location map is presented in Figure 1.

The vacant site is T-shaped with about 63 feet of frontage on Broad Street and a site area of about 12,600 square feet (SF), with surface elevation varying from about el 9 to el 11. An eight-story structure with one cellar level was demolished in 2007 to make way for the previous owner's proposed redevelopment. The former cellar was backfilled with demolition debris to

sidewalk grade with the former foundations, including piles and pile caps and basement slab, left in place.

Adjacent Buildings

Existing structures adjacent to the site on the north, south, and east are shown in Figure 6:

41 Broad Street – Claremont Preparatory School

The Claremont Preparatory School (41 Broad Street) north of the site is a nine- to twelve-story brick and stone structure with a footprint of about 11,000 SF built in 1929. Available architectural drawings indicate that 41 Broad Street has two below-grade levels with the subcellar level having a finished-floor elevation about 28 feet below the adjacent sidewalk grades(about el -17.5). Available foundation drawings show the structure supported by spread footings. Bearing capacity was not indicated on the available plans. Construction drawings appear to indicate that, along the southern end of the site (adjacent to 45 Broad), the foundations consist of piers bearing on bedrock constructed by way of a continuous cofferdam.

25 Broad Street

25 Broad Street is a T-shaped lot to the east occupied by a 20-story brick and stone structure with a 263-foot frontage along Exchange Place, built around 1900. The building previously had an about 50-foot-wide section that extended to the south, adjacent to 41 and 45 Broad Street to the east. This 4,200-square-foot extension was demolished to be part of the previous 45 Broad Street development scheme. Available architectural drawings show that the entire building footprint of 25 Broad Street, including the demolished southern part, has one cellar level. The finished-floor elevations of the below-grade levels are not known, and no foundation drawings are available for this structure. A steam-line easement running in the north-south exists within the part of 25 Broad Street that was demolished.

40 Exchange Place

Beyond 25 Broad Street to the east is 40 Exchange Place, a 20-story brick and stone commercial building with one below-grade level, built in 1902. The finished-floor elevations of the below-grade levels are not known, and no foundation drawings are available for this structure.

15 William Street

Adjacent to 25 Broad Street to the southeast is 15 William Street, a 44-story concrete residential structure with below-grade levels that extend about 45 feet below the surrounding grades (about el -34.5) built in 2005. The foundation wall and excavation support system for 15 William Street consists of a permanent reinforced secant pile wall drilled into the underlying bedrock.

55 Broad Street

55 Broad Street, adjacent to the south, is a brick building varying from 6 to 31 stories, built in 1968. A one-story extension borders the project site to the southeast. Available drawings show that the building has one below-grade level at about el -7.5 and that the structure is supported on driven H-piles bearing on bedrock.

Adjacent NYCT Subway Structure

The existing NYCT subway tunnels and structures for the BMT and IND J, M, and Z lines run beneath Broad Street about 20 feet west of the site; in addition, the Broad Street station (servicing lines J and Z) is nearby. NYCT drawings (Broad Street Station, South-End, 1928) show that the subway consists of a reinforced concrete box constructed using cut-and-cover methods. Vents in the Broad Street sidewalk are as close as about 10.5 feet to the property line. The base of the rail closest to the site is at about el -12.5. The tunnel foundation level is at about el -16.5, which is about 28 feet below the adjacent sidewalk grades. Because the proposed construction will be within 200 feet of the subway tunnel, NYCT approval of excavation and foundation construction is required to obtain building permits.

PROPOSED DEVELOPMENT

According to CetraRuddy's architectural drawings, the project will consist of about 8,950 square feet of development with an 83-story (plus mechanical penthouse) tower. The tower will extend to about 1,150 feet above grade and will have about 30-foot setback from the south property line along Broad Street. The top of the ground floor slab will be about el 11.4. The development in the rear "hammerhead" portion of the site is not proposed.

The building will include three cellar levels below the podium to be used for storage and amenities, including a swimming pool. The top of lowest cellar slab will be about 32 feet below sidewalk grade; the corresponding elevation is about el -20.7.

The tower will be concrete and will have a central structural core extending the entire height of the structure, with perimeter columns carrying the remaining load. The foundation loads and contact pressure at the base of the tower is not yet available at the time of this report; however WSP expects the contact pressure to be below 40tsf.

REVIEW OF PUBLISHED INFORMATION

Regional Geology

The United States Geological Survey "Bedrock and Engineering Geologic Maps of New York County and Parts of Kings and Queens Counties, New York, and Parts of Bergen and Hudson Counties, New Jersey" (see Figure 2) shows the bedrock formation underlying the site is Manhattan Schist.

Pleistocene glacial activity modified the landscapes and surficial features of Manhattan, Brooklyn, Queens, and Long Island. Glaciers scoured uplands and deposited varying amounts of till (an unsorted mixture of sand, clay and boulders) across the lowlands and valleys. The USGS surficial geology map indicates that the site is underlain by glacial outwash deposits generally consisting of sand and gravel. See Figure 3 for the USGS surficial geology map.

Historical Land Use

We reviewed the "Sanitary & Topographical Map of the City and Island of New York" (Viele, 1856), which indicates the east portion of the site near Broad Street is on manmade land and the west part of the site was a meadow. Before being filled, Broad Street was an inlet from the East River known as Broad Canal. See Figure 4 for the relevant part of the Viele Map.

Flood Hazard

We reviewed the Federal Emergency Management Agency (FEMA) Preliminary Flood Insurance Rate Map (FIRM), dated 5 December 2013 (Community Panel No. 360497 0088 G). According to the Preliminary FIRM, the western part of the site is within Zone X (areas within the 0.2 percent annual chance floodplain, i.e., 500-year flood). The eastern part of the site is within Zone AE (areas within the 1 percent annual chance floodplain, i.e., 100-year flood), which has a base flood elevation of el 11 NAVD88. Design of the building must follow the flood protection requirements of the NYCT and ASCE-24. The relevant part of the Preliminary FIRM is presented in Figure 5.

SUBSURFACE EXPLORATION

A summary of our subsurface explorations performed in August 2007 and February 2016 are presented below.

2007 Borings

Six borings (B-1 through B-6) were drilled as part of our 2007 subsurface exploration. All borings were drilled by Craig Test Boring, Inc. with a CME track-mounted drill rig, under Langan's full-time special inspection. The borings were advanced using mud rotary drilling techniques and a tricone roller bit with drilling fluid and steel casing providing soil support. Borings were advanced to between 59 and 65 feet below grade.

The upper 10 feet of each boring was drilled without sampling to permit the boring to be advanced through demolition debris and the remnant cellar-floor slab. Standard Penetration Test (SPT)[1] N-values were measured and soil samples were typically obtained beginning at about 10 feet below the existing site grades and at 5-foot intervals thereafter. Samples were retrieved using a standard 2-inch outside-diameter split-spoon sampler driven by a 140-pound automatic hammer in accordance with ASTM D1586. NX-size rock cores were obtained at each boring location in accordance with ASTM D2113. Rock core recovery[2] and rock quality designation (RQD)[3] was recorded for each core run.

Recovered soil samples were visually examined and classified in the field in accordance with the Building Code. Soil classifications, N-values, and other field observations were recorded on field logs. See Appendix A for the boring logs and Figure 6 for the boring location plan.

2016 Borings

Two borings (B-7 and B-8) were drilled in the rear of the lot ("hammerhead") as part of our 2016 supplemental subsurface exploration program. The borings were drilled by Craig Geotechnical Drilling Co., Inc. with a truck-mounted drill rig under Langan's full-time special inspection. . The borings were advanced using mud-rotary drilling techniques and a tricone roller bit with drilling fluid and steel casing providing soil support. Both borings were advanced to 55 feet below grade.

[1] The Standard Penetration Test is a measure of the soil density and consistency. The SPT N-value is defined as the number of blows required to drive a 2-inch outside diameter split-barrel sampler 12-inches, after an initial penetration of 6-inches, using a 140-pound hammer free falling from a height of 30-inches.

[2] Core recovery is defined as the ratio of the total length of rock recovered to the total core run length, expressed as a percent.

[3] The RQD is defined as the ratio of the summation of each rock piece greater than 4-inches in length for NX cores to total core run length, expressed as a percent.

The upper 10 feet of each boring was drilled without sampling to permit the boring to be advanced through demolition debris and the remnant cellar floor slab. SPT N-values were measured and soil samples were typically obtained beginning at about 10 feet below the existing site grades and at 5-foot intervals thereafter. Samples were retrieved using a standard 2-inch outside-diameter split-spoon sampler driven by a 140-pound automatic hammer in accordance with ASTM D1586. NX-size rock cores were obtained at each boring location in accordance with ASTM D2113. Rock core recovery and RQD were recorded for each core run.

Recovered soil samples were visually examined and classified in the field in accordance with the Building Code. Soil classification, N-values, and other field observations were recorded on field logs. See Appendix A for the boring logs and Figure 6 for the boring location plan.

2016 Cone Penetration Tests (CPTs)

Two Cone Penetration Tests (CPT-1, CPT-2) were performed on 1 February 2016 in accordance with ASTMD-5778 as part of our supplemental subsurface exploration. The CPTs were performed by Craig Geotechnical Drilling Co., Inc. under the special inspection of Langan. A truck-mounted CPT rig was used to hydraulically push a 1.4-inch-diameter (36mm) electric cone penetrometer to about 35 feet (CPT-1) and 38 feet (CPT-2).

The upper 15 feet of each CPT was pre-drilled to penetrate through the demolition debris and the remnant cellar-floor slab. The cone penetrometer was pushed at an estimated rate of about 0.75 in/sec (20mm/s) and readings were taken every 0.5 to 2.0 inch. Seismic shear-wave velocity tests were performed approximately every 5 feet. Seven shear-wave tests were performed at CPT-1, and eight at CPT-2. See Figure 6 for CPT locations and Appendix E for the CPT report prepared by Craig Geotechnical Drilling Co., Inc.

2016 Test Pit

One test pit (TP-1) was excavated by J. Coffey Contracting Inc., Flushing, New York, from 17 through 22 February 2016 under the full-time special inspection of Langan. The purpose of the test pit was to explore the adjacent foundation condition at 55 Broad Street. The test-pit indicated the cellar slab for 55 Broad Street extends to about el -5.25 (which appears to be slightly higher than el -7.5 depicted on available drawings), and that foundation pile caps extend to about el -12.25. The test pit was backfilled to existing grade with excavated material upon completion of the exploration.

See Figure 6 for the test pit location and Appendix D for the test pit sketch and selected photographs.

Groundwater Observation Wells

Three groundwater monitoring wells were installed in completed borings B-1, B-6, and B-7 to monitor the groundwater level at the site. The wells consisted of 1¼-inch or 2-inch diameter PVC riser pipes and 10-foot- or 20-foot-long well screens with well depths ranging between about 26 and 49 feet. The water levels were measured during the exploration. Observation well construction logs are provided in Appendix B.

Laboratory Testing

Samples obtained during our 2007 and 2016 subsurface explorations were brought to our office for further analysis and laboratory tests. Soil classifications were verified by a senior engineer and selected soil and rock samples were sent to our laboratory for testing. Six grain-size analyses, 11 Atterberg Limits determinations, 17 moisture-content measurements, 4 unconfined compression tests, 2 elastic moduli determinations, and 2 splitting tensile strength tests were performed. See Appendix C for laboratory test results.

SUBSURFACE CONDITIONS

The subsurface conditions generally consist of about 13 to 17 feet of uncontrolled fill and demolition debris, about 21 to 27 feet of silt with discontinuous sand and clay seams, and about 3 to 15 feet of decomposed rock. Schist bedrock was encountered between about 38 to 49 feet below grade. Stabilized groundwater levels were observed at depths of about 13.5 feet in 2016 and 20 feet in 2007. A more detailed description of each layer is provided below. Representative subsurface profiles are presented on Figures 7 and 8.

Fill [Class 7][4]

A layer of uncontrolled fill and demolition debris ranging in thickness between 13 and 17 feet was encountered in the borings, test pits and CPTs. The upper fill generally consisted of brick, concrete, and rebar debris from previous demolition at the site. The former basement floor slab was encountered about 12 feet below the existing site grade. Fill encountered below the basement slab generally consisted of coarse to fine sand with varying amounts of silt, gravel, and debris. No soil sampling was performed within the upper 10 feet of each borehole because of obstructions within the fill from the demolition operations. In addition to the floor slab, former foundation elements and other large obstructions should be anticipated within the fill. The piles and pile caps from the former structure are also present below the slab.

[4] Numbers in brackets that follow the material designation indicate classification of soil and rock materials in accordance with the NYC Building Code.

The fill is highly variable and is designated as Building Code Class 7, "uncontrolled fill."

Silt and Clay [Class 5b, 4c, and 6]

A layer of low-plasticity silt about 21 to 27 feet thick was encountered below the fill layer. This silt is regionally known as "Bull's Liver". The silt is generally loose to medium-dense with varying amounts of fine sand and clay, and is known for having unconventional engineering properties because of its silt-sized particles with little to no plasticity. In a saturated state, this silt has been observed to behave like a gel or even flow like liquid under shock or vibration. The foundation contractor should consider this soil behavior because it can introduce significant challenges during excavation and foundation construction.

Discontinuous layers of fine silty sand were encountered within the silt in borings B-2, B-3, B-4, and B-8 (discussed below). In addition, pockets with more clay content were encountered within the silt layer in borings B-4, B-5, and B-7.

Standard Penetration Test (SPT) N-values for the silt ranged between 1 and 29 blows per foot. CPT results indicated that this layer has the behavior of "Clayey silt to silty clay" or "Silty sand to sandy silt" with small pockets of "Clay to silty clay" and "Clean sand to silty sand". In general terms the SPT sampling and CPT results correlate well.

Laboratory testing of collected samples yielded natural moisture contents from 27 to 40 percent. The liquid limit ranged between 26 and 33 (average about 30); the plastic limit ranged from 20 to 25 (average about 23); and the plasticity index ranged from 4 to 11 (average about 7). In most tests the water content is near or above the liquid limit indicating that the silt could behave similarly to a viscous liquid when disturbed by construction.

The silt is generally classified as ML, CL, and ML-CL, in accordance with Unified Soil Classification System (USCS). The silt is designated as Building Code Class 5b and 6 material, "medium dense silts" and "loose silts," respectively. The pockets with higher clay content are designated as Building Code Class 4c and 6 material, "medium stiff clays" and "soft clays," respectively.

Clayey Sand [Class 6]

Four to 7 feet thick pockets of clayey fine to coarse sand were encountered within the silt in borings B-2, B-3, B-4, and B-8. Typical N-values for these sand pockets ranged between 1 and 8 bpf. These thin pockets of "Clean sand to silty sand" were also encountered at CPT-1 and CPT-2.

The clayey sand is generally classified as SC in accordance with USCS and is designated as Building Code Class 6 material, "loose granular soils."

Decomposed Rock [Class 1d]

Decomposed rock, ranging in thickness between about 3 and 15 feet, was encountered below the silt. The top of the decomposed rock was found about 34 to 41 feet below the existing ground surface (about el -24 to el -32). The decomposed rock generally consisted of micaceous silt with varying proportions of gravel and sand, and gravel-sized fragments of schist. SPT N-values within the decomposed rock generally met split-spoon refusal at 100 blows over 3 inches.

The decomposed rock layer is classified as Building Code Class 1d material, "soft rock."

Bedrock [Class 1a, 1b, and 1c]

The site is underlain by Manhattan schist bedrock, and the top of rock was encountered at depths of about 38 to 49 feet below the existing site grades. The corresponding top or rock elevations range between about el -28 and el -40. Rock-core recoveries range between 58 and 100 percent. Rock quality designation (RQD) values range between 37 and 100 percent. Both core recoveries and RQD generally improve with depth.

The bedrock at the site is classified as Building Code Class 1a, 1b, and 1c material, "hard sound rock," "medium hard rock," and "intermediate rock," respectively. Laboratory testing performed on select rock cores show intact compressive strength ranging from 8,400 to 16,800 psi, with an average compressive strength of about 13,500 psi. The rock Elastic Modulus test results range from 6,500 to 9,100 ksi, with an average of about 7,800 ksi. Splitting Tensile test results range from 1,300 to 2,300 psi, with an average of about 1,600 psi.

Groundwater

Groundwater levels were measured between about 18 and 20 feet below the existing grades during our 2007 exploration (about el -8 and el -10). Groundwater levels were measured at about 13.5 feet below the existing grade (about el -3.5) during our 2016 exploration. Groundwater can be expected to fluctuate with weather, seasonal conditions, construction activity, or groundwater pumping. The NYCT tunnels in Broad and William streets may be causing a local depression of the groundwater table. Nearby construction or pumping activity can also affect groundwater elevations on this site. We recommend the groundwater level be monitored throughout the design phase.

EVALUATION AND DISCUSSION

The subsurface and surrounding conditions present several geotechnical design challenges:

1. The uncontrolled fill and low-plasticity silt are unsuitable to support the proposed high-rise tower.
2. Existing structures (buildings, a subway tunnel, and a steam tunnel) are adjacent to the site on all four sides; the excavation and foundations construction methods must not overstress or damage the adjacent structures.
3. Driven piles are not recommended because of the proximity to adjacent buildings and NYCT tunnel.

The building will include three cellar levels with the top of the lowest cellar slab at about 32 feet below sidewalk grade. Therefore, we recommend a mat foundation bearing directly on the underlying bedrock combined with permanent tie-down anchors to resist wind and hydrostatic uplift. Where the top of competent rock (Building Code Class 1b or better) is below the proposed bottom of the mat, the mat should rest on clean, concrete fill with a minimum 28-day strength of 4,000 psi, casted atop the rock. The excavation will require installing a permanent rigid support of excavation (SOE) system to provide groundwater cut-off. The rigid SOE system can be appropriately sized and reinforced to carry compression and tension perimeter building loads. Geotechnical parameters for the mat foundation, tie-down anchors, and support of excavation design are provided in subsequent sections.

Because the site is long-narrow shaped and the excavation will extend about 50 feet below existing grades, equipment access and material storage through the site during foundation construction could be challenging. Traditional bottom-up construction would require rather dense temporary bracing, which could restrict access and congest traffic. Therefore, top-down construction has been considered and discussed with Madison 45 Broad Development and the design team as a viable alternative. During the top-down (or up-down) construction the perimeter wall is installed first (as a drilled secant wall) and the cellar floors are constructed as the excavation progresses. When in place, the ground floor slab will be used as a lay-down area and allow equipment access across the site.

Because of the site's proximity to the adjacent subway tunnel, NYCT review and approval will be required to obtain an excavation and foundation permit from the NYC Department of Buildings. We expect that the interaction with NYCT will be extensive and that permitting process can take four to six months or more, which must be accounted for in the project schedule.

FOUNDATION DESIGN RECOMMENDATIONS

The following sections present our liquefaction evaluation, a discussion of the seismic design parameters, and our recommendations related to the design and construction of the foundation system for the proposed development. All discussions reference the 2014 Building Code.

Seismic Design Parameters

The proposed structure will be founded directly on rock; therefore, the Site Class is B. The Building Code seismic design parameters are summarized in Table 1.

Table 1 – Seismic Design Parameters

Description	Parameter	Recommended Value	Building Code Reference
Risk Category (Assumed; to be confirmed by structural engineer)		**II**	Section 1604.5
Site Class	**Rock**	**B**	Section 1613.5.2
Mapped Spectral Acceleration for short periods:	**S_s**	**0.281 g**	Section 1613.5.1
Mapped Spectral Acceleration for 1-sec period:	**S_1**	**0.073 g**	
Site Coefficient:	**F_a**	**1.00**	Section 1613.5.3
Site Coefficient:	**F_v**	**1.00**	
5%damped design spectral response acceleration at short periods:	**S_{DS}**	**0.187 g**	Section 1613.5.4
5% damped design spectral response acceleration at 1-sec period:	**S_{D1}**	**0.049 g**	Section 1613.5.4
Maximum considered Earthquake geometric mean (MCEG) peak ground acceleration	**PGA_M**	**0.17g**	Section 1813.2.1
Seismic Design Category (Based on assumed Risk Category)		**B**	Tables 1613.5.6 (1) & 1613.5.6 (2)

Based on the design spectral accelerations in Table 1 and the anticipated structural occupancy/risk category of the structure (identified as Structural Occupancy/Risk Category II) and in accordance with the Building Code, we have estimated that the design will be subject to the requirements of Seismic Design Category B. The Structural Occupancy/Risk Category must be confirmed by the architect and structural engineer.

Liquefaction Evaluation

The Building Code requires an evaluation of the liquefaction potential of noncohesive soil and cohesive soil with plasticity index 20 or less below the groundwater table and up to 50 feet below the ground surface. In accordance with the Building Code screening process for liquefaction, the SPT N_{60} values from the borings are plotted versus depth on the Liquefaction Assessment Diagram, presented as Figure 9. This plot shows a significant amount of soil in the "Liquefaction Probable" zone.

The proposed construction involves excavation and removal of all soil to support the structure directly on rock. Therefore, the risk of liquefaction is mitigated and a site-specific study is not required. If the development plan changes and excavation and removal of all liquefiable soil is no longer considered, the design team should address this change and re-evaluate the site classification and soil liquefaction potential.

Foundation System

We recommend the building be supported by a mat foundation bearing on bedrock. The recommended allowable rock bearing capacity is 40 tsf (Building Class 1b bock). The top of rock was encountered at depths of about 38 to 49 feet below the existing site grades and generally dips north to south. The corresponding top or rock elevations range from about el -28 to el -40. The bottom of a 9 to 12-foot-thick mat foundation as shown on preliminary design drawings prepared by WSP, will be at about el -29.5 to el -33. Therefore, the bottom of the proposed mat will not bear directly on rock at the majority of the site.

Wherever Building Class 1b rock is not encountered at the bottom of mat foundation elevation, all soil and decomposed rock should be excavated to the top of Building Class 1b rock and backfilled with 4,000 psi concrete fill. All rock bearing surfaces should have a maximum 10-percent slope as required by the Building Code. Otherwise, horizontal benches 10 feet long and wide, with vertical faces, should be created to satisfy the maximum slope requirement. Because the difference in the bottom of the mat elevation and the estimated top of rock can be as much as 8 feet or more, WSP should evaluate whether the concrete fill should be reinforced.

For initial design development, we recommend an average modulus of subgrade reaction of 1,500 psi/inch for Class 1b rock. The mat foundation design should be compatible with half and twice of this value. The subgrade modulus must be iterated until the geotechnical model and the structural model (which approximates the subgrade response via Winkler springs) converge (i.e., the spring value must be iterated until the settlement predicted by the geotechnical model matches that predicted by the structural model).

Foundation Settlement

The settlement of foundations is a function of the structural loads and are dependent on the layout of columns and shear walls and stiffness of the foundation. For the proposed building loads, we anticipate that the total and differential foundation settlements below the thick foundation mat will be ¾ inch or less.

Lateral Resistance

For a mat bearing directly on rock, lateral loads can be resisted by friction on the bottom of the mat. We recommend an ultimate frictional coefficient of 0.70 for mass concrete poured on clean sound rock. Where concrete fill underlies the mat foundation, WSP should confirm that the concrete fill-to-foundation concrete-to-rock interfaces can resist the proposed lateral loading. If additional resistance is needed, shear keys may be embedded into rock or concrete. We should be contacted to evaluate passive pressure if needed.

Rigid Perimeter Excavation Support

Below grade construction will require excavating to the top or rock or about 38 to 49 feet below the existing grades (about el -28 to el -40). To provide excavation support and temporary groundwater cut-off we recommend installing a rigid, continuous secant pile wall system on the south, east, and west foundation perimeter. The secant pile walls will abut the foundation wall of 41 Broad Street, which extends into the bedrock according to historic construction plans.

The secant pile wall installation begins with the construction of a guide wall at the ground surface. The guide wall ensures that the position, alignment and required overlap of subsequent secant piles are maintained. After the guide wall is formed, the primary piles (every other pile location) are installed by advancing steel casing to top of rock and continuing the rock socket to the design depth. The casing is then withdrawn as the pile is grouted. Secondary piles are then drilled in between such that they overlap with the primary piles. Reinforcing steel is added to the secondary piles based on the structural loading and

excavation support requirements. These systems are relatively stiff soil retention systems, necessary to limit wall deflection and movement of adjacent structures, and assist in groundwater control. To accommodate access of the drilling equipment close to the property line, the edge of casing is positioned at least 12 inches from the face of adjacent buildings. The contractor should note that obstructions such as remnant slabs and foundations including piles and pile caps exist within and below the fill and should be removed prior to or bypassed during the installation of the perimeter excavation support.

In addition to serving as temporary excavation support and water cut-off, the secant pile wall can serve as the permanent foundation wall and carry part of the foundation loads according to the foundation design. The structural loads on the secant pile wall were not available at the time of this report. If the secant piles are used to rest tension capacity, they must also be evaluated for global stability. In addition, the top level of the secant pile wall must be coordinated with the structural engineer to account for the continuous ring beam.

For top-down construction, lateral bracing is provided by the ground and cellar floors slabs, which are constructed as the excavation progresses. The Owner and design team are considering creating additional headroom during construction by constructing one of the cellar slabs after the foundation construction is complete; therefore additional temporary lateral support will be necessary at the bypassed slab elevation. Lateral support could consist of tiebacks on the east and west (below the NYCT tunnel influence line) and rakers or buttresses (additional secant piles perpendicular to the perimeter walls).

The NYC Department of buildings (DOB) requires that project-specific excavation support drawings be prepared as part of the new-building submission. The project-specific plans must be fully developed, in conjunction with developed structural building plans, to be reviewed and approved by DOB so that a construction permit for the new building (or foundations) can be issued. Excavation support plans will also need to be reviewed by the NYCT for potential impacts on the adjacent subway structures.

Permanent Rock Anchors

Permanent post-tensioned tie-downs anchored into bedrock will be required to resist uplift forces resulting from wind, buoyant, and seismic loads. We recommend using double corrosion-protected Grade 150 threaded bars meeting ASTM A-722 requirements or Grade 270 strand tendons meeting ASTM A-416 requirements for reinforcement steel. Double corrosion

protection should consist of PVC sheathing and grout encapsulation around the anchor bar or tendons. The anchor bar diameter should not exceed 3 inches; if higher capacity is required, strand anchors should be used. The anchor bond length should be proportioned using an allowable peripheral shear resistance in uplift of 100 psi. The free stress (un-bonded) length should be a minimum of 10 feet long, but additional length may be required for group effects and global uplift stability.

The free-stressing length of reinforcement should be proportioned such that the dead weight and tensile strength of the engaged rock mass is greater than the individual anchor load or the sum of the group anchor loads. Group and global stability analysis must be performed by Langan during design development. The free length of adjacent anchors can be alternated in a staggered pattern, if required by the group analysis. Table No. 2 and Table No. 3 present the estimated design capacity with corresponding bond lengths for both threaded bars and strand tendon options.

Table 2 – Threaded Bar Rock Anchor Capacities

Design Uplift Load (kips)	Threaded Bar Diameter (inch)	Threaded Bar Grade	Min. Drill Hole Diameter (inch)	Min. Free Length[1] (ft)	Min. Bond Length[2] (ft)
110	1-1/4	150	5	10	10
615	3	150	7	10	25

[1] The free stressing length will be defined by the global stability and group effect analysis

[2] This table represents minimum lengths for single anchors. Group effects must be analyzed during DD phase and may require longer anchors.

Table 3 – Strand Tendon Rock Anchor Capacities

Design Uplift Load (kips)	No. of Strand Tendons	Strand Tendon Cross Sectional Area (sq-inch)	Strand Tendon Grade	Min. Drill Hole Diameter (inch)	Min. Free Length[1] (ft)	Min. Bond Length[2] (ft)
110	4	0.868	270	5	10	10
615	18	3.906	270	7	10	25

[1] The free stressing length will be defined by the global stability and group effect analysis

[2] This table represents minimum lengths for single anchors. Group effects must be analyzed during DD phase and may require longer anchors.

A minimum of 10 anchors or two percent of the tie-down anchors (whichever is greater) should be performance-tested (creep) to 133% of their design loads in accordance with Post-Tensioning Institute (PTI) standards. The remaining anchors should be proof tested to 133% their design load per PTI standards. Lift-off testing should be performed to all anchors. Successfully tested anchors should be locked off at a load exceeding the sum of the design load, seating loss, and long-term losses.

Pressure Slabs

The lowest floor level will extend below groundwater and should be designed as a pressure slab. We recommend that the pressure slabs be designed assuming hydrostatic uplift corresponding to the design groundwater el 12 (BFE + 1ft). Where possible, pressure slabs should be keyed into the foundation walls and should be cast with integral water stops (PVC "dumbbells" and post construction grout tubes). Pressure slabs should be waterproofed according to the recommendations presented herein.

Permanent Groundwater Control

This section describes our recommendations for permanent groundwater control at the site.

Design Groundwater Level

During the 2007 subsurface exploration, the static groundwater was observed at about 18 to 20 feet below existing grade (about el -8 to el -10). During the 2016 subsurface exploration, the

static groundwater was observed at about 13.5 feet below existing grade (about el -3.5). This fluctuation could be related to seasonal variations, nearby construction or pumping activities.

Because the site is partially located within the Flood Zone AE, the foundation walls, ground level, and below-ground slabs should be flood-proofed and designed to resist hydrostatic pressure for groundwater rising to el 12. This Design Flood Elevation (DFE) corresponds to the base flood elevation of el 11 (BFE) plus 1-foot freeboard as per Chapter G5 Table 6.1 of the Building Code.

Foundation Waterproofing

To limit water seepage we recommend that the foundation raft and the perimeter secant pile wall be fully waterproofed to at least the design flood elevation (DFE). We recommend installing a membrane-type, positive-side waterproofing (installation on outside of structure). For horizontal applications, the waterproofing membrane should be installed on a two-inch-minimum concrete working surface (mud-slab), which will create a uniform substrate. For one-face wall vertical applications (conventional foundation wall and pit walls), plywood or other acceptable flat surfaces should be used to secure the waterproofing membrane. The membrane should be protected against damage during rebar placement, concrete placement, and general construction traffic.

Groundwater can be expected to seep through the joints in the secant pile wall. One scheme to accommodate the water leakage is to create a cavity wall using masonry block. The water is collected behind the partition walls via a series of scupper drains and directed to the lowest cellar level. The water is then ejected and discharged into the city sewer system.

An alternate scheme is to waterproof the inside face of the secant pile wall. This can be accomplished by installing a waterproofing membrane on the secant pile wall and casting an interior liner wall. Prior to the membrane application the secant wall surface should be purged and leveled. A concrete facing wall would then be cast against the secant piles to provide the necessary bond to the waterproofing and to hold the membrane in place. The minimum wall thickness is 4 inches (or as otherwise recommended by the waterproofing manufacturer) as needed for structural integrity. Special waterproofing details will need to be developed for locations of the secant pile wall – intermediate slabs interface and at the bracing locations. For the horizontal and vertical applications we recommend using Preprufe products by W.R. Grace or other equivalent. As a supplementary measure, waterproofing concrete admixtures such as

Hycrete's products can be added to the secant pile grout mix (for water control and corrosion protection) and the liner wall grout mix.

We recommend that warranties are obtained from the manufacturers and installers to cover materials and workmanship. Material and system compatibility needs to be confirmed if products from multiple manufacturers are selected. Only certified installers should be used to perform the work. Detailed oversight should be performed and a representative of the manufacturer should perform a final inspection of the waterproofing prior to concrete pours.

Depending on the use of the cellar space, installing a secondary control system may be warranted. For this purpose the following secondary measures can also be considered.

1. Install a second mud slab on top of the installed horizontal waterproofing membrane. This mud slab would protect the installed waterproofing from construction traffic during placement for the steel reinforcement.
2. Use a waterproofing additive in the foundation concrete. Addatives typically react with water to block pours and small cracks.
3. Install a connection layer and concrete slab over the mat slab. The draining layer can be gravel with collection pipes or a heavy duty prefabricated drainage board. This system will collect groundwater (that could intrude through damaged waterproofing) and guide it to a drain system.

Permanent Below-Grade Walls

Permanent below-grade walls including perimeter foundation and elevator pit walls should be designed to resist lateral loadings from static earth pressure, water pressure, and vertical surcharge. Backfill should not be placed against below-grade walls until the concrete has reached its 28-day compressive design strength and after adequate lateral bracing has been provided to prevent rotation of the wall, or as otherwise directed by the structural engineer. We recommend the following design parameters in Table 3 and subsequent paragraphs.

Table 3 – Horizontal Earth Pressure Parameters

Layer	Unit Weight Above WT (pcf)	Effective Unit Weight Below WT (pcf)	At Rest Earth Pressure Coefficient K_o
Fill [Class 7]	120	63	.50
Silt and Clay [Class 5b, 4c, 6]	110	57	.60
Decomposed Rock [Class 1d]	135	72	.35

- Hydrostatic pressures should be added as a triangular pressure distribution having an equivalent fluid weight of 62.4 pounds per square foot per foot of depth below the design groundwater level.

Surcharge loads should be considered in the design of below-grade walls. The walls should be designed for an additional uniform pressure distribution equal to 0.50 times the anticipated surcharge load. We recommend the following minimum surcharges be considered:

- Surficial traffic loads should be considered for the west perimeter walls (along Broad Street). We recommend a surcharge load of 300 psf for the street side walls to account for large trucks and emergency vehicles.

- Surficial loads should be considered for the east perimeter walls (along hammerhead). We recommend a surcharge of 100 psf for these walls.

- Construction surcharge loads should be considered along the west and east perimeter walls if they exceed the recommended values above.

- Walls must also be designed for surcharge loads from adjacent structures where the walls extend below the area of influence of the adjacent foundations. We understand 41 Broad Street is founded on rock, and 55 Broad Street is founded on piles such that only the surcharge from the neighboring slab needs to be considered.

GEOTECHNICAL CONSTRUCTION RECOMMENDATIONS

Our recommendations for excavation, subgrade preparation, temporary groundwater control, and pre-construction activities and construction monitoring are provided below.

Excavation

Site excavation within the fill and underlying silt and clay can be performed using conventional earth-moving equipment (e.g., backhoes, excavators, dozers, etc.). All excavations should be conducted in accordance with all OSHA requirements including, but not limited to, temporary shoring, trench boxes, and proper benching. Obstructions such as old foundations, slabs, pile caps and piles, and demolition debris should be expected and may require heavy demolition equipment to remove.

Note that obstructions such as remnant slabs and foundations including piles and pile caps exist within and below the fill. Specifically, the remnant cellar slab was encountered about 12 feet below existing grade. The contractor should be prepared to demolish and excavate through the existing slab and all obstructions, and remove the existing pile caps, piles, and slabs.

An alternative method to perform the foundation construction would be the "top-down" construction method. In general terms this option involves construction of the ground and cellar floor levels as the excavation progresses. Top-down construction begins with installation of exterior walls and load bearing elements to support subsequent floor slabs. The ground floor is then cast. The excavation is performed below the cast slab to the next slab level, with excavation spoils removed through shafts and access openings in the slabs. The process is repeated to the final mat level.

Subgrade Preparation for Foundation Mat on Rock

The foundation mat bearing surface should be level and clear of debris, standing or frozen water, and other deleterious materials. All rock bearing surfaces should have a maximum 10-percent slope as required by the Building Code. Otherwise, horizontal benches at least 10 feet long and wide with vertical faces should be created to satisfy the maximum slope requirement. Compressed air should be used to clean all rock surfaces. Rock, joints, foliation, and local zones of weathered or fractured rock may require locally deepening the excavations further into rock. The Building Code requires that all rock subgrade be inspected by Professional Engineer to verify the quality of the bedrock before installing reinforcing steel and concreting. The rock

subgrade must be inspected to verify bearing capacity and that foundations have been adequately cleaned and prepared.

Temporary Groundwater Control

Groundwater was encountered in the 2016 investigation at 13.5 feet below grade. The proposed deep excavation will require dewatering. The proposed SOE system using secant piles and tangent piles will provide groundwater cutoff such that the interior of the excavation can be locally dewatered. Collection of rainwater runoff will also be needed during the excavation and subgrade preparation work. Water runoff should be controlled with the use of gravel-lined collection trenches or pits and submersible pumps. Care should be taken to ensure that drainage is provided during all phases of excavation work so as to limit the disturbance of the subgrade materials and provide a workable surface. Any necessary environmental pre-treatment of groundwater should be coordinated with the applicable environmental regulations for the site. A DEP discharge permit will need to be furnished to discharge groundwater into the DEP combined sewer. It is the contractor's responsibility to estimate the daily groundwater discharge volume and to furnish all paperwork for the permit application.

Preconstruction Conditions Survey and Monitoring During Construction

A preconstruction-conditions survey report should be prepared for the adjacent buildings and the existing NYCT subway tunnel adjacent to the site. We recommend that a monitoring program be developed to observe the response of the existing buildings and subway tunnel adjacent to the site during foundation construction activities (i.e., excavation, SOE installation, bracing, etc.). According to our past discussions with NYCT, this program could consist of monitoring horizontal and vertical movements by optical surveying and inclinometers, and vibration monitoring using seismographs. The NYCT typically requires that the vibration monitoring data is collected manually, or at least has on site observation of an automated system.

Construction Documents and Quality Control

Design specifications and drawings should incorporate our recommendations to ensure that subsurface conditions and other geotechnical issues at the site are adequately addressed in construction documents. Langan should assist the design team in preparing specification sections related to geotechnical issues such as support of excavation, foundations, backfill, and excavation support. Langan should also review foundation design drawings and details, and all contractor submissions and construction procedures related to geotechnical work.

Geotechnical assessment and design is an ongoing process as additional information becomes available, including during construction. A geotechnical engineer familiar with the site subsurface conditions and design intent should perform the quality assurance observations and testing of geotechnical-related work during construction. According to the Building Code, construction of foundations (i.e., earthwork, subgrade preparation, etc.) and support of excavation require special inspection by a Professional Engineer licensed in the state of New York.

Owner and Contractor Obligations

Construction activities that alter the existing ground conditions such as excavation, fill placement, foundation construction, ground improvement, pile driving/drilling, dewatering, etc. can induce stresses, vibrations and movements on nearby structures. The Owner and all Contractors must ensure that these impacts will not adversely affect the performance of the structures and take adequate measures to protect the existing structures during construction.

Unless otherwise agreed to by Langan in writing, by using this report, the owner agrees to the following:

1) That Langan will not be held responsible for damage to adjacent structures caused by the actions of contractors involved in the project;

2) To have Langan added to the Foundation Contractor's General Liability insurance as an additional insured;

3) To require the Foundation Contractor to defend, indemnify and hold harmless the Owner and Langan against all claims related to damage to adjacent structures or properties

LIMITATIONS

The conclusions and recommendations provided in this report are based on subsurface conditions inferred from a limited number of borings, as well as information provided by Madison 45 Broad Development LLC, February 2016 concept design drawings and sketches provided by CetraRuddy, and subsequent discussions with the project team. Recommendations provided are dependent upon one another and no recommendation should be followed independent of the others.

Any proposed changes in structures or their locations should be brought to Langan's attention as soon as possible so that we can determine whether such changes affect our recommendations. Information on subsurface strata and groundwater levels shown on the logs

represent conditions encountered only at the locations indicated and at the time of investigation. If different conditions are encountered during construction, they should immediately be brought to Langan's attention for evaluation, as they may affect our recommendations.

This report has been prepared for 45 Broad Street, New York, New York, to assist the owner, architect, and structural engineer in the design process and is only applicable to the design of the specific project identified. The information in this report cannot be utilized or depended on by engineers or contractors who are involved in evaluations or designs of facilities (including underpinning, grouting, stabilization, etc.) on adjacent properties, which are beyond the limits of that which is the specific subject of this report.

Environmental issues (such as potentially contaminated soil and groundwater) are outside the scope of this study and should be addressed in a separate study.

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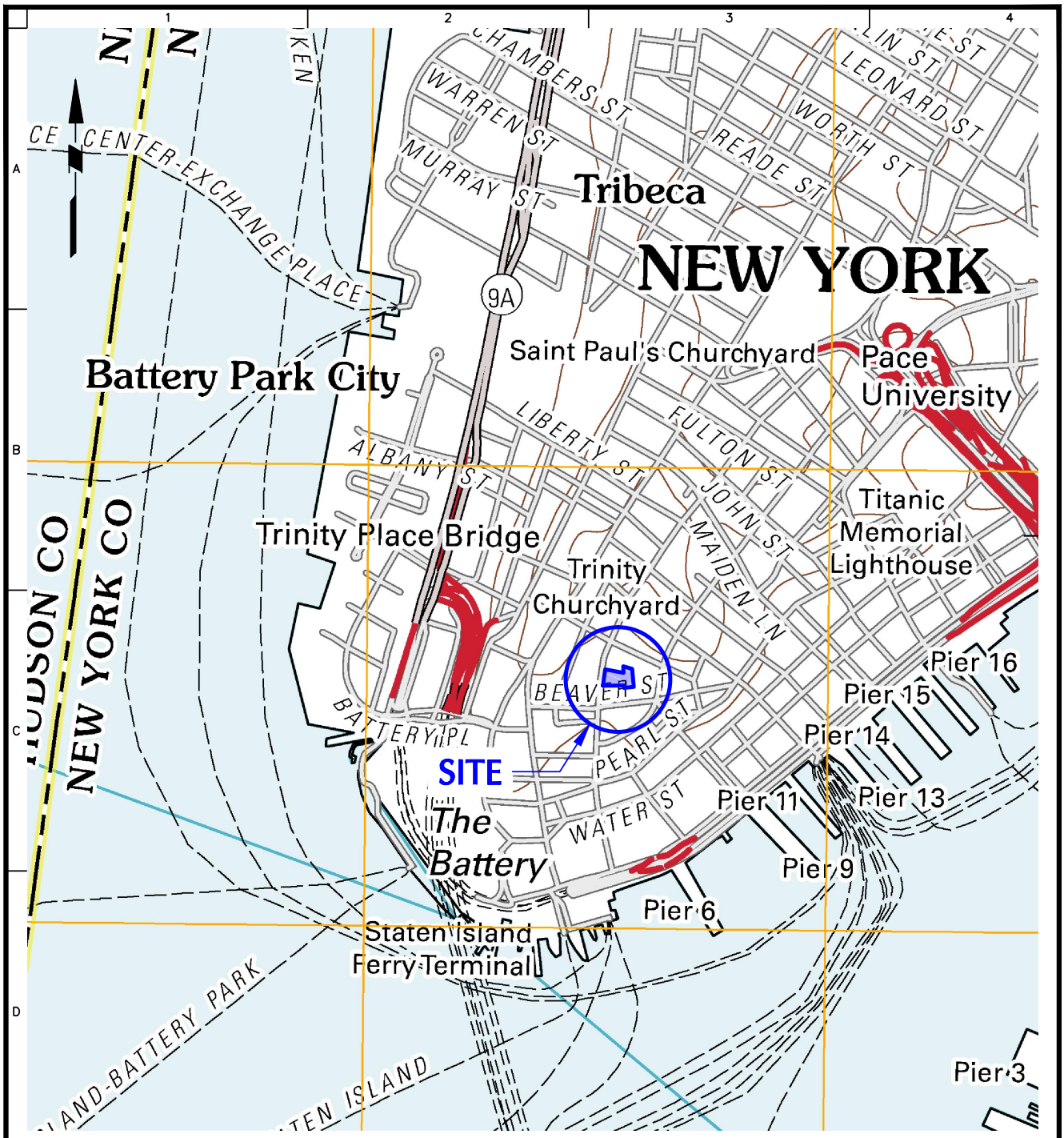
FIGURES



SOURCE: USGS JERSEY CITY, NJ-NY 7.5-MINUTE QUADRANGLE MAP, 9 JUNE 2011.

1000 0 500 1000
SCALE IN FEET

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Langan CT, Inc.
Langan International LLC
Collectively known as Langan

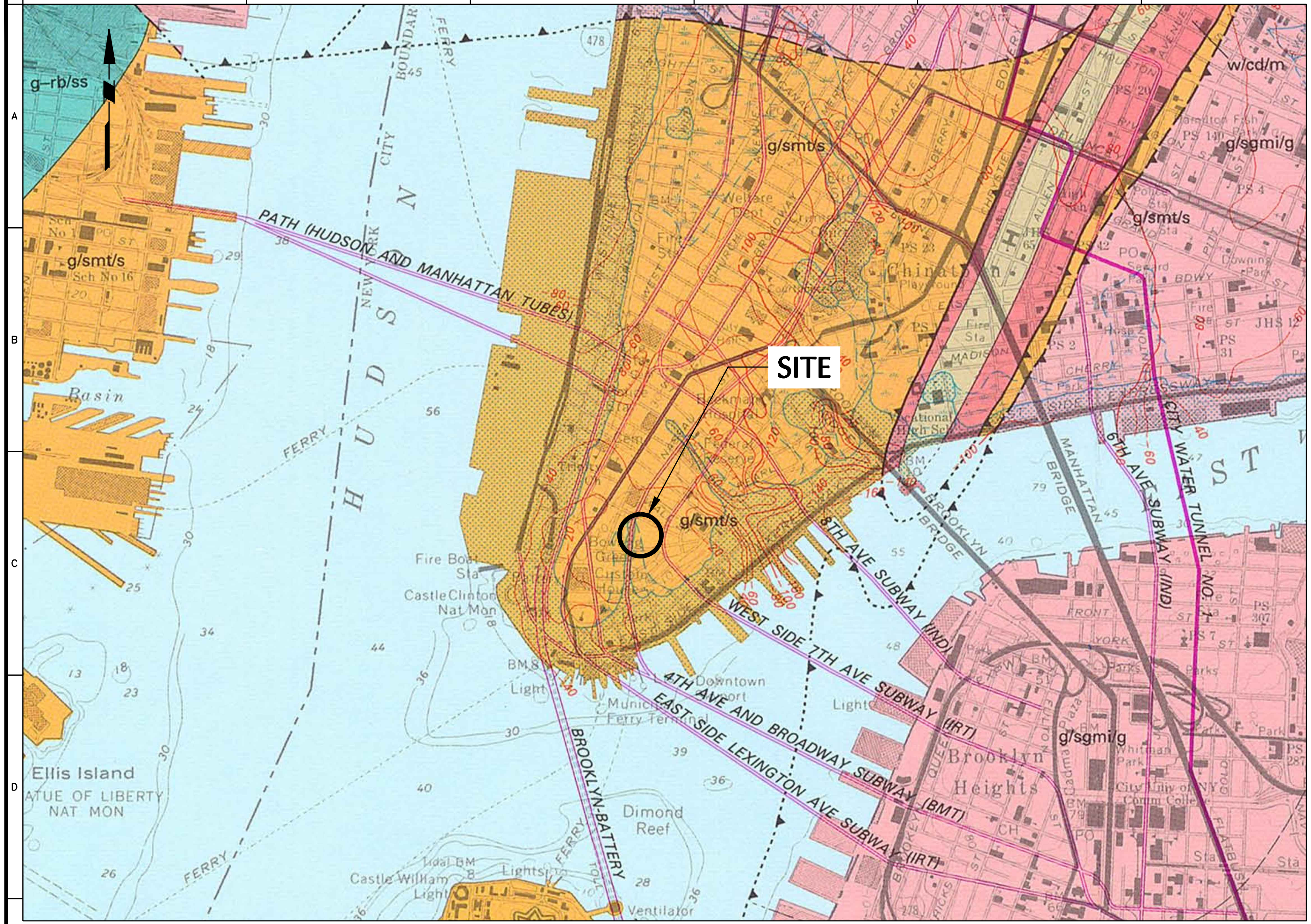
Project: 45 BROAD STREET
BLOCK No. 25, LOT No. 7
MANHATTAN
NEW YORK NEW YORK

Drawing Title: SITE LOCATION MAP

Project No. 170394201
Date 12/30/2015
Scale 1"=1000'
Drawn By SWB | Checked By CAP
Submission Date 12/30/2015

Figure 1
Sheet 1 of 9

Filename: \\Langan.com\data\NY\data2\170394201\Cadd Data - 170394201\SheetFiles\Geotechnical\Geotechnical Engineering Study\FG01 SITE LOCATION MAP.dwg Date: 12/30/2015 Time: 08:54 User: sborecki Style Table: Langan.stb Layout: ANSIA-BP



GEOLOGIC UNITS COMBINED ACCORDING TO SIMILAR ENGINEERING CHARACTERISTICS

The major common attribute of engineering significance used in the grouping of these units is similarity of rock type, which should give rise to reasonably uniform strength characteristics for intact rock (rock without faults or other discontinuities). Intact-rock strength decreases with an increase in discontinuity frequency and in weathering (Farmer, 1983). Formal geologic-unit names are in parentheses.

g/smt/s	Gray sillimanite-muscovite-tourmaline schist (Manhattan Schist)
g/pqm/s	Gray plagioclase-quartz-muscovite schist (Walloomsac Formation)
w/cd/m	White calcite-dolomite marble (Inwood Marble and lenses in the Hartland Formation (O€hm), and coarse-grained siliceous dolomite (Yfm))
bw/gpb/g	Black and white garnet-plagioclase-biotite gneiss (Fordham Gneiss, member B)
g/qbp/s	Gray quartz-biotite-plagioclase schist (Fordham Gneiss, member C)
p/mbp/g	Pink muscovite-biotite-plagioclase gneiss (Fordham Gneiss, member A)
w/qmim/gr	White quartz-microcline-muscovite granite (Hartland Formation)
g/bmq/s	Gray biotite-muscovite-quartz schist (Hartland Formation)
g/gkmboq/s	Gray garnet-kyanite-muscovite-biotite-oligoclase-quartz schist (Hartland Formation)
g/spm/s	Gray sillimanite-plagioclase-muscovite schist (Hartland Formation)
w/gr	White granite
gn/sp	Green serpentinite
gb/am	Greenish-black amphibolite (in all units except marble and Walloomsac Formation)
am	Amphibolite (usually looks black in outcrops)
g/sgmi/g	Gray sillimanite-garnet-microcline gneiss (Ravenswood Granodiorite)
dg/pa/d	Dark-gray plagioclase-augite diabase (Palisade Diabase)
gnr/sh-ss	Greenish-red shale and sandstone (Passaic Formation)
g-b/sh	Gray and black shale (Lockatong Formation)
g-rb/ss	Gray and reddish-brown sandstone (Stockton Formation)

EXPLANATION OF MAP SYMBOLS

SUBSURFACE ENGINEERING STRUCTURES

City Water Tunnels No. 1, 2, and 3, and Richmond Water Tunnel

Old and New Croton Aqueducts—Where aqueduct is shown side-by-side with City Water Tunnel No. 3, water tunnel actually is directly beneath aqueduct

Subway, railroad, or auto tunnel—Where City Water Tunnel No. 1 directly underlies subway tunnel, only the former is shown

Consolidated Edison Co. gas tunnel

Sewer tunnel

FORMER DRAINAGE AND SHORELINE

Former drainage and shoreline—In blue. Shown only where different from present drainage and shoreline. Areas formerly under water shown by dot pattern. Where very small, former ponds are labelled "p". Straight line segments probably are furrows and ditches built to lower the water table

Former swamp or marsh—In blue. Dashed line defines where swamp or marsh adjoins higher ground. Very small occurrences are labelled "s"

GEOLOGY—SURFACE AND SUBSURFACE

Contact between geologic units—Dashed where approximately located; dotted where under water; queried where uncertain. Where shown solid under water, was located by test borings and tunnel data

Fault—Paired arrows show relative movement; U, upthrown side; D, downthrown side. Dashed where approximately located; dotted where under water; queried where uncertain. Where seen in tunnel, arrow shows inclined dip, and short line normal to fault trace shows vertical dip

Thrust fault—Sawteeth on upper plate. Dashed where approximately located; dotted where under water. Where seen in tunnel is shown solid. Alternating solid and open sawteeth indicate thrust faults coincident in map view (near Roosevelt [Welfare] Island; see sheet 1)

Crush or shear zone encountered in underground workings—Shows dip where known

Contours on the bedrock surface—Based on same datum as topographic contours. Closed, hachured areas indicate depressions. Contour interval 20 ft, except 10 ft on Wards Island

Single outcrop or area of closely spaced outcrops

SOURCE: "BEDROCK AND ENGINEERING GEOLOGIC MAPS OF NEW YORK COUNTY AND PARTS OF KINGS AND QUEENS COUNTIES, NEW YORK, AND PART OF BERGEN AND HUDSON COUNTIES, NEW JERSEY" USGS, SHEET 2 OF 2 (BASKERVILLE, 1994)

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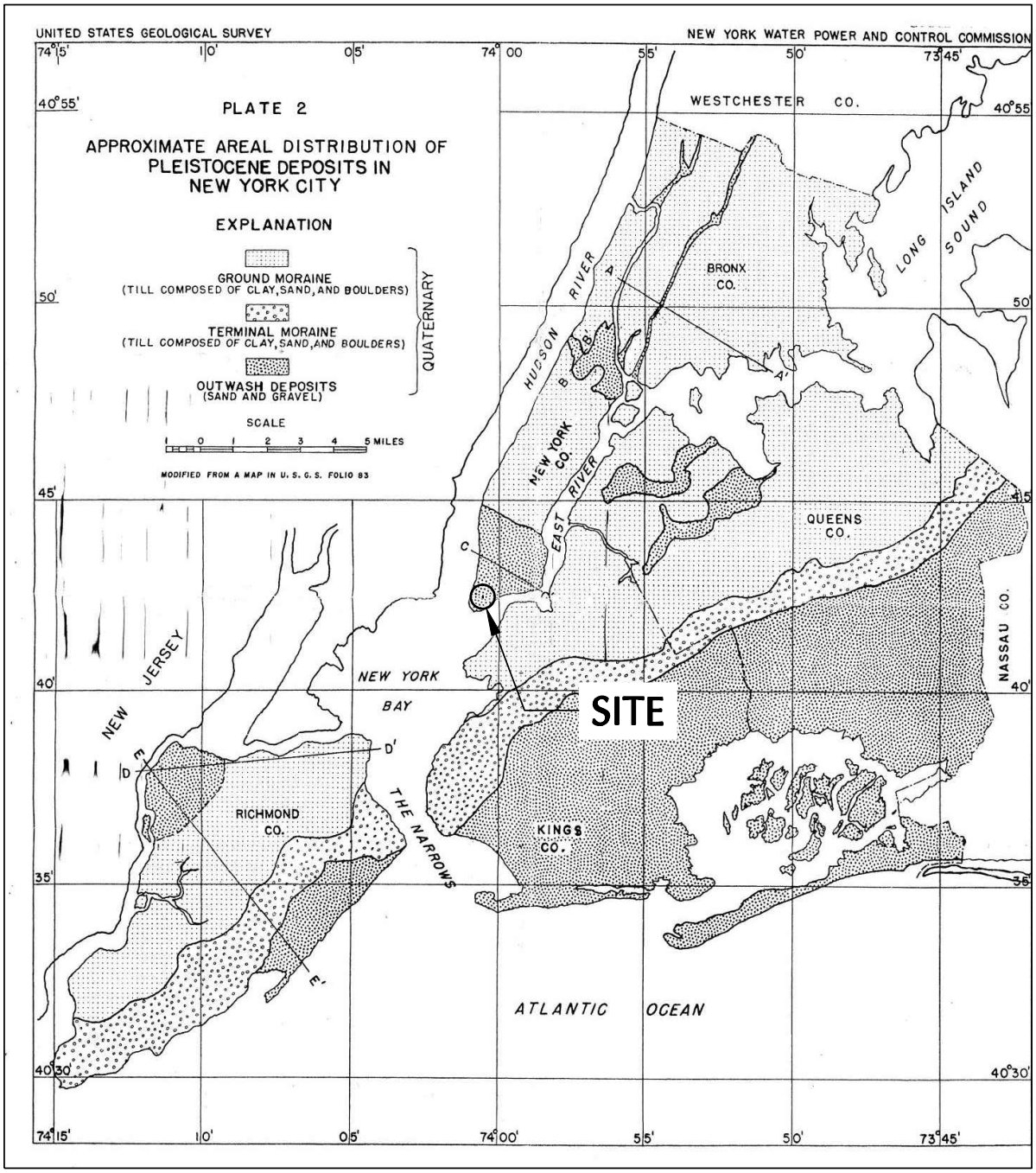
Langan CT, Inc.
Langan International LLC
Collectively known as Langan

Project: **45 BROAD STREET**
BLOCK No. 25, LOT No. 7
MANHATTAN
NEW YORK NEW YORK

Drawing Title: **BEDROCK GEOLOGY MAP**

Project No.	170394201
Date	12/30/2015
Scale	N.T.S.
Drawn By	SWB
Checked By	CAP
Submission Date	12/30/2015
Figure	2
Sheet	2 of 9

Filename: \\Langan.com\data\NY\data2\170394201\Cadd Data - 170394201\SheetFiles\Geotechnical\Geotechnical Engineering Study\FG02 BEDROCK GEOLOGY MAP.dwg Date: 12/30/2015 Time: 08:53 User: sborecki Style Table: Langan.stb Layout: ANSIB-BL



LANGAN 21 Penn Plaza, 360 West 31st Street, 8th Floor New York, NY 10001 T: 212.479.5400 F: 212.479.5444 www.langan.com Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C. S.A. Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C. Langan Engineering and Environmental Services, Inc. Langan CT, Inc. Langan International LLC Collectively known as Langan	Project **45 BROAD STREET** BLOCK No. 25, LOT No. 7 MANHATTAN NEW YORK NEW YORK	Drawing Title **SURFICIAL GEOLOGY MAP**	Project No. 170394201 Date 12/30/2015 Scale N.T.S. Drawn By SWB / Checked By CAP Submission Date 12/30/2015	Figure **3** Sheet 3 of 9

Filename: \\Langan.com\data\NY\data2\170394201\Cadd Data - 170394201\SheetFiles\Geotechnical\Geotechnical Engineering Study\FG03 SURFICIAL GEOLOGY MAP.dwg Date: 12/30/2015 Time: 08:53 User: sborecki Style Table: Langan.stb Layout: ANSIA-BP

SOURCE: SANITARY & TOPOGRAPHIC MAP OF THE CITY OF NEW YORK, VIELE, 1865.

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45 BROAD STREET
BLOCK No. 25, LOT No. 7
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NEW YORK NEW YORK

Drawing Title
VIELE MAP (1865)

Project No. 170394201	Figure 4
Date 12/30/2015	
Scale N.T.S.	
Drawn By SWB / Checked By CAP	
Submission Date 12/30/2015	Sheet 4 of 9

Filename: \\Langan.com\data\NY\data2\170394201\Cadd Data - 170394201\SheetFiles\Geotechnical\Geotechnical Engineering Study\FG04 □iele Map.dwg Date: 12/30/2015 Time: 08:52 User: sborecki Style Table: Langan.stb Layout: ANSIA-BPI

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- Limit of Moderate Wave Action
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*
- * Referenced to the North American Vertical Datum of 1988
- Cross section line
- Transect line
- Culvert, Flume, Penstock or Aqueduct
- Road or Railroad Bridge
- Footbridge
- 87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 1000-meter Universal Transverse Mercator grid values, zone 18
- 600000 FT — 5000-foot grid values: New York State Plane coordinate system, Long Island zone (FIPSZONE 3104), Lambert Conformal Conic projection
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

INITIAL NFIP MAP DATE
June 28, 1974

FLOOD HAZARD BOUNDARY MAP REVISIONS
June 11, 1976

FLOOD INSURANCE RATE MAP EFFECTIVE
November 16, 1983

FLOOD INSURANCE RATE MAP REVISIONS

FIRM

FLOOD INSURANCE RATE MAP

CITY OF,
NEW YORK
NEW YORK
BRONX, RICHMOND, NEW YORK,
QUEENS, AND KINGS COUNTIES

PANEL 184 OF 457

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
NEW YORK, CITY OF	360497	0184	G

PRELIMINARY
DECEMBER 5, 2013

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
3604970184G

MAP REVISED

Federal Emergency Management Agency

500 0 250 500
SCALE IN FEET

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Project
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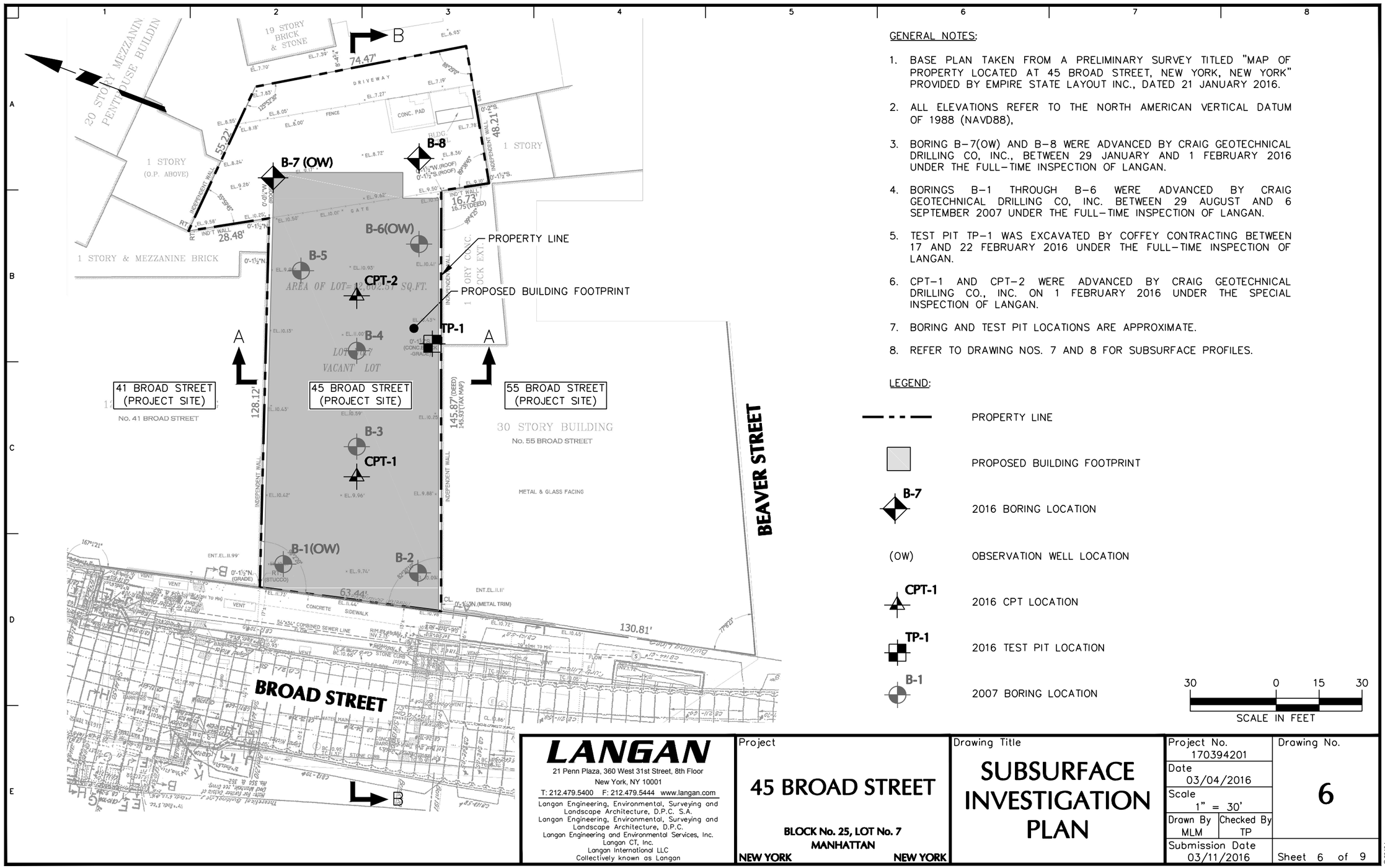
MANHATTAN
NEW YORK **NEW YORK**

Drawing Title
FEMA FLOOD INSURANCE RATE MAP

Project No. 170394201	Figure 5
Date 12/30/2015	
Scale 1"=500'	
Drawn By SWB / Checked By CAP	
Submission Date 12/30/2015	Sheet 5 of 9



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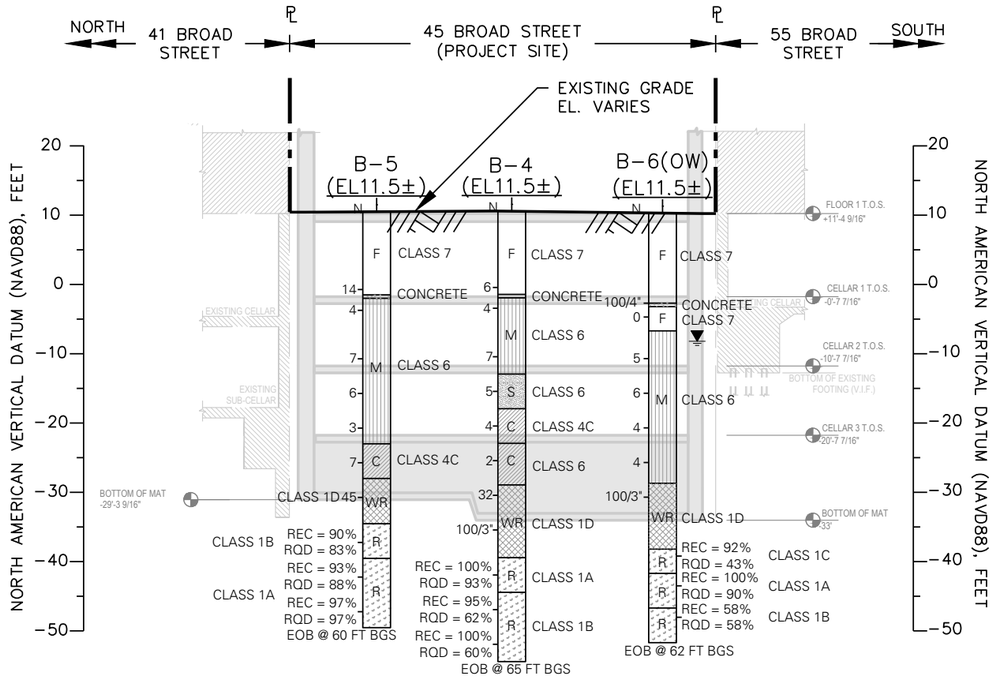
Project
45 BROAD STREET
BLOCK No. 25, LOT No. 7
MANHATTAN
NEW YORK NEW YORK

Drawing Title
SUBSURFACE INVESTIGATION PLAN

Project No. 170394201	Drawing No. 6
Date 03/04/2016	
Scale 1" = 30'	
Drawn By MLM / Checked By TP	
Submission Date 03/11/2016	Sheet 6 of 9

Filename: \\langan.com\data\NY\data2\170394201\Cadd Data - 170394201\SheetFiles\Geotechnical\Geotechnical Engineering Study UPDATED\DWG 06 -Subsurface Investigation Plan.dwg Date: 3/9/2016 Time: 13:24 User: mmatos Style Table: Langan.stb Layout: DWG 06



MATERIAL SYMBOLS

F	UNCONTROLLED FILL	M	SILT
S	SAND	WR	WEATHERED ROCK
C	CLAY	R	BEDROCK

GENERAL NOTES:

1. BORING LOCATIONS ARE APPROXIMATE.
2. THIS PROFILE REPRESENTS A GENERALIZED SOIL CROSS SECTION INTERPRETED FROM WIDELY SPACED BORINGS. SOIL AND GROUNDWATER MAY VARY IN TYPE, LOCATION, ELEVATION, AND ENVIRONMENTAL ENGINEERING PROPERTIES BETWEEN POINTS OF EXPLORATION. VARIATIONS IN THE SUBSURFACE CONDITIONS SHOULD BE EXPECTED BETWEEN BORINGS.

SUBSURFACE PROFILE A

FACING EAST

SCALE: 1" = 20'

20 0 5 10 20

SCALE IN FEET

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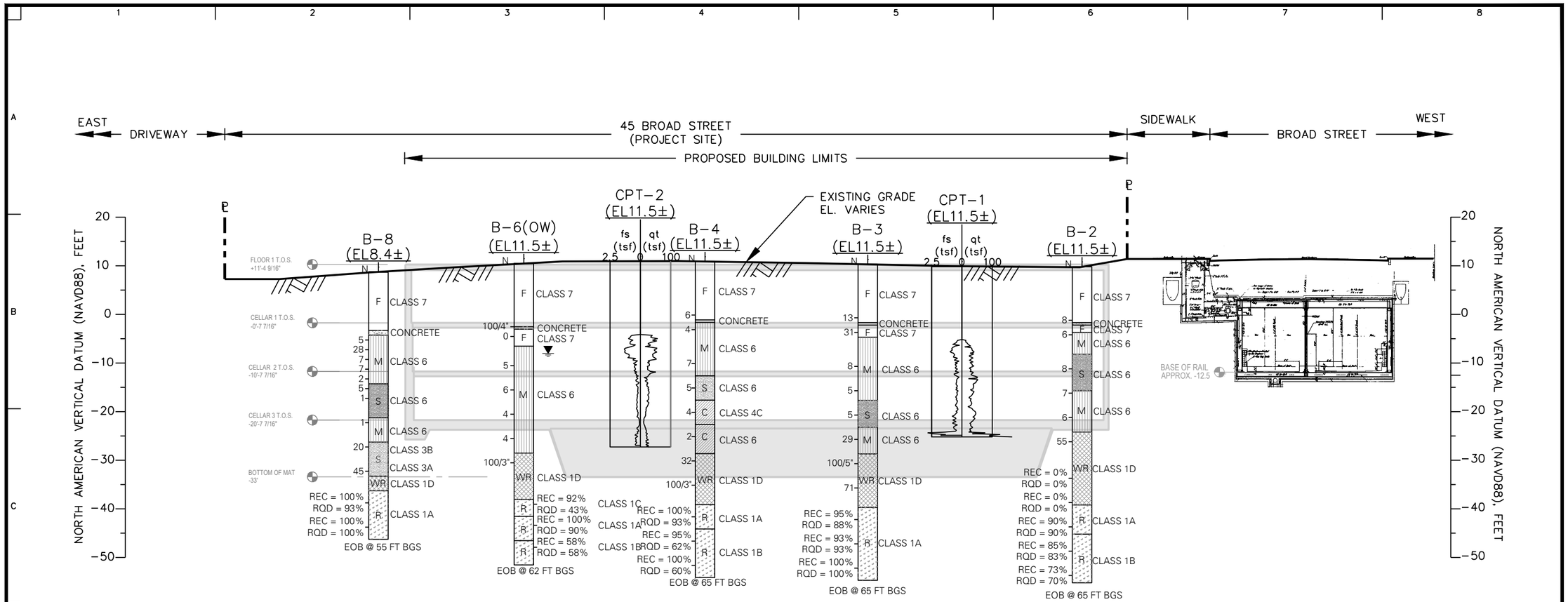
BLOCK No. 25, LOT No. 7
MANHATTAN
NEW YORK NEW YORK

Drawing Title: SUBSURFACE PROFILE A

Project No. 170394201	Drawing No. 7
Date 03/04/2016	
Scale 1" =20'	
Drawn By MLM / Checked By TP	
Submission Date 03/11/2016	Sheet 7 of 9

Filename: \\langan.com\data\NY\data2\170394201\Cadd Data - 170394201\SheetFiles\Geotechnical\Geotechnical Engineering Study UPDATED\DWG 07-08 - Subsurface Profiles.dwg Date: 4/21/2016 Time: 15:56 User: mmatos Style Table: Langan.stb Layout: DWG 07



MATERIAL SYMBOLS

F	UNCONTROLLED FILL	M	SILT
S	SAND	WR	WEATHERED ROCK
C	CLAY	R	BEDROCK

SUBSURFACE PROFILE B

FACING SOUTH

SCALE: 1" = 20'

20 0 5 10 20

SCALE IN FEET

GENERAL NOTES:

1. BORING LOCATIONS ARE APPROXIMATE.
2. THIS PROFILE REPRESENTS A GENERALIZED SOIL CROSS SECTION INTERPRETED FROM WIDELY SPACED BORINGS. SOIL AND GROUNDWATER MAY VARY IN TYPE, LOCATION, ELEVATION, AND ENVIRONMENTAL ENGINEERING PROPERTIES BETWEEN POINTS OF EXPLORATION. VARIATIONS IN THE SUBSURFACE CONDITIONS SHOULD BE EXPECTED BETWEEN BORINGS.

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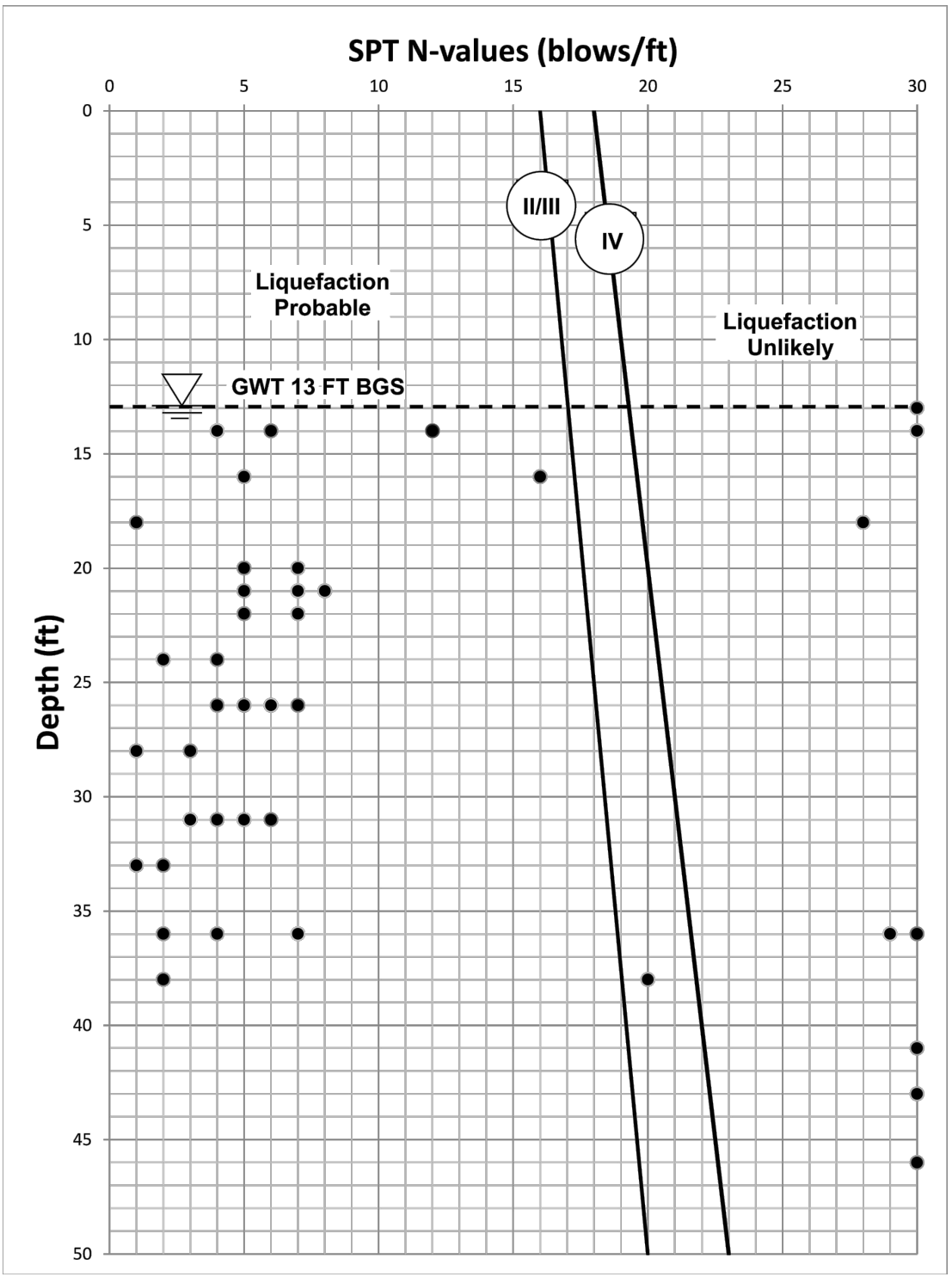
Project	45 BROAD STREET BLOCK No. 25, LOT No. 7 MANHATTAN NEW YORK NEW YORK
Drawing Title	SUBSURFACE PROFILE B
Project No.	170394201
Date	03/07/2016
Scale	1" = 20'
Drawn By / Checked By	MLM / TP
Submission Date	03/11/2016
Drawing No.	8
Sheet	8 of 9

Filename: \\langan.com\data\NY\data2\170394201\Cadd Data - 170394201\SheetFiles\Geotechnical\Geotechnical Engineering Study UPDATED\DWG 07-08 - Subsurface Profiles.dwg Date: 4/21/2016 Time: 15:57 User: mmatos Style Table: Langan.stb Layout: DWG 08



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Project
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BLOCK No. 25, LOT No. 7
MANHATTAN
NEW YORK NEW YORK

Drawing Title
NYCBC LIQUEFACTION CHART

Project No.	170394201
Date	03/07/2016
Scale	N.T.S.
Drawn By	MLM
Checked By	TP
Submission Date	03/07/2016
Drawing No.	9
Sheet	9 of 9

Filename: \\langan.com\data\NY\data2\170394201\Cadd Data - 170394201\SheetFiles\Geotechnical\Geotechnical Engineering Study UPDATED\DWG 09 - NYCBC Li uefaction Chart.dwg Date: 3/8/2016 Time: 18:10 User: mmatos Style Table: Langan.stb Layout: DWG 09

APPENDIX A-1
Boring Logs (Langan 2007)

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Log of Boring **B-1 (OW)** Sheet 1 of 3

Project: 45 Broad Street	Project No.: 170394201
Location: 45 Broad Street, New York, NY	Elevation and Datum: El. 10.5 NAVD88
Drilling Company: Craig Test Boring	Date Started: 8/29/07 — Date Finished: 8/30/07
Drilling Equipment: CME 55 Track Mounted Rig	Completion Depth: 59 ft — Rock Depth: 39 ft
Size and Type of Bit: 3-7/8" Tri cone roller bit	Number of Samples: Disturbed 6 — Undisturbed - — Core 4
Casing Diameter (in): 4" ID Steel casing — Casing Depth (ft): 38	Water Level (ft.): First ▽ 25 — Completion ▼ - — 24 HR. ▼ 19.8
Casing Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	Drilling Foreman: Rob Dollar
Sampler: 2" OD split spoon samplier	Inspecting Engineer: Michael Mudalel
Sampler Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Building Code	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Class 7	Brick, Concrete, and Rebar (FILL)	0–10						Hammer 4" casing to 8'
		Gray-red c-f SAND, so. concrete, so. brick, so. f. gravel (FILL) (moist)	10–11	S-1	SS	4	2 15 100/5"	100/5"	Roller bit to 10'
		1.5' Foundation Slab	11–13						Roller bit through foundation Smooth chatter 11.5' to 13' Hammer casing to 13'
	Class 6	Lt. brown-red Clayey SILT, tr. mica (ML) (moist) Moisture Content = 27.6% LL=28; PL=23; PI=5	13–20	S-2	SS	14	6 6 6 4	12	Hammer casing to 18'

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Log of Boring **B-1 (OW)** Sheet 2 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 10.5 NAVD88

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
				20						Roller bit to 20'
		Lt. brown-red SILT, tr. mica (ML) (moist)		21	S-3	SS	14	3 4 4 4	8	
				22						
				23						
				24						
				25						Roller bit to 25'
		Lt. brown-red SILT, tr. mica (ML) (wet) Moisture Content = 28.6%		26	S-4	SS	22	2 3 3 2	6	
	Class 6			27						
				28						Hammer casing to 28'
				29						
				30						Roller bit to 30'
		Lt. brown-reddish-lt. gray SILT, tr. mica (ML)(wet)		31	S-5	SS	18	2 2 2 3	4	
				32						
				33						
				34						
				35						Drilling resistance increased at 34.5' Roller bit to 35'
	Class 1d	Lt. brown-gray-green-black SILT, so. f. gravel, tr. f. sand, tr. glacial till, tr. mica (DECOMPOSED ROCK) (moist)		36	S-6	SS	16	20 40 69 49	109	
				37						Rig chatter 35.5' to 38'
				38						Casing fell 1'
			5	39	C-1	NX	REC=42"/60" =70%	RQD=35"/60" =58%		Hammer casing to 38' Roller bit to 39' Refusal at 39'
	Class 1b	Gray-black-green GNEISS, so. mica schist, tr. granite (BEDROCK)	4	40						
			4	41						
			4	42						
			4	43						
			3	44						
			4	45	C-2	NX				No return at 44.5'

N-Value (Blows/ft) scale: 10 20 30 40

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Log of Boring **B-1 (OW)** Sheet 3 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 10.5 NAVD88

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
			3	45						
			4	46						Stop for greasing
		Gray-black-green GNEISS-SCHIST (BEDROCK)	6	47	C-2	NX	REC=36"/60" =60%	RQD=24"/60" =40%		
			7	48						
				49						
			4	50						
			5	51						
	Class 1b	Gray-white-black GNEISS-SCHIST, so. mica (BEDROCK)	3	52	C-3	NX	REC=36"/60" =60%	RQD=22"/60" =37%		
			7	53						
			6	54						Stop coring at 3:00 (8/29)
			4	55						Day 2 (8/30)
			5	56						
		Gray-white-black-green GNEISS-SCHIST, so. mica (BEDROCK)	4	57	C-4	NX	REC=51"/60" =85%	RQD=32"/60" =53%		
			6	58						Install 2" PVC MW
			5	59						E.O.B. @ 59'
				60						
				61						
				62						
				63						
				64						
				65						
				66						
				67						
				68						
				69						
				70						

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Log of Boring **B-2** Sheet 1 of 3

Project: 45 Broad Street	Project No.: 170394201
Location: 45 Broad Street, New York, NY	Elevation and Datum: El. 10 NAVD88
Drilling Company: Craig Test Boring	Date Started: 9/6/07 — Date Finished: 9/6/07
Drilling Equipment: CME 55 Track Mounted Rig	Completion Depth: 65 ft — Rock Depth: 49 ft
Size and Type of Bit: 3-7/8" Tri cone roller bit	Number of Samples: Disturbed 6 — Undisturbed - — Core 5
Casing Diameter (in): 4" ID Steel casing — Casing Depth (ft): 19	Water Level (ft.): First ▽ 20 — Completion ▼ - — 24 HR. ▼ -
Casing Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	Drilling Foreman: Rob Dollar
Sampler: 2" OD split spoon samplier	Inspecting Engineer: Michael Mudalel
Sampler Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist. BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Class 7	Brick, Concrete, and Rebar (FILL)		0–5						Hammer casing to 4' Roller bit to 5'
		Gray-red-white GRAVEL, so. c-f sand, so. concrete, tr. brick, tr. metal (FILL) (wet)		10	S-1	SS	3	3 5 3 100/3"	8	Hammer casing to 9' Roller bit to 10'
		6" Foundation Slab		12						Roller bit through concrete slab
	Class 7			13						Smooth chatter 11.5' to 12'
		Lt. brown-reddish-gray SILT, so. f-c sand, so. f gravel (ML) (moist)		14	S-2	SS	19	2 3 3 19	6	
	Class 6			15–18						Rig chatter 18'-19'
	Class 6			19–20						Hammer casing to 19'

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Log of Boring **B-2** Sheet 2 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 10 NAVD88

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
				20						Roller bit to 20'
	Class 6	Lt. brown-reddish-gray clayey SILT, so f sand, tr. mica (ML)) (wet) Moisture Content = 27.0%		21	S-3	SS	12	4 4 4 5	8	
				22						
				23						
				24						
				25						Roller bit to 25'
		Lt. brown-red SILT, so. f. sand, tr. mica (ML)(wet)		26	S-4	SS	18	2 3 4 4	7	
				27						
				28						
				29						
	Class 6			30						Roller bit to 30'
		Lt. brown-red SILT, so. f. sand, tr. mica (ML)(wet) Moisture Content = 29.2% LL=33; PL=25; PI=8		31	S-5	SS	17	3 3 3 3	6	
				32						
				33						
				34						
				35						Roller bit to 35'
	Class 1d	Lt. brown-red-green SILT, so. f-c gravel, so. f-c sand, tr. decomposed rock (DECOMPOSED ROCK) (moist)		36	S-6	SS	20	11 18 37 31	55	
				37						Heavy rig chatter at 37'
				38						Rig chatter at 38'
				39						Smooth rig chatter 39' to 40'
			5	40						Roller bit to 40'
			5	41						
			7	42	C-1	NX	REC=0"/60" =0%	RQD=0"/60" =0%		No return 40' to 45'
			3	43						
			4	44						
				45						

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Log of Boring **B-2** Sheet 3 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 10 NAVD88

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Class 1d	Lt. brown-green-gray f. GRAVEL, so. f-c sand, so. decomposed rock (DECOMPOSED ROCK) (moist)	4 2 3 1	45 46 47 48 49	C-2	NX	REC=0"/60" =0%	RQD=0"/60" =0%		Rig chatter 45' to 49' No return 45'-50' Casing fell 1' when coring at 50'
		Lt. gray-black-white-red GNEISS-SCHIST, so. garnets, so. mica, tr. quartz (BEDROCK)	2 4 7 2 4 4	50 51 52 53 54	C-3	NX	REC=54"/60" =90%	RQD=54"/60" =90%		No return 50' to 55'
	Class 1a	Lt. gray-black-white-red GNEISS-SCHIST, so. garnets, so. mica, tr. quartz (BEDROCK)	4 5 6 7 4	55 56 57 58 59	C-4	NX	REC=51"/60" =85%	RQD=50"/60" =83%		Slight rig chatter 55' to 60' No return 55' to 60'
		Lt. gray-black-blue-red GNEISS-SCHIST, so. garnets, so. mica (BEDROCK)	5 6 4 4 5	60 61 62 63 64 65	C-5	NX	REC=44"/60" =73%	RQD=42"/60" =70%		Rig chatter 62' to 63' E.O.B. @ 65'
				66 67 68 69 70						

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Log of Boring **B-3** Sheet 1 of 3

Project: 45 Broad Street	Project No.: 170394201
Location: 45 Broad Street, New York, NY	Elevation and Datum: El. 10 NAVD88
Drilling Company: Craig Test Boring	Date Started: 9/5/07 — Date Finished: 9/5/07
Drilling Equipment: CME 55 Track Mounted Rig	Completion Depth: 65 ft — Rock Depth: 47 ft
Size and Type of Bit: 3-7/8" Tri cone roller bit	Number of Samples: Disturbed 8 — Undisturbed - — Core 3
Casing Diameter (in): 4" ID Steel casing — Casing Depth (ft): 19	Water Level (ft.): First ▽ 20 — Completion ▼ - — 24 HR. ▼ -
Casing Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	Drilling Foreman: Rob Dollar
Sampler: 2" OD split spoon samplier	Inspecting Engineer: Michael Mudalel
Sampler Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist. BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
				0						
				1						
				2						
				3						
				4						Hammer casing to 4'
		Brick, Concrete, and Rebar (FILL)		5						Roller bit to 5'
	Class 7			6						
				7						
				8						
				9						Hammer casing to 9'
		Gray-red-yellow f. GRAVEL, so. concrete, so. brick, so. f-c sand (FILL)(wet)		10	S-1	SS	6	2 3 10 7	13	Roller bit to 10'
		6" Foundation Slab		11						Roller bit thru concrete slab
				12						Smooth chatter 12' to 12.5'
	Class 7	Lt. brown-gray-red f. GRAVEL, so. f-c sand, tr. silt (FILL) (wet)		13	S-2	SS	14	4 16 15 7	31	
				14						
				15						
	Class 6			16						
				17						
				18						
				19						Hammer casing to 19'
				20						

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Log of Boring **B-3** Sheet 2 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 10 NAVD88

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Class 6	Lt. brown-reddish-gray Clayey SILT, tr. f sand (ML) (wet)		20	S-3	SS	14	3 4 4 3	8	Roller bit to 20'
				21						
				22						
				23						
				24						
				25						Roller bit to 25'
		Lt. brown-reddish-gray, Clayey SILT, tr. f. sand (ML) (wet)		26	S-4	SS	20	2 2 3 3	5	
				27						
				28						
	Class 6	Lt. brown-red f-SAND, so. silt, (wet) (SP/SM) (wet)		29						
				30	S-5	SS	18	1 2 3 2	5	Roller bit to 30'
				31						
				32						
				33						
				34						
				35						Roller bit to 35'
	Class 3b	Lt. brown-gray coarse-fine SAND, some silt, some clay, tr. decomposed rock (SC) (moist) Moisture Content = 21.2%		36	S-6	SS	14	4 14 15 37	29	
				37						Rig chatter at 36'
				38						
				39						Heavy rig chatter at 39'
				40						Roller bit to 40'
	Class 1d	Lt. brown-gray-green f. GRAVEL, so. f-c sand, so. silt, (DECOMPOSED ROCK) (moist)		41	S-7	SS	16	13 64 100/5"	100/5"	
				42						
				43						Heavy rig chatter 43' to 44'
				44						
				45						

N-Value (Blows/ft) scale: 10 20 30 40

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Log of Boring **B-3** Sheet 3 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 10 NAVD88

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Class 1d	Lt. brown-white-black-green f-c SAND, so. mica, tr. silt (DECOMPOSED ROCK) (moist)		45	S-8	SS	10	37 43 28 100/4"	71	Roller bit to 45'
				46						
				47						Smooth rig chatter 47' to 50'
				48						
				49						
				50						Roller bit to 50'
			5	51	C-1	NX	REC=57"/60" =95%	RQD=53"/60" =88%		Brownish return 50'-51'
			5							
		Gray-white-black-red-green GNEISS-MICA SCHIST, so. garnets (BEDROCK)	2	52						
			2	53						Gray return 51'-55'
			2	54						
			2	55	C-2	NX	REC=56"/60" =93%	RQD=56"/60" =93%		
			2	56						
	Class 1a		2	57						Gray return 55'-60'
		Gray-black-red-green GNEISS-SCHIST, so. garnets (BEDROCK)	2	58						
			2	59						
			2	60						Gray return 60'-65'
			2	61	C-3	NX	REC=60"/60" =100%	RQD=60"/60" =100%		
			1	62						
		Gray-black-red GNEISS-SCHIST, so. garnets (BEDROCK)	2	63						Rig chatter 62' to 63'
			2	64						
			3	65						E.O.B. @ 65'
				66						
				67						
				68						
				69						
				70						

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Log of Boring **B-4** Sheet 1 of 3

Project: 45 Broad Street	Project No.: 170394201
Location: 45 Broad Street, New York, NY	Elevation and Datum: El. 11 NAVD88
Drilling Company: Craig Test Boring	Date Started: 9/4/07 — Date Finished: 9/4/07
Drilling Equipment: CME 55 Track Mounted Rig	Completion Depth: 65 ft — Rock Depth: 45.5 ft
Size and Type of Bit: 3-7/8" Tri cone roller bit	Number of Samples: Disturbed 8 — Undisturbed - — Core 3
Casing Diameter (in): 4" ID Steel casing — Casing Depth (ft): 19	Water Level (ft.): First ▽ 20 — Completion ▼ - — 24 HR. ▼ -
Casing Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	Drilling Foreman: Rob Dollar
Sampler: 2" OD split spoon samplier	Inspecting Engineer: Michael Mudalel
Sampler Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
				0						
				1						
				2						
				3						
				4						Hammer casing to 4'
		Brick, Concrete, and Rebar (FILL)		5						Roller bit to 5'
	Class 7			6						
				7						
				8						
				9						Hammer casing to 9'
				10	S-1	SS	3	2 1 5 100/5"	6	Roller bit to 10'
		Lt. brown f GRAVEL, so. f-c sand, tr. organics (FILL) (wet)		11						
		8" Foundation Slab		12						Roller bit thru concrete slab to 13'
				13	S-2	SS	10	3 2 2 2	4	
		Lt. brown-red Clayey SILT, tr. f-c sand (ML) (moist) Moisture Content = 27.4%		14						
	Class 6			15						
				16						
				17						
				18						
				19						Hammer casing to 19'
				20						

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Log of Boring **B-4** Sheet 2 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 11 NAVD88

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Class 6	Lt. brown-redish-gray Silty CLAY (ML/CL) (wet)		20–22	S-3	SS	14	3 3 4 4	7	Roller bit to 20'
	Class 6	Lt. brown-red f-SAND, so. silt (SP) (wet)		23–27	S-4	SS	12	2 3 2 2	5	Roller bit to 25'
	Class 4c	Lt. brown-red Silty CLAY (CL) (wet)		28–32	S-5	SS	17	1 2 2 3	4	Roller bit to 30'
	Class 6	Lt. brown-red Silty CLAY, tr. f-c sand (CL-ML) (wet) Moisture Content = 28.0% LL=26; PL=20; PI=6		33–37	S-6	SS	20	0 1 1 2	2	Roller bit to 35'
	Class 1d	Lt. brown-black-green-orange f-c SAND, so. silt, so. f gravel (DECOMPOSED ROCK) (moist)		38–42	S-7	SS	20	9 11 21 51	32	Rig chatter at 39.5' Roller bit to 40'
		Lt. brown-green-gray f. GRAVEL, so. f-c sand, tr. silt,		43–45						

N-Value (Blows/ft) scale: 10 20 30 40

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Log of Boring **B-4** Sheet 3 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 11 NAVD88

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Class 1d	(DECOMPOSED ROCK) (moist)		45	S-8	SS	3	100/3"	100/3"	Roller bit to 45' Heavy rig chatter at 45' Take S-8
				46						
				47						
				48						
				49						Roller bit to 50'
				50						Smooth rig chatter 45.5' to 50'
			4	51	C-1	NX	REC=60"/60" =100%	RQD=56"/60" =93%		Start coring at 50'
		Gray-black-red GNEISS-MICA SCHIST, so. garnets, (BEDROCK)	3	52						
			3	53						
			3	54						
			4	55						
			3	56	C-2	NX	REC=57"/60" =95%	RQD=37"/60" =62%		
	Class 1a	Gray-black-red GNEISS-SCHIST, so. garnets, so. mica (BEDROCK)	3	57						Coring resistance decreased 57'-58'
			1	58						
			2	59						
			3	60						
			3	61	C-3	NX	REC=60"/60" =100%	RQD=36"/60" =60%		
		Gray-black-red GNEISS-SCHIST, so. garnets, so. mica (BEDROCK)	2	62						
			3	63						
			2	64						
			3	65						E.O.B. @ 65'
				66						
				67						
				68						
				69						
				70						

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Log of Boring **B-5** Sheet 1 of 3

Project: 45 Broad Street	Project No.: 170394201
Location: 45 Broad Street, New York, NY	Elevation and Datum: El. 10 NAVD88
Drilling Company: Craig Test Boring	Date Started: 8/31/07 — Date Finished: 8/31/07
Drilling Equipment: CME 55 Track Mounted Rig	Completion Depth: 60 ft — Rock Depth: 45 ft
Size and Type of Bit: 3-7/8" Tri cone roller bit	Number of Samples: Disturbed 7 — Undisturbed - — Core 3
Casing Diameter (in): 4" ID Steel casing — Casing Depth (ft): 19	Water Level (ft.): First ▽ 25 — Completion ▼ - — 24 HR. ▼ -
Casing Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	Drilling Foreman: Rob Dollar
Sampler: 2" OD split spoon samplier	Inspecting Engineer: Michael Mudalel
Sampler Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Building Code	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist. BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Class 7	Brick, Concrete, and Rebar (FILL)	0–10						Hammer casing to 9'
		Lt. brown-gray f GRAVEL, so. f-c sand, so. concrete (FILL) (wet)	10–11	S-1	SS	4	6 7 7 100/5"	14	Roller bit to 10'
		6" Foundation Slab	12						Roller bit through concrete slab to 13'
	Class 6	Lt. brown-red SILT, tr. c-f sand (ML) (moist)	13–14	S-2	SS	8	3 2 2 2	4	
			15–19						Hammer casing to 19'
			20						

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Log of Boring **B-5** Sheet 2 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 10 NAVD88

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
				20						Roller bit to 20'
		Lt. brown Clayey SILT, tr. f. sand (ML) (moist) Moisture Content = 28.1%		21	S-3	SS	16	2 3 4 4	7	
				22						
				23						
				24						
			▽	25						Roller bit to 25'
	Class 6	Lt. brown-red SILT (ML) (wet)		26	S-4	SS	14	2 3 3 2	6	
				27						
				28						
				29						
				30						Roller bit to 30'
		Lt. brown-red SILT, tr. clay (ML) (wet) Moisture Content = 35.4% LL=32; PL=25; PI=7		31	S-5	SS	16	1 1 2 2	3	
				32						
				33						
				34						
	Class 4c	Lt. brown-reddish-gray Silty CLAY (CL) (wet)		35						Roller bit to 35'
				36	S-6	SS	18	2 3 4 7	7	
				37						
				38						
				39						Rig chatter 38' to 40'
				40						Roller bit to 40'
	Class 1d	Lt. brown-gray SILT, so f-c sand, so f. gravel, tr. mica (DECOMPOSED ROCK) (moist)		41	S-7	SS	24	19 25 20 22	45	
				42						
				43						Rig chatter 43' to 43.5'
				44						Smooth chatter 43.5' to 44' Rock core at 44'
				45						

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Log of Boring **B-5** Sheet 3 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 10 NAVD88

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
			5	45						Pull rock core barrel out of decomposed rock
			6	46						Roller bit through decomposed rock to 45'
	Class 1b	Gray-black-white-red GNEISS-MICA SCHIST, so. garnets (BEDROCK)	4	47	C-1	NX	REC=54"/60" =90%	RQD=50"/60" =83%		Rock core at 45'
			4	48						
			3	49						
			3	50						
			5	51						
		Gray-black-red GNEISS-SCHIST, so. mica, so. garnets (BEDROCK)	4	52	C-2	NX	REC=56"/60" =93%	RQD=53"/60" =88%		
			4	53						
			3	54						
	Class 1a		6	55						
			4	56						
			2	57						
		Gray-black-red GNEISS-SCHIST, so. garnets, so. mica (BEDROCK)	2	58	C-3	NX	REC=58"/60" =97%	RQD=58"/60" =97%		
			2	59						
				60						E.O.B. @ 60'
				61						
				62						
				63						
				64						
				65						
				66						
				67						
				68						
				69						
				70						

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Log of Boring **B-6 (OW)** Sheet 1 of 3

Project: 45 Broad Street	Project No.: 170394201
Location: 45 Broad Street, New York, NY	Elevation and Datum: El. 10.5 NAVD88
Drilling Company: Craig Test Boring	Date Started: 8/30/07 — Date Finished: 8/30/07
Drilling Equipment: CME 55 Track Mounted Rig	Completion Depth: 62 ft — Rock Depth: 48.5 ft
Size and Type of Bit: 3-7/8" Tri cone roller bit	Number of Samples: Disturbed 7 — Undisturbed - — Core 4
Casing Diameter (in): 4" ID Steel casing — Casing Depth (ft): 19	Water Level (ft.): First ▽ 25 — Completion ▼ - — 24 HR. ▼ 18.4
Casing Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	Drilling Foreman: Rob Dollar
Sampler: 2" OD split spoon samplier	Inspecting Engineer: Michael Mudalel
Sampler Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist. BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Class 7	Brick, Concrete, and Rebar (FILL)		0–5						Hammer casing to 4'
										Roller bit to 10'
		Lt. gray, so. concrete, so f-c sand (FILL) (moist)		5–12						Hammer casing to 9'
										Roller bit to 10'
				12–13						Hammer casing to 12.5'
		6" Foundation Slab		13	S-1	SS	4	100/4"	100/4"	Smooth chatter 13' to 13.5'
	Class 7	No recovery		13–16	S-2	SS	NR	1 WOR WOR 1		Roller bit to 14'
	Class 6	? ? ? ?		16–19						Hammer casing to 19'
				19–20						

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Log of Boring **B-6 (OW)** Sheet 2 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 10.5 NAVD88

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
				20						Roller bit to 20'
		Lt. brown-red silty CLAY, tr. f sand, tr. f gravel (CL) (moist) Moisture Content = 23.0% LL=32; PL=21; PI=11		21	S-3	SS	8	3 2 3 3	5	
				22						
				23						
				24						
				25						Roller bit to 25'
		Lt. brown-red SILT, tr. f sand (ML) (wet)		26	S-4	SS	20	2 3 3 3	6	
				27						
				28						
				29						
	Class 6			30						Roller bit to 30'
		Lt. brown-red SILT (ML) (wet) Moisture Content = 34.3%		31	S-5	SS	18	1 2 2 2	4	
				32						
				33						
				34						
				35						Roller bit to 35'
		Lt. brown-reddish-gray Clayey SILT (ML) (wet)		36	S-6	SS	18	3 2 2 2	4	
				37						
				38						
				39						Rig chatter at 39'
		Lt. brown-red SILT, tr. f-c sand (DECOMPOSED ROCK) (moist)		40	S-7	SS	9	6 100/3"	100/3"	Roller bit to 40'
	Class 1d		5	41						
			6	42	C-1	NX	NA	NA		Smooth rig chatter 40.5' to 42'
			4	43						
				44						Decrease in return 44' to 45'
				45						

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Log of Boring **B-6 (OW)** Sheet 3 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 10.5 NAVD88

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Class 1d	Lt. brown, gray, green f-c SAND, so. f gravel, tr silt, (DECOMPOSED ROCK), (wet)	3	45	C-1	NX	NA	NA		
			4	46						
			4	47						Rig chatter 45' to 49'
			2	48	C-2	NX	REC=55"/60" =92%	RQD=26"/60" =43%		
			5	49						Resistance increased at 49'
			3	50						
		Lt. Gray-greenish-red-black GNEISS-SCHIST, so. garnets, so. mica (BEDROCK)	5	51						
			6	52						No return 51' to 52
			4	53	C-3	NX	REC=60"/60" =100%	RQD=54"/60" =90%		
			3	54						
	Class 1c	Lt. Gray-greenish-red-black, GNEISS-SCHIST, so. garnets, so. mica (BEDROCK)	3	55						
			2	56						
			3	57						No return 54' to 57'
			3	58	C-4	NX	REC=35"/60" =58%	RQD=35"/60" =58%		
			3	59						
		Lt. Gray-red-black, GNEISS-SCHIST, so. garnets, so. mica (BEDROCK)	3	60						
			4	61						Install 2" PVC MW
				62						E.O.B. @ 62'
				63						
				64						
				65						
				66						
				67						
				68						
				69						
				70						

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APPENDIX A-2
Boring Logs (Langan 2016)

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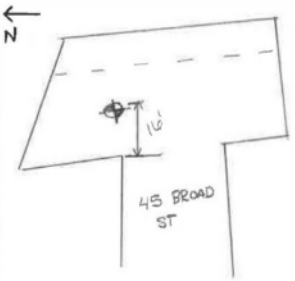
Log of Boring **B-7(OW)** Sheet 1 of 3

Project: 45 Broad Street	Project No.: 170394201
Location: 45 Broad Street, New York, NY	Elevation and Datum: El. 9 NAVD88
Drilling Company: Craig Geotechnical Drilling Co., Inc.	Date Started: 1/29/16 / Date Finished: 1/29/16
Drilling Equipment: Truck Mounted Rig	Completion Depth: 55 ft / Rock Depth: 45 ft
Size and Type of Bit: 3-7/8" Tri cone roller bit	Number of Samples: Disturbed 10, Undisturbed -, Core 2
Casing Diameter (in): 4" ID Steel casing / Casing Depth (ft): 25	Water Level (ft.): First ▽ 15, Completion ▼, 24 HR. ▼ 13.5
Casing Hammer: Auto / Weight (lbs): 140 / Drop (in): 30	Drilling Foreman: Ryan Warden
Sampler: 2" OD split spoon samplier, NX Core Barrel	Inspecting Engineer: Maria Mis
Sampler Hammer: Auto / Weight (lbs): 140 / Drop (in): 30	

Material Symbol	Building Code	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist. BL/6in	N-Value (Blows/ft) 10 20 30 40
	Class 7	Demolition Debris 0-12 ft Sampling not performed in demolition debris above remnant basement slab	0–12					
		Remnant basement slab (9" thick)	12					
	Class 7	Medium dense gray coarse GRAVEL [FILL]	13–14	S-1	SS	4	5, 6, 10, 4	16
		Loose gray coarse GRAVEL, trace brick fragments [FILL]	14–16	S-2	SS	3	2, 1, WOH, 1	
	Class 6	Loose brown/gray CLAY (CL), trace coarse to fine sand (wet)	16–19	S-3	SS	2	1, 2, 3, 4	5
			19–20	S-4	SS	6	2, 2	5

Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)



Install casing to 10ft
Advance roller bit
Smooth drilling
Brown wash

Chatter at 12ft
Slow drilling
Gray wash
Break through at 12.75ft

Take S-1: 13-15ft

Take S-2: 15-17ft

Install casing to 15ft
Clean casing
Roller bit to 17ft
Take S-3: 17-19ft

Take S-4: 19-21ft

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Log of Boring **B-7(OW)** Sheet 2 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 9 NAVD88

Material Symbol	Building Code	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Loose brown/gray CLAY (CL), trace coarse to fine sand, trace wood fragments (wet) Moisture Content = 35.6% LL=33; PL=23; PI=10	20	S-4	SS	6	3 4	5	Install casing to 20ft Clean casing Roller bit to 22ft, brown wash Take S-5: 21-23ft
		Loose brown/gray CLAY (CL), trace fine sand (wet)	21						
			22	S-5	SS	2	1 2 2 2	4	
		Loose brown/gray silty CLAY (CL-ML) (wet) Moisture Content = 40.3% LL=26; PL=21; PI=5	23						Take S-6: 23-25ft
			24	S-6	SS	10	1 2 2 2	4	
		Loose brown CLAY (CL), trace clay, trace fine sand (wet)	25						Roller bit to 25ft Brown wash Take S-7: 25-27ft
			26	S-7	SS	8	WOH 1 2 2	3	Casing to 25ft
			27						
			28						Roller bit to 30ft
			29						
	Class 6	Loose brown/gray CLAY (CL), trace fine sand, trace wood fragments (wet)	30	S-8	SS	6	3 1 1 2	2	Take S-8: 30-32ft
			31						
			32						
			33						Roller bit to 35ft
			34						
		Loose brown/gray CLAY (CL), trace fine sand (wet) Moisture Content = 34.6% LL=30; PL=22; PI=8	35	S-9	SS	15	WOH 1 1 1	2	Take S-9: 35-37ft
			36						
			37						
			38						Roller bit to 40ft Brown wash
			39						
			40	S-10	SS	18	21 36 100/4"	100/4"	Take S-10: 40-41.5ft Spoon refusal at 41.5ft
	Class 1d	Black/green WEATHERED MICA SCHIST, some fine sand, trace silt, trace fine gravel	41						
			42						Roller bit to 45ft Slight chatter
			43						
			44						
			45						

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Log of Boring **B-7(OW)** Sheet 3 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 9 NAVD88

MATERIAL SYMBOL	Building Code	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Class 1b	Black/gray MICA SCHIST with quartz and fieldspar intrusions, slightly weathered, slightly fractured, horizontal foliations, subvertical fractures	45–50	C-1	NX	REC=46"/60" =77%	RQD=46"/60" =77%		Take S-11 at 45ft Spoon refusal at 45ft Start core C-1: 45-50ft
									End C-1 at 50ft
	Class 1a	Black/gray MICA SCHIST with quartz intrusions, slightly to moderately weathered, slightly to moderately fractured, horizontal foliations, subvertical fractures	50–55	C-2	NX	REC=60"/60" =100%	RQD=53"/60" =88%		Start core C-2: at 50ft End core C-2 at 55ft End of Boring at 55ft
		End of Boring @ 55 ft BGS	55–70						Remove casing Install well See Well Construction Log B-7(OW) for details of well construction

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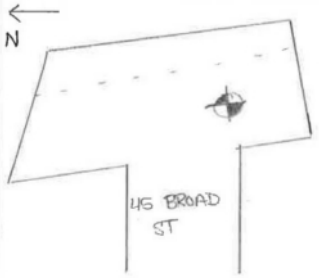
Log of Boring **B-8** Sheet 1 of 3

Project: 45 Broad Street	Project No.: 170394201
Location: 45 Broad Street, New York, NY	Elevation and Datum: El. 9 NAVD88
Drilling Company: Craig Geotechnical Drilling Co., Inc.	Date Started: 2/1/16 — Date Finished: 2/1/16
Drilling Equipment: Truck Mounted Rig	Completion Depth: 55 ft — Rock Depth: 45 ft
Size and Type of Bit: 3-7/8" Tri cone roller bit	Number of Samples: Disturbed 10 — Undisturbed - — Core 2
Casing Diameter (in): 4" ID Steel casing — Casing Depth (ft): 15	Water Level (ft.): First ▽ — Completion ▼ — 24 HR. ▼
Casing Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	Drilling Foreman: Ryan Warden
Sampler: 2" OD split spoon samplier, NX Core Barrel	Inspecting Engineer: Maria Mis
Sampler Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Building Code	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40
		Demolition debris Sampling not performed in demolition debris above remnant basement slab	0–12					
	Class 7							
		Remnant basement slab (9" thick)	12					
		Loose brown SILT (ML), trace fine sand (wet)	13–14	S-1	SS	12	6 2 3 2	5
		Medium Dense brown SILT (ML), trace fine sand (wet) Moisture content = 32.8% LL=28; PL=23; PI=5	15–16	S-2	SS	15	7 13 15 16	28
	Class 6	Loose brown SILT (ML), trace fine sand (wet)	17–18	S-3	SS	12	1 3 4 4	7
		Loose brown/gray SILT (ML), trace fine sand (wet)	19–20	S-4	SS	3	6 3	7

Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)



Predrilled through demolition debris and fill layer with 4-7/8in. tricone roller bit

Rig chatter at 12ft
Broke through at 12.75ft

Take S-1: 13-15ft

Take S-2: 15-17ft

Install casing to 15ft
Clean-out casing with tricone roller bit
Brown wash
Take S-3: 17-19ft

Take S-4: 19-21ft

LANGAN

Log of Boring **B-8** Sheet 2 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 9 NAVD88

Material Symbol	Building Code	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Class 6	Loose brown/gray SILT (ML), trace fine sand (wet)	20	S-4	SS	3	4 5	7	
			21						
			22	S-5	SS	15	WOH 1 1 2	2	Take S-5: 21-23ft
			23						
	Class 6	Loose brown silty fine SAND (SM) (wet) Moisture Content = 30.3%	24	S-6	SS	18	1 2 3 4	5	Take S-6: 23-25ft
			25						Advance roller bit to 25ft
		Loose brown silty fine SAND (SM), some silt, trace clay (wet)	26	S-7	SS	12	WOH WOH 1 WOH		Take S-7: 25-27ft
			27						
			28						Advance roller bit to 30ft Brown wash Smooth drilling
	Class 6	Loose brown/gray SILT (ML), some fine sand (wet)	29						
			30	S-8	SS	12	1 WOH 1 2		Take S-8: 30-32ft
			31						
			32						
			33						Advance roller bit to 35ft Brown wash Smooth drilling
			34						
			35	S-9	SS	18	WOH 4 16 18	20	Take S-9: 35-37ft
	Class 3b	Medium dense gray/brown coarse to fine SAND (SM), some silt, trace decomposed mica schist (wet)	36						
			37						
			38						Advance roller bit to 40ft Brown wash Smooth drilling
			39						
	Class 3a	Dense brown/gray coarse to fine SAND (SM), some silt, trace clay, trace weathered rock (wet)	40	S-10	SS	18	14 20 25 100/5"	45	Take S-10: 40-41.9ft Spoon Refusal at 41.9ft
			41						
			42						Advance roller bit to 45ft Slow drilling Rig chatter
	Class 1d	WEATHERED MICA SCHIST	43						
			44						
			45						

N-Value (Blows/ft) scale: 10 20 30 40

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LANGAN

Log of Boring **B-8** Sheet 3 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 9 NAVD88

Material Symbol	Building Code	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Class 1c	Black/gray MICA SCHIST with quartz and fieldspar intrusions, slightly weathered, slightly fractured, horizontal foliations, subvertical fractures	45–50	C-1	NX	REC=60"/60" =100%	RQD=56"/60" =93%		Take S-11 at 45ft Spoon refusal at 45ft Start core C-1: 45-50ft End C-1 at 50ft
		Black/gray MICA SCHIST with quartz and fieldspar intrusions, slightly weathered, slightly fractured, horizontal foliations, subvertical fractures	50–55	C-2	NX	REC=60"/60" =100%	RQD=60"/60" =100%		Start core C-2: 50-55ft End C-2 at 55ft End of Boring at 55ft Remove rods and casing
		End of Boring @ 55 ft BGS	55–70						

APPENDIX B-1
Observation Well Construction Logs (Langan 2007)

WELL CONSTRUCTION SUMMARY
Well No. MW-1

PROJECT: 45 Broad St	PROJECT NO.: 5797401 PERMIT:
LOCATION: New York, NY	ELEVATION AND DATUM: BPMD 9.90 Top of Casing
DRILLING AGENCY: Craig Test Boring	DATE STARTED: 8/29/07 DATE FINISHED: 8/30/2007
DRILLING EQUIPMENT: CME 55 Track Mounted Rig	DRILLER: Rob Dollar
SIZE AND TYPE OF BIT: 3-7/8" Tri-cone roller bit	INSPECTOR: Michael Mudalel

METHOD OF INSTALLATION
A 2-inch PVC screen and riser were installed and the annular space was filled with No. 1 filter sand, a bentonite seal, backfilled with fill material.

METHOD OF WELL DEVELOPMENT
Well was developed by surge and pump method for 60 minutes until discharge was clear of silt. A total of 5 gallons was purged.

TYPE OF CASING: PVC DIAMETER: 2-inch	TYPE OF BACKFILL MATERIAL: Hole cuttings
TYPE OF SCREEN: PVC DIAMETER: 2-inch	TYPE OF SEAL MATERIAL: Bentonite
BOREHOLE DIAMETER: 4"	TYPE OF FILTER MATERIAL: # 1 Sand

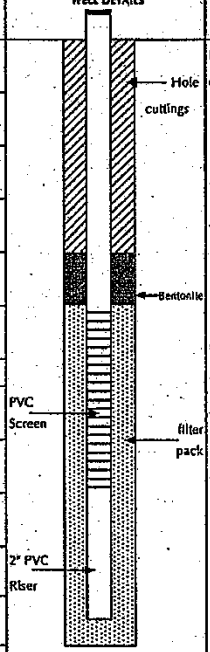
TOP OF CASING	ELEVATION	DEPTH (ft)
	9.90	0.00
TOP OF SEAL	ELEVATION	DEPTH (ft)
	-13.10	23.00
TOP OF FILTER	ELEVATION	DEPTH (ft)
	-16.13	25.00
TOP OF SCREEN	ELEVATION	DEPTH (ft)
	-20.13	29.00
BOTTOM OF WELL	ELEVATION	DEPTH (ft)
	-40.13	49.00

SCREEN LENGTH: 10 ft
SLOT SIZE: 0.01-in

GROUNDWATER ELEVATIONS

ELEVATION	DATE	DEPTH TO WATER
-9.90	8/31/07	19.80
-10.30	9/4/07	20.20
-10.10	9/5/2007	20
-10.40	9/6/2007	20.3

WELL DETAILS



SUMMARY SOIL CLASSIFICATION	DEPTH (FT) bgs
Demo debree, brick, concrete, and steel rebar	0.0
18" Concrete slab	11.5
Lt. brown-redish SILT, tr mica	29.0
Top of bed rock	38.0
Bed rock	59.0

LANGAN Engineering and Environmental Services, PC
21 Penn Plaza, 360 W 31st Street, 8th Floor, New York

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WELL CONSTRUCTION SUMMARY

Well No. MW-6

PROJECT: 45 Broad St	PROJECT NO.: 5797401 PERMIT:
LOCATION: New York, NY	ELEVATION AND DATUM: BPMD 9.90 Top of Casing
DRILLING AGENCY: Craig Test Boring	DATE STARTED: 8/30/07 DATE FINISHED: 8/30/2007
DRILLING EQUIPMENT: CME 55 Track Mounted Rig	DRILLER: Rob Dollar
SIZE AND TYPE OF BIT: 3-7/8" Tri-cone roller bit	INSPECTOR: Michael Mudalel

METHOD OF INSTALLATION

A 2-inch PVC screen and riser were installed and the annular space was filled with No. 1 filter sand, a bentonite seal, backfilled with bentonite and fill material.

METHOD OF WELL DEVELOPMENT

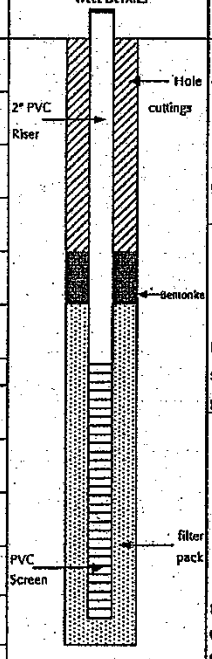
Well was developed by surge and pump method for 60 minutes until discharge was clear of silt. A total of 5 gallons was purged.

TYPE OF CASING: PVC	DIAMETER: 2-inch	TYPE OF BACKFILL MATERIAL: Hole cuttings	
TYPE OF SCREEN: PVC	DIAMETER: 2-inch	TYPE OF SEAL MATERIAL: Bentonite	
BOREHOLE DIAMETER: 4"		TYPE OF FILTER MATERIAL: # 1 Sand	
TOP OF CASING	ELEVATION: 9.90	DEPTH (ft): 0.00	
TOP OF SEAL	ELEVATION: -8.10	DEPTH (ft): 18.00	
TOP OF FILTER	ELEVATION: -11.13	DEPTH (ft): 20.00	
TOP OF SCREEN	ELEVATION: -11.13	DEPTH (ft): 20.00	
BOTTOM OF WELL	ELEVATION: -31.13	DEPTH (ft): 40.00	
SCREEN LENGTH: 20 ft			
SLOT SIZE: 0.01-in			

GROUNDWATER ELEVATIONS

ELEVATION	DATE	DEPTH TO WATER
-8.50	9/4/07	18.40
-8.10	9/5/07	18.00
-8.10	9/6/07	18.00

WELL DETAILS



SUMMARY SOIL CLASSIFICATION	DEPTH (FT) bgs
Demo debree, brick, concrete, and steel rebar	0.0
6" Concrete slab	13.0
Lt brown-redish SILT, so. Clay, tr. f. sand, tr c. gravel	20.0
Lt brown- redish SILT, tr. decomposed rock, tr. f.-c. sand	40.0

LANGAN Engineering and Environmental Services, PC
21 Penn Plaza, 360 W 31st Street, 8th Floor, New York

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APPENDIX B-2
Observation Well Construction Logs (Langan 2016)

OBSERVATION WELL CONSTRUCTION SUMMARY

Well No. B-7(OW)

PROJECT 45 Broad Street	**PROJECT NO.** 170394201
LOCATION New York, New York	**ELEVATION AND DATUM** 9.9 (NAVD88)
DRILLING AGENCY Craig Test Boring Inc.	**DATE STARTED** 1/29/2016 **DATE FINISHED** 1/29/2016
DRILLING EQUIPMENT Truck Mounted Rig	**DRILLER** Ryan Warden
SIZE AND TYPE OF BIT 3-7/8" Tricone Roller Bit	**INSPECTOR** Maria Mis

METHOD OF INSTALLATION

BORING WAS DRILLED TO 55 FEET. HOLE COLLAPSED TO 26 FEET. INSTALLED WELL TO 26 FEET. A 2.00 INCH PVC SCREEN (10 FT) AND RISER TO THE SURFACE WERE INSTALLED TO THE CORRECT DEPTH TO 26 FT; CASING WAS THEN REMOVED, AS THE CASING WAS REMOVED SAND FILTER AND BENTONITE PELLETS WERE PACKED RESPECTIVELY. A FLUSH-MOUNT WELL CAP WAS THEN INSTALLED AND CEMENTED IN.

METHOD OF WELL DEVELOPMENT

WELL WAS FLUSHED UNTIL WATER RETURN WAS CLEAR.

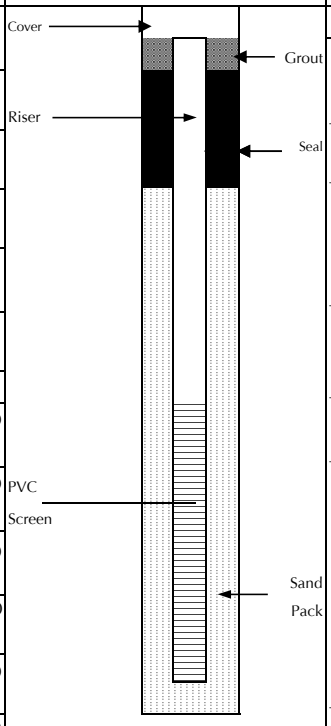
TYPE OF RISER PVC	**DIAMETER** 2.00 inches	**TYPE OF BACKFILL MATERIAL** SOIL CUTTINGS
TYPE OF SCREEN PVC	**DIAMETER** 2.00 inches	**TYPE OF SEAL MATERIAL** BENTONITE PELLETS
BOREHOLE NOMINAL DIAMETER 4 inches		**TYPE OF FILTER MATERIAL** NO. 1 FILTER SAND (SILICA QUARTZ SAND)

	ELEVATION	DEPTH (ft)
TOP OF CASING	13.9	-4
TOP OF SEAL	7.4	2.5
TOP OF FILTER	6.4	3.5
TOP OF SCREEN	-6.1	16
BOTTOM OF BORING	-16.1	26
SCREEN LENGTH		10 FT
SLOT SIZE		0.025-IN

GROUNDWATER ELEVATIONS

ELEVATION (ft)	DATE	DEPTH TO WATER (ft)
-5.1	1/29/2016	15.0
-3.6	2/1/2016	13.5
-3.6	2/1/2016	13.5

WELL DETAILS



SUMMARY SOIL CLASSIFICATION	DEPTH (FT)
	0.0
0 to 12 feet: FILL	2.5
0 to 12 feet: FILL	3.5
0 to 12 feet: FILL	
12 to12.8 feet: CONCRETE	12.8
12.8 to 17 feet: FILL	16.0
12.8 to 17 feet: FILL	17.0
17 to 38.5 feet: SILT	
	26.0

Note: N.T.S.

LANGAN Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.

21 Penn Plaza, 360 W 31st Street, 7th Floor , New York, NY 10001

APPENDIX C-1
Laboratory Test Results (Langan 2007)

Project No.: 31737700 - 728 File: Indx1.xls

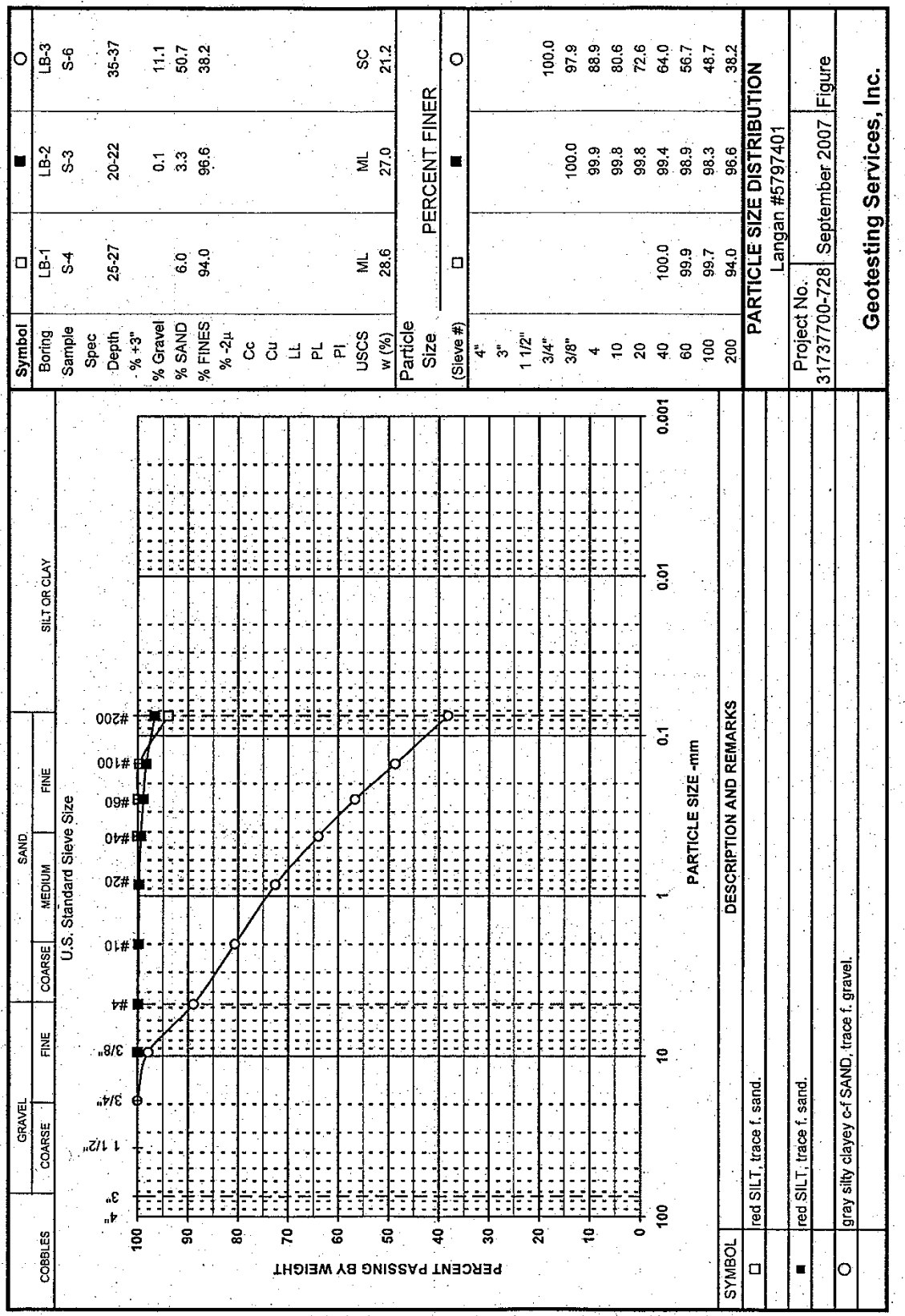
Langan #5797401

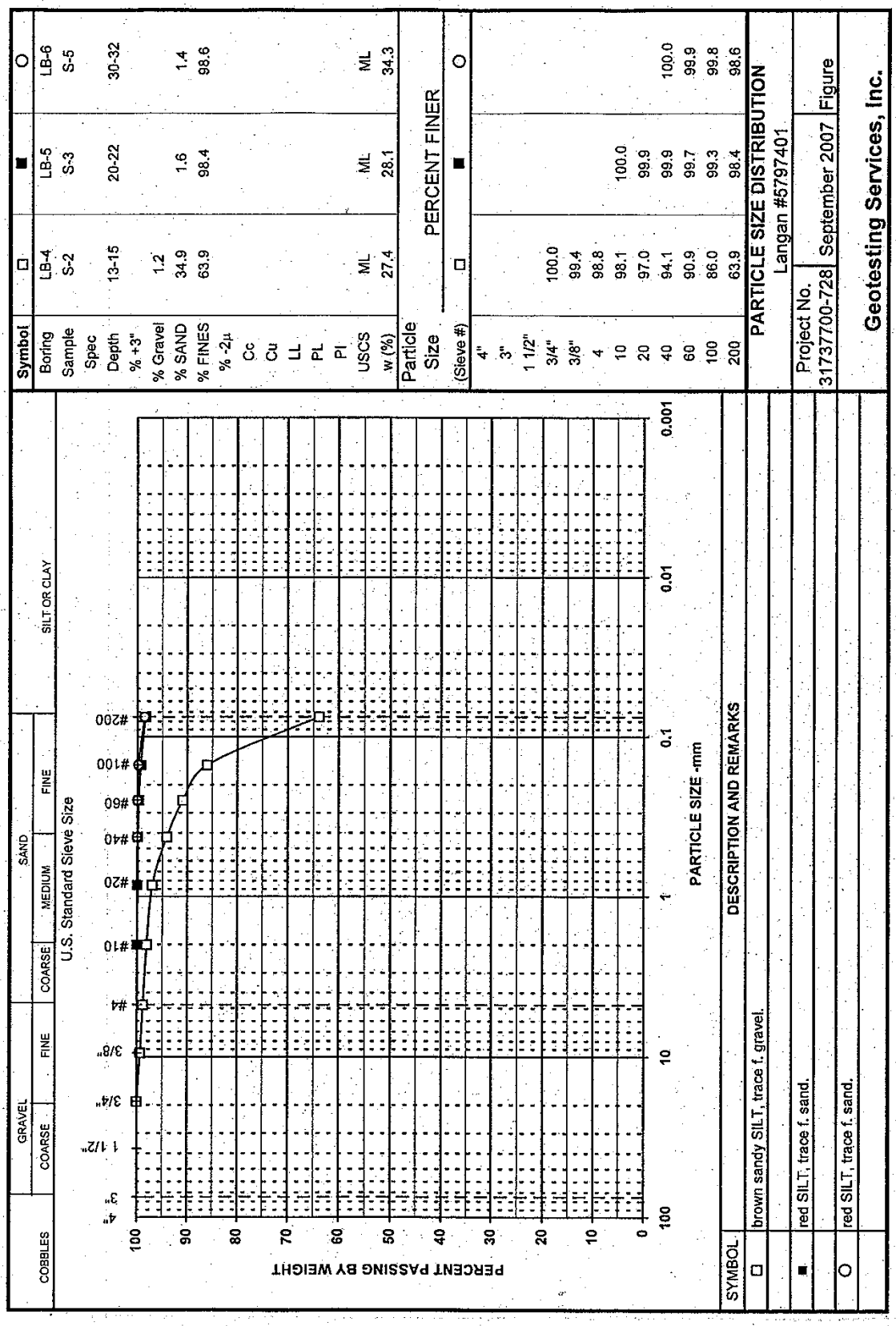
LABORATORY TESTING DATA SUMMARY

	BORING NO.	SAMPLE NO.	DEPTH (ft)	IDENTIFICATION TESTS: WATER CONTENT (%)	LIQUID LIMIT (-)	PLASTIC LIMIT (-)	PLAS. INDEX (-)	USCS SYMB. (1)	SIEVE MINUS NO. 200 (%)	REMARKS
SILT	LB-1	S-2	13-15	27.6	28	23	5	ML		
SILT	LB-1	S-4	25-27	28.6				ML	94.0	
	LB-2	S-3	20-22	27.0				ML	96.6	
SILT	LB-2	S-5	30-32	29.2	33	25	8	ML		
SILT	LB-3	S-3	20-22	28.9	27	23	4	ML		
SAND	LB-3	S-6	35-37	21.2				SC	38.2	
SILT	LB-4	S-2	13-15	27.4				ML	63.9	
CLAY	LB-4	S-6	35-37	28.0	26	20	6	CL-ML		
SILT	LB-5	S-3	20-22	28.1				ML	98.4	
SILT	LB-5	S-5	30-32	35.4	32	25	7	ML		
SILT	LB-6	S-3	20-22	23.0	32	21	11	CL		
SILT	LB-6	S-5	30-32	34.3				ML	98.6	

Note: (1) USCS symbol based on visual observation and Sieve and Atterberg limits reported.

Prepared by: JR Reviewed by: CMJ Date: 9/26/2007 Page 1 of 1


COBBLES
GRAVEL
COARSE
FINE
SAND
COARSE
MEDIUM
FINE
SILT OR CLAY
U.S. Standard Sieve Size
4"
3"
1 1/2"
3/4"
3/8"
#4
#10
#20
#40
#60
#100
#200
PERCENT PASSING BY WEIGHT
PARTICLE SIZE -mm
SYMBOL
DESCRIPTION AND REMARKS
red SILT, trace f. sand.
red SILT, trace f. sand.
gray silty clayey c-f SAND, trace f. gravel.
Symbol □ ■ ○
Boring LB-1 LB-2 LB-3
Sample S-4 S-3 S-6
Spec
Depth 25-27 20-22 35-37
% +3"
% Gravel 0.1 11.1
% SAND 6.0 3.3 50.7
% FINES 94.0 96.6 38.2
% -2μ
Cc
Cu
LL
PL
PI
USCS ML ML SC
w (%) 28.6 27.0 21.2
Particle Size (Sieve #) PERCENT FINER □ ■ ○
4" 100.0
3" 97.9
1 1/2" 100.0 88.9
3/4" 99.9 80.6
3/8" 99.8 72.6
4 99.8 64.0
10 99.4 56.7
20 100.0 98.9 48.7
40 99.9 98.3
60 99.7 96.6
100 94.0 38.2
200
PARTICLE SIZE DISTRIBUTION
Langan #5797401
Project No. 31737700-728
September 2007
Figure
Geotesting Services, Inc.
siev1a.xls 9/26/2007


COBBLES
GRAVEL
COARSE
FINE
SAND
COARSE
MEDIUM
FINE
SILT OR CLAY
U.S. Standard Sieve Size
4"
3"
1 1/2"
3/4"
3/8"
#4
#10
#20
#40
#60
#100
#200
PERCENT PASSING BY WEIGHT
100
90
80
70
60
50
40
30
20
10
0
100
10
1
0.1
0.01
0.001
PARTICLE SIZE -mm
Symbol □ ■ ○
Boring LB-4 LB-5 LB-6
Sample S-2 S-3 S-5
Spec
Depth 13-15 20-22 30-32
% +3"
% Gravel 1.2
% SAND 34.9 1.6 1.4
% FINES 63.9 98.4 98.6
% -2μ
Cc
Cu
LL
PL
PI
USCS ML ML ML
w (%) 27.4 28.1 34.3
Particle Size PERCENT FINER
(Sieve #) □ ■ ○
4" 100.0
3" 100.0
1 1/2" 100.0
3/4" 100.0 100.0
3/8" 99.4 99.9
4 98.8 99.9
10 98.1 100.0
20 97.0 99.9
40 94.1 99.9 100.0
60 90.9 99.7 99.9
100 86.0 99.3 99.8
200 63.9 98.4 98.6
SYMBOL DESCRIPTION AND REMARKS
□ brown sandy SILT, trace f. gravel.
■ red SILT, trace f. sand.
○ red SILT, trace f. sand.
PARTICLE SIZE DISTRIBUTION
Langan #5797401
Project No. 31737700-728
September 2007
Figure
Geotesting Services, Inc.
siev1b.xls 9/26/2007

APPENDIX C-2
Laboratory Test Results (Langan 2016)

Client:	Langan Engineering				
Project:	45 Broad St				
Location:	New York, NY			Project No:	GTX-304342
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	02/10/16	Checked By:	emm
Depth :	---	Test Id:	363604		

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content, %
B-7	S- 4	19-21 ft	Moist, brown clay	35.6
B-7	S- 6	23-25 ft	Wet, brown silty clay	40.3
B-7	S- 9	35-37 ft	Wet, brown clay	34.6
B-8	S- 2	15-17 ft	Wet, brown silt	32.8
B-8	S- 6	23-25 ft	Moist, brown silt	30.3

Notes: Temperature of Drying : 110° Celsius

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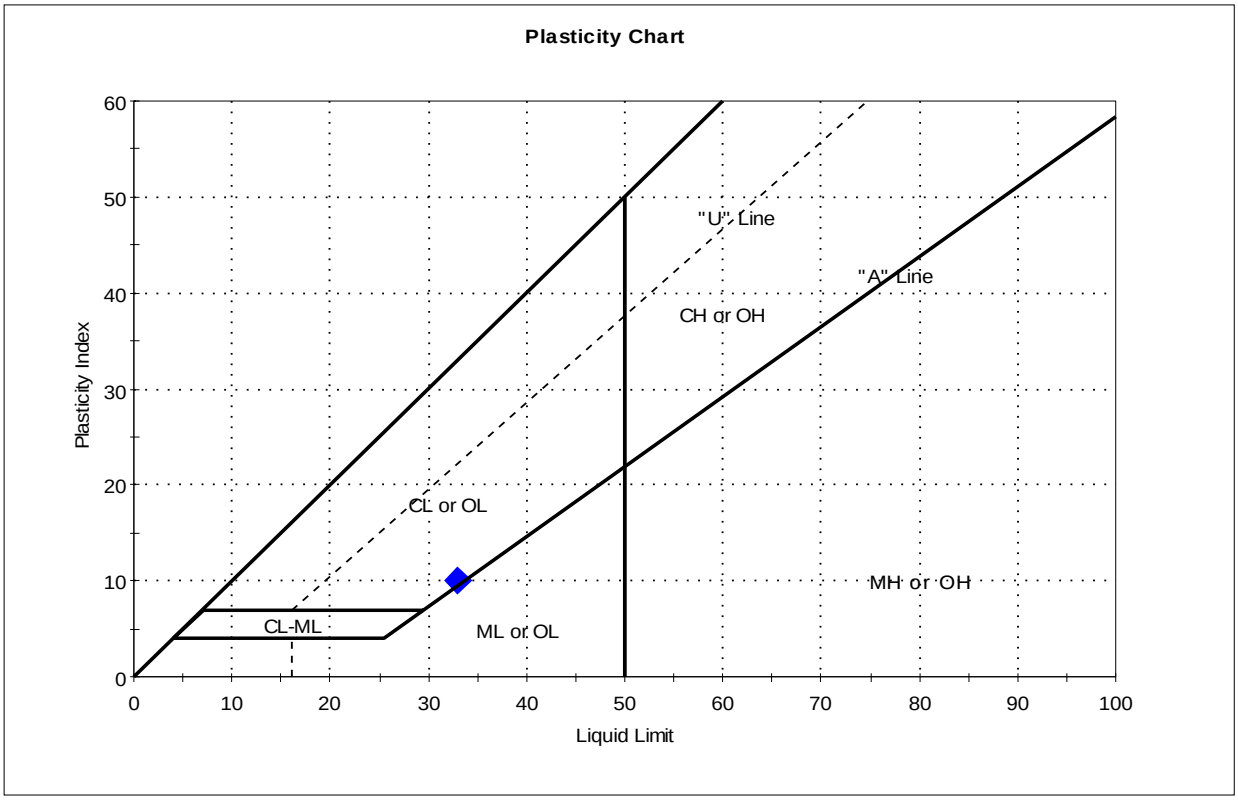
Client:	Langan Engineering				
Project:	45 Broad St				
Location:	New York, NY			Project No:	GTX-304342
Boring ID:	B-7	Sample Type:	jar	Tested By:	GA
Sample ID:	S-4	Test Date:	02/10/16	Checked By:	emm
Depth :	19-21 ft	Test Id:	363595		
Test Comment:	---				
Visual Description:	Moist, brown clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-4	B-7	19-21 ft	36	33	23	10	1.3	

Sample Prepared using the WET method

Dry Strength: HIGH
Dilatancy: NONE
Toughness: MEDIUM

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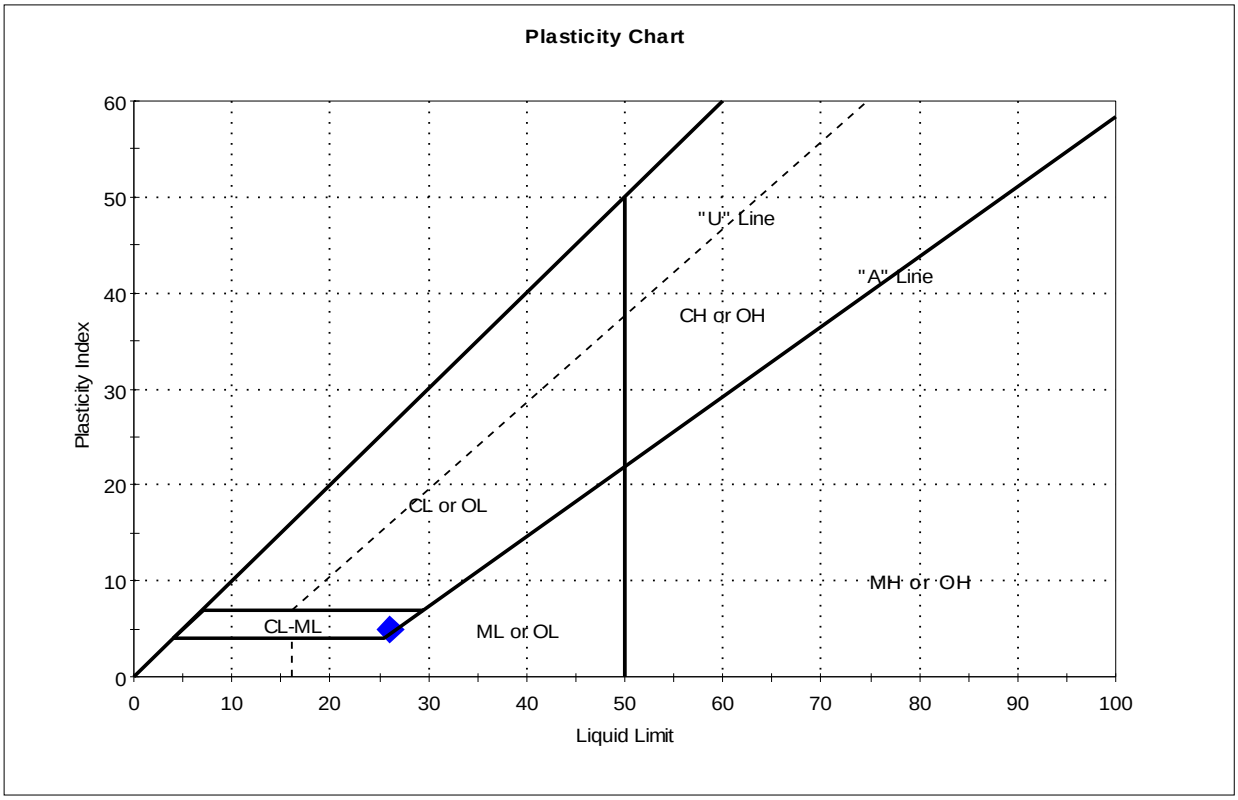
GeoTesting EXPRESS

Client:	Langan Engineering				
Project:	45 Broad St				
Location:	New York, NY			Project No:	GTX-304342
Boring ID:	B-7	Sample Type:	jar	Tested By:	GA
Sample ID:	S-6	Test Date:	02/10/16	Checked By:	emm
Depth :	23-25 ft	Test Id:	363596		
Test Comment:	---				
Visual Description:	Wet, brown silty clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-6	B-7	23-25 ft	40	26	21	5	3.9	

Sample Prepared using the WET method

Dry Strength: HIGH
Dilatancy: SLOW
Toughness: MEDIUM

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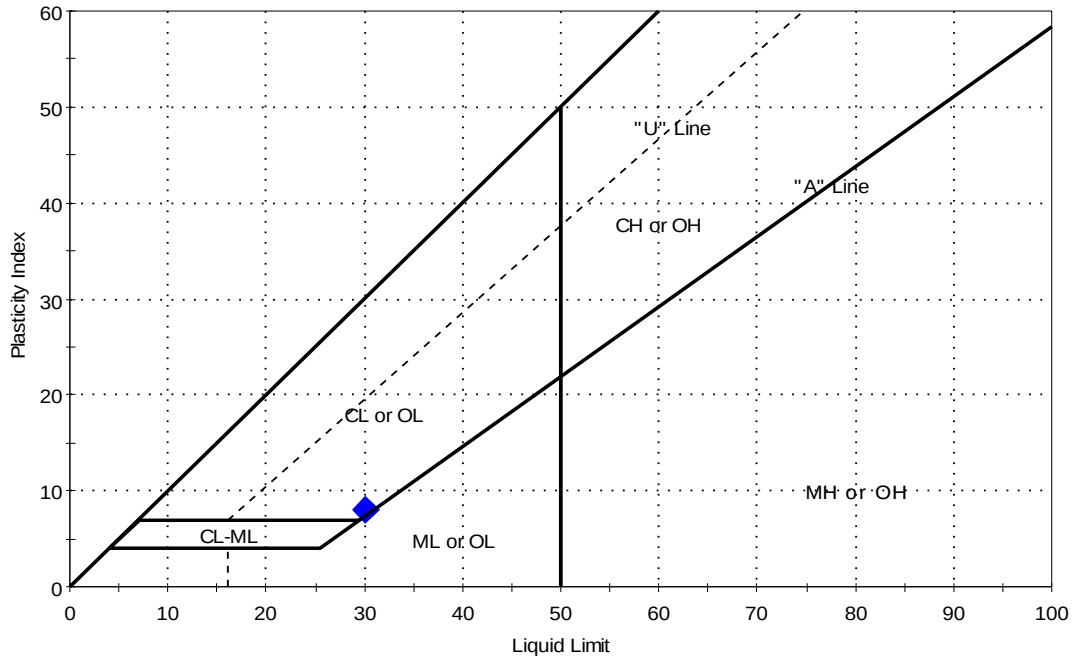
GeoTesting EXPRESS

Client:	Langan Engineering				
Project:	45 Broad St				
Location:	New York, NY			Project No:	GTX-304342
Boring ID:	B-7	Sample Type:	jar	Tested By:	GA
Sample ID:	S-9	Test Date:	02/10/16	Checked By:	emm
Depth :	35-37 ft	Test Id:	363597		
Test Comment:	---				
Visual Description:	Wet, brown clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-9	B-7	35-37 ft	35	30	22	8	1.6	

Sample Prepared using the WET method

Dry Strength: HIGH
Dilatancy: SLOW
Toughness: MEDIUM

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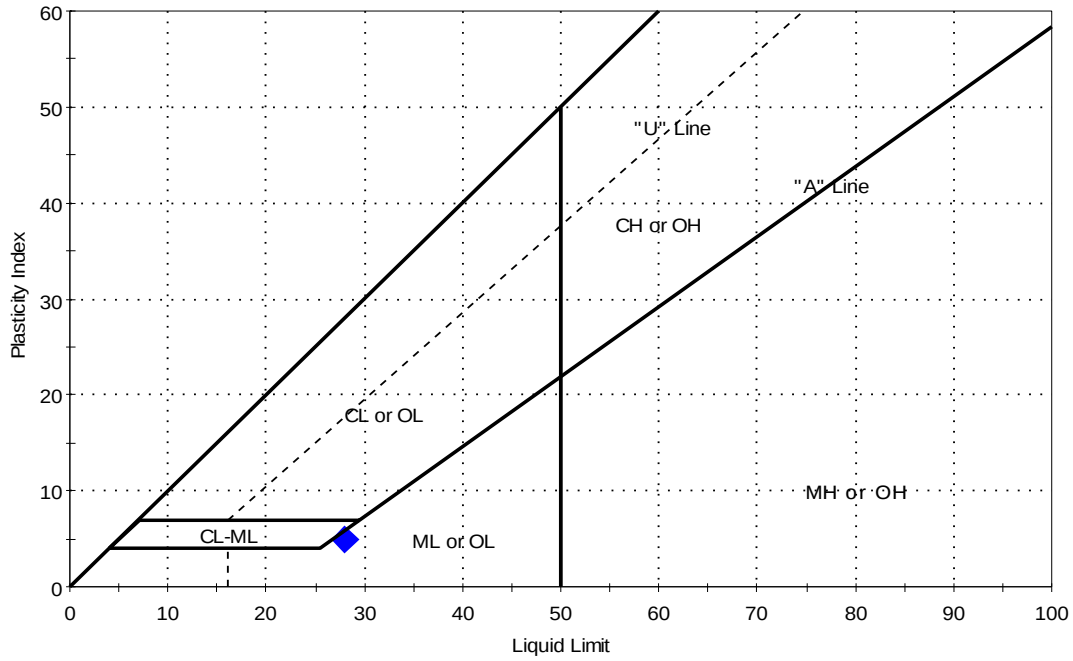
Client:	Langan Engineering				
Project:	45 Broad St				
Location:	New York, NY			Project No:	GTX-304342
Boring ID:	B-8	Sample Type:	jar	Tested By:	GA
Sample ID:	S-2	Test Date:	02/10/16	Checked By:	emm
Depth :	15-17 ft	Test Id:	363598		
Test Comment:	---				
Visual Description:	Wet, brown silt				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-2	B-8	15-17 ft	33	28	23	5	2	

Sample Prepared using the WET method

Dry Strength: HIGH
Dilatancy: SLOW
Toughness: MEDIUM

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Client:	Langan Engineering				
Project:	45 Broad St				
Location:	New York, NY			Project No:	GTX-304342
Boring ID:	B-8	Sample Type:	jar	Tested By:	GA
Sample ID:	S-6	Test Date:	02/10/16	Checked By:	emm
Depth :	23-25 ft	Test Id:	363599		
Test Comment:	---				
Visual Description:	Moist, brown silt				
Sample Comment:	---				

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-6	B-8	23-25 ft	30	n/a	n/a	n/a	n/a	

Dry Strength: NONE

Dilatancy: RAPID

Toughness: n/a

The sample was determined to be Non-Plastic

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Langan #170394201
45 Broad
SUMMARY OF ROCK TESTING

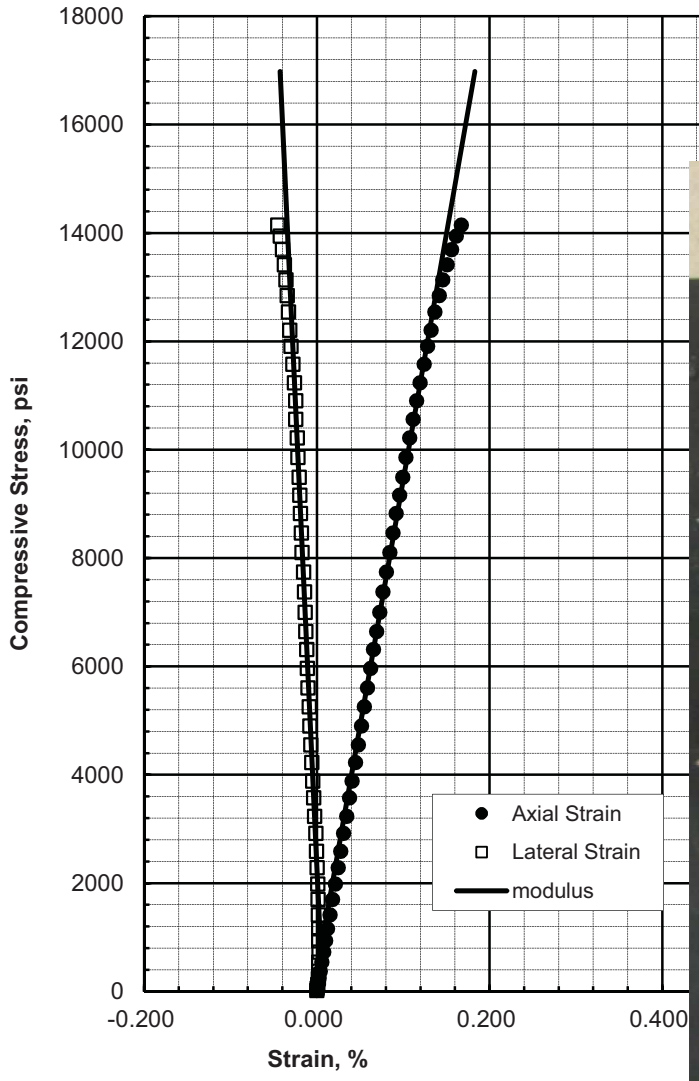
SAMPLE IDENTIFICATION			STATE PROPERTIES			ENGINEERING PROPERTY TESTS								REMARKS
Boring	Run	Depth	WATER CONTENT (1)	TOTAL UNIT WGT.	DRY UNIT WGT.	TEST TYPE (2)	ORIENTATION	Brazilian (ASTM D3967)	UNCONFINED COMPRESSION TESTS (ASTM D7012)					
								SPLITTING TENSILE STRENGTH	COMPRESSIVE STRENGTH	AXIAL STRAIN @ FAILURE	ESTIMATED (5) ELASTIC MODULUS	ELASTIC MODULUS	POISSON'S RATIO	
			(%)	(pcf)	(pcf)		(3)	(psi)	(psi)	(%)	(psi)	(psi)	(-)	
B-7	C-1	45.1-45.5	0.1	180	179	UCmod			14220	0.17		9.1E+06	0.26	
B-7	C-2	50.1-50.2	0.1	182	182	A	A	2311						
B-7	C-2	50.2-50.6	0.1	181	181	UC			16810	0.18	1.01E+07			
B-7	C-2	50.6-50.7	0.0	177	177	B	B	1341						
B-8	C-1	48.3-48.7	0.6	178	177	UCmod			8420	0.14		6.5E+06	0.31	
B-8	C-2	50.4-50.5	0.2	180	180	A	A	1428						
B-8	C-2	50.5-50.9	0.2	178	177	UC			14220	0.20	7.82E+06			
B-8	C-2	50.9-51.0	0.1	173	173	B	B	1510						

Notes: (1) Water contents determined after trimming and shearing.
(2) Test Type Abbreviations: UC: UC Compression test with estimated elastic moduli determination; Ucmod: UC compression test with direct elastic moduli determination
(3) Diametral orientation across core along bedding plane, axial perpendicular to bedding plane.
(5) Modulus estimated based on corrected gross deformations.

Prepared by: CMJ
Reviewed by: GET
Date: 4/21/2016

TerraSense, LLC
45H Commerce Way
Totowa, NJ 07512

Project No.: 7920-16016
File: RockSummary16.xlsx



FAILURE PHOTO

Specimen Information

Water Content (%)	Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	Length (inch)	Diameter (inch)
0.08	180	179	4.745	1.974

Specimen meets ASTM D4543 shape tolerances

Test Summary

Strain Rate (%/min)	Strain to Peak (%)	q_u (psi)	Elastic Modulus (psi)	Poisson's Ratio
0.11	0.17	14220	9.09E+06	0.26

Tested by: GT Test Date: Apr-16-16

Langan **Project # 170394201**	**45 Broad**	**COMPRESSIVE STRESS VS STRAIN** **UNCONFINED COMPRESSIVE STRENGTH AND** **AND ELASTIC MODULUS TEST** **Boring: B-7 Sample: C-1** **Depth 45.1-45.5 ft.**
TerraSense, LLC **Project # 7920-616**		

Analysis File: UCModV2

4/21/2016
UCMLB7C1.xlsx

SPLITTING TENSILE (Brazilian) TEST

ASTM D 3967

Project Number: 7920-616 **Test by:** MHC **Sta:** B-7

Project Name: 45 Broad **Test Date:** 4/19/16 **Run:** C-2

SPECIMEN READINGS

	A	B
Test Number:	A	B
Depth:	50.1-50.2	50.6-50.7
Specimen mass(gm):	146.39	148.80

	A Thickness (inch)	A Diameter (inch)	B Thickness (inch)	B Diameter (inch)
	1.003	1.976	1.035	1.979
	0.994	1.975	1.042	1.978
	1.003	1.977	1.046	1.981
Average	1.000	1.976	1.041	1.979
Thickness / Diameter, (t/d):	0.51		0.53	
t/D ratio between 0.2 and 0.75	yes		yes	

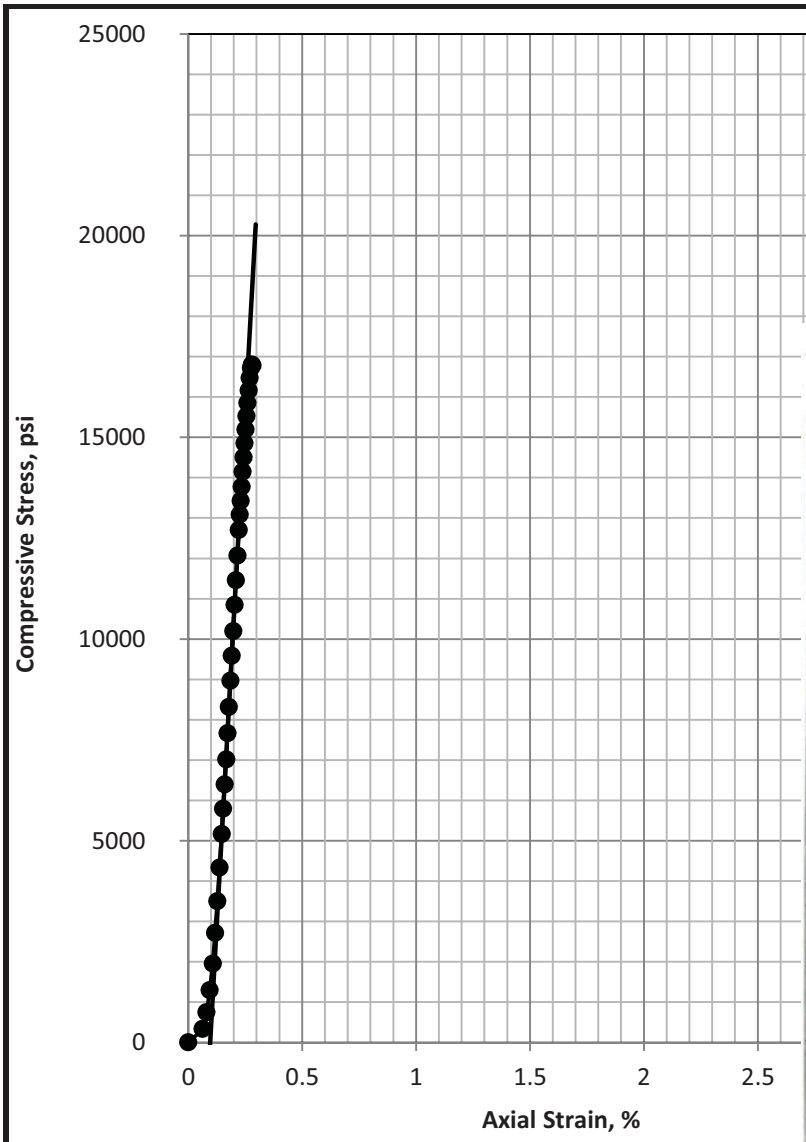
	A	B
Data Acquisition File	BR-B7-C2-A	BR-B7-C2-B
Maximum Load	7169 lb	4338 lb

	A After Test	B After Test
Container No.:	144A	930
Initial Mass + cont. (g):	356.94	363.23
Dry Mass + cont. (g):	356.85	363.16
Mass of cont. (g):	210.58	214.51
Water content (%):	**0.06**	**0.05**
Total unit weight (pcf):	181.95	177.12
Dry unit weight (pcf):	181.84	177.04
Splitting Tensile Strength (psi)	2310.64	1341.16

A B

Failure Photo

Langan	170394201	**45 Broad**	**DATA SHEET SPLITTING TENSILE STRENGTH TEST Sta: B-7 Run: C-2 Depth: 50.1-50.7 ft.**
TerraSense, LLC	7920-616		



FAILURE PHOTO

Specimen Information

Water Content (%)	Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	Length (inch)	Diameter (inch)
0.05	181	181	4.873	1.977

Specimen meets ASTM D4543 shape tolerances

Test Summary

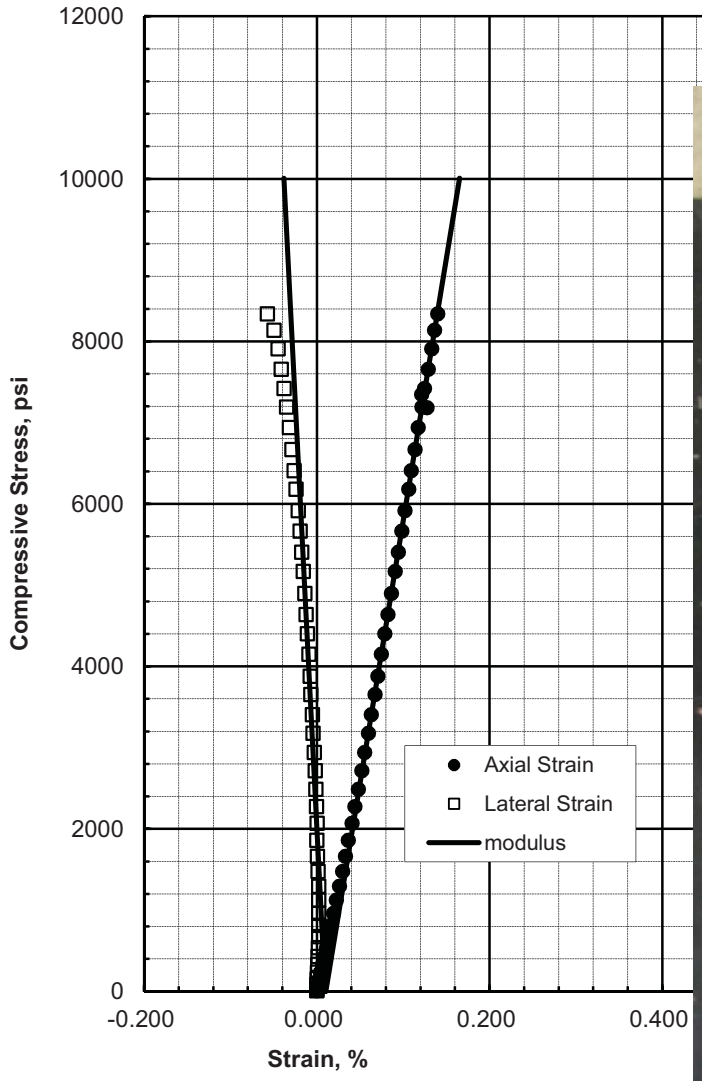
Strain Rate (%/min)	Corrected Strain to Peak (%)	q_u (psi)	Estimated (shown) Elastic Modulus (psi)
0.08	0.18	16810	1.01E+07

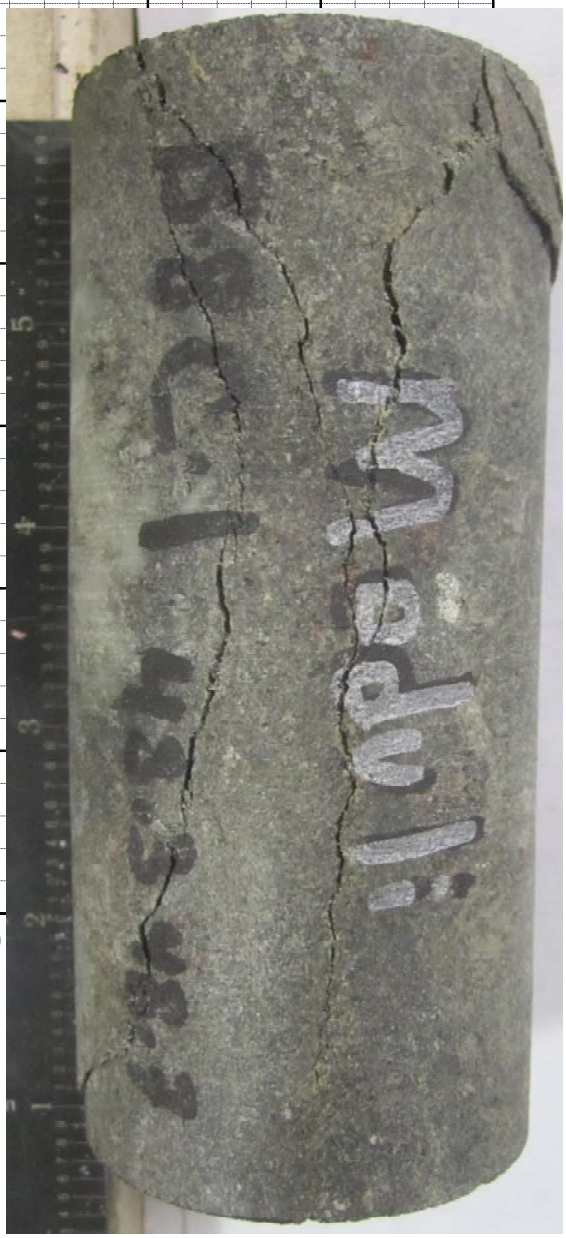
Test by: MHC
Test Date: Apr-19-16
Reviewed by: GET

Langan **Project # 170394201**	**45 Broad**	**COMPRESSIVE STRESS VS STRAIN** **UNCONFINED COMPRESSIVE STRENGTH TEST**
TerraSense, LLC **Project # 7920-616**		**Boring: B-7 Sample: C-2** **Depth 50.2-50.6 ft.**

Analysis File: UCrock7rev1 (3/11)

4/21/2016
UCB7C2.xlsx





Specimen Information

Water Content (%)	Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	Length (inch)	Diameter (inch)
0.58	178	177	4.834	1.976

Specimen meets ASTM D4543 shape tolerances

Test Summary

Strain Rate (%/min)	Strain to Peak (%)	q_u (psi)	Elastic Modulus (psi)	Poisson's Ratio
0.15	0.14	8420	6.47E+06	0.31

Tested by: GT Test Date: Apr-16-16

FAILURE PHOTO

Langan **Project # 170394201**	**45 Broad**	**COMPRESSIVE STRESS VS STRAIN** **UNCONFINED COMPRESSIVE STRENGTH AND** **AND ELASTIC MODULUS TEST** **Boring: B-8 Sample: C-1** **Depth 48.3-48.7 ft.**
TerraSense, LLC **Project # 7920-616**		

Analysis File: UCModV2

4/21/2016
UCMLB8C1.xlsx

SPLITTING TENSILE (Brazilian) TEST

ASTM D 3967

Project Number: 7920-616 **Test by:** MHC **Sta:** B-8

Project Name: 45 Broad **Test Date:** 4/19/16 **Run:** C-2

SPECIMEN READINGS

	A	B
Test Number:	A	B
Depth:	50.4-50.5	50.9-51.0
Specimen mass(gm):	153.00	144.35

A Thickness (inch)	A Diameter (inch)	B Thickness (inch)	B Diameter (inch)
1.050	1.980	1.042	1.985
1.049	1.980	1.025	1.978
1.054	1.979	1.030	1.975
Average 1.051	1.979	Average 1.032	1.979

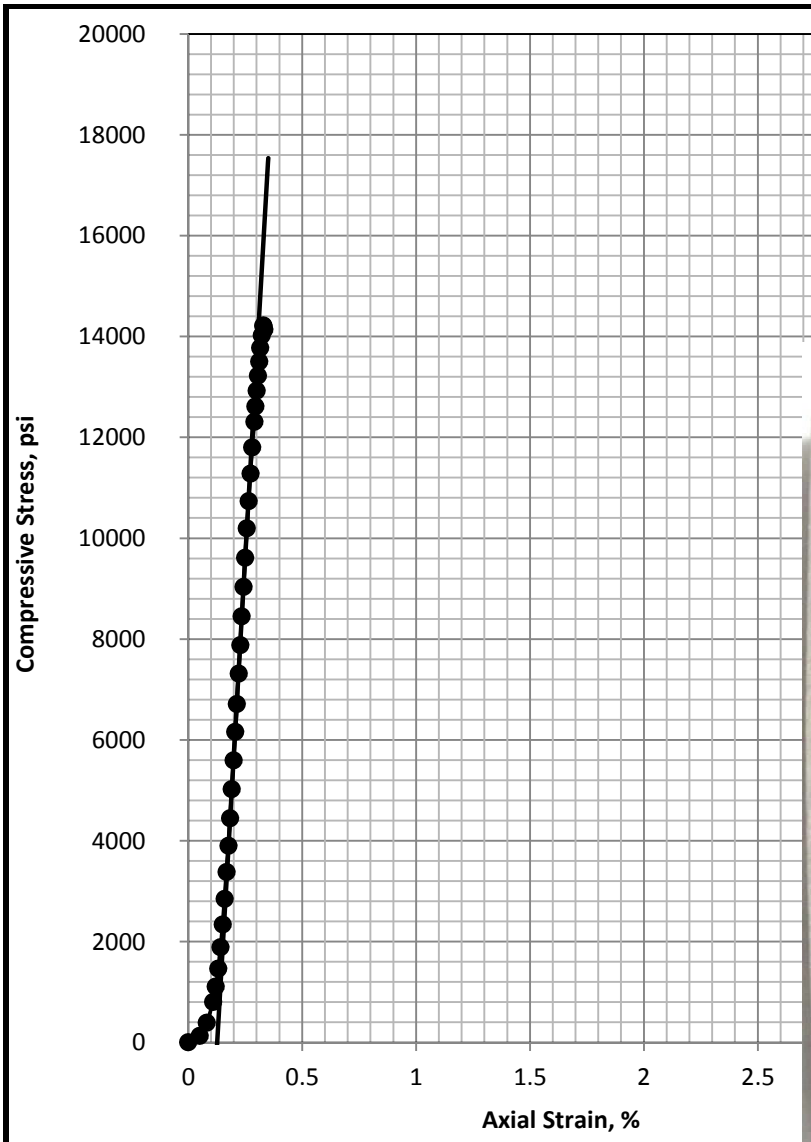
	A	B
Thickness / Diameter, (t/d):	0.53	0.52
t/D ratio between 0.2 and 0.75	yes	yes
Data Acquisition File	BR-B8-C2-A	BR-B8-C2-B
Maximum Load	4666 lb	4844 lb

A B

Failure Photo

	A After Test	B After Test
Container No.:	118	482
Initial Mass + cont. (g):	363.99	357.05
Dry Mass + cont. (g):	363.71	356.84
Mass of cont. (g):	211.04	212.77
Water content (%):	**0.18**	**0.15**
Total unit weight (pcf):	180.27	173.24
Dry unit weight (pcf):	179.94	172.99
Splitting Tensile Strength (psi)	1428.14	1509.94

Langan	170394201	**45 Broad**	**DATA SHEET SPLITTING TENSILE STRENGTH TEST Sta: B-8 Run: C-2 Depth: 50.4-51.0 ft.**
TerraSense, LLC	7920-616		



Specimen Information

Water Content (%)	Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	Length (inch)	Diameter (inch)
0.17	178	177	4.747	1.980

Specimen meets ASTM D4543 shape tolerances

FAILURE PHOTO

Test Summary

Strain Rate (%/min)	Corrected Strain to Peak (%)	q_u (psi)	Estimated (shown) Elastic Modulus (psi)
0.09	0.20	14220	7.82E+06

Test by: MHC
Test Date: Apr-19-16
Reviewed by: GET

Langan **Project # 170394201**	**45 Broad**	**COMPRESSIVE STRESS VS STRAIN** **UNCONFINED COMPRESSIVE STRENGTH TEST**
TerraSense, LLC **Project # 7920-616**		**Boring: B-8 Sample: C-2** **Depth 50.5-50.9 ft.**

Analysis File: UCrock7rev1 (3/11)

4/21/2016
UCB8C2.xlsx

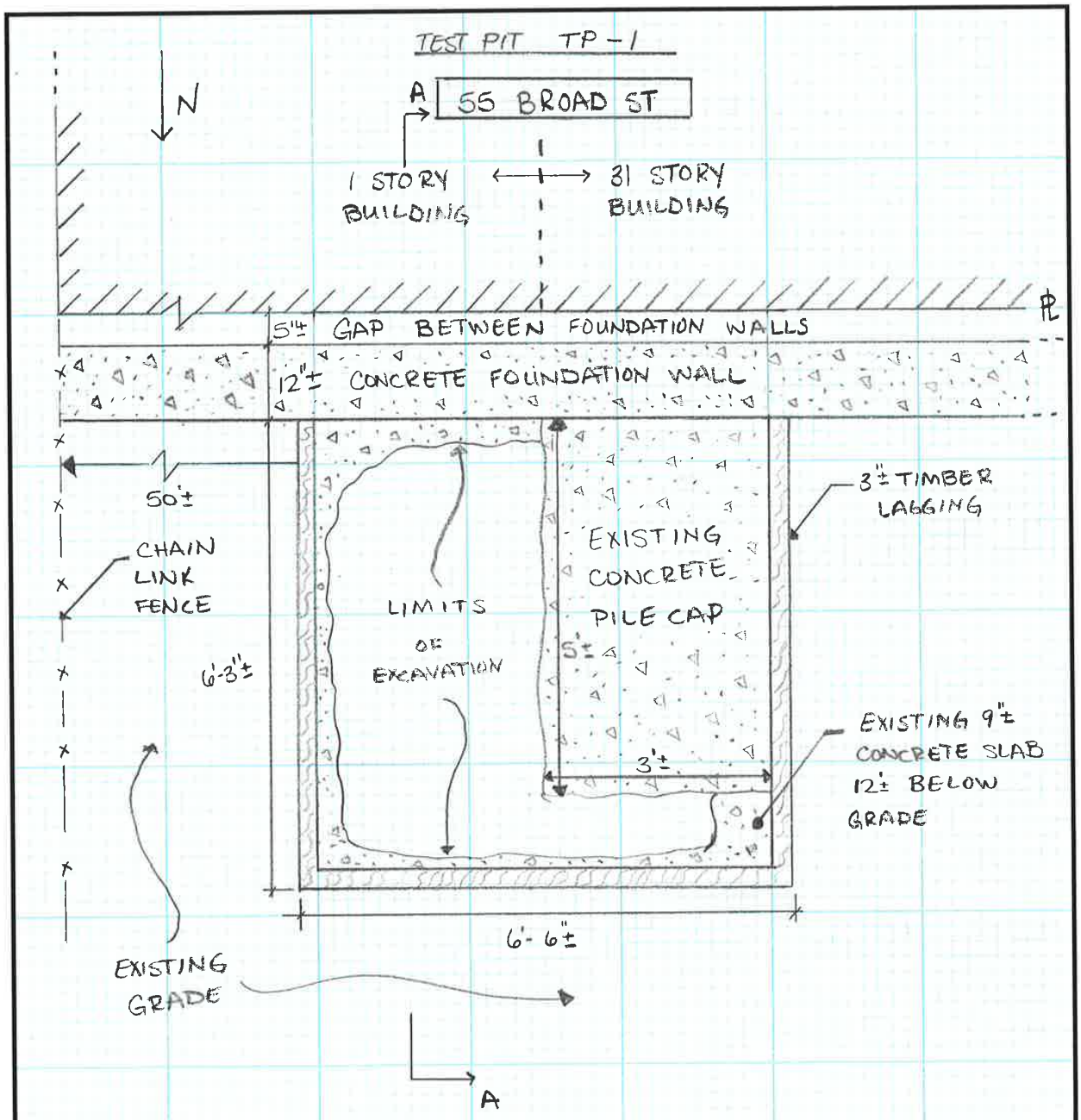
APPENDIX D
Test Pit Log and Photographs (Langan 2016)

Test Pit TP-1

Test pit TP-1 was excavated along the south property line of the site to investigate the foundation properties of the adjacent building, 55 Broad Street. The excavation was 6 feet wide by 6 feet long by 23 feet deep. Existing grade is about el. 11.5.

The remaining portion of the 12-inch-thick foundation wall was encountered at the existing grade and extended to about 12 feet below the existing grade, corresponding to about el. -0.5. The foundation wall rested on a 9-inch-thick concrete slab with rebar. A 5-inch-wide gap separated the remaining foundation wall and the adjacent building. The test pit exposed the adjacent building's foundation wall and pile cap. The concrete foundation wall extended to about 16 feet below the existing grade, corresponding to about el. -4.5. Two feet of timber was encountered below the foundation wall, followed by an about 5-foot-thick pile cap. The bottom of the pile cap was encountered at about 23 feet below the existing grade, corresponding to about el. -11.5.

Demolition debris (brick, concrete, building material, etc.) mixed with brown coarse to fine sand was encountered in the first 12 feet of the test pit, above the existing basement slab. Gray-brown clayey silt was encountered beneath the concrete slab and extended throughout the explored depth of the test pit. Groundwater was encountered at about 18 feet below existing grade in TP-1 (about el. -6.5). The test pit was backfilled with the excavated material upon completion.



45 Broad Street, Manhattan, NY Test Pit, TP-1	BY MLM DATE 2/22/16 CKD. ____ DATE ____	PROJ. NO. 170394201 SHEET 1 OF 2

LANGAN

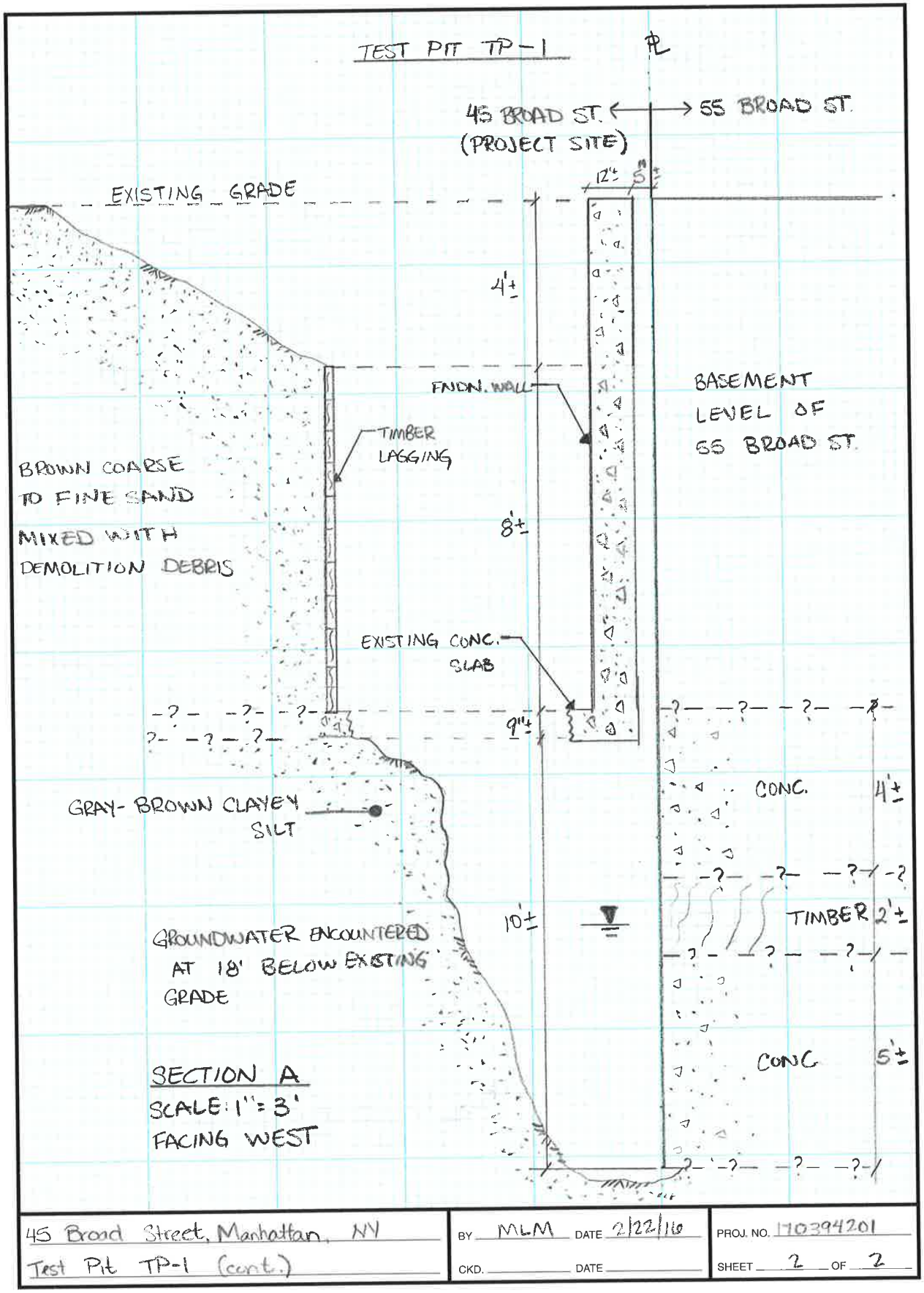

TEST PIT TP-1
℄
45 BROAD ST. ⟷ 55 BROAD ST.
(PROJECT SITE)
EXISTING GRADE
12"±
5"±
4'±
FNDN. WALL
BASEMENT LEVEL OF 55 BROAD ST.
TIMBER LAGGING
BROWN COARSE TO FINE SAND MIXED WITH DEMOLITION DEBRIS
8'±
EXISTING CONC. SLAB
9"±
GRAY-BROWN CLAYEY SILT
CONC.
4'±
10'±
TIMBER
2'±
GROUNDWATER ENCOUNTERED AT 18' BELOW EXISTING GRADE
CONC
5'±
SECTION A
SCALE: 1" = 3'
FACING WEST
45 Broad Street, Manhattan, NY
Test Pit TP-1 (cont.)
BY MLM DATE 2/22/16
CKD. DATE
PROJ. NO. 170394201
SHEET 2 OF 2
LANGAN

Photo 001: General view of the existing foundation wall, facing southwest.

Photo 002: General view of the demolition debris excavated from the test pit, facing northeast.

Photo 003: General view of the basement slab encountered at 12 feet below the ground surface, facing south.

Photo 004: General view of the test pit showing rebar found underneath the 9-inch-thick concrete slab, facing southwest.

Photo 005: General view of the test pit showing the pile cap encountered, facing south.

Photo 006: General view of the test pit showing the foundation wall extending to 23 feet below the ground surface, facing south.

APPENDIX E
Cone Penetration Tests (CPTs) Report

CRAIG
GEOTECHNICAL DRILLING CO., INC.

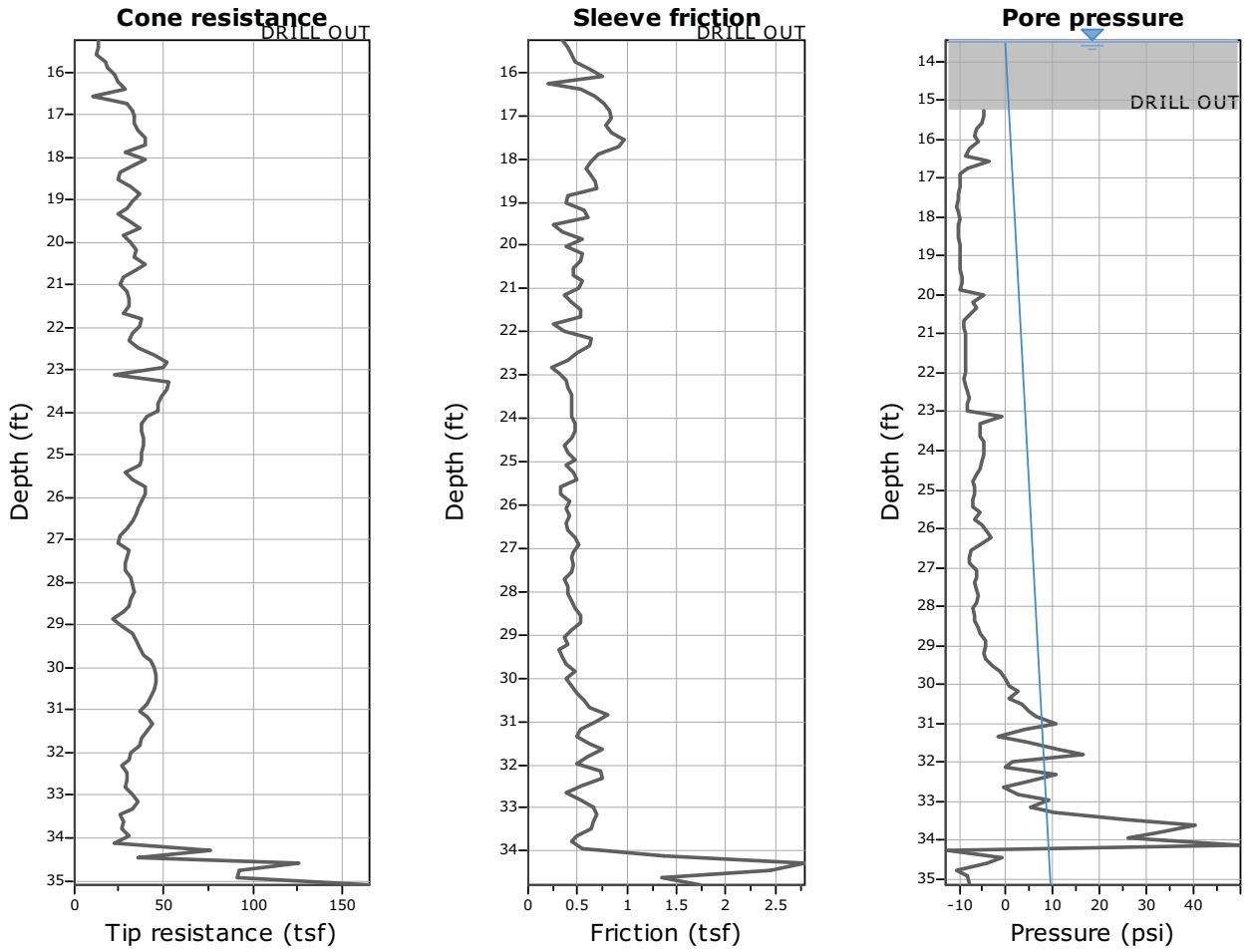
2/8/16 Job#: 165015 Client: Langan Engineeri Location: 45 Broad Street, Manhattan NY

Date	CPT Sounding	Depth	Seicmic Tests	Comments
2/1/16	CPT-1	35.1	7	Pre-Drill 15ft.
2/1/16	CPT-2	38.22	8	Pre-Drill 15ft.

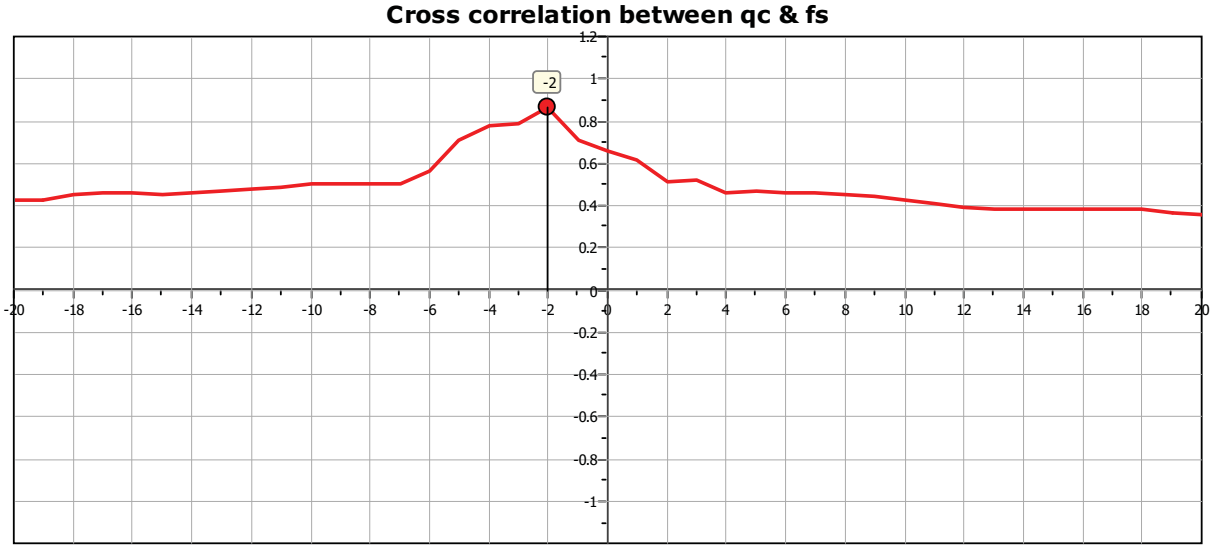
CRAIG GEOTECHNICAL DRILLING CO., INC.

CPT: LanganBroad Street CPT-1
Total depth: 35.10 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

Project: **Langan**
Location: **45 Broad Street, Manhattan NY**



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).

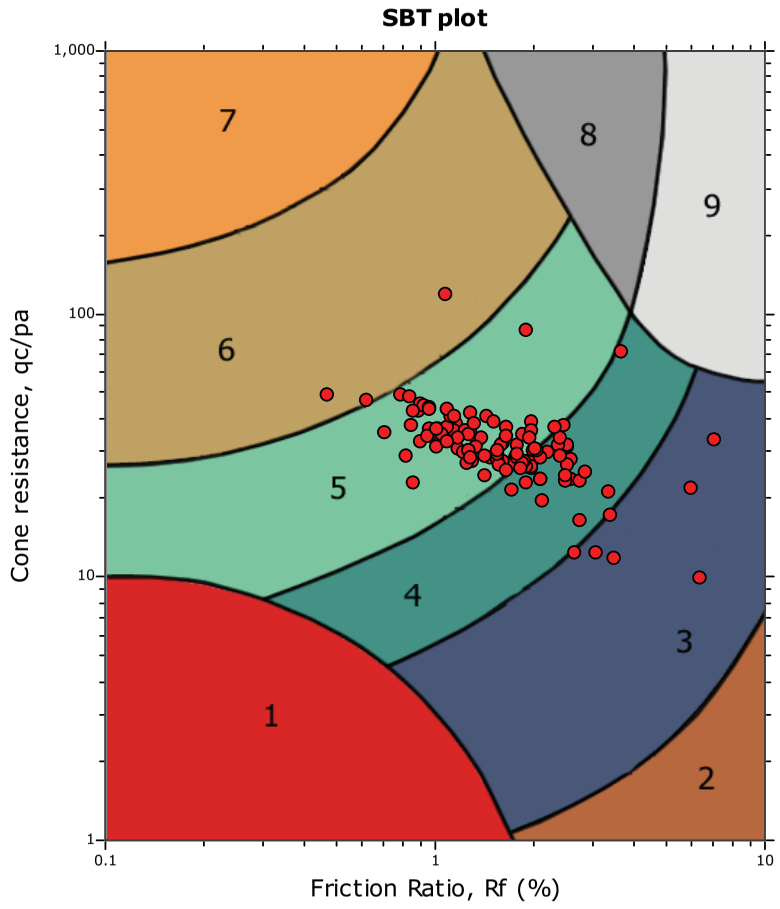


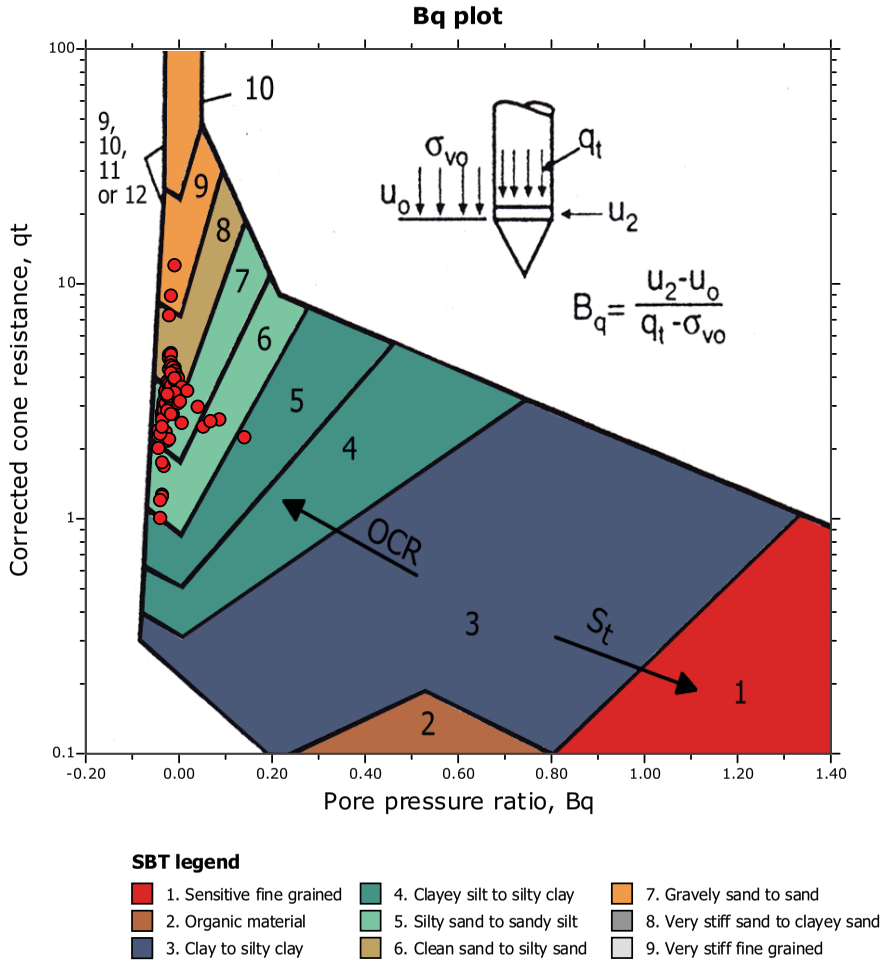
CRAIG GEOTECHNICAL DRILLING CO., INC.

Project: **Langan**
Location: **45 Broad Street, Manhattan NY**

CPT: LanganBroad Street CPT-1
Total depth: 35.10 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

SBT - Bq plots





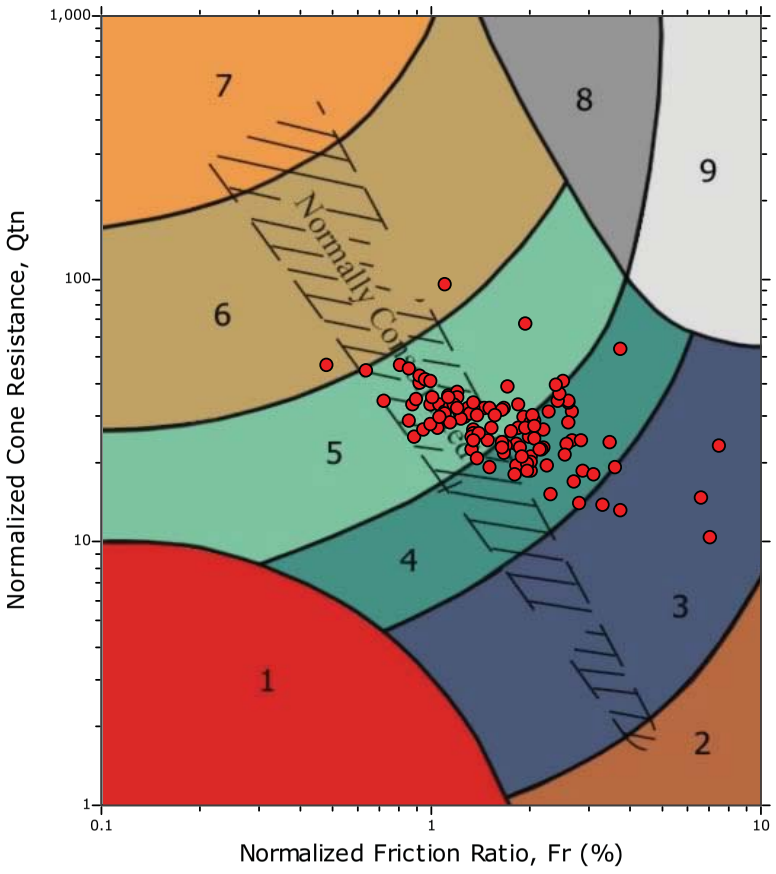
CRAIG GEOTECHNICAL DRILLING CO., INC.

Project: **Langan**
Location: **45 Broad Street, Manhattan NY**

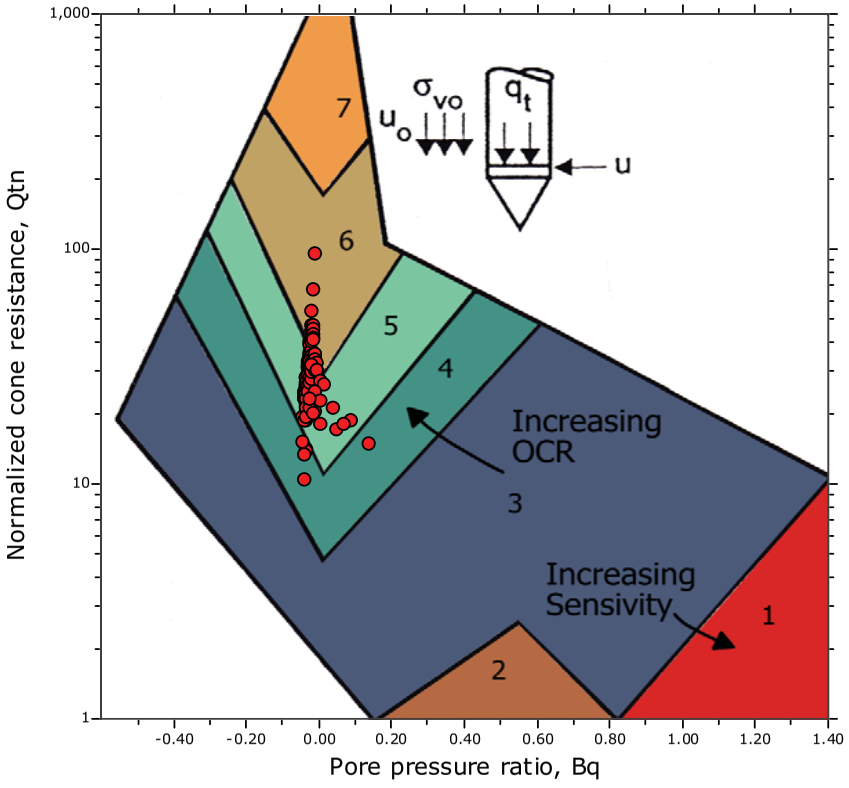
CPT: LanganBroad Street CPT-1
Total depth: 35.10 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

SBT - Bq plots (normalized)

SBTn plot



Normalized Bq plot



SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CRAIG GEOTECHNICAL DRILLING CO., INC.

Project: Langan

Location: 45 Broad Street, Manhattan NY

CPT: LanganBroad Street CPT-1

Total depth: 35.10 ft, Date: 2/8/2016

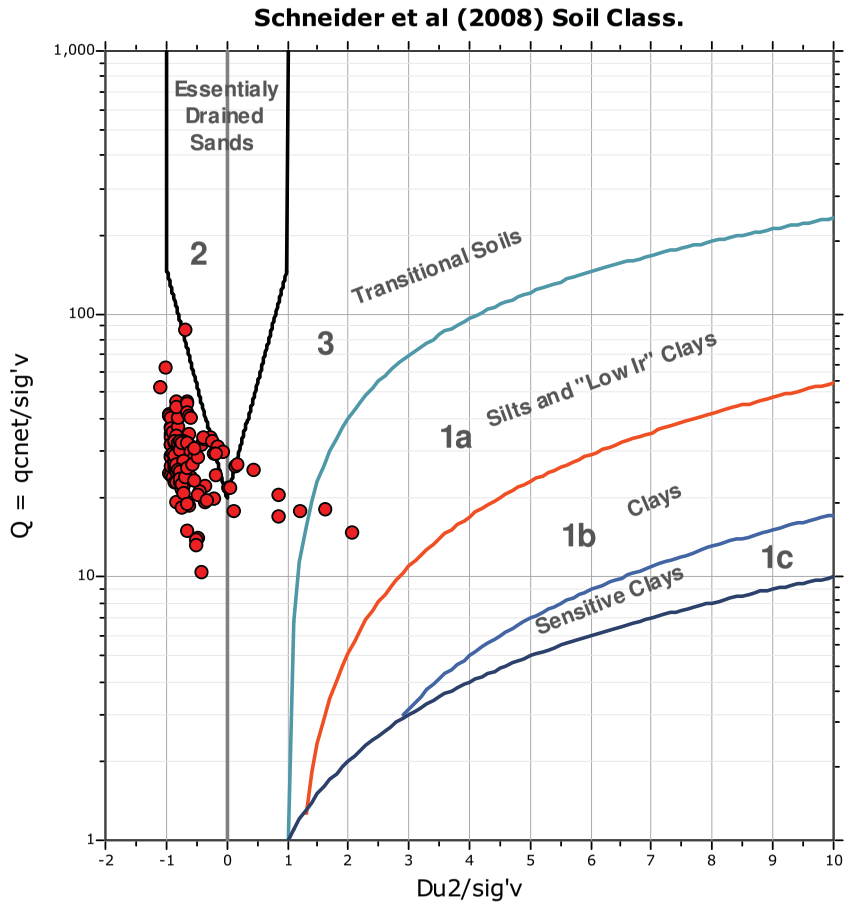
Surface Elevation: 0.00 ft

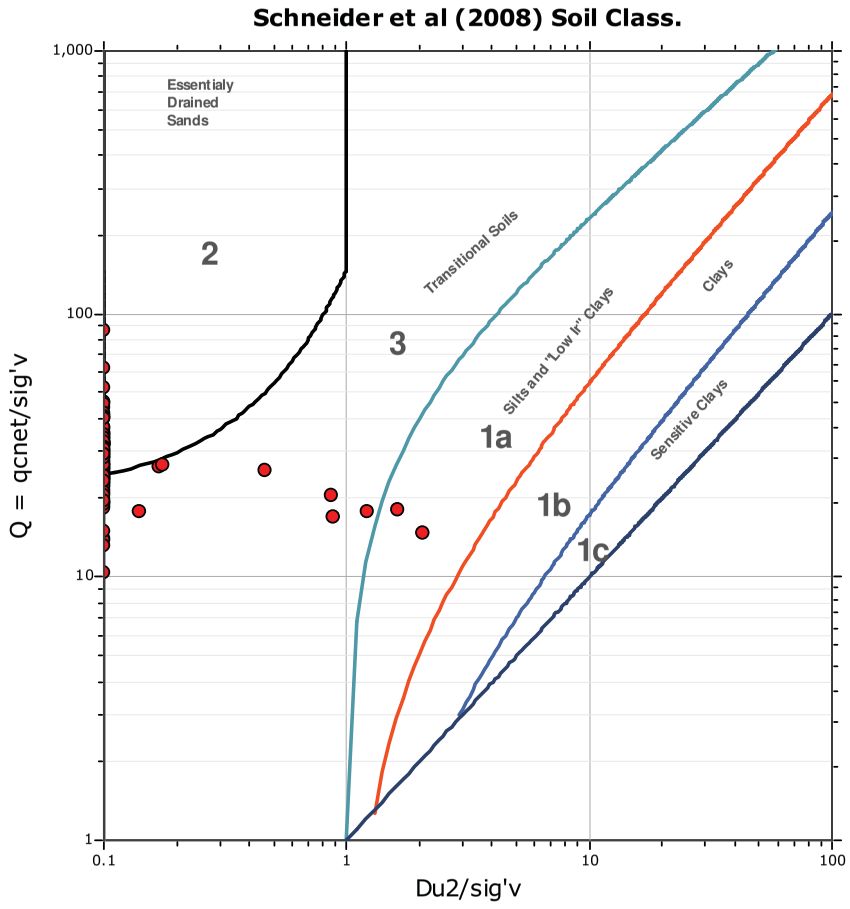
Coords: X:0.00, Y:0.00

Cone Type: Uknown

Cone Operator: Uknown

Bq plots (Schneider)



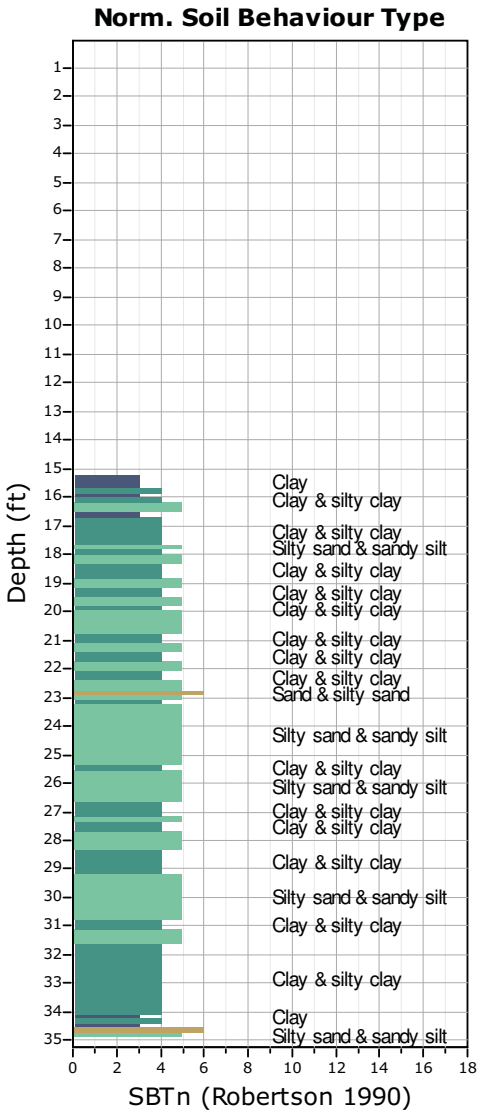


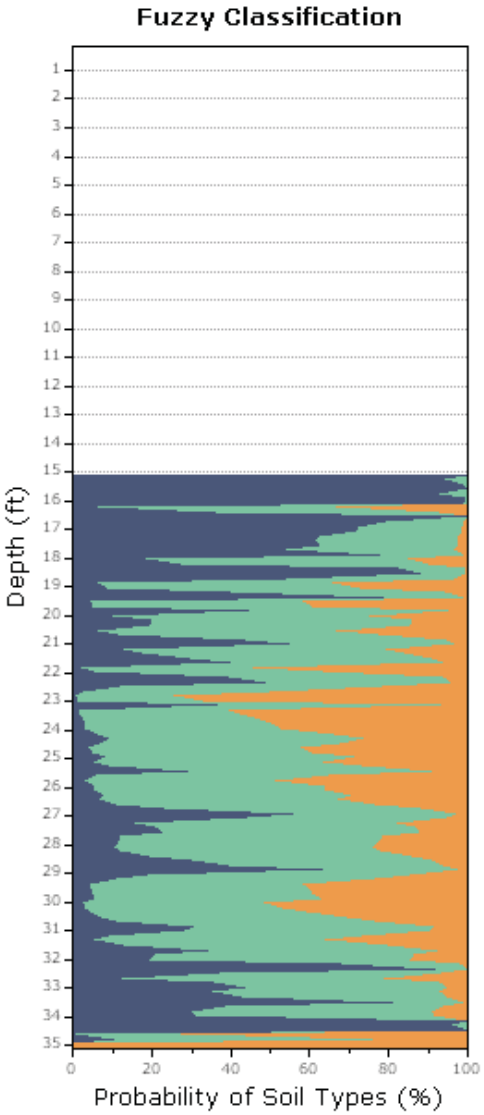
CRAIG GEOTECHNICAL DRILLING CO., INC.

CPT: LanganBroad Street CPT-1

Total depth: 35.10 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

Project: **Langan**
Location: **45 Broad Street, Manhattan NY**



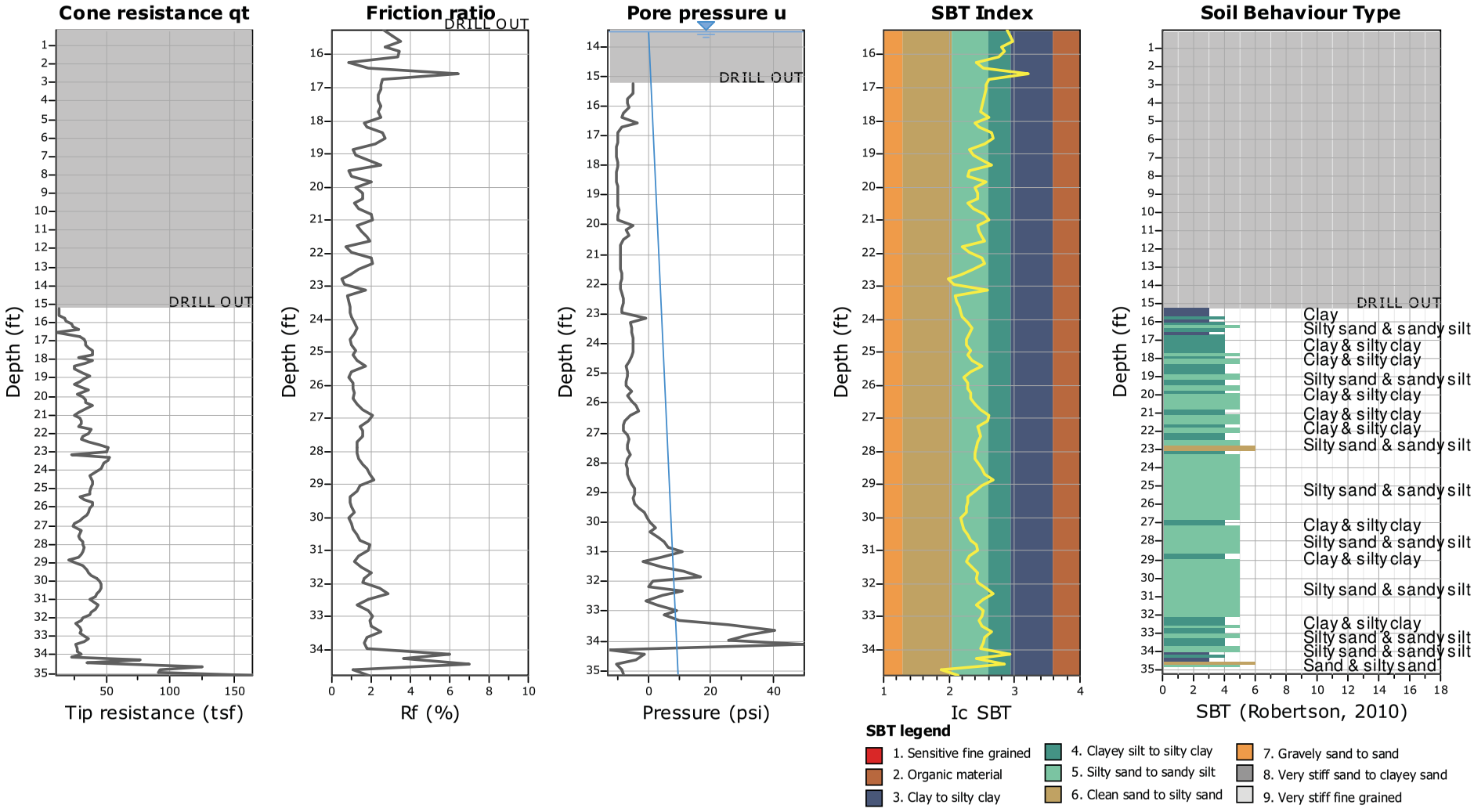


CRAIG GEOTECHNICAL DRILLING CO., INC.

CPT: LanganBroad Street CPT-1

Total depth: 35.10 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

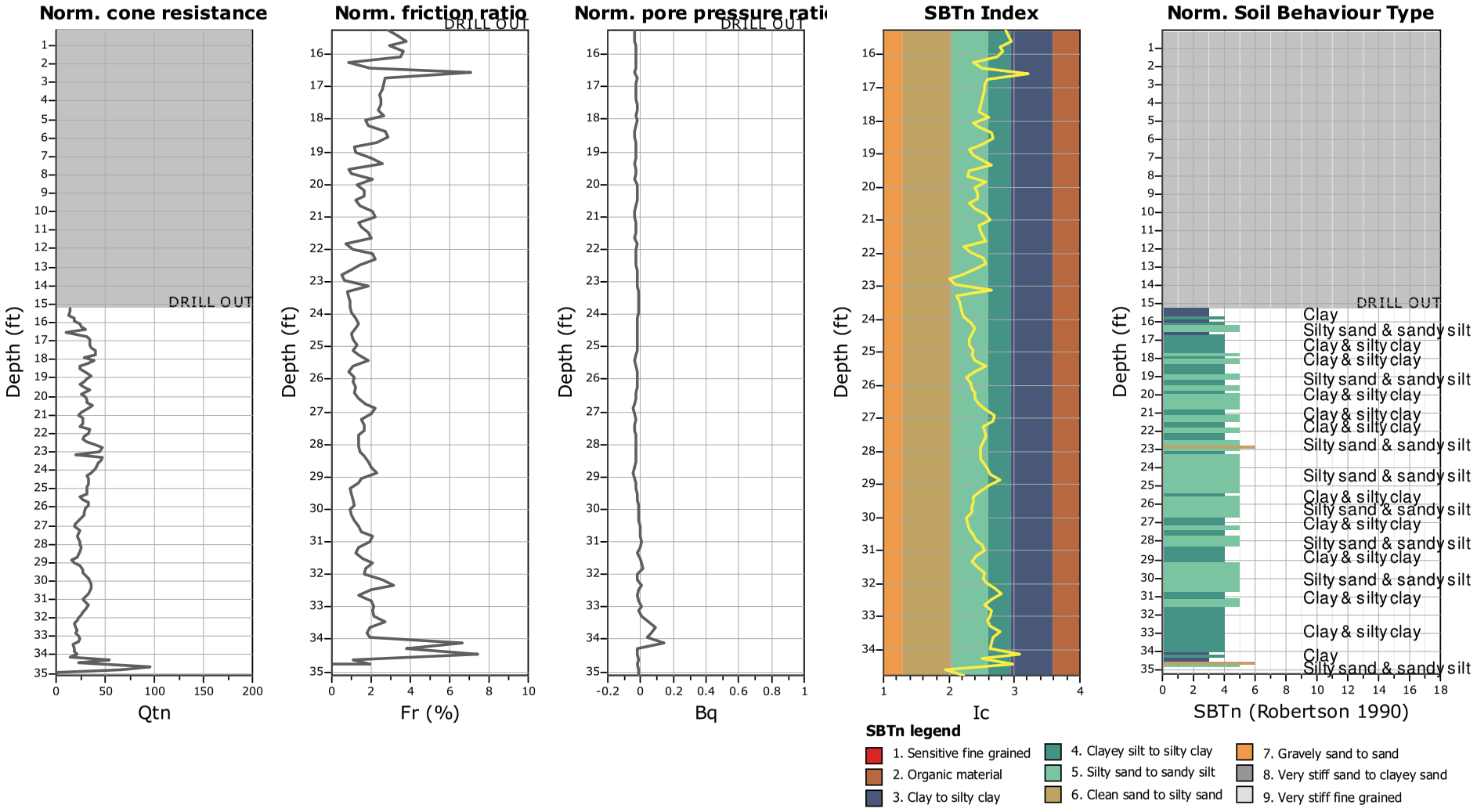
Project: Langan
Location: 45 Broad Street, Manhattan NY



CRAIG
GEOTECHNICAL DRILLING CO., INC.

Project: Langan
Location: 45 Broad Street, Manhattan NY

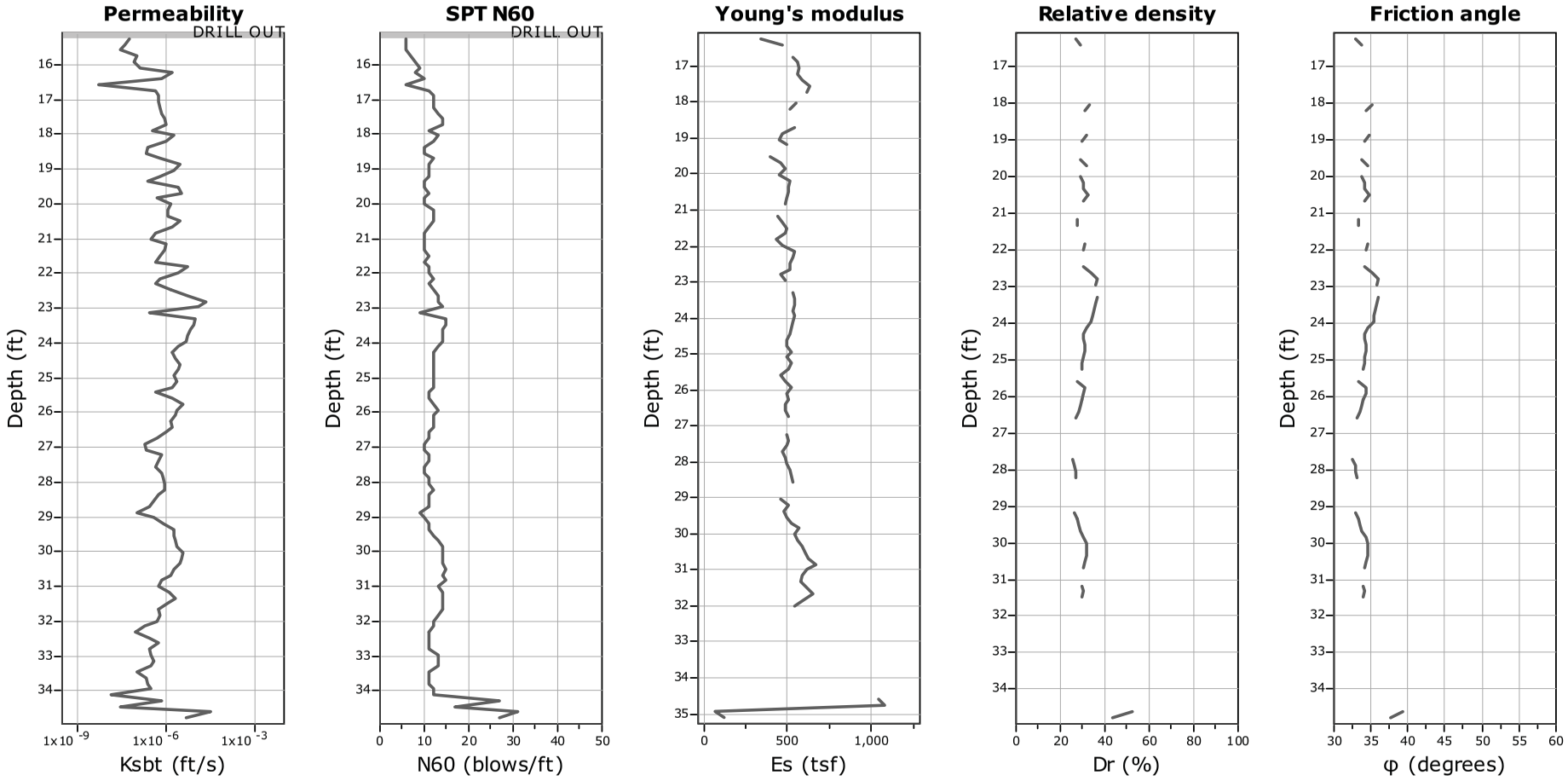
CPT: LanganBroad Street CPT-1
Total depth: 35.10 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown



CRAIG GEOTECHNICAL DRILLING CO., INC.

Project: **Langan**
Location: **45 Broad Street, Manhattan NY**

CPT: LanganBroad Street CPT-1
Total depth: 35.10 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown



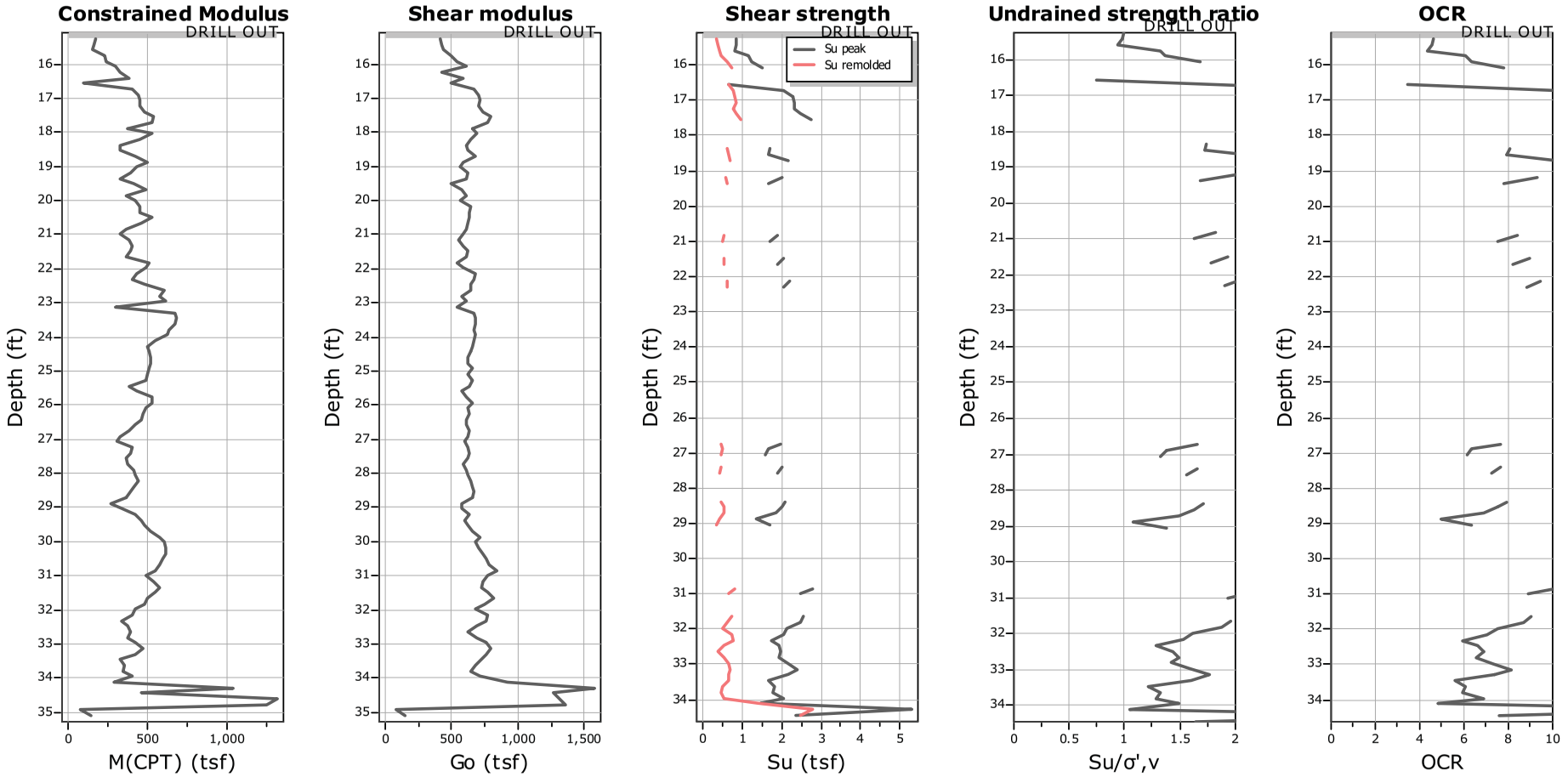
Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative desnisty constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

CPT: LanganBroad Street CPT-1

Total depth: 35.10 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

Project: Langan
Location: 45 Broad Street, Manhattan NY



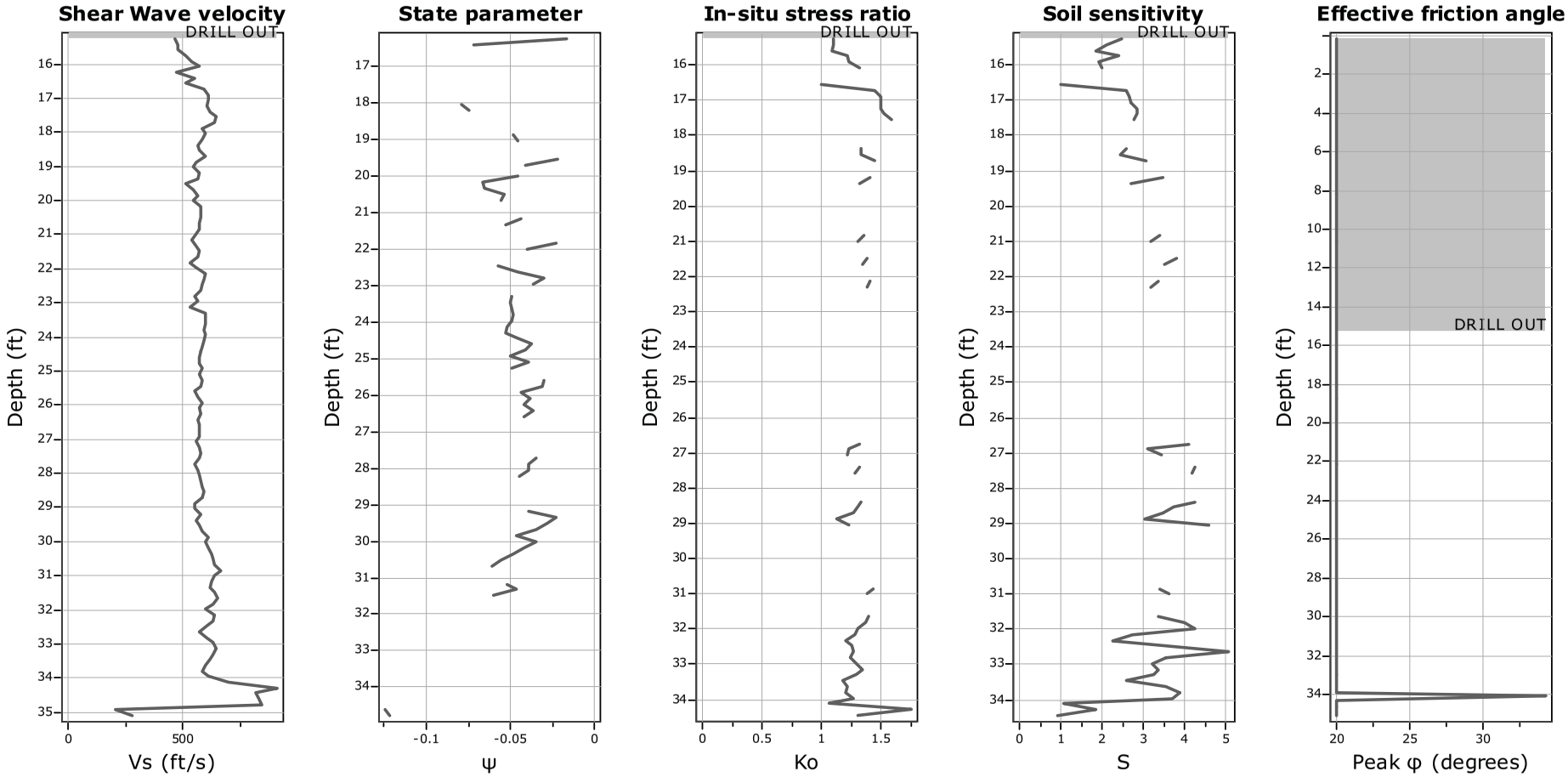
Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14
OCR factor for clays, N_{kt}: 0.33
User defined estimation data

CPT: LanganBroad Street CPT-1

Total depth: 35.10 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

Project: Langan
Location: 45 Broad Street, Manhattan NY



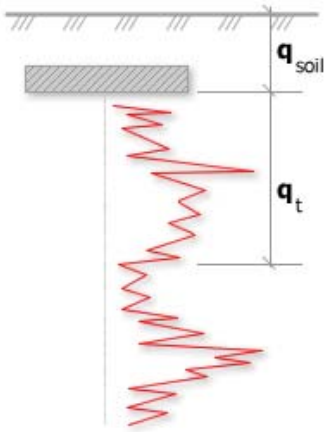
Calculation parameters

Soil Sensitivity factor, N_S: 7.00
User defined estimation data

CRAIG GEOTECHNICAL DRILLING CO., INC.

CPT: LanganBroad Street CPT-1
Total depth: 35.10 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

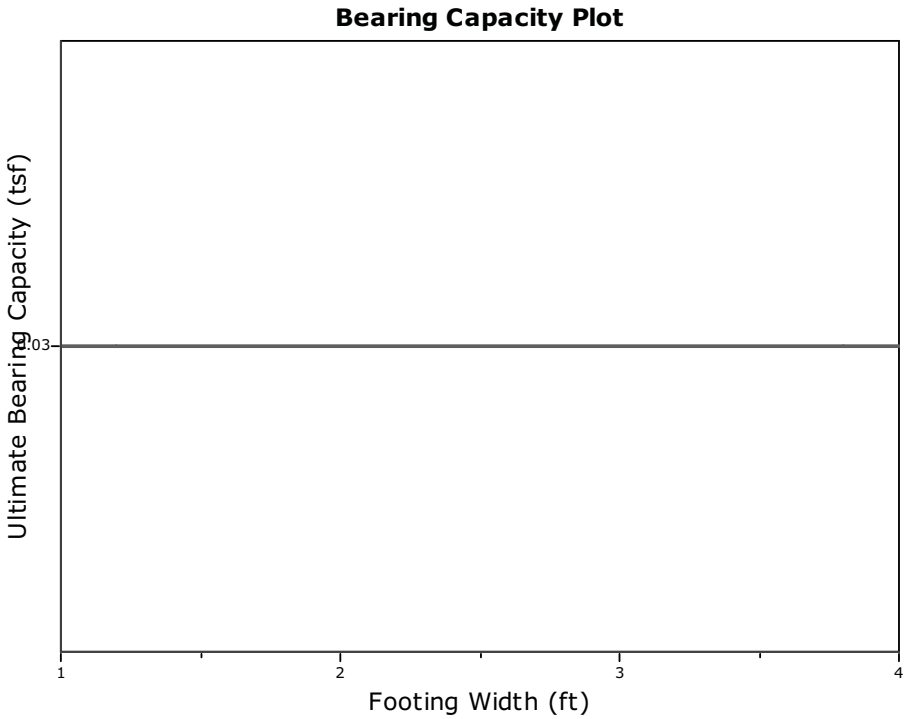
Project: **Langan**
Location: **45 Broad Street, Manhattan NY**



Bearing Capacity calculation is perfromed based on the formula:

$$Q_{ult} = R_k \times q_t + q_{soil}$$

where:
R_k: Bearing capacity factor
q_t: Average corrected cone resistance over calculation depth
q_{soil}: Pressure applied by soil above footing



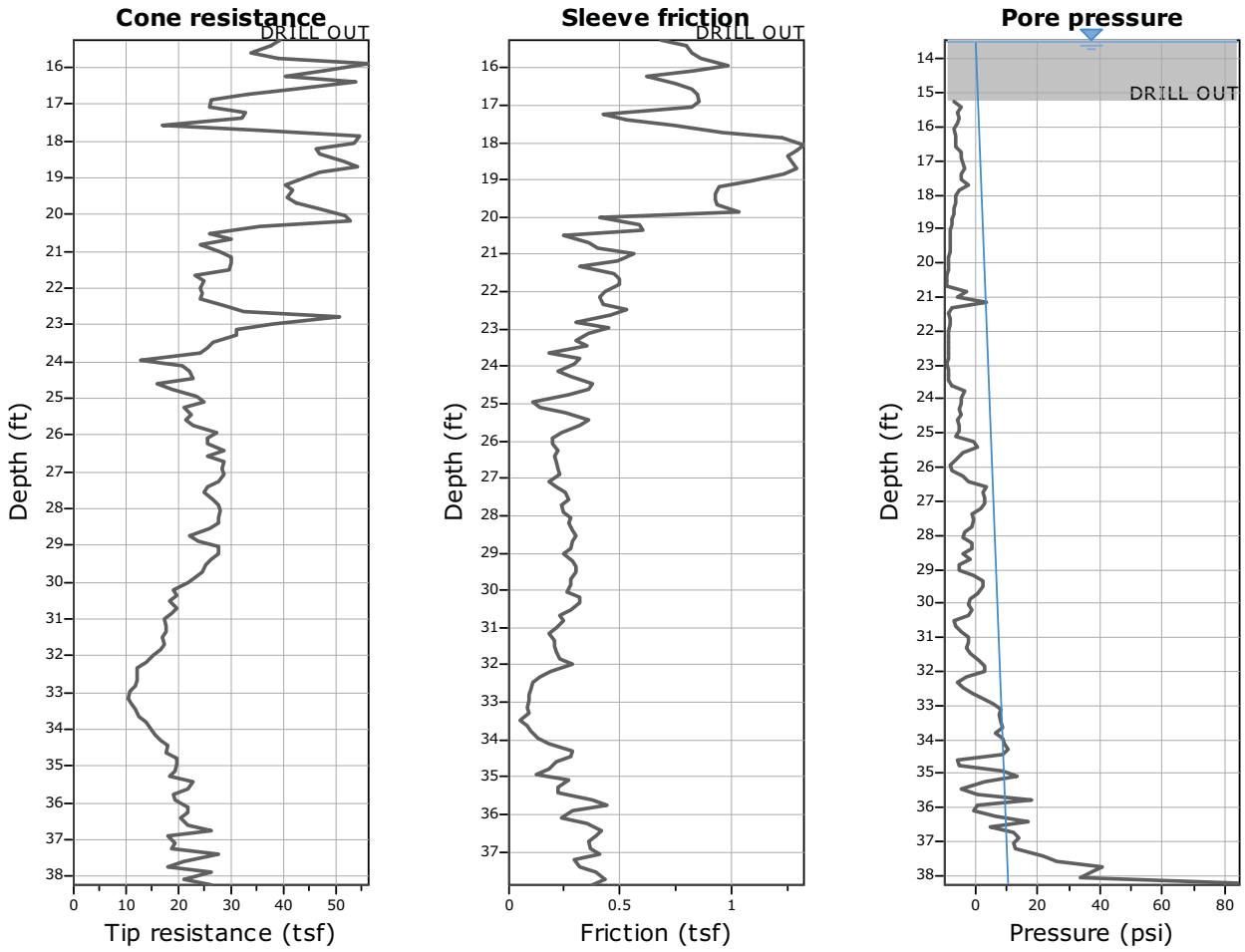
:: Tabular results ::

No	B (ft)	Start Depth (ft)	End Depth (ft)	Ave. q_t (tsf)	R_k	Soil Press. (tsf)	Ult. bearing cap. (tsf)
1	1.00	0.50	2.00	0.00	0.20	0.03	0.03
2	1.20	0.50	2.30	0.00	0.20	0.03	0.03
3	1.40	0.50	2.60	0.00	0.20	0.03	0.03
4	1.60	0.50	2.90	0.00	0.20	0.03	0.03
5	1.80	0.50	3.20	0.00	0.20	0.03	0.03
6	2.00	0.50	3.50	0.00	0.20	0.03	0.03
7	2.20	0.50	3.80	0.00	0.20	0.03	0.03
8	2.40	0.50	4.10	0.00	0.20	0.03	0.03
9	2.60	0.50	4.40	0.00	0.20	0.03	0.03
10	2.80	0.50	4.70	0.00	0.20	0.03	0.03
11	3.00	0.50	5.00	0.00	0.20	0.03	0.03
12	3.20	0.50	5.30	0.00	0.20	0.03	0.03
13	3.40	0.50	5.60	0.00	0.20	0.03	0.03
14	3.60	0.50	5.90	0.00	0.20	0.03	0.03
15	3.80	0.50	6.20	0.00	0.20	0.03	0.03
16	4.00	0.50	6.50	0.00	0.20	0.03	0.03

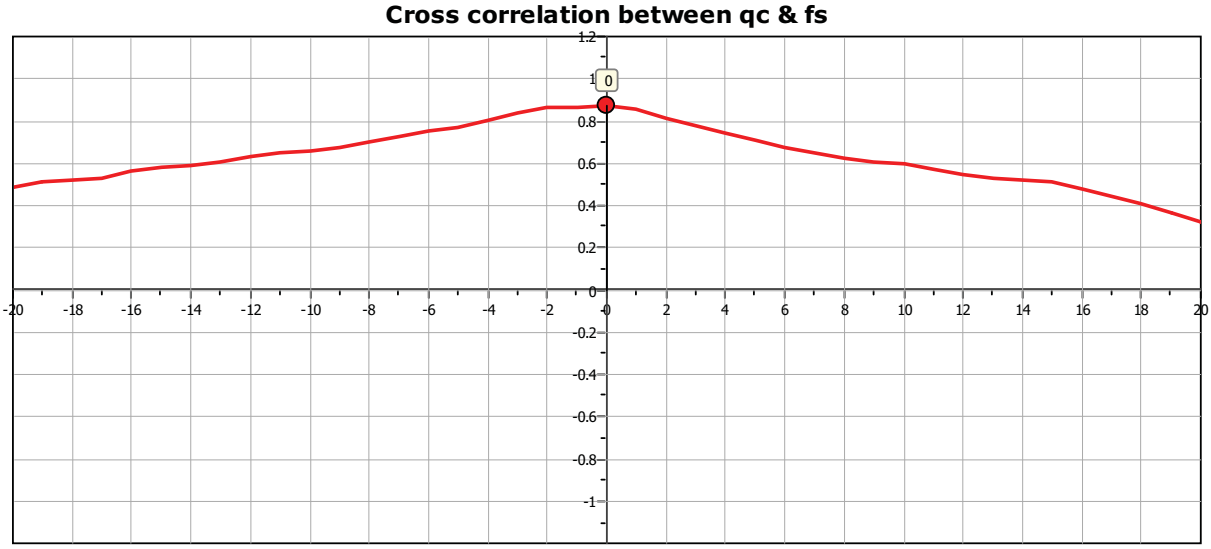
CRAIG GEOTECHNICAL DRILLING CO., INC.

CPT: LanganBroad Street CPT-2c
Total depth: 38.22 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

Project: **Langan**
Location: **45 Broad Street, Manhattan NY**



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).

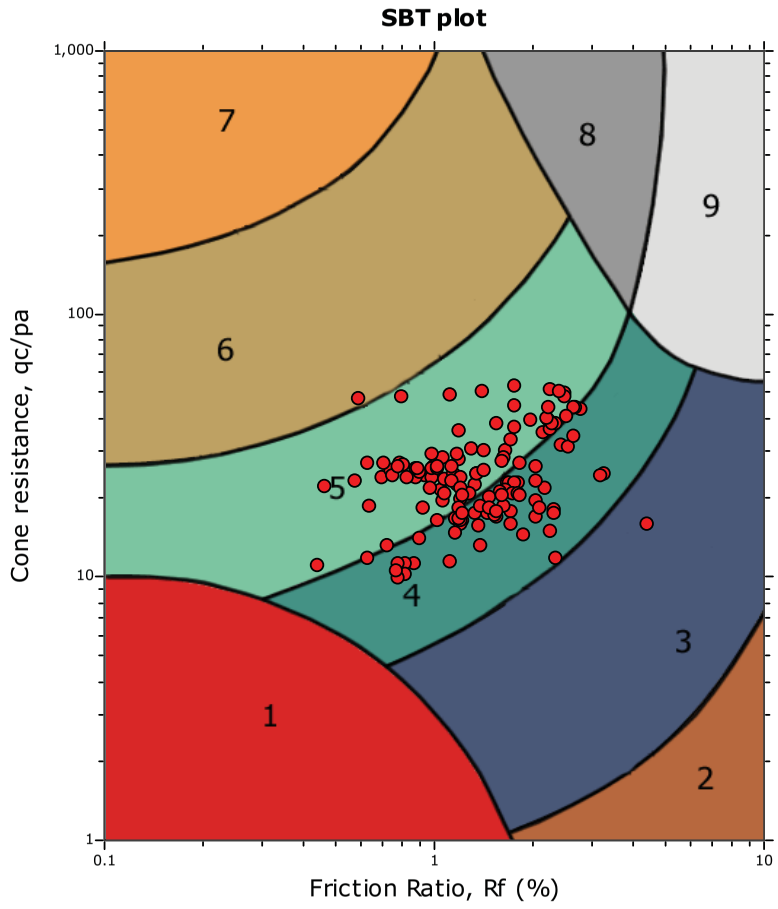


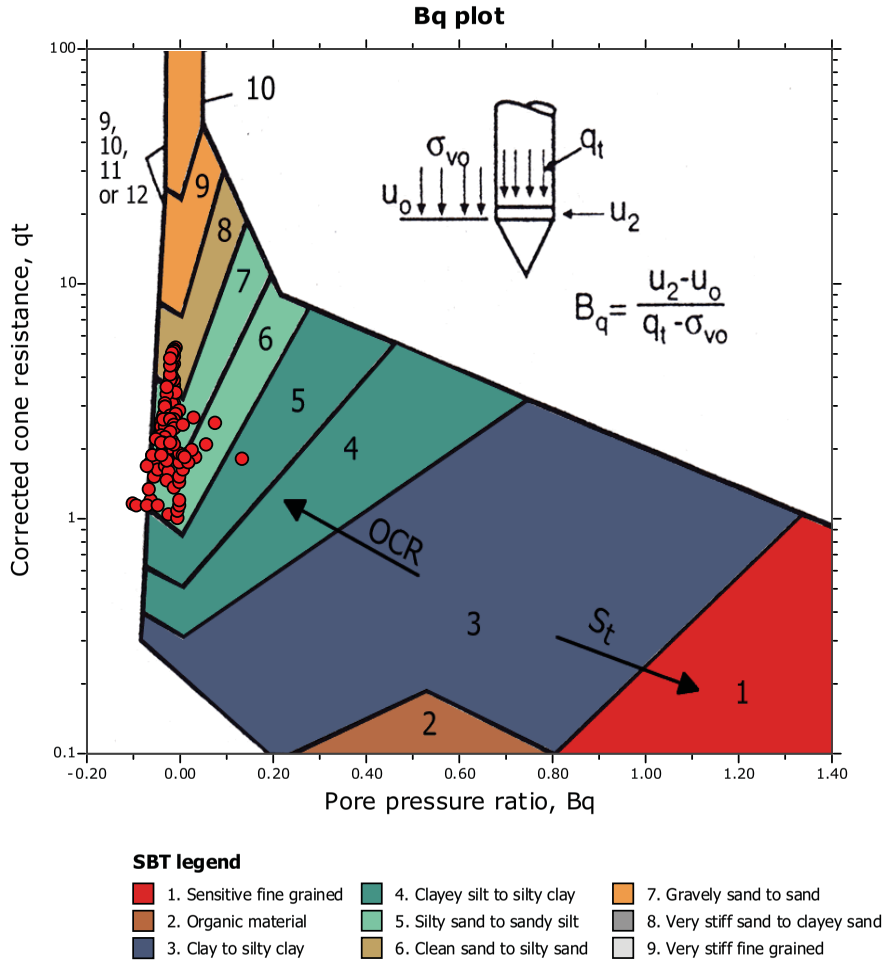
CRAIG GEOTECHNICAL DRILLING CO., INC.

Project: Langan
Location: 45 Broad Street, Manhattan NY

CPT: LanganBroad Street CPT-2c
Total depth: 38.22 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

SBT - Bq plots



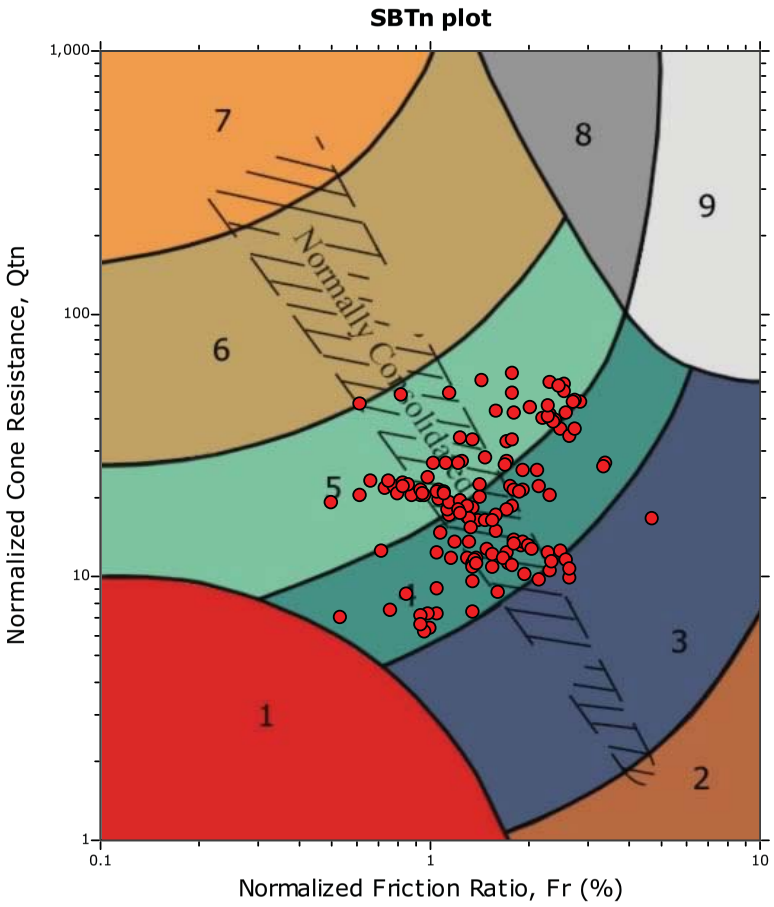


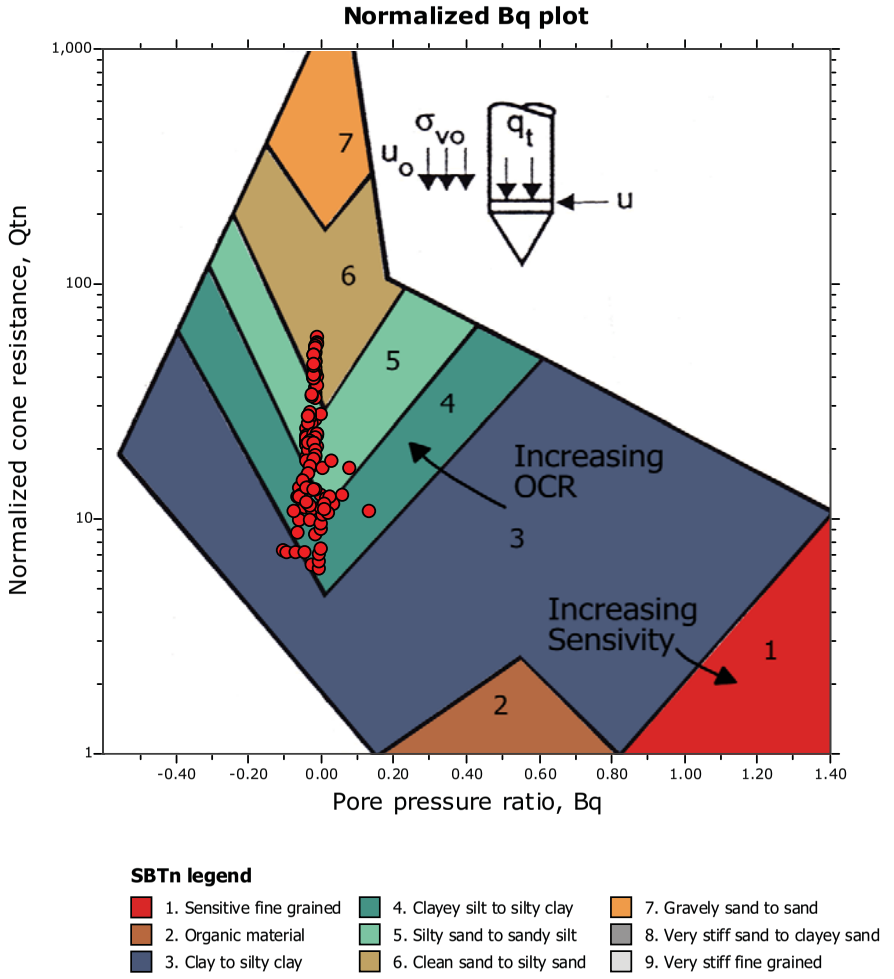
CRAIG GEOTECHNICAL DRILLING CO., INC.

Project: Langan
Location: 45 Broad Street, Manhattan NY

CPT: LanganBroad Street CPT-2c
Total depth: 38.22 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CRAIG GEOTECHNICAL DRILLING CO., INC.

Project: Langan

Location: 45 Broad Street, Manhattan NY

CPT: LanganBroad Street CPT-2c

Total depth: 38.22 ft, Date: 2/8/2016

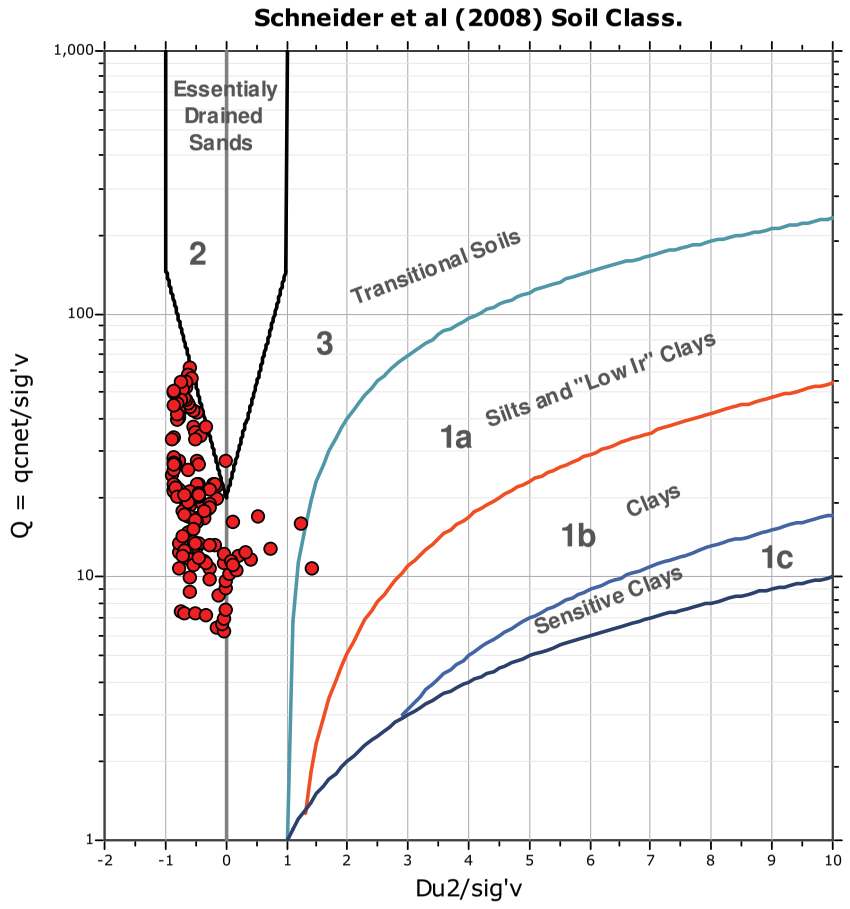
Surface Elevation: 0.00 ft

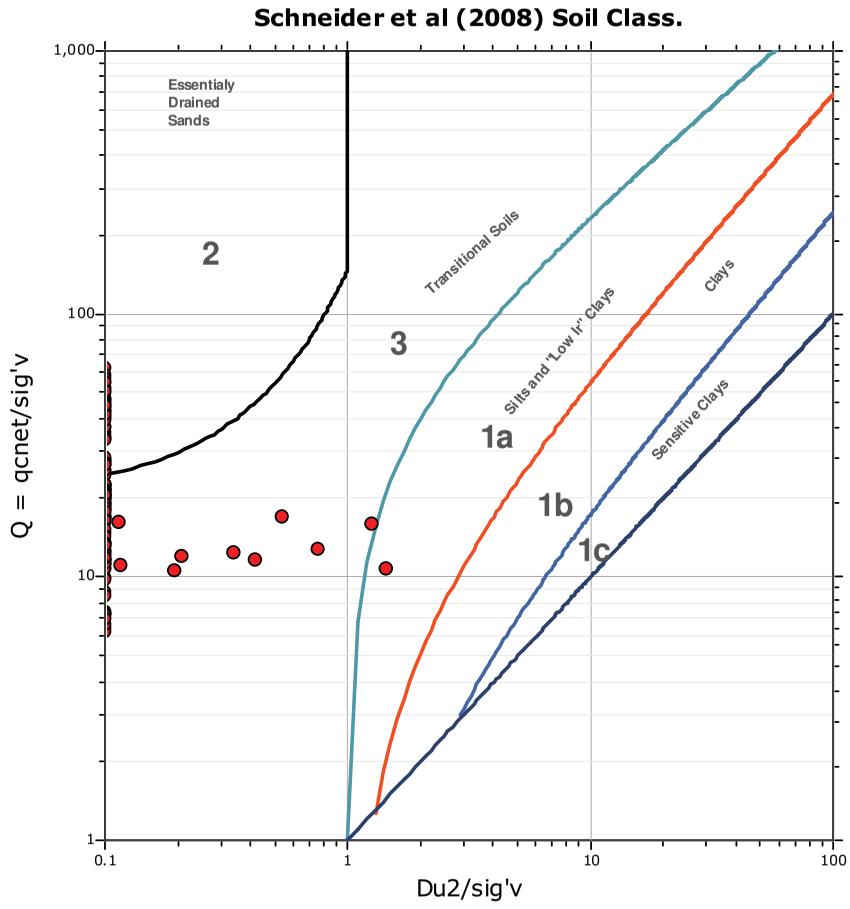
Coords: X:0.00, Y:0.00

Cone Type: Uknown

Cone Operator: Uknown

Bq plots (Schneider)





CRAIG GEOTECHNICAL DRILLING CO., INC.

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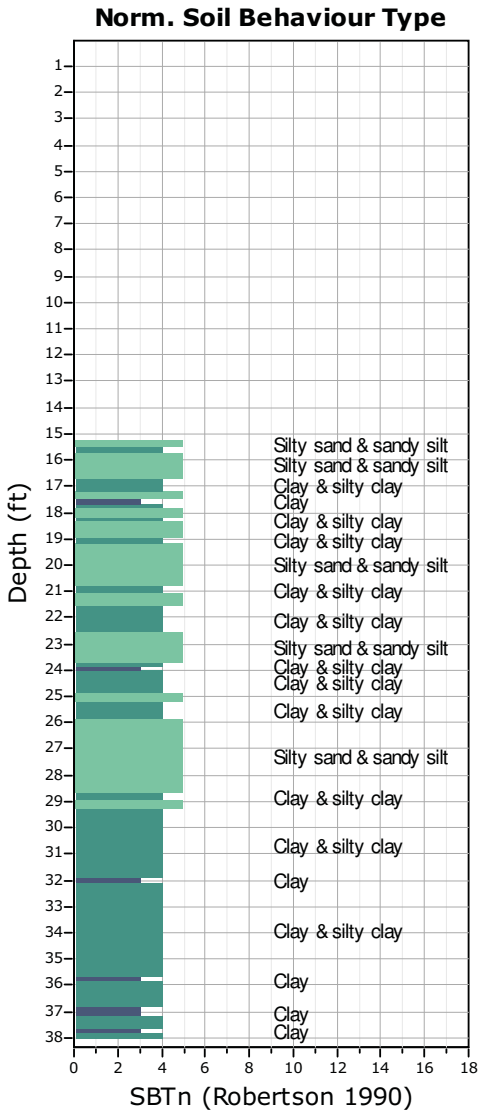
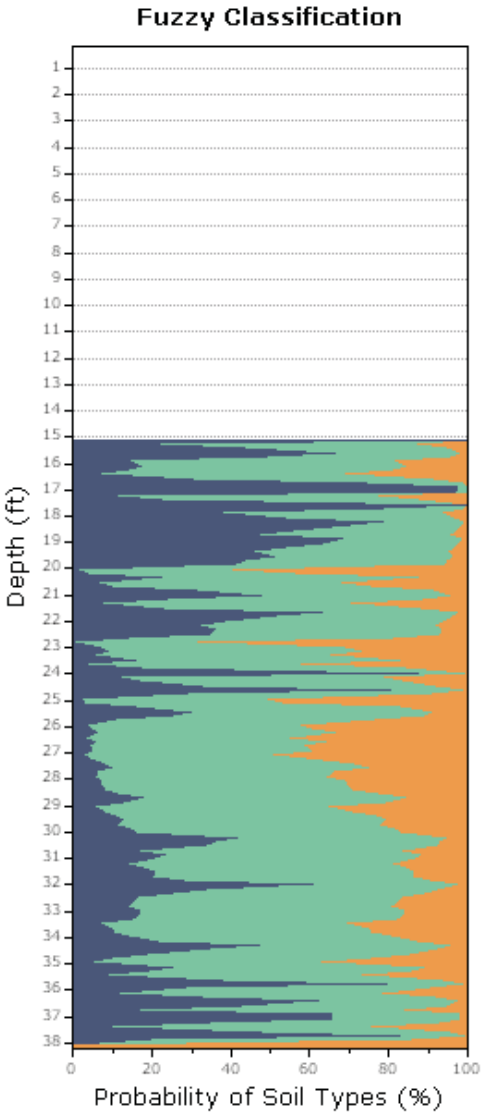
Total depth: 38.22 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

Project: **Langan**
Location: **45 Broad Street, Manhattan NY**





CRAIG GEOTECHNICAL DRILLING CO., INC.

CPT: LanganBroad Street CPT-2c

Total depth: 38.22 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
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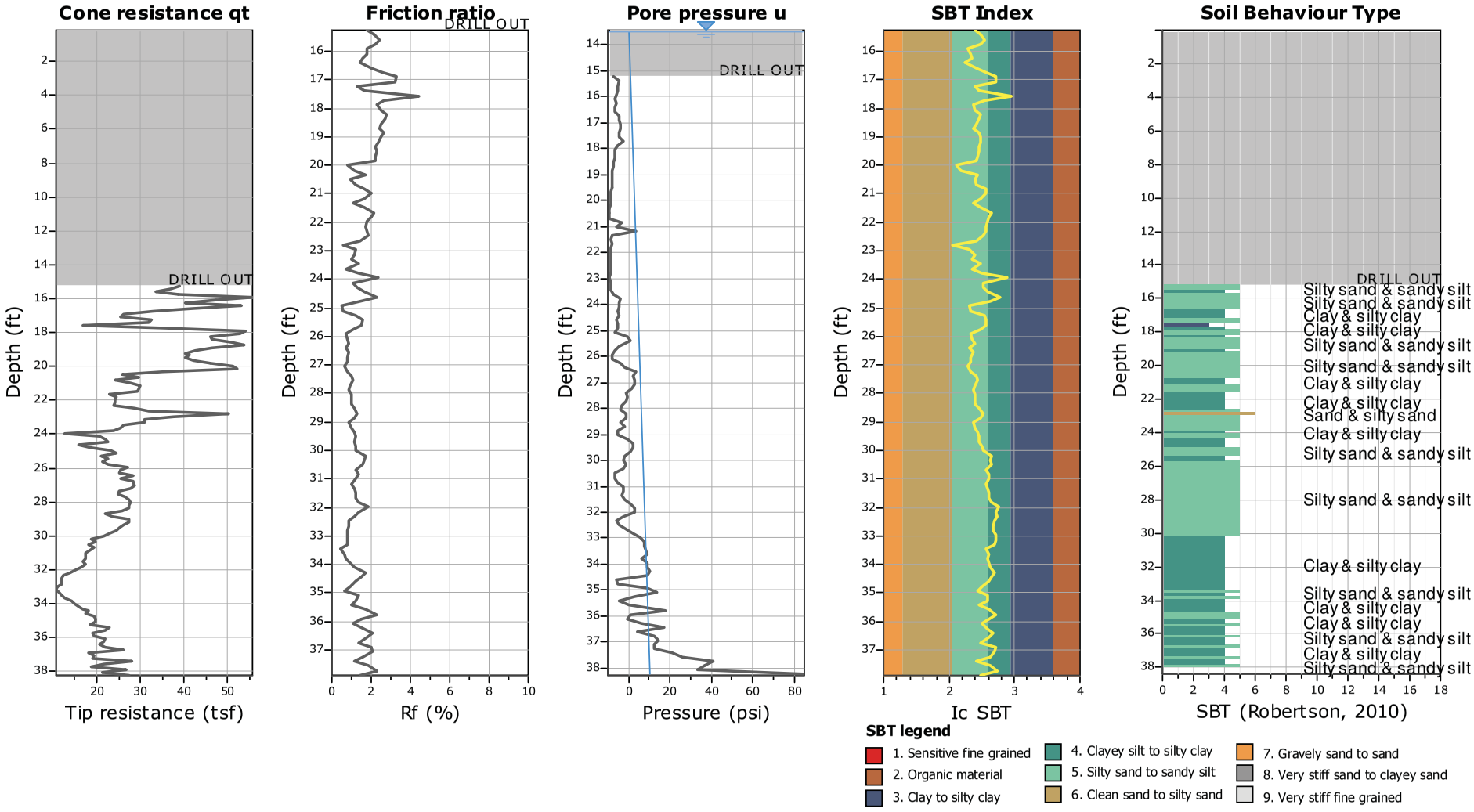
Project: **Langan**
Location: **45 Broad Street, Manhattan NY**



Project: Langan
Location: 45 Broad Street, Manhattan NY

CPT: LanganBroad Street CPT-2c
Total depth: 38.22 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
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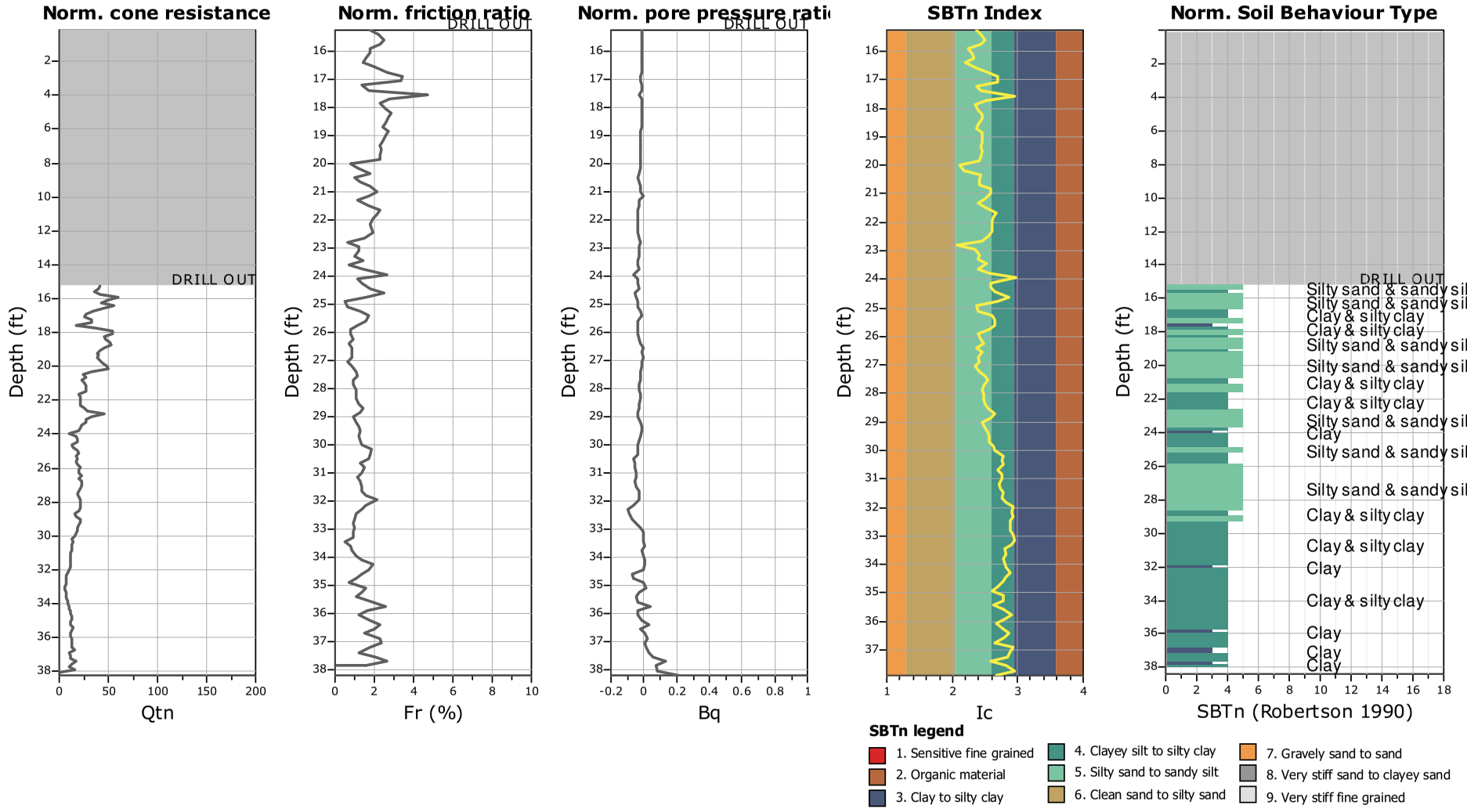

CRAIG GEOTECHNICAL DRILLING CO., INC.

Project: **Langan**
Location: **45 Broad Street, Manhattan NY**

CPT: LanganBroad Street CPT-2c
Total depth: 38.22 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
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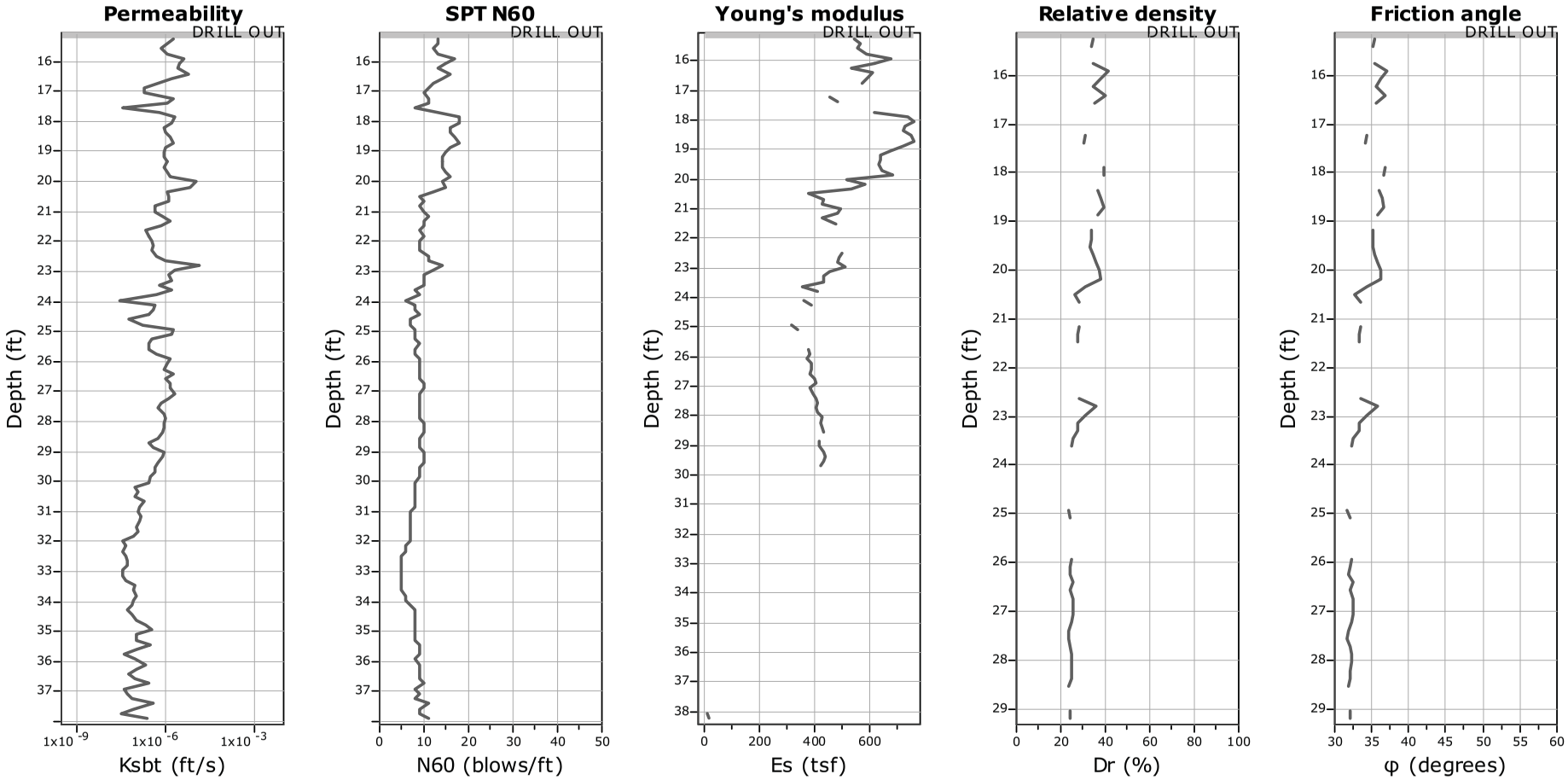


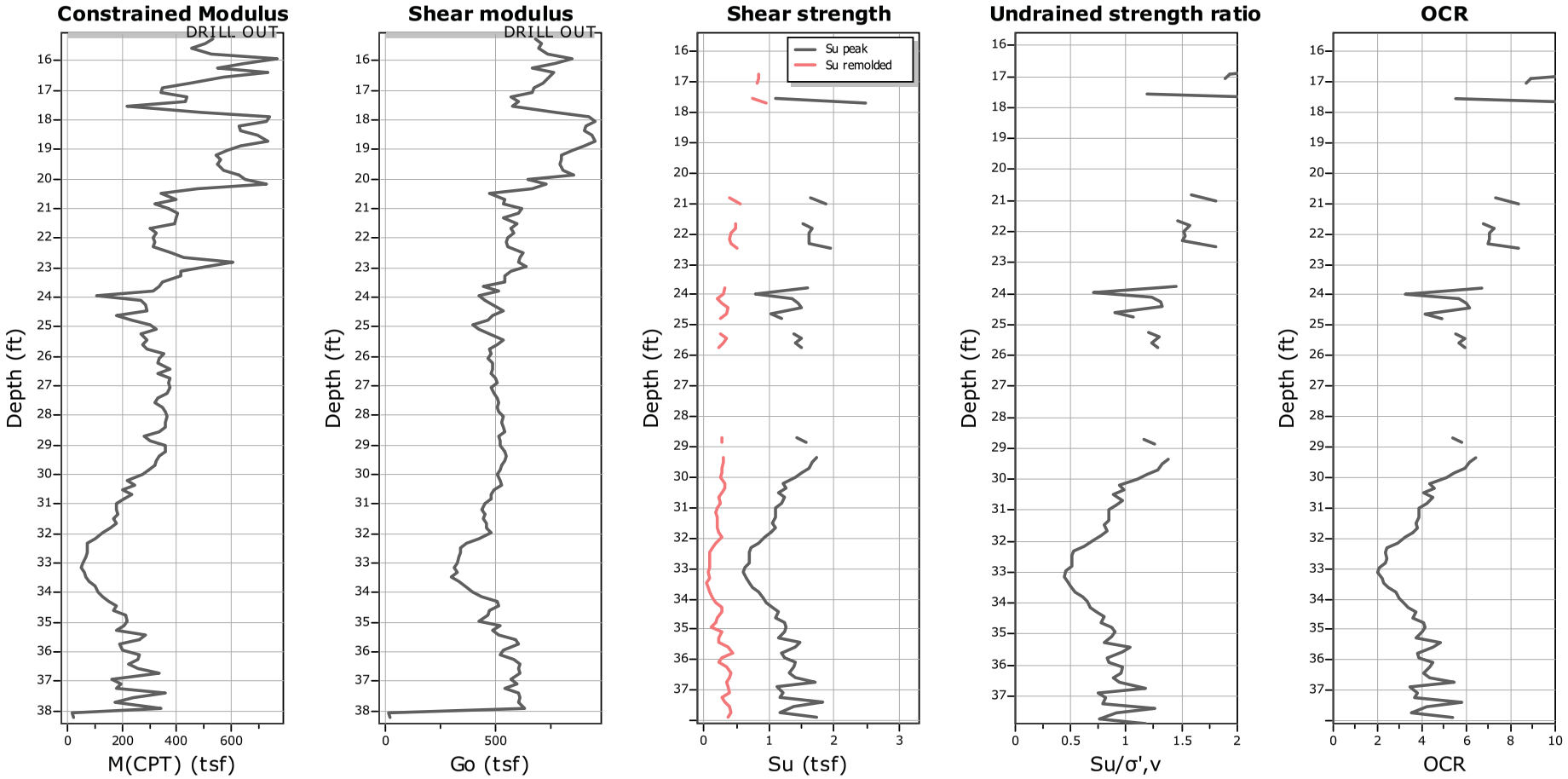
Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative desnisty constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

CRAIG GEOTECHNICAL DRILLING CO., INC.

Project: **Langan**
Location: **45 Broad Street, Manhattan NY**

CPT: LanganBroad Street CPT-2c
Total depth: 38.22 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown



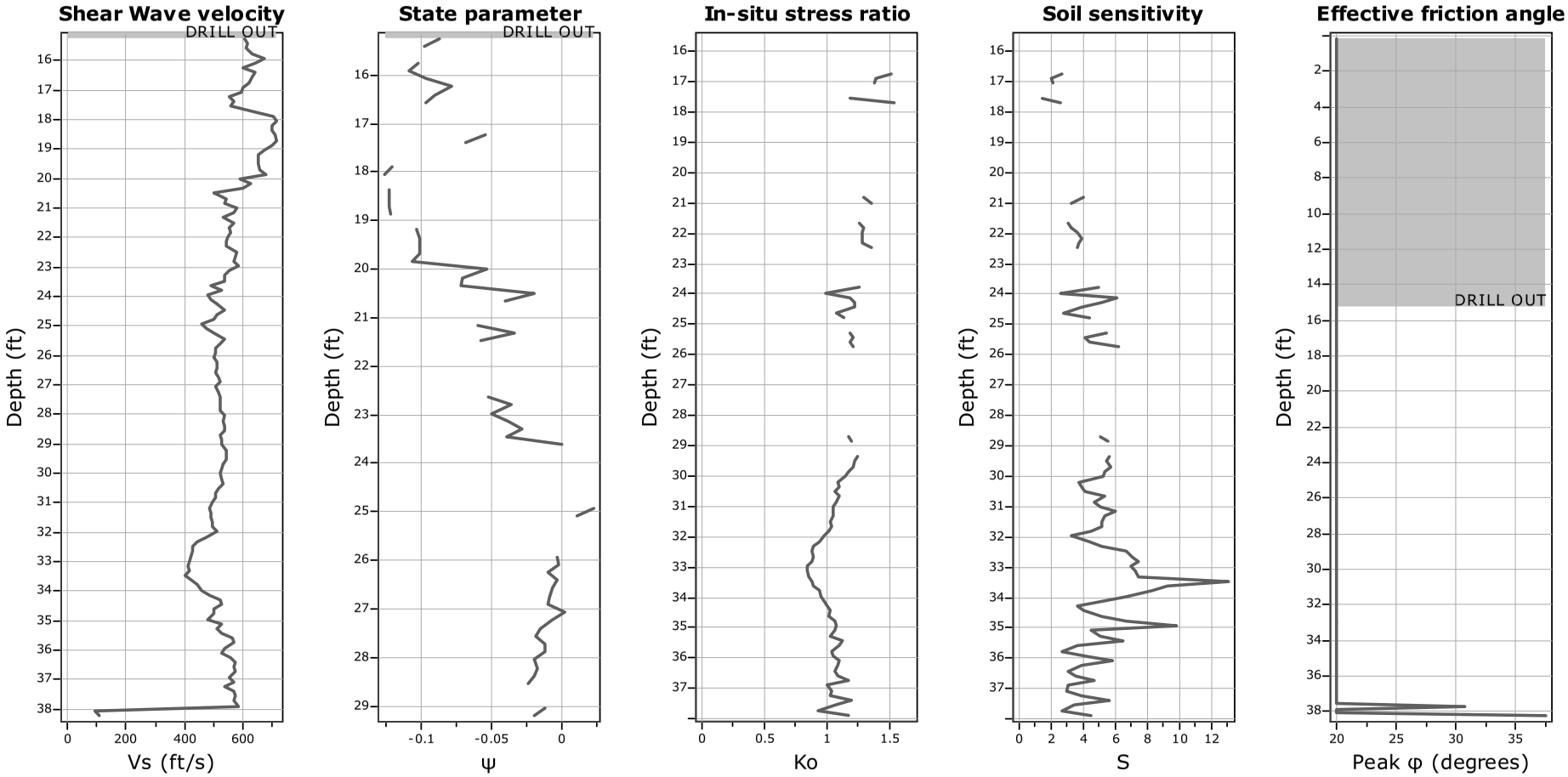
Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14
OCR factor for clays, N_{kt}: 0.33
User defined estimation data

CRAIG GEOTECHNICAL DRILLING CO., INC.

Project: Langan
Location: 45 Broad Street, Manhattan NY

CPT: LanganBroad Street CPT-2c
Total depth: 38.22 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown



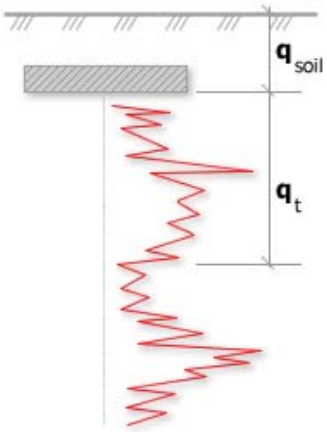
Calculation parameters

Soil Sensitivity factor, N_S: 7.00
User defined estimation data

CRAIG GEOTECHNICAL DRILLING CO., INC.

CPT: LanganBroad Street CPT-2c
Total depth: 38.22 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

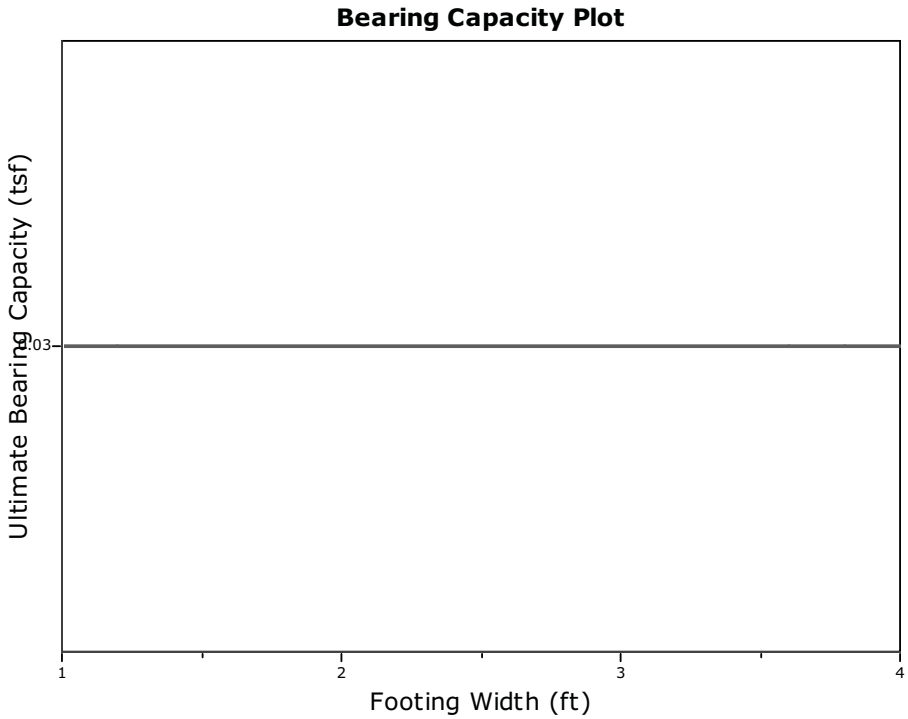
Project: **Langan**
Location: **45 Broad Street, Manhattan NY**



Bearing Capacity calculation is perfromed based on the formula:

$$Q_{ult} = R_k \times q_t + q_{soil}$$

where:
R_k: Bearing capacity factor
q_t: Average corrected cone resistance over calculation depth
q_{soil}: Pressure applied by soil above footing



:: Tabular results ::

No	B (ft)	Start Depth (ft)	End Depth (ft)	Ave. q_t (tsf)	R_k	Soil Press. (tsf)	Ult. bearing cap. (tsf)
1	1.00	0.50	2.00	0.00	0.20	0.03	0.03
2	1.20	0.50	2.30	0.00	0.20	0.03	0.03
3	1.40	0.50	2.60	0.00	0.20	0.03	0.03
4	1.60	0.50	2.90	0.00	0.20	0.03	0.03
5	1.80	0.50	3.20	0.00	0.20	0.03	0.03
6	2.00	0.50	3.50	0.00	0.20	0.03	0.03
7	2.20	0.50	3.80	0.00	0.20	0.03	0.03
8	2.40	0.50	4.10	0.00	0.20	0.03	0.03
9	2.60	0.50	4.40	0.00	0.20	0.03	0.03
10	2.80	0.50	4.70	0.00	0.20	0.03	0.03
11	3.00	0.50	5.00	0.00	0.20	0.03	0.03
12	3.20	0.50	5.30	0.00	0.20	0.03	0.03
13	3.40	0.50	5.60	0.00	0.20	0.03	0.03
14	3.60	0.50	5.90	0.00	0.20	0.03	0.03
15	3.80	0.50	6.20	0.00	0.20	0.03	0.03
16	4.00	0.50	6.50	0.00	0.20	0.03	0.03

Presented below is a list of formulas used for the estimation of various soil properties. The formulas are presented in SI unit system and assume that all components are expressed in the same units.

:: Unit Weight, g (kN/m³) ::

$$g = g_w \cdot \left(0.27 \cdot \log(R_f) + 0.36 \cdot \log(\frac{q_t}{p_a}) + 1.236 \right)$$

where g_w = water unit weight

:: Permeability, k (m/s) ::

$I_c < 3.27$ and $I_c > 1.00$ then $k = 10^{0.952-3.04 \cdot I_c}$

$I_c \leq 4.00$ and $I_c > 3.27$ then $k = 10^{-4.52-1.37 \cdot I_c}$

:: N_{SPT} (blows per 30 cm) ::

$$N_{60} = \left(\frac{q_c}{P_a} \right) \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

$$N_{1(60)} = Q_{tn} \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

:: Young's Modulus, Es (MPa) ::

$(q_t - \sigma_v) \cdot 0.015 \cdot 10^{0.55 \cdot I_c + 1.68}$

(applicable only to $I_c < I_{c\_cutoff}$)

:: Relative Density, Dr (%) ::

$100 \cdot \sqrt{\frac{Q_{tn}}{k_{DR}}}$ (applicable only to SBT_n: 5, 6, 7 and 8 or $I_c < I_{c\_cutoff}$)

:: State Parameter, ψ ::

$\psi = 0.56 - 0.33 \cdot \log(Q_{tn,cs})$

:: Peak drained friction angle, φ (°) ::

$\varphi = 17.60 + 11 \cdot \log(Q_{tn})$

(applicable only to SBT_n: 5, 6, 7 and 8)

:: 1-D constrained modulus, M (MPa) ::

If $I_c > 2.20$

$\alpha = 14$ for $Q_{tn} > 14$

$\alpha = Q_{tn}$ for $Q_{tn} \leq 14$

$M_{CPT} = \alpha \cdot (q_t - \sigma_v)$

If $I_c \leq 2.20$

$M_{CPT} = (q_t - \sigma_v) \cdot 0.0188 \cdot 10^{0.55 \cdot I_c + 1.68}$

:: Small strain shear Modulus, Go (MPa) ::

$G_0 = (q_t - \sigma_v) \cdot 0.0188 \cdot 10^{0.55 \cdot I_c + 1.68}$

:: Shear Wave Velocity, Vs (m/s) ::

$$V_s = \left(\frac{G_0}{\rho} \right)^{0.50}$$

:: Undrained peak shear strength, Su (kPa) ::

$N_{kt} = 10.50 + 7 \cdot \log(F_r)$ or user defined

$$S_u = \frac{(q_t - \sigma_v)}{N_{kt}}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Remolded undrained shear strength, Su(rem) (kPa) ::

$S_{u(rem)} = f_s$ (applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Overconsolidation Ratio, OCR ::

$$k_{OCR} = \left[\frac{Q_{tn}^{0.20}}{0.25 \cdot (10.50 \cdot +7 \cdot \log(F_r))} \right]^{1.25}$$ or user defined

$OCR = k_{OCR} \cdot Q_{tn}$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: In situ Stress Ratio, Ko ::

$K_O = (1 - \sin\varphi') \cdot OCR^{\sin\varphi'}$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Soil Sensitivity, S_t ::

$$S_t = \frac{N_S}{F_r}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Effective Stress Friction Angle, φ' (°) ::

$\varphi' = 29.5° \cdot B_q^{0.121} \cdot (0.256 + 0.336 \cdot B_q + \log Q_t)$

(applicable for $0.10 < B_q < 1.00$)

References

• Robertson, P.K., Cabal K.L., Guide to Cone Penetration Testing for Geotechnical Engineering, Gregg Drilling & Testing, Inc., 5th Edition, November 2012

• Robertson, P.K., Interpretation of Cone Penetration Tests - a unified approach., Can. Geotech. J. 46(11): 1337–1355 (2009)

January 9, 2017

Andrew Manton
Madison 45 Broad Development LLC
105 Madison Avenue, 9th Floor
New York, NY 10016

Re: Test Pit Findings and Recommendations Report
45 Broad Street
New York, NY 10004
Langan Project No.: 170394201

Dear Mr. Manton:

This letter presents the results of the additional test pits performed for the development at 45 Broad Street in December of 2016. The purpose of these test pits was to observe the type, depth, and configuration of the foundations of 41 Broad Street and 55 Broad Street, and to provide additional information regarding buried obstructions within the site. Four test pits were performed by Posillico, Inc. from 1 to 8 December 2016 as follows:

- TP-2 along the 41 Broad Street property
- TP-3 along the 55 Broad Street property
- TP-1 and TP-4 within the site to expose buried obstructions

The following sections provide general observations from the test pit excavations; refer to attached Drawing No. 1 - Test pit location plan, sketches, and photo log for details. All test pits were backfilled with excavated material upon completion. Posillico was present and made observations throughout the test pit operation. All elevations in this memo are assumed to be in the North American Vertical Datum (NAVD88[1]) unless otherwise noted.

Test Pit TP-1

Test pit TP-1 was excavated along the north property line to obtain info on the existing pile foundations buried within the project site. Existing grade in this area is about el. 10±. A 9-inch thick concrete slab was encountered on top of a 2-feet-thick concrete pile cap, observed to be supported on unreinforced concrete tapered (possibly Raymond) piles. Observed piles were about 18-inch diameter at the pile head, with a thin steel shell (about 1/16-inch thick) and spiral bar along the outside of the pile.

[1] Elevations are referenced to North American Vertical Datum (NAVD88) which is 1.1 feet higher than USGS (1929 NGVD) Mean Sea Level at Sandy Hook, NJ [NAVD = NGVD – 1.1] and 1.65 feet lower than the Borough President of Manhattan Datum (BPMD), [NAVD = BPMD + 1.65].

Test Pit TP-2

Test pit TP-2 was excavated along the north property line of the 45 Broad Street site to observe the type, depth, and configuration of the adjacent 41 Broad Street building extension to the north. Existing grade elevation in this area is about el. 10±. The 41 Broad Street concrete foundation wall was observed to extend to about 16 feet below grade with about a 3 feet concrete pier at the base. The base of the concrete pier was at about el. -6±. A steel section, likely a sheet pile, was observed below the concrete pier. The depth of the steel section and the material behind the sheet pile could not be observed.

Test Pit TP-3

Test pit TP-3 was excavated along the south property line of the site to observe the type, depth, and configuration of the adjacent 55 Broad Street building extension to the south. Existing grade elevation in this area is about el. 10±. The 55 Broad Street concrete foundation was observed about 19 feet below the existing ground surface, corresponding to about el. -9.5±. An about 10.5 inch wide steel pile, was encountered below the exposed concrete foundation.

Test Pit TP-4

Test pit TP-4 was excavated within the project site to investigate the buried foundations within the site. The excavation for TP-4 was about 13.5 feet deep. Existing grade elevation in this area was about el. 9.5. The buried foundation was observed to consist of brick masonry. The buried wall terminated on a 20-inch concrete slab, with the bottom of slab at about el. -4±. The concrete "caissons/barrettes" shown on historic drawings were not observed during test pit excavation.

Conclusions and Recommendations

Based on our observations from the test pit excavations, we conclude the following:

1. The 55 Broad Street building extension foundation includes steel piles.
2. The 41 Broad Street building extension foundation includes a concrete pier at about el -6±. We could not observe if pier extends below el -6.
3. The contractor should consider the buried piles and walls observed at TP-1 and TP-4 during excavation and drilling.
4. Our findings represent conditions at the test pit locations. The contractor may elect to do additional test pits if he deems appropriate or necessary.
5. The Contractor must not over-excavate next to adjacent foundations prior to installation of appropriate excavation support. The Contractor must perform all work without adversely affecting the adjacent buildings.

Closing

The observations and recommendations provided above are based on findings at the investigation locations. Please call us if you have any questions or you need further information.

Sincerely,
Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.

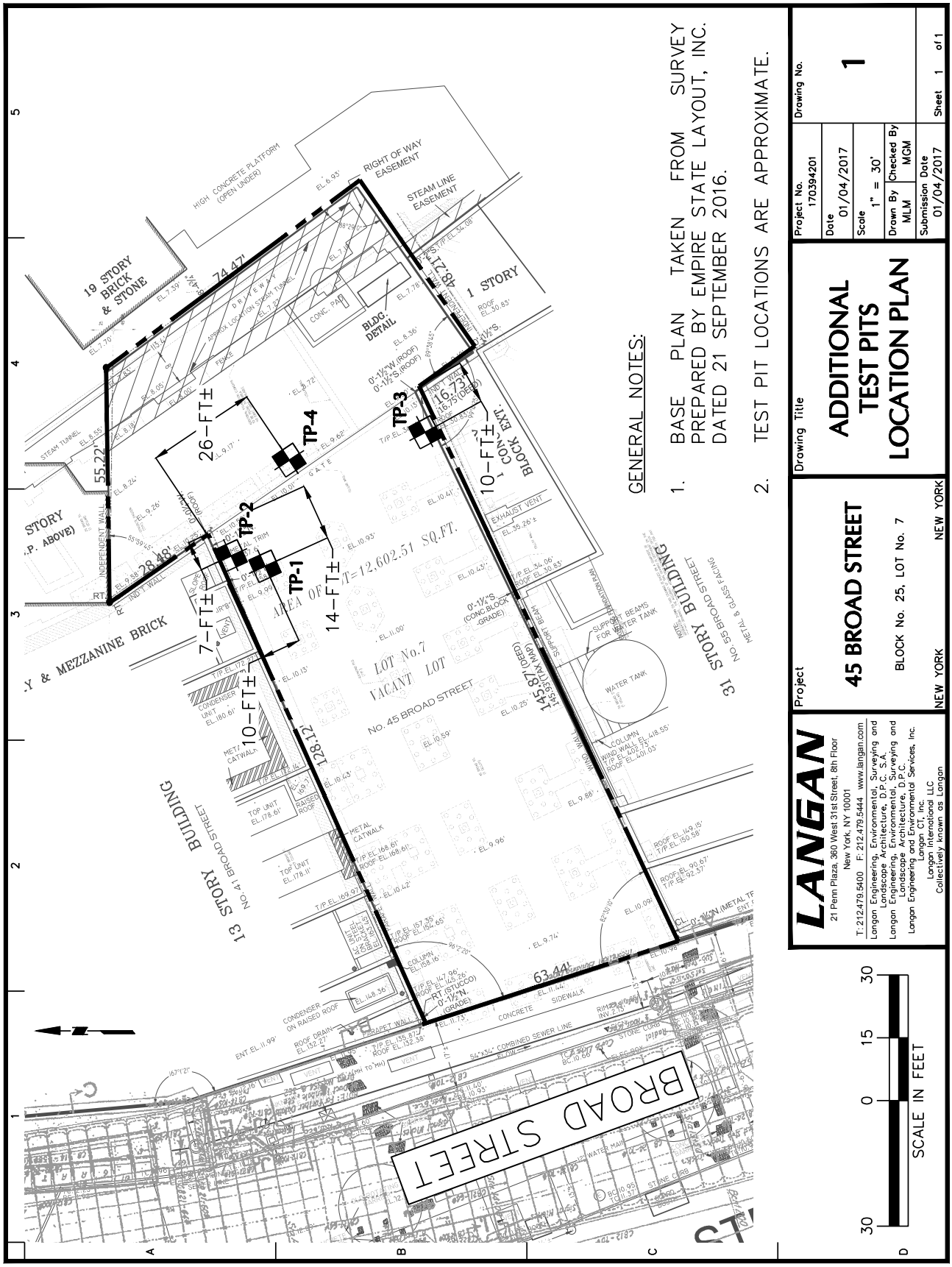
Miguel G. Matos, P.E.
Project Engineer

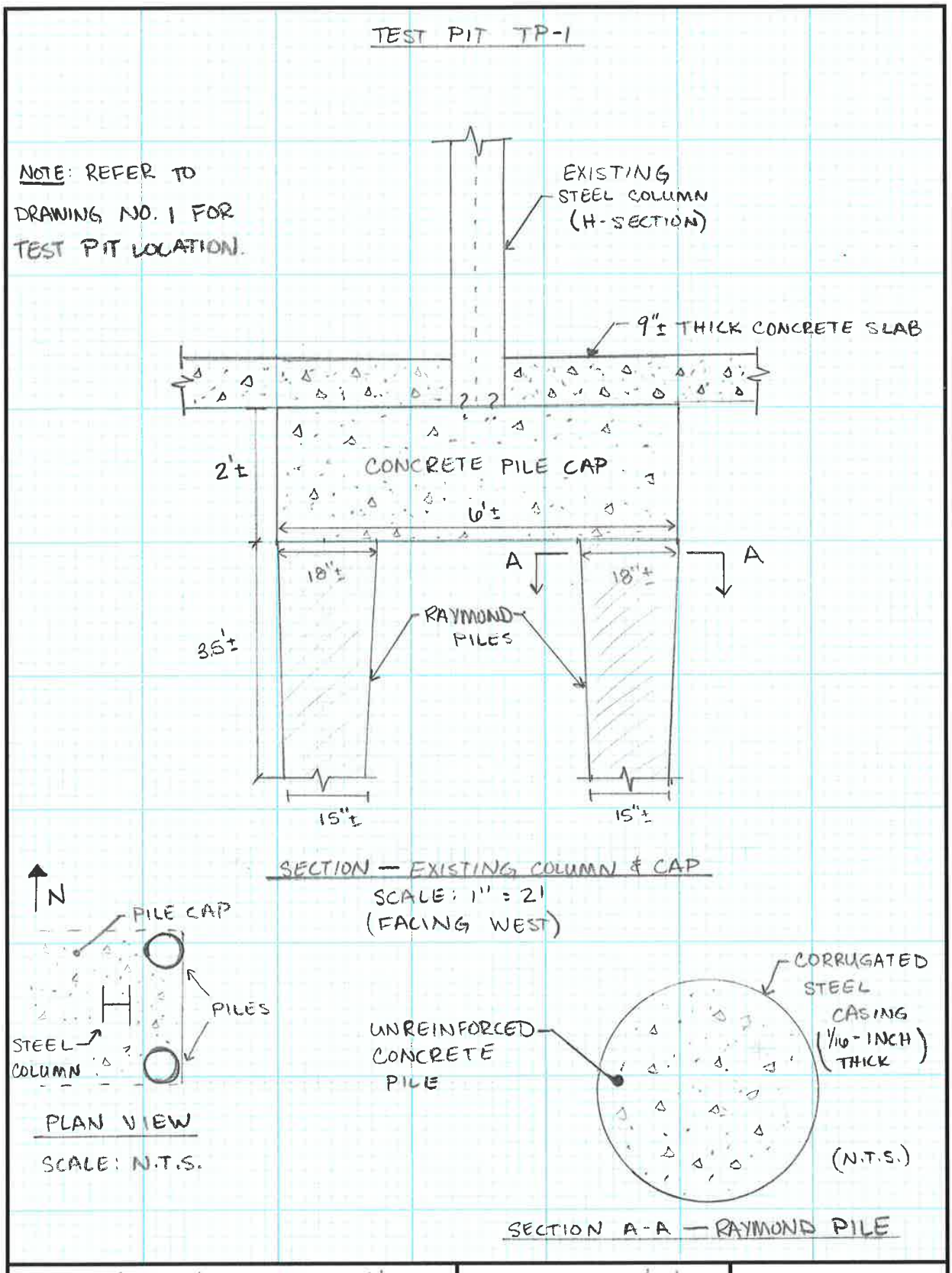
Tasos Papathanasiou, P.E.
Senior Associate/Vice President

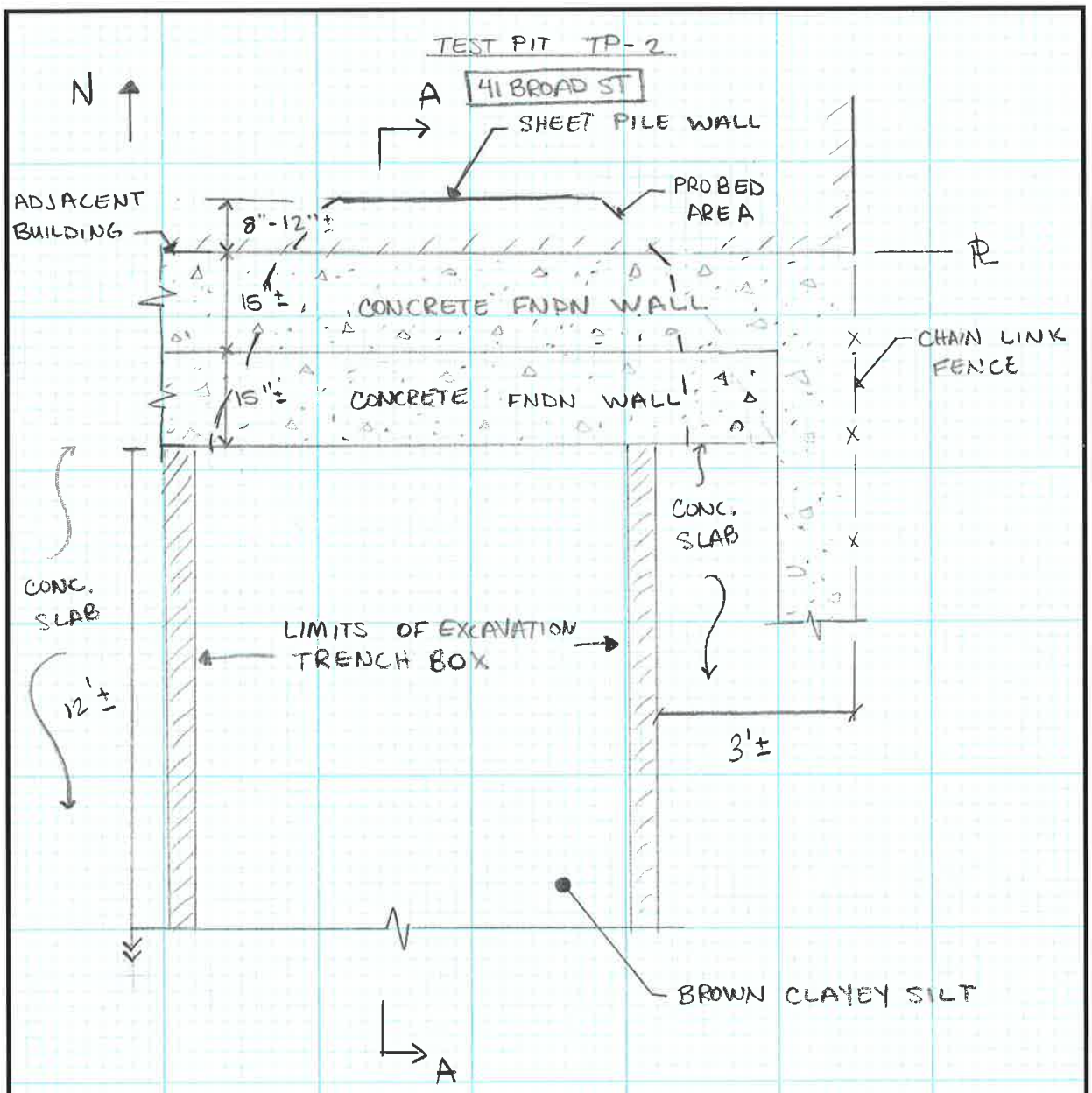
Enclosure(s): Test Pit Location Plans
Test Pit Sketches
Test Pit Photo Log

cc: Gerald Nicholls - Langan

\\langan.com\data\NY\data2\170394201\Office Data\Reports\Geotechnical\Test Pit Report\Test Pit Letter.docx

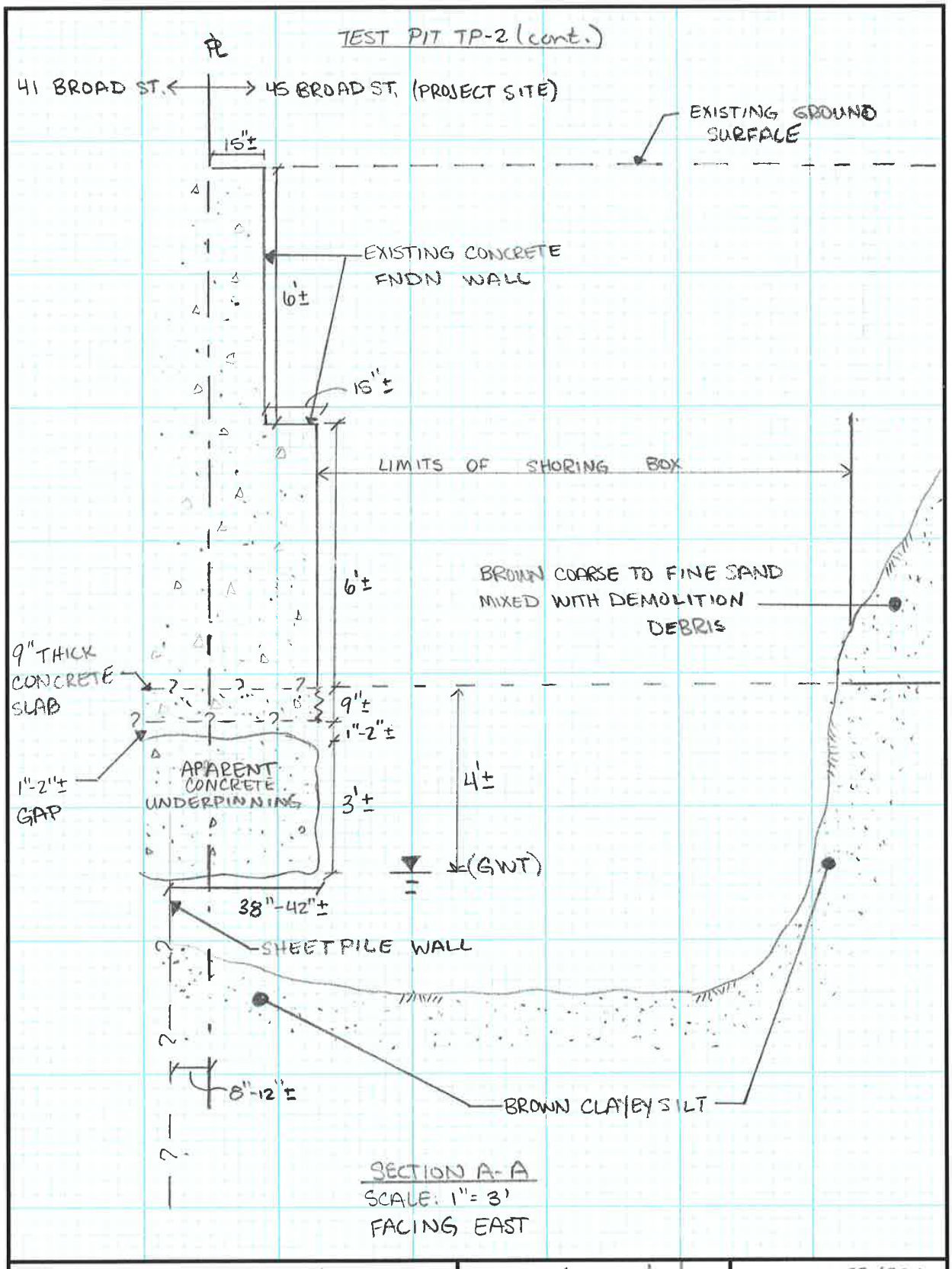

GENERAL NOTES:
1. BASE PLAN TAKEN FROM SURVEY PREPARED BY EMPIRE STATE LAYOUT, INC. DATED 21 SEPTEMBER 2016.
2. TEST PIT LOCATIONS ARE APPROXIMATE.
TP-1
TP-2
TP-3
TP-4
26-FT±
14-FT±
10-FT±
7-FT±
10-FT±
AREA OF T=12,602.51 SQ.FT.
LOT No.7
VACANT LOT
No. 45 BROAD STREET
BROAD STREET
SCALE IN FEET
LANGAN
21 Penn Plaza, 360 West 31st Street, 8th Floor
New York, NY 10001
T: 212.479.5400 F: 212.479.5444 www.langan.com
Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C. S.A.
Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.
Langan Engineering and Environmental Services, Inc.
Langan CT, Inc.
Langan International, LLC
Collectively known as Langan
Project
45 BROAD STREET
BLOCK No. 25, LOT No. 7
NEW YORK NEW YORK
Drawing Title
ADDITIONAL TEST PITS LOCATION PLAN
Project No. 170394201
Date 01/04/2017
Scale 1" = 30'
Drawn By MLM
Checked By MGM
Submission Date 01/04/2017
Drawing No. 1
Sheet 1 of 1
© 2016 Langan
Filename: \\Langan.com\data\NY\data2\170394201\Cadd Data - 170394201\SheetFiles\Geotechnical\170394201-B101-0101.dwg Date: 1/3/2017 Time: 17:22 User: vvelluchamy Style Table: Langan.stb Layout: ADDITIONAL TP PLAN


TEST PIT TP-1
NOTE: REFER TO DRAWING NO. 1 FOR TEST PIT LOCATION.
EXISTING STEEL COLUMN (H-SECTION)
9"± THICK CONCRETE SLAB
2'±
CONCRETE PILE CAP
6'±
A
A
18"±
18"±
RAYMOND PILES
35'±
15"±
15"±
SECTION — EXISTING COLUMN & CAP
SCALE: 1" = 2'
(FACING WEST)
N
PILE CAP
PILES
STEEL COLUMN
PLAN VIEW
SCALE: N.T.S.
CORRUGATED STEEL CASING (1/16-INCH THICK)
UNREINFORCED CONCRETE PILE
(N.T.S.)
SECTION A-A — RAYMOND PILE
45 Broad Street, Manhattan NY
Additional Test Pits, TP-1
BY MLM DATE 12/08/16
CKD. DATE
PROJ. NO. 170394201
SHEET 1 OF 6
LANGAN



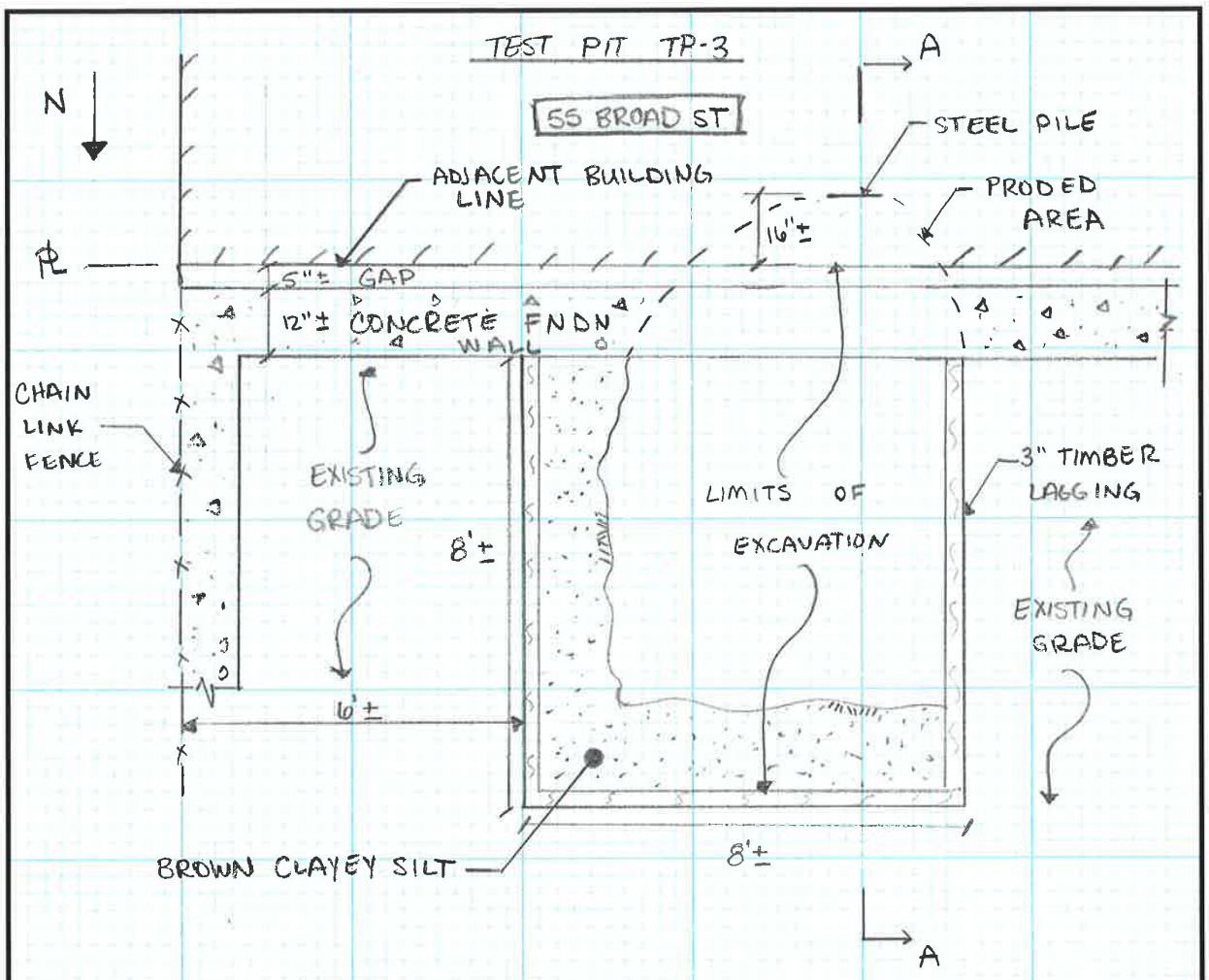
45 Broad Street, Manhattan, NY Additional Test Pits, TP-2	BY MLM DATE 12/08/16 CKD. DATE	PROJ. NO. 170394201 SHEET 2 OF 6

LANGAN



45 Broad Street, Manhattan NY Additional Test Pits TP-2	BY MLM DATE 12/09/10 CKD. DATE	PROJ. NO. 170394201 SHEET 3 OF 6

LANGAN



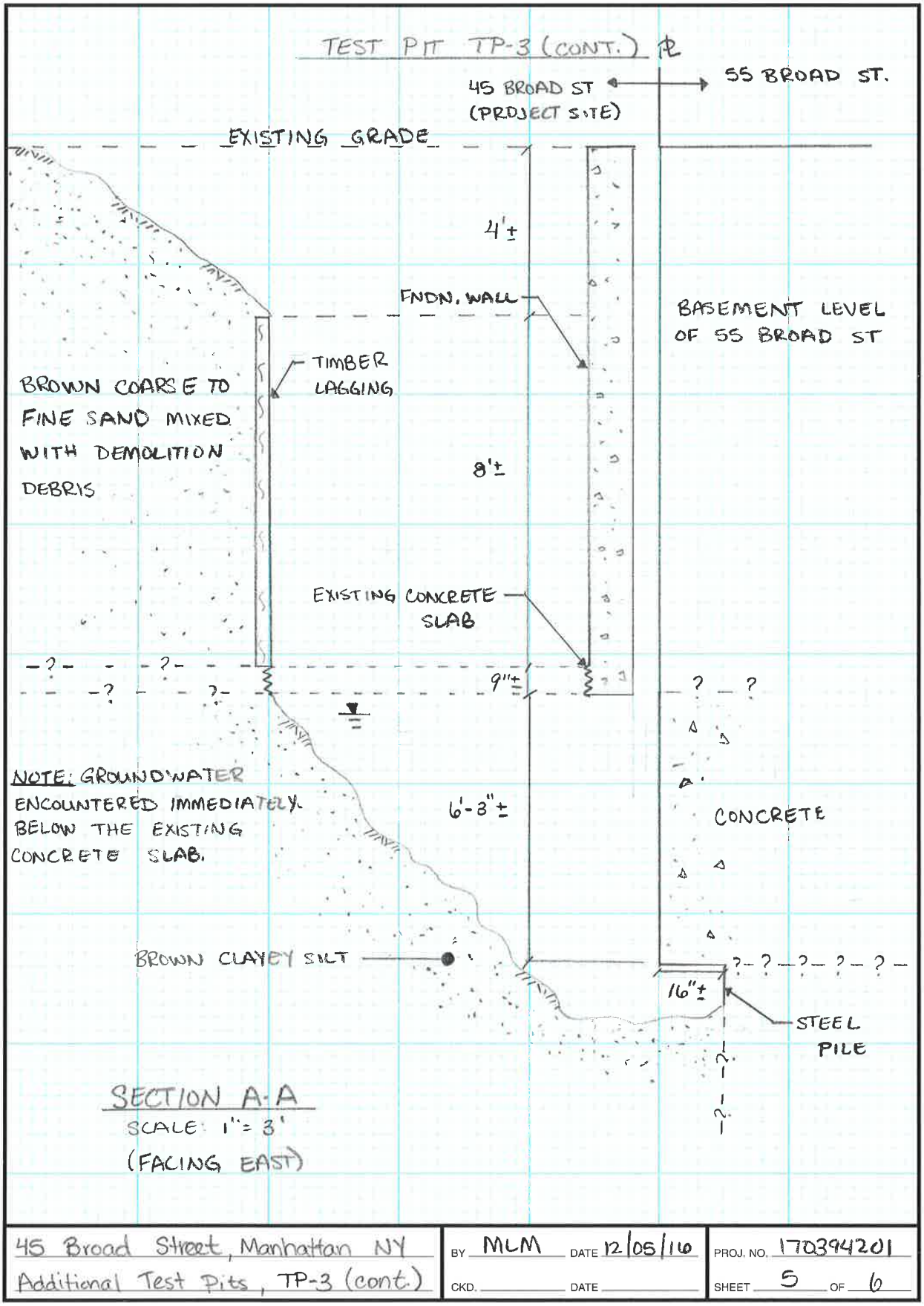
PLAN VIEW

SCALE: 1" = 3'

NOTE REFER TO DRAWING NO. 1 FOR TEST PIT LOCATION PLAN.

45 Broad Street, Manhattan NY Additional Test Pits, TP-3	BY MLM DATE 12/05/16 CKD. ____ DATE ____	PROJ. NO. 170394201 SHEET 4 OF 6

LANGAN



45 Broad Street, Manhattan NY Additional Test Pits, TP-3 (cont.)	BY MLM DATE 12/05/16 CKD. DATE	PROJ. NO. 170394201 SHEET 5 OF 6

LANGAN

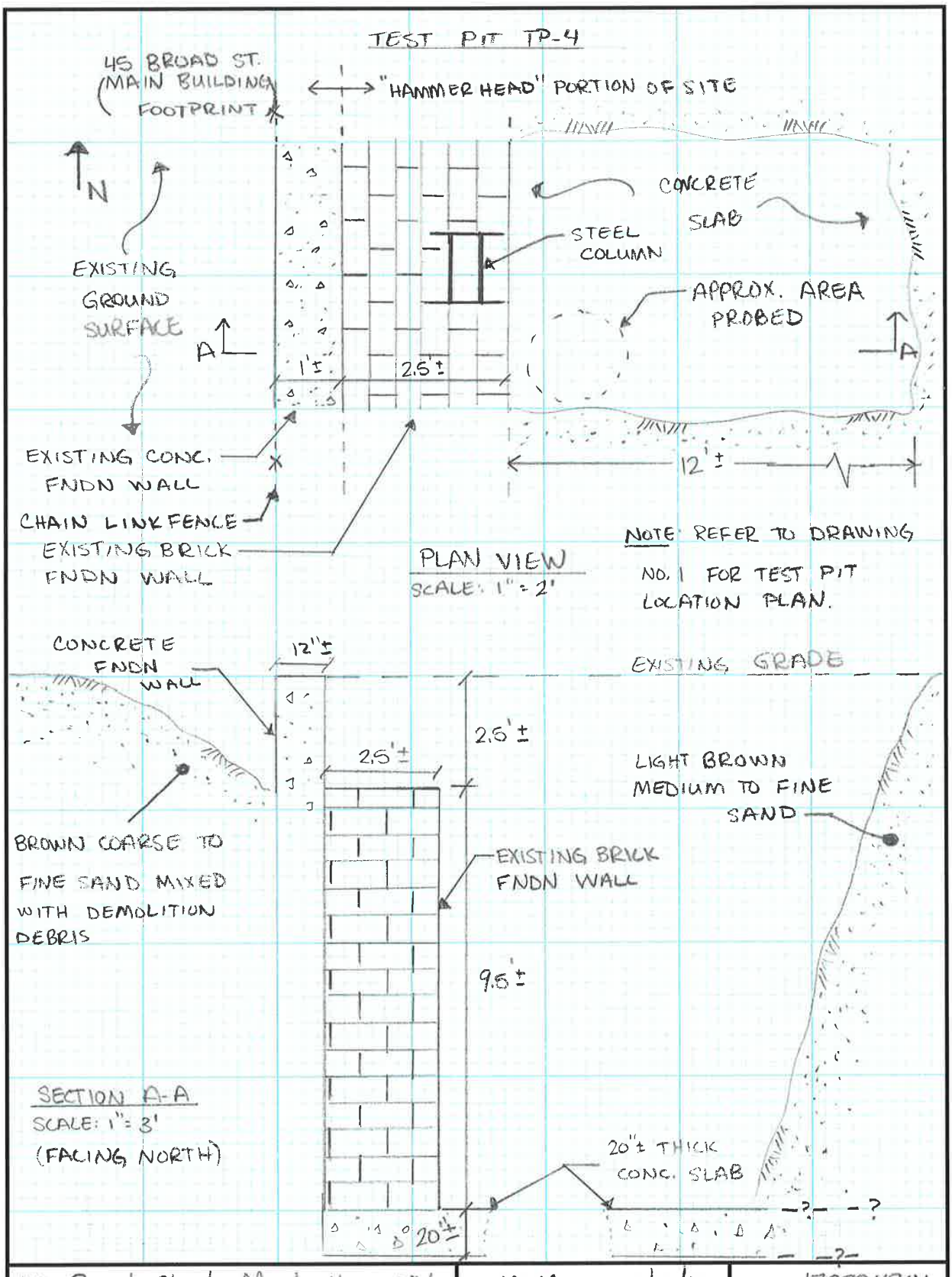

TEST PIT TP-4
45 BROAD ST. (MAIN BUILDING) FOOTPRINT
"HAMMER HEAD" PORTION OF SITE
N
EXISTING GROUND SURFACE
A
A
CONCRETE SLAB
STEEL COLUMN
APPROX. AREA PROBED
1'±
2.5'±
12'±
EXISTING CONC. FNDN WALL
CHAIN LINK FENCE
EXISTING BRICK FNDN WALL
PLAN VIEW
SCALE: 1" = 2'
NOTE: REFER TO DRAWING NO. 1 FOR TEST PIT LOCATION PLAN.
CONCRETE FNDN WALL
12"±
EXISTING GRADE
2.5'±
2.5'±
LIGHT BROWN MEDIUM TO FINE SAND
BROWN COARSE TO FINE SAND MIXED WITH DEMOLITION DEBRIS
EXISTING BRICK FNDN WALL
9.5'±
SECTION A-A
SCALE: 1" = 3'
(FACING NORTH)
20"± THICK CONC. SLAB
20"±
45 Broad Street, Manhattan NY
Additional Test Pits TP-4
BY MLM DATE 12/09/16
CKD. DATE
PROJ. NO. 170394201
SHEET 6 OF 6
LANGAN

Photo 1: TP-1 - General view of the excavation. Facing Northwest.

Photo 2: TP-1 - Concrete Raymond pile from former building foundations

Photo 3: TP-2 - General view of the excavation. Facing Northeast.

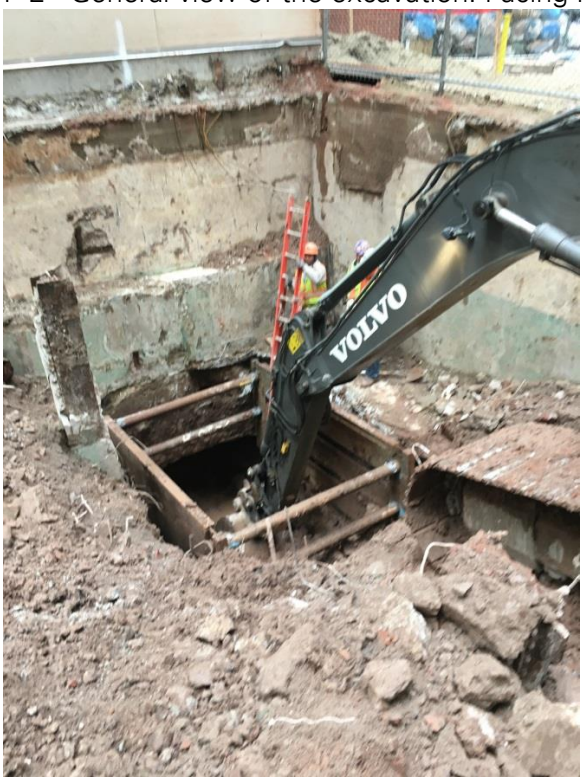


Photo 4: TP-2 - Final stages of excavation. Facing Northeast.

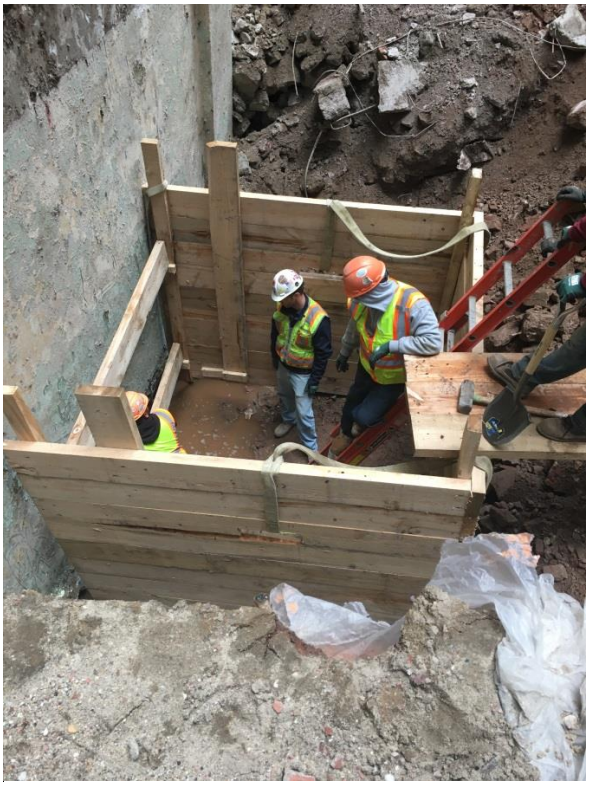


Photo 5: TP-3 - Excavation progress. Facing Southwest

Photo 6: TP-3 - End of Excavation. Looking from above

Photo 7: TP-3 – Observed steel pile. Facing South

Photo 8: TP-4 - Excavation progress. Facing West

Photo 9: TP-4 - Excavation complete. Facing West

UPDATED GEOTECHNICAL ENGINEERING STUDY for

45 Broad Street
New York, New York

Prepared For:

Madison 45 Broad Development LLC
105 Madison Avenue, 9th Floor
New York, New York 10016

Prepared By:

Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.
21 Penn Plaza
360 West 31st Street, 8th Floor
New York, New York 10001

Miguel G. Matos, P.E.
N.Y. Professional Engineer License No. 091718

Tasos Papathanasiou, P.E.
N.Y. Professional Engineer License No. 085329

12 May 2017
170394201

LANGAN

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FIGURES

APPENDICES

INTRODUCTION

This report is an update to our amended geotechnical engineering study for the proposed development of 45 Broad Street in Manhattan, New York. Specifically, this report includes recommendations for deep foundations instead of a mat foundation bearing on bedrock. This change was decided jointly by the design team and the Owner during the bidding of the foundations. The purpose of this study was to develop recommendations for foundations and other geotechnical aspects of design and construction. Our work was performed in accordance with our approved 19 November 2015 proposal. Our study included a review of available information, field investigations, engineering evaluation, and development of geotechnical recommendations in accordance with the 2014 New York City Building Code.

Elevations given are based on the survey prepared by Empire State Layout, Inc., dated 21 September 2016, and are with respect to the North American Vertical Datum (NAVD88) unless otherwise noted.

SITE DESCRIPTION

The 45 Broad Street site is on the east side of Broad Street between Exchange Place and Beaver Street in lower Manhattan, New York. The site is identified as Block 25, Lot 7 on the New York City Tax Maps and is currently vacant. The site is within the block bound by Exchange Place on the north, Beaver Street on the south, Broad Street on the west, and William Street on the east. Existing buildings are adjacent to the site on the north, south, and east. Broad Street borders the site on the west. A New York City Transit (NYCT) tunnel is located under Broad Street. A site location map is presented in Figure 1.

The vacant site is T-shaped with about 63 feet of frontage on Broad Street and a site area of about 12,600 square feet (SF), with surface elevation varying from about el 9 to el 11. An eight-story structure with one cellar level was demolished in 2007 to make way for the previous owner's proposed redevelopment. The former cellar was backfilled with demolition debris to sidewalk grade with the former foundations, including piles and pile caps and basement slab, left in place.

Adjacent Buildings

Existing structures adjacent to the site on the north, south, and east are shown in Figure 6.

41 Broad Street – Claremont Preparatory School

The Claremont Preparatory School (41 Broad Street) north of the site is a nine- to twelve-story brick and stone structure with a footprint of about 11,000 SF built in 1929. Available architectural drawings indicate that 41 Broad Street has two below-grade levels with the subcellar level having a finished-floor elevation about 28 feet below the adjacent sidewalk grades(about el -17.5). Available foundation drawings show the structure supported by concrete piers/spread footings. Bearing capacity was not indicated on the available plans. Construction drawings appear to indicate that, along the southern end of the site (adjacent to 45 Broad), the foundations consist of piers bearing on bedrock constructed by way of a continuous cofferdam.

25 Broad Street

25 Broad Street is a T-shaped lot to the east occupied by a 20-story brick and stone structure with a 263-foot frontage along Exchange Place, built around 1900. The building previously had an about 50-foot-wide section that extended to the south, adjacent to 41 and 45 Broad Street to the east. This 4,200-square-foot extension was demolished to be part of the previous 45 Broad Street development scheme. Available architectural drawings show that the entire building footprint of 25 Broad Street, including the demolished southern part, has one cellar level. The finished-floor elevations of the below-grade levels are not known, and no foundation drawings are available for this structure. A steam-line easement running in the north-south exists within the part of 25 Broad Street that was demolished.

25 Broad Street is a designated landmark building and falls within 90 feet of the project site. Therefore, 25 Broad Street must be monitored in accordance with TPPN 10/88 requirements.

40 Exchange Place

Beyond 25 Broad Street to the east is 40 Exchange Place, a 20-story brick and stone commercial building with one below-grade level, built in 1902. The finished-floor elevations of the below-grade levels are not known, and no foundation drawings are available for this structure.

15 William Street

Adjacent to 25 Broad Street to the southeast is 15 William Street, a 44-story concrete residential structure with below-grade levels that extend about 45 feet below the surrounding grades (about el -34.5) built in 2005. The foundation wall and excavation support system for

15 William Street consists of a permanent reinforced secant pile wall drilled into the underlying bedrock.

55 Broad Street

55 Broad Street, adjacent to the south, is a brick building varying from 6 to 31 stories, built in 1968. A one-story extension borders the project site to the southeast. Available drawings show that the building has one below-grade level at about el -7.5 and that the structure is supported on driven H-piles bearing on rock. According to information obtained from a test pit performed in December 2016, H-piles were also observed below the one-story extension.

The available information about the adjacent buildings should not to be considered absolute and all-inclusive. The foundation contractor must obtain all necessary information in order to protect all neighbor buildings during foundation construction.

Adjacent NYCT Subway Structure

The existing NYCT subway tunnels and structures for the BMT and IND J, M, and Z lines run beneath Broad Street about 20 feet west of the site; in addition, the Broad Street station (servicing lines J and Z) is nearby. NYCT drawings (Broad Street Station, South-End, 1928) show that the subway consists of a reinforced concrete box constructed using cut-and-cover methods. Vents in the Broad Street sidewalk are as close as about 10.5 feet to the property line. The base of the rail closest to the site is at about el -12.5. The tunnel foundation level is at about el -16.5, which is about 28 feet below the adjacent sidewalk grades. Because the proposed construction will be within 200 feet of the subway tunnel, NYCT approval of excavation and foundation construction is required to obtain building permits.

PROPOSED DEVELOPMENT

According to CetraRuddy's architectural drawings, the project will consist of about 8,950 square feet of development with an 83-story (plus mechanical penthouse) tower. The tower will extend to about 1,150 feet above grade and will have about 30-foot setback from the south property line along Broad Street. The top of the ground floor slab will be about el 11.7. The development in the rear "hammerhead" portion of the site is not proposed.

The building will include three cellar levels below the podium to be used for storage and amenities, including a swimming pool. The top of lowest cellar slab will be about 33 feet below sidewalk grade; the corresponding elevation is about el -22.

The tower will be concrete and will have a central structural core extending the entire height of the structure, with perimeter columns carrying the remaining load. According to the structural engineer (WSP) the following loads were considered for the foundation design:

1. Perimeter caisson compression loads (dead, live and wind) up to 3,000 tons (maximum along north side);
2. Interior caisson loads (dead, live and wind) up to 1,200 tons;
3. Uplift caisson loads up to 1,200 tons (net service level wind loads);
4. Total base shear of about 1,000 tons on the east-west direction and 1,500 tons on the north-south direction.

REVIEW OF PUBLISHED INFORMATION

Regional Geology

The United States Geological Survey "Bedrock and Engineering Geologic Maps of New York County and Parts of Kings and Queens Counties, New York, and Parts of Bergen and Hudson Counties, New Jersey" (see Figure 2) shows the bedrock formation underlying the site is Manhattan Schist.

Pleistocene glacial activity modified the landscapes and surficial features of Manhattan, Brooklyn, Queens, and Long Island. Glaciers scoured uplands and deposited varying amounts of till (an unsorted mixture of sand, clay and boulders) across the lowlands and valleys. The USGS surficial geology map indicates that the site is underlain by glacial outwash deposits generally consisting of sand and gravel. See Figure 3 for the USGS surficial geology map.

Historical Land Use

We reviewed the "Sanitary & Topographical Map of the City and Island of New York" (Viele, 1856), which indicates the east portion of the site near Broad Street is on manmade land and the west part of the site was a meadow. Before being filled, Broad Street was an inlet from the East River known as Broad Canal. See Figure 4 for the relevant part of the Viele Map.

Flood Hazard

We reviewed the Federal Emergency Management Agency (FEMA) Preliminary Flood Insurance Rate Map (FIRM), dated 5 December 2013 (Community Panel No. 360497 0088 G). According to the Preliminary FIRM, the western part of the site is within Zone X (areas within the 0.2 percent annual chance floodplain, i.e., 500-year flood). The eastern part of the site is within Zone AE (areas within the 1 percent annual chance floodplain, i.e., 100-year flood), which has a

base flood elevation of el 11 NAVD88. Design of the building must follow the flood protection requirements of the NYCT and ASCE-24. The relevant part of the Preliminary FIRM is presented in Figure 5.

SUBSURFACE EXPLORATION

A summary of our subsurface explorations performed in August 2007, February 2016, and December 2016 are presented below.

2007 Borings

Six borings (B-1 through B-6) were drilled as part of our 2007 subsurface exploration. All borings were drilled by Craig Test Boring, Inc. with a CME track-mounted drill rig, under Langan's full-time special inspection. The borings were advanced using mud rotary drilling techniques and a tricone roller bit with drilling fluid and steel casing providing soil support. Borings were advanced to between 59 and 65 feet below grade.

The upper 10 feet of each boring was drilled without sampling to permit the boring to be advanced through demolition debris and the remnant cellar-floor slab. Standard Penetration Test (SPT)[1] N-values were measured and soil samples were typically obtained beginning at about 10 feet below the existing site grades and at 5-foot intervals thereafter. Samples were retrieved using a standard 2-inch outside-diameter split-spoon sampler driven by a 140-pound automatic hammer in accordance with ASTM D1586. NX-size rock cores were obtained at each boring location in accordance with ASTM D2113. Rock core recovery[2] and rock quality designation (RQD)[3] was recorded for each core run.

Recovered soil samples were visually examined and classified in the field in accordance with the Building Code. Soil classifications, N-values, and other field observations were recorded on field logs. See Appendix A for the boring logs and Figure 6 for the boring location plan.

2016 Borings

Two borings (B-7 and B-8) were drilled in the rear of the lot ("hammerhead") as part of our February 2016 supplemental subsurface exploration program. The borings were drilled by Craig Geotechnical Drilling Co., Inc. with a truck-mounted drill rig under Langan's full-time special

[1] The Standard Penetration Test is a measure of the soil density and consistency. The SPT N-value is defined as the number of blows required to drive a 2-inch outside diameter split-barrel sampler 12-inches, after an initial penetration of 6-inches, using a 140-pound hammer free falling from a height of 30-inches.

[2] Core recovery is defined as the ratio of the total length of rock recovered to the total core run length, expressed as a percent.

[3] The RQD is defined as the ratio of the summation of each rock piece greater than 4-inches in length for NX cores to total core run length, expressed as a percent.

inspection. . The borings were advanced using mud-rotary drilling techniques and a tricone roller bit with drilling fluid and steel casing providing soil support. Both borings were advanced to 55 feet below grade.

The upper 10 feet of each boring was drilled without sampling to permit the boring to be advanced through demolition debris and the remnant cellar floor slab. SPT N-values were measured and soil samples were typically obtained beginning at about 10 feet below the existing site grades and at 5-foot intervals thereafter. Samples were retrieved using a standard 2-inch outside-diameter split-spoon sampler driven by a 140-pound automatic hammer in accordance with ASTM D1586. NX-size rock cores were obtained at each boring location in accordance with ASTM D2113. Rock core recovery and RQD were recorded for each core run.

Recovered soil samples were visually examined and classified in the field in accordance with the Building Code. Soil classification, N-values, and other field observations were recorded on field logs. See Appendix A for the boring logs and Figure 6 for the boring location plan.

2016 Cone Penetration Tests (CPTs)

Two Cone Penetration Tests (CPT-1, CPT-2) were performed on 1 February 2016 in accordance with ASTMD-5778 as part of our supplemental subsurface exploration. The CPTs were performed by Craig Geotechnical Drilling Co., Inc. under the special inspection of Langan. A truck-mounted CPT rig was used to hydraulically push a 1.4-inch-diameter (36mm) electric cone penetrometer to about 35 feet (CPT-1) and 38 feet (CPT-2).

The upper 15 feet of each CPT was pre-drilled to penetrate through the demolition debris and the remnant cellar-floor slab. The cone penetrometer was pushed at an estimated rate of about 0.75 in/sec (20mm/s) and readings were taken every 0.5 to 2.0 inch. Seismic shear-wave velocity tests were performed approximately every 5 feet. Seven shear-wave tests were performed at CPT-1, and eight at CPT-2. See Figure 6 for CPT locations and Appendix E for the CPT report prepared by Craig Geotechnical Drilling Co., Inc.

February 2016 Test Pit

One test pit (TP-1) was excavated by J. Coffey Contracting Inc., Flushing, New York, from 17 through 22 February 2016 under the full-time special inspection of Langan. The purpose of the test pit was to explore the adjacent foundation condition at 55 Broad Street. The test-pit indicated the cellar slab for 55 Broad Street extends to about el -5.25 (which appears to be slightly higher than el -7.5 depicted on available drawings), and that foundation pile caps extend

to about el -12.25. The test pit was backfilled to existing grade with excavated material upon completion of the exploration.

See Figure 6 for the test pit location and Appendix D for the test pit sketch and selected photographs.

December 2016 Test Pits

Four additional test pits (TP-1 to TP-4) were excavated by Posillico, Inc. from 1 through 8 December 2016 under the full-time inspection of Langan. The purpose of the test pits were to observe the adjacent foundation conditions at 41 Broad Street and 55 Broad Street, as well as observe potential buried obstructions within the site. Through these test pits, steel piles were observed supporting the 55 Broad Street building extension, a concrete foundation was observed to at least el -6 supporting the 41 Broad Street building extension (observations could not be made beyond el -6), and concrete piles with a thin steel shell were observed buried within the site. The test pits were backfilled to existing grade with excavated material upon completion.

See Appendix F for the Test Pit Findings and Recommendations Report, dated 9 January 2017.

Groundwater Observation Wells

Three groundwater monitoring wells were installed in completed borings B-1, B-6, and B-7 to monitor the groundwater level at the site. The wells consisted of 1¼-inch or 2-inch diameter PVC riser pipes and 10-foot- or 20-foot-long well screens with well depths ranging between about 26 and 49 feet. The water levels were measured during the exploration. Observation well construction logs are provided in Appendix B.

Laboratory Testing

Samples obtained during our 2007 and 2016 subsurface explorations were brought to our office for further analysis and laboratory tests. Soil classifications were verified by a senior engineer and selected soil and rock samples were sent to our laboratory for testing. Six grain-size analyses, 11 Atterberg Limits determinations, 17 moisture-content measurements, 4 unconfined compression tests, 2 elastic moduli determinations, and 2 splitting tensile strength tests were performed. See Appendix C for laboratory test results.

SUBSURFACE CONDITIONS

The subsurface conditions generally consist of about 13 to 17 feet of uncontrolled fill and demolition debris, about 21 to 27 feet of silt with discontinuous sand and clay seams, and about

3 to 15 feet of decomposed rock. Schist bedrock was encountered between about 38 to 49 feet below grade. Stabilized groundwater levels were observed at depths of about 13.5 feet in 2016 and 20 feet in 2007. A more detailed description of each layer is provided below. Representative subsurface profiles are presented on Figures 7 and 8.

Fill [Class 7][4]

A layer of uncontrolled fill and demolition debris ranging in thickness between 13 and 17 feet was encountered in the borings, test pits and CPTs. The upper fill generally consisted of brick, concrete, and rebar debris from previous demolition at the site. The former basement floor slab was encountered about 12 feet below the existing site grade. Fill encountered below the basement slab generally consisted of coarse to fine sand with varying amounts of silt, gravel, and debris. No soil sampling was performed within the upper 10 feet of each borehole because of obstructions within the fill from the demolition operations. In addition to the floor slab, former foundation elements and other large obstructions should be anticipated within the fill. The piles and pile caps from the former structure are also present below the slab.

The fill is highly variable and is designated as Building Code Class 7, "uncontrolled fill."

Silt and Clay [Class 5b, 4c, and 6]

A layer of low-plasticity silt about 21 to 27 feet thick was encountered below the fill layer. This silt is regionally known as "Bull's Liver". The silt is generally loose to medium-dense with varying amounts of fine sand and clay, and is known for having unconventional engineering properties because of its silt-sized particles with little to no plasticity. In a saturated state, this silt has been observed to behave like a gel or even flow like liquid under shock or vibration. The foundation contractor should consider this soil behavior because it can introduce significant challenges during excavation and foundation construction.

Discontinuous layers of fine silty sand were encountered within the silt in borings B-2, B-3, B-4, and B-8 (discussed below). In addition, pockets with more clay content were encountered within the silt layer in borings B-4, B-5, and B-7.

Standard Penetration Test (SPT) N-values for the silt ranged between 1 and 29 blows per foot. CPT results indicated that this layer has the behavior of "Clayey silt to silty clay" or "Silty sand to sandy silt" with small pockets of "Clay to silty clay" and "Clean sand to silty sand". In general terms the SPT sampling and CPT results correlate well.

[4] Numbers in brackets that follow the material designation indicate classification of soil and rock materials in accordance with the NYC Building Code.

Laboratory testing of collected samples yielded natural moisture contents from 27 to 40 percent. The liquid limit ranged between 26 and 33 (average about 30); the plastic limit ranged from 20 to 25 (average about 23); and the plasticity index ranged from 4 to 11 (average about 7). In most tests the water content is near or above the liquid limit indicating that the silt could behave similarly to a viscous liquid when disturbed by construction.

The silt is generally classified as ML, CL, and ML-CL, in accordance with Unified Soil Classification System (USCS). The silt is designated as Building Code Class 5b and 6 material, "medium dense silts" and "loose silts," respectively. The pockets with higher clay content are designated as Building Code Class 4c and 6 material, "medium stiff clays" and "soft clays," respectively.

Clayey Sand [Class 6]

Four- to seven-foot thick pockets of clayey fine to coarse sand were encountered within the silt in borings B-2, B-3, B-4, and B-8. Typical N-values for these sand pockets ranged between 1 and 8 bpf. These thin pockets of "Clean sand to silty sand" were also encountered at CPT-1 and CPT-2.

The clayey sand is generally classified as SC in accordance with USCS and is designated as Building Code Class 6 material, "loose granular soils."

Decomposed Rock [Class 1d]

Decomposed rock, ranging in thickness between about 3 and 15 feet, was encountered below the silt. The top of the decomposed rock was found about 34 to 41 feet below the existing ground surface (about el -24 to el -32). The decomposed rock generally consisted of micaceous silt with varying proportions of gravel and sand, and gravel-sized fragments of schist. SPT N-values within the decomposed rock generally met split-spoon refusal at 100 blows over 3 inches.

The decomposed rock layer is classified as Building Code Class 1d material, "soft rock."

Bedrock [Class 1a, 1b, and 1c]

The site is underlain by Manhattan schist bedrock, and the top of rock was encountered at depths of about 38 to 49 feet below the existing site grades. The corresponding top or rock elevations range between about el -28 and el -40. Rock-core recoveries range between 58 and 100 percent. Rock quality designation (RQD) values range between 37 and 100 percent. Both core recoveries and RQD generally improve with depth.

The bedrock at the site is classified as Building Code Class 1a, 1b, and 1c material, "hard sound rock," "medium hard rock," and "intermediate rock," respectively. Laboratory testing performed on select rock cores show intact compressive strength ranging from 8,400 to 16,800 psi, with an average compressive strength of about 13,500 psi. The rock Elastic Modulus test results range from 6,500 to 9,100 ksi, with an average of about 7,800 ksi. Splitting Tensile test results range from 1,300 to 2,300 psi, with an average of about 1,600 psi.

Groundwater

Groundwater levels were measured between about 18 and 20 feet below the existing grades during our 2007 exploration (about el -8 and el -10). Groundwater levels were measured at about 13.5 feet below the existing grade (about el -3.5) during our 2016 exploration. Groundwater can be expected to fluctuate with weather, seasonal conditions, construction activity, or groundwater pumping. The NYCT tunnels in Broad and William streets may be causing a local depression of the groundwater table. Nearby construction or pumping activity can also affect groundwater elevations on this site. We recommend the groundwater level be monitored throughout the design and construction phases.

EVALUATION AND DISCUSSION

The subsurface and surrounding conditions present several geotechnical design challenges:

1. The uncontrolled fill and low-plasticity silt are unsuitable to support the proposed high-rise tower.
2. Existing structures (buildings, a subway tunnel, and a steam tunnel) are adjacent to the site on all four sides; the excavation and foundations construction methods must not overstress or damage the adjacent structures.
3. Driven piles are not recommended because of the proximity to adjacent buildings and NYCT tunnel.

The building will include three cellar levels with the top of the lowest cellar slab at about 33 feet below sidewalk grade. Bedrock is about 6 to 18 feet below the top of the lowest cellar slab. Therefore, a drilled-in pile foundation, socketed into bedrock was considered. This foundation system would limit the depth of excavation (excavation to competent bedrock not required). Drilled-in caissons can also resist wind and hydrostatic lift, thus permanent tie-down anchors would not be needed. The foundation excavation will require installing a permanent rigid support of excavation (SOE) system to provide groundwater cut-off at the south, east and west

side of the excavation. The rigid system will also be reinforced and socked into the bedrock to carry permanent compression and tension loads.

According to historic drawings, the 41 Broad Street building is founded on continuous concrete wall footings which extend to bedrock. Therefore, the drawings indicate that the 41 Broad Street foundation walls can provide groundwater cut-off on the north side of the 45 Broad Street excavation. Along the remaining excavation perimeter, the rigid SOE system shall consist of secant pile walls. The secants piles can be appropriately sized and reinforced to carry compression and tension perimeter building loads, i.e. individual secant piles will be converted to caissons. Geotechnical parameters for the drilled caissons and support of excavation design are provided in subsequent sections.

During construction, the perimeter walls are installed first, and temporary lateral bracing is installed as excavation progresses. Once the foundation system is in place, cellar slabs are casted and all lateral bracing is removed. The proposed excavation system must account for the tight spatial constraints and depth of excavation. Excavation recommendations including the use of corner bracing, rakers, and soil-mix walls are discussed in subsequent sections.

Because of the site's proximity to the adjacent subway tunnel, NYCT review and approval will be required to obtain an excavation and foundation permit from the NYC Department of Buildings. We expect that the interaction with NYCT will be extensive and that permitting process can take four to six months or more, which must be accounted for in the project schedule.

FOUNDATION DESIGN RECOMMENDATIONS

The following sections present our liquefaction evaluation, a discussion of the seismic design parameters, and our recommendations related to the design and construction of the foundation system for the proposed development. All discussions reference the 2014 Building Code.

Seismic Design Parameters

The proposed structure will be supported on drilled caissons socketed into rock. On average, the bottom of [9ft thick] pile caps is less than 10 feet from top of bedrock; therefore, the Site Class is B in accordance with Section 1613.5.5 of the Building Code. The Building Code seismic design parameters are summarized in Table 1.

Table 1 – Seismic Design Parameters

Description	Parameter	Recommended Value	Building Code Reference
Risk Category (Assumed; to be confirmed by structural engineer)		**II**	Section 1604.5
Site Class	**Rock**	**B**	Section 1613.5.2
Mapped Spectral Acceleration for short periods:	**S_s**	**0.281 g**	Section 1613.5.1
Mapped Spectral Acceleration for 1-sec period:	**S_1**	**0.073 g**	
Site Coefficient:	**F_a**	**1.00**	Section 1613.5.3
Site Coefficient:	**F_v**	**1.00**	
5%damped design spectral response acceleration at short periods:	**S_{DS}**	**0.187 g**	Section 1613.5.4
5% damped design spectral response acceleration at 1-sec period:	**S_{D1}**	**0.049 g**	Section 1613.5.4
Maximum considered Earthquake geometric mean (MCEG) peak ground acceleration	**PGA_M**	**0.17g**	Section 1813.2.1
Seismic Design Category (Based on assumed Risk Category)		**B**	Tables 1613.5.6 (1) & 1613.5.6 (2)

Based on the design spectral accelerations in Table 1 and the anticipated structural occupancy/risk category of the structure (identified as Structural Occupancy/Risk Category II) and in accordance with the Building Code, we have estimated that the design will be subject to the requirements of Seismic Design Category B. The Structural Occupancy/Risk Category must be confirmed by the architect and structural engineer.

Liquefaction Evaluation

The Building Code requires an evaluation of the liquefaction potential of non-cohesive soil and cohesive soil with plasticity index 20 or less below the groundwater table and up to 50 feet below the ground surface. In accordance with the Building Code screening process for liquefaction, the SPT N_{60} values from the borings are plotted versus depth on the Liquefaction Assessment Diagram, presented as Figure 9. This plot shows a significant amount of soil in the "Liquefaction Probable" zone.

The proposed construction involves excavation and removal of approximately 35 feet of soil to about el -23. Drilled caissons will be socketed into competent bedrock and pile caps will be constructed with the bottom of caps approximately at the top of weathered rock. Therefore, the risk of liquefaction is mitigated and a site-specific study is not required. If the development plan changes and excavation and removal of all liquefiable soil is no longer considered, the design team should address this change and re-evaluate the site classification and soil liquefaction potential.

Foundation System

The bottom of the lowest cellar slab elevation will be about at el -23, within the transition zone between the low-plasticity silt or sand layer and decomposed rock. Because the low-plasticity silt is unsuitable as a bearing material, we recommend that the building be supported on a drilled-in caisson/pile foundation.

The caisson pile consists of an open-ended steel pipe drilled to top of rock (free length) and an uncased rock socket (bond length). After drilling, the entire shaft is filled with concrete or grout and high strength reinforcement bars. Caissons develop axial load capacity through peripheral shear resistance between the concrete and bedrock, as well as end-bearing resistance on bedrock for compression.

For interior caisson piles, we have considered nominal 36-inches diameter caissons with 0.75-inch thick permanent casing, and 18-inches diameter caissons with 0.5-inch thick permanent casing, extending to, and socketed into NYCBC Class 1c or better bedrock. In addition, the secondary piles of the proposed secant pile walls can be converted to load carrying caissons. Because the axial compression and tension loads vary considerably along the secant wall lengths, the design drawings will specify socket lengths at each location where a secant is converted into a caisson.

The top of bedrock was encountered at depths of about 39 to 51 feet below the existing site grades, corresponding to el -28 and -40, and generally dips north to south. Estimated design sizes and capacities for the foundation caissons are provided in Table 2 below.

Table 2 – Caisson Design Parameters

Casing OD (inches)	Approx. Socket Diameter (inches)	Approx. Rock Socket Length (ft)	Grout Strength (psi)	Approx. Axial Capacity (tons)	Approx. Uplift Capacity (tons)
36	33	25	10,000	3,000	1,500
18	17	20	10,000	1,200	600
39	35.5	15	10,000	2,100	1,000
24	20.5	12	10,000	1,100	400

The Building Code recommends that under fixed headed pile conditions, the allowable lateral load shall correspond to a gross lateral movement of 3/8-inch. The recommended allowable lateral load for 18-inch and 36-inch diameters interior caissons (assuming fixed headed condition) are 10 tons and 40 tons respectively and must be verified via loads tests.

The recommended minimum center-to-center pile spacing between the caissons is three times the caisson diameter. No reduction in the allowable axial (compression) loading for group effects is needed for this pile spacing. Uplift and lateral resistance group effect will vary for each pile cap configuration (e.g. the individual uplift pile capacity will decrease for closer pile spacing, and the individual lateral capacity will decrease for pile spacing less than 8.0 pile diameters). Group and global stability analysis must be performed during design development. The design length of piles may be increased where needed, if required by the group analysis. The Building Code does not require axial loading testing of drilled caissons socketed in Class 1a through 1c rock, but does require video inspection of the rock socket prior to reinforcement and concrete placement.

Rigid Perimeter Excavation Support

Below grade construction will include excavating to between about 34 and 42 feet below the existing grades (about el -23 to el -31). To provide excavation support and temporary groundwater cut-off we recommend installing a rigid, continuous secant pile wall system on the

south, east, and west foundation perimeter. The secant pile walls will abut the foundation wall of 41 Broad Street, which extends into the bedrock (according to historic construction plans).

The secant pile wall installation begins with the construction of a guide wall at the ground surface. The guide wall ensures that the position, alignment and required overlap of subsequent secant piles are maintained. After the guide wall is formed, the primary piles (generally every other pile location) are installed by advancing steel casing to top of rock and continuing the rock socket to the design depth. The casing is then withdrawn as the pile is grouted. Secondary piles are then drilled in between such that they overlap with the primary piles. Reinforcing steel is added to the secondary piles based on the structural loading and excavation support requirements. These systems are relatively stiff soil retention systems, necessary to limit wall deflection and movement of adjacent structures, and assist in groundwater control. To accommodate access of the drilling equipment close to the property line, the edge of casing is positioned at least 12 inches from the face of adjacent buildings. The contractor must account for the presence of numerous obstructions such as remnant slabs and foundations, including piles and pile caps, exist within and below the fill and should be removed prior to or bypassed during the installation of the perimeter excavation support.

In addition to serving as temporary excavation support and water cut-off, the secant pile wall can serve as the permanent foundation wall and carry part of the foundation loads according to the foundation design. The design loads for the secant wall caissons are discussed above. If the secant piles are used to resist uplift loading, they must also be evaluated for global stability. In addition, the top level of the secant pile wall must be coordinated with the structural engineer to account for the continuous ring beam.

Lateral support is provided by corner braces, rakers, and soil-mix walls, which are installed as the excavation progresses. Steel sheeting, or other internally braced methods, may be installed where required to accommodate the caisson-cap excavation.

The NYC Department of buildings (DOB) requires that project-specific excavation support drawings be prepared as part of the new-building submission. The project-specific plans must be fully developed, in conjunction with developed structural building plans, to be reviewed and approved by DOB so that a construction permit for the new building (or foundations) can be issued. Excavation support plans will also need to be reviewed by NYCT for potential impacts on the adjacent subway structures.

Pressure Slabs

The lowest floor level will extend below groundwater and should be designed as a pressure slab. We recommend that the pressure slabs be designed assuming hydrostatic uplift corresponding to the design groundwater el 12 (BFE + 1ft). Where possible, pressure slabs should be keyed into the foundation walls and should be cast with integral water stops (PVC "dumbbells" and post construction grout tubes). Pressure slabs should be waterproofed according to the recommendations presented herein.

Permanent Groundwater Control

This section describes our recommendations for permanent groundwater control at the site.

Design Groundwater Level

During the 2007 subsurface exploration, the static groundwater was observed at about 18 to 20 feet below existing grade (about el -8 to el -10). During the 2016 subsurface exploration, the static groundwater was observed at about 13.5 feet below existing grade (about el -3.5). This fluctuation could be related to seasonal variations, nearby construction or pumping activities.

Because the site is partially located within the Flood Zone AE, the foundation walls, ground level, and below-ground slabs should be flood-proofed and designed to resist hydrostatic pressure for groundwater rising to el 12. This Design Flood Elevation (DFE) corresponds to the base flood elevation of el 11 (BFE) plus 1-foot freeboard as per Chapter G5 Table 6.1 of the Building Code.

Foundation Waterproofing

To limit water seepage we recommend that the foundation slab, caisson-caps, and the perimeter foundation walls be fully waterproofed to at least the design flood elevation (DFE). We recommend installing a membrane-type, positive-side waterproofing (installation on outside of structure). For horizontal applications, the waterproofing membrane should be installed on a two-inch-minimum concrete working surface (mud-slab), which will create a uniform substrate. For one-face wall vertical applications (conventional foundation wall and pit walls), plywood or other acceptable flat surfaces should be used to secure the waterproofing membrane. The membrane should be protected against damage during rebar placement, concrete placement, and general construction traffic.

Groundwater can be expected to seep through the joints in the secant pile wall. One scheme to accommodate the water leakage is to create a cavity wall using masonry block. The water is

collected behind the partition walls via a series of scupper drains and directed to the lowest cellar level. The water is then ejected and discharged into the city sewer system.

An alternate scheme is to waterproof the inside face of the secant pile wall. This can be accomplished by installing a waterproofing membrane on the secant pile wall and casting an interior liner wall. Prior to the membrane application the secant wall surface should be purged and leveled. A concrete facing wall would then be cast against the secant piles to provide the necessary bond to the waterproofing and to hold the membrane in place. The minimum wall thickness is 4 inches (or as otherwise recommended by the waterproofing manufacturer) as needed for structural integrity. Special waterproofing details will need to be developed for locations of the secant pile wall – intermediate slabs interface and at the bracing locations. For the horizontal and vertical applications we recommend using Preprufe products by W.R. Grace or other equivalent. As a supplementary measure, waterproofing concrete admixtures such as Hycrete's products can be added to the secant pile grout mix (for water control and corrosion protection) and/or the liner wall grout mix.

We recommend that warranties are obtained from the manufacturers and installers to cover materials and workmanship. Material and system compatibility needs to be confirmed if products from multiple manufacturers are selected. Only certified installers should be used to perform the work. Detailed oversight should be performed and a representative of the manufacturer should perform a final inspection of the waterproofing prior to concrete pours.

Depending on the use of the cellar space, installing a secondary control system may be warranted. For this purpose the following secondary measures can also be considered.

1. Install a second mud slab on top of the installed horizontal waterproofing membrane. This mud slab would protect the installed waterproofing from construction traffic during placement for the steel reinforcement.
2. Use a waterproofing additive in the foundation concrete. Additives typically react with water to block pours and small cracks.
3. Install a collection layer and concrete slab over the mat slab. The draining layer can be gravel with collection pipes or a heavy duty prefabricated drainage board. This system will collect groundwater (that could intrude through damaged waterproofing) and guide it to a drain system.

Permanent Below-Grade Walls

Permanent below-grade walls including perimeter foundation and elevator pit walls should be designed to resist lateral loadings from static earth pressure, water pressure, and vertical surcharge. Backfill should not be placed against below-grade walls until the concrete has reached its 28-day compressive design strength and after adequate lateral bracing has been provided to prevent rotation of the wall, or as otherwise directed by the structural engineer. We recommend the following design parameters in Table 3 and subsequent paragraphs.

Table 3 – Horizontal Earth Pressure Parameters

Layer	Unit Weight Above WT (pcf)	Effective Unit Weight Below WT (pcf)	At Rest Earth Pressure Coefficient K_o
Fill [Class 7]	120	63	.50
Silt and Clay [Class 5b, 4c, 6]	110	57	.60
Decomposed Rock [Class 1d]	135	72	.35

- Hydrostatic pressures should be added as a triangular pressure distribution having an equivalent fluid weight of 62.4 pounds per square foot per foot of depth below the design groundwater level.

Surcharge loads should be considered in the design of below-grade walls. The walls should be designed for an additional uniform pressure distribution equal to 0.50 times the anticipated surcharge load. We recommend the following minimum surcharges be considered:

- Surficial traffic loads should be considered for the west perimeter walls (along Broad Street). We recommend a surcharge load of 300 psf for the street side walls to account for large trucks and emergency vehicles.

- Surficial loads should be considered for the east perimeter walls (along hammerhead). We recommend a surcharge of 100 psf for these walls.

- Construction surcharge loads should be considered along the west and east perimeter walls if they exceed the recommended values above.

- Walls must also be designed for surcharge loads from adjacent structures where the walls extend below the area of influence of the adjacent foundations. We understand 41 Broad Street is founded on rock, and 55 Broad Street is founded on piles such that only the surcharge from the neighboring slab needs to be considered.

GEOTECHNICAL CONSTRUCTION RECOMMENDATIONS

Our recommendations for excavation, subgrade preparation, temporary groundwater control, and pre-construction activities and construction monitoring are provided below.

Excavation

Site excavation within the fill and underlying silt and clay can be performed using conventional earth-moving equipment (e.g., backhoes, excavators, dozers, etc.). All excavations should be conducted in accordance with all OSHA requirements including, but not limited to, temporary shoring, trench boxes, and proper benching. Obstructions such as old foundations, slabs, pile caps and piles, and demolition debris should be expected and may require heavy demolition equipment to remove.

Note that obstructions such as remnant slabs and foundations including piles and pile caps were observed within and below the fill. Specifically, the remnant cellar slab was encountered about 12 feet below existing grade. The contractor should be prepared to demolish and excavate through the existing slab and all obstructions, and remove the existing pile caps, piles, and slabs. Additional test pits by the foundation contractor are recommended prior to excavation, in order to evaluate the extent and condition of former foundations and buried structures.

Temporary Groundwater Control

Groundwater was encountered in the 2016 investigation at 13.5 feet below grade. The proposed deep excavation will require dewatering. The proposed SOE system using secant piles will provide groundwater cutoff such that the interior of the excavation can be locally dewatered. Collection of rainwater runoff will also be needed during the excavation and subgrade preparation work. Water runoff should be controlled with the use of gravel-lined collection trenches or pits and submersible pumps. Care should be taken to ensure that drainage is provided during all phases of excavation work so as to limit the disturbance of the subgrade materials and provide a workable surface. Any necessary environmental pre-treatment of groundwater should be coordinated with the applicable environmental regulations

for the site. A DEP discharge permit will need to be furnished to discharge groundwater into the DEP combined sewer. It is the contractor's responsibility to estimate the daily groundwater discharge volume and to furnish all paperwork for the permit application.

Preconstruction Conditions Survey and Monitoring During Construction

A preconstruction-conditions survey report should be prepared for the adjacent buildings and the existing NYCT subway tunnel adjacent to the site. We recommend that a monitoring program be developed to observe the response of the existing buildings and subway tunnel adjacent to the site during foundation construction activities (i.e., excavation, SOE installation, bracing, etc.). According to our past discussions with NYCT, this program could consist of monitoring horizontal and vertical movements by optical surveying and inclinometers, vibration monitoring using seismographs, and monitoring of groundwater through observation wells. The NYCT typically requires that the vibration monitoring data is collected manually, or at least has on site observation of an automated system.

All designated landmarks within 90 feet of the site must be monitored in accordance with TPPN 10/88 requirements. The Owner and Contract shall be aware that 25 Broad Street (to the northeast of the site) and the street plan of New Amsterdam, including Broad Street (to the west of the site) are designated landmarks.

Construction Documents and Quality Control

Design specifications and drawings should incorporate our recommendations to ensure that subsurface conditions and other geotechnical issues at the site are adequately addressed in construction documents. Langan should assist the design team in preparing specification sections related to geotechnical issues such as support of excavation, foundations, backfill, and excavation support. Langan should also review foundation design drawings and details, and all contractor submissions and construction procedures related to geotechnical work.

Geotechnical assessment and design is an ongoing process as additional information becomes available, including during construction. A geotechnical engineer familiar with the site subsurface conditions and design intent should perform the quality assurance observations and testing of geotechnical-related work during construction. According to the Building Code, construction of foundations (i.e., earthwork, subgrade preparation, etc.) and support of excavation require special inspection by a Professional Engineer licensed in the state of New York.

Owner and Contractor Obligations

Construction activities that alter the existing ground conditions such as excavation, fill placement, foundation construction, ground improvement, pile driving/drilling, dewatering, etc. can induce stresses, vibrations and movements on nearby structures. The Owner and all Contractors must ensure that these impacts will not adversely affect the performance of the structures and take adequate measures to protect the existing structures during construction.

Unless otherwise agreed to by Langan in writing, by using this report, the owner agrees to the following:

1) That Langan will not be held responsible for damage to adjacent structures caused by the actions of contractors involved in the project;

2) To have Langan added to the Foundation Contractor's General Liability insurance as an additional insured;

3) To require the Foundation Contractor to defend, indemnify and hold harmless the Owner and Langan against all claims related to damage to adjacent structures or properties

LIMITATIONS

The conclusions and recommendations provided in this report are based on subsurface conditions inferred from a limited number of borings, as well as information provided by Madison 45 Broad Development LLC, February 2016 concept design drawings and sketches provided by CetraRuddy and WSP, and subsequent discussions with the project team. Recommendations provided are dependent upon one another and no recommendation should be followed independent of the others.

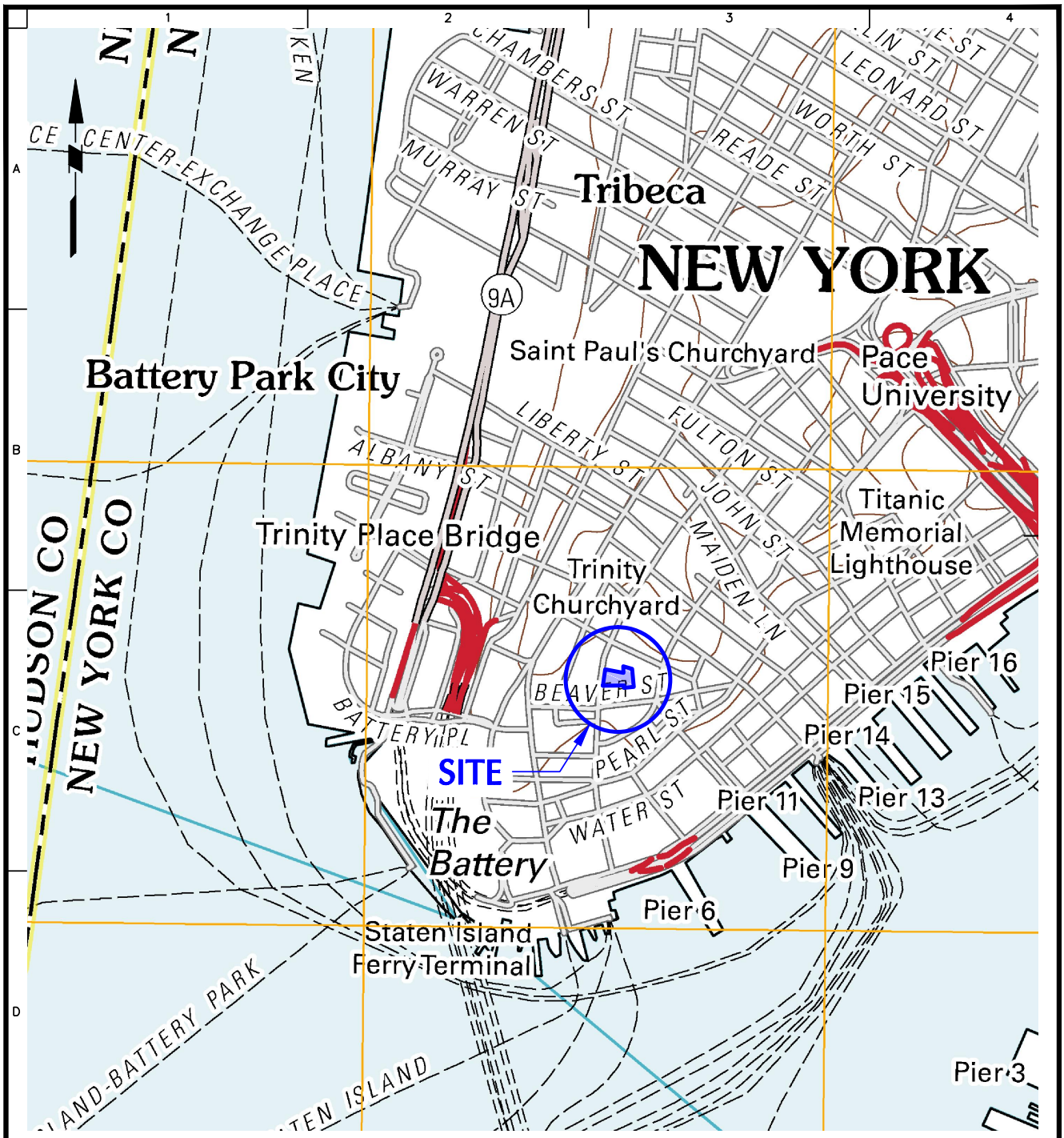
Any proposed changes in structures or their locations should be brought to Langan's attention as soon as possible so that we can determine whether such changes affect our recommendations. Information on subsurface strata and groundwater levels shown on the logs represent conditions encountered only at the locations indicated and at the time of investigation. If different conditions are encountered during construction, they should immediately be brought to Langan's attention for evaluation, as they may affect our recommendations.

This report has been prepared for 45 Broad Street, New York, New York, to assist the owner, architect, and structural engineer in the design process and is only applicable to the design of the specific project identified. The information in this report cannot be utilized or depended on

by engineers or contractors who are involved in evaluations or designs of facilities (including underpinning, grouting, stabilization, etc.) on adjacent properties, which are beyond the limits of that which is the specific subject of this report.

Environmental issues (such as potentially contaminated soil and groundwater) are outside the scope of this study and should be addressed in a separate study.

FIGURES



SOURCE: USGS JERSEY CITY, NJ-NY 7.5-MINUTE QUADRANGLE MAP, 9 JUNE 2011.

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Project	45 BROAD STREET BLOCK No. 25, LOT No. 7 MANHATTAN NEW YORK NEW YORK
Drawing Title	SITE LOCATION MAP
Project No.	170394201
Date	12/30/2015
Scale	1"=1000'
Drawn By / Checked By	SWB / CAP
Submission Date	12/30/2015
Figure	1
Sheet	1 of 9

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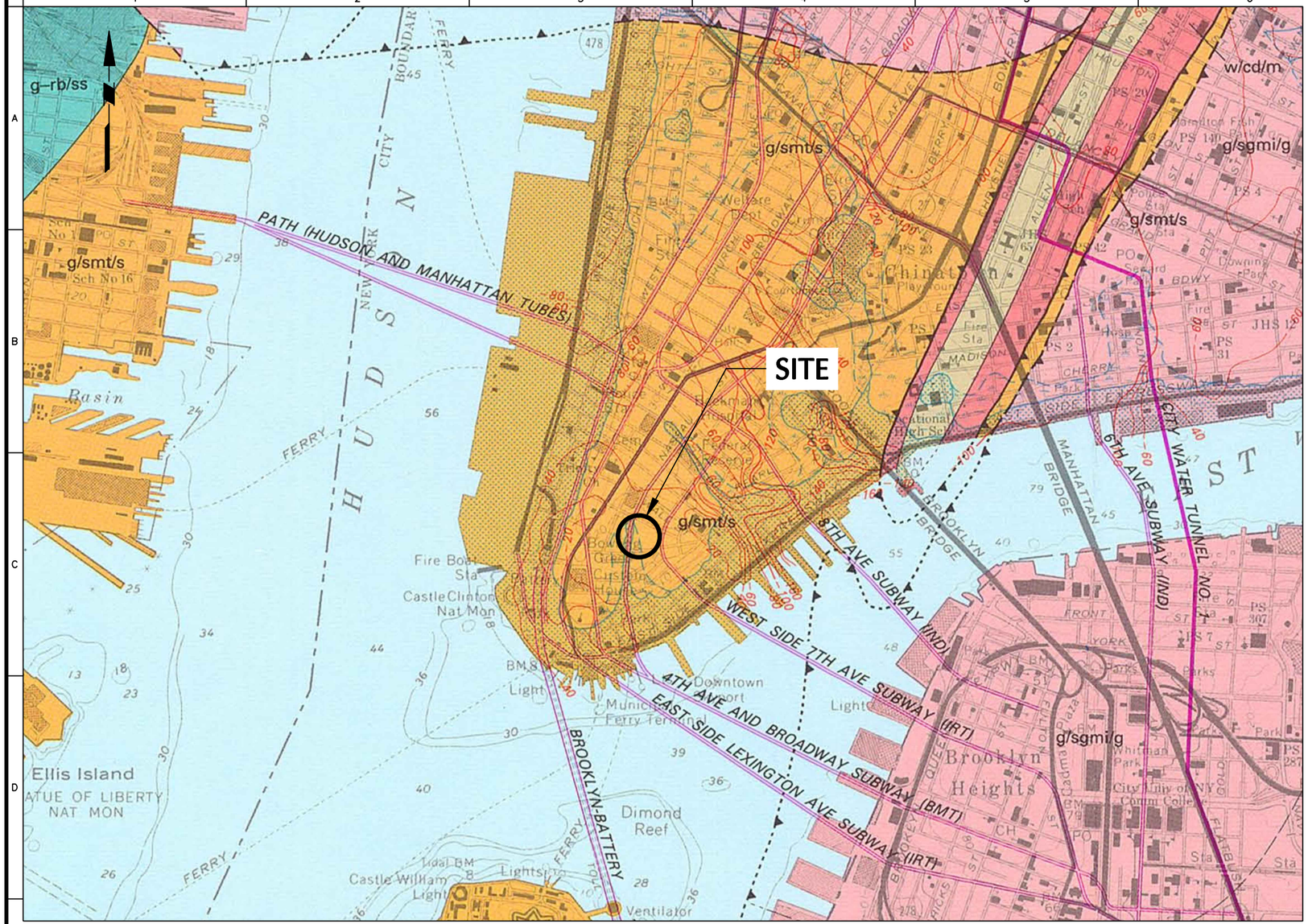

GEOLOGIC UNITS COMBINED ACCORDING TO SIMILAR ENGINEERING CHARACTERISTICS

The major common attribute of engineering significance used in the grouping of these units is similarity of rock type, which should give rise to reasonably uniform strength characteristics for intact rock (rock without faults or other discontinuities). Intact-rock strength decreases with an increase in discontinuity frequency and in weathering (Farmer, 1983). Formal geologic-unit names are in parentheses.

g/smt/s	Gray sillimanite-muscovite-tourmaline schist (Manhattan Schist)
g/pqm/s	Gray plagioclase-quartz-muscovite schist (Walloomsac Formation)
w/cd/m	White calcite-dolomite marble (Inwood Marble and lenses in the Hartland Formation (OChm), and coarse-grained siliceous dolomite (Yfm))
bw/gpb/g	Black and white garnet-plagioclase-biotite gneiss (Fordham Gneiss, member B)
g/qbp/s	Gray quartz-biotite-plagioclase schist (Fordham Gneiss, member C)
p/mbp/g	Pink muscovite-biotite-plagioclase gneiss (Fordham Gneiss, member A)
w/qmlm/gr	White quartz-microcline-muscovite granite (Hartland Formation)
g/bmq/s	Gray biotite-muscovite-quartz schist (Hartland Formation)
g/gkmbqq/s	Gray garnet-kyanite-muscovite-biotite-oligoclase-quartz schist (Hartland Formation)
g/spm/s	Gray sillimanite-plagioclase-muscovite schist (Hartland Formation)
w/gr	White granite
gn/sp	Green serpentinite
gb/am	Greenish-black amphibolite (in all units except marble and Walloomsac Formation)
am	Amphibolite (usually looks black in outcrops)
g/sgmi/g	Gray sillimanite-garnet-microcline gneiss (Ravenswood Granodiorite)
dg/pa/d	Dark-gray plagioclase-augite diabase (Palisade Diabase)
gnr/sh-ss	Greenish-red shale and sandstone (Passaic Formation)
g-b/sh	Gray and black shale (Lockatong Formation)
g-rb/ss	Gray and reddish-brown sandstone (Stockton Formation)

EXPLANATION OF MAP SYMBOLS

SUBSURFACE ENGINEERING STRUCTURES

- **City Water Tunnels No. 1, 2, and 3, and Richmond Water Tunnel**
- **Old and New Croton Aqueducts**—Where aqueduct is shown side-by-side with City Water Tunnel No. 3, water tunnel actually is directly beneath aqueduct
- **Subway, railroad, or auto tunnel**—Where City Water Tunnel No. 1 directly underlies subway tunnel, only the former is shown
- **Consolidated Edison Co. gas tunnel**
- **Sewer tunnel**

FORMER DRAINAGE AND SHORELINE

- **Former drainage and shoreline**—In blue. Shown only where different from present drainage and shoreline. Areas formerly under water shown by dot pattern. Where very small, former ponds are labelled "p". Straight line segments probably are furrows and ditches built to lower the water table
- **Former swamp or marsh**—In blue. Dashed line defines where swamp or marsh adjoins higher ground. Very small occurrences are labelled "s"

GEOLOGY—SURFACE AND SUBSURFACE

- **Contact between geologic units**—Dashed where approximately located; dotted where under water; queried where uncertain. Where shown solid under water, was located by test borings and tunnel data
- **Fault**—Paired arrows show relative movement; U, upthrown side; D, downthrown side. Dashed where approximately located; dotted where under water; queried where uncertain. Where seen in tunnel, arrow shows inclined dip, and short line normal to fault trace shows vertical dip
- **Thrust fault**—Sawteeth on upper plate. Dashed where approximately located; dotted where under water. Where seen in tunnel is shown solid. Alternating solid and open sawteeth indicate thrust faults coincident in map view (near Roosevelt [Welfare] Island; see sheet 1)
- **Crush or shear zone encountered in underground workings**—Shows dip where known
- **Contours on the bedrock surface**—Based on same datum as topographic contours. Closed, hachured areas indicate depressions. Contour interval 20 ft, except 10 ft on Wards Island
- **Single outcrop or area of closely spaced outcrops**

SOURCE: "BEDROCK AND ENGINEERING GEOLOGIC MAPS OF NEW YORK COUNTY AND PARTS OF KINGS AND QUEENS COUNTIES, NEW YORK, AND PART OF BERGEN AND HUDSON COUNTIES, NEW JERSEY" USGS, SHEET 2 OF 2 (BASKERVILLE, 1994)

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Langan International LLC
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Project: 45 BROAD STREET
BLOCK No. 25, LOT No. 7
MANHATTAN
NEW YORK NEW YORK

Drawing Title: BEDROCK GEOLOGY MAP

Project No. 170394201
Date 12/30/2015
Scale N.T.S.
Drawn By SWB | Checked By CAP
Submission Date 12/30/2015

Figure 2

Sheet 2 of 9

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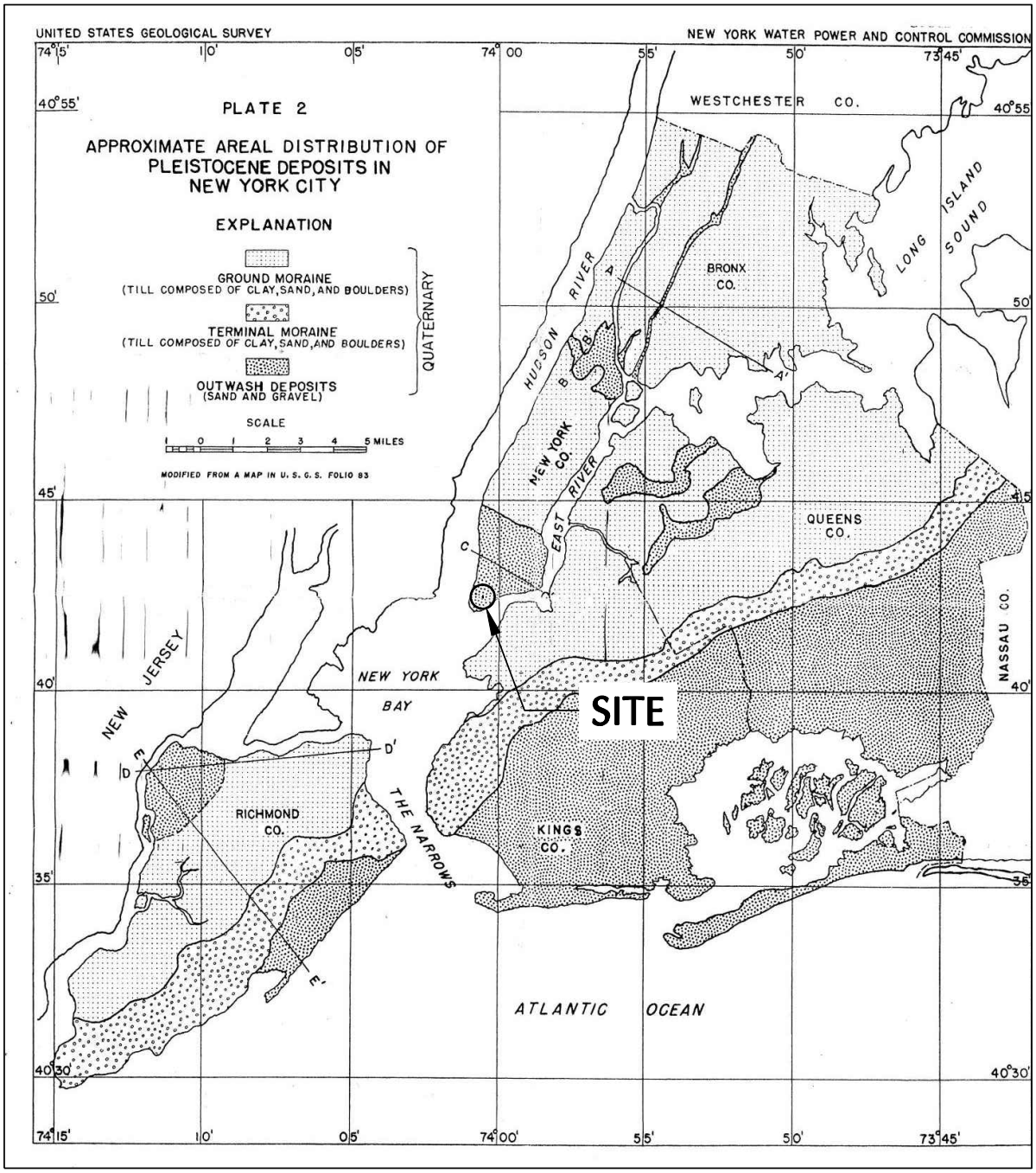

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Filename: \\Langan.com\data\NY\data2\170394201\Cadd Data - 170394201\SheetFiles\Geotechnical\Geotechnical Engineering Study\FG03 SURFICIAL GEOLOGY MAP.dwg Date: 12/30/2015 Time: 08:53 User: sborecki Style Table: Langan.stb Layout: ANSIA-BP

SOURCE: SANITARY & TOPOGRAPHIC MAP OF THE CITY OF NEW YORK, VIELE, 1865.

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Project
45 BROAD STREET
BLOCK No. 25, LOT No. 7
MANHATTAN
NEW YORK NEW YORK

Drawing Title
VIELE MAP (1865)

Project No. 170394201	Figure 4
Date 12/30/2015	
Scale N.T.S.	
Drawn By SWB / Checked By CAP	
Submission Date 12/30/2015	Sheet 4 of 9

Filename: \\Langan.com\data\NY\data2\170394201\Cadd Data - 170394201\SheetFiles\Geotechnical\Geotechnical Engineering Study\FG04 □iele Map.dwg Date: 12/30/2015 Time: 08:52 User: sborecki Style Table: Langan.stb Layout: ANSIA-BPI

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- Limit of Moderate Wave Action
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*
- * Referenced to the North American Vertical Datum of 1988
- Cross section line
- Transect line
- Culvert, Flume, Penstock or Aqueduct
- Road or Railroad Bridge
- Footbridge
- 87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 1000-meter Universal Transverse Mercator grid values, zone 18
- 600000 FT — 5000-foot grid values: New York State Plane coordinate system, Long Island zone (FIPSZONE 3104), Lambert Conformal Conic projection
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

INITIAL NFIP MAP DATE
June 28, 1974

FLOOD HAZARD BOUNDARY MAP REVISIONS
June 11, 1976

FLOOD INSURANCE RATE MAP EFFECTIVE
November 16, 1983

FLOOD INSURANCE RATE MAP REVISIONS

FIRM

FLOOD INSURANCE RATE MAP

CITY OF,
NEW YORK
NEW YORK
BRONX, RICHMOND, NEW YORK,
QUEENS, AND KINGS COUNTIES

PANEL 184 OF 457

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
NEW YORK, CITY OF	360497	0184	G

PRELIMINARY
DECEMBER 5, 2013

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
3604970184G

MAP REVISED

Federal Emergency Management Agency

500 0 250 500
SCALE IN FEET

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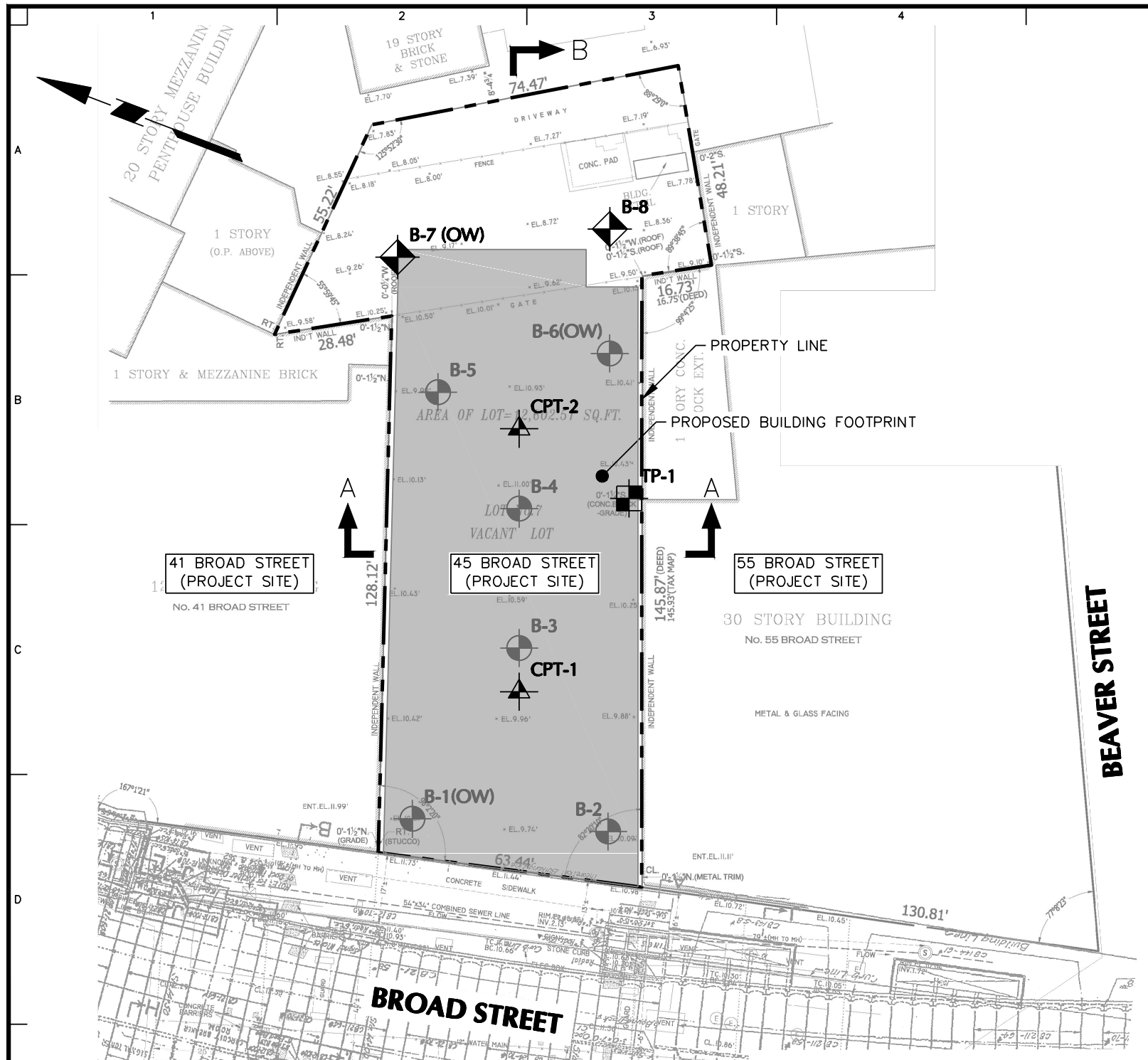
Project
45 BROAD STREET
BLOCK No. 25, LOT No. 7
MANHATTAN
NEW YORK **NEW YORK**

Drawing Title
FEMA FLOOD INSURANCE RATE MAP

Project No. 170394201	Figure 5
Date 12/30/2015	
Scale 1"=500'	
Drawn By SWB / Checked By CAP	
Submission Date 12/30/2015	Sheet 5 of 9



GENERAL NOTES:

1. BASE PLAN TAKEN FROM A PRELIMINARY SURVEY TITLED "MAP OF PROPERTY LOCATED AT 45 BROAD STREET, NEW YORK, NEW YORK" PROVIDED BY EMPIRE STATE LAYOUT INC., DATED 21 JANUARY 2016.
2. ALL ELEVATIONS REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88),
3. BORING B-7(OW) AND B-8 WERE ADVANCED BY CRAIG GEOTECHNICAL DRILLING CO, INC., BETWEEN 29 JANUARY AND 1 FEBRUARY 2016 UNDER THE FULL-TIME INSPECTION OF LANGAN.
4. BORINGS B-1 THROUGH B-6 WERE ADVANCED BY CRAIG GEOTECHNICAL DRILLING CO, INC. BETWEEN 29 AUGUST AND 6 SEPTEMBER 2007 UNDER THE FULL-TIME INSPECTION OF LANGAN.
5. TEST PIT TP-1 WAS EXCAVATED BY COFFEY CONTRACTING BETWEEN 17 AND 22 FEBRUARY 2016 UNDER THE FULL-TIME INSPECTION OF LANGAN.
6. CPT-1 AND CPT-2 WERE ADVANCED BY CRAIG GEOTECHNICAL DRILLING CO., INC. ON 1 FEBRUARY 2016 UNDER THE SPECIAL INSPECTION OF LANGAN.
7. BORING AND TEST PIT LOCATIONS ARE APPROXIMATE.
8. REFER TO DRAWING NOS. 7 AND 8 FOR SUBSURFACE PROFILES.

LEGEND:

	PROPERTY LINE
	PROPOSED BUILDING FOOTPRINT
B-7	2016 BORING LOCATION
(OW)	OBSERVATION WELL LOCATION
CPT-1	2016 CPT LOCATION
TP-1	2016 TEST PIT LOCATION
B-1	2007 BORING LOCATION

30 0 15 30
SCALE IN FEET

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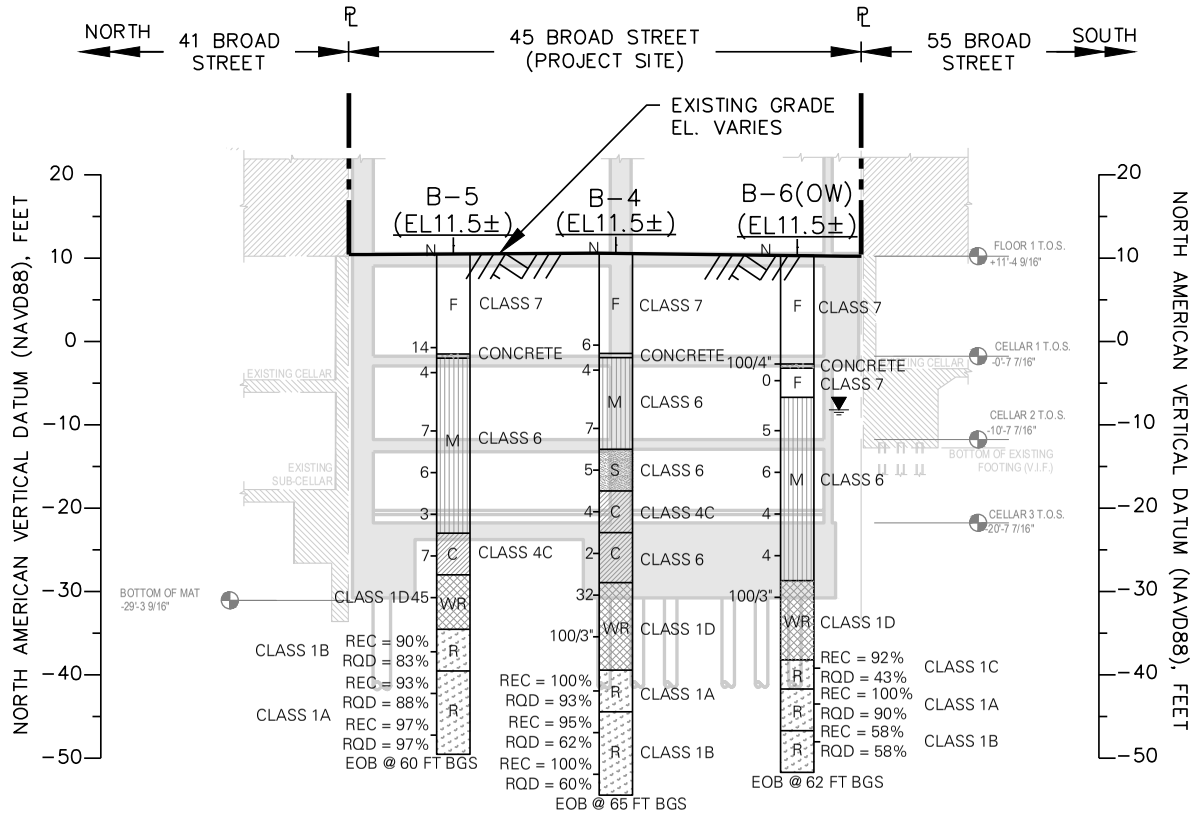
BLOCK No. 25, LOT No. 7
MANHATTAN
NEW YORK NEW YORK

Drawing Title
SUBSURFACE INVESTIGATION PLAN

Project No. 170394201	Drawing No. 6
Date 03/04/2016	
Scale 1" = 30'	
Drawn By MLM / Checked By TP	
Submission Date 03/11/2016	Sheet 6 of 9

Filename: \\langan.com\data\NY\data2\170394201\Cadd Data - 170394201\SheetFiles\Geotechnical\Geotechnical Engineering Study UPDATED\DWG 06 -Subsurface Investigation Plan.dwg Date: 3/9/2016 Time: 13:24 User: mmatos Style Table: Langan.stb Layout: DWG 06



MATERIAL SYMBOLS

F	UNCONTROLLED FILL	M	SILT
S	SAND	WR	WEATHERED ROCK
C	CLAY	R	BEDROCK

GENERAL NOTES:
1. BORING LOCATIONS ARE APPROXIMATE.
2. THIS PROFILE REPRESENTS A GENERALIZED SOIL CROSS SECTION INTERPRETED FROM WIDELY SPACED BORINGS. SOIL AND GROUNDWATER MAY VARY IN TYPE, LOCATION, ELEVATION, AND ENVIRONMENTAL ENGINEERING PROPERTIES BETWEEN POINTS OF EXPLORATION. VARIATIONS IN THE SUBSURFACE CONDITIONS SHOULD BE EXPECTED BETWEEN BORINGS.

SUBSURFACE PROFILE A

FACING EAST
SCALE: 1" = 20'

20 0 5 10 20
SCALE IN FEET

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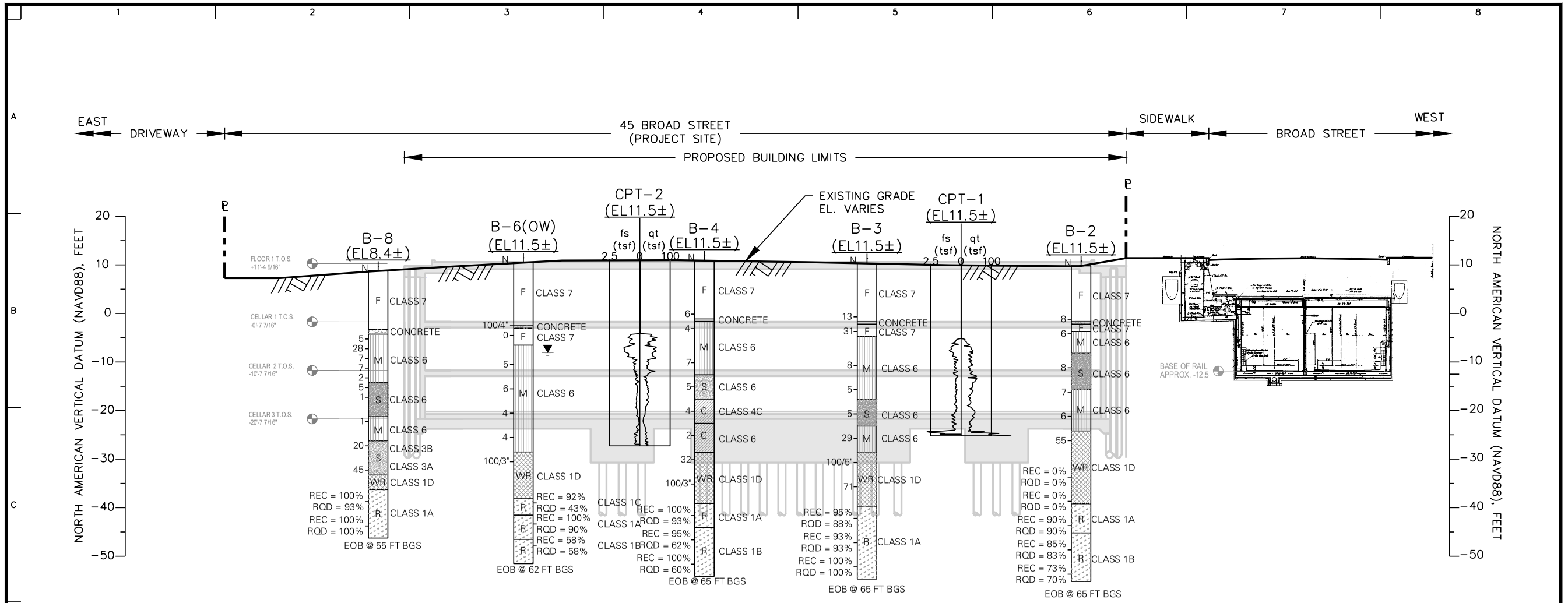
Project	45 BROAD STREET BLOCK No. 25, LOT No. 7 MANHATTAN NEW YORK NEW YORK
Drawing Title	SUBSURFACE PROFILE A
Project No.	170394201
Drawing No.	7
Date	03/04/2016
Scale	1" =20'
Drawn By / Checked By	MLM / TP
Submission Date	03/11/2016
Sheet	7 of 9

Filename: \\langan.com\data\NY\data2\170394201\Cadd Data - 170394201\SheetFiles\Geotechnical\Geotechnical Engineering Study UPDATED\DWG 07-08 - Subsurface Profiles.dwg Date: 5/11/2017 Time: 16:19 User: vveluchamy Style Table: Langan.stb Layout: DWG 07



MATERIAL SYMBOLS

F	UNCONTROLLED FILL	M	SILT
S	SAND	WR	WEATHERED ROCK
C	CLAY	R	BEDROCK

SUBSURFACE PROFILE B

FACING SOUTH

SCALE: 1" = 20'

20 0 5 10 20

SCALE IN FEET

GENERAL NOTES:

1. BORING LOCATIONS ARE APPROXIMATE.
2. THIS PROFILE REPRESENTS A GENERALIZED SOIL CROSS SECTION INTERPRETED FROM WIDELY SPACED BORINGS. SOIL AND GROUNDWATER MAY VARY IN TYPE, LOCATION, ELEVATION, AND ENVIRONMENTAL ENGINEERING PROPERTIES BETWEEN POINTS OF EXPLORATION. VARIATIONS IN THE SUBSURFACE CONDITIONS SHOULD BE EXPECTED BETWEEN BORINGS.

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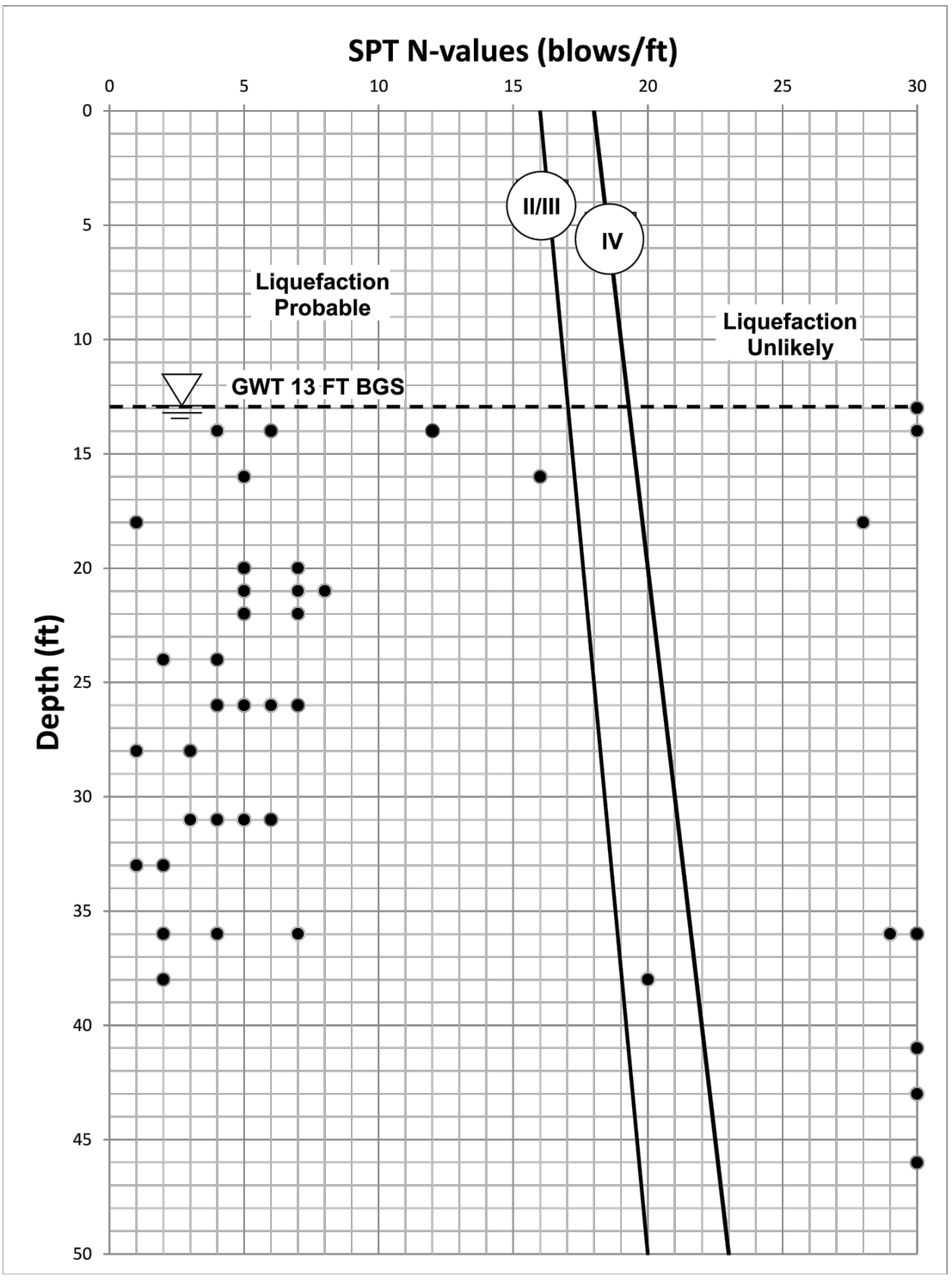
Project	45 BROAD STREET BLOCK No. 25, LOT No. 7 MANHATTAN NEW YORK NEW YORK
Drawing Title	SUBSURFACE PROFILE B
Project No.	170394201
Drawing No.	8
Date	03/07/2016
Scale	1" = 20'
Drawn By	MLM
Checked By	TP
Submission Date	03/11/2016
Sheet	8 of 9

Filename: \\langan.com\data\NY\data2\170394201\Cadd Data - 170394201\SheetFiles\Geotechnical\Geotechnical Engineering Study UPDATED\DWG 07-08 - Subsurface Profiles.dwg Date: 5/11/2017 Time: 16:19 User: vveluchamy Style Table: Langan.stb Layout: DWG 08



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Project
45 BROAD STREET
BLOCK No. 25, LOT No. 7
MANHATTAN
NEW YORK NEW YORK

Drawing Title
NYCBC LIQUEFACTION CHART

Project No. 170394201	Drawing No. 9
Date 03/07/2016	
Scale N.T.S.	
Drawn By MLM / Checked By TP	
Submission Date 03/07/2016	Sheet 9 of 9

Filename: \\langan.com\data\NY\data2\170394201\Cadd Data - 170394201\SheetFiles\Geotechnical\Geotechnical Engineering Study UPDATED\DWG 09 - NYCBC Liquefaction Chart.dwg Date: 3/8/2016 Time: 18:10 User: mmatos Style Table: Langan.stb Layout: DWG 09

APPENDIX A-1
Boring Logs (Langan 2007)

LANGAN

Log of Boring **B-1 (OW)** Sheet 1 of 3

Project: 45 Broad Street	Project No.: 170394201
Location: 45 Broad Street, New York, NY	Elevation and Datum: El. 10.5 NAVD88
Drilling Company: Craig Test Boring	Date Started: 8/29/07 — Date Finished: 8/30/07
Drilling Equipment: CME 55 Track Mounted Rig	Completion Depth: 59 ft — Rock Depth: 39 ft
Size and Type of Bit: 3-7/8" Tri cone roller bit	Number of Samples: Disturbed 6 — Undisturbed - — Core 4
Casing Diameter (in): 4" ID Steel casing — Casing Depth (ft): 38	Water Level (ft.): First ▽ 25 — Completion ▼ - — 24 HR. ▼ 19.8
Casing Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	Drilling Foreman: Rob Dollar
Sampler: 2" OD split spoon samplier	Inspecting Engineer: Michael Mudalel
Sampler Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Building Code	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Class 7	Brick, Concrete, and Rebar (FILL)	0–10						Hammer 4" casing to 8'
		Gray-red c-f SAND, so. concrete, so. brick, so. f. gravel (FILL) (moist)	10–11	S-1	SS	4	2 15 100/5"	100/5"	Roller bit to 10'
		1.5' Foundation Slab	11–12						Roller bit through foundation
	Class 6	Lt. brown-red Clayey SILT, tr. mica (ML) (moist) Moisture Content = 27.6% LL=28; PL=23; PI=5	12–13						Smooth chatter 11.5' to 13'
			13–14	S-2	SS	14	6 6 6 4	12	Hammer casing to 13'
			15–18						Hammer casing to 18'
		▽	19–20						

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LANGAN

Log of Boring **B-1 (OW)** Sheet 2 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 10.5 NAVD88

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
				20						Roller bit to 20'
		Lt. brown-red SILT, tr. mica (ML) (moist)		21	S-3	SS	14	3 4 4 4	8	
				22						
				23						
				24						
			▽	25						Roller bit to 25'
				26	S-4	SS	22	2 3 3 2	6	
	Class 6	Lt. brown-red SILT, tr. mica (ML) (wet) Moisture Content = 28.6%		27						
				28						Hammer casing to 28'
				29						
				30						Roller bit to 30'
		Lt. brown-reddish-lt. gray SILT, tr. mica (ML)(wet)		31	S-5	SS	18	2 2 2 3	4	
				32						
				33						
				34						
				35						Drilling resistance increased at 34.5' Roller bit to 35'
	Class 1d	Lt. brown-gray-green-black SILT, so. f. gravel, tr. f. sand, tr. glacial till, tr. mica (DECOMPOSED ROCK) (moist)		36	S-6	SS	16	20 40 69 49	109	
				37						Rig chatter 35.5' to 38'
				38						Casing fell 1'
			5	39	C-1	NX	REC=42"/60" =70%	RQD=35"/60" =58%		Hammer casing to 38' Roller bit to 39' Refusal at 39'
	Class 1b	Gray-black-green GNEISS, so. mica schist, tr. granite (BEDROCK)	4	40						
			4	41						
			4	42						
			4	43						
			3	44						
			4	45	C-2	NX				No return at 44.5'

N-Value (Blows/ft) scale: 10 20 30 40

\\LANGAN.COM\DATA\NY\DATA2\170394201\ENGINEERING DATA\GEOTECHNICAL\GINTLOGS\170394201.GPJ ... 3/11/2016 3:35:06 PM ... Report: Log - LANGAN

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Log of Boring **B-1 (OW)** Sheet 3 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 10.5 NAVD88

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
			3	45						
			4	46						Stop for greasing
		Gray-black-green GNEISS-SCHIST (BEDROCK)	6	47	C-2	NX	REC=36"/60" =60%	RQD=24"/60" =40%		
			7	48						
				49						
			4	50						
			5	51						
	Class 1b	Gray-white-black GNEISS-SCHIST, so. mica (BEDROCK)	3	52	C-3	NX	REC=36"/60" =60%	RQD=22"/60" =37%		
			7	53						
			6	54						Stop coring at 3:00 (8/29)
			4	55						Day 2 (8/30)
			5	56						
		Gray-white-black-green GNEISS-SCHIST, so. mica (BEDROCK)	4	57	C-4	NX	REC=51"/60" =85%	RQD=32"/60" =53%		
			6	58						Install 2" PVC MW
			5	59						E.O.B. @ 59'
				60						
				61						
				62						
				63						
				64						
				65						
				66						
				67						
				68						
				69						
				70						

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LANGAN

Log of Boring **B-2** Sheet 1 of 3

Project: 45 Broad Street	Project No.: 170394201
Location: 45 Broad Street, New York, NY	Elevation and Datum: El. 10 NAVD88
Drilling Company: Craig Test Boring	Date Started: 9/6/07 — Date Finished: 9/6/07
Drilling Equipment: CME 55 Track Mounted Rig	Completion Depth: 65 ft — Rock Depth: 49 ft
Size and Type of Bit: 3-7/8" Tri cone roller bit	Number of Samples: Disturbed 6 — Undisturbed - — Core 5
Casing Diameter (in): 4" ID Steel casing — Casing Depth (ft): 19	Water Level (ft.): First ▽ 20 — Completion ▼ - — 24 HR. ▼ -
Casing Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	Drilling Foreman: Rob Dollar
Sampler: 2" OD split spoon samplier	Inspecting Engineer: Michael Mudalel
Sampler Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist. BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Class 7	Brick, Concrete, and Rebar (FILL)		0–5						Hammer casing to 4' Roller bit to 5'
		Gray-red-white GRAVEL, so. c-f sand, so. concrete, tr. brick, tr. metal (FILL) (wet)		10	S-1	SS	3	3 5 3 100/3"	8	Hammer casing to 9' Roller bit to 10'
		6" Foundation Slab		12						Roller bit through concrete slab
	Class 7			13						Smooth chatter 11.5' to 12'
		Lt. brown-reddish-gray SILT, so. f-c sand, so. f gravel (ML) (moist)		14	S-2	SS	19	2 3 3 19	6	
	Class 6			15–18						
	Class 6			19						Rig chatter 18'-19' Hammer casing to 19'
				20						

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Log of Boring **B-2** Sheet 2 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 10 NAVD88

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
				20						Roller bit to 20'
	Class 6	Lt. brown-reddish-gray clayey SILT, so f sand, tr. mica (ML)) (wet) Moisture Content = 27.0%		21	S-3	SS	12	4 4 4 5	8	
				22						
				23						
				24						
				25						Roller bit to 25'
		Lt. brown-red SILT, so. f. sand, tr. mica (ML)(wet)		26	S-4	SS	18	2 3 4 4	7	
				27						
				28						
				29						
	Class 6			30						Roller bit to 30'
		Lt. brown-red SILT, so. f. sand, tr. mica (ML)(wet) Moisture Content = 29.2% LL=33; PL=25; PI=8		31	S-5	SS	17	3 3 3 3	6	
				32						
				33						
				34						
				35						Roller bit to 35'
	Class 1d	Lt. brown-red-green SILT, so. f-c gravel, so. f-c sand, tr. decomposed rock (DECOMPOSED ROCK) (moist)		36	S-6	SS	20	11 18 37 31	55	
				37						Heavy rig chatter at 37'
				38						Rig chatter at 38'
				39						
				40						Smooth rig chatter 39' to 40' Roller bit to 40'
			5	41						
			5	42						No return 40' to 45'
			7	43	C-1	NX	REC=0"/60" =0%	RQD=0"/60" =0%		
			3	44						
			4	45						

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Log of Boring **B-2** Sheet 3 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 10 NAVD88

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Class 1d	Lt. brown-green-gray f. GRAVEL, so. f-c sand, so. decomposed rock (DECOMPOSED ROCK) (moist)	4 2 3 1	45 46 47 48	C-2	NX	REC=0"/60" =0%	RQD=0"/60" =0%		Rig chatter 45' to 49' No return 45'-50'
			2	49						
		Lt. gray-black-white-red GNEISS-SCHIST, so. garnets, so. mica, tr. quartz (BEDROCK)	4 7 2 4 4	50 51 52 53 54	C-3	NX	REC=54"/60" =90%	RQD=54"/60" =90%		Casing fell 1' when coring at 50' No return 50' to 55'
	Class 1a	Lt. gray-black-white-red GNEISS-SCHIST, so. garnets, so. mica, tr. quartz (BEDROCK)	4 5 6 7 4	55 56 57 58 59 60	C-4	NX	REC=51"/60" =85%	RQD=50"/60" =83%		Slight rig chatter 55' to 60' No return 55' to 60'
		Lt. gray-black-blue-red GNEISS-SCHIST, so. garnets, so. mica (BEDROCK)	5 6 4 4 5	61 62 63 64 65	C-5	NX	REC=44"/60" =73%	RQD=42"/60" =70%		Rig chatter 62' to 63' E.O.B. @ 65'
				66 67 68 69 70						

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Log of Boring **B-3** Sheet 1 of 3

Project: 45 Broad Street	Project No.: 170394201
Location: 45 Broad Street, New York, NY	Elevation and Datum: El. 10 NAVD88
Drilling Company: Craig Test Boring	Date Started: 9/5/07 — Date Finished: 9/5/07
Drilling Equipment: CME 55 Track Mounted Rig	Completion Depth: 65 ft — Rock Depth: 47 ft
Size and Type of Bit: 3-7/8" Tri cone roller bit	Number of Samples: Disturbed 8 — Undisturbed - — Core 3
Casing Diameter (in): 4" ID Steel casing — Casing Depth (ft): 19	Water Level (ft.): First ▽ 20 — Completion ▼ - — 24 HR. ▼ -
Casing Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	Drilling Foreman: Rob Dollar
Sampler: 2" OD split spoon samplier	Inspecting Engineer: Michael Mudalel
Sampler Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist. BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
				0						
				1						
				2						
				3						
				4						Hammer casing to 4'
		Brick, Concrete, and Rebar (FILL)		5						Roller bit to 5'
	Class 7			6						
				7						
				8						
				9						Hammer casing to 9'
		Gray-red-yellow f. GRAVEL, so. concrete, so. brick, so. f-c sand (FILL)(wet)		10	S-1	SS	6	2 3 10 7	13	Roller bit to 10'
		6" Foundation Slab		11						Roller bit thru concrete slab
	Class 7	Lt. brown-gray-red f. GRAVEL, so. f-c sand, tr. silt (FILL) (wet)		12						Smooth chatter 12' to 12.5'
				13	S-2	SS	14	4 16 15 7	31	
				14						
				15						
	Class 6			16						
				17						
				18						
				19						Hammer casing to 19'
				20						

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Log of Boring **B-3** Sheet 2 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 10 NAVD88

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Class 6	Lt. brown-reddish-gray Clayey SILT, tr. f sand (ML) (wet)		20	S-3	SS	14	3 4 4 3	8	Roller bit to 20'
				21						
				22						
				23						
				24						
				25						Roller bit to 25'
		Lt. brown-reddish-gray, Clayey SILT, tr. f. sand (ML) (wet)		26	S-4	SS	20	2 2 3 3	5	
				27						
				28						
	Class 6	Lt. brown-red f-SAND, so. silt, (wet) (SP/SM) (wet)		29						
				30	S-5	SS	18	1 2 3 2	5	Roller bit to 30'
				31						
				32						
				33						
				34						
				35						Roller bit to 35'
	Class 3b	Lt. brown-gray coarse-fine SAND, some silt, some clay, tr. decomposed rock (SC) (moist) Moisture Content = 21.2%		36	S-6	SS	14	4 14 15 37	29	
				37						Rig chatter at 36'
				38						
				39						Heavy rig chatter at 39'
				40						Roller bit to 40'
	Class 1d	Lt. brown-gray-green f. GRAVEL, so. f-c sand, so. silt, (DECOMPOSED ROCK) (moist)		41	S-7	SS	16	13 64 100/5"	100/5"	
				42						
				43						Heavy rig chatter 43' to 44'
				44						
				45						

N-Value (Blows/ft) scale: 10 20 30 40

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Log of Boring **B-3** Sheet 3 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 10 NAVD88

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Class 1d	Lt. brown-white-black-green f-c SAND, so. mica, tr. silt (DECOMPOSED ROCK) (moist)		45	S-8	SS	10	37 43 28 100/4"	71	Roller bit to 45'
				46						
				47						Smooth rig chatter 47' to 50'
				48						
				49						
				50						Roller bit to 50'
			5	51	C-1	NX	REC=57"/60" =95%	RQD=53"/60" =88%		Brownish return 50'-51'
		Gray-white-black-red-green GNEISS-MICA SCHIST, so. garnets (BEDROCK)	5	52						
			2	53						Gray return 51'-55'
			2	54						
			2	55						
			2	56	C-2	NX	REC=56"/60" =93%	RQD=56"/60" =93%		
	Class 1a		2	57						Gray return 55'-60'
		Gray-black-red-green GNEISS-SCHIST, so. garnets (BEDROCK)	2	58						
			2	59						
			2	60						Gray return 60'-65'
			2	61	C-3	NX	REC=60"/60" =100%	RQD=60"/60" =100%		
			1	62						
		Gray-black-red GNEISS-SCHIST, so. garnets (BEDROCK)	2	63						Rig chatter 62' to 63'
			2	64						
			3	65						E.O.B. @ 65'
				66						
				67						
				68						
				69						
				70						

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Log of Boring **B-4** Sheet 1 of 3

Project: 45 Broad Street	Project No.: 170394201
Location: 45 Broad Street, New York, NY	Elevation and Datum: El. 11 NAVD88
Drilling Company: Craig Test Boring	Date Started: 9/4/07 — Date Finished: 9/4/07
Drilling Equipment: CME 55 Track Mounted Rig	Completion Depth: 65 ft — Rock Depth: 45.5 ft
Size and Type of Bit: 3-7/8" Tri cone roller bit	Number of Samples: Disturbed 8 — Undisturbed - — Core 3
Casing Diameter (in): 4" ID Steel casing — Casing Depth (ft): 19	Water Level (ft.): First ▽ 20 — Completion ▼ - — 24 HR. ▼ -
Casing Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	Drilling Foreman: Rob Dollar
Sampler: 2" OD split spoon samplier	Inspecting Engineer: Michael Mudalel
Sampler Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Class 7	Brick, Concrete, and Rebar (FILL)		0–5						Hammer casing to 4' Roller bit to 5'
		Lt. brown f GRAVEL, so. f-c sand, tr. organics (FILL) (wet)		10–11	S-1	SS	3	2 1 5 100/5"	6	Hammer casing to 9' Roller bit to 10'
		8" Foundation Slab		12						Roller bit thru concrete slab to 13'
	Class 6	Lt. brown-red Clayey SILT, tr. f-c sand (ML) (moist) Moisture Content = 27.4%		13–15	S-2	SS	10	3 2 2 2	4	
				19						Hammer casing to 19'

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Log of Boring **B-4** Sheet 2 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 11 NAVD88

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Class 6	Lt. brown-redish-gray Silty CLAY (ML/CL) (wet)		20–22	S-3	SS	14	3, 3, 4, 4	7	Roller bit to 20'
	Class 6	Lt. brown-red f-SAND, so. silt (SP) (wet)		22–27	S-4	SS	12	2, 3, 2, 2	5	Roller bit to 25'
	Class 4c	Lt. brown-red Silty CLAY (CL) (wet)		27–32	S-5	SS	17	1, 2, 2, 3	4	Roller bit to 30'
	Class 6	Lt. brown-red Silty CLAY, tr. f-c sand (CL-ML) (wet) Moisture Content = 28.0% LL=26; PL=20; PI=6		32–37	S-6	SS	20	0, 1, 1, 2	2	Roller bit to 35'
	Class 1d	Lt. brown-black-green-orange f-c SAND, so. silt, so. f gravel (DECOMPOSED ROCK) (moist)		37–42	S-7	SS	20	9, 11, 21, 51	32	Rig chatter at 39.5' Roller bit to 40'
		Lt. brown-green-gray f. GRAVEL, so. f-c sand, tr. silt,		42–45						

N-Value (Blows/ft) scale: 10 20 30 40

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Log of Boring **B-4** Sheet 3 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 11 NAVD88

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Class 1d	(DECOMPOSED ROCK) (moist)		45	S-8	SS	3	100/3"	100/3"	Roller bit to 45' Heavy rig chatter at 45' Take S-8
				46						
				47						
				48						
				49						Roller bit to 50'
				50						Smooth rig chatter 45.5' to 50'
			4	51	C-1	NX	REC=60"/60" =100%	RQD=56"/60" =93%		Start coring at 50'
		Gray-black-red GNEISS-MICA SCHIST, so. garnets, (BEDROCK)	3	52						
			3	53						
			3	54						
			4	55						
			3	56	C-2	NX	REC=57"/60" =95%	RQD=37"/60" =62%		
	Class 1a	Gray-black-red GNEISS-SCHIST, so. garnets, so. mica (BEDROCK)	3	57						Coring resistance decreased 57'-58'
			1	58						
			2	59						
			3	60						
			3	61	C-3	NX	REC=60"/60" =100%	RQD=36"/60" =60%		
		Gray-black-red GNEISS-SCHIST, so. garnets, so. mica (BEDROCK)	2	62						
			3	63						
			2	64						
			3	65						E.O.B. @ 65'
				66						
				67						
				68						
				69						
				70						

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Log of Boring **B-5** Sheet 1 of 3

Project: 45 Broad Street	Project No.: 170394201
Location: 45 Broad Street, New York, NY	Elevation and Datum: El. 10 NAVD88
Drilling Company: Craig Test Boring	Date Started: 8/31/07 — Date Finished: 8/31/07
Drilling Equipment: CME 55 Track Mounted Rig	Completion Depth: 60 ft — Rock Depth: 45 ft
Size and Type of Bit: 3-7/8" Tri cone roller bit	Number of Samples: Disturbed 7 — Undisturbed - — Core 3
Casing Diameter (in): 4" ID Steel casing — Casing Depth (ft): 19	Water Level (ft.): First ▽ 25 — Completion ▼ - — 24 HR. ▼ -
Casing Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	Drilling Foreman: Rob Dollar
Sampler: 2" OD split spoon samplier	Inspecting Engineer: Michael Mudalel
Sampler Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist. BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Class 7	Brick, Concrete, and Rebar (FILL)		0–9						Hammer casing to 9'
		Lt. brown-gray f GRAVEL, so. f-c sand, so. concrete (FILL) (wet)		10–11	S-1	SS	4	6 7 7 100/5"	14	Roller bit to 10'
		6" Foundation Slab		12						Roller bit through concrete slab to 13'
	Class 6	Lt. brown-red SILT, tr. c-f sand (ML) (moist)		13–14	S-2	SS	8	3 2 2 2	4	
				15–19						Hammer casing to 19'
				20						

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Log of Boring **B-5** Sheet 2 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 10 NAVD88

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
				20						Roller bit to 20'
		Lt. brown Clayey SILT, tr. f. sand (ML) (moist) Moisture Content = 28.1%		21	S-3	SS	16	2 3 4 4	7	
				22						
				23						
				24						
				25						Roller bit to 25'
	Class 6	Lt. brown-red SILT (ML) (wet)		26	S-4	SS	14	2 3 3 2	6	
				27						
				28						
				29						
				30						Roller bit to 30'
		Lt. brown-red SILT, tr. clay (ML) (wet) Moisture Content = 35.4% LL=32; PL=25; PI=7		31	S-5	SS	16	1 1 2 2	3	
				32						
				33						
				34						
				35						Roller bit to 35'
	Class 4c	Lt. brown-reddish-gray Silty CLAY (CL) (wet)		36	S-6	SS	18	2 3 4 7	7	
				37						
				38						
				39						Rig chatter 38' to 40'
				40						Roller bit to 40'
	Class 1d	Lt. brown-gray SILT, so f-c sand, so f. gravel, tr. mica (DECOMPOSED ROCK) (moist)		41	S-7	SS	24	19 25 20 22	45	
				42						
				43						Rig chatter 43' to 43.5'
				44						Smooth chatter 43.5' to 44' Rock core at 44'
				45						

N-Value (Blows/ft) scale: 10 20 30 40

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Log of Boring **B-5** Sheet 3 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 10 NAVD88

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
			5	45						Pull rock core barrel out of decomposed rock
			6	46						Roller bit through decomposed rock to 45'
	Class 1b	Gray-black-white-red GNEISS-MICA SCHIST, so. garnets (BEDROCK)	4	47	C-1	NX	REC=54"/60" =90%	RQD=50"/60" =83%		Rock core at 45'
			4	48						
			3	49						
			3	50						
			5	51						
		Gray-black-red GNEISS-SCHIST, so. mica, so. garnets (BEDROCK)	4	52	C-2	NX	REC=56"/60" =93%	RQD=53"/60" =88%		
			4	53						
	Class 1a		3	54						
			6	55						
			4	56						
		Gray-black-red GNEISS-SCHIST, so. garnets, so. mica (BEDROCK)	2	57	C-3	NX	REC=58"/60" =97%	RQD=58"/60" =97%		
			2	58						
			2	59						
				60						E.O.B. @ 60'
				61						
				62						
				63						
				64						
				65						
				66						
				67						
				68						
				69						
				70						

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Log of Boring **B-6 (OW)** Sheet 1 of 3

Project: 45 Broad Street	Project No.: 170394201
Location: 45 Broad Street, New York, NY	Elevation and Datum: El. 10.5 NAVD88
Drilling Company: Craig Test Boring	Date Started: 8/30/07 — Date Finished: 8/30/07
Drilling Equipment: CME 55 Track Mounted Rig	Completion Depth: 62 ft — Rock Depth: 48.5 ft
Size and Type of Bit: 3-7/8" Tri cone roller bit	Number of Samples: Disturbed 7 — Undisturbed - — Core 4
Casing Diameter (in): 4" ID Steel casing — Casing Depth (ft): 19	Water Level (ft.): First ▽ 25 — Completion ▼ - — 24 HR. ▼ 18.4
Casing Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	Drilling Foreman: Rob Dollar
Sampler: 2" OD split spoon samplier	Inspecting Engineer: Michael Mudalel
Sampler Hammer: Auto — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist. BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Class 7	Brick, Concrete, and Rebar (FILL)		0–5						Hammer casing to 4' Roller bit to 10'
				5–9						Hammer casing to 9' Roller bit to 10'
		Lt. gray, so. concrete, so f-c sand (FILL) (moist)		10–12						Hammer casing to 12.5'
		6" Foundation Slab		13	S-1	SS	4	100/4"	100/4"	Smooth chatter 13' to 13.5'
	Class 7	No recovery		14–16	S-2	SS	NR	1 WOR WOR 1		Roller bit to 14'
	Class 6	?—?—?—?—		17–19						Hammer casing to 19'
				20						

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Log of Boring **B-6 (OW)** Sheet 2 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 10.5 NAVD88

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
				20					10 20 30 40	Roller bit to 20'
		Lt. brown-red silty CLAY, tr. f sand, tr. f gravel (CL) (moist) Moisture Content = 23.0% LL=32; PL=21; PI=11		21	S-3	SS	8	3 2 3 3	5	
				22						
				23						
				24						
				25						Roller bit to 25'
		Lt. brown-red SILT, tr. f sand (ML) (wet)		26	S-4	SS	20	2 3 3 3	6	
				27						
				28						
				29						
	Class 6			30						Roller bit to 30'
		Lt. brown-red SILT (ML) (wet) Moisture Content = 34.3%		31	S-5	SS	18	1 2 2 2	4	
				32						
				33						
				34						
				35						Roller bit to 35'
		Lt. brown-reddish-gray Clayey SILT (ML) (wet)		36	S-6	SS	18	3 2 2 2	4	
				37						
				38						
				39						Rig chatter at 39'
		Lt. brown-red SILT, tr. f-c sand (DECOMPOSED ROCK) (moist)		40	S-7	SS	9	6 100/3"	100/3"	Roller bit to 40'
	Class 1d			41						
			5	42	C-1	NX	NA	NA		Smooth rig chatter 40.5' to 42'
			6	43						
			4	44						
				45						Decrease in return 44' to 45'

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Log of Boring **B-6 (OW)** Sheet 3 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 10.5 NAVD88

Material Symbol	Building Code	Sample Description	Coring (min)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Class 1d	Lt. brown, gray, green f-c SAND, so. f gravel, tr silt, (DECOMPOSED ROCK), (wet)	3	45	C-1	NX	NA	NA		
			4	46						
			4	47						Rig chatter 45' to 49'
			2	48	C-2	NX	REC=55"/60" =92%	RQD=26"/60" =43%		
			5	49						Resistance increased at 49'
			3	50						
		Lt. Gray-greenish-red-black GNEISS-SCHIST, so. garnets, so. mica (BEDROCK)	5	51						
			6	52						No return 51' to 52
			4	53	C-3	NX	REC=60"/60" =100%	RQD=54"/60" =90%		
			3	54						
	Class 1c	Lt. Gray-greenish-red-black, GNEISS-SCHIST, so. garnets, so. mica (BEDROCK)	3	55						
			2	56						
			3	57						No return 54' to 57'
			3	58	C-4	NX	REC=35"/60" =58%	RQD=35"/60" =58%		
			3	59						
		Lt. Gray-red-black, GNEISS-SCHIST, so. garnets, so. mica (BEDROCK)	3	60						
			4	61						Install 2" PVC MW
				62						E.O.B. @ 62'
				63						
				64						
				65						
				66						
				67						
				68						
				69						
				70						

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APPENDIX A-2
Boring Logs (Langan 2016)

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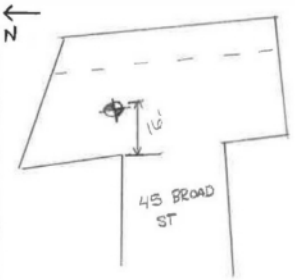
Log of Boring **B-7(OW)** Sheet 1 of 3

Project: 45 Broad Street	Project No.: 170394201
Location: 45 Broad Street, New York, NY	Elevation and Datum: El. 9 NAVD88
Drilling Company: Craig Geotechnical Drilling Co., Inc.	Date Started: 1/29/16 / Date Finished: 1/29/16
Drilling Equipment: Truck Mounted Rig	Completion Depth: 55 ft / Rock Depth: 45 ft
Size and Type of Bit: 3-7/8" Tri cone roller bit	Number of Samples: Disturbed 10, Undisturbed -, Core 2
Casing Diameter (in): 4" ID Steel casing / Casing Depth (ft): 25	Water Level (ft.): First ▽ 15, Completion ▼, 24 HR. ▼ 13.5
Casing Hammer: Auto / Weight (lbs): 140 / Drop (in): 30	Drilling Foreman: Ryan Warden
Sampler: 2" OD split spoon samplier, NX Core Barrel	Inspecting Engineer: Maria Mis
Sampler Hammer: Auto / Weight (lbs): 140 / Drop (in): 30	

Material Symbol	Building Code	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist. BL/6in	N-Value (Blows/ft) 10 20 30 40
	Class 7	Demolition Debris 0-12 ft Sampling not performed in demolition debris above remnant basement slab	0–12					
		Remnant basement slab (9" thick)	12					
	Class 7	Medium dense gray coarse GRAVEL [FILL]	13–14	S-1	SS	4	5, 6, 10, 4	16
		Loose gray coarse GRAVEL, trace brick fragments [FILL]	14–16	S-2	SS	3	2, 1, WOH, 1	
	Class 6	Loose brown/gray CLAY (CL), trace coarse to fine sand (wet)	16–19	S-3	SS	2	1, 2, 3, 4	5
			19–20	S-4	SS	6	2, 2	5

Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)



Install casing to 10ft
Advance roller bit
Smooth drilling
Brown wash

Chatter at 12ft
Slow drilling
Gray wash
Break through at 12.75ft

Take S-1: 13-15ft

Take S-2: 15-17ft

Install casing to 15ft
Clean casing
Roller bit to 17ft
Take S-3: 17-19ft

Take S-4: 19-21ft

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Log of Boring **B-7(OW)** Sheet 2 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 9 NAVD88

Material Symbol	Building Code	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Loose brown/gray CLAY (CL), trace coarse to fine sand, trace wood fragments (wet) Moisture Content = 35.6% LL=33; PL=23; PI=10	20	S-4	SS	6	3 4	5	Install casing to 20ft Clean casing Roller bit to 22ft, brown wash
		Loose brown/gray CLAY (CL), trace fine sand (wet)	21	S-5	SS	2	1 2 2 2	4	Take S-5: 21-23ft
		Loose brown/gray silty CLAY (CL-ML) (wet) Moisture Content = 40.3% LL=26; PL=21; PI=5	23	S-6	SS	10	1 2 2 2	4	Take S-6: 23-25ft
		Loose brown CLAY (CL), trace clay, trace fine sand (wet)	25	S-7	SS	8	WOH 1 2 2	3	Roller bit to 25ft Brown wash Take S-7: 25-27ft Casing to 25ft
			27						Roller bit to 30ft
	Class 6	Loose brown/gray CLAY (CL), trace fine sand, trace wood fragments (wet)	30	S-8	SS	6	3 1 1 2	2	Take S-8: 30-32ft
			32						Roller bit to 35ft
		Loose brown/gray CLAY (CL), trace fine sand (wet) Moisture Content = 34.6% LL=30; PL=22; PI=8	35	S-9	SS	15	WOH 1 1 1	2	Take S-9: 35-37ft
			37						Roller bit to 40ft Brown wash
			40	S-10	SS	18	21 36 100/4"	100/4"	Take S-10: 40-41.5ft Spoon refusal at 41.5ft
	Class 1d	Black/green WEATHERED MICA SCHIST, some fine sand, trace silt, trace fine gravel	42						Roller bit to 45ft Slight chatter
			45						

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Log of Boring **B-7(OW)** Sheet 3 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 9 NAVD88

MATERIAL SYMBOL	Building Code	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Class 1b	Black/gray MICA SCHIST with quartz and fieldspar intrusions, slightly weathered, slightly fractured, horizontal foliations, subvertical fractures	45–50	C-1	NX	REC=46"/60" =77%	RQD=46"/60" =77%		Take S-11 at 45ft Spoon refusal at 45ft Start core C-1: 45-50ft End C-1 at 50ft
	Class 1a	Black/gray MICA SCHIST with quartz intrusions, slightly to moderately weathered, slightly to moderately fractured, horizontal foliations, subvertical fractures	50–55	C-2	NX	REC=60"/60" =100%	RQD=53"/60" =88%		Start core C-2: at 50ft End core C-2 at 55ft End of Boring at 55ft
		End of Boring @ 55 ft BGS	55–70						Remove casing Install well See Well Construction Log B-7(OW) for details of well construction

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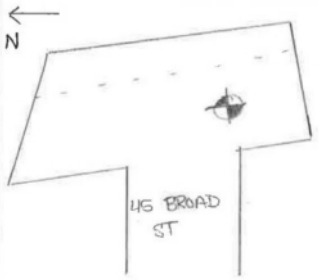
Log of Boring **B-8** Sheet 1 of 3

Project: 45 Broad Street		Project No.: 170394201	
Location: 45 Broad Street, New York, NY		Elevation and Datum: El. 9 NAVD88	
Drilling Company: Craig Geotechnical Drilling Co., Inc.		Date Started: 2/1/16	Date Finished: 2/1/16
Drilling Equipment: Truck Mounted Rig		Completion Depth: 55 ft	Rock Depth: 45 ft
Size and Type of Bit: 3-7/8" Tri cone roller bit		Number of Samples: Disturbed 10	Undisturbed - / Core 2
Casing Diameter (in): 4" ID Steel casing	Casing Depth (ft): 15	Water Level (ft.): First ▽	Completion ▼ / 24 HR. ▼
Casing Hammer: Auto	Weight (lbs): 140 / Drop (in): 30	Drilling Foreman: Ryan Warden	
Sampler: 2" OD split spoon samplier, NX Core Barrel		Inspecting Engineer: Maria Mis	
Sampler Hammer: Auto	Weight (lbs): 140 / Drop (in): 30		

Material Symbol	Building Code	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40
		Demolition debris Sampling not performed in demolition debris above remnant basement slab	0–12					
	Class 7							
		Remnant basement slab (9" thick)	12					
		Loose brown SILT (ML), trace fine sand (wet)	13–14	S-1	SS	12	6 2 3 2	5
		Medium Dense brown SILT (ML), trace fine sand (wet) Moisture content = 32.8% LL=28; PL=23; PI=5	15–16	S-2	SS	15	7 13 15 16	28
	Class 6	Loose brown SILT (ML), trace fine sand (wet)	17–18	S-3	SS	12	1 3 4 4	7
		Loose brown/gray SILT (ML), trace fine sand (wet)	19–20	S-4	SS	3	6 3	7

Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)



Predrilled through demolition debris and fill layer with 4-7/8in. tricone roller bit

Rig chatter at 12ft
Broke through at 12.75ft

Take S-1: 13-15ft

Take S-2: 15-17ft

Install casing to 15ft
Clean-out casing with tricone roller bit
Brown wash
Take S-3: 17-19ft

Take S-4: 19-21ft

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Log of Boring **B-8** Sheet 2 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 9 NAVD88

Material Symbol	Building Code	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Class 6	Loose brown/gray SILT (ML), trace fine sand (wet)	20	S-4	SS	3	4 5	7	
			21						
			22	S-5	SS	15	WOH 1 1 2	2	Take S-5: 21-23ft
			23						
	Class 6	Loose brown silty fine SAND (SM) (wet) Moisture Content = 30.3%	24	S-6	SS	18	1 2 3 4	5	Take S-6: 23-25ft
			25						Advance roller bit to 25ft
		Loose brown silty fine SAND (SM), some silt, trace clay (wet)	26	S-7	SS	12	WOH WOH 1 WOH		Take S-7: 25-27ft
			27						
			28						Advance roller bit to 30ft Brown wash Smooth drilling
			29						
	Class 6	Loose brown/gray SILT (ML), some fine sand (wet)	30	S-8	SS	12	1 WOH 1 2		Take S-8: 30-32ft
			31						
			32						
			33						Advance roller bit to 35ft Brown wash Smooth drilling
			34						
			35	S-9	SS	18	WOH 4 16 18	20	Take S-9: 35-37ft
	Class 3b	Medium dense gray/brown coarse to fine SAND (SM), some silt, trace decomposed mica schist (wet)	36						
			37						
			38						Advance roller bit to 40ft Brown wash Smooth drilling
			39						
	Class 3a	Dense brown/gray coarse to fine SAND (SM), some silt, trace clay, trace weathered rock (wet)	40	S-10	SS	18	14 20 25 100/5"	45	Take S-10: 40-41.9ft Spoon Refusal at 41.9ft
			41						
			42						Advance roller bit to 45ft Slow drilling Rig chatter
	Class 1d	WEATHERED MICA SCHIST	43						
			44						
			45						

N-Value (Blows/ft) scale: 10 20 30 40

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Log of Boring **B-8** Sheet 3 of 3

Project	Project No.
45 Broad Street	170394201
Location	**Elevation and Datum**
45 Broad Street, New York, NY	El. 9 NAVD88

Material Symbol	Building Code	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Class 1c	Black/gray MICA SCHIST with quartz and fieldspar intrusions, slightly weathered, slightly fractured, horizontal foliations, subvertical fractures	45–50	C-1	NX	REC=60"/60" =100%	RQD=56"/60" =93%		Take S-11 at 45ft Spoon refusal at 45ft Start core C-1: 45-50ft End C-1 at 50ft
		Black/gray MICA SCHIST with quartz and fieldspar intrusions, slightly weathered, slightly fractured, horizontal foliations, subvertical fractures	50–55	C-2	NX	REC=60"/60" =100%	RQD=60"/60" =100%		Start core C-2: 50-55ft End C-2 at 55ft End of Boring at 55ft Remove rods and casing
		End of Boring @ 55 ft BGS	55–70						

APPENDIX B-1
Observation Well Construction Logs (Langan 2007)

WELL CONSTRUCTION SUMMARY
Well No. MW-1

PROJECT: 45 Broad St	PROJECT NO.: 5797401 PERMIT:
LOCATION: New York, NY	ELEVATION AND DATUM: BPMD 9.90 Top of Casing
DRILLING AGENCY: Craig Test Boring	DATE STARTED: 8/29/07 DATE FINISHED: 8/30/2007
DRILLING EQUIPMENT: CME 55 Track Mounted Rig	DRILLER: Rob Dollar
SIZE AND TYPE OF BIT: 3-7/8" Tri-cone roller bit	INSPECTOR: Michael Mudalel

METHOD OF INSTALLATION
A 2-inch PVC screen and riser were installed and the annular space was filled with No. 1 filter sand, a bentonite seal, backfilled with fill material.

METHOD OF WELL DEVELOPMENT
Well was developed by surge and pump method for 60 minutes until discharge was clear of silt. A total of 5 gallons was purged.

TYPE OF CASING: PVC DIAMETER: 2-inch	TYPE OF BACKFILL MATERIAL: Hole cuttings
TYPE OF SCREEN: PVC DIAMETER: 2-inch	TYPE OF SEAL MATERIAL: Bentonite
BOREHOLE DIAMETER: 4"	TYPE OF FILTER MATERIAL: # 1 Sand

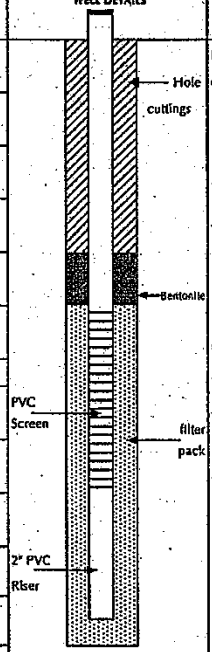
TOP OF CASING	ELEVATION	DEPTH (ft)
	9.90	0.00
TOP OF SEAL	ELEVATION	DEPTH (ft)
	-13.10	23.00
TOP OF FILTER	ELEVATION	DEPTH (ft)
	-16.13	25.00
TOP OF SCREEN	ELEVATION	DEPTH (ft)
	-20.13	29.00
BOTTOM OF WELL	ELEVATION	DEPTH (ft)
	-40.13	49.00

SCREEN LENGTH: 10 ft
SLOT SIZE: 0.01-in

GROUNDWATER ELEVATIONS

ELEVATION	DATE	DEPTH TO WATER
-9.90	8/31/07	19.80
-10.30	9/4/07	20.20
-10.10	9/5/2007	20
-10.40	9/6/2007	20.3

WELL DETAILS



SUMMARY SOIL CLASSIFICATION	DEPTH (FT) bgs
Demo debree, brick, concrete, and steel rebar	0.0
18" Concrete slab	11.5
Lt. brown-redish SILT, tr mica	29.0
Top of bed rock	38.0
Bed rock	59.0

LANGAN Engineering and Environmental Services, PC
21 Penn Plaza, 360 W 31st Street, 8th Floor, New York

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WELL CONSTRUCTION SUMMARY

Well No. MW-6

PROJECT: 45 Broad St	PROJECT NO.: 5797401 PERMIT:
LOCATION: New York, NY	ELEVATION AND DATUM: BPMD 9.90 Top of Casing
DRILLING AGENCY: Craig Test Boring	DATE STARTED: 8/30/07 DATE FINISHED: 8/30/2007
DRILLING EQUIPMENT: CME 55 Track Mounted Rig	DRILLER: Rob Dollar
SIZE AND TYPE OF BIT: 3-7/8" Tri-cone roller bit	INSPECTOR: Michael Mudalel

METHOD OF INSTALLATION

A 2-inch PVC screen and riser were installed and the annular space was filled with No. 1 filter sand, a bentonite seal, backfilled with bentonite and fill material.

METHOD OF WELL DEVELOPMENT

Well was developed by surge and pump method for 60 minutes until discharge was clear of silt. A total of 5 gallons was purged.

TYPE OF CASING: PVC	DIAMETER: 2-inch	TYPE OF BACKFILL MATERIAL: Hole cuttings	
TYPE OF SCREEN: PVC	DIAMETER: 2-inch	TYPE OF SEAL MATERIAL: Bentonite	
BOREHOLE DIAMETER: 4"		TYPE OF FILTER MATERIAL: # 1 Sand	

	ELEVATION	DEPTH (ft)
TOP OF CASING	9.90	0.00
TOP OF SEAL	-8.10	18.00
TOP OF FILTER	-11.13	20.00
TOP OF SCREEN	-11.13	20.00
BOTTOM OF WELL	-31.13	40.00

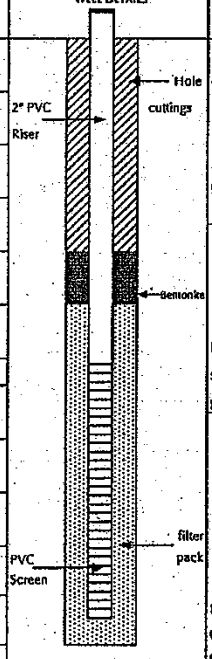
SCREEN LENGTH: 20 ft

SLOT SIZE: 0.01-in

GROUNDWATER ELEVATIONS

ELEVATION	DATE	DEPTH TO WATER
-8.50	9/4/07	18.40
-8.10	9/5/07	18.00
-8.10	9/6/07	18.00

WELL DETAILS



SUMMARY SOIL CLASSIFICATION	DEPTH (FT) bgs
Demo debree, brick, concrete, and steel rebar	0.0
6" Concrete slab	13.0
Lt brown-redish SILT, so. Clay, tr. f. sand, tr c. gravel	20.0
Lt brown- redish SILT, tr. decomposed rock, tr. f.-c. sand	40.0

LANGAN Engineering and Environmental Services, PC
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APPENDIX B-2
Observation Well Construction Logs (Langan 2016)

OBSERVATION WELL CONSTRUCTION SUMMARY

Well No. B-7(OW)

PROJECT 45 Broad Street	**PROJECT NO.** 170394201
LOCATION New York, New York	**ELEVATION AND DATUM** 9.9 (NAVD88)
DRILLING AGENCY Craig Test Boring Inc.	**DATE STARTED** 1/29/2016 **DATE FINISHED** 1/29/2016
DRILLING EQUIPMENT Truck Mounted Rig	**DRILLER** Ryan Warden
SIZE AND TYPE OF BIT 3-7/8" Tricone Roller Bit	**INSPECTOR** Maria Mis

METHOD OF INSTALLATION

BORING WAS DRILLED TO 55 FEET. HOLE COLLAPSED TO 26 FEET. INSTALLED WELL TO 26 FEET. A 2.00 INCH PVC SCREEN (10 FT) AND RISER TO THE SURFACE WERE INSTALLED TO THE CORRECT DEPTH TO 26 FT; CASING WAS THEN REMOVED, AS THE CASING WAS REMOVED SAND FILTER AND BENTONITE PELLETS WERE PACKED RESPECTIVELY. A FLUSH-MOUNT WELL CAP WAS THEN INSTALLED AND CEMENTED IN.

METHOD OF WELL DEVELOPMENT

WELL WAS FLUSHED UNTIL WATER RETURN WAS CLEAR.

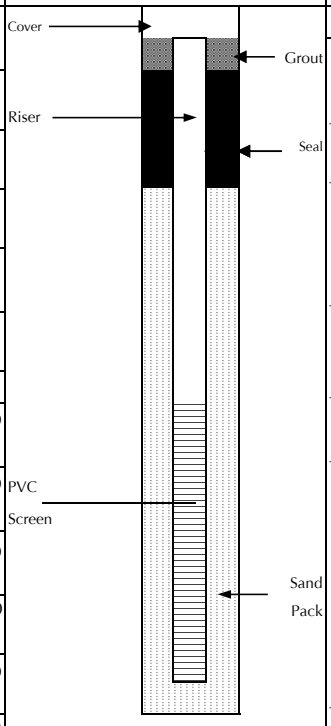
TYPE OF RISER PVC	**DIAMETER** 2.00 inches	**TYPE OF BACKFILL MATERIAL** SOIL CUTTINGS
TYPE OF SCREEN PVC	**DIAMETER** 2.00 inches	**TYPE OF SEAL MATERIAL** BENTONITE PELLETS
BOREHOLE NOMINAL DIAMETER 4 inches		**TYPE OF FILTER MATERIAL** NO. 1 FILTER SAND (SILICA QUARTZ SAND)

TOP OF CASING	**ELEVATION** 13.9	**DEPTH (ft)** -4
TOP OF SEAL	**ELEVATION (ft)** 7.4	**DEPTH (ft)** 2.5
TOP OF FILTER	**ELEVATION (ft)** 6.4	**DEPTH (ft)** 3.5
TOP OF SCREEN	**ELEVATION (ft)** -6.1	**DEPTH (ft)** 16
BOTTOM OF BORING	**ELEVATION (ft)** -16.1	**DEPTH (ft)** 26
SCREEN LENGTH		10 FT
SLOT SIZE		0.025-IN

GROUNDWATER ELEVATIONS

ELEVATION (ft)	DATE	DEPTH TO WATER (ft)
-5.1	1/29/2016	15.0
-3.6	2/1/2016	13.5
-3.6	2/1/2016	13.5

WELL DETAILS



SUMMARY SOIL CLASSIFICATION	DEPTH (FT)
	0.0
0 to 12 feet: FILL	2.5
0 to 12 feet: FILL	3.5
0 to 12 feet: FILL	
12 to12.8 feet: CONCRETE	12.8
12.8 to 17 feet: FILL	16.0
12.8 to 17 feet: FILL	17.0
17 to 38.5 feet: SILT	
	26.0

Note: N.T.S.

LANGAN Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.
21 Penn Plaza, 360 W 31st Street, 7th Floor , New York, NY 10001

APPENDIX C-1
Laboratory Test Results (Langan 2007)

Project No.: 31737700 - 728 File: Indx1.xls

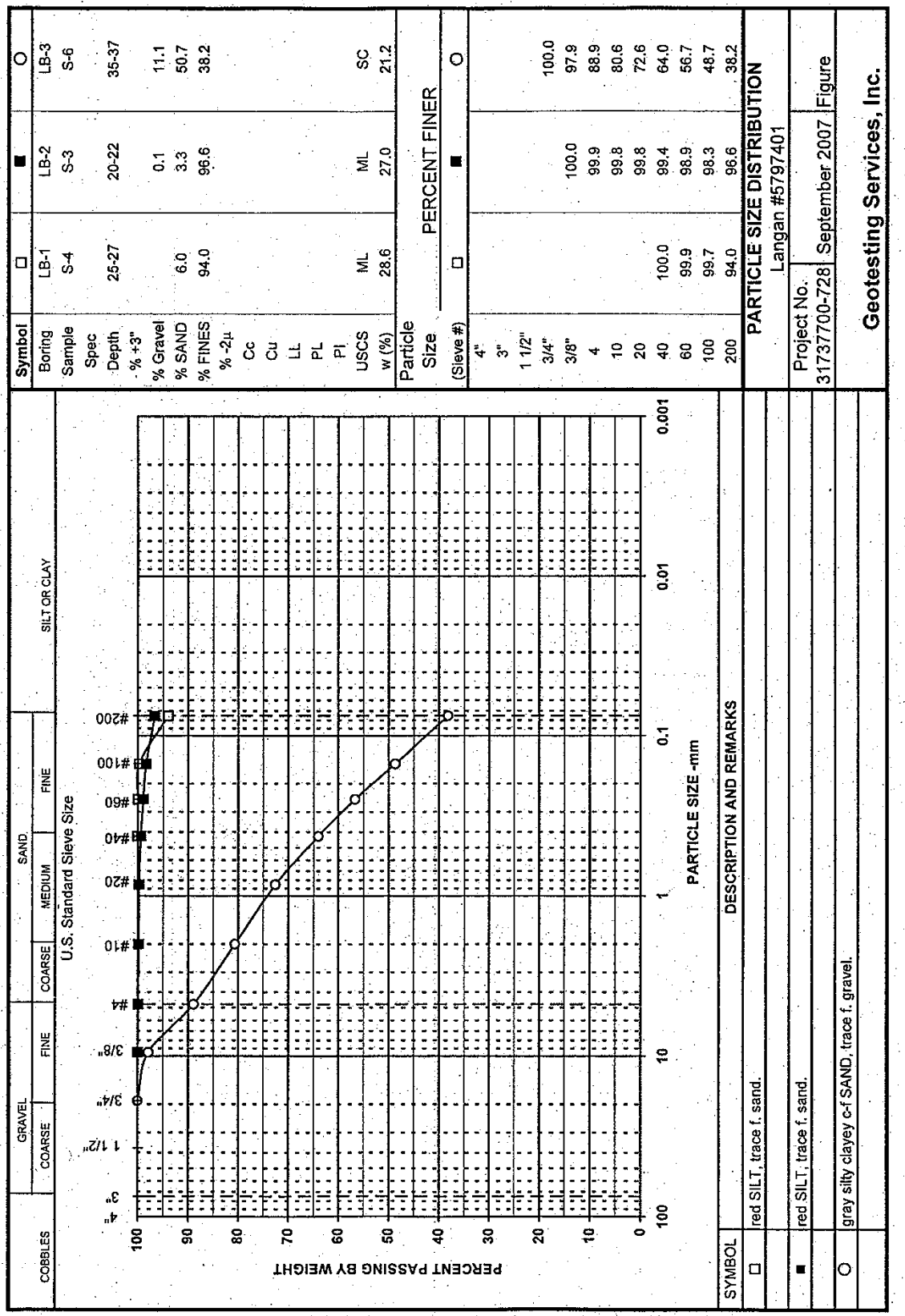
Langan #5797401

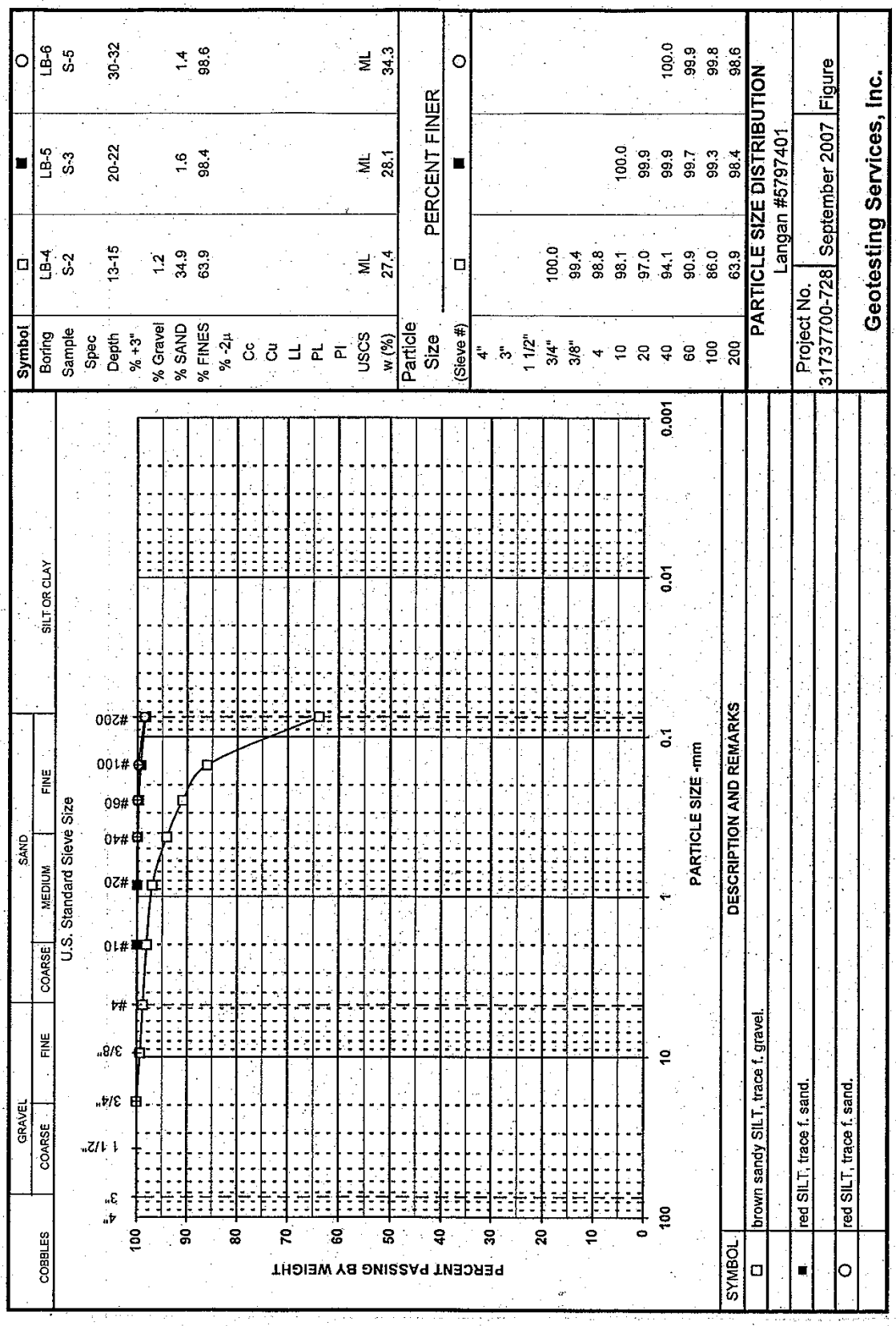
LABORATORY TESTING DATA SUMMARY

	BORING NO.	SAMPLE NO.	DEPTH (ft)	IDENTIFICATION TESTS: WATER CONTENT (%)	LIQUID LIMIT (-)	PLASTIC LIMIT (-)	PLAS. INDEX (-)	USCS SYMB. (1)	SIEVE MINUS NO. 200 (%)	REMARKS
SILT	LB-1	S-2	13-15	27.6	28	23	5	ML		
SILT	LB-1	S-4	25-27	28.6				ML	94.0	
	LB-2	S-3	20-22	27.0				ML	96.6	
SILT	LB-2	S-5	30-32	29.2	33	25	8	ML		
SILT	LB-3	S-3	20-22	28.9	27	23	4	ML		
SAND	LB-3	S-6	35-37	21.2				SC	38.2	
SILT	LB-4	S-2	13-15	27.4				ML	63.9	
CLAY	LB-4	S-6	35-37	28.0	26	20	6	CL-ML		
SILT	LB-5	S-3	20-22	28.1				ML	98.4	
SILT	LB-5	S-5	30-32	35.4	32	25	7	ML		
SILT	LB-6	S-3	20-22	23.0	32	21	11	CL		
SILT	LB-6	S-5	30-32	34.3				ML	98.6	

Note: (1) USCS symbol based on visual observation and Sieve and Atterberg limits reported.

Prepared by: JR Reviewed by: CMJ Date: 9/26/2007 Page 1 of 1


COBBLES
GRAVEL
COARSE
FINE
SAND
COARSE
MEDIUM
FINE
SILT OR CLAY
U.S. Standard Sieve Size
4"
3"
1 1/2"
3/4"
3/8"
#4
#10
#20
#40
#60
#100
#200
PERCENT PASSING BY WEIGHT
PARTICLE SIZE -mm
SYMBOL
DESCRIPTION AND REMARKS
red SILT, trace f. sand.
red SILT, trace f. sand.
gray silty clayey c-f SAND, trace f. gravel.
Symbol □ ■ ○
Boring LB-1 LB-2 LB-3
Sample S-4 S-3 S-6
Spec
Depth 25-27 20-22 35-37
% +3"
% Gravel 6.0 0.1 11.1
% SAND 94.0 3.3 50.7
% FINES 96.6 38.2
% -2μ
Cc
Cu
LL
PL
PI
USCS ML ML SC
w (%) 28.6 27.0 21.2
Particle Size PERCENT FINER
(Sieve #) □ ■ ○
4" 100.0
3" 97.9
1 1/2" 100.0 88.9
3/4" 99.9 80.6
3/8" 99.8 72.6
4 99.8 64.0
10 99.4 56.7
20 100.0 98.9 48.7
40 99.9 98.3
60 99.7 96.6
100 94.0 38.2
200
PARTICLE SIZE DISTRIBUTION
Langan #5797401
Project No. September 2007 Figure
31737700-728
Geotesting Services, Inc.
siev1a.xls 9/26/2007


COBBLES
GRAVEL
COARSE
FINE
SAND
COARSE
MEDIUM
FINE
SILT OR CLAY
U.S. Standard Sieve Size
4"
3"
1 1/2"
3/4"
3/8"
#4
#10
#20
#40
#60
#100
#200
PERCENT PASSING BY WEIGHT
100
90
80
70
60
50
40
30
20
10
0
100
10
1
0.1
0.01
0.001
PARTICLE SIZE -mm
Symbol □ ■ ○
Boring LB-4 LB-5 LB-6
Sample S-2 S-3 S-5
Spec
Depth 13-15 20-22 30-32
% +3" 1.2
% Gravel 34.9 1.6 1.4
% SAND 63.9 98.4 98.6
% FINES
% -2μ
Cc
Cu
LL
PL
PI
USCS ML ML ML
w (%) 27.4 28.1 34.3
Particle Size PERCENT FINER
(Sieve #) □ ■ ○
4" 100.0
3" 99.4
1 1/2" 98.8
3/4" 98.1 100.0
3/8" 97.0 99.9
4 94.1 99.9 100.0
10 90.9 99.7 99.9
20 86.0 99.3 99.8
40 63.9 98.4 98.6
60
100
200
SYMBOL DESCRIPTION AND REMARKS
□ brown sandy SILT, trace f. gravel.
■ red SILT, trace f. sand.
○ red SILT, trace f. sand.
PARTICLE SIZE DISTRIBUTION
Langan #5797401
Project No. September 2007 Figure
31737700-728
Geotesting Services, Inc.
siev1b.xls 9/26/2007

APPENDIX C-2
Laboratory Test Results (Langan 2016)

Client:	Langan Engineering				
Project:	45 Broad St				
Location:	New York, NY			Project No:	GTX-304342
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	02/10/16	Checked By:	emm
Depth :	---	Test Id:	363604		

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content, %
B-7	S- 4	19-21 ft	Moist, brown clay	35.6
B-7	S- 6	23-25 ft	Wet, brown silty clay	40.3
B-7	S- 9	35-37 ft	Wet, brown clay	34.6
B-8	S- 2	15-17 ft	Wet, brown silt	32.8
B-8	S- 6	23-25 ft	Moist, brown silt	30.3

Notes: Temperature of Drying : 110° Celsius

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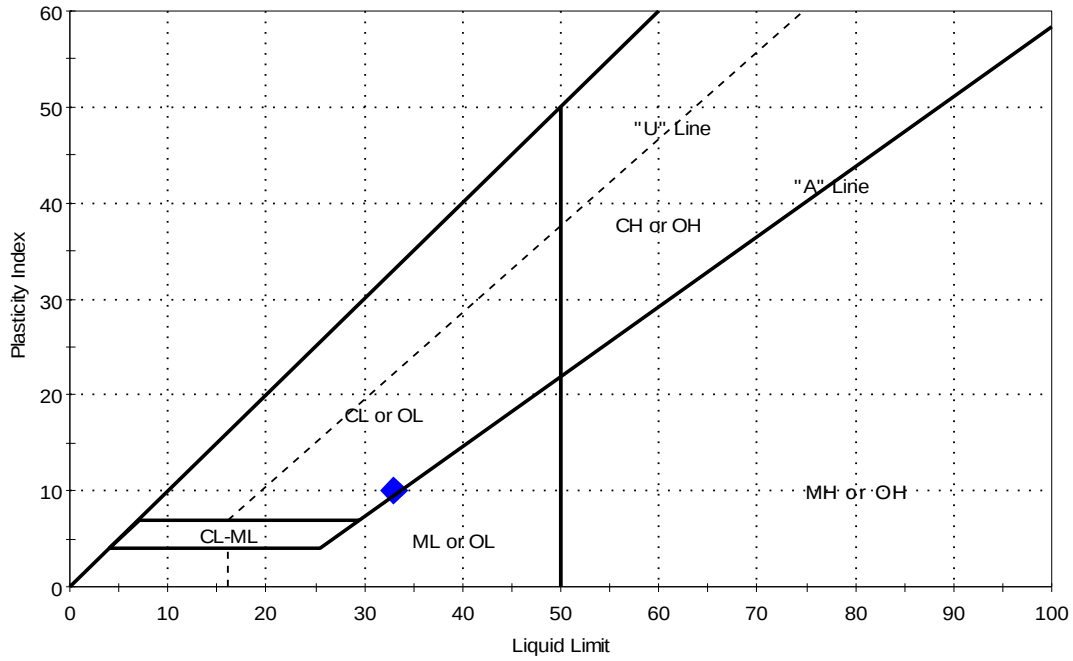
Client:	Langan Engineering				
Project:	45 Broad St				
Location:	New York, NY			Project No:	GTX-304342
Boring ID:	B-7	Sample Type:	jar	Tested By:	GA
Sample ID:	S-4	Test Date:	02/10/16	Checked By:	emm
Depth :	19-21 ft	Test Id:	363595		
Test Comment:	---				
Visual Description:	Moist, brown clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-4	B-7	19-21 ft	36	33	23	10	1.3	

Sample Prepared using the WET method

Dry Strength: HIGH
Dilatancy: NONE
Toughness: MEDIUM

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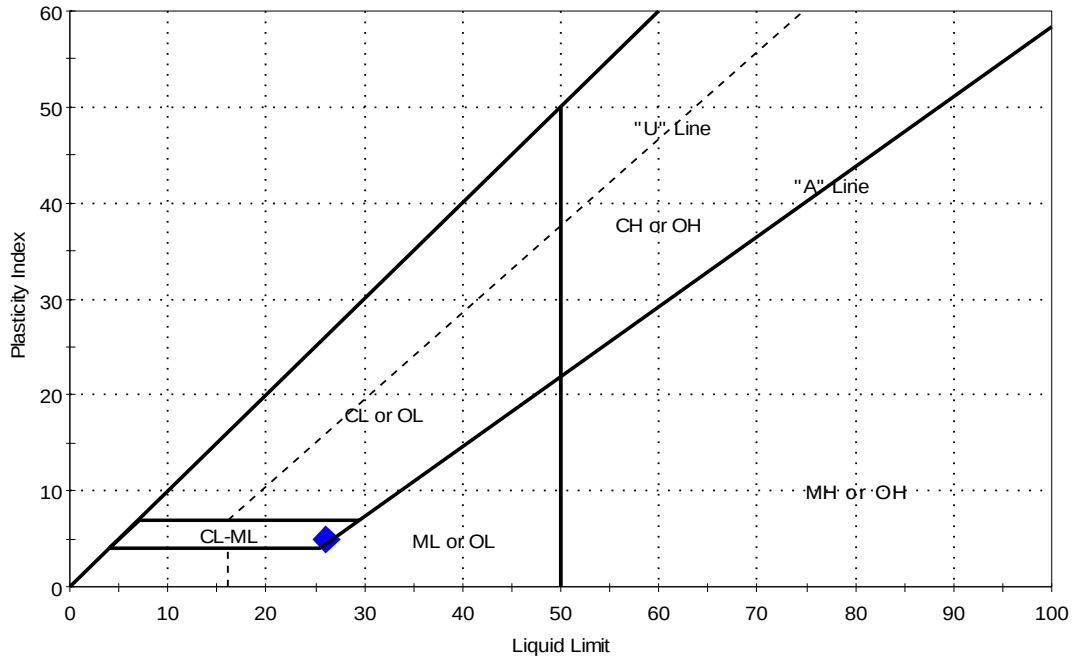
Client:	Langan Engineering				
Project:	45 Broad St				
Location:	New York, NY			Project No:	GTX-304342
Boring ID:	B-7	Sample Type:	jar	Tested By:	GA
Sample ID:	S-6	Test Date:	02/10/16	Checked By:	emm
Depth :	23-25 ft	Test Id:	363596		
Test Comment:	---				
Visual Description:	Wet, brown silty clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-6	B-7	23-25 ft	40	26	21	5	3.9	

Sample Prepared using the WET method

Dry Strength: HIGH
Dilatancy: SLOW
Toughness: MEDIUM

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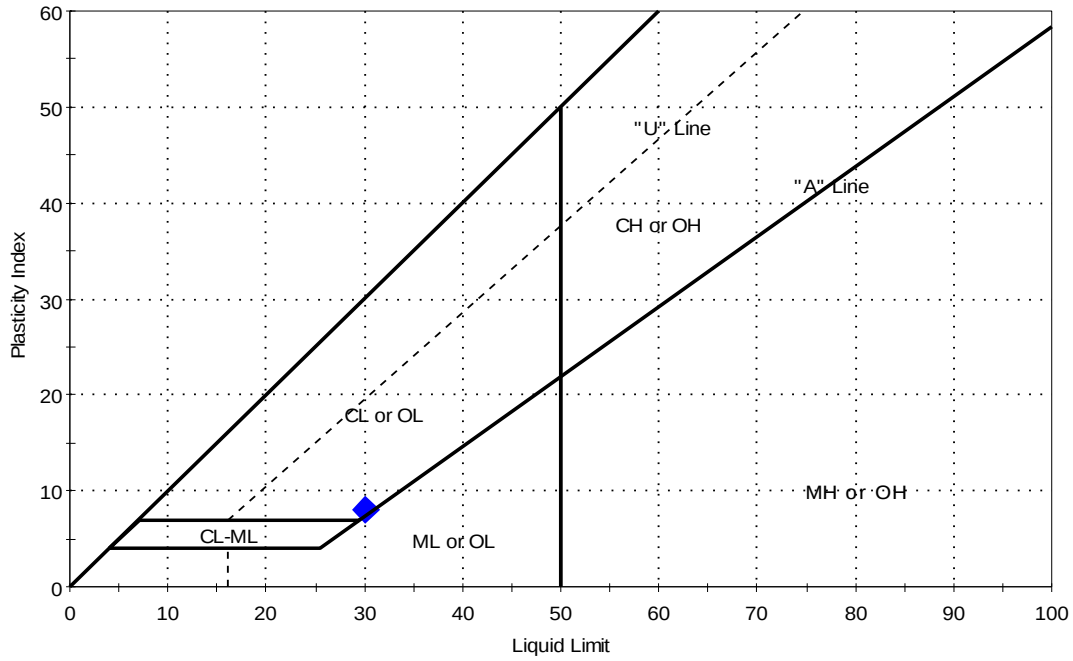
GeoTesting EXPRESS

Client:	Langan Engineering				
Project:	45 Broad St				
Location:	New York, NY			Project No:	GTX-304342
Boring ID:	B-7	Sample Type:	jar	Tested By:	GA
Sample ID:	S-9	Test Date:	02/10/16	Checked By:	emm
Depth :	35-37 ft	Test Id:	363597		
Test Comment:	---				
Visual Description:	Wet, brown clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-9	B-7	35-37 ft	35	30	22	8	1.6	

Sample Prepared using the WET method

Dry Strength: HIGH
Dilatancy: SLOW
Toughness: MEDIUM

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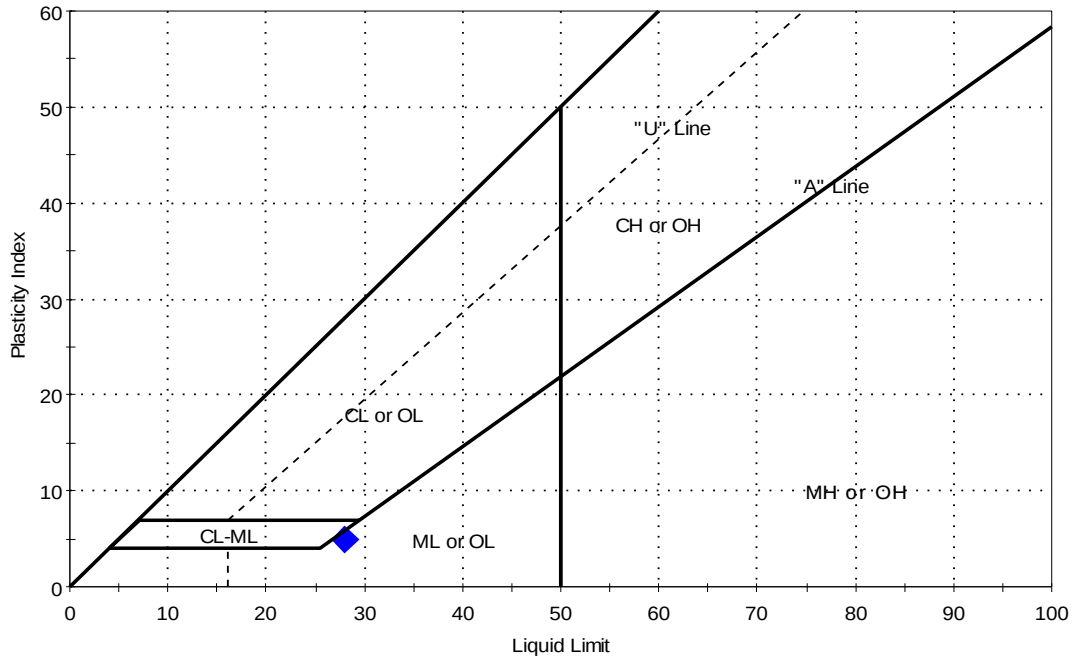
Client:	Langan Engineering				
Project:	45 Broad St				
Location:	New York, NY			Project No:	GTX-304342
Boring ID:	B-8	Sample Type:	jar	Tested By:	GA
Sample ID:	S-2	Test Date:	02/10/16	Checked By:	emm
Depth :	15-17 ft	Test Id:	363598		
Test Comment:	---				
Visual Description:	Wet, brown silt				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-2	B-8	15-17 ft	33	28	23	5	2	

Sample Prepared using the WET method

Dry Strength: HIGH
Dilatancy: SLOW
Toughness: MEDIUM

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Client:	Langan Engineering				
Project:	45 Broad St				
Location:	New York, NY			Project No:	GTX-304342
Boring ID:	B-8	Sample Type:	jar	Tested By:	GA
Sample ID:	S-6	Test Date:	02/10/16	Checked By:	emm
Depth :	23-25 ft	Test Id:	363599		
Test Comment:	---				
Visual Description:	Moist, brown silt				
Sample Comment:	---				

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-6	B-8	23-25 ft	30	n/a	n/a	n/a	n/a	

Dry Strength: NONE

Dilatancy: RAPID

Toughness: n/a

The sample was determined to be Non-Plastic

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Langan #170394201
45 Broad
SUMMARY OF ROCK TESTING

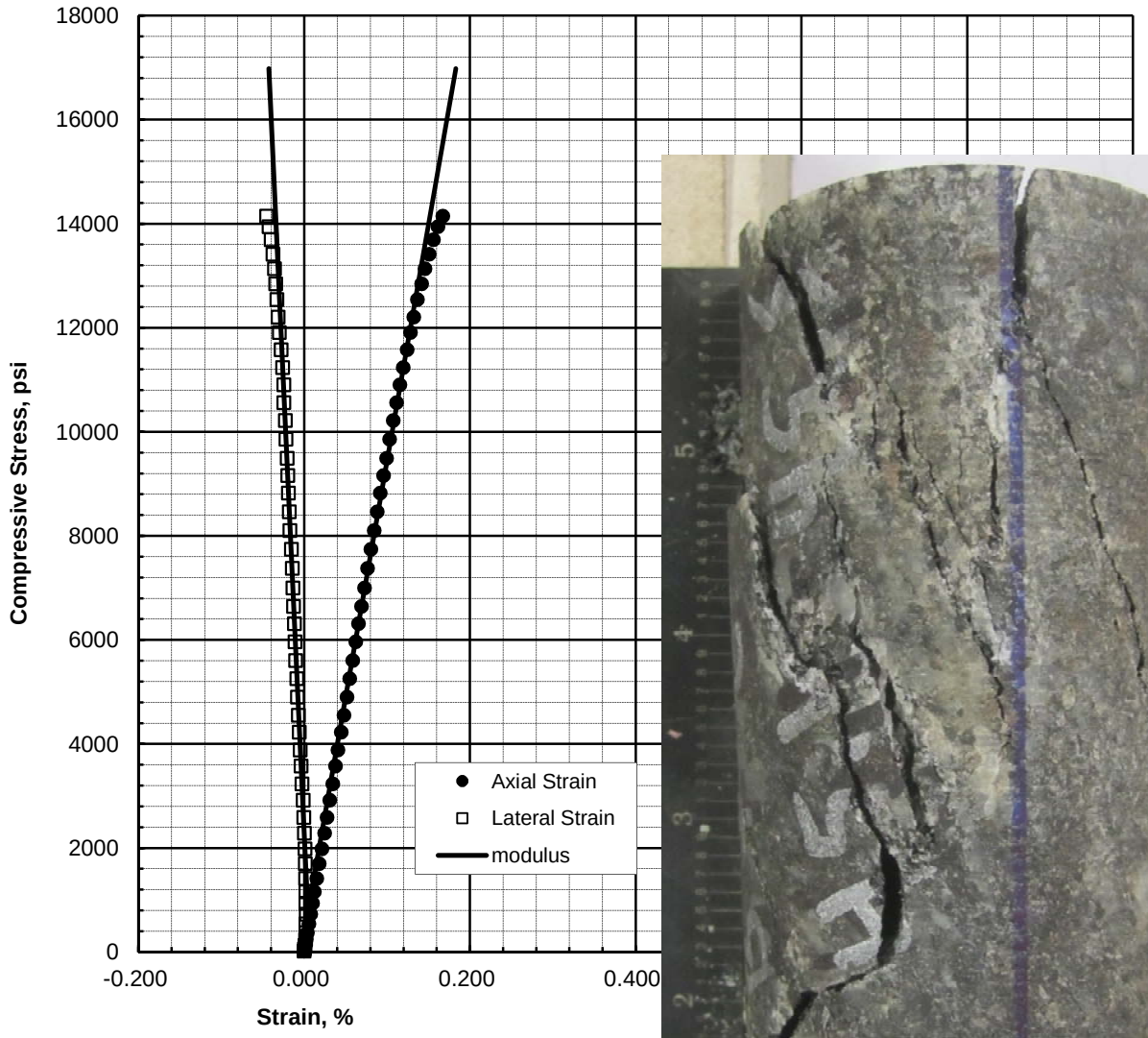
SAMPLE IDENTIFICATION			STATE PROPERTIES			ENGINEERING PROPERTY TESTS								REMARKS
Boring	Run	Depth	WATER CONTENT (1)	TOTAL UNIT WGT.	DRY UNIT WGT.	TEST TYPE (2)	ORIENTATION	Brazilian (ASTM D3967)	UNCONFINED COMPRESSION TESTS (ASTM D7012)					
								SPLITTING TENSILE STRENGTH	COMPRESSIVE STRENGTH	AXIAL STRAIN @ FAILURE	ESTIMATED (5) ELASTIC MODULUS	ELASTIC MODULUS	POISSON'S RATIO	
			(%)	(pcf)	(pcf)		(3)	(psi)	(psi)	(%)	(psi)	(psi)	(-)	
B-7	C-1	45.1-45.5	0.1	180	179	UCmod			14220	0.17		9.1E+06	0.26	
B-7	C-2	50.1-50.2	0.1	182	182	A	A	2311						
B-7	C-2	50.2-50.6	0.1	181	181	UC			16810	0.18	1.01E+07			
B-7	C-2	50.6-50.7	0.0	177	177	B	B	1341						
B-8	C-1	48.3-48.7	0.6	178	177	UCmod			8420	0.14		6.5E+06	0.31	
B-8	C-2	50.4-50.5	0.2	180	180	A	A	1428						
B-8	C-2	50.5-50.9	0.2	178	177	UC			14220	0.20	7.82E+06			
B-8	C-2	50.9-51.0	0.1	173	173	B	B	1510						

Notes: (1) Water contents determined after trimming and shearing.
(2) Test Type Abbreviations: UC: UC Compression test with estimated elastic moduli determination; Ucmod: UC compression test with direct elastic moduli determination
(3) Diametral orientation across core along bedding plane, axial perpendicular to bedding plane.
(5) Modulus estimated based on corrected gross deformations.

Prepared by: CMJ
Reviewed by: GET
Date: 4/21/2016

TerraSense, LLC
45H Commerce Way
Totowa, NJ 07512

Project No.: 7920-16016
File: RockSummary16.xlsx
Page 1 of 1



FAILURE PHOTO

Specimen Information

Water Content (%)	Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	Length (inch)	Diameter (inch)
0.08	180	179	4.745	1.974

Specimen meets ASTM D4543 shape tolerances

Test Summary

Strain Rate (%/min)	Strain to Peak (%)	q_u (psi)	Elastic Modulus (psi)	Poisson's Ratio
0.11	0.17	14220	9.09E+06	0.26

Tested by: GT Test Date: Apr-16-16

Langan **Project # 170394201**	**45 Broad**	**COMPRESSIVE STRESS VS STRAIN** **UNCONFINED COMPRESSIVE STRENGTH AND** **AND ELASTIC MODULUS TEST** **Boring: B-7 Sample: C-1** **Depth 45.1-45.5 ft.**
TerraSense, LLC **Project # 7920-616**		

Analysis File: UCModV2

4/21/2016
UCMLB7C1.xlsx

SPLITTING TENSILE (Brazilian) TEST

ASTM D 3967

Project Number: 7920-616 **Test by:** MHC **Sta:** B-7

Project Name: 45 Broad **Test Date:** 4/19/16 **Run:** C-2

SPECIMEN READINGS

	Test A	Test B
Test Number:	A	B
Depth:	50.1-50.2	50.6-50.7
Specimen mass(gm):	146.39	148.80

	Thickness (inch)	Diameter (inch)	Thickness (inch)	Diameter (inch)
	1.003	1.976	1.035	1.979
	0.994	1.975	1.042	1.978
	1.003	1.977	1.046	1.981
Average	1.000	1.976	1.041	1.979
Thickness / Diameter, (t/d):		0.51		0.53
t/D ratio between 0.2 and 0.75		yes		yes

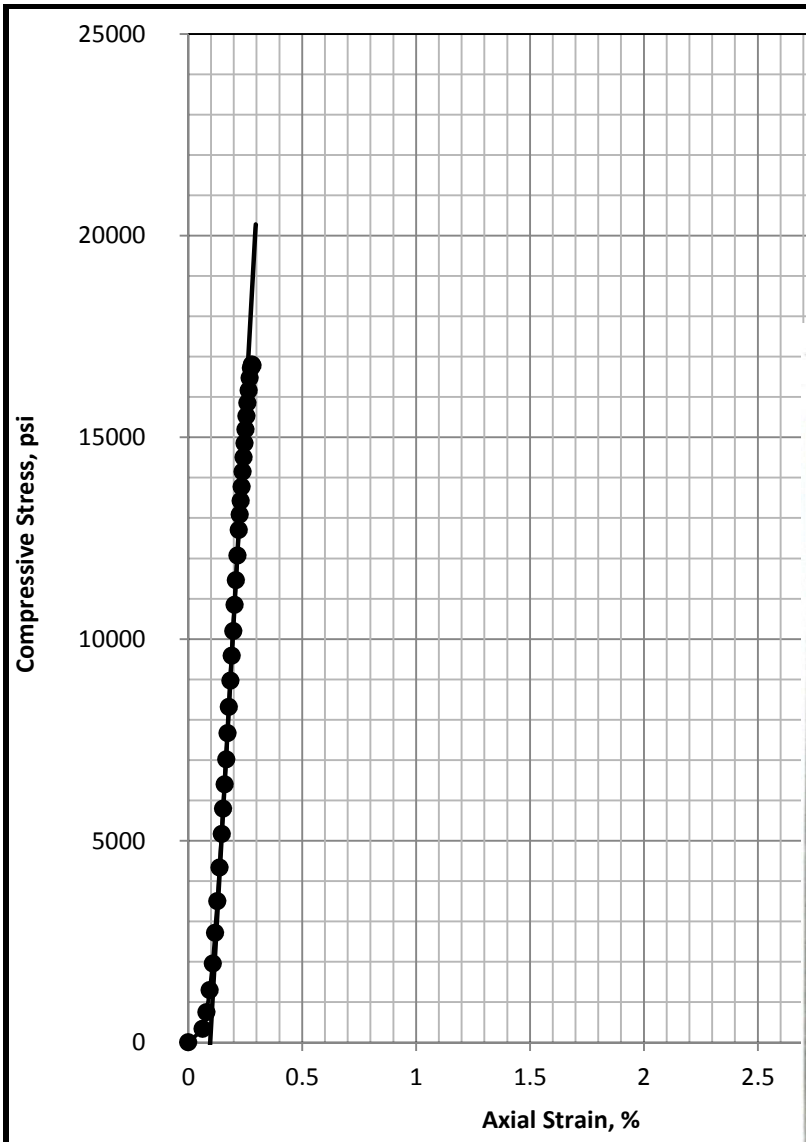
Data Acquisition File	BR-B7-C2-A	BR-B7-C2-B
Maximum Load	7169 lb	4338 lb

	After Test	After Test
Container No.:	144A	930
Initial Mass + cont. (g):	356.94	363.23
Dry Mass + cont. (g):	356.85	363.16
Mass of cont. (g):	210.58	214.51
Water content (%):	**0.06**	**0.05**
Total unit weight (pcf):	181.95	177.12
Dry unit weight (pcf):	181.84	177.04
Splitting Tensile Strength (psi)	2310.64	1341.16

A B

Failure Photo

Langan	170394201	**45 Broad**	**DATA SHEET SPLITTING TENSILE STRENGTH TEST Sta: B-7 Run: C-2 Depth: 50.1-50.7 ft.**
TerraSense, LLC	7920-616		



FAILURE PHOTO

Specimen Information

Water Content (%)	Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	Length (inch)	Diameter (inch)
0.05	181	181	4.873	1.977

Specimen meets ASTM D4543 shape tolerances

Test Summary

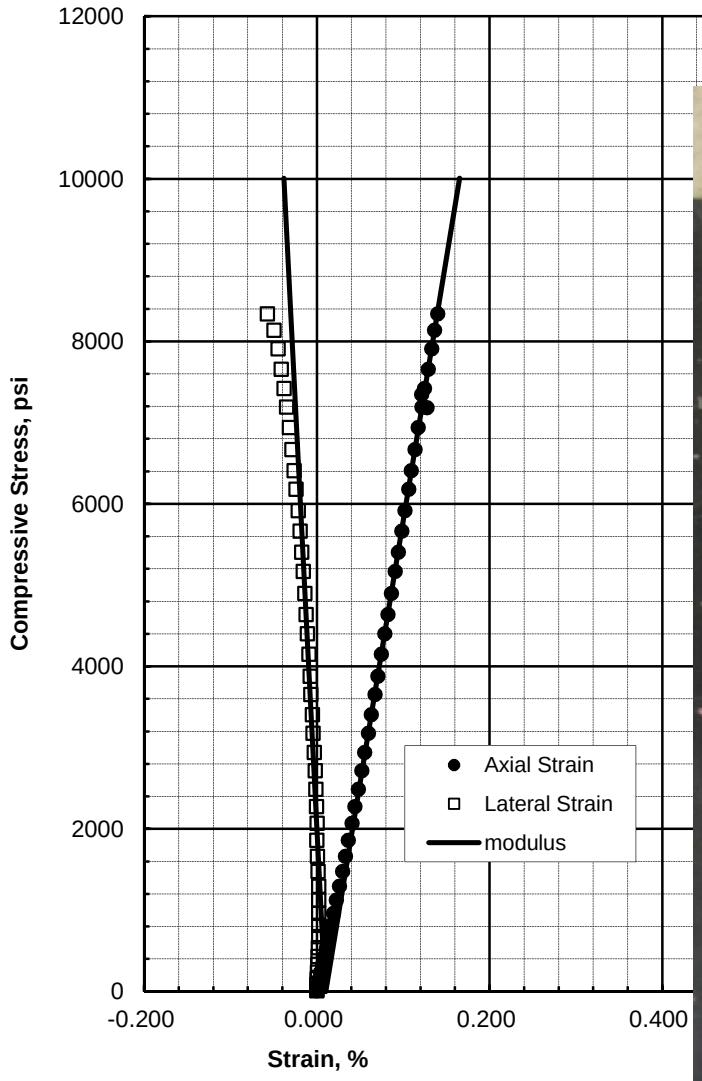
Strain Rate (%/min)	Corrected Strain to Peak (%)	q_u (psi)	Estimated (shown) Elastic Modulus (psi)
0.08	0.18	16810	1.01E+07

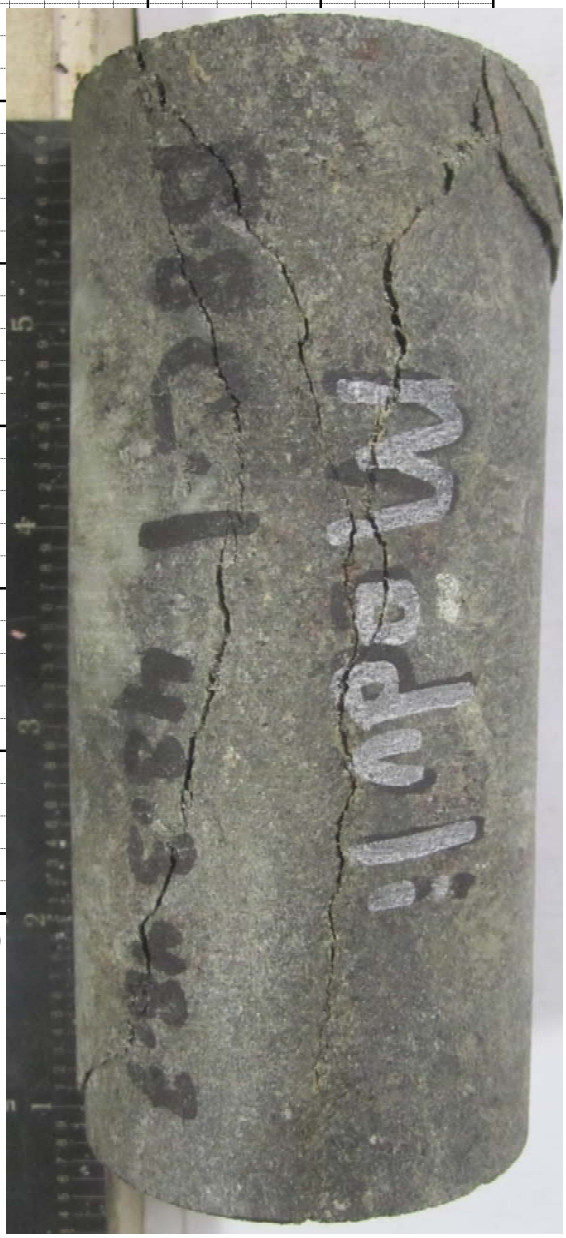
Test by: MHC
Test Date: Apr-19-16
Reviewed by: GET

Langan **Project # 170394201**	**45 Broad**	**COMPRESSIVE STRESS VS STRAIN** **UNCONFINED COMPRESSIVE STRENGTH TEST**
TerraSense, LLC **Project # 7920-616**		**Boring: B-7 Sample: C-2** **Depth 50.2-50.6 ft.**

Analysis File: UCrock7rev1 (3/11)

4/21/2016
UCB7C2.xlsx





FAILURE PHOTO

Specimen Information

Water Content (%)	Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	Length (inch)	Diameter (inch)
0.58	178	177	4.834	1.976

Specimen meets ASTM D4543 shape tolerances

Test Summary

Strain Rate (%/min)	Strain to Peak (%)	q_u (psi)	Elastic Modulus (psi)	Poisson's Ratio
0.15	0.14	8420	6.47E+06	0.31

Tested by: GT Test Date: Apr-16-16

Langan **Project # 170394201**	**45 Broad**	**COMPRESSIVE STRESS VS STRAIN** **UNCONFINED COMPRESSIVE STRENGTH AND** **AND ELASTIC MODULUS TEST** **Boring: B-8 Sample: C-1** **Depth 48.3-48.7 ft.**
TerraSense, LLC **Project # 7920-616**		

Analysis File: UCModV2

4/21/2016
UCMLB8C1.xlsx

SPLITTING TENSILE (Brazilian) TEST

ASTM D 3967

Project Number: 7920-616 **Test by:** MHC **Sta:** B-8

Project Name: 45 Broad **Test Date:** 4/19/16 **Run:** C-2

SPECIMEN READINGS

	A	B
Test Number:	A	B
Depth:	50.4-50.5	50.9-51.0
Specimen mass(gm):	153.00	144.35

Thickness (inch)	Diameter (inch)	Thickness (inch)	Diameter (inch)
1.050	1.980	1.042	1.985
1.049	1.980	1.025	1.978
1.054	1.979	1.030	1.975
Average 1.051	1.979	Average 1.032	1.979

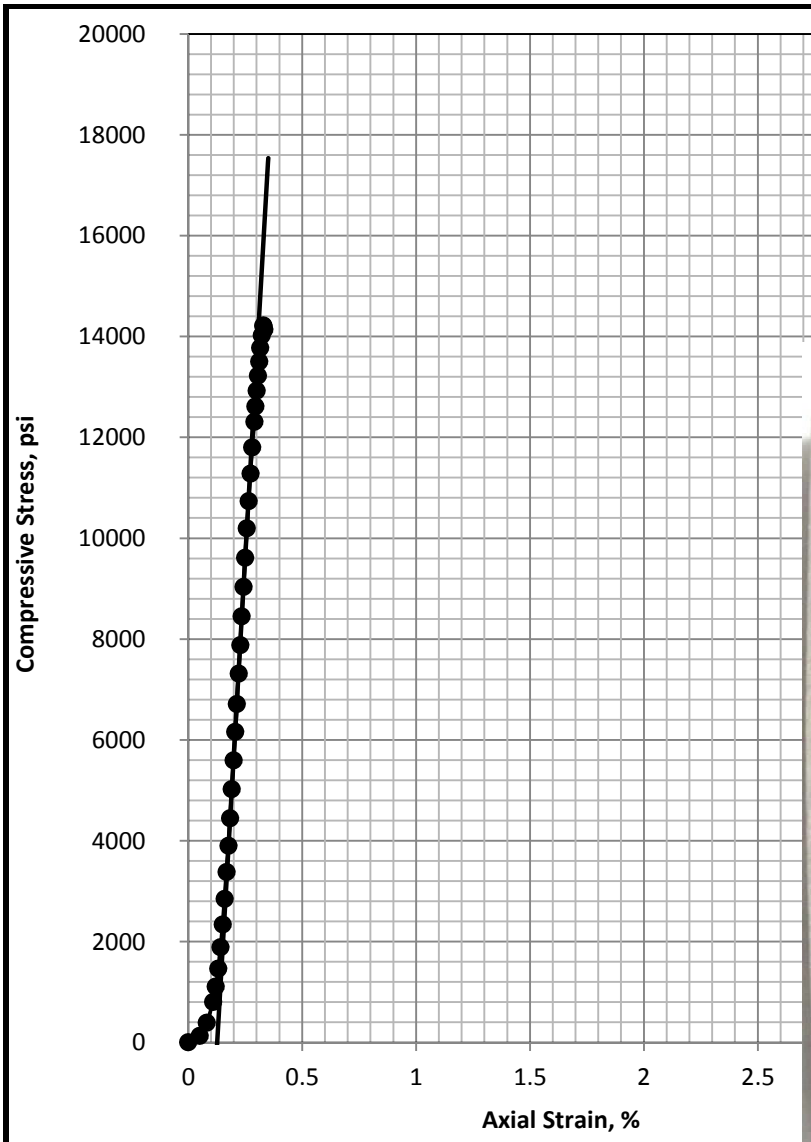
Thickness / Diameter, (t/d):	0.53	0.52
t/D ratio between 0.2 and 0.75	yes	yes
Data Acquisition File	BR-B8-C2-A	BR-B8-C2-B
Maximum Load	4666 lb	4844 lb

A B

Failure Photo

	After Test	After Test
Container No.:	118	482
Initial Mass + cont. (g):	363.99	357.05
Dry Mass + cont. (g):	363.71	356.84
Mass of cont. (g):	211.04	212.77
Water content (%):	**0.18**	**0.15**
Total unit weight (pcf):	180.27	173.24
Dry unit weight (pcf):	179.94	172.99
Splitting Tensile Strength (psi)	1428.14	1509.94

Langan	170394201	**45 Broad**	**DATA SHEET SPLITTING TENSILE STRENGTH TEST Sta: B-8 Run: C-2 Depth: 50.4-51.0 ft.**
TerraSense, LLC	7920-616		



Specimen Information

Water Content (%)	Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	Length (inch)	Diameter (inch)
0.17	178	177	4.747	1.980

Specimen meets ASTM D4543 shape tolerances

FAILURE PHOTO

Test Summary

Strain Rate (%/min)	Corrected Strain Strain to to Peak (%)	q_u (psi)	Estimated (shown) Elastic Modulus (psi)
0.09	0.20	14220	7.82E+06

Test by: MHC
Test Date: Apr-19-16
Reviewed by: GET

Langan **Project # 170394201**	**45 Broad**	**COMPRESSIVE STRESS VS STRAIN** **UNCONFINED COMPRESSIVE STRENGTH TEST**
TerraSense, LLC **Project # 7920-616**		**Boring: B-8 Sample: C-2** **Depth 50.5-50.9 ft.**

Analysis File: UCrock7rev1 (3/11)

4/21/2016
UCB8C2.xlsx

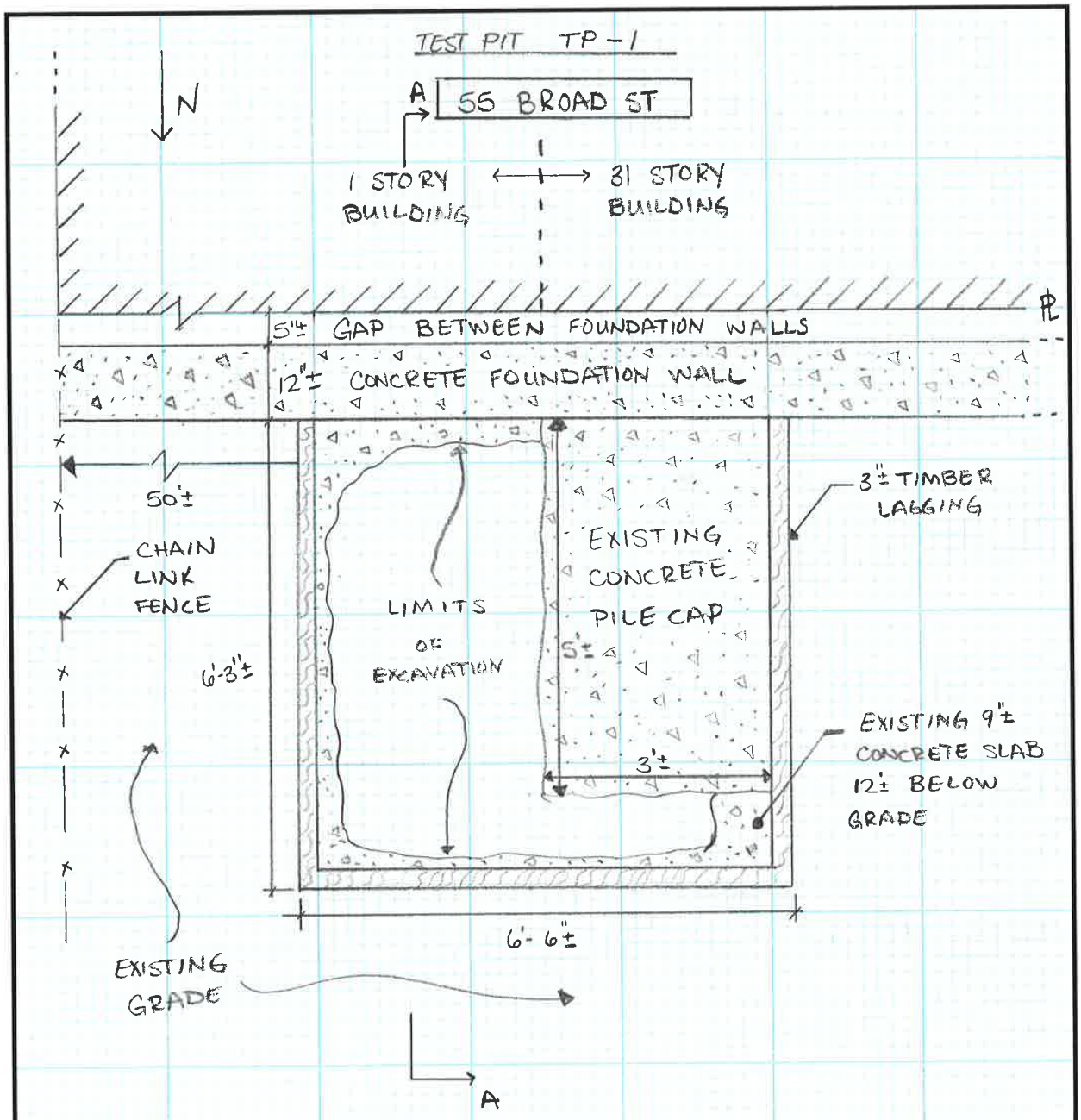
APPENDIX D
Test Pit Log and Photographs (Langan 2016)

Test Pit TP-1

Test pit TP-1 was excavated along the south property line of the site to investigate the foundation properties of the adjacent building, 55 Broad Street. The excavation was 6 feet wide by 6 feet long by 23 feet deep. Existing grade is about el. 11.5.

The remaining portion of the 12-inch-thick foundation wall was encountered at the existing grade and extended to about 12 feet below the existing grade, corresponding to about el. -0.5. The foundation wall rested on a 9-inch-thick concrete slab with rebar. A 5-inch-wide gap separated the remaining foundation wall and the adjacent building. The test pit exposed the adjacent building's foundation wall and pile cap. The concrete foundation wall extended to about 16 feet below the existing grade, corresponding to about el. -4.5. Two feet of timber was encountered below the foundation wall, followed by an about 5-foot-thick pile cap. The bottom of the pile cap was encountered at about 23 feet below the existing grade, corresponding to about el. -11.5.

Demolition debris (brick, concrete, building material, etc.) mixed with brown coarse to fine sand was encountered in the first 12 feet of the test pit, above the existing basement slab. Gray-brown clayey silt was encountered beneath the concrete slab and extended throughout the explored depth of the test pit. Groundwater was encountered at about 18 feet below existing grade in TP-1 (about el. -6.5). The test pit was backfilled with the excavated material upon completion.



45 Broad Street, Manhattan, NY Test Pit, TP-1	BY MLM DATE 2/22/16 CKD. ____ DATE ____	PROJ. NO. 170394201 SHEET 1 OF 2

LANGAN

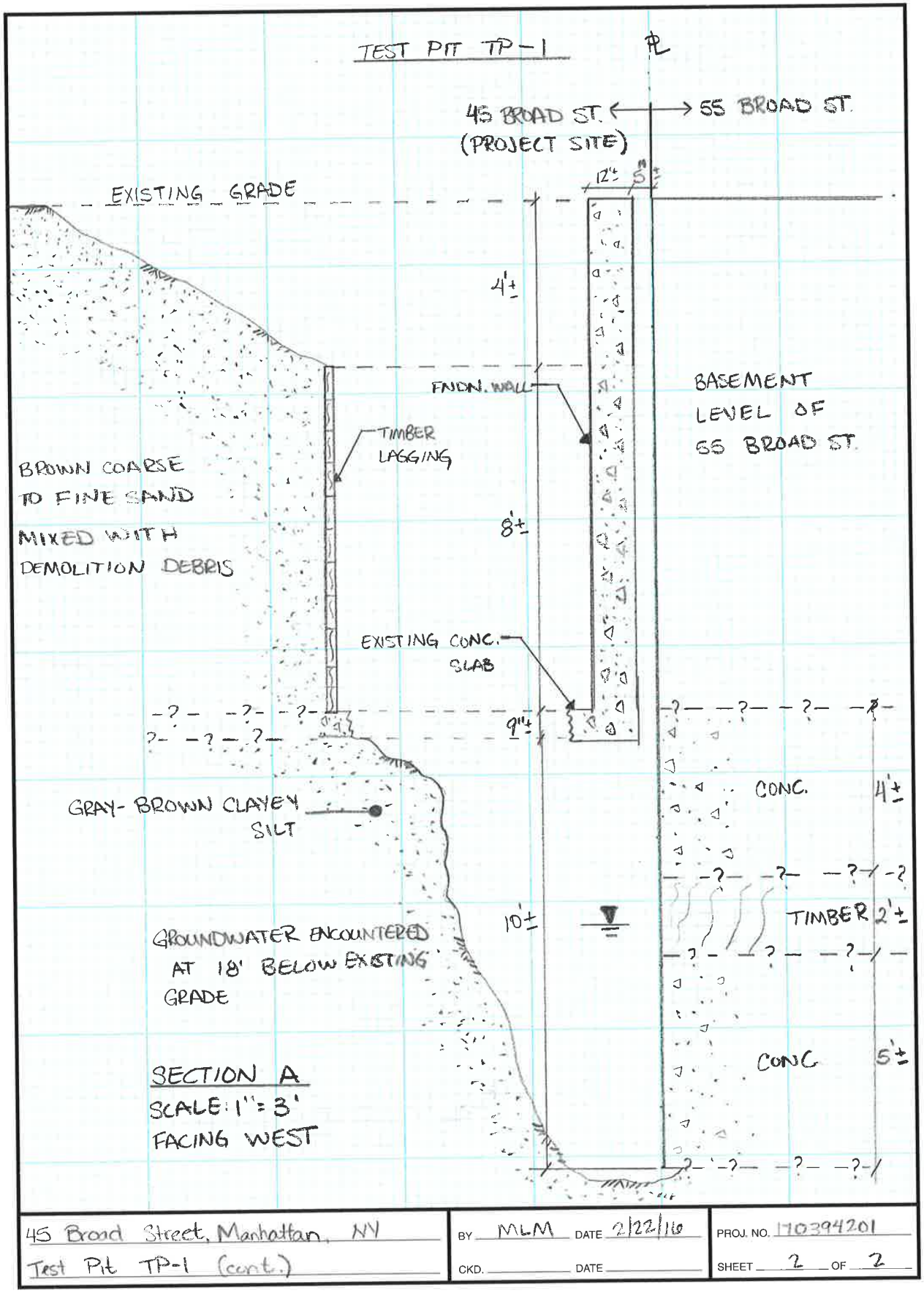

TEST PIT TP-1
℄
45 BROAD ST. ← → 55 BROAD ST.
(PROJECT SITE)
EXISTING GRADE
12"±
5"±
4'±
FNDN. WALL
BASEMENT LEVEL OF 55 BROAD ST.
TIMBER LAGGING
BROWN COARSE TO FINE SAND MIXED WITH DEMOLITION DEBRIS
8'±
EXISTING CONC. SLAB
9"±
GRAY-BROWN CLAYEY SILT
CONC.
4'±
10'±
TIMBER
2'±
GROUNDWATER ENCOUNTERED AT 18' BELOW EXISTING GRADE
CONC
5'±
SECTION A
SCALE: 1" = 3'
FACING WEST
45 Broad Street, Manhattan, NY
Test Pit TP-1 (cont.)
BY MLM DATE 2/22/16
CKD. DATE
PROJ. NO. 170394201
SHEET 2 OF 2
LANGAN

Photo 001: General view of the existing foundation wall, facing southwest.

Photo 002: General view of the demolition debris excavated from the test pit, facing northeast.

Photo 003: General view of the basement slab encountered at 12 feet below the ground surface, facing south.

Photo 004: General view of the test pit showing rebar found underneath the 9-inch-thick concrete slab, facing southwest.

Photo 005: General view of the test pit showing the pile cap encountered, facing south.

Photo 006: General view of the test pit showing the foundation wall extending to 23 feet below the ground surface, facing south.

APPENDIX E
Cone Penetration Tests (CPTs) Report

CRAIG
GEOTECHNICAL DRILLING CO., INC.

2/8/16 Job#: 165015 Client: Langan Engineeri Location: 45 Broad Street, Manhattan NY

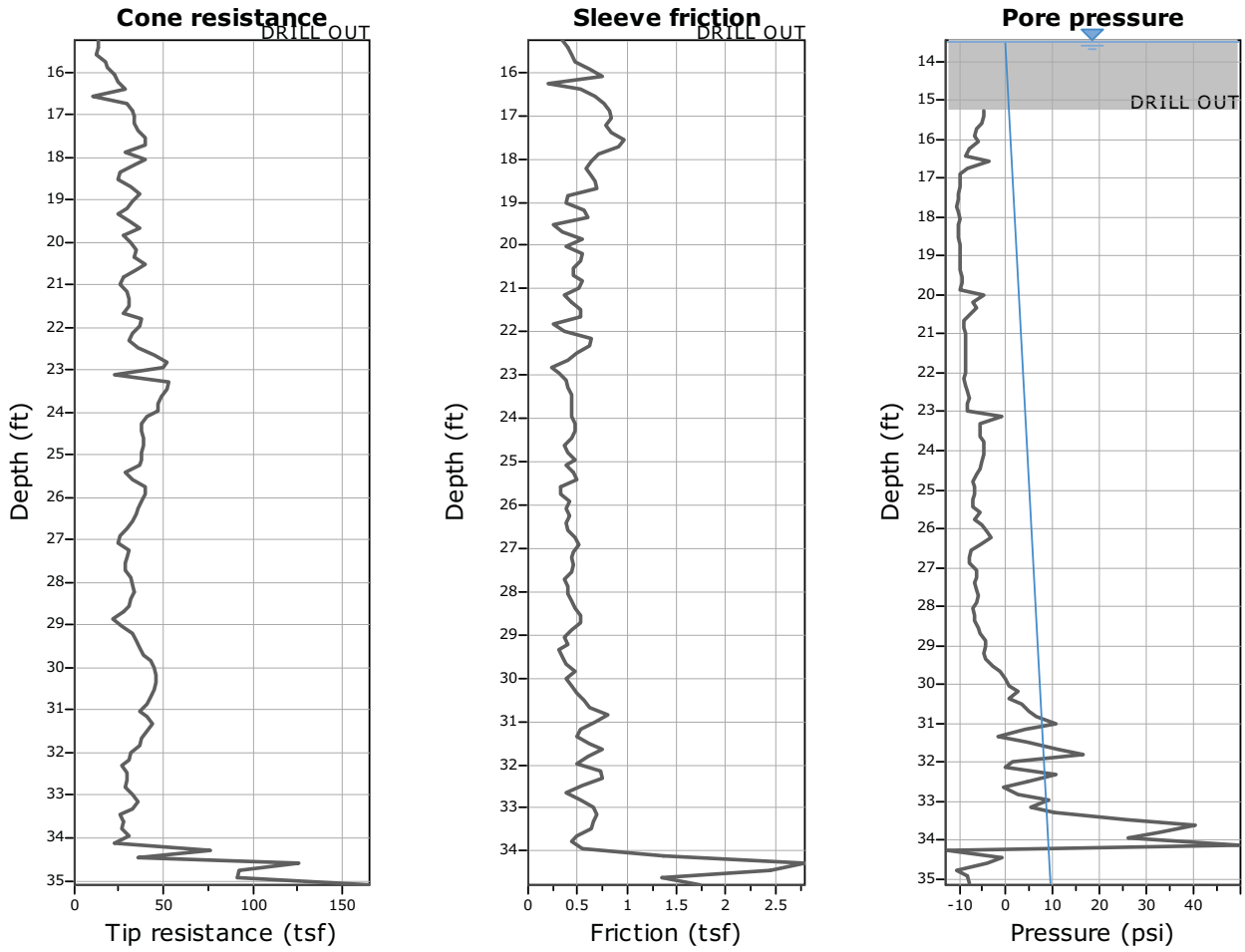
Date	CPT Sounding	Depth	Seicmic Tests	Comments
2/1/16	CPT-1	35.1	7	Pre-Drill 15ft.
2/1/16	CPT-2	38.22	8	Pre-Drill 15ft.

5435 Harding Hwy, Mays Landing, NJ, 08330
Tel: (609)625-4862 Fax: (609)625-4306 E-Mail:kcraig@craigtest.com Web Site: craigtest.com

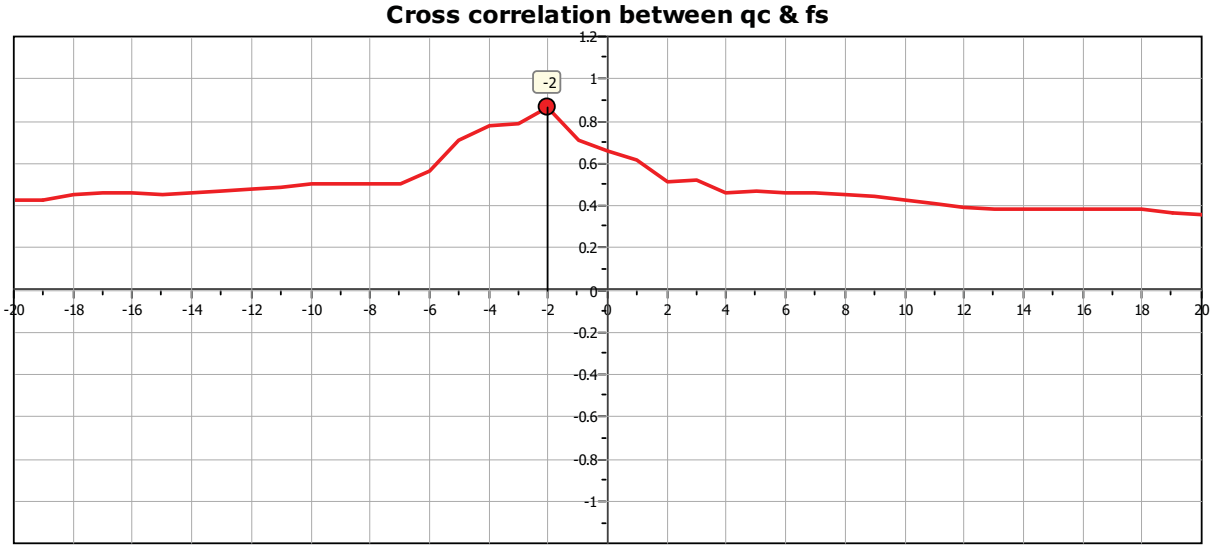
CRAIG GEOTECHNICAL DRILLING CO., INC.

CPT: LanganBroad Street CPT-1
Total depth: 35.10 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

Project: **Langan**
Location: **45 Broad Street, Manhattan NY**



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).

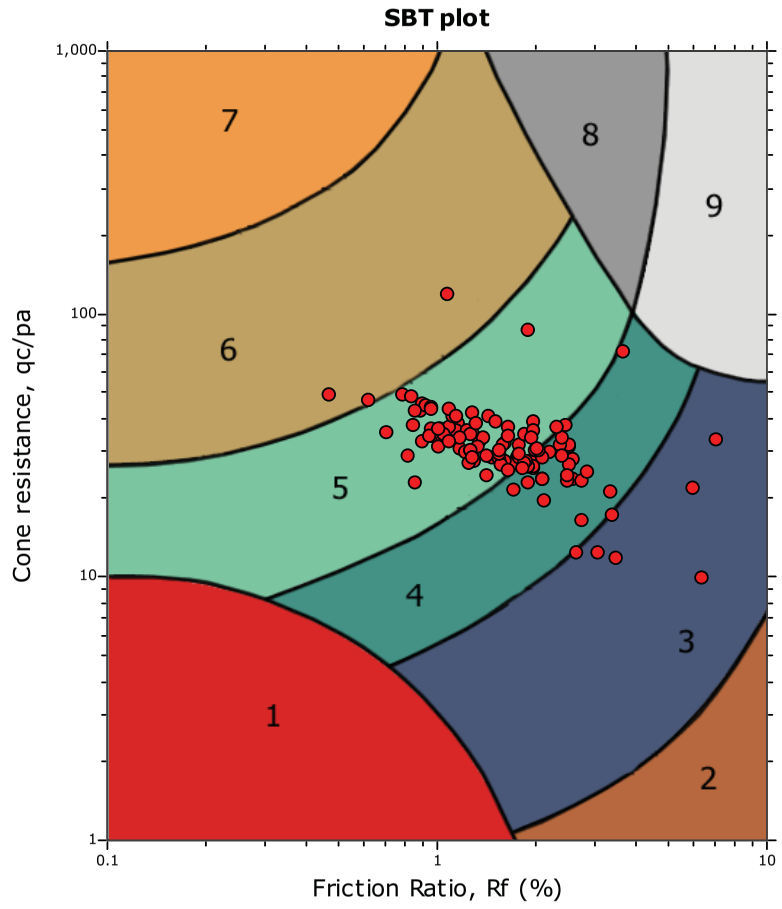


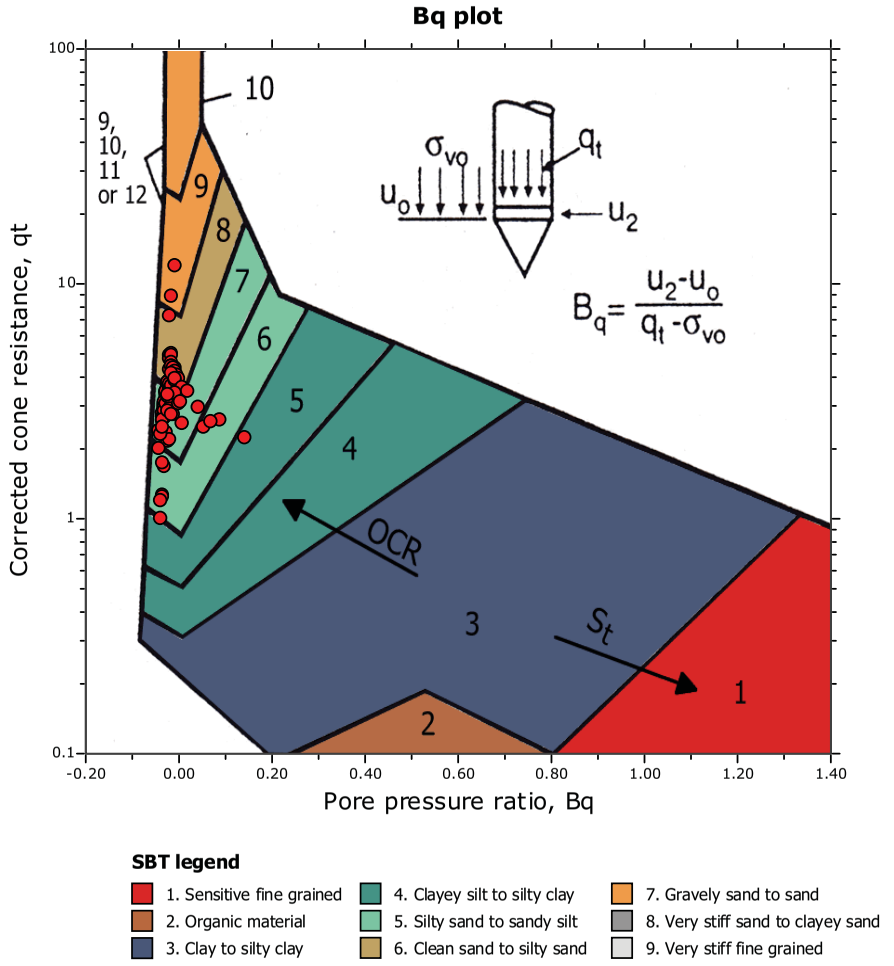
CRAIG GEOTECHNICAL DRILLING CO., INC.

Project: Langan
Location: 45 Broad Street, Manhattan NY

CPT: LanganBroad Street CPT-1
Total depth: 35.10 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

SBT - Bq plots



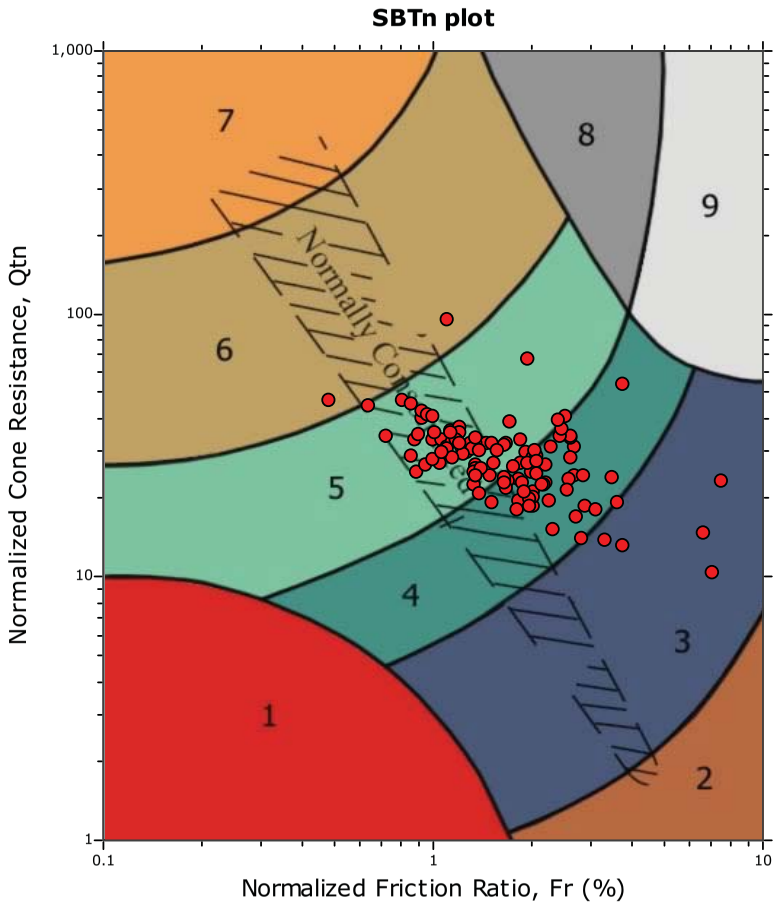


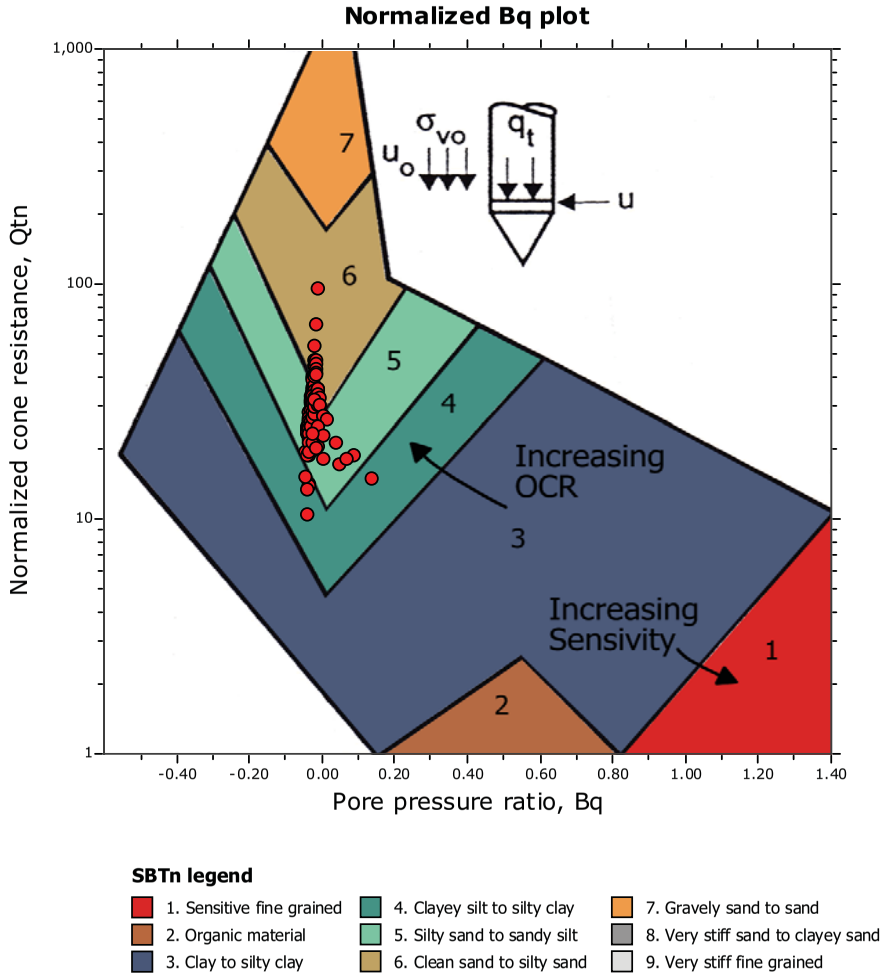
CRAIG GEOTECHNICAL DRILLING CO., INC.

Project: **Langan**
Location: **45 Broad Street, Manhattan NY**

CPT: LanganBroad Street CPT-1
Total depth: 35.10 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

SBT - Bq plots (normalized)





SBTn legend

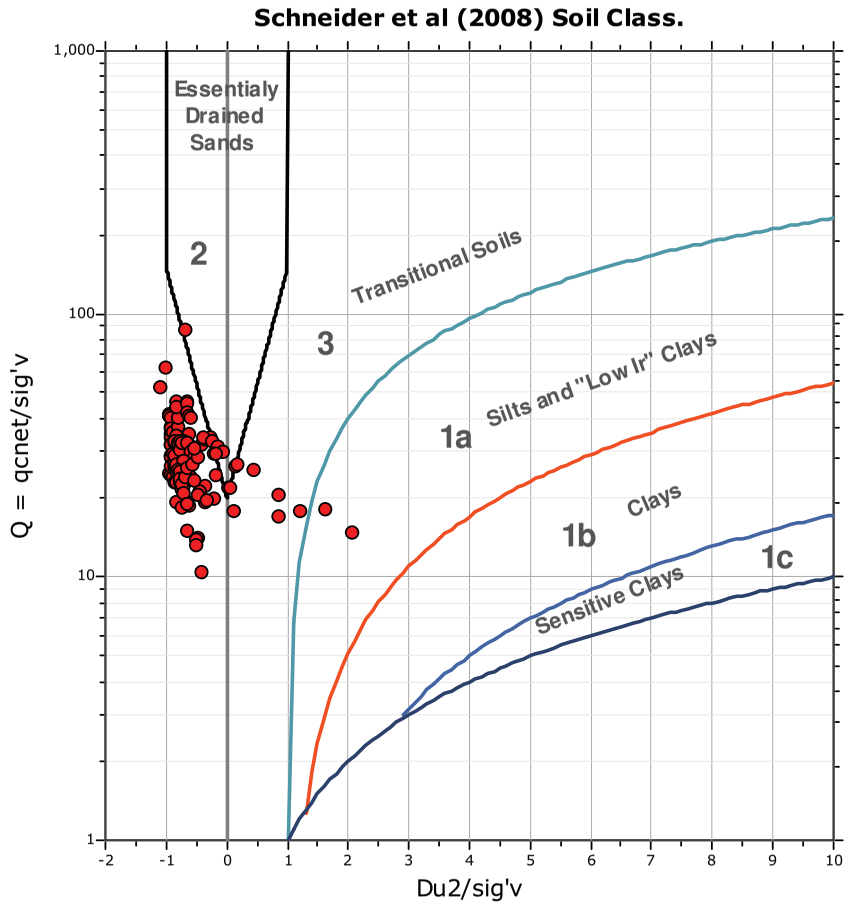
1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

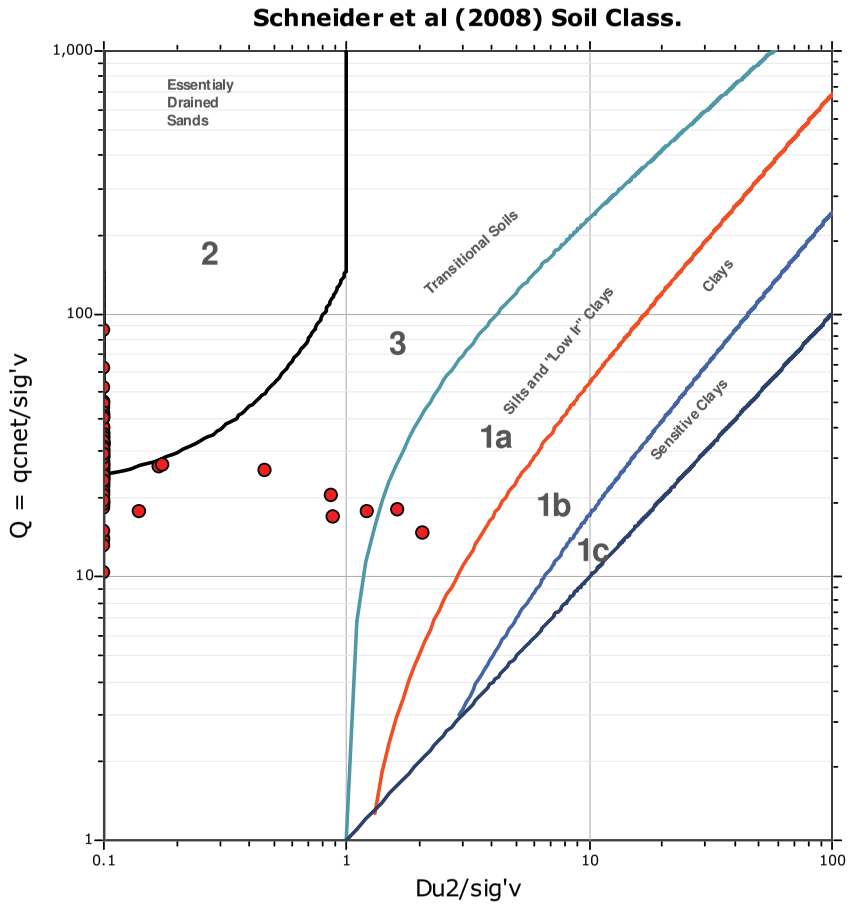
CRAIG GEOTECHNICAL DRILLING CO., INC.

Project: Langan
Location: 45 Broad Street, Manhattan NY

CPT: LanganBroad Street CPT-1
Total depth: 35.10 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

Bq plots (Schneider)



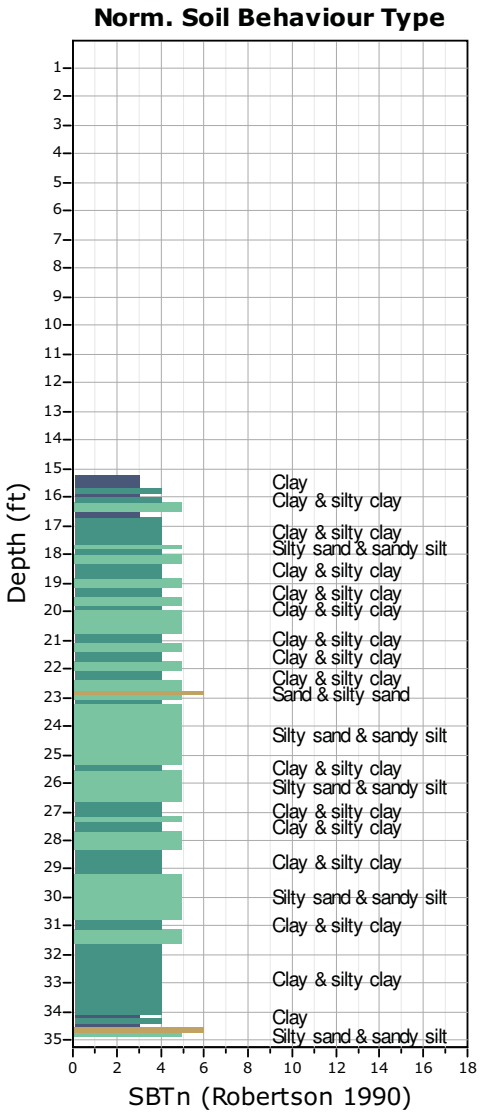


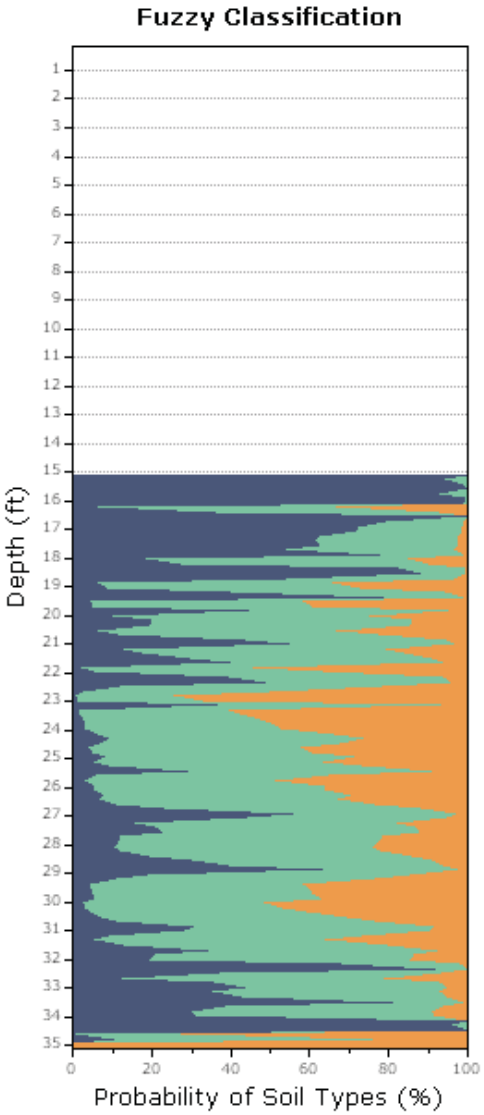
CRAIG GEOTECHNICAL DRILLING CO., INC.

CPT: LanganBroad Street CPT-1

Total depth: 35.10 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

Project: **Langan**
Location: **45 Broad Street, Manhattan NY**



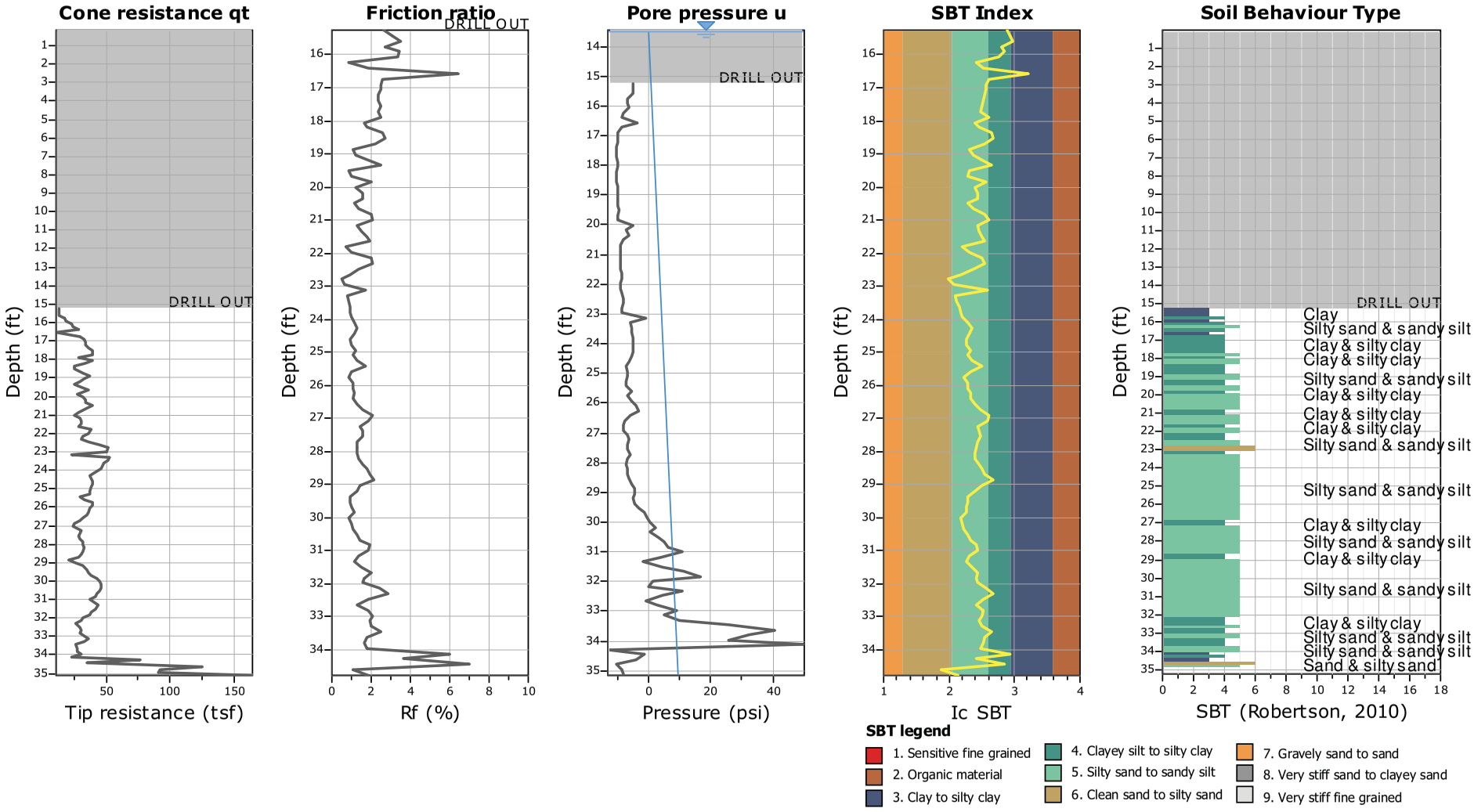


CRAIG GEOTECHNICAL DRILLING CO., INC.

CPT: LanganBroad Street CPT-1

Total depth: 35.10 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

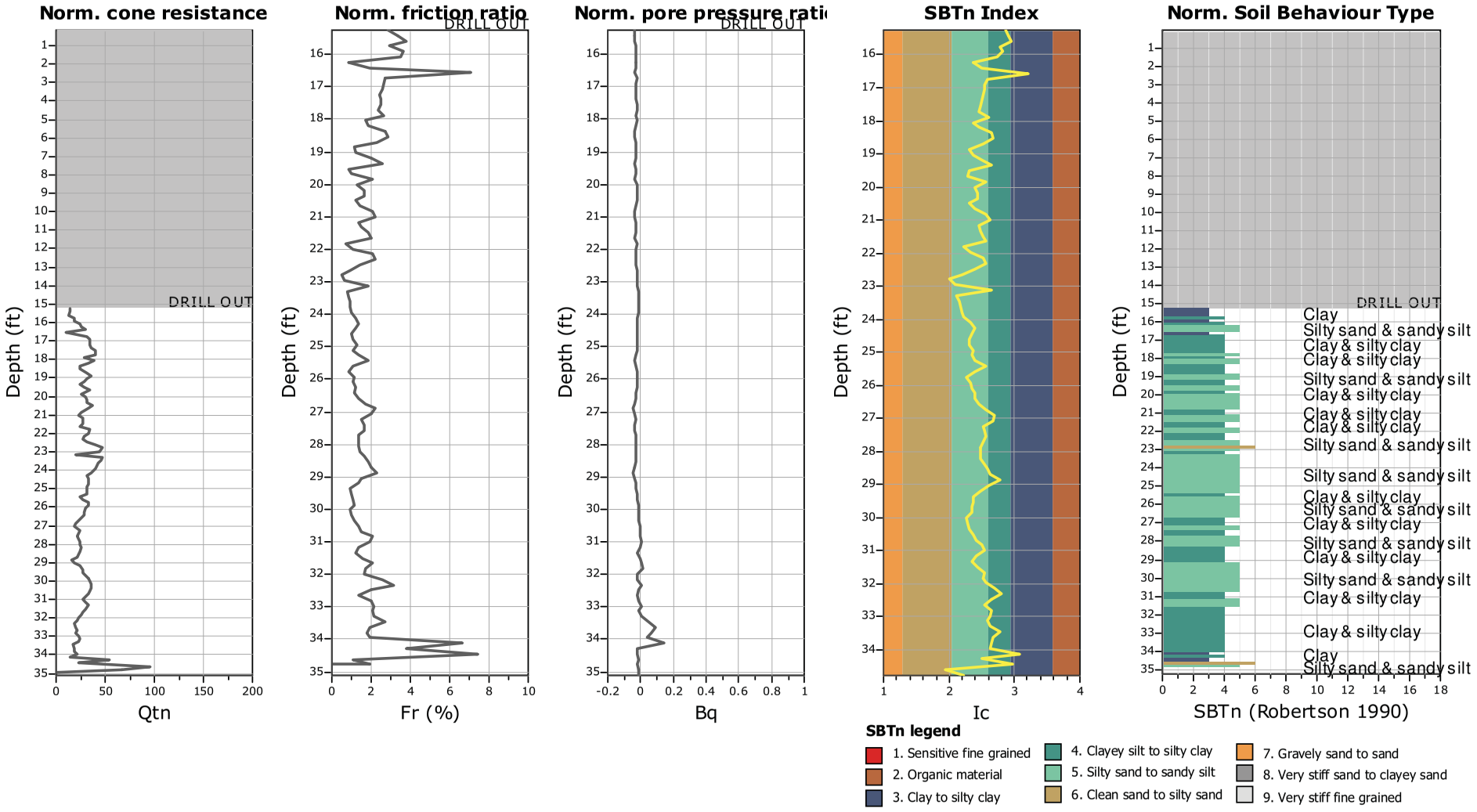
Project: Langan
Location: 45 Broad Street, Manhattan NY



CRAIG
GEOTECHNICAL DRILLING CO., INC.

Project: Langan
Location: 45 Broad Street, Manhattan NY

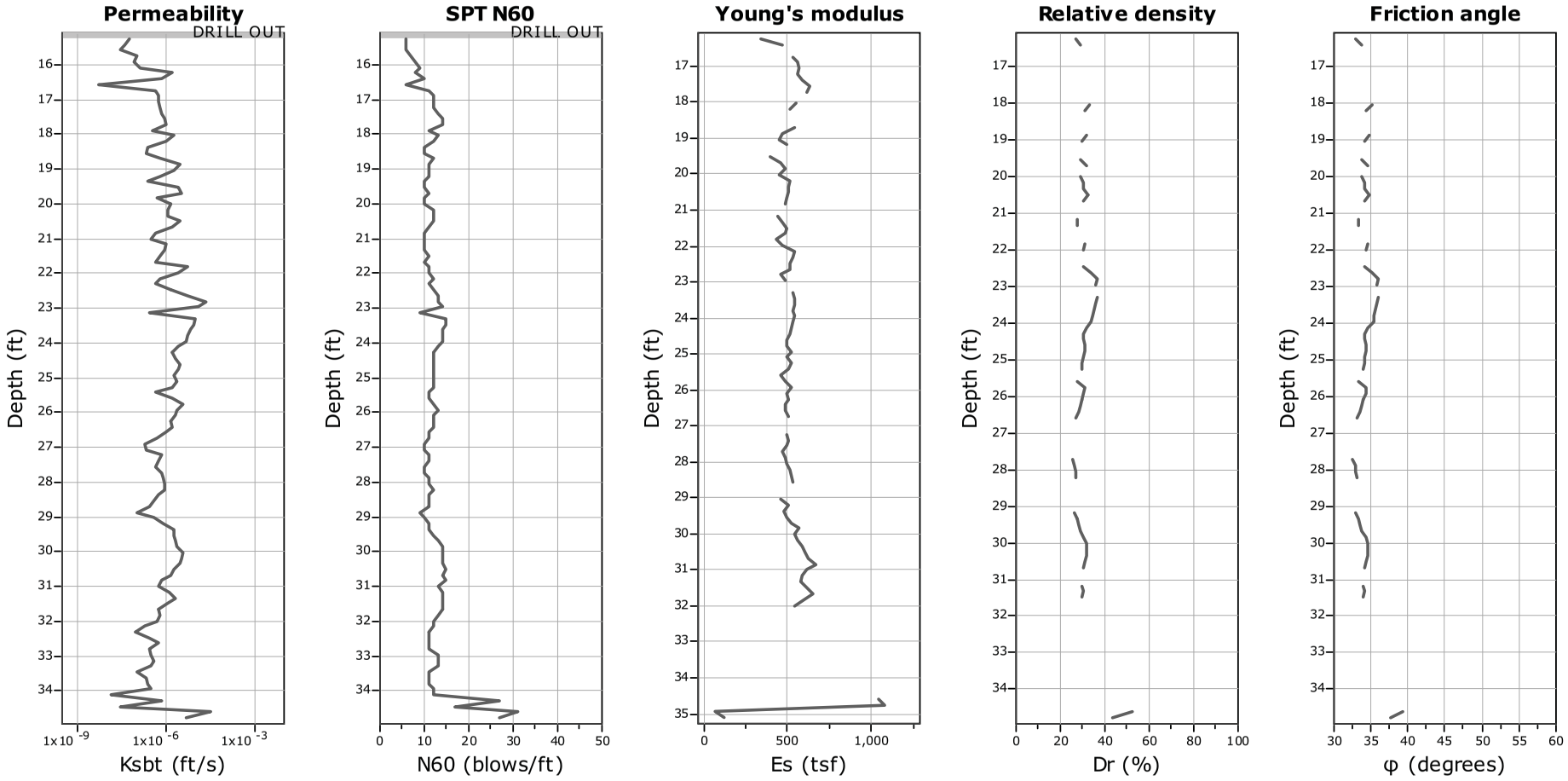
CPT: LanganBroad Street CPT-1
Total depth: 35.10 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown



CPT: LanganBroad Street CPT-1

Total depth: 35.10 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

Project: **Langan**
Location: **45 Broad Street, Manhattan NY**



Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative desnisty constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

CRAIG GEOTECHNICAL DRILLING CO., INC.

Project: Langan

Location: 45 Broad Street, Manhattan NY

CPT: LanganBroad Street CPT-1

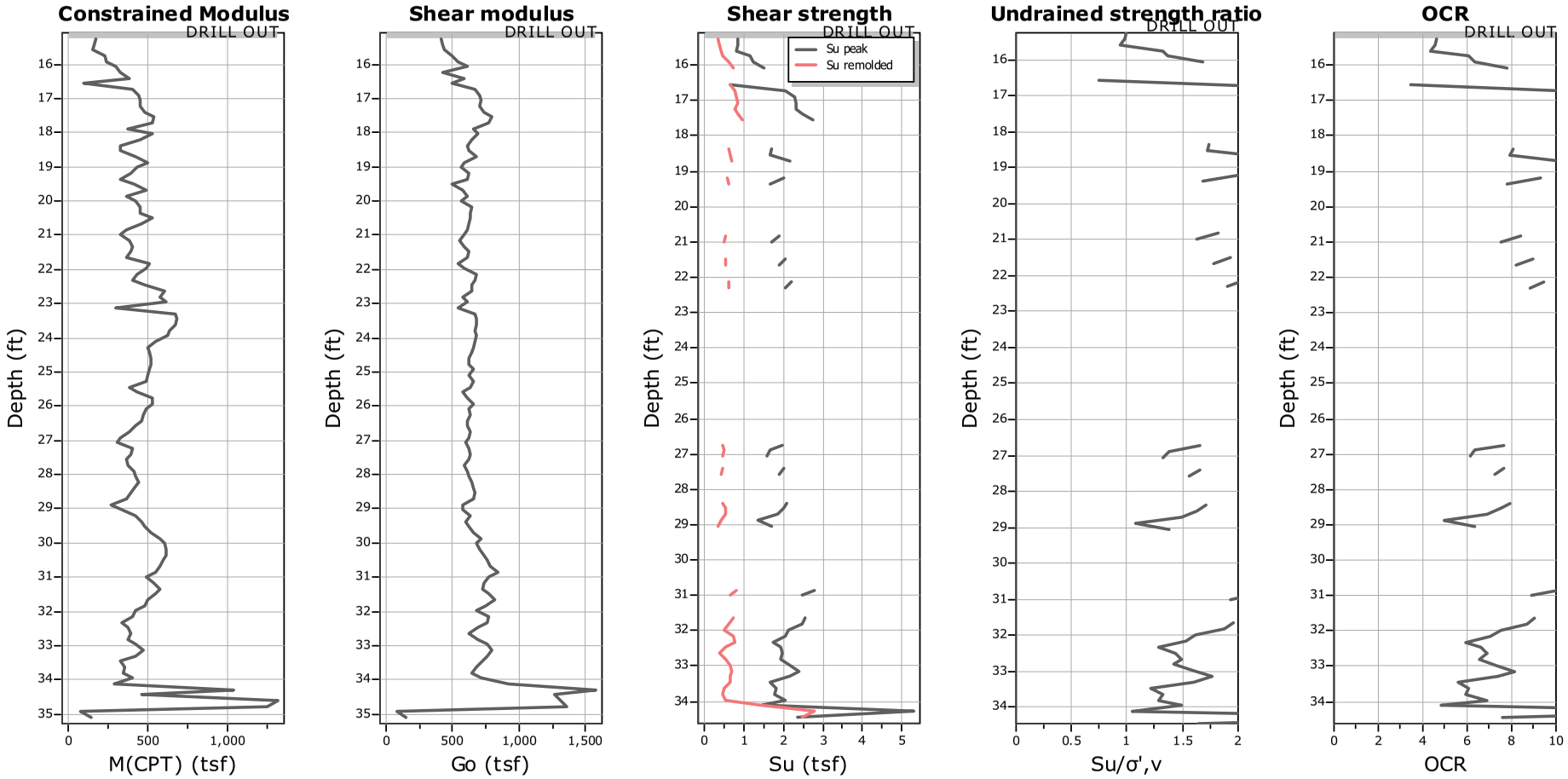
Total depth: 35.10 ft, Date: 2/8/2016

Surface Elevation: 0.00 ft

Coords: X:0.00, Y:0.00

Cone Type: Uknown

Cone Operator: Uknown



Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)

Go: Based on variable *alpha* using I_c (Robertson, 2009)

Undrained shear strength cone factor for clays, N_{kt}: 14

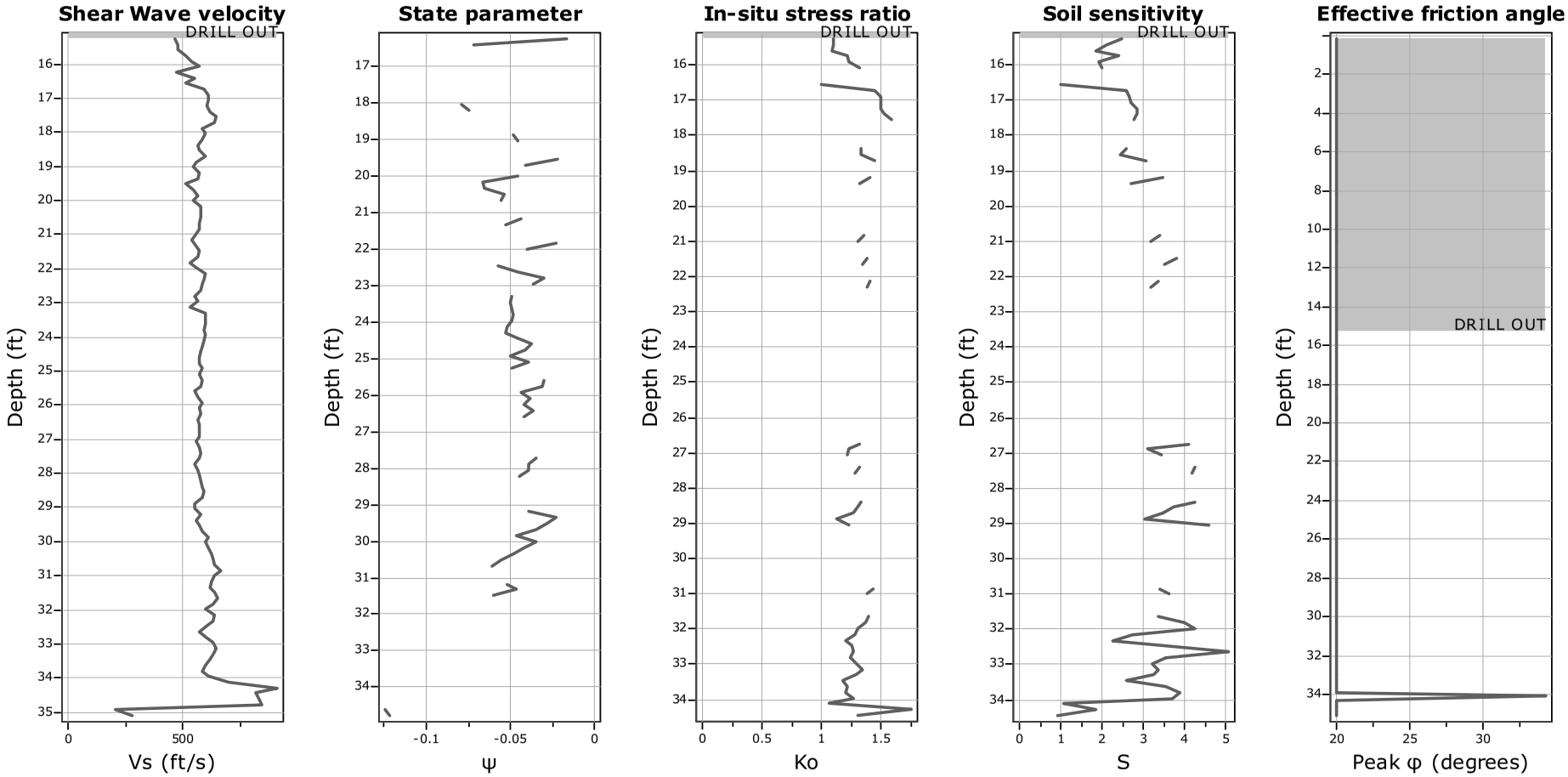
OCR factor for clays, N_{kt}: 0.33

User defined estimation data

CPT: LanganBroad Street CPT-1

Total depth: 35.10 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

Project: **Langan**
Location: **45 Broad Street, Manhattan NY**



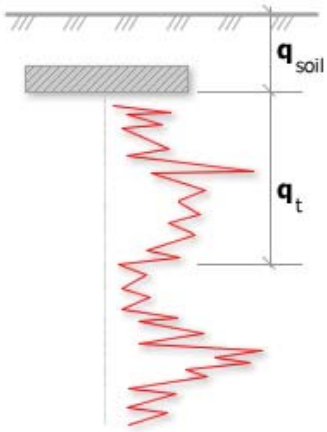
Calculation parameters

Soil Sensitivity factor, N_S: 7.00
User defined estimation data

CRAIG GEOTECHNICAL DRILLING CO., INC.

CPT: LanganBroad Street CPT-1
Total depth: 35.10 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

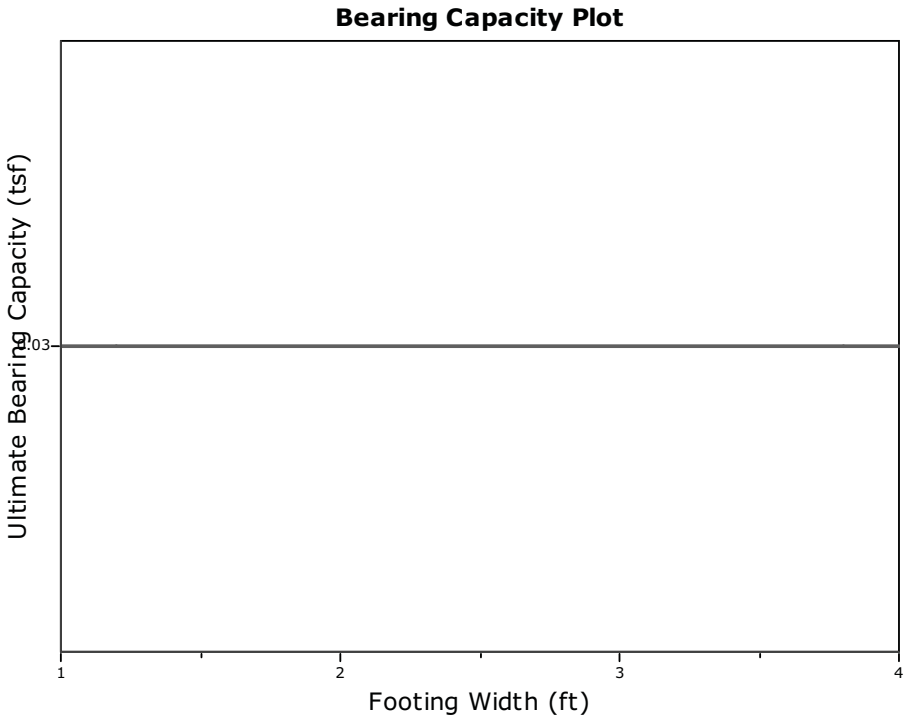
Project: **Langan**
Location: **45 Broad Street, Manhattan NY**



Bearing Capacity calculation is perfromed based on the formula:

$$Q_{ult} = R_k \times q_t + q_{soil}$$

where:
R_k: Bearing capacity factor
q_t: Average corrected cone resistance over calculation depth
q_{soil}: Pressure applied by soil above footing



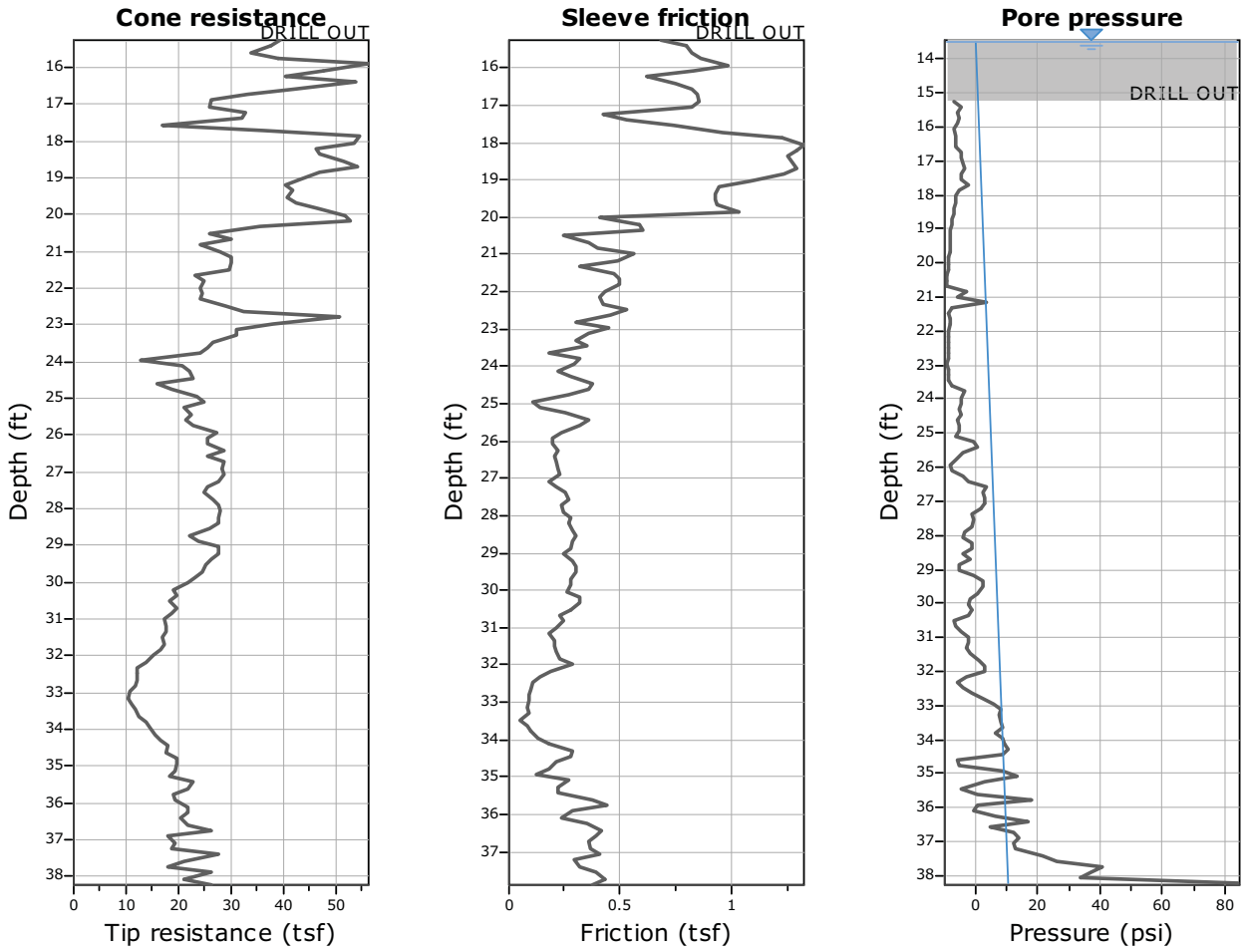
:: Tabular results ::

No	B (ft)	Start Depth (ft)	End Depth (ft)	Ave. q_t (tsf)	R_k	Soil Press. (tsf)	Ult. bearing cap. (tsf)
1	1.00	0.50	2.00	0.00	0.20	0.03	0.03
2	1.20	0.50	2.30	0.00	0.20	0.03	0.03
3	1.40	0.50	2.60	0.00	0.20	0.03	0.03
4	1.60	0.50	2.90	0.00	0.20	0.03	0.03
5	1.80	0.50	3.20	0.00	0.20	0.03	0.03
6	2.00	0.50	3.50	0.00	0.20	0.03	0.03
7	2.20	0.50	3.80	0.00	0.20	0.03	0.03
8	2.40	0.50	4.10	0.00	0.20	0.03	0.03
9	2.60	0.50	4.40	0.00	0.20	0.03	0.03
10	2.80	0.50	4.70	0.00	0.20	0.03	0.03
11	3.00	0.50	5.00	0.00	0.20	0.03	0.03
12	3.20	0.50	5.30	0.00	0.20	0.03	0.03
13	3.40	0.50	5.60	0.00	0.20	0.03	0.03
14	3.60	0.50	5.90	0.00	0.20	0.03	0.03
15	3.80	0.50	6.20	0.00	0.20	0.03	0.03
16	4.00	0.50	6.50	0.00	0.20	0.03	0.03

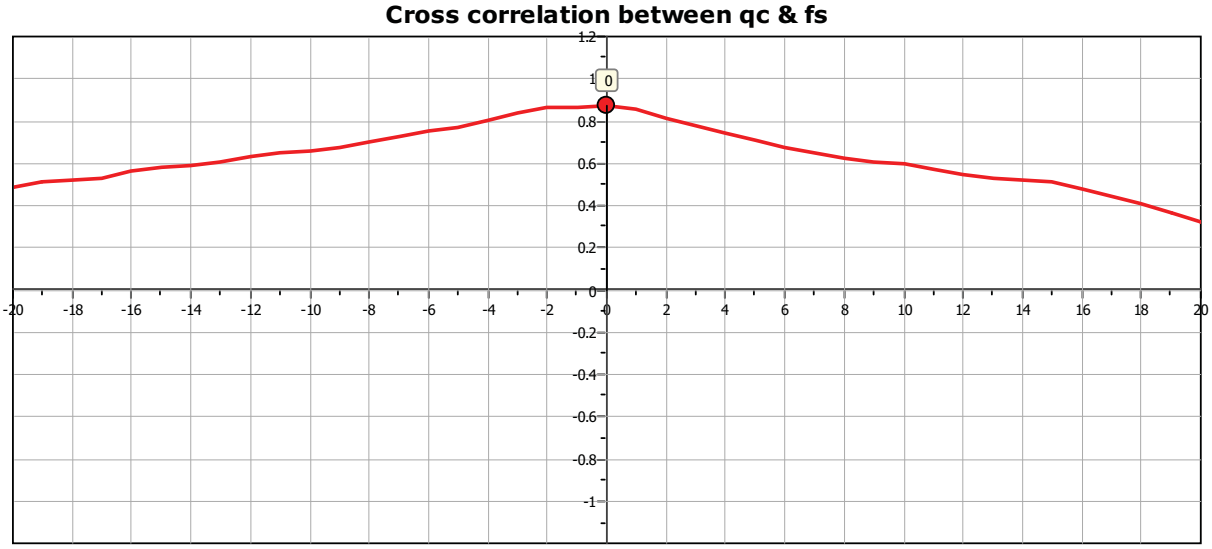
CRAIG GEOTECHNICAL DRILLING CO., INC.

CPT: LanganBroad Street CPT-2c
Total depth: 38.22 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

Project: **Langan**
Location: **45 Broad Street, Manhattan NY**



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).

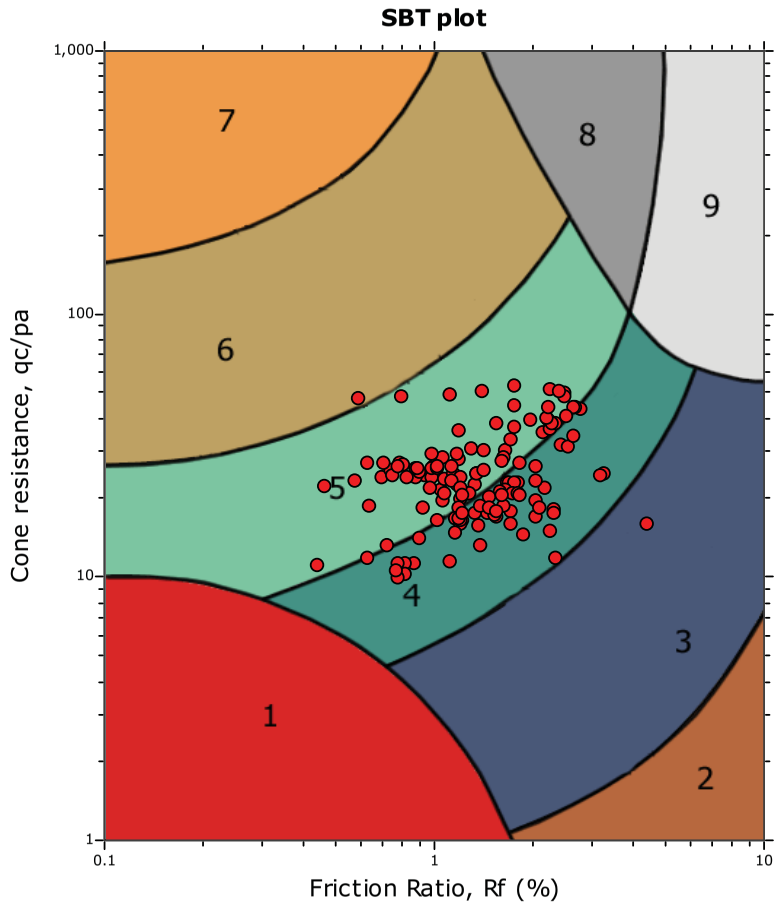


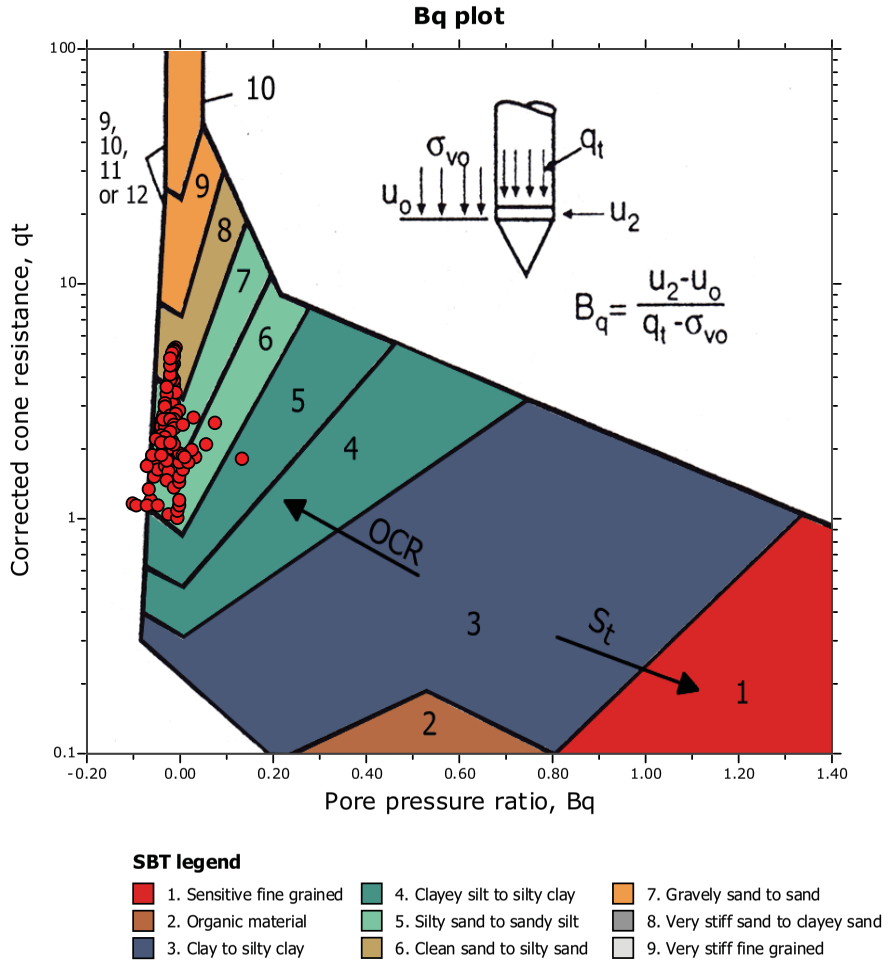
CRAIG GEOTECHNICAL DRILLING CO., INC.

Project: Langan
Location: 45 Broad Street, Manhattan NY

CPT: LanganBroad Street CPT-2c
Total depth: 38.22 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

SBT - Bq plots



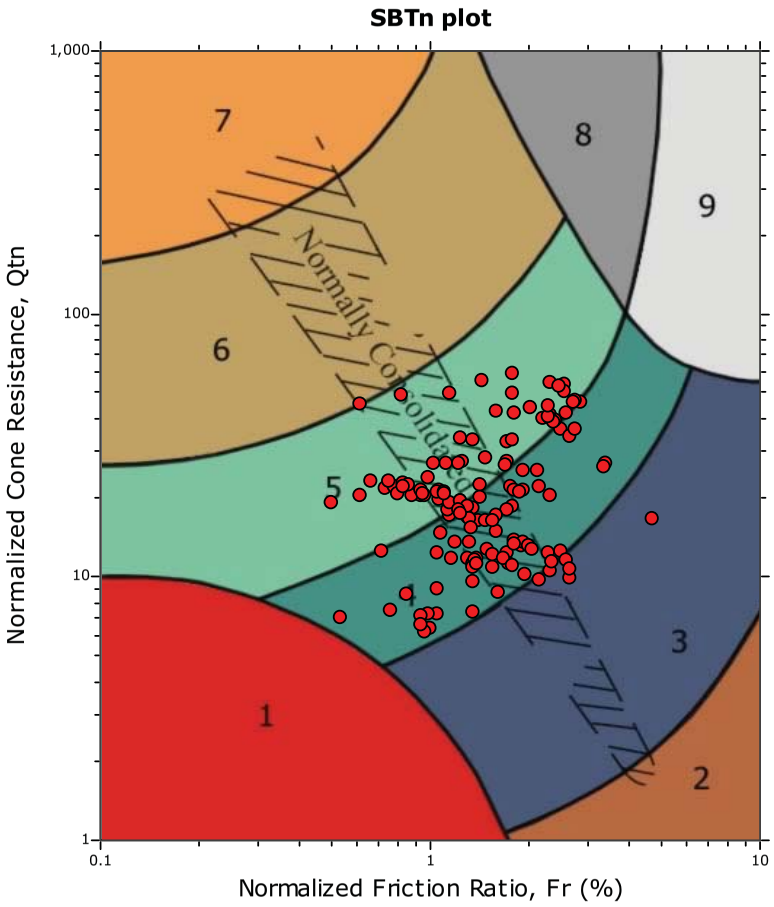


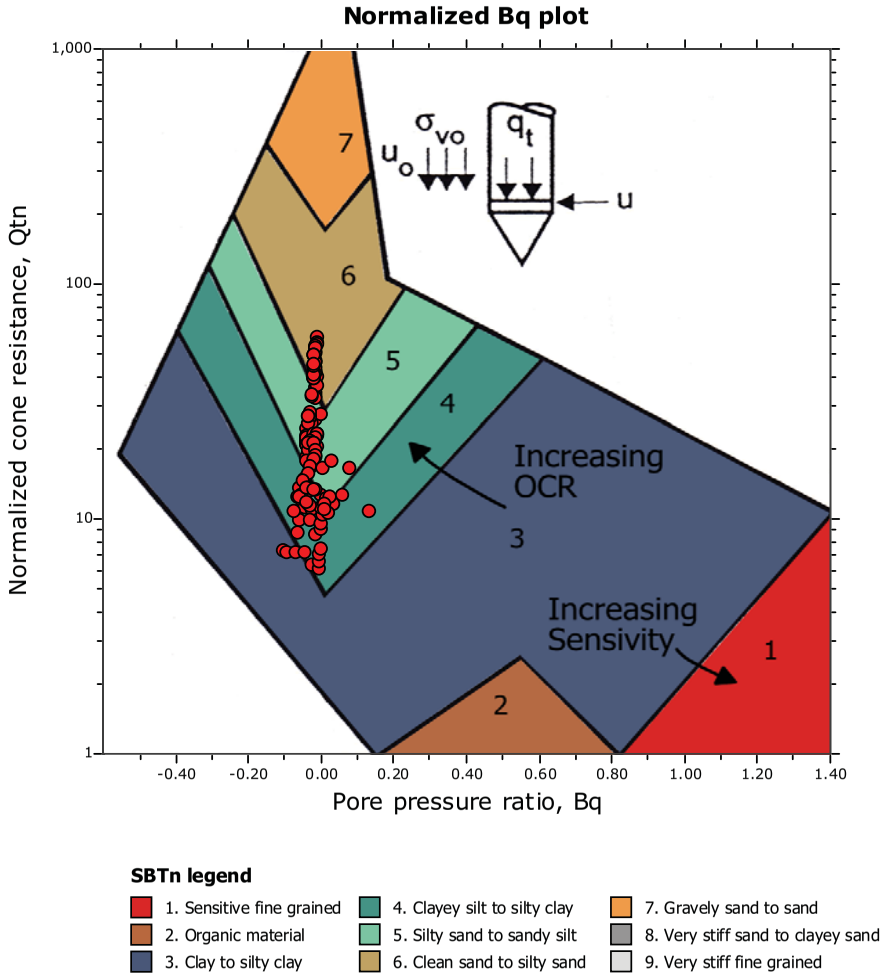
CRAIG GEOTECHNICAL DRILLING CO., INC.

Project: Langan
Location: 45 Broad Street, Manhattan NY

CPT: LanganBroad Street CPT-2c
Total depth: 38.22 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

SBT - Bq plots (normalized)





SBTn legend

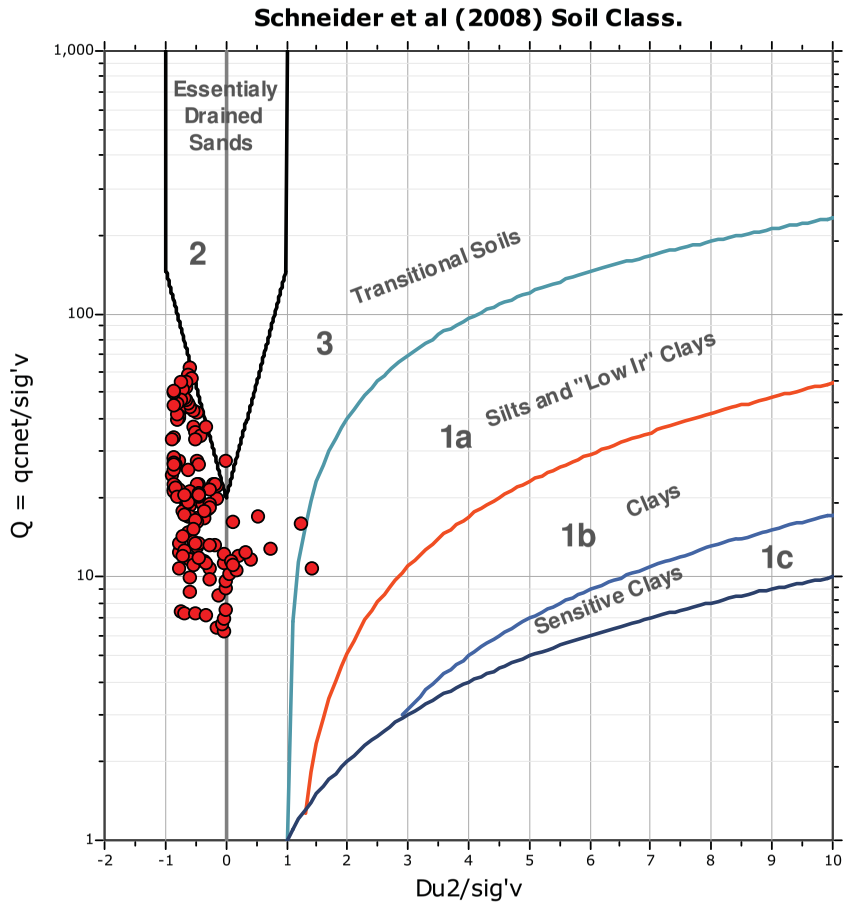
1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

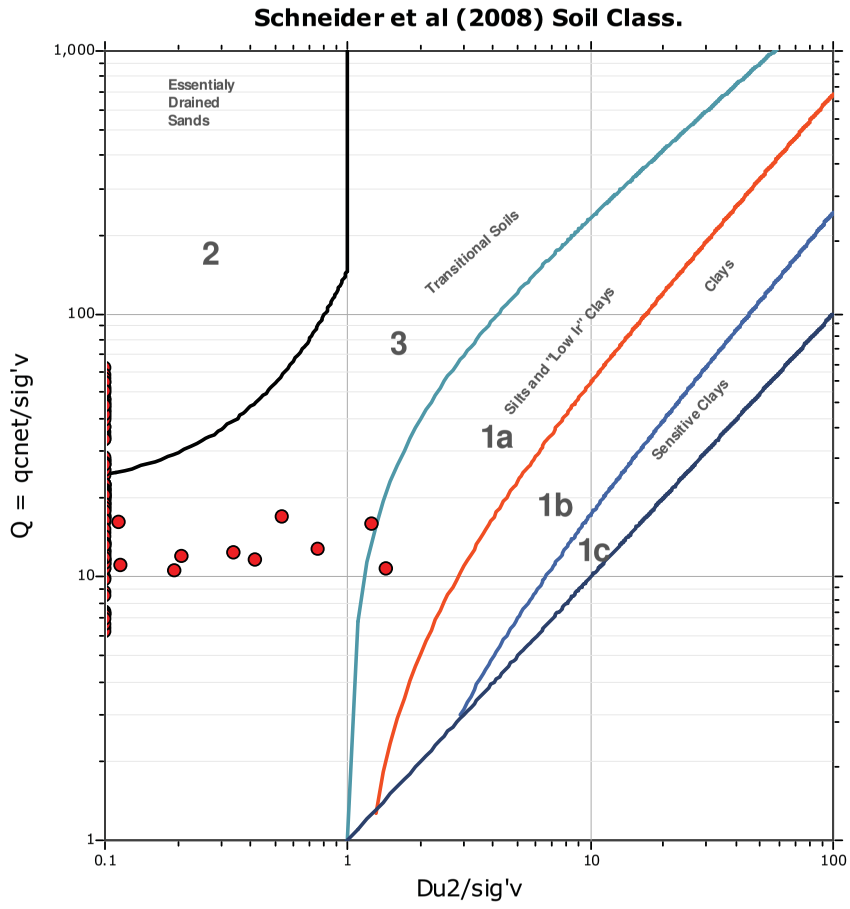
CRAIG
GEOTECHNICAL DRILLING CO., INC.

Project: Langan
Location: 45 Broad Street, Manhattan NY

CPT: LanganBroad Street CPT-2c
Total depth: 38.22 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

Bq plots (Schneider)

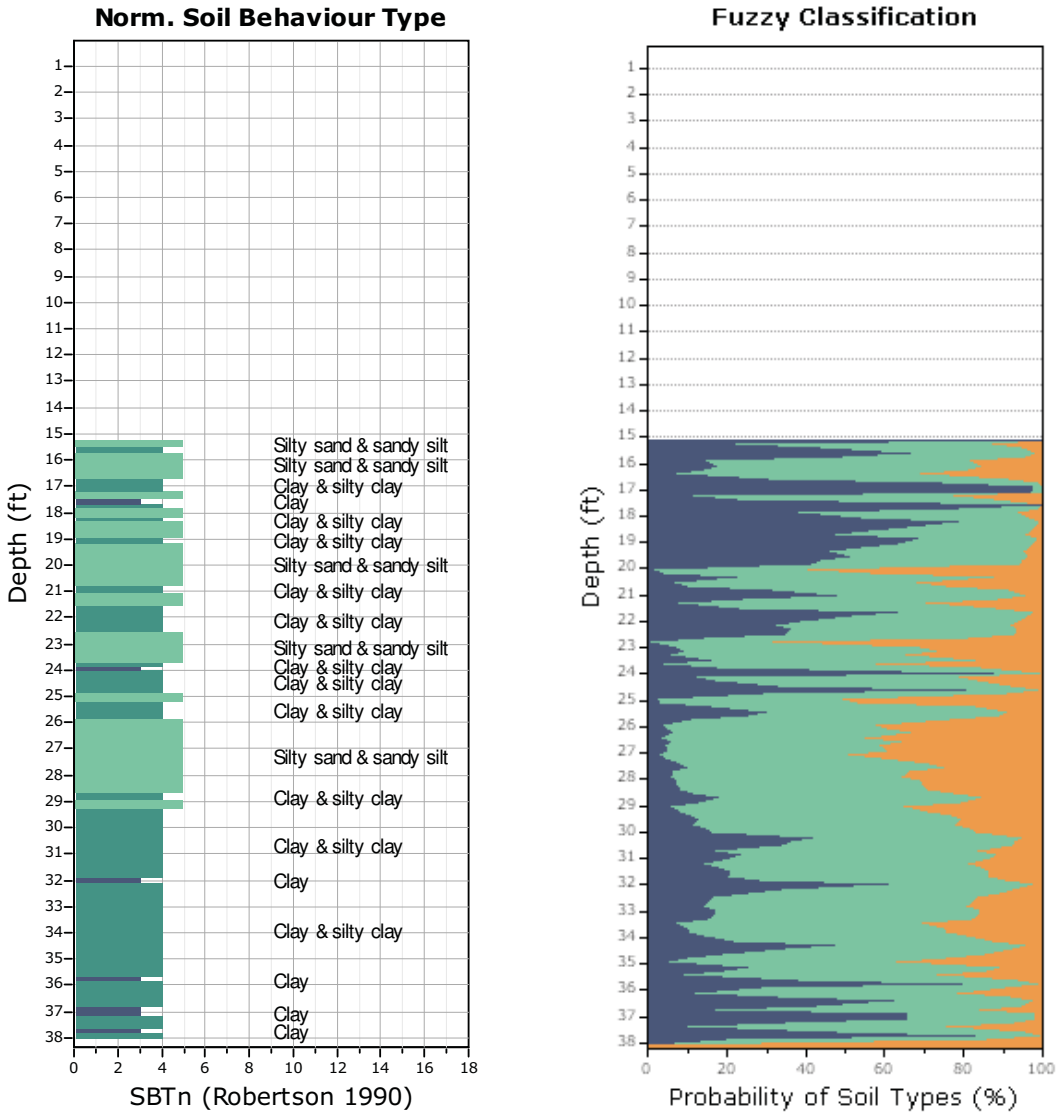




CRAIG GEOTECHNICAL DRILLING CO., INC.

CPT: LanganBroad Street CPT-2c
Total depth: 38.22 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

Project: **Langan**
Location: **45 Broad Street, Manhattan NY**

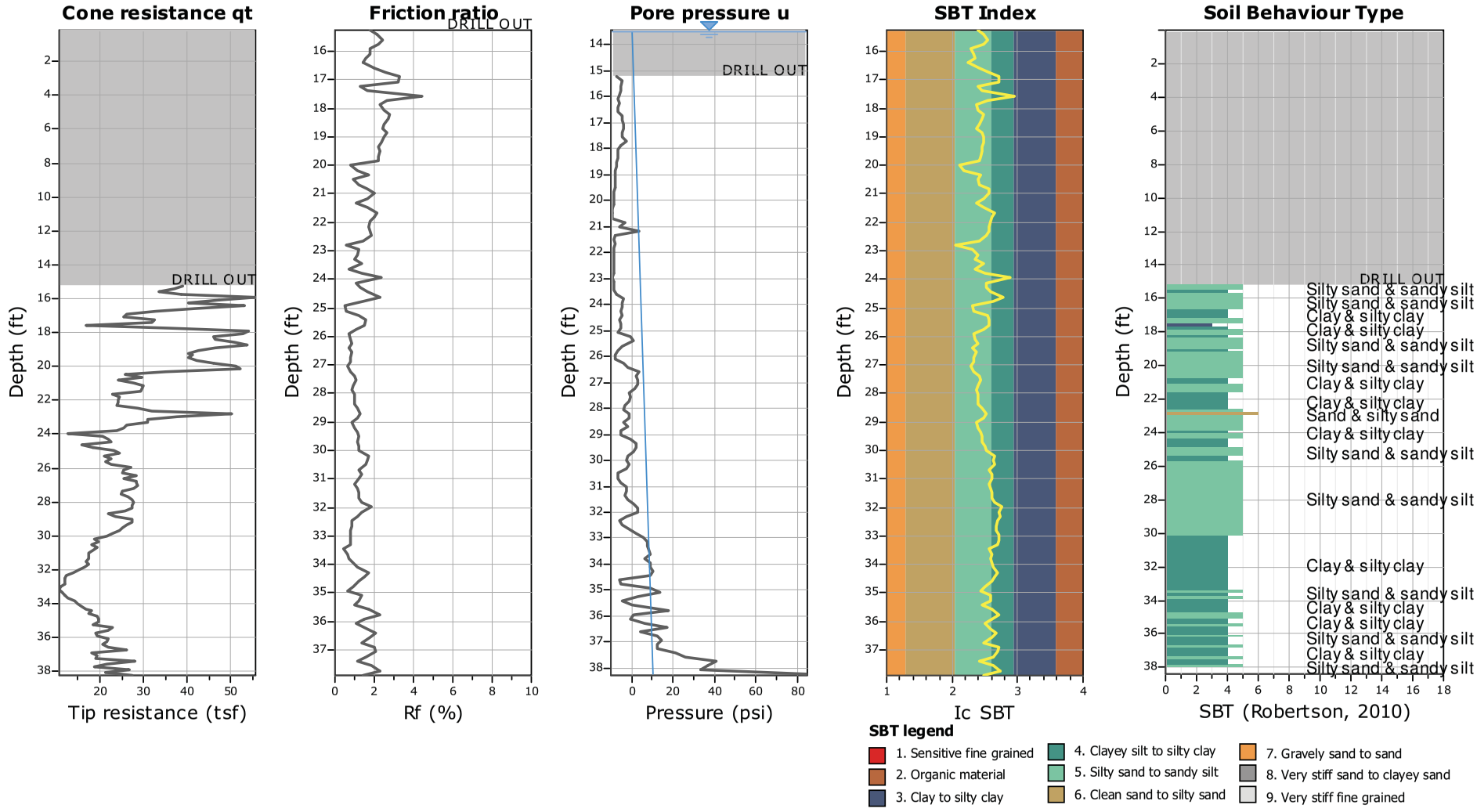


CRAIG GEOTECHNICAL DRILLING CO., INC.

CPT: LanganBroad Street CPT-2c

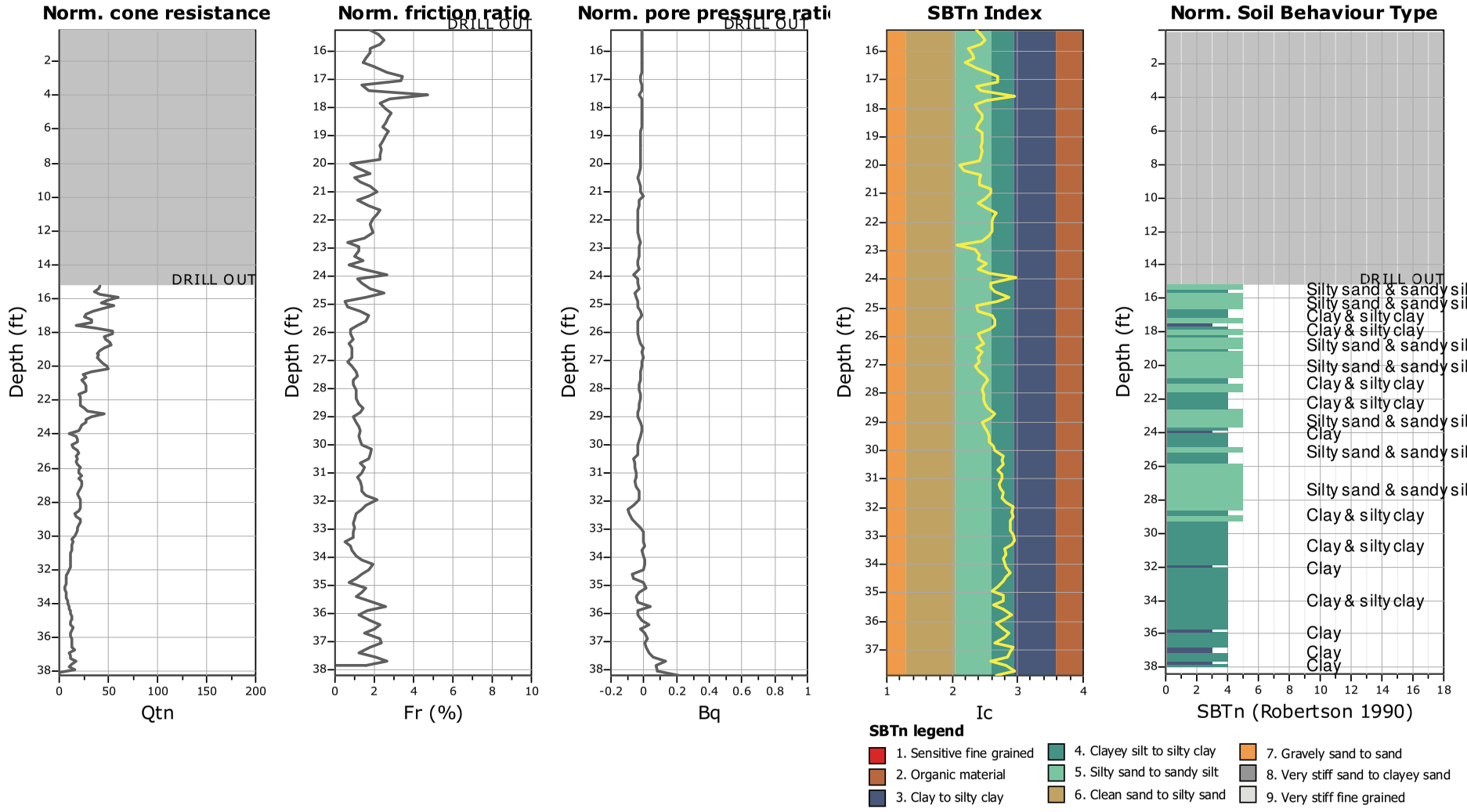
Total depth: 38.22 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

Project: **Langan**
Location: **45 Broad Street, Manhattan NY**



Project: Langan
Location: 45 Broad Street, Manhattan NY

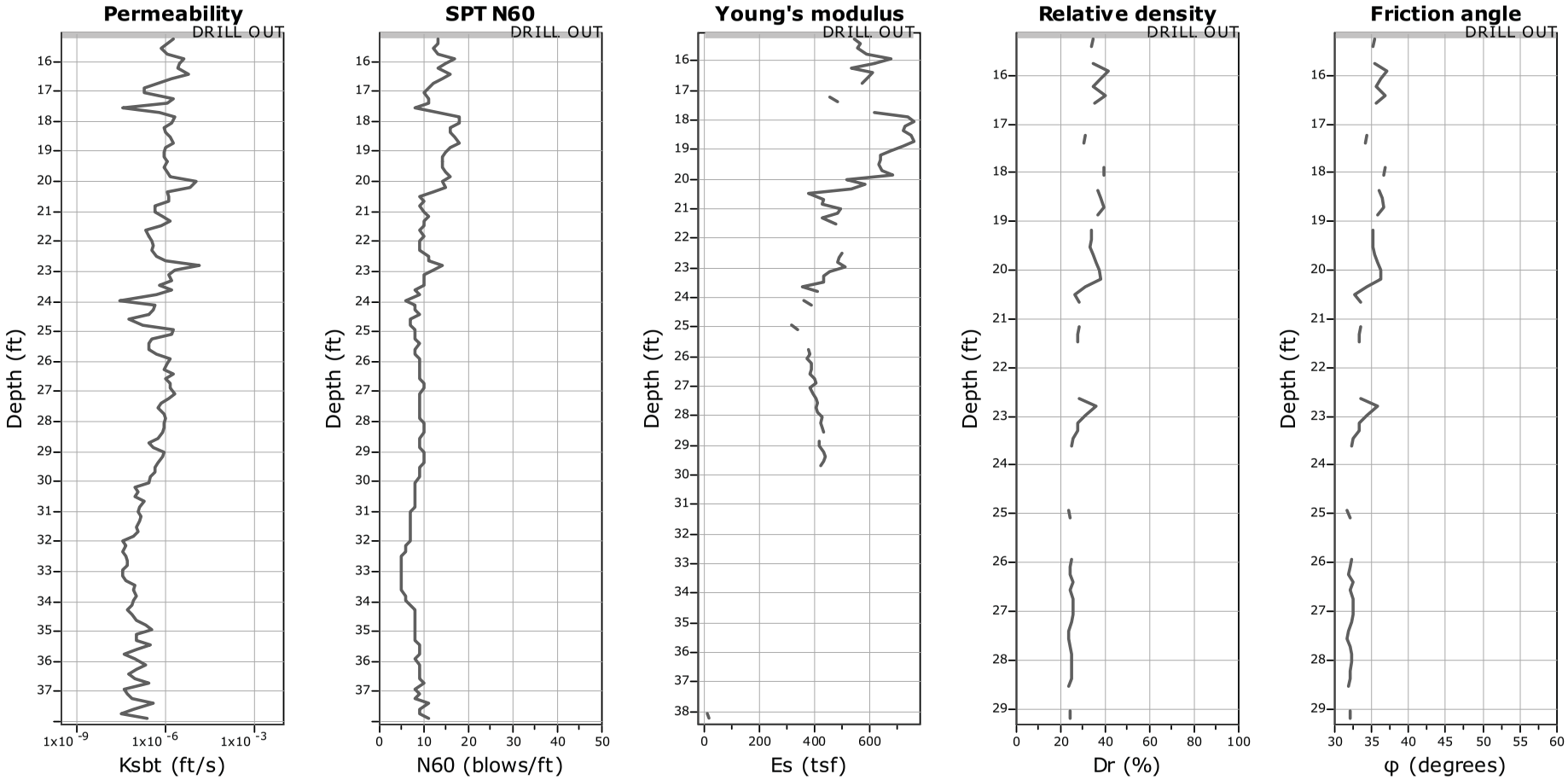
CPT: LanganBroad Street CPT-2c
Total depth: 38.22 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown



CRAIG GEOTECHNICAL DRILLING CO., INC.

Project: **Langan**
Location: **45 Broad Street, Manhattan NY**

CPT: LanganBroad Street CPT-2c
Total depth: 38.22 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown



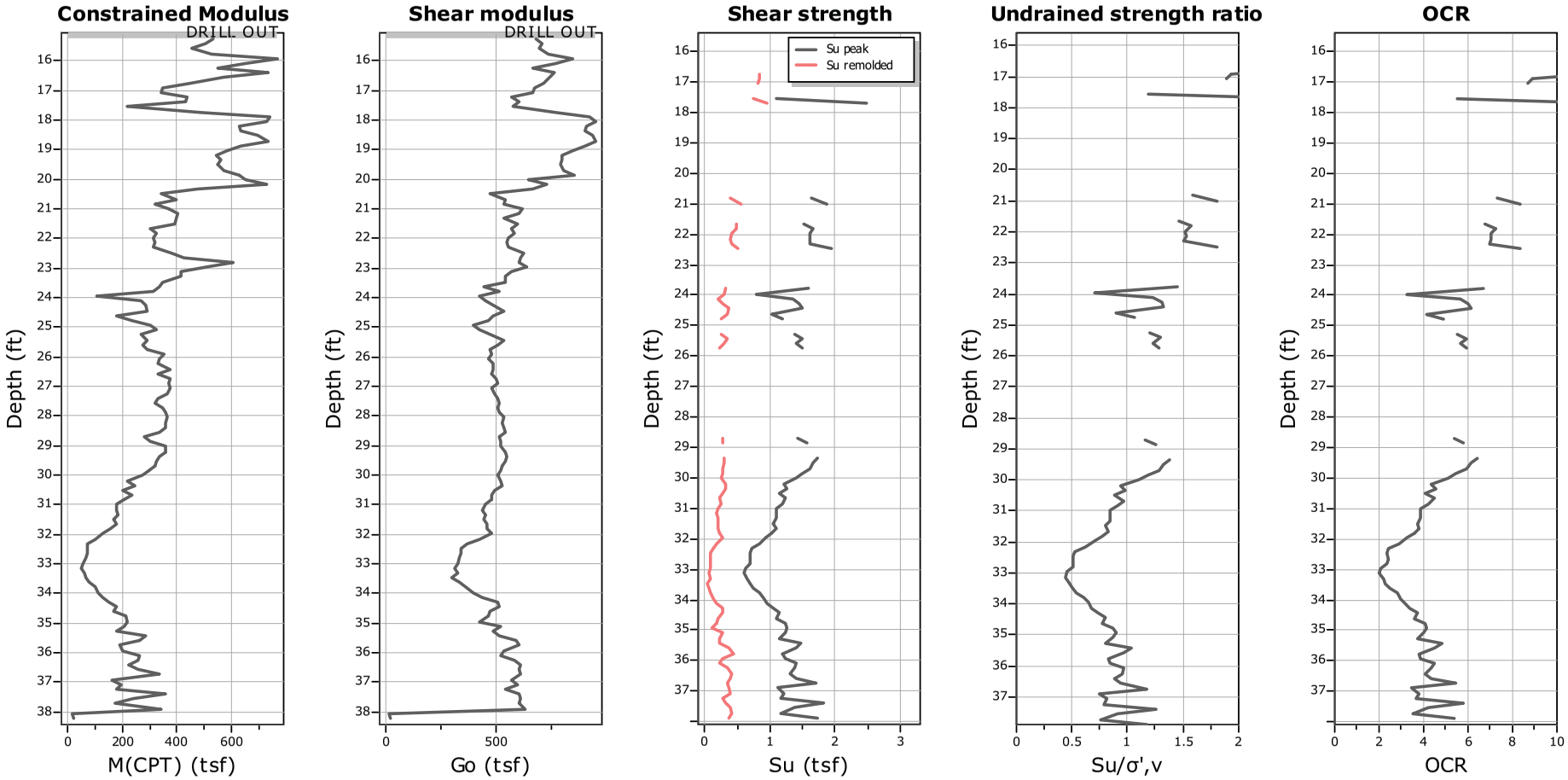
Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative desnisty constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

CRAIG GEOTECHNICAL DRILLING CO., INC.

Project: **Langan**
Location: **45 Broad Street, Manhattan NY**

CPT: LanganBroad Street CPT-2c
Total depth: 38.22 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown



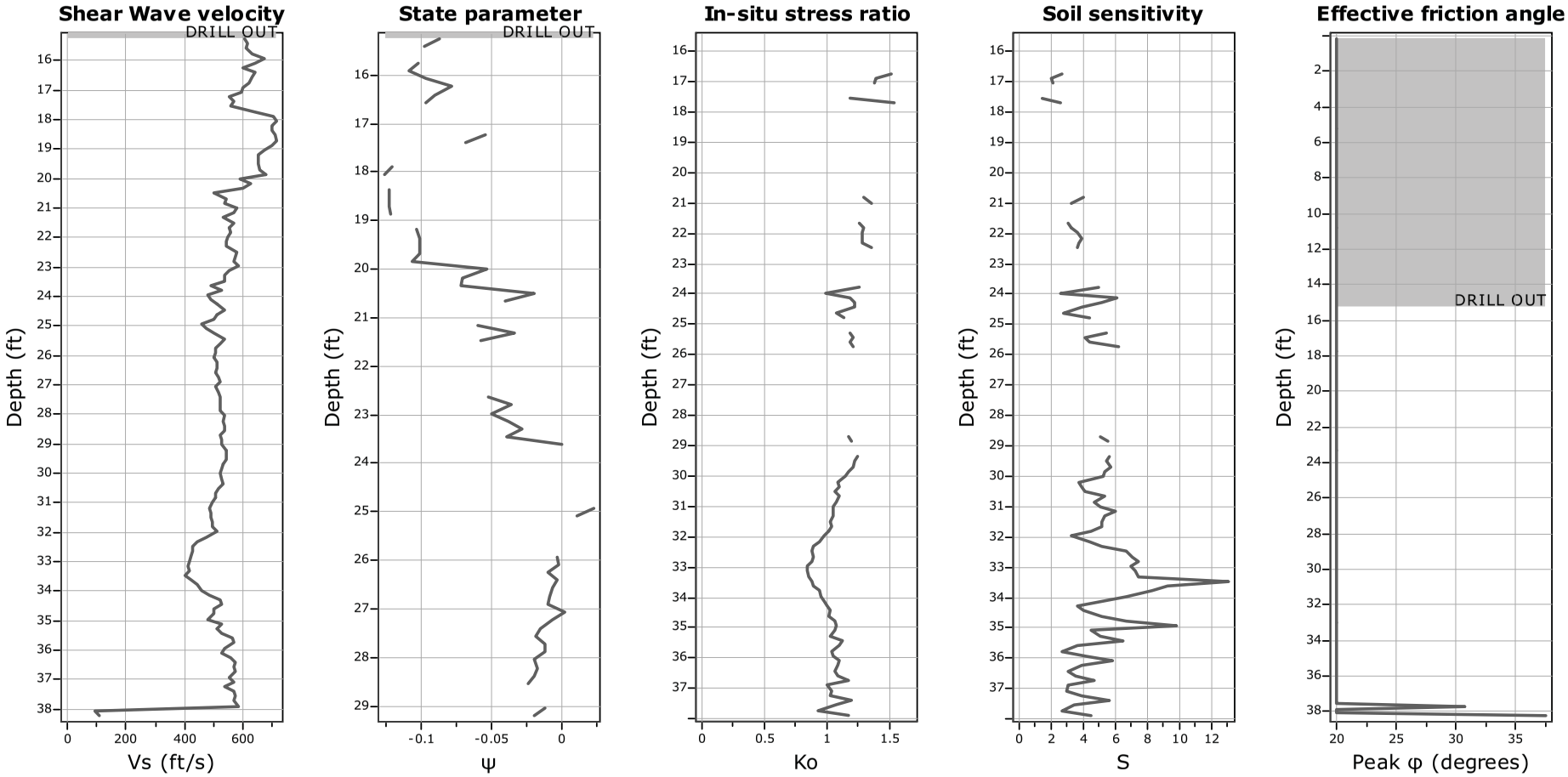
Calculation parameters

Constrained modulus: Based on variable *alpha* using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable *alpha* using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: 14
OCR factor for clays, N_{kt}: 0.33
User defined estimation data

CRAIG GEOTECHNICAL DRILLING CO., INC.

Project: Langan
Location: 45 Broad Street, Manhattan NY

CPT: LanganBroad Street CPT-2c
Total depth: 38.22 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown



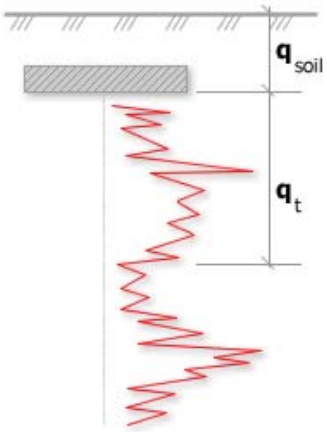
Calculation parameters

Soil Sensitivity factor, N_S: 7.00
User defined estimation data

CRAIG GEOTECHNICAL DRILLING CO., INC.

CPT: LanganBroad Street CPT-2c
Total depth: 38.22 ft, Date: 2/8/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Uknown
Cone Operator: Uknown

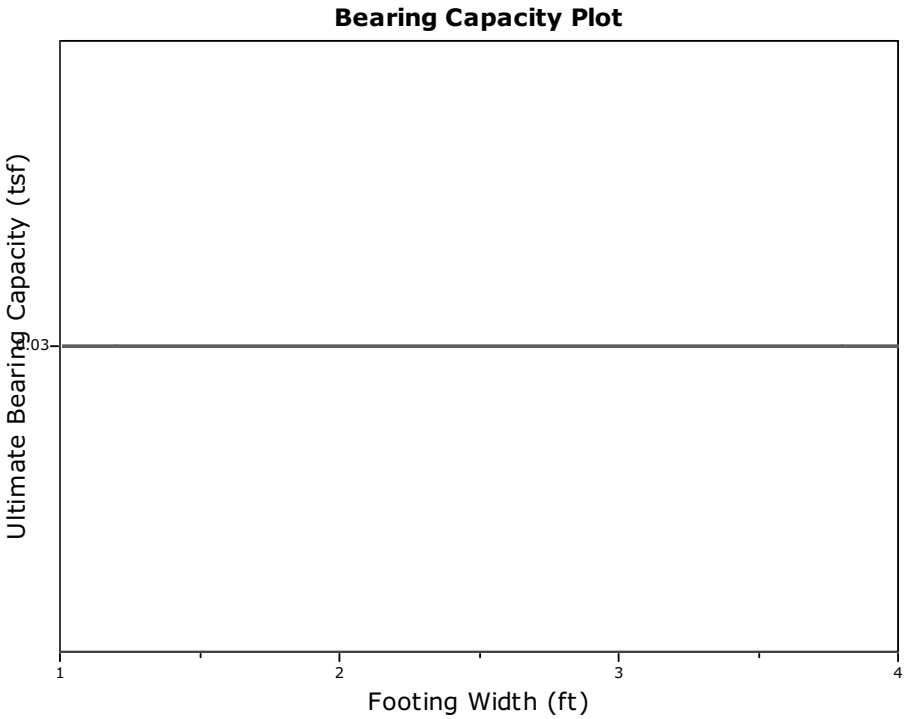
Project: **Langan**
Location: **45 Broad Street, Manhattan NY**



Bearing Capacity calculation is perfromed based on the formula:

$$Q_{ult} = R_k \times q_t + q_{soil}$$

where:
R_k: Bearing capacity factor
q_t: Average corrected cone resistance over calculation depth
q_{soil}: Pressure applied by soil above footing



:: Tabular results ::

No	B (ft)	Start Depth (ft)	End Depth (ft)	Ave. q_t (tsf)	R_k	Soil Press. (tsf)	Ult. bearing cap. (tsf)
1	1.00	0.50	2.00	0.00	0.20	0.03	0.03
2	1.20	0.50	2.30	0.00	0.20	0.03	0.03
3	1.40	0.50	2.60	0.00	0.20	0.03	0.03
4	1.60	0.50	2.90	0.00	0.20	0.03	0.03
5	1.80	0.50	3.20	0.00	0.20	0.03	0.03
6	2.00	0.50	3.50	0.00	0.20	0.03	0.03
7	2.20	0.50	3.80	0.00	0.20	0.03	0.03
8	2.40	0.50	4.10	0.00	0.20	0.03	0.03
9	2.60	0.50	4.40	0.00	0.20	0.03	0.03
10	2.80	0.50	4.70	0.00	0.20	0.03	0.03
11	3.00	0.50	5.00	0.00	0.20	0.03	0.03
12	3.20	0.50	5.30	0.00	0.20	0.03	0.03
13	3.40	0.50	5.60	0.00	0.20	0.03	0.03
14	3.60	0.50	5.90	0.00	0.20	0.03	0.03
15	3.80	0.50	6.20	0.00	0.20	0.03	0.03
16	4.00	0.50	6.50	0.00	0.20	0.03	0.03

Presented below is a list of formulas used for the estimation of various soil properties. The formulas are presented in SI unit system and assume that all components are expressed in the same units.

:: Unit Weight, g (kN/m³) ::

$$g = g_w \cdot \left(0.27 \cdot \log(R_f) + 0.36 \cdot \log(\frac{q_t}{p_a}) + 1.236 \right)$$

where g_w = water unit weight

:: Permeability, k (m/s) ::

$I_c < 3.27$ and $I_c > 1.00$ then $k = 10^{0.952-3.04 \cdot I_c}$

$I_c \leq 4.00$ and $I_c > 3.27$ then $k = 10^{-4.52-1.37 \cdot I_c}$

:: N_{SPT} (blows per 30 cm) ::

$$N_{60} = \left(\frac{q_c}{P_a} \right) \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

$$N_{1(60)} = Q_{tn} \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

:: Young's Modulus, Es (MPa) ::

$(q_t - \sigma_v) \cdot 0.015 \cdot 10^{0.55 \cdot I_c + 1.68}$

(applicable only to $I_c < I_{c\_cutoff}$)

:: Relative Density, Dr (%) ::

$100 \cdot \sqrt{\frac{Q_{tn}}{k_{DR}}}$ (applicable only to SBT_n: 5, 6, 7 and 8 or $I_c < I_{c\_cutoff}$)

:: State Parameter, ψ ::

$\psi = 0.56 - 0.33 \cdot \log(Q_{tn,cs})$

:: Peak drained friction angle, φ (°) ::

$\varphi = 17.60 + 11 \cdot \log(Q_{tn})$

(applicable only to SBT_n: 5, 6, 7 and 8)

:: 1-D constrained modulus, M (MPa) ::

If $I_c > 2.20$

$\alpha = 14$ for $Q_{tn} > 14$

$\alpha = Q_{tn}$ for $Q_{tn} \leq 14$

$M_{CPT} = \alpha \cdot (q_t - \sigma_v)$

If $I_c \leq 2.20$

$M_{CPT} = (q_t - \sigma_v) \cdot 0.0188 \cdot 10^{0.55 \cdot I_c + 1.68}$

:: Small strain shear Modulus, Go (MPa) ::

$G_0 = (q_t - \sigma_v) \cdot 0.0188 \cdot 10^{0.55 \cdot I_c + 1.68}$

:: Shear Wave Velocity, Vs (m/s) ::

$$V_s = \left(\frac{G_0}{\rho} \right)^{0.50}$$

:: Undrained peak shear strength, Su (kPa) ::

$N_{kt} = 10.50 + 7 \cdot \log(F_r)$ or user defined

$$S_u = \frac{(q_t - \sigma_v)}{N_{kt}}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Remolded undrained shear strength, Su(rem) (kPa) ::

$S_{u(rem)} = f_s$ (applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Overconsolidation Ratio, OCR ::

$$k_{OCR} = \left[\frac{Q_{tn}^{0.20}}{0.25 \cdot (10.50 \cdot +7 \cdot \log(F_r))} \right]^{1.25}$$ or user defined

$OCR = k_{OCR} \cdot Q_{tn}$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: In situ Stress Ratio, Ko ::

$K_O = (1 - \sin\varphi') \cdot OCR^{\sin\varphi'}$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Soil Sensitivity, S_t ::

$$S_t = \frac{N_S}{F_r}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Effective Stress Friction Angle, φ' (°) ::

$\varphi' = 29.5° \cdot B_q^{0.121} \cdot (0.256 + 0.336 \cdot B_q + \log Q_t)$

(applicable for $0.10 < B_q < 1.00$)

References

• Robertson, P.K., Cabal K.L., Guide to Cone Penetration Testing for Geotechnical Engineering, Gregg Drilling & Testing, Inc., 5th Edition, November 2012

• Robertson, P.K., Interpretation of Cone Penetration Tests - a unified approach., Can. Geotech. J. 46(11): 1337–1355 (2009)

APPENDIX F
Test Pit Findings and Recommendations Report (Langan 2017)

January 9, 2017

Andrew Manton
Madison 45 Broad Development LLC
105 Madison Avenue, 9th Floor
New York, NY 10016

Re: Test Pit Findings and Recommendations Report
45 Broad Street
New York, NY 10004
Langan Project No.: 170394201

Dear Mr. Manton:

This letter presents the results of the additional test pits performed for the development at 45 Broad Street in December of 2016. The purpose of these test pits was to observe the type, depth, and configuration of the foundations of 41 Broad Street and 55 Broad Street, and to provide additional information regarding buried obstructions within the site. Four test pits were performed by Posillico, Inc. from 1 to 8 December 2016 as follows:

- TP-2 along the 41 Broad Street property
- TP-3 along the 55 Broad Street property
- TP-1 and TP-4 within the site to expose buried obstructions

The following sections provide general observations from the test pit excavations; refer to attached Drawing No. 1 - Test pit location plan, sketches, and photo log for details. All test pits were backfilled with excavated material upon completion. Posillico was present and made observations throughout the test pit operation. All elevations in this memo are assumed to be in the North American Vertical Datum (NAVD88[1]) unless otherwise noted.

Test Pit TP-1

Test pit TP-1 was excavated along the north property line to obtain info on the existing pile foundations buried within the project site. Existing grade in this area is about el. 10±. A 9-inch thick concrete slab was encountered on top of a 2-feet-thick concrete pile cap, observed to be supported on unreinforced concrete tapered (possibly Raymond) piles. Observed piles were about 18-inch diameter at the pile head, with a thin steel shell (about 1/16-inch thick) and spiral bar along the outside of the pile.

[1] Elevations are referenced to North American Vertical Datum (NAVD88) which is 1.1 feet higher than USGS (1929 NGVD) Mean Sea Level at Sandy Hook, NJ [NAVD = NGVD – 1.1] and 1.65 feet lower than the Borough President of Manhattan Datum (BPMD), [NAVD = BPMD + 1.65].

Test Pit TP-2

Test pit TP-2 was excavated along the north property line of the 45 Broad Street site to observe the type, depth, and configuration of the adjacent 41 Broad Street building extension to the north. Existing grade elevation in this area is about el. 10±. The 41 Broad Street concrete foundation wall was observed to extend to about 16 feet below grade with about a 3 feet concrete pier at the base. The base of the concrete pier was at about el. -6±. A steel section, likely a sheet pile, was observed below the concrete pier. The depth of the steel section and the material behind the sheet pile could not be observed.

Test Pit TP-3

Test pit TP-3 was excavated along the south property line of the site to observe the type, depth, and configuration of the adjacent 55 Broad Street building extension to the south. Existing grade elevation in this area is about el. 10±. The 55 Broad Street concrete foundation was observed about 19 feet below the existing ground surface, corresponding to about el. -9.5±. An about 10.5 inch wide steel pile, was encountered below the exposed concrete foundation.

Test Pit TP-4

Test pit TP-4 was excavated within the project site to investigate the buried foundations within the site. The excavation for TP-4 was about 13.5 feet deep. Existing grade elevation in this area was about el. 9.5. The buried foundation was observed to consist of brick masonry. The buried wall terminated on a 20-inch concrete slab, with the bottom of slab at about el. -4±. The concrete "caissons/barrettes" shown on historic drawings were not observed during test pit excavation.

Conclusions and Recommendations

Based on our observations from the test pit excavations, we conclude the following:

1. The 55 Broad Street building extension foundation includes steel piles.
2. The 41 Broad Street building extension foundation includes a concrete pier at about el -6±. We could not observe if pier extends below el -6.
3. The contractor should consider the buried piles and walls observed at TP-1 and TP-4 during excavation and drilling.
4. Our findings represent conditions at the test pit locations. The contractor may elect to do additional test pits if he deems appropriate or necessary.
5. The Contractor must not over-excavate next to adjacent foundations prior to installation of appropriate excavation support. The Contractor must perform all work without adversely affecting the adjacent buildings.

Closing

The observations and recommendations provided above are based on findings at the investigation locations. Please call us if you have any questions or you need further information.

Sincerely,
Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.

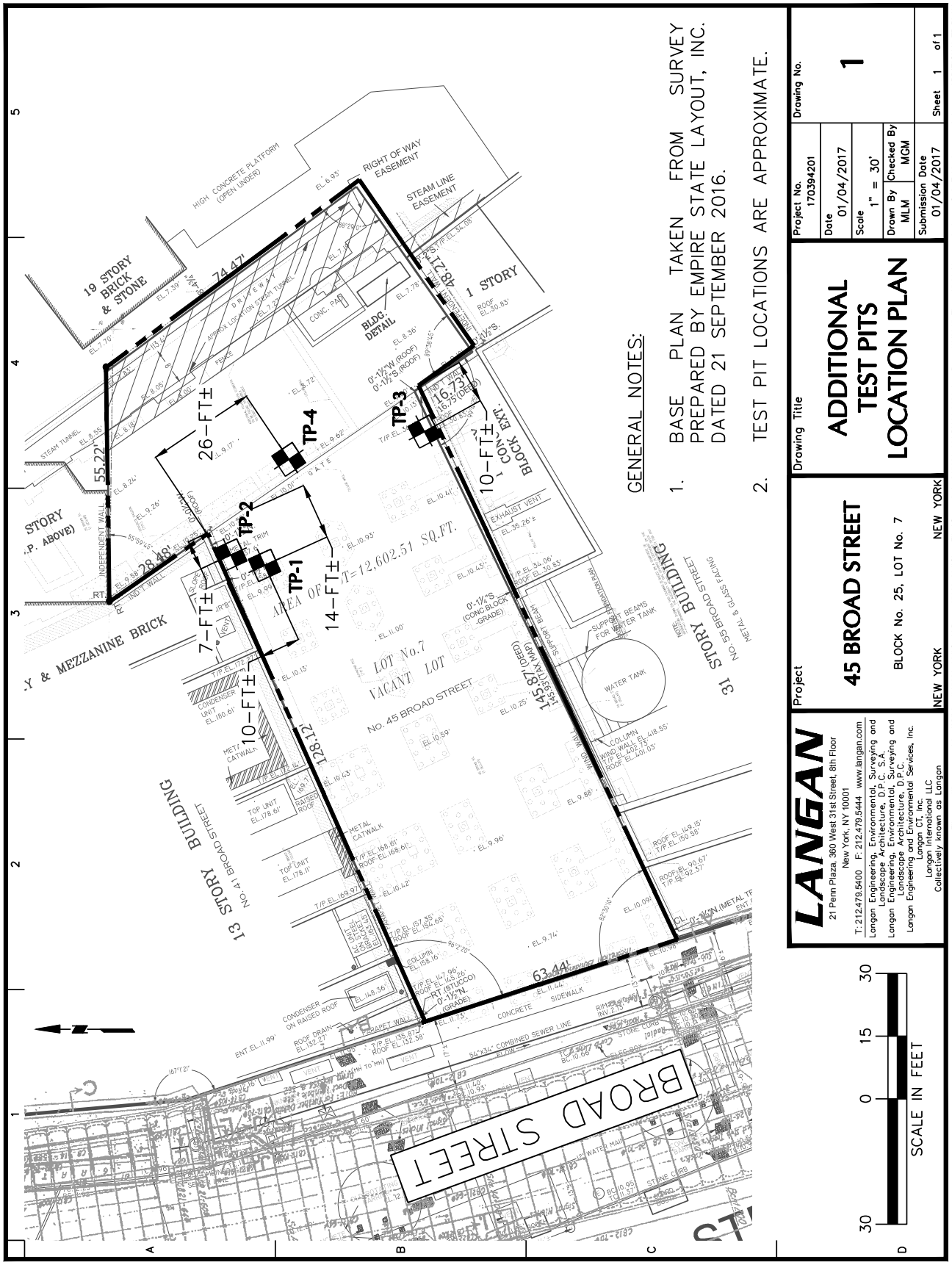
Miguel G. Matos, P.E.
Project Engineer

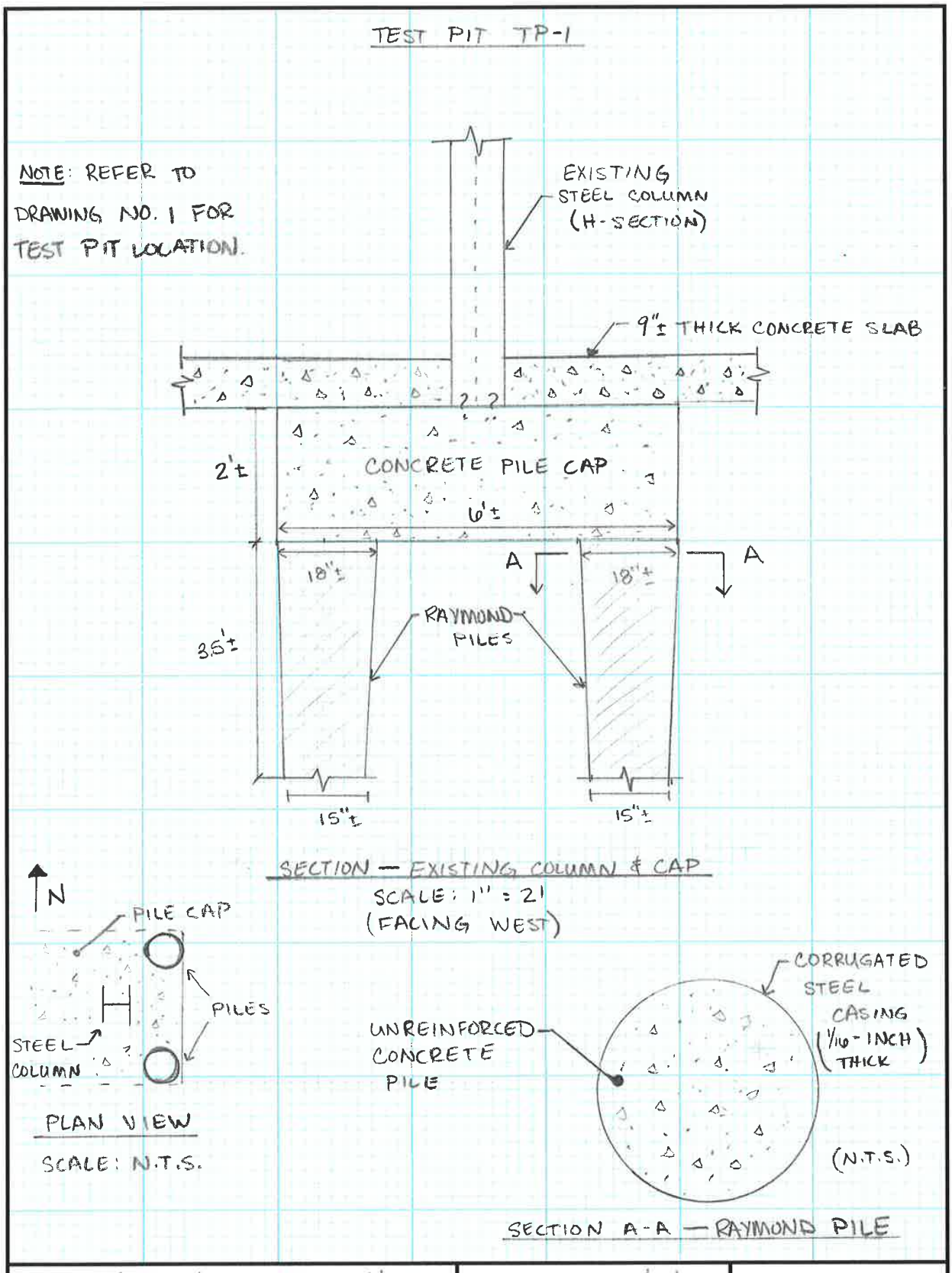
Tasos Papathanasiou, P.E.
Senior Associate/Vice President

Enclosure(s): Test Pit Location Plans
Test Pit Sketches
Test Pit Photo Log

cc: Gerald Nicholls - Langan

\\langan.com\data\NY\data2\170394201\Office Data\Reports\Geotechnical\Test Pit Report\Test Pit Letter.docx


GENERAL NOTES:
1. BASE PLAN TAKEN FROM SURVEY PREPARED BY EMPIRE STATE LAYOUT, INC. DATED 21 SEPTEMBER 2016.
2. TEST PIT LOCATIONS ARE APPROXIMATE.
TP-1
TP-2
TP-3
TP-4
26-FT±
14-FT±
10-FT±
7-FT±
10-FT±
AREA OF T=12,602.51 SQ.FT.
LOT No.7
VACANT LOT
No. 45 BROAD STREET
BROAD STREET
19 STORY BRICK & STONE
1 STORY
13 STORY BUILDING
31 STORY BUILDING
SCALE IN FEET
LANGAN
21 Penn Plaza, 360 West 31st Street, 8th Floor
New York, NY 10001
T: 212.479.5400 F: 212.479.5444 www.langan.com
Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C. S.A.
Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.
Langan Engineering and Environmental Services, Inc.
Langan CT, Inc.
Langan International, LLC
Collectively known as Langan
Project
45 BROAD STREET
BLOCK No. 25, LOT No. 7
NEW YORK NEW YORK
Drawing Title
ADDITIONAL TEST PITS LOCATION PLAN
Project No. 170394201
Date 01/04/2017
Scale 1" = 30'
Drawn By MLM
Checked By MGM
Submission Date 01/04/2017
Drawing No. 1
Sheet 1 of 1
© 2016 Langan
Filename: \\Langan.com\data\NY\data2\170394201\Cadd Data - 170394201\SheetFiles\Geotechnical\170394201-B101-0101.dwg Date: 1/3/2017 Time: 17:22 User: vveluchamy Style Table: Langan.stb Layout: ADDITIONAL TP PLAN


TEST PIT TP-1
NOTE: REFER TO DRAWING NO. 1 FOR TEST PIT LOCATION.
EXISTING STEEL COLUMN (H-SECTION)
9"± THICK CONCRETE SLAB
2'±
CONCRETE PILE CAP
6'±
A
A
18"±
18"±
RAYMOND PILES
35'±
15"±
15"±
SECTION — EXISTING COLUMN & CAP
SCALE: 1" = 2'
(FACING WEST)
N
PILE CAP
PILES
STEEL COLUMN
PLAN VIEW
SCALE: N.T.S.
CORRUGATED STEEL CASING (1/16-INCH THICK)
UNREINFORCED CONCRETE PILE
(N.T.S.)
SECTION A-A — RAYMOND PILE
45 Broad Street, Manhattan NY
Additional Test Pits, TP-1
BY MLM DATE 12/08/16
CKD. DATE
PROJ. NO. 170394201
SHEET 1 OF 6
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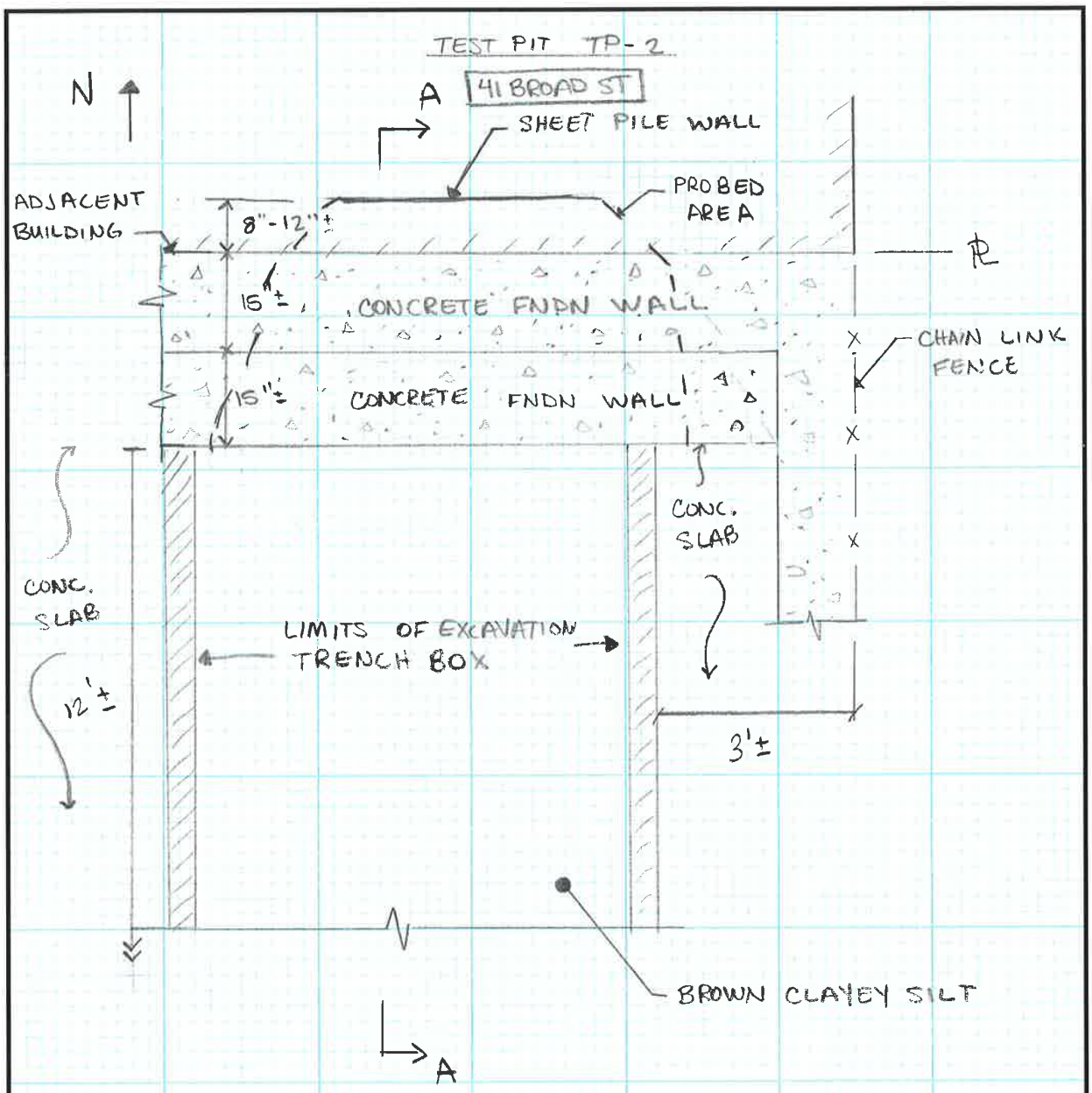

45 Broad Street, Manhattan, NY Additional Test Pits, TP-2	BY MLM DATE 12/08/16 CKD. DATE	PROJ. NO. 170394201 SHEET 2 OF 6

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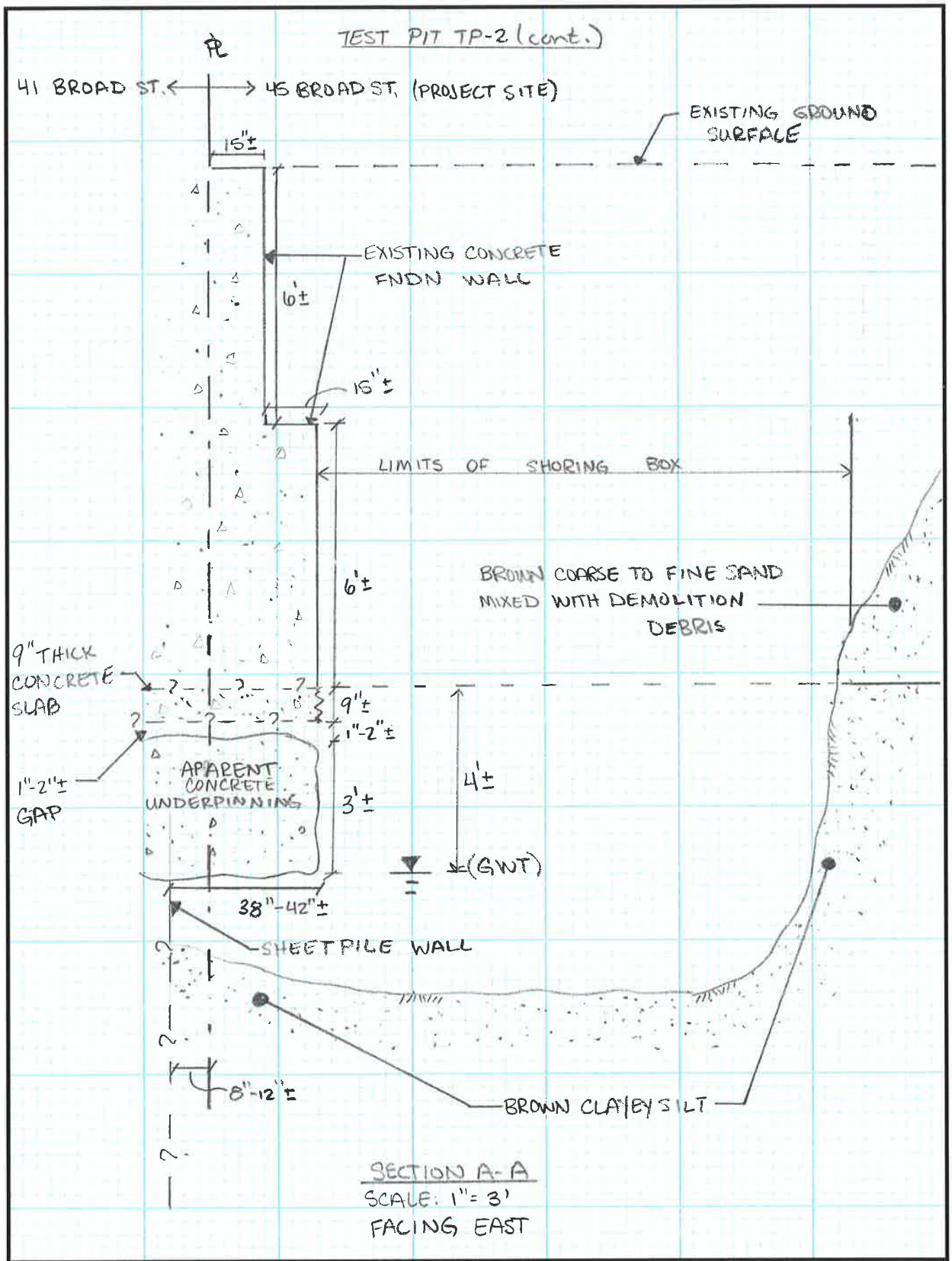
TEST PIT TP-2 (cont.)
PL
41 BROAD ST.
45 BROAD ST. (PROJECT SITE)
EXISTING GROUND SURFACE
15"±
EXISTING CONCRETE FNDN WALL
6'±
15"±
LIMITS OF SHORING BOX
6'±
BROWN COARSE TO FINE SAND MIXED WITH DEMOLITION DEBRIS
9" THICK CONCRETE SLAB
9"±
1"-2"±
1"-2"± GAP
APARENT CONCRETE UNDERPINNING
3'±
4'±
(GWT)
38"-42"±
SHEET PILE WALL
8"-12"±
BROWN CLAYEY SILT
SECTION A-A
SCALE: 1"=3'
FACING EAST
45 Broad Street, Manhattan NY
Additional Test Pits TP-2
BY MLM DATE 12/09/10
CKD. DATE
PROJ. NO. 170394201
SHEET 3 OF 6
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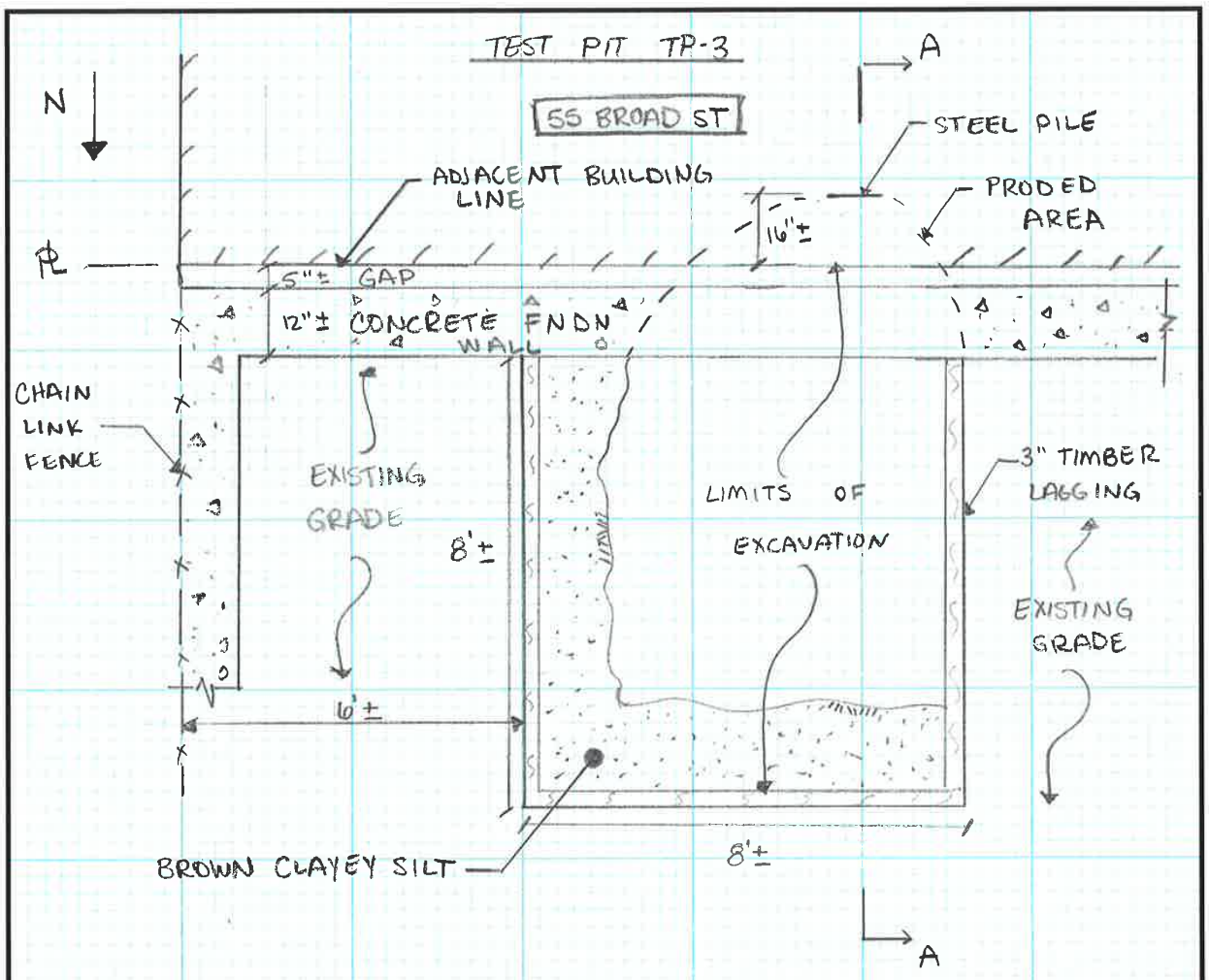

PLAN VIEW

SCALE: 1" = 3'

NOTE REFER TO DRAWING NO. 1 FOR TEST PIT LOCATION PLAN.

45 Broad Street, Manhattan NY Additional Test Pits, TP-3	BY MLM DATE 12/05/16 CKD. ____ DATE ____	PROJ. NO. 170394201 SHEET 4 OF 6

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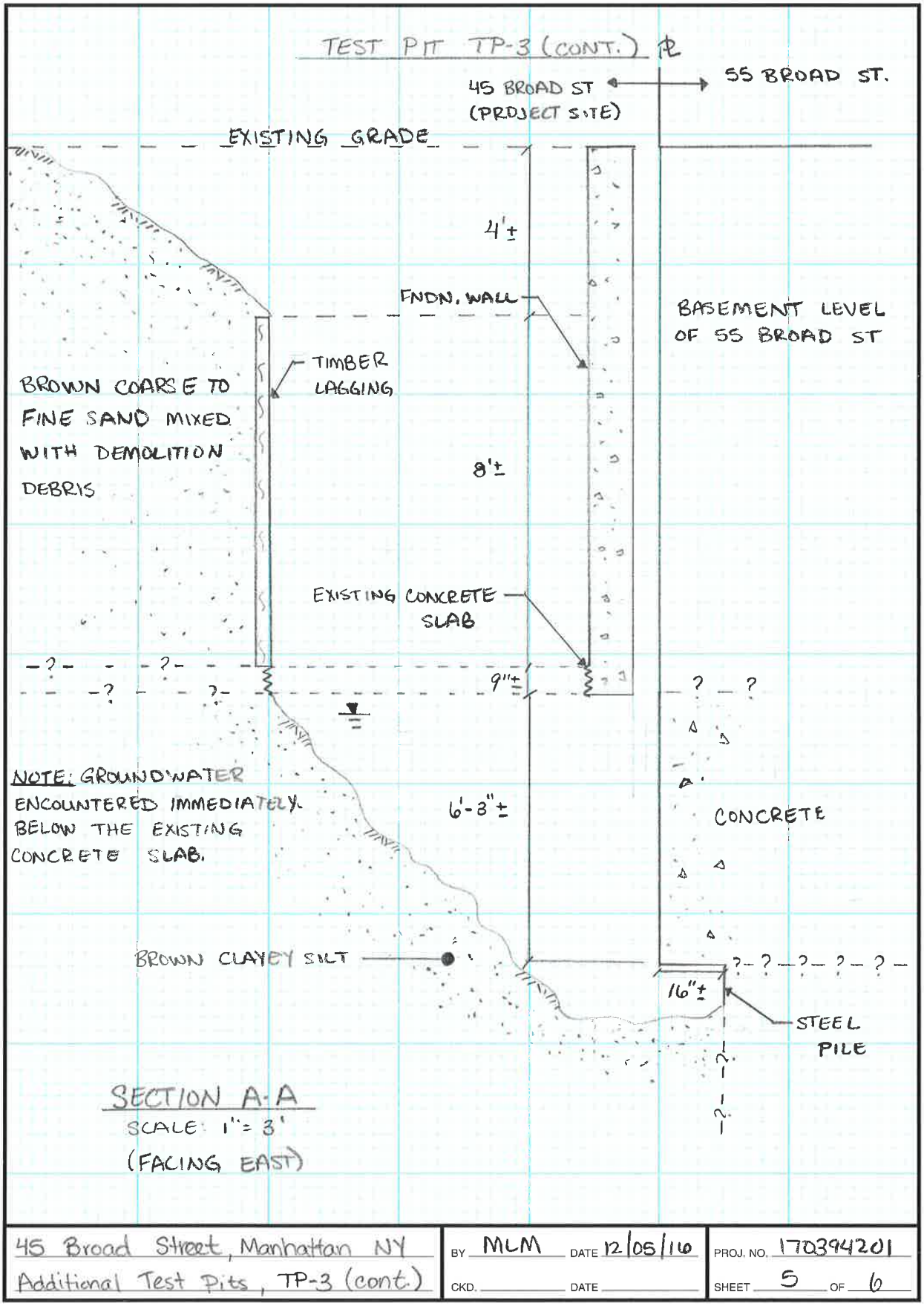

45 Broad Street, Manhattan NY Additional Test Pits, TP-3 (cont.)	BY MLM DATE 12/05/16 CKD. ____ DATE ____	PROJ. NO. 170394201 SHEET 5 OF 6

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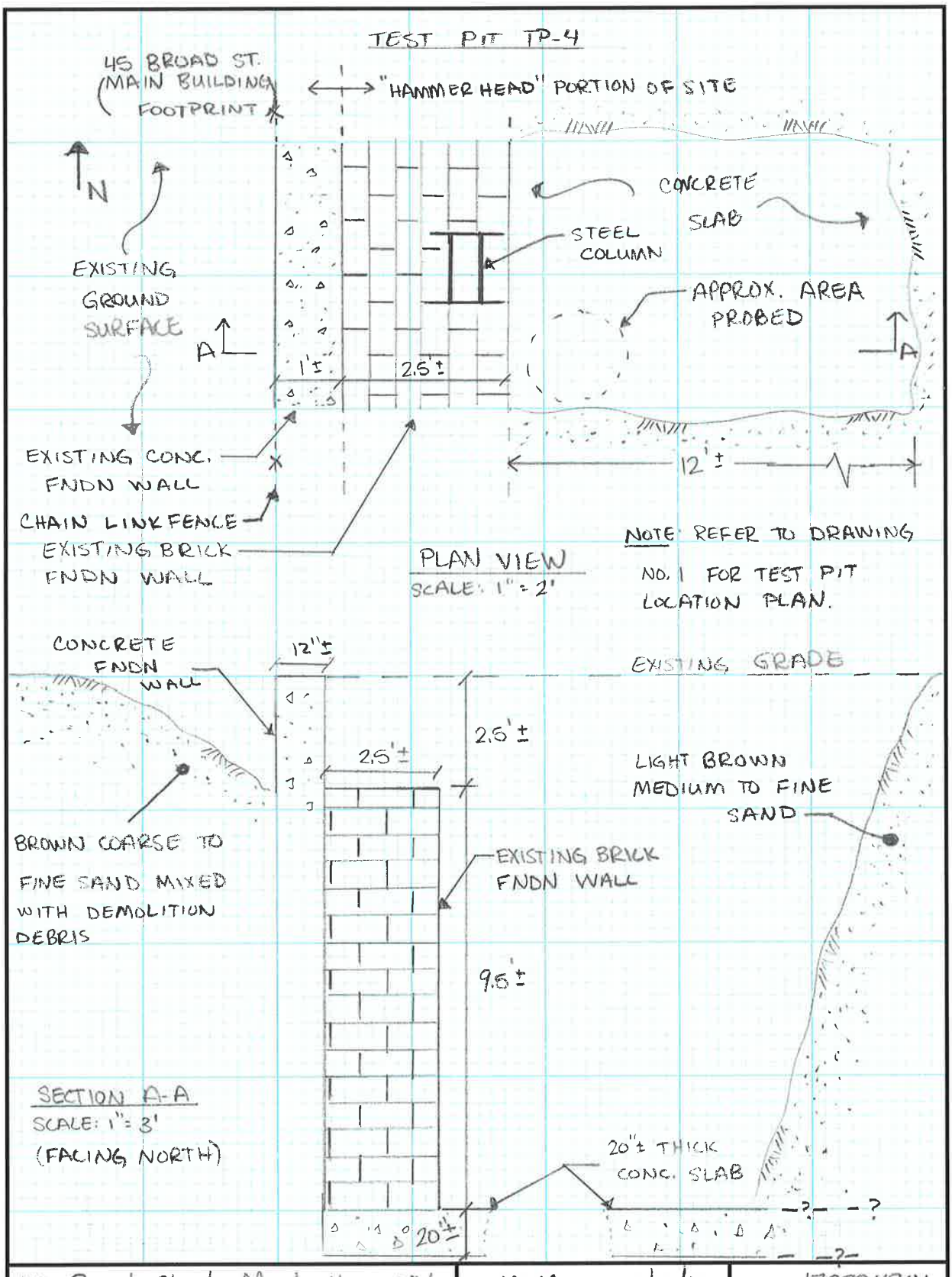
TEST PIT TP-4
45 BROAD ST. (MAIN BUILDING) FOOTPRINT
"HAMMER HEAD" PORTION OF SITE
N
EXISTING GROUND SURFACE
A
A
CONCRETE SLAB
STEEL COLUMN
APPROX. AREA PROBED
1'±
2.5'±
12'±
EXISTING CONC. FNDN WALL
CHAIN LINK FENCE
EXISTING BRICK FNDN WALL
PLAN VIEW
SCALE: 1" = 2'
NOTE: REFER TO DRAWING NO. 1 FOR TEST PIT LOCATION PLAN.
CONCRETE FNDN WALL
12"±
EXISTING GRADE
2.5'±
2.5'±
LIGHT BROWN MEDIUM TO FINE SAND
BROWN COARSE TO FINE SAND MIXED WITH DEMOLITION DEBRIS
EXISTING BRICK FNDN WALL
9.5'±
SECTION A-A
SCALE: 1" = 3'
(FACING NORTH)
20"± THICK CONC. SLAB
20"±
45 Broad Street, Manhattan NY
Additional Test Pits TP-4
BY MLM DATE 12/09/16
CKD. DATE
PROJ. NO. 170394201
SHEET 6 OF 6
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Photo 1: TP-1 - General view of the excavation. Facing Northwest.

Photo 2: TP-1 - Concrete Raymond pile from former building foundations

Photo 3: TP-2 - General view of the excavation. Facing Northeast.

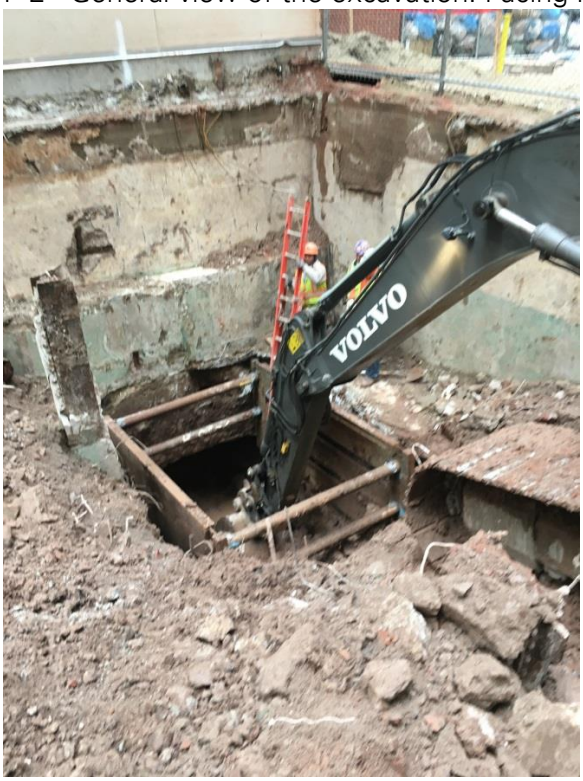

Photo 4: TP-2 - Final stages of excavation. Facing Northeast.

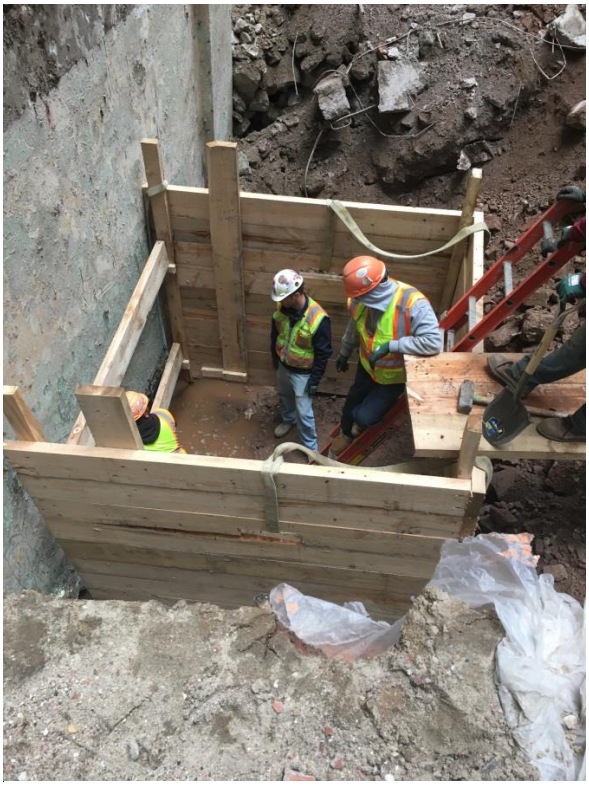

Photo 5: TP-3 - Excavation progress. Facing Southwest

Photo 6: TP-3 - End of Excavation. Looking from above

Photo 7: TP-3 – Observed steel pile. Facing South

Photo 8: TP-4 - Excavation progress. Facing West

Photo 9: TP-4 - Excavation complete. Facing West

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Memorandum

Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.
21 Penn Plaza, 360 West 31st Street, 8th Floor New York, NY 10001 T: 212.479.5400 F: 212.479.5444

To: Amanda Sutphin, Gina Santucci / NYC Landmarks Preservation Commission (LPC)

From: Tasos Papathanasiou, Marc Gallagher / Langan

Info: Anthony Labozzetta, Andrew Manton / Madison Equities
Robert Kulikowski, Michael Keane / Langan

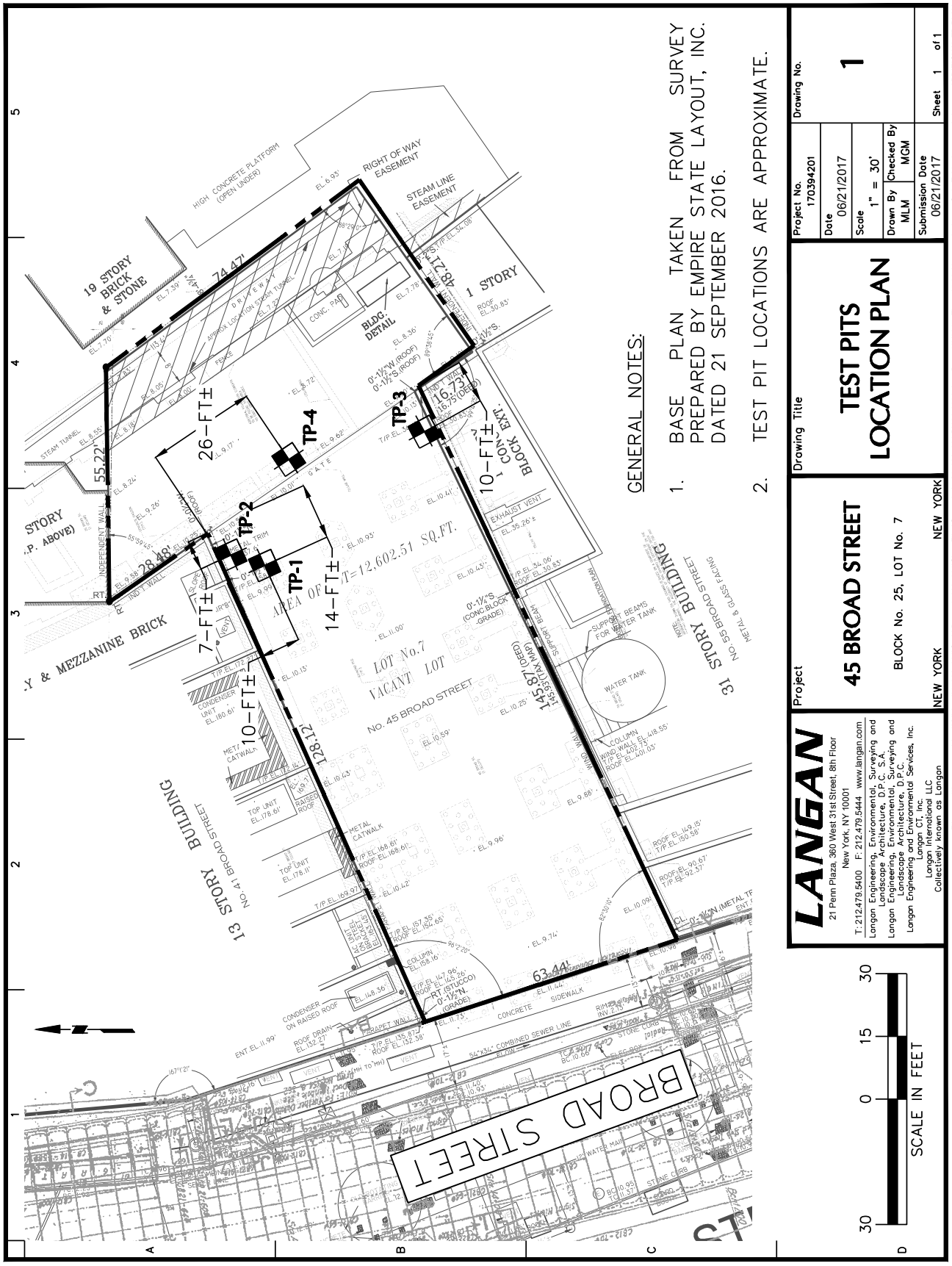
Date: 21 June 2017

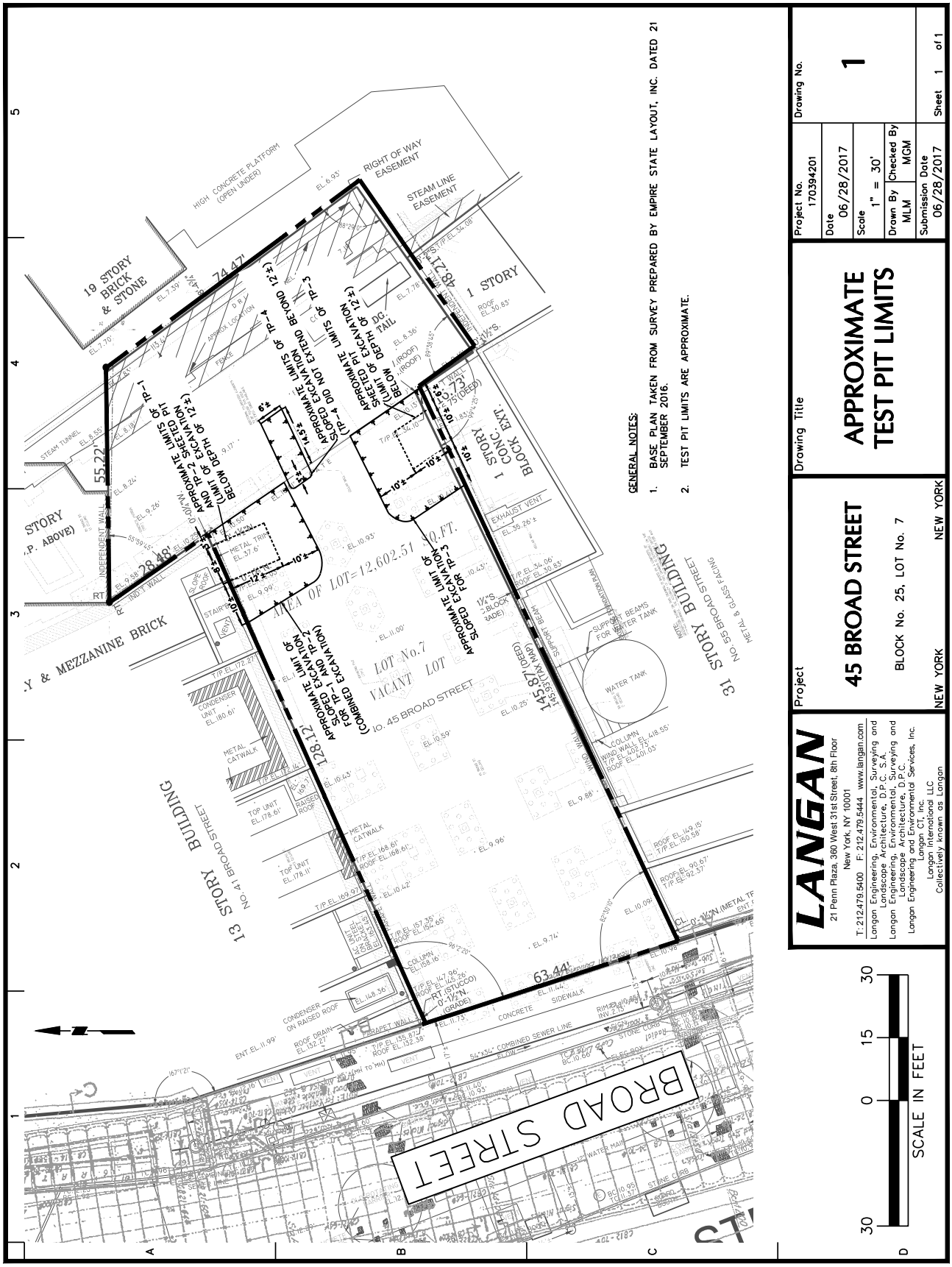
Re: **Test Pits Excavations**
45 Broad Street
New York, New York
Langan Project No.: 170394201

At LPC's request, we have prepared this memorandum explaining the purpose and presenting the findings of the test pits excavated at 45 Broad Street from 1 to 8 December 2016.

1. The purpose of the test pit work was to observe the type, depth, and configuration of existing and buried foundations. Therefore, the test pit locations were selected based on information from historic drawings at areas where we specifically expected to find foundation elements, i.e. areas that were previously disturbed. Obtaining this information was crucial to develop and complete the Support of Excavation (SOE) design for the new development.
2. Four test pits were performed at 45 Broad Street in December of 2016. The test pits were excavated using a backhoe at the following locations and depths (see also attached Figure 1) All test pits were backfilled with the excavated material upon completion.
   - TP-1 was excavated at the location of a buried pile cap to observe the size of the pile cap and the type of the piles below it. TP-1 extended about 18 feet deep.
   - TP-2 was excavated along the perimeter of the 41 Broad Street property to observe the type, depth, and configuration of the neighboring foundations. TP-2 extended about 16 feet deep.
   - TP-3 along the perimeter of the 55 Broad Street property to observe the type, depth, and configuration of the neighboring foundations. TP-3 extended about 19 feet deep.
   - TP-4 was excavated at the location of a buried foundation wall to observe the thickness and the material composition of this buried element. TP-4 extended about 12 feet deep.
3. The test pit excavations were sloped (open cut) up to 12 feet below ground surface (i.e. to the top of the former buried cellar slab) and were sheeted below. The excavations extended only to the depth of the adjacent building foundations (TP-2 and TP-3) and the old pile cap and foundation wall within the site (TP-1 and TP-4), and did not extend further.
4. Foundations (wall, pile caps, and piles) were observed in all four test pits. This is consistent with the available historic drawings and confirms as well that all four locations were previous "disturbed".

We trust that this provides sufficient information for understanding the excavation of the test pits at 45 Broad Street. If you have any questions we would be happy to discuss further.


GENERAL NOTES:
1. BASE PLAN TAKEN FROM SURVEY PREPARED BY EMPIRE STATE LAYOUT, INC. DATED 21 SEPTEMBER 2016.
2. TEST PIT LOCATIONS ARE APPROXIMATE.
TP-1
TP-2
TP-3
TP-4
AREA OF T=12,602.51 SQ.FT.
LOT No.7
VACANT LOT
NO. 45 BROAD STREET
BROAD STREET
SCALE IN FEET
LANGAN
21 Penn Plaza, 360 West 31st Street, 8th Floor
New York, NY 10001
T: 212.479.5400 F: 212.479.5444 www.langan.com
Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C. S.A.
Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.
Langan Engineering and Environmental Services, Inc.
Langan CT, Inc.
Langan International, LLC
Collectively known as Langan
Project
45 BROAD STREET
BLOCK No. 25, LOT No. 7
NEW YORK NEW YORK
Drawing Title
TEST PITS
LOCATION PLAN
Project No. 170394201
Date 06/21/2017
Scale 1" = 30'
Drawn By MLM
Checked By MGM
Submission Date 06/21/2017
Drawing No. 1
Sheet 1 of 1
© 2016 Langan
Filename: \\Langan.com\data\NY\data2\170394201\Cadd Data - 170394201\SheetFiles\Geotechnical\170394201-B101-0101.dwg Date: 1/3/2017 Time: 17:22 User: vvelluchamy Style Table: Langan.stb Layout: ADDITIONAL TP PLAN


GENERAL NOTES:
1. BASE PLAN TAKEN FROM SURVEY PREPARED BY EMPIRE STATE LAYOUT, INC. DATED 21 SEPTEMBER 2016.
2. TEST PIT LIMITS ARE APPROXIMATE.
AREA OF LOT=12,602.51 SQ.FT.
LOT No.7
VACANT LOT
NO. 45 BROAD STREET
BROAD STREET
19 STORY BRICK & STONE
13 STORY BUILDING
1 STORY
1 STORY CONC. BLOCK EXT.
STEAM LINE EASEMENT
RIGHT OF WAY EASEMENT
HIGH CONCRETE PLATFORM (OPEN UNDER)
APPROXIMATE LIMITS OF TP-1 (±12' DEPTH OF EXCAVATION BELOW EXISTING GRADE)
APPROXIMATE LIMITS OF TP-2 (±12' DEPTH OF EXCAVATION BELOW EXISTING GRADE)
APPROXIMATE LIMITS OF TP-3 (±12' DEPTH OF EXCAVATION BELOW EXISTING GRADE)
APPROXIMATE LIMITS OF TP-4 (±12' DEPTH OF EXCAVATION BELOW EXISTING GRADE)
SLOPED EXCAVATION (TP-4 DID NOT EXTEND BEYOND 12:1)
APPROXIMATE LIMITS OF TP-5 (±12' DEPTH OF EXCAVATION BELOW EXISTING GRADE)
SLOPED EXCAVATION FOR TP-5
APPROXIMATE LIMITS OF TP-6 (±12' DEPTH OF EXCAVATION BELOW EXISTING GRADE)
SLOPED EXCAVATION FOR TP-6 (COMBINED)
BROAD STREET
SCALE IN FEET
0 15 30
30
LANGAN
21 Penn Plaza, 360 West 31st Street, 8th Floor
New York, NY 10001
T: 212.479.5400 F: 212.479.5444 www.langan.com
Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C. S.A.
Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.
Langan Engineering and Environmental Services, Inc.
Langan CT, Inc.
Langan International, LLC
Collectively known as Langan
Project
45 BROAD STREET
BLOCK No. 25, LOT No. 7
NEW YORK NEW YORK
Drawing Title
APPROXIMATE TEST PIT LIMITS
Project No. 170394201
Date 06/28/2017
Scale 1" = 30'
Drawn By MLM
Checked By MGM
Submission Date 06/28/2017
Drawing No. 1
Sheet 1 of 1
© 2016 Langan
Filename: \\langan.com\data\NYC\data2\170394201\Caddd Data - 170394201\SheetFiles\Geotechnical\170394201-BH101-0101-Test pit limits.dwg Date: 6/28/2017 Time: 18:43 User: fmamedova Style Table: Langan.stb Layout: ADDITIONAL TP PLAN

SCOPE OF WORK FOR ARCHAEOLOGICAL MONITORING DURING SUPPORT OF EXCAVATION PRE-TRENCHING

for

45 BROAD STREET
Manhattan, New York

Prepared For:

Madison Equities
105 Madison Avenue, 9th Floor
New York, New York 10016

Prepared By:
Langan Engineering, Environmental Surveying and Landscape Architecture, D.P.C.
360 West 31st Street New York, NY 10001

Michael Audin, RPA
Marc Gallagher, PE

August 2017
170394201

LANGAN

1.0 INTRODUCTION

Archaeological testing and monitoring is required by the New York City Landmarks Preservation Commission (LPC) as part of the Restrictive Declaration for the development of 45 Broad Street in Lower Manhattan, New York City, New York (Project Site). The Area of Potential Effect (APE) is located on the east side of Broad Street between the intersections of Beaver Street and Exchange Place in Manhattan (Figure 1). Pre-trenching excavation around the Project Site perimeter is required prior to installation of the Support of Excavation (SOE) in order to remove any obstructions related to demolished 20th-century structures at the Project Site. This plan outlines archaeological monitoring only for pre-trenching excavation along the site perimeter. No other excavation will be permitted in archaeologically sensitive areas until a comprehensive archaeological testing plan for the remainder of the site has been reviewed and approved by LPC.

Langan's previous geotechnical investigations at 45 Broad Street, included 1) soil borings to study soils and geomorphology and 2) geotechnical test pits to identify buried structural obstructions and to characterize the foundations of neighboring structures. The investigation identified foundations from a building built at the site in 1920 and its concrete basement slab running across the archaeological-APE at approximately 11 or 13 feet below ground surface[1]. In addition, the investigation identified buried structural elements below this depth (pile caps, other foundation elements, etc.) associated with the 20th-century building. These buried structural elements are discontinuous and at varying depths throughout the archaeological-APE.

The geotechnical investigations reviewed included a pile cap location plan and a number of these pile caps will be within the alignment of the pre-trenching along the perimeter of the APE. The Phase IA Archaeological Study of the APE (Audin and French 2017) identified the potential for historic materials at the APE. There is a moderate sensitivity for historic shaft features, such as wells, privies, or cisterns and a low sensitivity for other 17th- and 18th-century features below the concrete basement slab. The study noted that the potential archeological materials would lie within native soil. Therefore, archaeological monitoring during soil excavation for the pre-trenching below the slab foundation is proposed. The APE is divided into two areas for monitoring (see Figure 2):

- Area 1 - western portion of the APE is where archaeological monitoring is required starting below the existing basement slab (approximately 13 feet below current Site grade) and continuing to culturally sterile soils.
- Area 2 – eastern portion of the APE is where archaeological monitoring is required starting below the existing basement slab (approximately 11 feet below current Site grade) and continuing to culturally sterile soils.

[1] All depths will be reported as feet below ground surface in the monitoring plan. Prior to trenching, project surveyors will establish a vertical datum for the site that will be used for all subsequent archaeological recording.

All archaeological monitoring during excavation will be conducted in accordance the *Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation*, the *New York State Historic Preservation Act of 1980, section 14.09* and *Landmarks Preservation Commission Guidelines for Archaeological Work in New York City* (2002). This monitoring plan addresses project planning, responsible parties, monitoring methodology, treatment and curating of artifacts, and reporting requirements.

2.0 PREVIOUS REPORTS

The previous investigations referenced in this report include:

- January 2017 *Memo – Test Pit Findings and Recommendations, 45 Broad Street, New York, New York* prepared by Langan;
- May 2017*Updated Geotechnical Engineering Study for 45 Broad Street, New York, New York* prepared by Langan;
- August 2017 Phase IA Archaeological Assessment by Langan (Audin and French 2017).

3.0 SCOPE OF WORK

The pre-trenching excavation will only impact a portion of the archaeological-APE. The archaeological-APE for this phase of the project is an approximately 7-foot wide trench around the west, south, east, and part of the north perimeter of the proposed construction where pre-trenching excavation has the potential to impact archaeological resources (Figure 3) below the existing concrete basement slab. The subsurface profile consists of demolition debris within the former basement of a 20th-century building that occupied the site which was recently demolished. The basement slab is still in place at approximately 11 feet below grade in Area 2 and 13 feet below grade in Area 1. As such, the material above the slab is not considered archaeologically sensitive and archaeological monitoring is not proposed for excavation of this material. Archaeological monitoring is proposed for excavation that extends below the existing basement slab to culturally sterile soils to check for archaeological features.

Archaeological monitoring will include the following stages:

- Project planning
- Archaeological monitoring
- Treatment of archaeological artifacts
- Reporting
- Curation of artifacts

3.1 Project Planning

Archaeological monitoring of soil excavation requires careful and considered planning. This planning will be performed prior to the start of excavation and will include the following steps.

3.1.1 Archaeological Monitoring Approach

All elements of the archaeological monitoring during the pre-trench excavation will be conducted in accordance with this written archaeological monitoring plan. The purpose of the archaeological monitoring plan is to identify within a single document the archaeological scope and requirements of the pre-trenching excavation work.

Langan proposes archaeological monitoring as follows:

- No archaeological monitoring is recommended for the first 11 to 13 feet of fill across the archaeological-APE.
- Archaeological Monitoring for historic features within soils underlying the slab during the pre-trenching. See Section 3.2.2. below for detailed information on monitoring procedures.

The objectives of the proposed archaeological monitoring are to monitor for and investigate archaeological features within the pre-trenching excavation (see Figure 3). In the event any unanticipated artifact concentrations or deposits are observed during the archaeological monitoring, they will also be investigated.

Contingencies will be provided for possible subsurface historic archaeological deposits such as wells, cisterns, privies and any artifact deposits or features. If significant prehistoric or historic features or artifacts are present that require additional investigations to determine if they are eligible for the National Register of Historic Places (NRHP), we would recommend immediately conducting Phase II archaeological investigations to save time. The plan for feature investigation during pre-trenching is detailed in section 3.2.3.

Michael Audin, RPA, an archaeologist who meets the NPS professional criteria, will be overseeing all archaeological monitoring.

3.1.2 Contacts

The Langan archaeological team will meet with Madison Equities LLC (the Client) and the selected excavation contractor Posillico (the Contractor) to discuss the pre-trenching excavation work and archaeological monitoring. While on Site, the Contractor's Site Manager will be verbally informed of the monitoring work on a daily basis. Following is the list of Parties/Agencies involved and their contact information.

Client:/Owner:
Madison Equities
105 Madison Avenue, 9th Floor
New York, New York 10016

Archaeologist:

Langan Engineering, Environmental,	Michael Audin, RPA, Principal Archaeologist
Surveying and Landscape Architecture, D.P.C.	(973) 919-1965
360 West 31st Street, 8th Floor	maudin@langan.com
New York, NY 10001	Langan Main Office: (212) 479-5400

Archaeological Reviewer:

NYC Landmarks Preservation Commission	Amanda Sutphin, Director of Archaeology
1 Centre Street, 9N	(212) 669-7823
New York, NY 10007	asutphin@lpc.nyc.gov

Contractor:

Posillico	David Sposito, PE, NYC Division Manager
131-36A 20th Avenue	(718) 353-9616
College Point, NY 11356	

3.1.3 Strategy, Resources and Health and Safety

- Monitoring Strategy – The procedure for archaeological monitoring of the pre-trenching excavation includes close observations of the excavation procedures by experienced archaeologist(s). The monitoring plan for the excavation will consist of one archaeologist monitoring one excavator during pre-trenching excavation within Areas 1 and 2. Excavated soil will be sorted of debris and stockpiled on site. Soil cleared of debris will be used to backfill the pre-trenching excavation at the end of the obstruction investigations. If the archaeologist identifies something of interest, the excavator will be directed to create a separate stockpile of material for further investigation. If a potential resource of interest (feature, artifact concentration, deposit) is identified by the archaeological monitor, excavation will halt in the archaeologically sensitive area until the archaeologist can complete their assessment. Additional on-call archaeologists may be needed if any features or significant concentrations of artifacts are uncovered. Section 3.2.3 contains the detailed plan for feature investigation during pre-trenching.

  No monitoring is recommended during the first 11 to 13 feet of excavation. For Area 1 (shown on Figure 2), archaeological monitoring should commence at approximately 13 feet below current grade after the concrete slab is removed. For Area 2 (shown on Figure 2), archaeological monitoring should commence at approximately 11 feet below current grade after the concrete slab is removed. Archaeological monitoring will cease

once excavation has extended to culturally sterile soil and no archaeological features or artifact concentrations have been identified.

Prior to the start of excavation, project surveyors will establish a vertical datum for the site that will be used for all subsequent archaeological recording. Archaeologists will photograph the APE prior to and during the excavation and any potential archaeological features or recovered artifacts. The excavation area will be mapped on the excavation plans for provenience purposes. Artifacts will be collected and bagged with the necessary provenience information. Features will be documented using standard feature forms and mapped using the necessary provenience information.

- Resources – Langan will supply all equipment (shovels, rakes, sifting screens, camera, etc.) necessary for the archaeologists to conduct their monitoring.

- Health & Safety – Archaeological monitoring will comply with the site approved Health and Safety Plan (HASP). A Langan environmental engineer will support the archaeological monitoring and coordinate the implementation of the HASP. All Langan archaeological monitoring personnel will follow applicable Occupational Health and Safety (OSHA) requirements for fieldwork and will be OSHA 10-hour Construction Site certified. The Langan engineer will notify the monitoring team of any changes to the HASP.

3.2 Archaeological Field Monitoring

The archaeological monitoring of pre-trenching excavation shall be carried-out in accordance with this archaeological monitoring plan and, in particular, the methodology described below. Any changes to the methodology shall be reported under the agreed liaison framework.

3.2.1 Overview of Planned Pre-Trenching Excavation

Pre-trenching excavation is required prior to SOE installation to remove buried obstructions from the previous buildings. Trenching will occur along the perimeter of the proposed construction, which are also the edges of the archaeological-APE (Figure 3). There is one section along the northern perimeter of the site adjacent to 41 Broad Street that does not require pre-trenching. Excavation is only anticipated to extend to the depths of the bottom of the foundational elements from the previous building. This includes the removal of the concrete basement slab (approximately 9 inches thick) required for the SOE, 2-foot thick pile caps that underlie the slab and associated reinforced concrete. Given the depths of these foundational elements, the contractor anticipates the trench to be approximately 7 feet wide and to extend to 17-18 feet below ground surface in Area 1 and 15-16 feet below ground surface in Area 2. In areas where there are no pile caps, the excavation will conclude as soon as the concrete slab is removed and the soil below checked for obstructions. The archaeological monitor will observe

the excavation below the existing basement slab to determine if any buried obstructions are possible archaeological features.

Posillico will use a CAT 345 or equivalent large excavator with a denticulated blade for the pre-trenching. If the archaeological monitor identifies a potential *in situ* feature that requires careful machine excavation to investigate, a flat plate can be welded onto the blade for this work.

3.2.2 Monitoring Procedure

Should the monitoring archaeologist note a potential artifact or feature, s/he shall request the operator to:

- Stop excavation as necessary in the immediate area of the potentially significant artifacts;
- Avoid working in the area of potential archaeology;
- Alter the way in which the machine is operated (i.e., to scrape across an area in one to two foot lifts versus excavating down 3 or feet and then across the area).

When a machine operator is requested to stop, the monitoring archaeologist will log the time and action taken. Such a log will minimize any confusion over the impact of monitoring procedures and practices on the excavation.

Given the risk to buried features or artifacts by excavation and construction traffic, once a feature or artifact or area has been identified it should be:

- Fenced off with orange construction fences and clearly marked with warning signs;
- Photographed with time and date stamps;
- Logged and numbered sequentially (i.e. in order of their discovery), and;
- Recorded to document the location and extent.

To minimize delays to the excavation work, the nature and extent of any identified area will be explored (by way of small scale, exploratory hand-excavation or targeted machine excavation or possibly both) as soon as is safely possible. Detailed procedures for the safe investigation of features identified during pre-trenching are found in section 3.2.3 below. These investigations will be coordinated by the archaeological monitor or principal archaeologist to expedite the investigation and determination of significance. Should the exploratory examination reveal the area to not be significant, the area can be returned to excavation. If archaeological features or artifact deposits are found and the monitoring team cannot determine the extent of the deposit, additional hand excavation may be needed to determine the extent of the feature. If needed, an additional archaeological assistant will be retained to further investigate the find and determine the extent and nature of the find.

The monitoring archaeologist will also:

- Oversee the conduct of the monitoring and ensure a professional standard of recording;
- Pay due regard to stray finds in the soil;
- Recover any notable archaeological objects and record their location, if possible;
- Recover all finds associated with archaeological deposits which have been disturbed by the excavation during monitoring;
- Maintain daily logs;
- Provide daily verbal updates; and
- Adhere to the agreed liaison framework.

3.2.3 Procedures for Feature Investigation

If a potentially significant archaeological feature is identified underlying the concrete slab, then the following procedures will be followed to allow the archaeologist to investigate further. First, the trench will be widened and sloped between the surface level and the concrete slab (0 to 11 or 13 feet below surface) to allow the archaeologist safe access to investigate closer. This excavation and sloping will only occur above the concrete slab in historic building demolition fill that has no archaeological sensitivity. If the archaeologist requires safe access to explore a feature that is significantly deeper than the concrete slab level, a trench box will be installed.

If the find consists of a well, cistern or privy feature, an engineer will assist the archaeological team in developing a safe process for disassembling the feature as the investigation of the feature progresses. Once a determination is made, LPC and the project team will be consulted before proceeding with excavations. LPC retains the final decision on how to proceed.

Depending on the feature or deposit we would typically recommend sampling 10 to 25 percent of the feature or deposit. This would allow for good documentation while allowing the project to move forward in a timely manner. Additional samples for radiocarbon dating, dendrochronology, and other possible future testing will be gathered.

If a feature cannot be safely sampled following the above procedures, then additional excavation for investigation will follow the "Delayed Feature Investigation" procedure below.

Feature Investigation Adjacent to MTA Tunnel
SOE plans, including pre-trenching for pile cap removal, have been approved by MTA, who will not allow deviations. This means that trench boxes or additional excavation for feature investigation will not be permitted on the western border of the site adjacent to the MTA subway tunnel. Any feature identified along the western site border that requires additional excavation for investigation will follow the "Delayed Feature Investigation" procedure below.

Delayed Feature Investigation
If a potential archaeological feature is identified during pre-trenching and it cannot be safely investigated prior to SOE install, the location will be documented (by measurements off

existing buildings or structures) and the area backfilled until the SOE allows for safe excavation to the depth of the feature. Once the feature is re-exposed, the archaeologist will determine whether the feature is significant.

If the potential archaeological feature is identified in a location where secant pile drilling or other SOE installation activities may damage the feature, LPC will be notified and a mitigation strategy will be decided, if possible. We anticipate that any damage associated with SOE install would not entirely destroy features such as building foundations or truncated shaft features and would still allow for at least 10% sampling after the feature is re-exposed for a thorough investigation after the completion of SOE install.

Water Control During Feature Investigation
Due to safety concerns related to the adjacent subway tunnel along the western site boundary, the MTA will not allow any site dewatering that lowers the water table prior to SOE installation. Therefore, the site dewatering system will not be functioning during pre-trenching excavations.

Langan has monitoring wells currently installed at the Project Site. Most recent data show the stabilized groundwater level is below the concrete slab at 14 feet below surface level. Archaeological features directly underlying the concrete slab should be identifiable without immediate inundation. If deeper feature investigations are required, engineers will assist with local water control measures, although these will be limited in scope without access to the site dewatering system. If water control issues do not allow for safe feature investigation, then the "Delayed Feature Investigation" protocol will be employed.

3.3 Treatment of Artifacts

All artifacts will be cleaned and stored in Langan's off-site archaeological laboratory. All archaeological objects shall be cared for in accordance with the *Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation* (Federal Register, vol. 48, no. 190) and LPC guidelines for treatment of archaeological artifacts and features

No human remains are anticipated during the excavation. However, should human remains be found, all work in the immediate area will stop, and the Site manager, the New York City Police Department (NYPD), the New York City Office of the Chief Medical Examiner's Office (OCME), and LPC will be contacted. Once a determination has been made by the medical examiner of the type of remains (forensic or archaeological), the LPC and the rest of the project team will be contacted to determine the course of action.

3.4 Reporting

Our archaeologist will prepare the following reports:

- Daily logs;

- Discovery reports; and
- End of field work summary memorandum.

3.5 Curating and Archiving Artifacts

Any artifacts to be curated will be determined in cooperation with the LPC after all archaeological testing and monitoring is completed. The project archive that will accompany the artifacts will contain the following:

- A copy of this scope of work;
- All relevant mapping and photography;
- All correspondence relating to the archaeological monitoring;
- A catalogue of all artifacts and ecofacts;
- End of Fieldwork Memo; and
- All other registers, catalogues or listings, pertaining to the monitoring work.

4.0 ADDITIONAL ARCHAEOLOGICAL TESTING

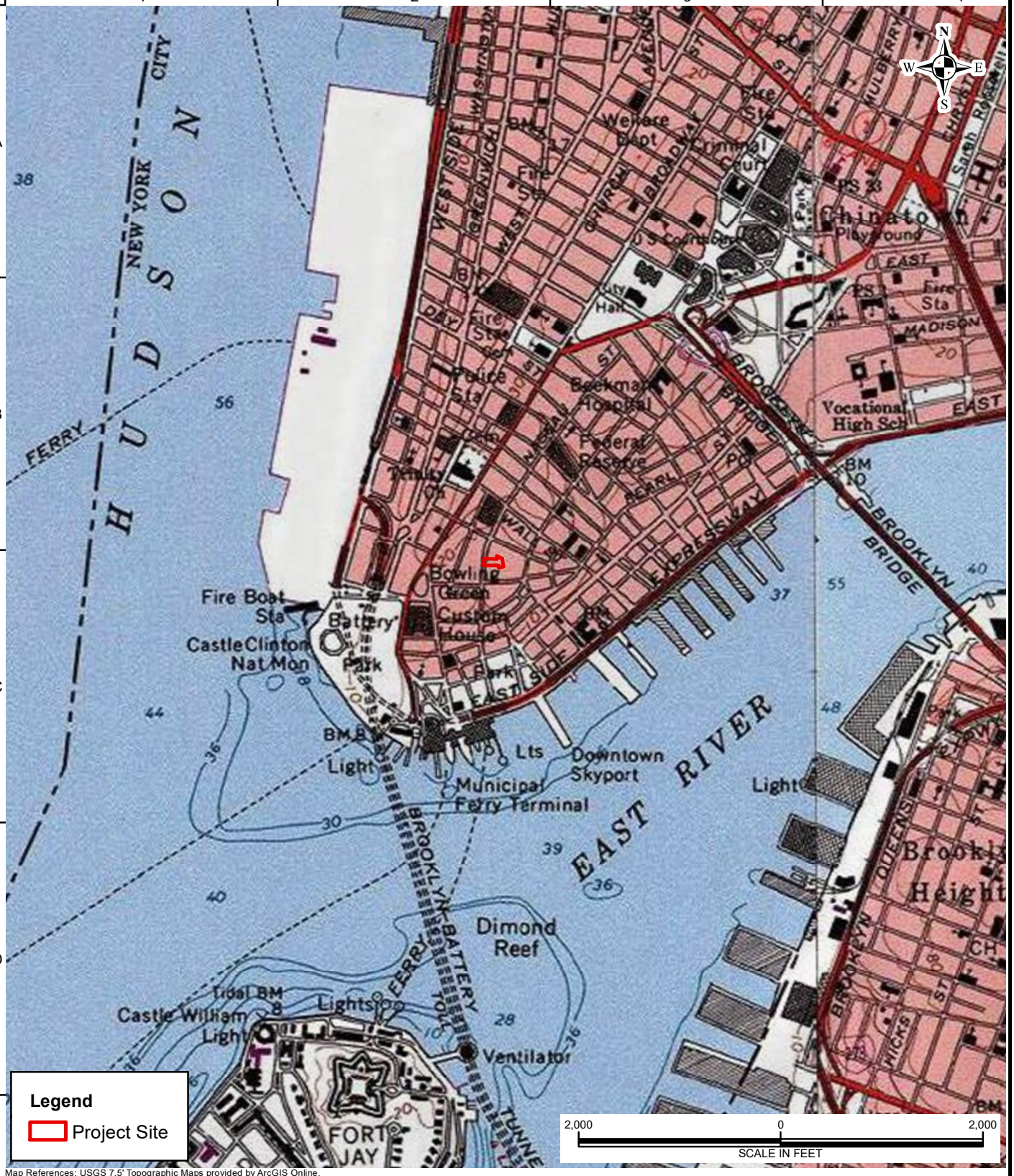
This monitoring plan only outlines archaeological monitoring during pre-trenching excavation for the purpose of obstruction removal prior to SOE install. No other excavation will be permitted to occur in archaeologically sensitive soils (deeper than 13 feet in Area 1 and deeper than 11 feet in Area 2) until a comprehensive archaeological testing plan has been approved by LPC.

When all site monitoring and testing are completed we will prepare the final testing/monitoring report in accordance with the *Landmarks Preservation Commission Guidelines for Archaeological Work in New York City* (2002). The report will address the following:

- An overview of the physical and archaeological setting of the site;
- A description of the development plan and excavation;
- The dates and duration of archaeological monitoring and testing;
- Details of the soil removal, methods and machinery;
- The monitoring and testing methodologies, including the project team and the hours worked;
- An overview of the ground, weather and overall monitoring and testing conditions;
- A description of all archaeological artifacts and features uncovered, including provenience information, if available;
- The actions taken with regard to any archaeological features, including cross-referencing (where available) any additional investigations;
- An overview (including tables) of all registered finds/archaeological objects;
- A general statistical analysis of the archaeology identified;
- A synthesis of all findings;
- An assessment of the significance of any resource identified using the National Register criteria;

- Conclusions;
- Bibliography and references;
- Supporting maps, plans, photographs and illustrations; and
- Details on the location and content of the monitoring archive.

The final report will be submitted within 150 days of the final archaeological field work. Copies of the final report will be sent to the relevant state and local authorities.



Map References: USGS 7.5' Topographic Maps provided by ArcGIS Online.

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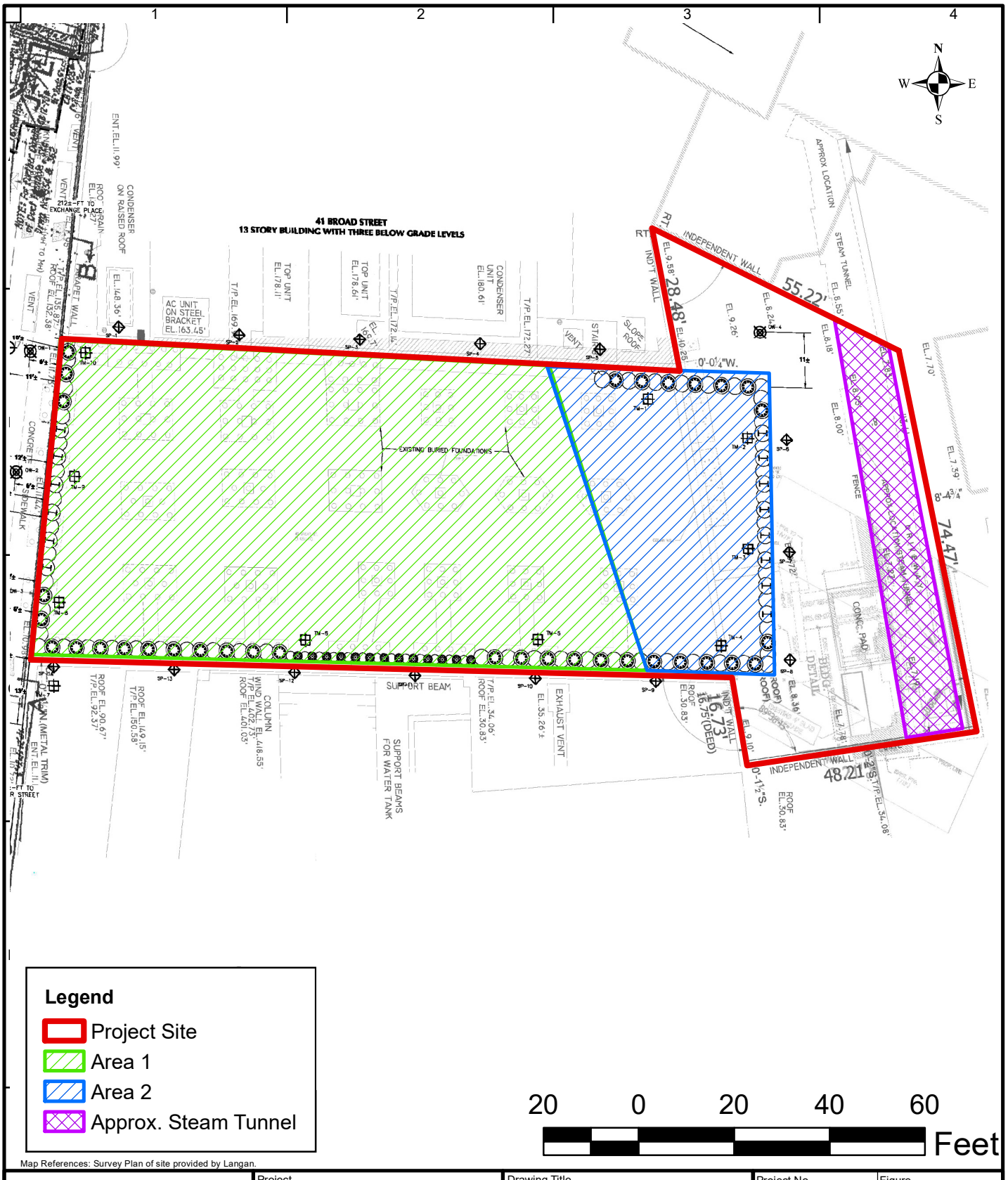
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project	45 BROAD STREET
	BLOCK NO. 25, LOT NO. 7
	CITY OF NEW YORK NEW YORK
Drawing Title	USGS SITE LOCATION MAP
Project No.	170394201
Date	4/17/2017
Scale	SEE ABOVE
Drawn By	MA
Figure	1



Map References: Survey Plan of site provided by Langan.

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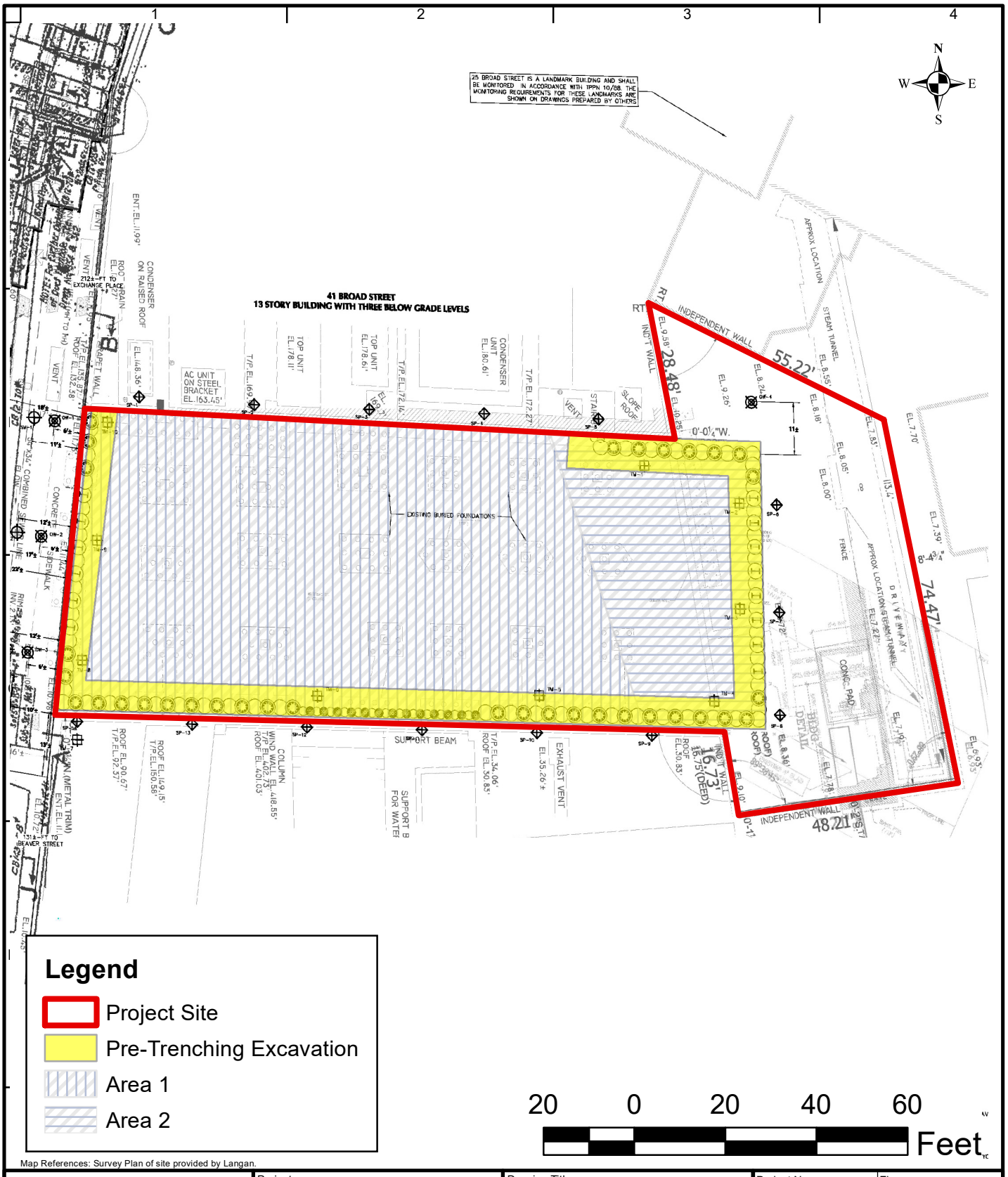
Project	Drawing Title	Project No.	Figure
45 BROAD STREET BLOCK NO. 25, LOT NO. 7 CITY OF NEW YORK NEW YORK	ARCHAEOLOGICAL SENSITIVITY MAP	170394201 Date 4/24/2017 Scale SEE ABOVE Drawn By KMF	2



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Project	Drawing Title	Project No.	Figure
45 BROAD STREET BLOCK NO. 25, LOT NO. 7 CITY OF NEW YORK NEW YORK	LOCATION OF PRE-TRENCHING	170394201	3
		Date 7/10/2017	
		Scale SEE ABOVE	
		Drawn By KMF	

APPENDIX F: TRANSPORTATION

(American Community Survey (ACS) Journey to Work Data)

2015 ACS Journey to Work data for Manhattan Census Tracts 7 and 9

B08301: MEANS OF TRANSPORTATION TO WORK - Universe: Workers 16 years and over 2011-2015 American Community Survey 5-Year Estimates		
	Census Tract 7, New York County, New York	**Census Tract 9, New York County, New York**
	Estimate	**Estimate**
Total:	**6,236**	**1,097**
Car, truck, or van:	156	114
Drove alone	156	110
Carpooled:	0	4
In 2-person carpool	0	4
In 3-person carpool	0	0
In 4-person carpool	0	0
In 5- or 6-person carpool	0	0
In 7-or-more-person carpool	0	0
Public transportation (excluding taxicab):	3,885	569
Bus or trolley bus	83	0
Streetcar or trolley car (carro publico in Puerto Rico)	0	0
Subway or elevated	3,747	561
Railroad	55	8
Ferryboat	0	0
Taxicab	33	29
Motorcycle	0	0
Bicycle	0	7
Walked	1,734	264
Other means	0	0
Worked at home	428	114

APPENDIX G: TECHNICAL MEMORANDUM

Technical Memorandum for 45 Broad Street – 18DCP063M-TM001
CEQR No. 18DCP063M
ULURP No. 180063ZSM
June 8, 2018

1.0 INTRODUCTION

On November 27, 2017, the New York City Planning Commission (CPC), as Lead Agency, issued a Negative Declaration for the proposed 45 Broad Street Project (CEQR No. 18DCP063M and ULURP No. 180063ZSM), based on analyses in an Environmental Assessment Statement completed on November 22, 2017 ("2017 EAS"). The Proposed Action is a Special Permit from the CPC, pursuant to New York City Zoning Resolution (ZR) Sections 74-634 and 91-251, for a floor area bonus in exchange for subway station improvements.

The Proposed Action would permit additional Floor Area Ratio (FAR) of up to 3.00 (71,391 square feet) within a proposed mixed-use building to be developed at 45 Broad Street (Block 25, Lot 7) in the Special Lower Manhattan District of Manhattan Community District 1. Approval of the Proposed Action would facilitate a proposal by the Applicant to develop a 1,115-foot (80-floor), approximately 478,209-gross-square-foot (gsf) mixed-use building on the Development Site. The proposed mixed-use building would include approximately 407,477 gsf of residential floor area (206 market rate dwelling units) on floor 1 and floors 11 through 80; approximately 62,006 gsf of commercial/office floor area on floors 1 through 10; and approximately 8,726 gsf of outdoor floor area on floors 12, 33, and 53 ("Development Project"). In connection with the Special Permit, the Applicant would also provide subway improvements to (i) the Broad Street station of the Nassau Street (J/Z) subway line (the "Broad Street Station"), and (ii) the Wall Street station of the Lexington Avenue (4/5) subway line (the "Wall Street Station"). The proposed subway improvements would consist of (i) the installation of two Americans with Disabilities Act (ADA) compliant elevators at the Broad Street subway station that would provide access from Broad Street to the southbound and northbound subway platforms and (ii) improvements to the ingress and egress at two control areas at the connecting Wall Street Station.

The Applicant, Madison 45 Broad Development LLC, obtained a new building permit from the Department of Buildings (DOB) in May 2017 (Job No. 121190772) for a 1,115-foot (66-floor), approximately 380,957-gsf, as-of-right mixed-use building on the Development Site, and is proceeding with foundation work and performing other early stage construction activities pursuant to that permit. Upon approval of the Proposed Action, 2.99 FAR of bonus floor area would be incorporated into the as-of-right building during the course of construction, pursuant to an amended DOB building permit. The incorporation of bonus floor area in the proposed building would not result in any change to the building height or overall building dimensions. The Restrictive Declaration recorded against the Project Site that would accompany the proposed Special Permit provides that the height of any building that incorporates the bonus floor area would not exceed 1,115 feet.

The New York City Council is now considering a number of modifications to the Restrictive Declaration (see "Attachment A"). These modifications would have no effect on the proposed Development Project in terms of use, size, building height, or overall dimensions.

This Technical Memorandum considers the potential environmental effects of the modifications to the Restrictive Declaration proposed by the New York City Council. It further considers the potential environmental effects of a correction to the location of subway station improvements in the Wall Street Station of the 4/5 Lexington Avenue line at Broadway between Pine Street and Thames Street that results in a modification to the 2017 EAS Study Area boundary.[1] As disclosed in this Technical Memorandum, these modifications and corrections would not alter the conclusions of the 2017 EAS or the Negative Declaration.

2.0 DESCRIPTION OF THE PROPOSED MODIFICATIONS

Modifications to the Restrictive Declaration

The following summarizes the intent of the modifications to the Restrictive Declaration being proposed by the New York City Council:

- Clarify that issuance of a zero occupancy Temporary Certificate of Occupancy (TCO) allowed under the Restrictive Declaration prior to substantial completion of the subway improvements would not allow occupancy of the building for any use;

- Modify platform-level plan for the Broad Street Station improvements to illustrate new turnstiles on southbound platform;

- Modify provisions governing issuance of TCOs to provide that (i) at least 36,695 square feet of floor area located in the building at a height above 229 feet above grade is designated as "Bonus Floor Area," and (ii) the remaining "Bonus Floor Area" may be located in the building below 229 feet above grade;

- Provide that the design development and construction drawings for the Broad Street Station improvements shall include signage at the street level elevator landings indicating that the westerly elevator services the southbound terminus of the J/Z line and that the easterly elevator services the northbound entry to the J/Z line, as specified by the Metropolitan Transportation Authority (MTA).

Correction to the Location of the Subway Station Improvements and EAS Study Area Boundary

The 2017 EAS indicates that the proposed Wall Street Station ingress/egress improvements would be implemented at the Lexington Avenue 4/5 subway line entrances located on (i) the west side (downtown entrance) and (ii) east side (uptown entrance) of Broadway between Wall Street and Rector Street (Figure 1). However, the proposed ingress/egress improvements would be implemented at the downtown entrances at (i) Broadway between Wall Street and Rector Street (as previously analyzed in the 2017 EAS), and (ii) Broadway between Pine Street and Thames Street (the corrected location) (Figure 2). This correction to the location of the proposed Wall Street Station improvement results in a modified 400-foot Study Area boundary, as shown in Figure 2.

[1] The 2017 EAS incorrectly identified the location of one of the subway station improvement locations that resulted in incorrect study area boundaries. See Figures 1 and 2.

3.0 POTENTIAL IMPACTS OF THE PROPOSED MODIFICATIONS

Modifications to the Restrictive Declaration

The proposed modifications to the Restrictive Declaration, as summarized above, would have no effect on the technical analyses presented in the 2017 EAS; therefore, no further assessment is necessary.

Correction to the Location of the Subway Station Improvements and EAS Study Area Boundary

As described in Section 2.0, the correction to the location of the proposed Wall Street Station ingress/egress improvements at Broadway between Pine Street and Thames Street results in a modified 400-foot Study Area boundary, as shown in Figure 2.

The 2017 EAS assessed the following eight (8) CEQR technical areas for potential environmental effects: Land Use, Zoning and Public Policy; Historic and Cultural Resources; Shadows; Urban Design; Hazardous Materials; Transportation; Air Quality; and Construction. The following six (6) technical areas can be screened out from requiring further analysis in response to the correction to the location of the subway station improvements: Shadows, Urban Design, Hazardous Materials, Transportation, Air Quality, and Construction. The proposed Wall Street Station improvements at Broadway between Pine Street and Thames Street (i.e., the corrected location) are limited to below-grade ingress/egress areas and involve only the replacement of the High Exit and Entrance Turnstiles with Automatic Fare Control (AFC) turnstiles in the station. Pursuant to Section 28-105.4.2 of the New York City Administrative Code, these proposed improvements are categorized as "minor alterations and repairs." Therefore, based on guidelines established in the *CEQR Technical Manual* (March 2014 Edition), these improvements did not warrant an assessment of potential environmental effects for these six technical areas.

However, the following two (2) CEQR technical areas cannot be screened out based on the CEQR Technical Manual guidelines and, therefore, warrant additional discussion: Land Use, Zoning, and Public Policy, and Historic and Cultural Resources.

Land Use, Zoning, and Public Policy

Land Use

As described in the 2017 EAS, the Project Site is in the Financial District in Lower Manhattan, which is primarily defined by high-rise office buildings and ground floor commercial uses. The Study Area also contains high-rise residential buildings. The Proposed Action would facilitate a high-rise mixed-use building on the Development Site, which would include ground floor commercial uses. Predominant land uses within the 2017 EAS 400-foot Study Area include the following: commercial/office and commercial/residential (Figure 3). The 2017 EAS concluded that the Proposed Action would not result in a change of land uses as compared to the No-Action Condition, would not directly displace any current land uses resulting in an adverse impact on the surrounding uses, and would not generate land uses that would be incompatible with current land uses in the Study Area.

The modified 400-foot Study Area boundary does not contain any land uses that differ from those previously contemplated in the 2017 EAS (Figure 4). Therefore, the correction to the location of subway

station improvements in the Wall Street Station of the 4/5 Lexington Avenue line at Broadway between Pine Street and Thames Street and resultant modification to the 2017 EAS Study Area boundary 400-Study Area does not alter the conclusions of the 2017 EAS as they pertain to land use. Based on this information, no further assessment is necessary.

Zoning

The entirety of the 2017 EAS 400-foot Study Area is mapped with a C5-5 district, and is within the Special LM District and the Historic Commercial Core Subdistrict (Figure 5). As described in the 2017 EAS, the Proposed Action would result in an increase in total permitted FAR on the Project Site (up to a 3.00 FAR bonus) in exchange for subway station improvements; however the FAR increase would not increase the permitted as-of-right residential floor area. The Development Project, facilitated by the City Planning Commission (CPC) granted special permit, would conform to the existing C5-5 zoning district uses and dimensional regulations, as well as the applicable Special LM District regulations. The proposed building height and bulk in the With-Action Condition would be identical to the building height and bulk in the No-Action Condition. Moreover, the Proposed Action would not result in a change in zoning different from the surrounding zoning The 2017 EAS concludes the Development Project would be consistent with development patterns defining the built environment in the Study Area.

The modified 400-foot Study Area boundary does not contain any zoning districts that differ from those previously contemplated in the 2017 EAS (Figure 4). Therefore, the correction to the location of subway station improvements in the Wall Street Station of the 4/5 Lexington Avenue line at Broadway between Pine Street and Thames Street and resultant modification to the 2017 EAS Study Area boundary 400-Study Area does not alter the conclusions of the 2017 EAS as they pertain to zoning. Based on this information, no further assessment is necessary.

Public Policy

As described in the 2017 EAS, public policies applicable in the 400-foot Study Area include: *One New York: The Plan for a Strong and Just City* (OneNYC) and New York City's Waterfront Revitalization Program (WRP) (Figures 7 and 9).

The modified 400-foot Study Area is not subject to any public policies that were not contemplated in the 2017 EAS. The modified Coastal Zone Boundary Map (Figure 8) and modified FEMA FIRM Map (Figure 10) would not affect the coastal consistency analysis; no additional flood zones are within the modified 400-Study Area boundary. Therefore, the correction to the location of subway station improvements in the Wall Street Station of the 4/5 Lexington Avenue line at Broadway between Pine Street and Thames Street and resultant modification to the 2017 EAS Study Area boundary 400-Study Area does not alter the conclusions of the 2017 EAS as they pertain to public policy. Based on this information, no further assessment is necessary.

Historic and Cultural Resources

Existing Conditions

The 2017 EAS 400-foot Study Area contains 79 historic resources that are designated as New York City Landmarks (NYCL) by the Landmarks Preservation Commission (LPC) and/or listed on the

State/National Register of Historic Places (S/NR). These historic resources include the Street Plan of New Amsterdam (11 street segments), historic lampposts (Lampposts 3, 4, 5, and 6), two historic districts (Wall Street and Stone Street historic districts), the IRT Subway System Underground Interior at Wall Street Station (Lexington Avenue 4/5 Line), and 74 buildings (Figure 11 and Table 1).

The correction to the location of subway station improvements in the Wall Street Station of the 4/5 Lexington Avenue line at Broadway between Pine Street and Thames Street results in a modified 400-foot Study Area boundary. As shown in Figure 12 and Table 1, this modified Study Area contains four (4) additional historic resources not contained in the 2017 EAS 400-foot Study Area:

- American Stock Exchange Building, 86 Trinity Place, Designated LPC Landmark (LP-02515) S/NR Listed
- U.S. Realty Company Building, 115 Broadway, Designated LPC Landmark (LP-01558) S/NR Listed
- Equitable Building, 120 Broadway, Designated LPC Landmark (LP-01935) S/NR Listed
- Western Electric Company Factory, 22 Thames Street, S/NR Listed

Architectural Resources – Direct Effects

Development Project

As described in the 2017 EAS, the Development Site is within the S/NR listed Wall St. Historic District. The Development Site is also directly adjacent to the S/NR listed Lee, Higginson & Company Bank Building at 41 Broad Street, the Broad Exchange Building at 25 Broad Street (S/NR and LPC listed), and the LPC designated Street Plan of New Amsterdam and Colonial New York. The Development Site is completely vacant and contains no architecturally significant resources. Therefore, the Proposed Action would not result in new construction, demolition, or significant physical alteration to any landmarked or landmark eligible historic building, structure, or object.

As described in the 2017 EAS all construction activities on the Development Site would follow the guidelines and procedures of the NYC DOB's TPPN#10/88 to avoid any damage to any historic structures within 90 feet, including the Lee, Higginson & Company building, the Broad Exchange Building and the Lord's Court Building. In addition, an LPC-approved Construction Protection Plan (CPP) would be developed to ensure the protection of adjacent historic structures during construction. Based on this information, the Proposed Action would not result in any potentially significant direct impacts on architectural resources.

The correction to the location of subway station improvements in the Wall Street Station of the 4/5 Lexington Avenue line at Broadway between Pine Street and Thames Street and the additional four (4) historic resources contained in the 400-Study Area boundary do not alter the conclusions of the 2017 EAS as they pertain to the Development Project's potential for direct effects on architectural resources. Therefore, no further assessment is necessary.

Subway Station Improvements

The Proposed Project also includes subway station improvements to the Broad Street J/Z subway station adjacent to the Project Site at Broad Street and Exchange Place, as well as improvements to the two control areas for ingress and egress at the connecting Wall Street Station on the Lexington Avenue line. The Broad Street improvement would consist of the installation of two ADA-compliant elevators at the Broad Street J/Z subway station that would provide access from Broad Street to the southbound and northbound subway platforms. One elevator is proposed to be located on the southwest corner of Broad Street and Exchange Place and the other is proposed to be located at the northeast corner. Improvements to the connecting Wall Street Station of the Lexington Avenue line would include the replacement of High Exit and Entrance Turnstiles with typical Automatic Fare Control (AFC) turnstiles.

As stated in its Binding Report dated 30 August 2016 (Docket #192370, Appendix D), LPC, at the Public Meeting of 26 July 2016, approved the proposed subway station improvements, concluding that the installation of the elevator bulkheads and alteration to the sidewalk and curbs would not significantly alter the character of the street bed or otherwise permanently affect the street pattern, and that the proposed work would not diminish the special architectural and historic character of the Street Plan of New Amsterdam and Colonial New York Individual Landmark. Based on these findings, LPC determined the proposed work to be appropriate and issued a positive report.

The corrected location where the proposed replacement of the High Exit and Entrance Turnstiles with Automatic Fare Control (AFC) turnstiles would be implemented is within the "IRT Subway Station Underground Interior" (designated LPC landmark (LP 1096)) and below the Trinity Building at 111 Broadway (designated LPC landmark (LP-1557) and S/NR listed). Although the proposed improvements are within 90 feet of these historic resources, the proposed improvements are limited to underground turnstile replacements. Pursuant to Section 28-105.4.2 of the New York City Administrative Code, the proposed improvements are categorized as "minor alterations and repairs." Therefore, monitoring requirements pursuant to Section 3309.16 of the New York City Building Code do not apply.

Further, because the proposed improvements to the connecting Wall Street Station would be limited to below-grade ingress/egress areas and involve only the replacement of the High Exit and Entrance Turnstiles with Automatic Fare Control (AFC) turnstiles, there would be no potential effect on the four (4) additional historic resources contained in the modified 400-foot Study Area boundary.

The corrected location of subway station improvements in the Wall Street Station of the 4/5 Lexington Avenue line at Broadway between Pine Street and Thames Street and resultant modification to the 2017 EAS Study Area boundary 400-Study Area does not alter the conclusions of the 2017 EAS as they pertain to direct effects on architectural resources. Based on this information, no further assessment is necessary.

Architectural Resources – Indirect Effects

Development Project

As described in the 2017 EAS, the Proposed Action would facilitate construction of a 1,115-foot (80-floor) commercial/residential building on the Development Site, which is the same height as the 1,115-

foot (66-floor) as-of-right building in the No-Action Condition; it would result only in an internal reconfiguration of floors to provide the additional floor area. Because the With-Action building envelope would be identical to that of the as-of-right building in the No-Action Condition, the Proposed Action would not result in any effects to the context or visual prominence of the adjacent historic buildings along Broad Street, including the adjacent Lee, Higginson & Company Bank Building (an S/NR-listed historic building). The With-Action building would conform to the as-of-right building street wall, building height, and setbacks; therefore, the Proposed Action would not alter existing view corridors or alter any historic resource's setting or visual relationship with the streetscape within the 400-foot Study Area. Based on this information, the Proposed Action would not result in any potentially significant indirect impacts on architectural resources.

The correction to the location of subway station improvements in the Wall Street Station of the 4/5 Lexington Avenue line at Broadway between Pine Street and Thames Street and the additional four (4) historic resources contained in the modified 400-foot Study Area boundary do not alter the conclusions of the 2017 EAS as they pertain to the Development Project's potential for indirect effects on architectural resources. Therefore, no further assessment is necessary.

Subway Station Improvements

The proposed improvements to the Broad Street subway station and the connecting Wall Street Station are described above. As stated in its Binding Report dated 30 August 2016 (Docket #192370, Appendix D), LPC, at the public meeting of 26 July 2016, approved the proposed Broad Street subway station improvements, concluding that the installation of the elevator bulkheads and alteration to the sidewalk and curbs would not significantly alter the character of the street bed or otherwise permanently affect the street pattern, and that the proposed work would not diminish the special architectural and historic character of the Street Plan of New Amsterdam and Colonial New York Individual Landmark.

Because the proposed improvements to the connecting Wall Street Station would be limited to below-grade ingress/egress areas and involve only the replacement of the High Exit and Entrance Turnstiles with Automatic Fare Control (AFC) turnstiles, there is no visual relationship to either the 79 historic resources previously identified in the 2017 EAS or the four (4) additional historic resources contained in the modified 400-foot Study Area boundary. Therefore, there is no potential for indirect impacts on historic resources, and no further assessment is necessary.

4.0 CONCLUSION

The purpose of this Technical Memorandum is to assess the potential environmental effects of (i) the administrative modifications to the Restrictive Declaration proposed by the New York City Council and (ii) a correction in the location of subway station improvements in the Wall Street Station of the 4/5 Lexington Avenue line at Broadway between Pine Street and Thames Street that results in a modification to the 2017 EAS Study Area boundary.

The 2017 EAS assessed the following eight (8) CEQR technical areas for potential environmental effects: Land Use, Zoning and Public Policy; Historic and Cultural Resources; Shadows; Urban Design; Hazardous Materials; Transportation; Air Quality; and Construction. The following six (6) technical areas screened out from requiring further analysis: Shadows, Urban Design, Hazardous Materials, Transportation, Air Quality, and Construction. The proposed Wall Street Station improvements at

Broadway between Pine Street and Thames Street are limited the below-grade ingress/egress areas and involve only the replacement of the High Exit and Entrance Turnstiles with Automatic Fare Control (AFC) turnstiles in the station. Pursuant to Section 28-105.4.2 of the New York City Administrative Code, these proposed improvements are categorized as "minor alterations and repairs." Therefore, based on guidelines established in the *CEQR Technical Manual* (March 2014 Edition), these improvements did not warrant an assessment of potential environmental effects.

The following CEQR technical areas were identified for additional assessment: Land Use, Zoning, and Public Policy, and Historic and Cultural Resources. As disclosed in this Technical Memorandum, the modifications and correction described herein do not alter the conclusions of the 2017 EAS as they pertain to Land Use, Zoning, and Public Policy and Historic and Cultural Resources. Therefore the conclusions of the 2017 EAS remain valid.

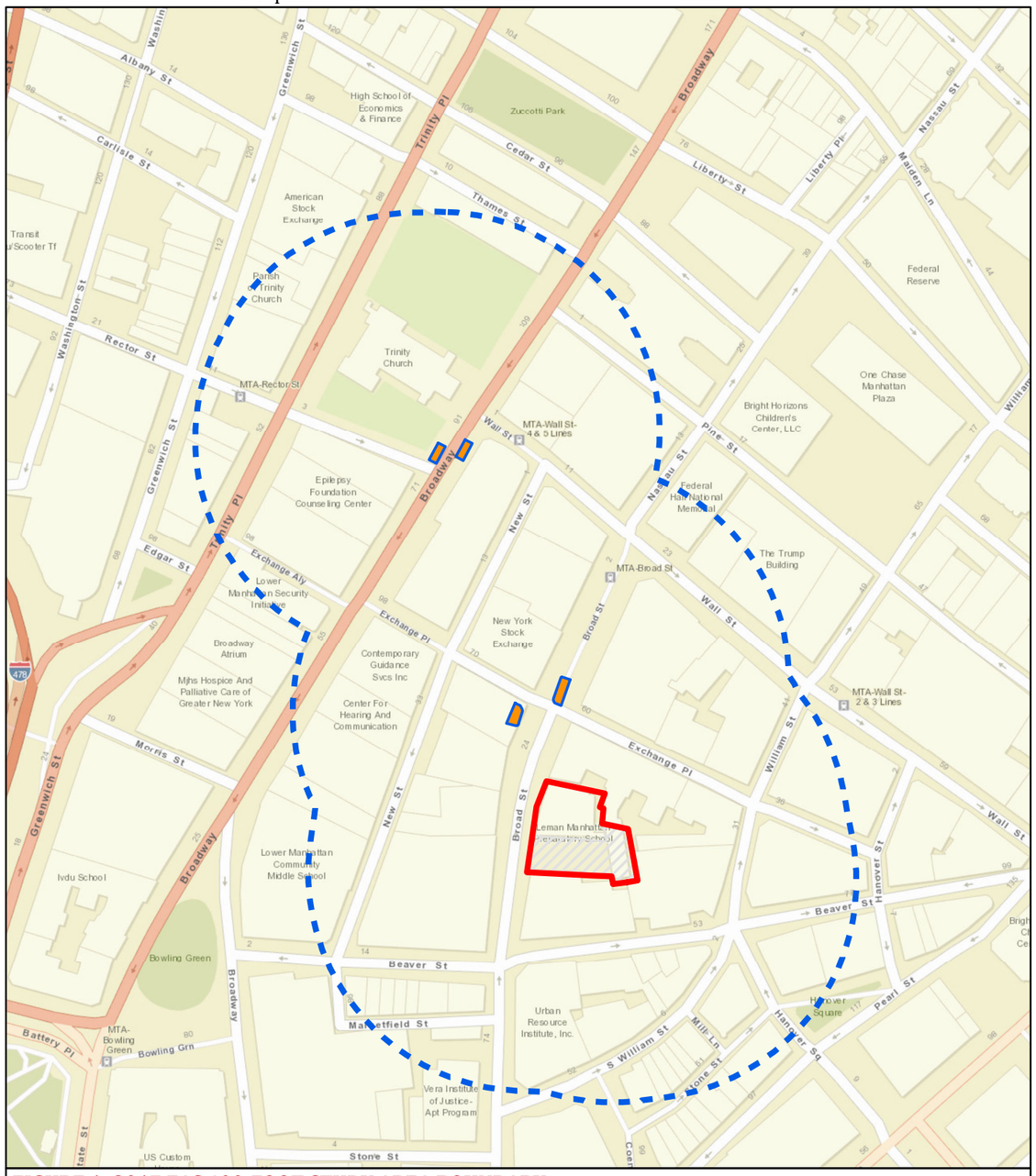

FIGURE 1: 2017 EAS 400-FOOT STUDY AREA BOUNDARY
45 BROAD STREET DEVELOPMENT

0 100 200 400 Feet

N

Project Site
Development Site
Subway Stations
2017 Study Area

FINANCIAL DISTRICT
MANHATTAN, NY

LANGAN

Map Reference: ESRI Basemap; NYC Department of City Planning MapPLUTO

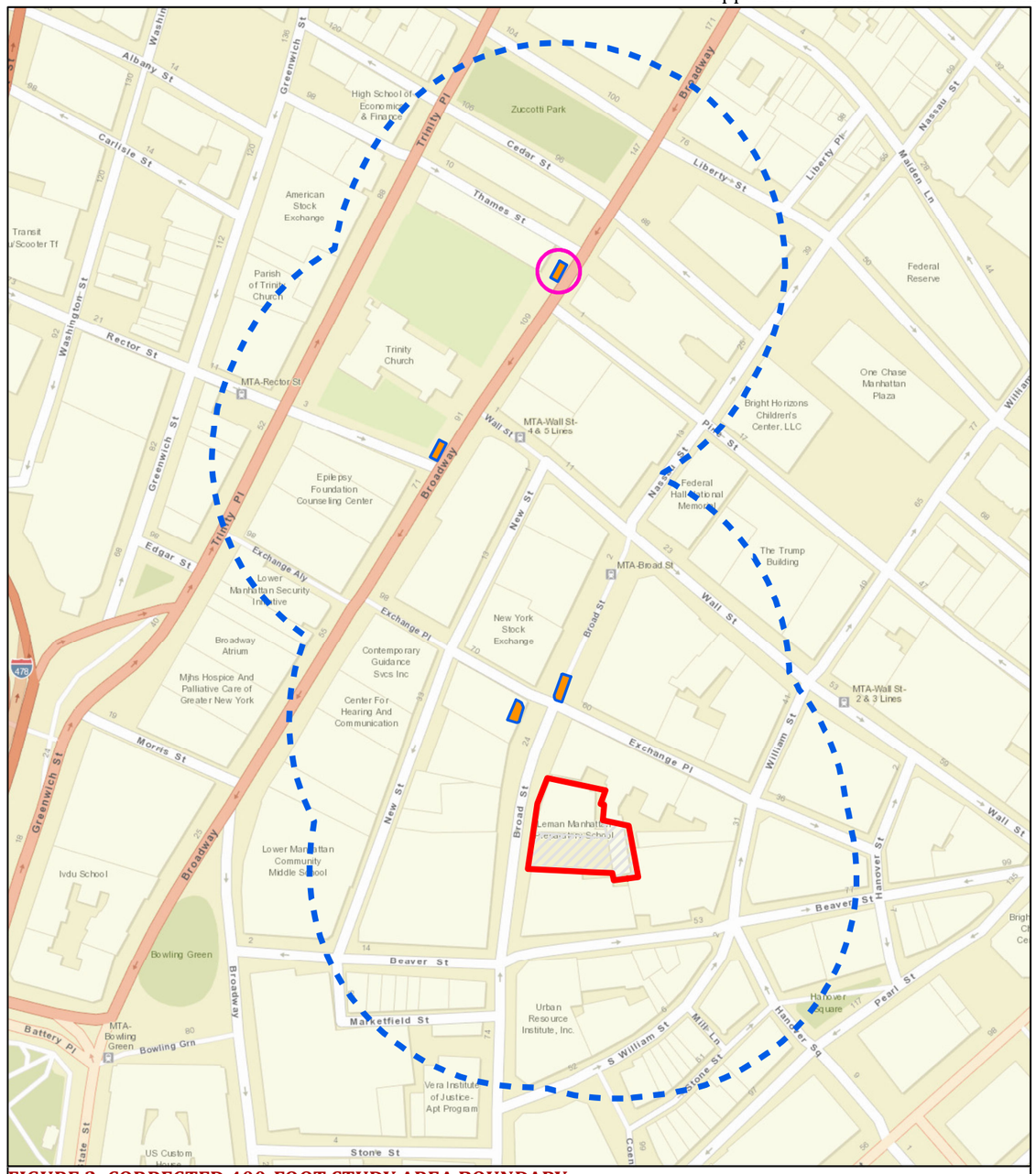

FIGURE 2: CORRECTED 400-FOOT STUDY AREA BOUNDARY
45 BROAD STREET DEVELOPMENT

0 100 200 400 Feet

N

Project Site
Development Site
Subway Stations
Corrected Subway Station Location
Corrected Study Area

FINANCIAL DISTRICT
MANHATTAN, NY

LANGAN

Map Reference: ESRI Basemap; NYC Department of City Planning MapPLUTO

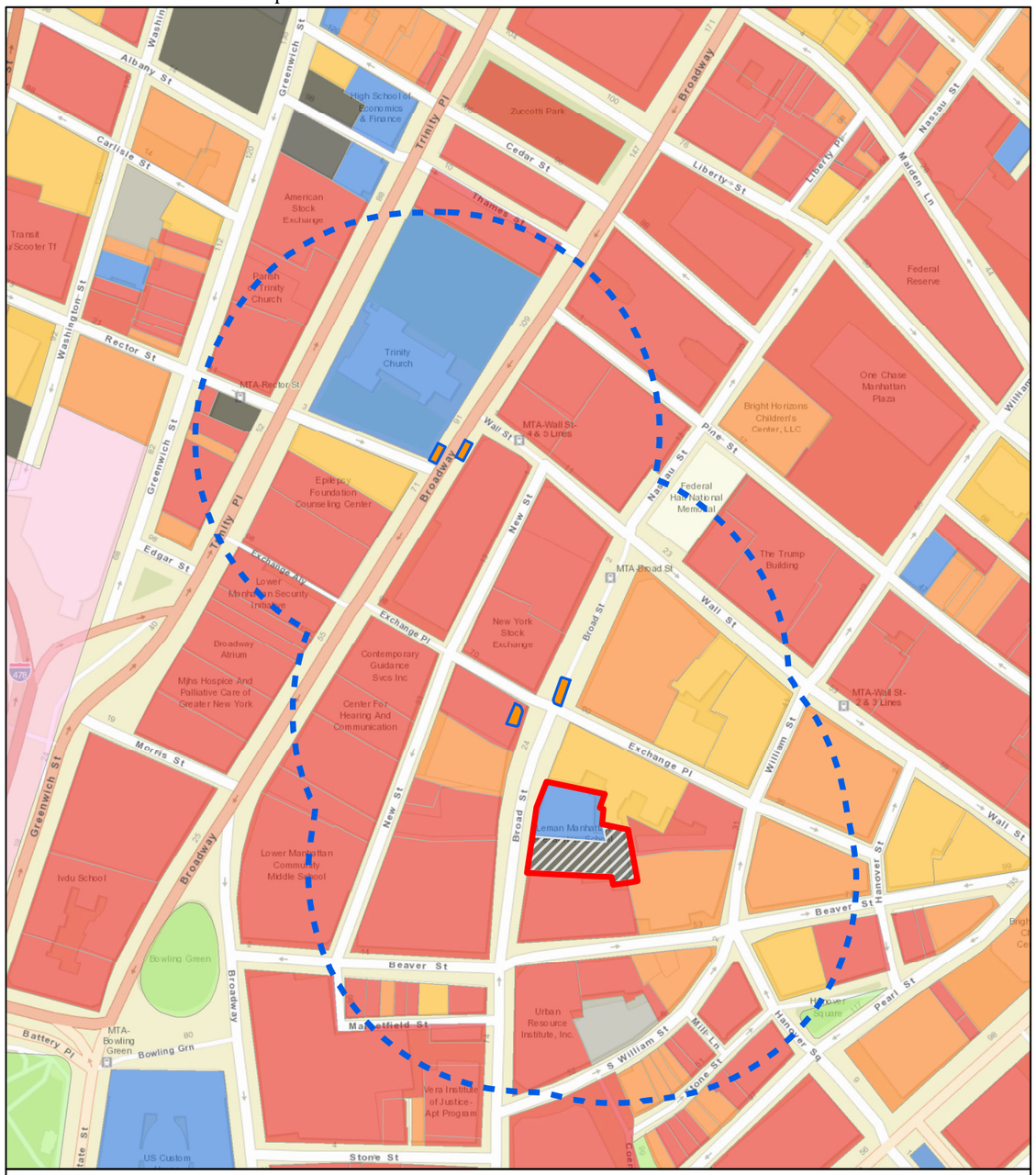

FIGURE 3: 2017 EAS LAND USE MAP

45 BROAD STREET DEVELOPMENT

Study Area (400-foot radius)

0 100 200 400 Feet

N

Directly Affected Area
- Project Site
- Development Site
- Subway Stations

Land Use
- One & Two Family Residences
- Multifamily Walkup Residences
- Multifamily Elevator Residences
- Mixed Residential/Commercial
- Commercial/Office
- Industrial/Manufacturing
- Transportation/Utility
- Public Facilities/Institutions
- Open Space
- Parking
- Vacant Land

FINANCIAL DISTRICT
MANHATTAN, NY

LANGAN

Map Reference: ESRI Basemap; NYC Department of City Planning MapPLUTO

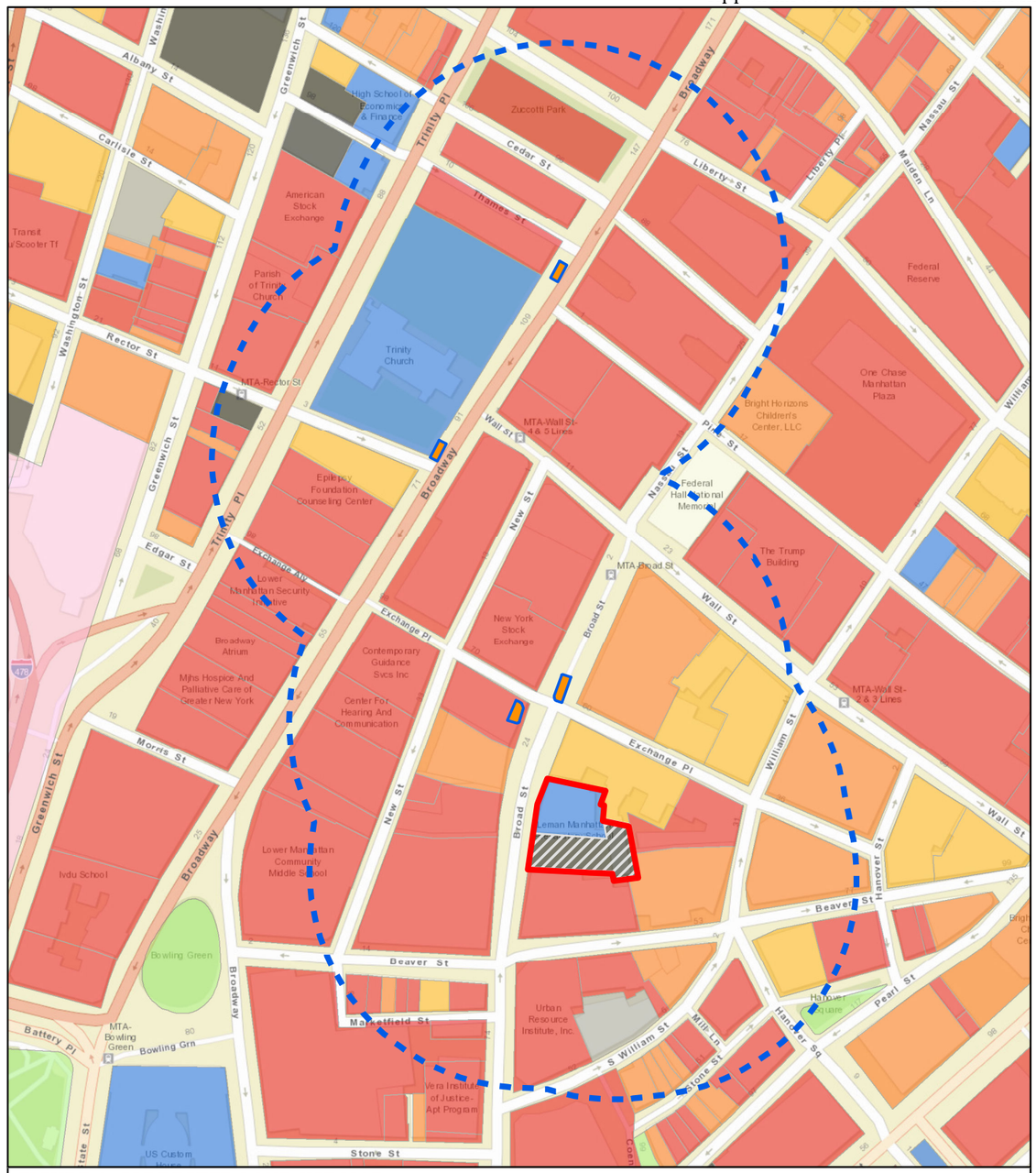

FIGURE 4: CORRECTED LAND USE MAP

45 BROAD STREET DEVELOPMENT

Corrected Study Area (400-foot radius)

0 100 200 400 Feet

N

Directly Affected Area
- Project Site
- Development Site
- Subway Stations

Land Use
- One & Two Family Residences
- Multifamily Walkup Residences
- Multifamily Elevator Residences
- Mixed Residential/Commercial
- Commercial/Office
- Industrial/Manufacturing
- Transportation/Utility
- Public Facilities/Institutions
- Open Space
- Parking
- Vacant Land

FINANCIAL DISTRICT
MANHATTAN, NY

LANGAN

Map Reference: ESRI Basemap; NYC Department of City Planning MapPLUTO

FIGURE 5: 2017 EAS ZONING MAP
45 BROAD STREET DEVELOPMENT

0 100 200 400 Feet

N

Directly Affected Area
- Project Site
- Development Site
- Subway Stations
- Study Area (400-foot radius)
- C5-5 Zoning Districts
- LM Special Purpose District

FINANCIAL DISTRICT
MANHATTAN, NY

LANGAN

Map Reference: NYC Department of City Planning Zoning Map No. 12b

FIGURE 6: CORRECTED ZONING MAP
45 BROAD STREET DEVELOPMENT

0 100 200 400 Feet

N

Directly Affected Area
- Project Site
- Development Site
- Subway Stations
- Corrected Study Area (400-foot radius)
- C5-5 Zoning Districts
- LM Special Purpose District

FINANCIAL DISTRICT
MANHATTAN, NY

LANGAN

Map Reference: NYC Department of City Planning Zoning Map No. 12b

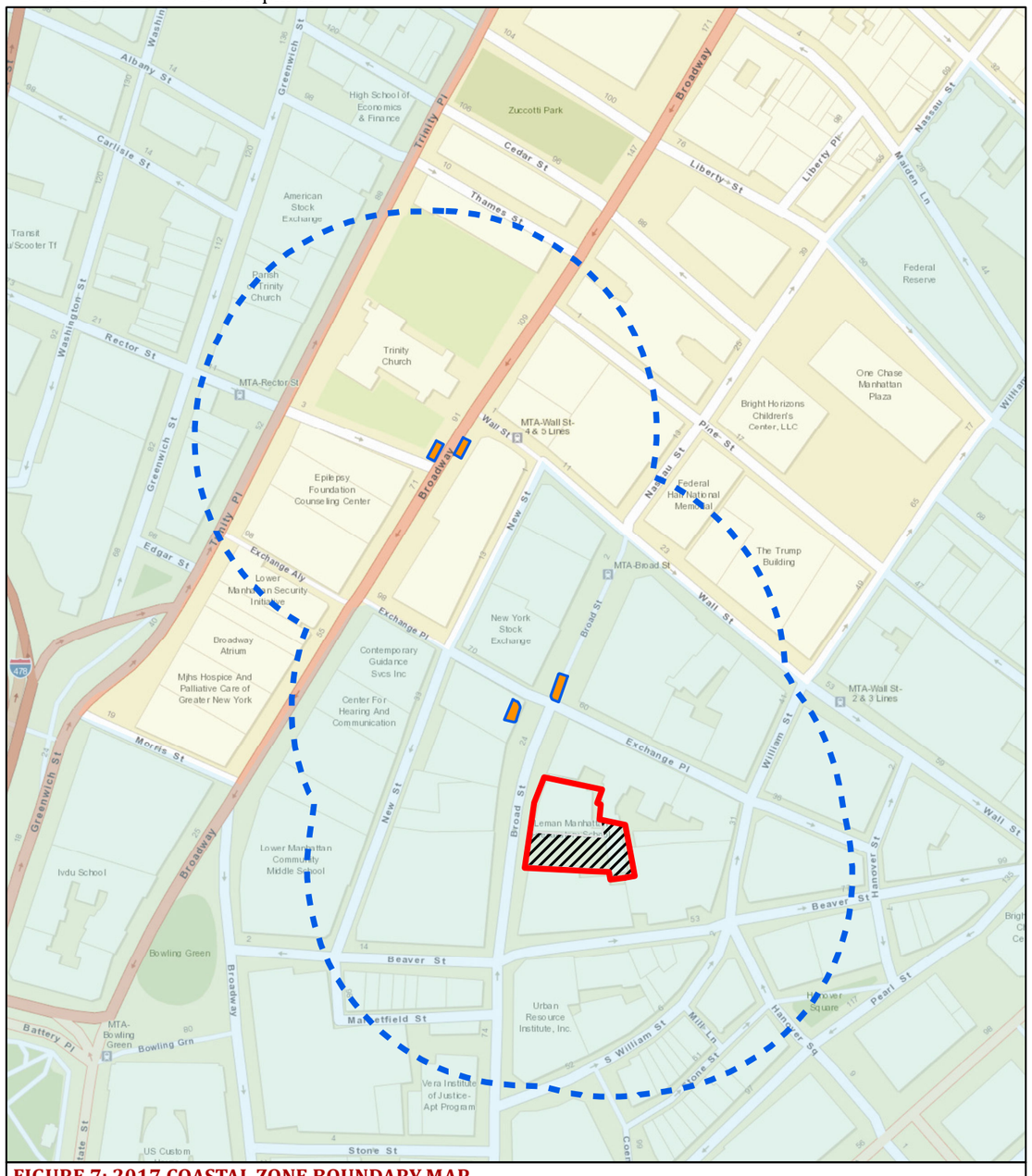

FIGURE 7: 2017 COASTAL ZONE BOUNDARY MAP
45 BROAD STREET DEVELOPMENT
FINANCIAL DISTRICT
MANHATTAN, NY

0 100 200 400 Feet

N

Directly Affected Area

- Project Site
- Development Site
- Subway Stations
- Study Area (400-foot radius)
- Coastal Zone

LANGAN

Map Reference: ESRI Basemap; NYC Department of City Planning MapPLUTO

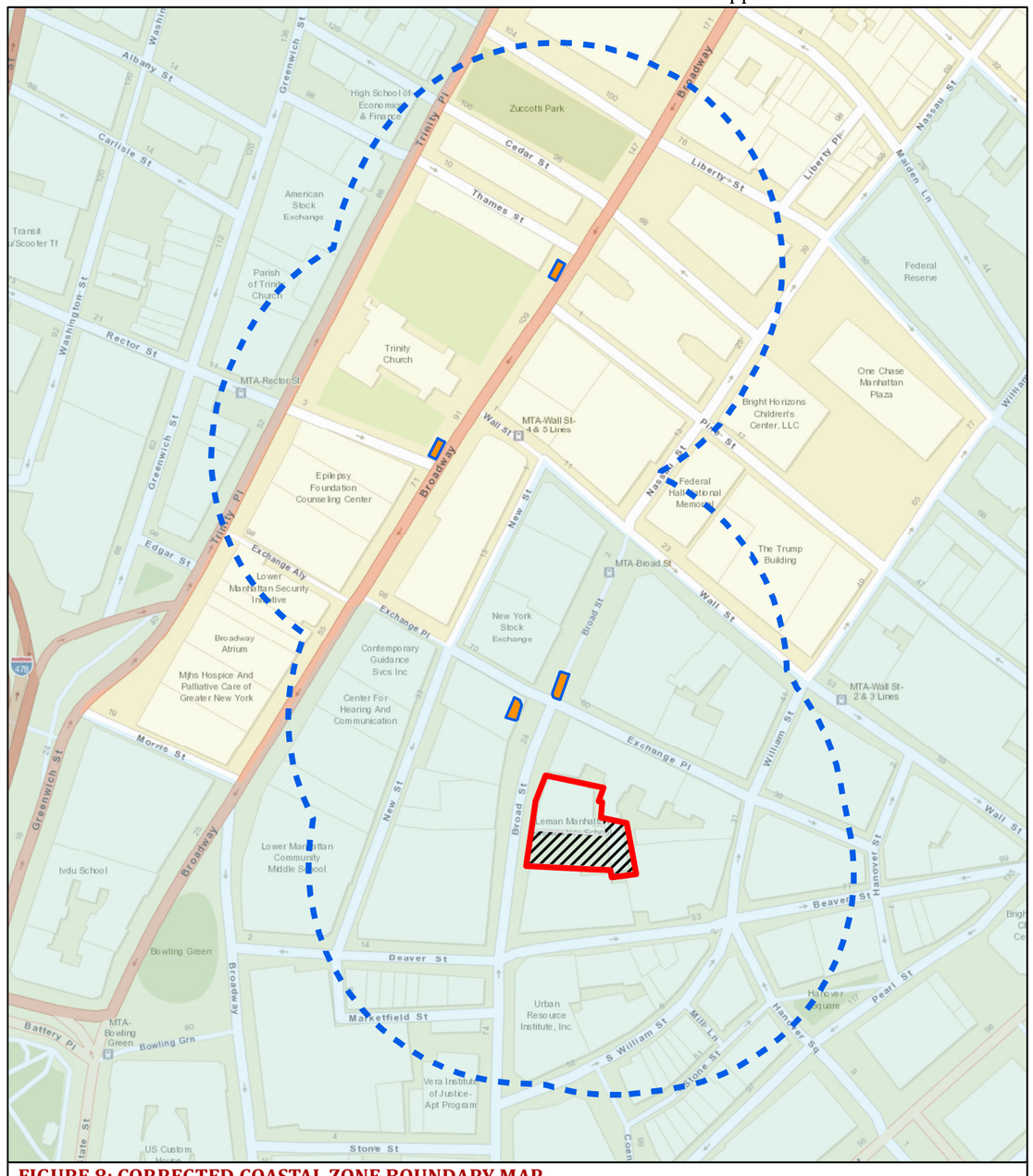

FIGURE 8: CORRECTED COASTAL ZONE BOUNDARY MAP
45 BROAD STREET DEVELOPMENT
FINANCIAL DISTRICT
MANHATTAN, NY

0 100 200 400 Feet

N

Directly Affected Area

- Project Site
- Development Site
- Subway Stations
- Corrected Study Area (400-foot radius)
- Coastal Zone

LANGAN

Map Reference: ESRI Basemap; NYC Department of City Planning MapPLUTO

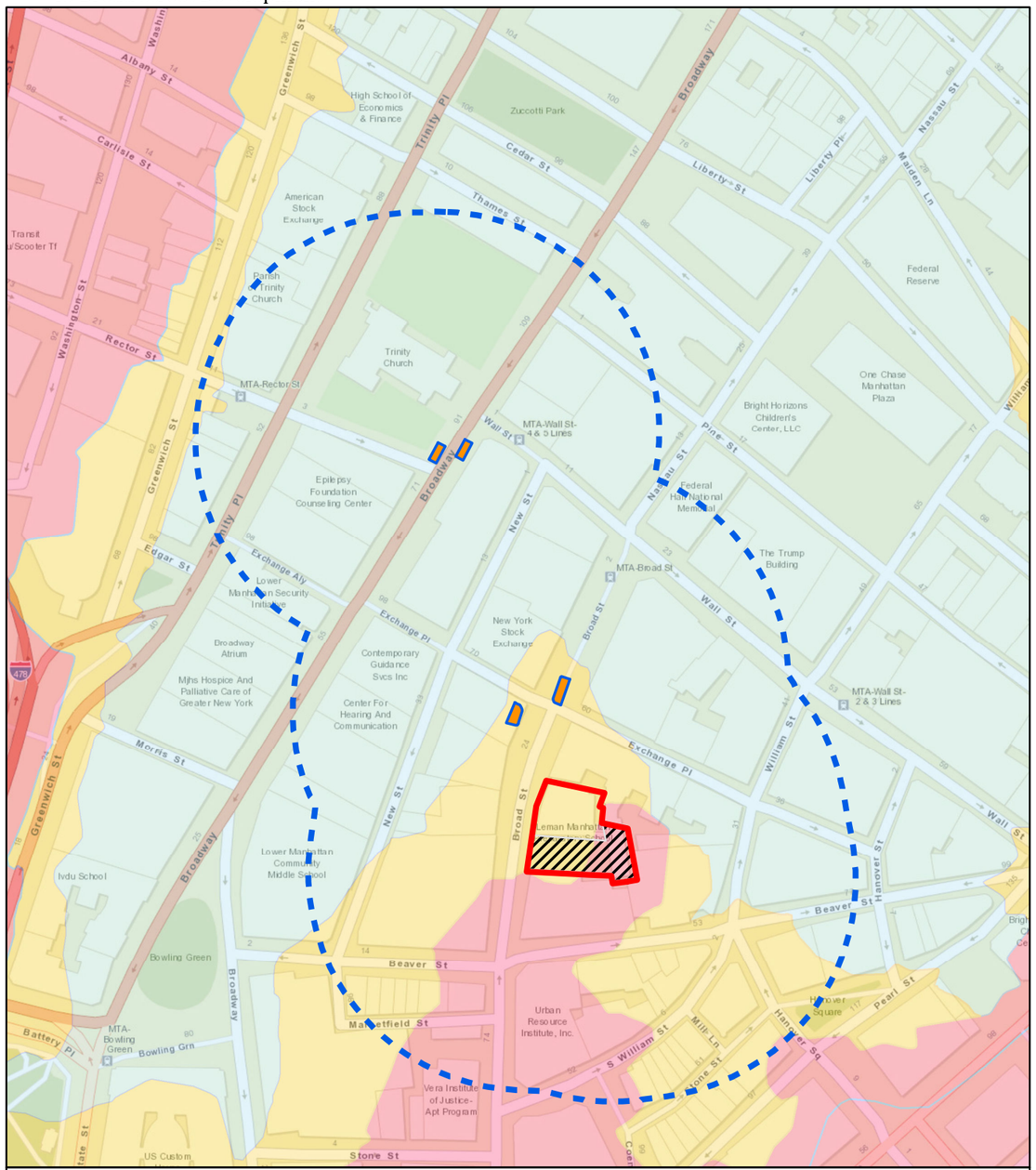

FIGURE 9: 2017 EAS FEMA FIRM MAP
45 BROAD STREET DEVELOPMENT
FINANCIAL DISTRICT
MANHATTAN, NY

Study Area

Directly Affected Area
- Project Site
- Development Site
- Subway Stations

Flood Zones
- Zone AE (1% Annual Chance Flood Hazard)
- 0.2% Annual Chance Flood Hazard
- Zone X

0 100 200 400 Feet

N

LANGAN

Map Reference: ESRI Basemap; NYC Department of City Planning MapPLUTO

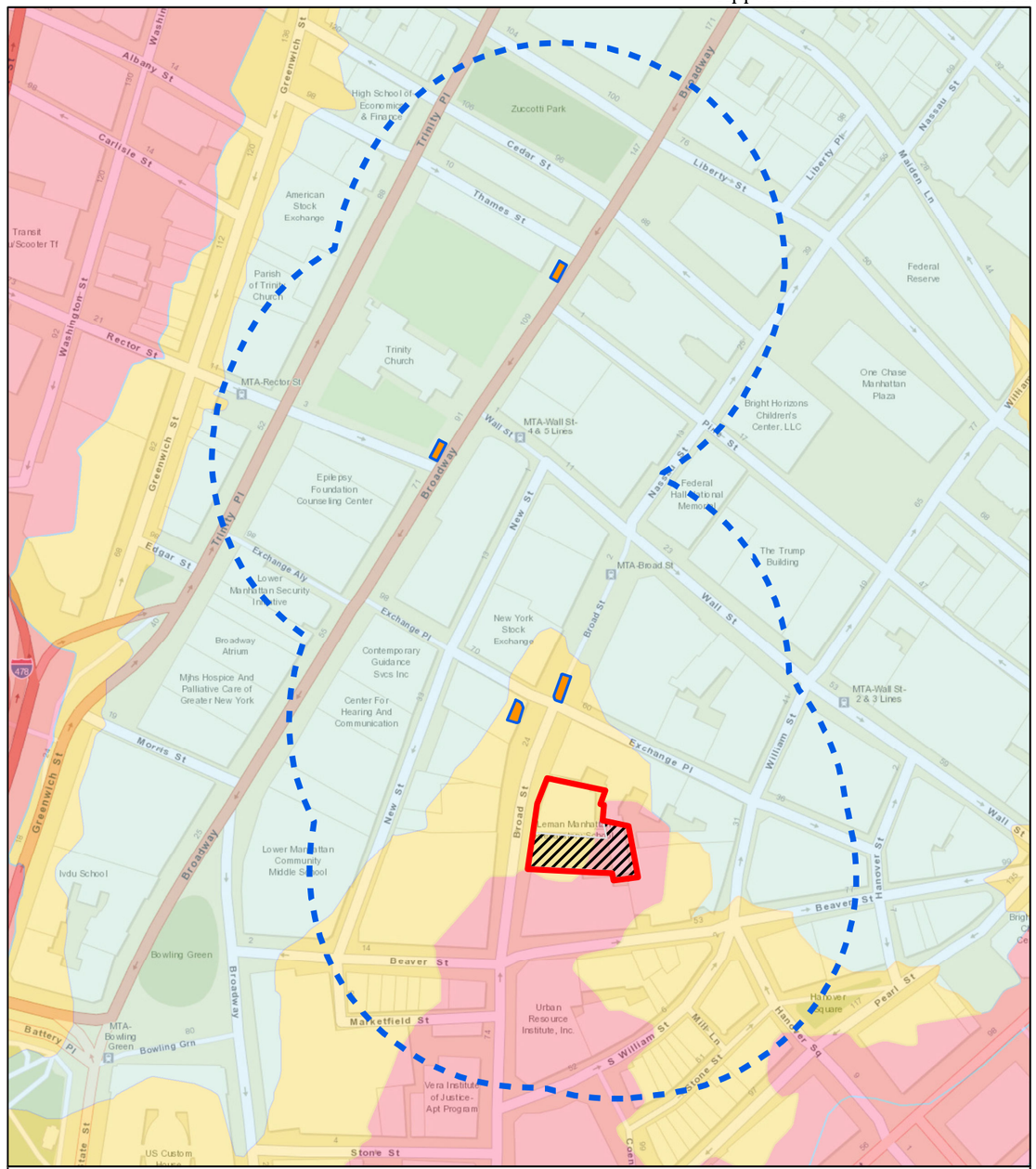

FIGURE 10: CORRECTED FEMA FIRM MAP
45 BROAD STREET DEVELOPMENT
FINANCIAL DISTRICT
MANHATTAN, NY

Corrected Study Area

Directly Affected Area
- Project Site
- Development Site
- Subway Stations

Flood Zones
- Zone AE (1% Annual Chance Flood Hazard)
- 0.2% Annual Chance Flood Hazard
- Zone X

0 100 200 400 Feet

N

LANGAN

Map Reference: ESRI Basemap; NYC Department of City Planning MapPLUTO

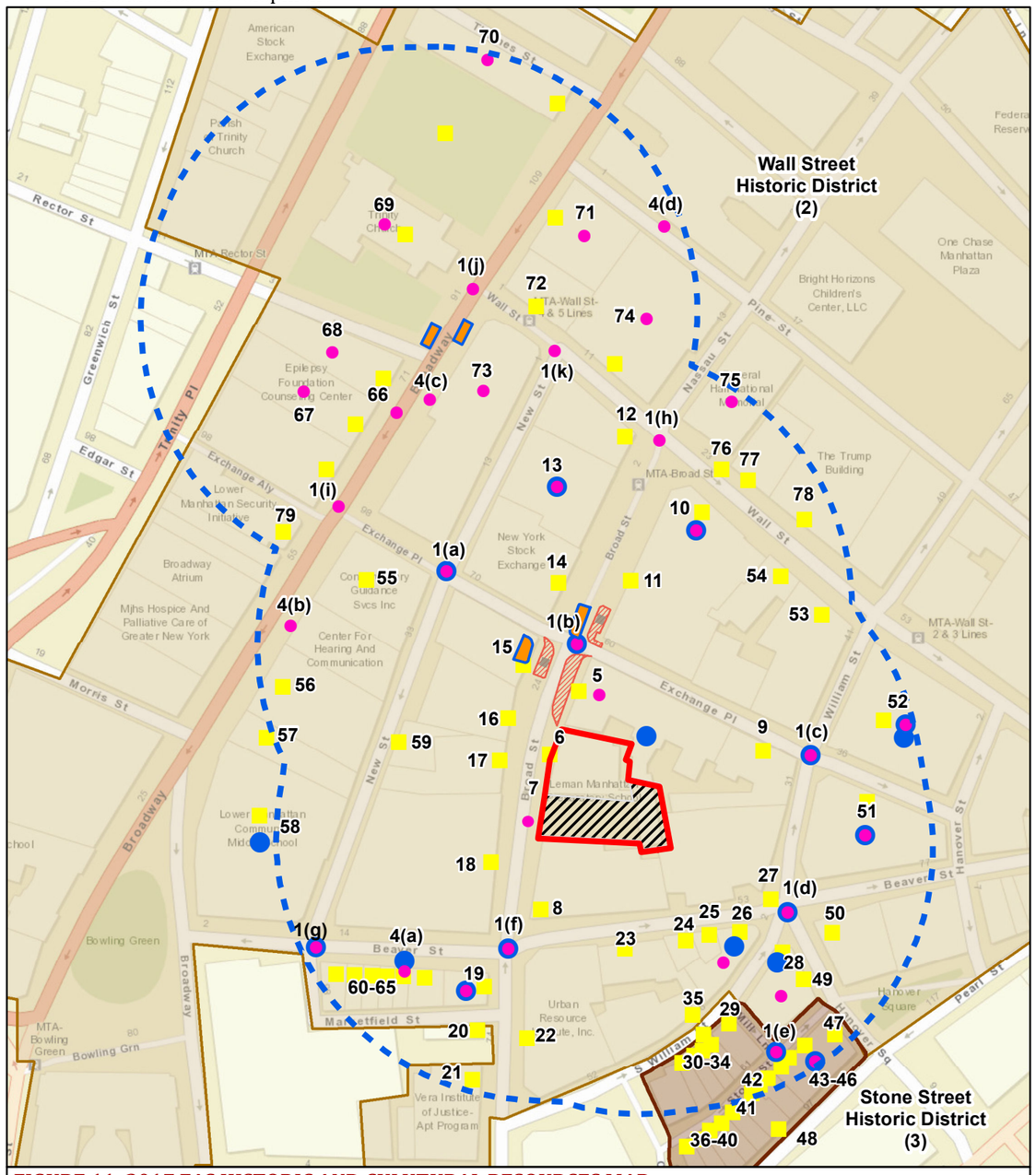

FIGURE 11: 2017 EAS HISTORIC AND CULUTURAL RESOURCES MAP
45 BROAD STREET DEVELOPMENT

Map Reference: NYC Department of City Planning MapPLUTO; NYC Landmarks Preservation Commission (LPC); New York State Historic Preservation Office (SHPO)

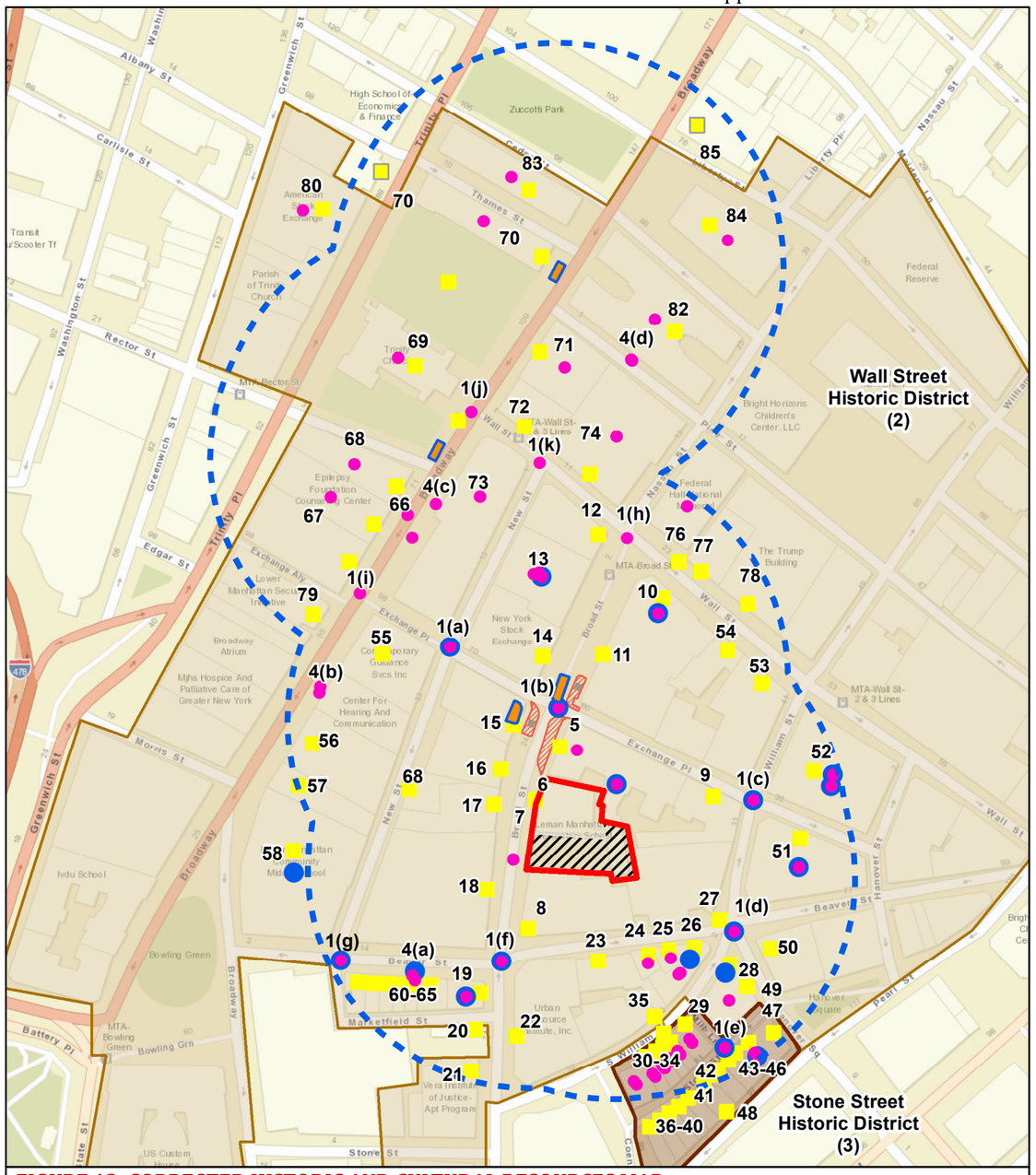

FIGURE 12: CORRECTED HISTORIC AND CULTURAL RESOURCES MAP
45 BROAD STREET DEVELOPMENT

Map Reference: NYC Department of City Planning MapPLUTO; NYC Landmarks Preservation Commission (LPC); New York State Historic Preservation Office (SHPO)

Table 1: Historic and Cultural Resources

Map No.	Historic Resource	Location (New York, NY)	Designation
1	Street Plan of New Amsterdam and Colonial New York	(a) Exchange Place Between Broadway and Hanover Street; New Street Between Wall Street and Marketfield; (b) Exchange Place Between Broadway and Hanover Street; Broad Street Between Wall and Pearl Streets (c) Exchange Place Between Broadway and Hanover Street; William Street Between Wall And Beaver Streets; (d) Beaver Street Between Broadway and Pearl Street; William Street, South William Street and Hanover Square; (e) Beaver Street Between Broadway and Pearl Street; Broad Street Between Wall and Pearl Streets; (f) Beaver Street Between Broadway and Pearl Street; New Street Between Wall and Marketfield; (g) Mill Lane Between South William and Stone Street; Stone Street Between Whitehall and Hanover Square; (h) Wall Street between Broadway and Pearl Street; Broad Street between Wall and Pearl Streets; (i) Broadway between Wall and Beaver Streets; Exchange Place between Broadway and Hanover Street; (j) Wall Street between Broadway and Pearl Street; Broadway between Wall Street and Beaver Street; (k) Wall Street between Broadway and Pearl Street; New Street between Wall Street and Beaver Street;	Designated NYC Individual Landmark (LP-1235)
2	Wall Street Historic District	Bounded by Maiden Lane, Pearl, Bridge, and Greenwich streets	S/NR Listed (2007)
3	Stone Street Historic District	Bounded by South William Street, William Street, Pearl Street and Coenties Slip	Designated NYC Historic District (LP-9945) NR Listed (04/28/1997) SR Listed (06/23/1980)
4(a)	Historic Street Lamppost 3	Adjacent to 24 Beaver Street	Designated LPC Landmark (LP-1961)
4(b)	Historic Street Lamppost 4	Adjacent to 50 Broadway	
4(c)	Historic Street Lamppost 5	Adjacent to 80 Broadway	
4(d)	Historic Street Lamppost 6	Adjacent to 10 Pine Street (120 Broadway)	
5	Broad Exchange Building	25 Broad Street	Designated LPC Landmark (LP-2074) S/NR Listed
6	Lee, Higginson Bank Building (on the Project Site)	37-41 Broad Street	S/NR Listed
7	American Bureau of Shipping (demolished previously on the Development Site)	45 Broad Street	S/NR Listed
8	55 Broad Street (non-contributing)	55 Broad Street	S/NR Listed (non-contributing)
9	Lord's Court Building	40 Exchange Place	S/NR Listed
10	J. P. Morgan & Co. Building	23 Wall Street/15 Broad Street	Designated LPC Landmark (LP-0039) S/NR Listed
11	Equitable Trust Company	15 Broad Street	S/NR Listed
12	New York Stock Exchange	11 Wall Street	S/NR Listed
13	New York Stock Exchange	2 Broad Street	Designated LPC Landmark (LP-1529)

Table 1: Historic and Cultural Resources

Map No.	Historic Resource	Location (New York, NY)	Designation
14	20 Broad Street	20 Broad Street	S/NR Listed
15	Continental Bank Building	30 Broad Street	S/NR Listed
16	Office Building (non-contributing)	40 Broad Street	S/NR Listed (1982; non-conforming)
17	50 Broad Street	50 Broad Street	S/NR Listed
18	FCC 621 (non-contributing)	60 Broad Street	S/NR Listed
19	American Bank Note Company Office Building	70 Broad Street	Designated LPC Landmark (LP-1955) S/NR Listed
20	74 Broad Street	74 Broad Street	S/NR Listed
21	Maritime Exchange Building	80 Broad Street	S/NR Listed
22	Former International Telephone Building	75 Broad Street	S/NR Listed
23	Kerr Steamship Co. Building	44 Beaver Street	S/NR Listed
24	Delmonico's Building (non-contributing)	48 Beaver Street	S/NR Listed (non-contributing)
25	Delmonico's Building (non-contributing)	52 Beaver Street	S/NR Listed (non-contributing)
26	Delmonico's Building (non-contributing)	54-56 Beaver Street	Designated LPC Landmark (LP-1944) S/NR Listed (non-contributing)
27	Delmonico's Restaurant	2-6 South William Street	S/NR Listed
28	J. & W. Seligman & Company Building/Lehman Brothers Building	1 William Street	Designated LPC Landmark (LP-1943) S/NR Listed
29	Office; American Board of Trades	9-11 South William Street	S/NR Listed
30	Business; now bar and restaurant (Stone Street Historic District)	13 South William Street	S/NR Listed
31	Business; now restaurant and offices	15 South William Street	S/NR Listed
32	Business; now Art Gallery/Offices	17 South William Street	S/NR Listed
33	Business	19 South William Street	S/NR Listed
34	Business	21-23 South William Street	S/NR Listed
35	Parking Garage (non-contributing)	26 South William Street	S/NR Listed (non-contributing)
36	Commercial Building	44 Stone Street	S/NR Listed
37	Commercial Building	46 Stone Street	S/NR Listed
38	Commercial Building	48 Stone Street	S/NR Listed
39	Commercial Building	50 Stone Street	S/NR Listed
40	Commercial Building	52 Stone Street	S/NR Listed
41	The Customs House on Pearl Street	54-56 Stone Street	S/NR Listed
42	Commercial Building	58 Stone Street	S/NR Listed
43	India House (Private Club)	60 Stone Street	S/NR Listed
44	India House (Private Club)	62 Stone Street	S/NR Listed
45	India House (Private Club)	64 Stone Street	S/NR Listed
46	India House (Private Club)	66 Stone Street	S/NR Listed
47	New York Cotton	1 Hanover Square	Designated LPC Landmark (LP-

Table 1: Historic and Cultural Resources

Map No.	Historic Resource	Location (New York, NY)	Designation
	Exchange (India House)		0042) S/NR Listed
48	Commercial building	95 Pearl Street	S/NR Listed
49	(non-contributing)	5 Hanover Square	S/NR Listed (non-contributing)
50	New York Cotton Exchange	3 Hanover Square	S/NR Listed
51	City Bank-Farmers Trust Company Building	20 Exchange Place	Designated LPC Landmark (LP-1941) S/NR Listed
52	First National City Bank (Merchants' Exchange)	55 Wall Street	Designated LPC Landmark (LP-00040); Also Interior Designation (LP-1979); and S/NR Listed
53	Trust Company of America	37 Wall Street	S/NR Listed
54	Atlantic Insurance Group	45 Wall Street	S/NR Listed
55	Standard Oil Building	26 Broadway	Designated LPC Landmark (LP-1930) S/NR Listed
56	Office Building by 1896 by Clinton & Russel	32 Broadway	S/NR Listed
57	Office building	42 Broadway	S/NR Listed
58	Exchange Court (non-contributing)	52 Broadway	S/NR Listed (non-contributing)
59	44 New Street	44 New Street	S/NR Listed
60	16 Beaver Street	16 Beaver Street	S/NR Listed
61	Fusco's Restaurant	18 Beaver St	S/NR Listed
62	20 Beaver Street	20 Beaver Street	S/NR Listed
63	(non-contributing)	22 Beaver Street	S/NR Listed (non-contributing)
64	(non-contributing)	24 Beaver Street	S/NR Listed (non-contributing)
65	Stock Quotation Telegraph Co.	26 Beaver Street	S/NR Listed
66	IRT Subway System Underground Interior (Wall Street Lexington Avenue Line Station)	Wall Street and Broadway	Designated LPC Landmark (LP-1096)
67	American Express Company Building	61 - 65 Broadway	Designated LPC Landmark (LP-1932) S/NR Listed
68	Empire Building	69 Broadway	Designated LPC Landmark (LP-1933) S/NR Listed
69	Trinity Church and Graveyard	75 Broadway	Designated LPC Landmark (LP-0048) S/NR Listed
70	Trinity Building	111 Broadway	Designated LPC Landmark (LP-1557) S/NR Listed
71	American Surety Company Building	96 Broadway	Designated LPC Landmark (LP-1934) S/NR Listed
72	First National City Bank Building	2 Wall Street	S/NR Listed
73	1 Wall Street Building	58 Broadway	Designated LPC Landmark (LP-2029)
74	14 Wall Street Building	14 Wall Street	Designated LPC Landmark (LP-1949) S/NR Listed

Table 1: Historic and Cultural Resources

Map No.	Historic Resource	Location (New York, NY)	Designation
75	Federal Hall	26 Wall Street	Designated LPC Landmark (LP-00887)
76	Federal Hall National Memorial	28 Wall Street	Designated LPC Landmark (LP-00047) S/NR Listed
77	United States Assay Office; Seaman's Bank of Savings	30 Wall Street	S/NR Listed
78	Bank of Manhattan Company Building	40 Wall Street	S/NR Listed
79	One Exchange Place	55 Broadway	S/NR Listed
80	**American Stock Exchange**	**86 Trinity Place**	**Designated LPC Landmark (LP-02515)** **S/NR Listed**
81	**U.S. Realty Company Building**	**115 Broadway**	**Designated LPC Landmark (LP-01558)** **S/NR Listed**
82	**Equitable Building**	**120 Broadway**	**Designated LPC Landmark (LP-01935)** **S/NR Listed**
83	**Western Electric Company Factory**	**22 Thames Street**	**S/NR Listed**

***Source**: SHPO's Cultural Resource Information System (CRIS) https://cris.parks.ny.gov/ Accessed on December 12, 2016; and LPC's Discover NYC Landmarks Online Map- http://nyclpc.maps.arcgis.com/apps/webappviewer/index.html?id=93a88691cace4067828b1eede432022b (Accessed on November 16, 2017.*

RESTRICTIVE DECLARATION

NEW YORK COUNTY
BLOCK 25 – LOT 7

RECORD AND RETURN TO:

Fried Frank Harris Shriver & Jacobson, LLP
One New York Plaza
New York, New York 10004
Attention: David Karnovsky, Esq.

RESTRICTIVE DECLARATION

THIS RESTRICTIVE DECLARATION ("**Declaration**"), made as of the [___] day of [_____], 2018, by MADISON 45 BROAD DEVELOPMENT LLC, a Delaware limited liability company having an address at c/o Madison Equities, 105 Madison Avenue, New York, New York 10016 (the "**Declarant**").

W I T N E S S E T H:

WHEREAS, the Declarant is fee owner of certain real property located in the Borough of Manhattan, City and State of New York, designated as Lot 7 of Block 25 (the "**Subject Property**") on the Tax Map of the City of New York (the "**Tax Map**"), which is more particularly described in **Exhibit A** attached hereto;

WHEREAS, in accordance with the procedure available pursuant to Section 12-10 of the Zoning Resolution of the City of New York, effective as of December 15, 1961, as amended (the "**Zoning Resolution**"), the Development Site and certain real property located in the Borough of Manhattan, City and State of New York, designated as Lot 10 of Block 25 on the Tax Map, which is more particularly described in **Exhibit B** attached hereto, have been declared to be a single "zoning lot" (the "**Subject Zoning Lot**") as that term is defined in the Zoning Resolution, pursuant to that certain Declaration of Zoning Lot Restrictions (the "**Declaration of Zoning Lot Restrictions**") by and between 45 Broad LLC, the predecessor in interest to Declarant, and Walwilhal Associates, LLC, dated February 26, 2007, and recorded in the Office of the City Register, New York County, at City Register File Number 2007000122083, a copy of which is attached as **Exhibit C** hereto;

WHEREAS, Declarant filed applications with the New York City Department of City Planning (**"DCP"**) for approval by the New York City Planning Commission (the "**Commission**") of a special permit pursuant to Sections 74-634 and 91-251 of the Zoning Resolution for an increase in the maximum floor area ratio for the provision of major improvements at a subway station adjacent to the Subject Zoning Lot (Application No. C 180063 ZSM) (the "**Special Permit**");

WHEREAS, the Declarant intends to develop the Subject Property pursuant to the Special Permit with a new building utilizing approximately 334,317 zoning square feet of zoning floor area, containing a mix of residential, office, retail and amenity uses (the "**Proposed Building**") and to undertake improvements to the Broad Street station of the Nassau Street subway line (the "**Broad Street Station**") and to fund improvements to the Wall Street station of the Lexington Avenue subway line (the "**Wall Street Station**") in accordance with the Transit Improvement Drawings (defined below);

WHEREAS, the Proposed Building would utilize up to 71,391 square feet of zoning floor area (3.0 FAR) (the "**Bonus Floor Area**") pursuant to the Special Permit;

WHEREAS, environmental review of the Special Permit demonstrated that the Proposed Building would be no taller than a building that could be constructed as-of-right on the Subject Property and accordingly would not lead to additional ground disturbance, and this Declaration provides for a maximum permitted height of the Proposed Building;

WHEREAS, Section 74-634(e)(2) of the Zoning Resolution requires applicants proposing subway station improvements pursuant to Section 91-251 to execute a legally enforceable instrument running with the land containing complete drawings of the proposed improvement and setting forth the obligations of the owner and developer, their successors and assigns, to construct and provide capital maintenance for the improvement, establish a construction schedule and provide a performance bond for completion of the improvement;

WHEREAS, MTA (defined below) has provided a letter (the "**MTA Letter**") to the Commission stating that it has determined that drawings and other documents submitted by Declarant are of sufficient scope and detail (subject to such further review of MTA) to fix and describe the size and character of the Broad Street Station Improvements and the Wall Street Station Improvements (each as defined herein);

WHEREAS, DCP, acting on behalf of the Commission, conducted an environmental review of the Special Permits as lead agency pursuant to City Environmental Quality Review, Executive Order No. 91 of 1977, as amended, and the regulations promulgated thereunder at 62 RCNY§5-01 et seq. ("**CEQR**") and the State Environmental Quality Review Act, New York State Environmental Conservation Law § 8-0101 et seq. and the regulations promulgated thereunder at 6 NYCRR Part 617 ("**SEQRA**"), and issued a Negative Declaration on November 27, 2017 (CEQR No. 18DCP063M);

WHEREAS, Declarant desires to restrict the manner in which the Subject Property may be developed, redeveloped, maintained and operated now and in the future;

WHEREAS, the certificate(s) annexed hereto as **Exhibit D** (**"Certification of Parties-in-Interest**"), Madison Abstract, Inc., dated as of ~~August~~April 2~~8~~5, 201~~7~~8, lists the "parties-in-interest" (as defined in subdivision (c) of the definition of the term "zoning lot" in Section 12-10 of the Zoning Resolution) (each, a **"Party-in-Interest";** multiple being "**Parties-in-Interest**"), to the Subject Property ;~~1~~

WHEREAS, all Parties-in-Interest have either executed this Declaration or waived their right to execute, and subordinated their interest in the Subject Property to, this Declaration, as listed on the Certification of Parties-in-Interest; and

WHEREAS, Declarant represents and warrants that, except with respect to mortgages or other instruments specified herein, the holders of which have given their consent or waived their respective rights to object hereto, there are no restrictions of record on the development or use of the Subject Property, nor any existing lien, obligation covenant, easement, limitation or encumbrance of any kind that shall preclude the enforcement of the obligations and restrictions as set forth herein.

NOW, THEREFORE, Declarant does hereby declare and agree that the Subject Property shall be held, sold, transferred, conveyed and occupied subject to the restrictions, covenants, obligations, easements, and agreements of this Declaration, which shall run with the Subject Property and which shall be binding on Declarant, its successors and assigns.

~~1 Title Certification to be updated prior to final action by City Council pursuant to Section 197-d~~

ARTICLE I.

CERTAIN DEFINITIONS

Section 1.01 Definitions.

For purposes of this Declaration, the following terms shall have the following meanings:

"Additional Scope Items" shall have the meaning set forth in Section 2.01 of this Declaration.

"As-of-Right Building" shall mean any building that can be developed and constructed on the Subject Premises without utilizing the Special Permit.

"Bonus Floor Area" shall have the meaning set forth in the Recitals of this Declaration.

"Broad Street Station Improvements" shall have the meaning set forth in Section 2.01 of this Declaration.

"**Broad Street Transit Improvements Deposit**" shall have the meaning set forth in Section 3.01 of this Declaration.

"Business Days" means any day other than a Saturday, Sunday or other day on which banks in the State of New York are not open for business.

"CEQR" shall have the meaning set forth in the Recitals of this Declaration.

"Certification of Parties-in-Interest" shall have the meaning set forth in the Recitals of this Declaration.

"City Council" shall mean the New York City Council.

"Chair" shall mean the Chairperson of the City Planning Commission.

"Commission" shall have the meaning set forth in the Recitals of this Declaration.

"CO Notice" shall have the meaning set forth in Section 7.03 of this Declaration.

"Construction Drawings" shall have the meaning set forth in Section 3.02(b)(ii) of this Declaration.

"DCP" shall have the meaning set forth in the Recitals of this Declaration.

"Declarant" shall have the meaning set forth in the Preamble hereof.

"Declaration" shall have the meaning set forth in the Preamble hereof.

"Delay Notice" shall have the meaning set forth in Section 9.04(a) of this Declaration.

"Default Notice" shall have the meaning set forth in Section 7.01(a) of this Declaration.

"DOB" shall mean the New York City Department of Buildings, or any successor agency thereto.

"Final Completion" or **"Finally Complete"** shall mean the completion of all relevant items of work, including any so-called "punch-list" items that remain to be completed upon Substantial Completion (defined below).

"Final Approval" shall mean approval or approval with modifications of the Special Permit by the City Council, or (b) if the City Council disapproves the decision of the Commission and the Mayor of the City of New York (the "**Mayor**") files a written disapproval of the City Council's action pursuant to New York City Charter Section 197-d(e), and the City Council does not override the Mayor's disapproval, in which event "Final Approval" shall mean the Mayor's written disapproval of the City Council's action pursuant to such New York City Charter Section 197-d(e).

"**Mortgage**" shall mean a mortgage given as security for a loan in respect of all or any portion of the Subject Property.

"Mortgagee" shall mean the holder of a Mortgage.

"MTA" shall mean the Metropolitan Transportation Authority and/or the New York City Transit Authority, as the case may be or any successor to its jurisdiction.

"Named Mortgagee" shall have the meaning set forth in Section 10.01(d) of this Declaration.

"**New Building Permit**" shall mean for a New Building Permit issued by the Department of Buildings for the As-of-Right Building.

"Non-Bonus Floor Area" shall mean approximately 191,670 square feet of floor area that is permitted as-of-right on the Subject Property.

"Notice" shall have the meaning set forth in Section 10.01(a) of this Declaration.

"Notice of Final Completion" shall have the meaning set forth in Section 7.02 of this Declaration.

"Notice of Substantial Completion" shall have the meaning set forth in Section 7.01 of this Declaration.

"Parties-in-Interest" shall have the meaning set forth in the Recitals of this Declaration.

"PCO" shall mean a Permanent Certificate of Occupancy issued by DOB.

"**Post-Approval Amendment**" shall mean a post-approval amendment to the New Building Permit for purposes of incorporation of Bonus Floor Area in the Proposed Building.

"Proposed Building" shall have the meaning set forth in the Recitals of this Declaration.

"SEQRA" shall have the meaning set forth in the Recitals of this Declaration.

"Special Permit" shall have the meaning set forth in the Recitals of this Declaration.

"Subject Property" shall have the meaning set forth in the Recitals of this Declaration.

"Substantial Completion" or **"Substantially Complete"** shall mean that the Broad Street Station Improvements have been constructed substantially in accordance with the Special Permit and may be operated and made available for public use. An improvement may be deemed Substantially Complete notwithstanding that minor or insubstantial items of construction, decoration or mechanical adjustment remain to be performed. A portion of the Transit Improvements shall be considered Substantially Complete where it has been certified as Substantially Complete by the MTA, as applicable. Notwithstanding the foregoing and for the avoidance of doubt, the installation of fare array turnstiles at the exit to the southbound platform of the Broad Street Station shall not be a requirement for Substantial Completion, provided that all connections necessary for such installation by the MTA are in place.

"TCO" shall mean a Temporary Certificate of Occupancy issued by DOB.

"Transit Improvement Agreement" shall have the meaning set forth in Section 3.02(a) of this Declaration.

"Transit Improvement Drawings" shall have the meaning set forth in Section 2.01 of this Declaration.

"Transit Improvements" shall mean the Broad Street Station Improvements and Wall Street Station Improvements respectively defined in Section 2.01(a) & (b) of this Declaration.

"Uncontrollable Circumstances" shall include the following elements which directly and materially delay the ability of Declarant to fund the Wall Street Station Improvement and/or complete the Broad Street Station Improvements: strike(s) or labor dispute(s); an industry-wide inability to obtain labor, equipment, supplies or materials or reasonable substitutes therefore in the open market; acts of God; governmental restrictions, regulations, omissions or controls pertaining to the area of New York City below 14th Street; enemy or hostile government actions, war, hostilities, terrorism, explosion, invasion; civil commotion, riot, mob violence, malicious mischief, insurrection, revolution or sabotage; a lockout; a flood, earthquake, or fire (destruction due to any of the foregoing events in this paragraph hereinafter referred to as "Casualty"); inclement weather of such a nature as to delay performance or completion of the Broad Street Station Improvements; a taking of the Subject Property, or a portion thereof that impairs the further construction of the Proposed Building, by condemnation or eminent domain; failure of a public utility to provide power, heat or light for the area below 14th Street; governmental actions with respect to construction projects in the vicinity of the Broad Street Station Improvement that directly delay performance or completion of the Broad Street Station Improvement; disruptions in subway services that impact the timely delivery of materials for the Broad Street Station Improvements if Declarant decides to deliver materials by the subway; inability to perform work due to transit related accident(s) at the Broad Street Station including property damage, and the

need for repairs as a result thereof; inability to access the work area; inability to perform work during hours stipulated by MTA for such work due to conditions outside of Declarant's control; the pendency of litigation not initiated by Declarant or similar proceeding which results in an injunction or restraining order or similar relief prohibiting or otherwise delaying the commencement or continuation of the obligations of Declarant pursuant to this Declaration, provided such litigation or proceeding resulting in the injunction or restraining order was not instituted, financed or supported by Declarant or any of its affiliates. In addition, "Uncontrollable Circumstances" shall also include (i) material delays by the City, State or United States government, or any agency or instrumentality thereof, MTA, or any utility company, in the performance of any work or processing or approval of any applications, or comment on architectural and engineering plans within a reasonable time period following receipt of such plans, unless due to any act or failure to act by Declarant ; (ii) denial to Declarant by any owner, ground lessee or franchisee of an enforceable interest in adjoining real property, including any private fee owner or ground lessee of adjoining real property, or any agency of the City or State or any utility company having an enforceable interest in adjoining real property, including sidewalk or streets, of a right to access to such adjoining real property provided that the Declarant has no" work around" for such denial of access; and (iii) design changes required by MTA, except those made as a result of changed or unforeseen field conditions No event shall constitute Uncontrollable Circumstances unless (i) the event is not due to an act or failure to act of Declarant, (ii) Declarant complies with the procedures set forth in Section 9.04 hereof, and (iii) the Chair has certified the existence of Uncontrollable Circumstances in accordance with the provisions of Section 9.04 hereof or has failed to respond.

~~"~~**"Wall Street Station Improvements**" shall have the meaning set forth in Section 2.01 (b) of this Declaration.

"**Wall Street Transit Improvements Deposit**" shall have the meaning set forth in Section 3.01 of this Declaration.

"Zero Occupancy TCO" shall mean a temporary certificate of occupancy issued by DOB for the core and shell of the Proposed Building. A Zero Occupancy TCO shall not include any certificate of occupancy that permits occupancy of the building or portions thereof for ~~office, retail, eating and drinking establishment, amenity or other tenant uses~~ any use.

"Zoning Resolution" shall have the meaning set forth in the Recitals hereof.

ARTICLE II.

TRANSIT IMPROVEMENT DRAWINGS

Section 2.01 As a requirement for utilizing Bonus Floor Area, the Declarant shall undertake the following with respect to the Transit Improvements set forth in the following drawings (the "**Transit Improvement Drawings**") which are subject to further review and are supplemented by additional scope items (the "Additional **Scope Items**") annexed hereto as **Exhibit G** hereto:

(a) Construct, at its sole cost and expense, the proposed improvements to the Broad Street Station as shown on the following plans prepared by Urbahn Architects, annexed hereto as **Exhibit E** (the "**Broad Street Station Improvements**"):

Drawing Number	**Title**	**Last Revision Date**
A-201	Key Plans Street, Platform and Underpass Level	4/19/18
A-211	Street Level Plan	4/19/18
A-212	Platform Level Plan	~~4~~5/~~19~~30/18
A-213	Underpass Level Plan	4/19/18
A-301	Longitudinal Section Through Northbound Elevator	4/19/18
A-302	Cross Section Through Northbound Elevator	4/19/18
A-303	Longitudinal Section Through Southbound Elevator	4/19/18
A-304	Cross Section Through Southbound Elevator	4/19/18

(b) Fund all costs of acquisition and installation by the MTA of the proposed improvements to the Wall Street Station as shown on the following plans prepared by the MTA, annexed hereto as **Exhibit F** (the "**Wall Street Station Improvements**"):

Drawing Number	**Title**	**Last Revision Date**
R204~~A(1),~~R204B,R204C	Control Area Plan	1/26/17
R204A~~(2)~~ (Option I)	Control Area Plan	1/26/17
R204A~~(3)~~ (Option II)	Control Area Plan	1/26/17
R204A (Option III)	Control Area Plan	1/26/17

(c) Notwithstanding the foregoing provisions of this Article II, Declarant may develop an As-of-Right Building, in which case the provisions of Sections 2.01(a) and 2.01(b) and the provisions of Articles III through VII of this Declaration shall not apply to such development.

ARTICLE III.

TRANSIT IMPROVEMENTS

Section 3.01 Building Permits. Declarant shall not accept the issuance by the DOB of a Post-Approval Amendment for the Proposed Building until the Declarant (a) has entered into an agreement with the MTA with respect to the design, construction and maintenance of the Transit Improvements (the "**Transit Improvement Agreement**") and recorded such agreement in the Office of the City Register, New York County; (b) has paid funds to the MTA for the purpose of acquisition and installation by MTA of the Wall Street Transit Improvements (the "**Wall Street Transit Improvements Deposit**"); and (c) has paid funds to the MTA for the purpose of acquisition and installation by MTA of fare array turnstiles at the exit to the southbound platform of the Broad Street Station (the "**Broad Street Transit Improvements Deposit**"). The amounts of the Wall Street Transit Improvements Deposit and the Broad Street Transit Improvements Deposit are currently estimated at One Million Dollars ($1,000,000) and Five Hundred Thousand Dollars ($500,000), respectively. No later than sixty (60) days following recordation of this Declaration, MTA shall provide Declarant with a second estimate of the amounts of the Wall Street Transit Improvements Deposit and the Broad Street Transit Improvements Deposit and shall meet and confer with Declarant upon request with respect thereto. The amount of the Wall Street Transit Improvements Deposit shall be the lesser of: (X) such second estimate; and (Y) One Million Dollars ($1,000,000). The amount of the Broad Street Transit Improvements Deposit shall be the lesser of: (X) such second estimate; and (Y) Five Hundred Thousand Dollars ($500,000). Notwithstanding the foregoing, the Declarant may file a Post-Approval Amendment application for the Proposed Building with the DOB solely for the purpose of seeking plan review for the Proposed Building prior to recordation of the Transit Improvement Agreement or making the Wall Street Transit Improvements Deposit or making the Broad Street Transit Improvements Deposit. For the avoidance of doubt, nothing herein shall affect or impair the New Building Permit or the performance of work pursuant thereto.

Section 3.02 Transit Improvement Agreement Terms. The Transit Improvement Agreement shall be generally consistent with the terms and conditions of MTA's standard subway entrance agreement ("**Subway Entrance Agreement**"), a copy of which has been provided to Declarant, with adjustments and modifications to address the subject improvements, and shall also include but not be limited to the following terms:

(a) **Construction Schedule.** Declarant shall develop a construction schedule for the Broad Street Station Improvements in consultation with the MTA describing the phasing of work and permitted work hours.

(b) **Design Development and Construction Drawings.** Declarant shall prepare design development and construction drawings (the **"Design Development and Construction Drawings"**) also known as "Plans and Specifications" in the Subway Entrance Agreement for the various scopes of work comprising the Broad Street Station Improvements for review and approval by MTA prior to construction commencement. The Design Development and Construction Drawings shall be in substantial compliance with the Transit Improvement Drawings and shall be prepared in accordance with MTA design standards and guidelines in effect at the time Declarant gives to MTA a "Notice to Advance Design" that Declarant is

commencing to advance design of the Transit Improvements at a level of detail greater than the Transit Improvement Drawings. The form and content of Design Development and Construction Drawings and timeframes for review and approval by MTA of submissions made by Declarant shall be as specified in the Transit Improvement Agreement. The Design Development and Construction Drawings shall include signage at the elevator landings at street level indicating that the westerly elevator services the southbound terminus of the Nassau Street (J/Z line) and that the easterly elevator services the northbound entry to the Nassau Street (J/Z) line, as specified by MTA.

(c) **Security.** Prior to the commencement of construction of the Broad Street Station Improvements, Declarant shall provide (i) a letter of credit for the performance of Declarant's construction obligations relating to the Broad Street Station Improvements, in an amount not to exceed 120% of the estimated construction cost of the Broad Street Station Improvements (including but not limited to engineering services, railroad support and compliance with ADA requirements), based on cost estimates prepared by Declarant and approved by MTA , which security may be subject to reduction by 15% of the original amount upon the achievement of substantial completion of the Broad Street Station Improvements as certified by MTA; and (ii) pursuant to Section 5 of Article 2 of the New York Lien Law, payments bonds or such other security provided for under the New York Lien Law as is acceptable to the MTA..

(d) **Maintenance, Repair and Replacement.** Upon Substantial Completion of the Broad Street Station Improvements, Declarant shall assume responsibility for the maintenance and repair thereof, by entering into agreements with service providers upon terms consistent with the provisions of the Transit Improvement Agreement. The Transit Improvement Agreement shall include a license or other agreement as necessary to permit service providers to perform such maintenance and repair services. In no event shall Declarant be responsible for public safety and security in the areas of the Transit Improvements. Declarant shall provide letters of credit reasonably satisfactory to the MTA for the performance of such maintenance and repair services in an amount equal to 120% of the annual cost of the elevator service and repair services under the agreements with service providers. The Transit Improvement Agreement shall also include provisions for the capital replacement of the Broad Street Station Improvements.

(e) **Successors and Assigns.** The Transit Improvement Agreement shall run with the land and be binding on the Declarant, its successors and assigns.

ARTICLE IV.

PROPOSED BUILDING REQUIREMENTS

Section 4.01 Height Limit of Proposed Building. In no event shall the height of the Proposed Building exceed 1,115 feet.

ARTICLE V.

CERTIFICATES OF OCCUPANCY

Section 5.01 Temporary Certificate of Occupancy. Except as provided in Section 7.04 hereof, Declarant shall not accept a TCO for any portion of the Proposed Building utilizing the Bonus Floor Area prior to certification by the Chair based on certification of the MTA in accordance with Section 5.03 that: (a) the Wall Street Transit Improvements Deposit and the Broad Street Transit Improvements Deposit have been funded in accordance with this Declaration; (b) the Broad Street Station Improvements are Substantially Complete (**"Notice of Substantial Completion"**); and (c) provisions regarding maintenance and repair obligations are met by repair/maintenance contracts and a letter of credit. However, (i) nothing herein shall prevent occupancy of Non-Bonus Floor Area prior to receipt of a Notice of Substantial Completion, and (ii) notwithstanding anything to the contrary herein, Declarant may apply for and accept a Zero Occupancy TCO prior to receipt of a Notice of Substantial Completion. For the purposes of this Section 5.01, at least 36,695 square feet of Floor Area located in the Proposed Building, at an elevation that is above 229 feet above grade (241 feet above datum), shall be designated as Bonus Floor Area, as shown on plans to be filed with DOB. The remainder of the Bonus Floor Area may be located below 229 feet above grade (241 feet above datum) and its location shall also be shown on plans to be filed with DOB. Such plans may be modified from time to time in connection with an application made to DOB for the issuance of a TCO prior to a certification by the Chair made in accordance with Section 5.03, in order to adjust the location of the Bonus Floor Area, provided that such plans shall at all times demonstrate compliance with the requirements of this Section 5.01 with respect to the amounts of Bonus Floor Area that may be located above and below 229 feet above grade(241 feet above datum).

Section 5.02 Permanent Certificates of Occupancy. Except as provided in Section 7.04 hereof, Declarant shall not accept a PCO for any portion of the Proposed Building utilizing the Bonus Floor Area prior to certification by the Chair based on the certification by MTA in accordance with Section 5.03 that the Broad Street Transit Improvements are Finally Complete (**"Notice of Final Completion"**). However, nothing herein shall prevent occupancy of Non-Bonus Floor Area prior to receipt of a Notice of Final Completion.

Section 5.03 DCP and MTA Review. Except as provided in Section 7.04 hereof, prior to accepting a TCO or PCO from DOB for zoning floor area in excess of the Non-Bonus Floor Area, Declarant shall submit a notice to DCP and MTA (the **"CO Notice"**) certifying that the Broad Street Station Improvements are Substantially Complete (or in the case of a PCO, Finally Complete). The MTA shall perform an on-site review of the Broad Street Station Improvements pursuant to time frames set forth in the Transit Improvement Agreement and will follow procedures set forth therein to make such determination of Substantial Completion. MTA will provide DCP with a copy of its certificate and any punch list items if the Broad Street Station Improvements are substantially complete. If the Broad Street Station Improvements are substantially complete, Declarant shall be entitled to obtain the TCO or PCO as the case may be, provided that all other requirements of Section 5.01 have been met. Notwithstanding the foregoing, in the event that (i) DCP has failed to (x) respond in writing to Declarant within twenty (20) business days of receipt of the CO Notice, (y) meet with Declarant within ten (10)

business days of receipt of the CO Notice, or (z) respond in writing to Declarant within ten (10) business days of receipt of any additional materials provided to DCP and under this Section, and (ii) the MTA has failed to take the actions required under the Transit Improvement Agreement following the CO Notice within the time frames set forth therein, then DCP and the MTA shall be deemed to have accepted the CO Notice and any subsequent materials related thereto as demonstrating compliance with the requirements for the issuance of the TCO or PCO and Declarant shall be entitled to apply for and accept the TCOs or PCOs.

ARTICLE VI.

EFFECTIVE DATE; AMENDMENTS AND MODIFICATIONS TO AND CANCELLATION OF THIS DECLARATION

Section 6.01 Effective Date; Lapse; Cancellation.

(a) This Declaration and the provisions and covenants hereof shall become effective upon Final Approval of the Special Permit, but Declarant's obligations hereunder shall be postponed until: (A) the latest to occur of the following dates: (i) the date on which the right to seek judicial review of the Special Permit has expired; (ii) the date on which the time to appeal from an order of any court of competent jurisdiction upholding or affirming the Special Permit has expired; and (iii) the date on which a final order upholding or affirming the Special Permit is entered pursuant to a decision by a court of competent jurisdiction from which no appeal can be taken; or (B) at any time prior to the latest to occur of the dates set forth in (A) above, such earlier date upon which Declarant proceeds to develop the Proposed Building in accordance with the Special Permit. For avoidance of doubt, construction of an As-of-Right Building shall not be deemed development for purposes of the foregoing sentence.

(b) Promptly, and no later than ten (10) days after Final Approval of the Special Permit, Declarant shall file and record this Declaration and any related waivers executed by Mortgagees or other Parties-in-Interest that are required to be recorded in public records, in the Office of the City Register, indexing them against the entire Subject Zoning Lot, and deliver to the Commission within ten (10) days from any such submission for recording, a copy of such documents as submitted for recording, together with an affidavit of submission for recordation. Declarant shall deliver to the Commission a copy of all such documents, as recorded, certified by the Office of the City Register, promptly upon receipt of such documents from the Office of the City Register. If Declarant fails to so record such documents within ten (10) days after Final Approval of the Special Permit, then the City may record duplicate originals of such documents. However, all fees paid or payable for the purpose of recording such documents, whether undertaken by Declarant or by the City, shall be borne by Declarant.

(c) Notwithstanding anything to the contrary contained in this Declaration, if the Special Permits is declared invalid or otherwise voided by a final judgment of any court of competent jurisdiction from which no appeal can be taken or for which no appeal has been taken within the applicable statutory period provided for such appeal, then, upon entry of said judgment or the expiration of the applicable statutory period for such appeal, this Declaration shall be cancelled and shall be of no further force or effect and an instrument discharging it may

be recorded. Prior to the recordation of an instrument discharging this Declaration, Declarant shall notify the Chair of Declarant's intent to cancel and terminate this Declaration and request the Chair's approval, which approval shall be limited to insuring that such cancellation and termination is in proper form. The Chair shall respond to such notice and request within thirty (30) days of receipt by the Chair of such notice, and shall at Declarant's request execute an instrument in recordable form consenting to the discharge of Declarant's obligations hereunder. The failure of the Chair to respond within such thirty (30) day period shall be deemed an approval by the Chair of the cancellation of the Declaration. Upon recordation of such instrument, Declarant shall provide a copy thereof to the Commission so certified by the Office of the City Register.

Section 6.02 Modification and Amendment.

(a) Except as otherwise provided in Sections 6.01, 6.02(b), 6.02(c), or 6.02(d) hereof, this Declaration may be amended, modified or cancelled only with the express written approval of the Commission and the MTA. No other approval or consent shall be required from any public body, private person or legal entity of any kind, including, without limitation, any other present Party-in-Interest or future Party-in-Interest who is not a successor of Declarant.

(b) Changes to Transit Improvement Drawings for the Broad Street Station Improvements that the Chair and the MTA deem to be minor shall be amended or modified administratively by the Chair and MTA, and no other approval or consent (including modifications to the Special Permits) shall be required from any public body, private person or legal entity of any kind, including, without limitation, any other present Party-in-Interest or future Party-in-Interest who is not a successor of Declarant.

(c) Changes to Transit Improvement Drawings for the Wall Street Station Improvements requested or made by MTA that do not reduce the amount of fare array controls to be provided shall be amended or modified administratively by MTA and no other approval or consent (including modifications to the Special Permits) shall be required from any public body, private person or legal entity of any kind, including, without limitation, any other present Party-in-Interest or future Party-in-Interest who is not a successor of Declarant

(d) Changes to this Declaration that the Chair and the MTA deem to be minor shall be amended or modified administratively by the Chair and the MTA, and no other approval or consent (including modifications to the Special Permits) shall be required from any public body, private person or legal entity of any kind, including, without limitation, any other present Party-in-Interest or future Party-in-Interest who is not a successor of Declarant.

(e) Any modification or amendment of this Declaration shall be executed and recorded in the same manner as this Declaration. Declarant shall record any such modification or amendment immediately after approval or consent has been granted pursuant to Section 6.02(a) and provide an executed and certified true copy thereof to DCP and, upon Declarant's failure to so record, permit its recording by DCP at the cost and expense of Declarant.

(f) Notwithstanding any other provision of this Section 6.02 to the contrary , in the event that the Transit Improvement Agreement includes provisions relating to security that

differ or vary from those of Section 3.02(c), the provisions of Section 3.02(c) shall thereby be deemed superseded and no amendment of this Declaration shall be required under this Section 6.02 , provided that Declarant notifies the Chair in writing that the provisions of the Transit Improvement Agreement alternate to Section 3.02 (c) are accepted and agreed to by the MTA, in the exercise of its sole discretion. In such event, the Declarant shall, if so directed by Counsel to DCP, file and record a notice in the Office of the City Register, indexed against the entire Subject Zoning Lot, stating that the provisions of Section 3.02 (c) are inoperative in accordance with the provisions of this Section 6.02(f). "

ARTICLE VII.

COMPLIANCE; DEFAULTS; REMEDIES

Section 7.01 Default.

(a) The City shall give written notice (each, a "Default Notice") of any alleged breach of the provisions of this Declaration to Declarant. Upon receipt of a Default Notice, Declarant shall effect a cure within forty-five (45) business days thereof. Alternatively, if the violation is not capable of cure within such forty-five (45) business day period, Declarant shall promptly initiate and diligently pursue any steps required to cure such breach and, if Declarant thereafter proceeds diligently toward the effectuation of such cure, the aforesaid forty-five (45) business day period shall be deemed extended for so long as Declarant continues to proceed diligently with the effectuation of such cure. Declarant shall have the right, in its sole discretion, to determine the manner in which a breach of this Declaration will be cured, provided such cure is in compliance with this Declaration. The forty-five (45) business day period for curing any breach of this Declaration by Declarant (as such may be extended in accordance with this Section 7.01) shall be subject to further extension for Uncontrollable Circumstances, provided that Declarant shall have taken the steps required by Section 7.04 hereof.

(b) The City retains all remedies at law and in equity and via administrative enforcement to enforce this Declaration.

(c) The City retains the right to resolve any dispute regarding the provisions of this Declaration by an alternate dispute resolution acceptable to Declarant, before resorting to litigation or administrative enforcement.

(d) In the case of an alleged breach of, or other dispute regarding the provisions of this Declaration, both Declarant and the City may (but shall not be obligated to) agree that the same shall be resolved by arbitration in a manner to be agreed upon, provided that nothing herein shall be construed to limit the provisions of Section 7.01(b) of this Declaration.

(e) A Named Mortgagee shall have the right to cure a breach on behalf of Declarant within the applicable notice and cure period provided in this Article VII.

Section 7.02 Enforcement of Declaration.

(a) The obligations of Declarant under this Declaration shall be enforceable solely by the City. No person or entity other than the City shall be entitled to enforce, or assert

any claim arising out of or in connection with, this Declaration. This Declaration shall not create any enforceable interest or right in any person or entity other than the City.

(b) Notwithstanding anything to the contrary contained in this Declaration, the City will look solely to the fee estate and interest of Declarant in the Subject Property, on an in rem basis only, for the collection of any money judgment recovered against Declarant, or the enforcement of any monetary remedy based upon any breach by the Declarant under this Declaration, and no other property of Declarant shall be subject to levy, execution or other enforcement procedure for the satisfaction of the remedies of the City or any other person or entity with respect to this Declaration, and Declarant shall have no personal liability under this Declaration. For the purposes of this Section 7.02, "Declarant" shall mean "Declarant" as defined in the Preamble of this Declaration, as well as any principals, disclosed or undisclosed, partners, affiliates, officers, employees, shareholders or directors of Declarant.

(c) The restrictions, covenants and agreements set forth in this Declaration shall be binding upon Declarant only for the period during which such party is the holder of a fee interest in or is a Party-in-Interest of the Subject Property and only to the extent of such fee interest or the interest rendering such party a Party-in-Interest. At such time as Declarant or any successor-in-interest thereto has no further fee interest in the Subject Property or portion thereof, and is no longer a Party-in-Interest of the Subject Property, or portion thereof, such party's obligations and liability with respect to this Declaration shall wholly cease and terminate as to the portion conveyed from and after the conveyance of such party's interest and such party's successor-in-interest in the Subject Property, or portion thereof, by acceptance of such conveyance automatically shall be deemed to assume such party's obligations and liabilities hereunder to the extent of such successor-in-interest's interest.

(d) Notwithstanding the foregoing, nothing herein shall be deemed to preclude, qualify, limit or prevent any of the City's governmental rights, powers or remedies, including, without limitation, with respect to the satisfaction of the remedies of the City under any laws, statutes, codes or ordinances.

(e). If Declarant is found by a court of competent jurisdiction to have been in default of any of its obligations under this Declaration and such finding is upheld on final appeal, or the time for such further review of such finding on appeal or by other proceeding has lapsed, Declarant shall indemnify and hold harmless the City from and against all of its reasonable legal and administrative expenses arising out of or in connection with the enforcement of any of the City's remedies resulting from such default.

Section 7.03 Certain Remedies.

(a) Declarant hereby agrees that failure to comply with conditions or restrictions in this Declaration shall constitute a violation of the Zoning Resolution, and such failure to comply may constitute the basis for denial or revocation of Building Permit(s) or certificate(s) of occupancy.

(b) In any application for an amendment or modification of this Declaration, Declarant shall verify that it has complied with each of the material conditions of the Declaration applicable at the time of such application.

(c) In the event that Declarant has not complied with the material conditions of this Declaration, such non-compliance may constitute grounds for the Commission and/or the City Council, as applicable, to disapprove any application for amendment or modification of the Declaration.

(d) For purposes of this Section 7.03, Declarant shall not be deemed to have failed to comply under any of paragraphs (a), (b) or (c) unless and until Declarant or a Named Mortgagee, as the case may be, has failed to remedy or cure the event or occurrence which is the basis of any allegation of a failure to comply in accordance with the procedure as set forth in Section 7.01 of this Declaration with respect to alleged default(s), including all applicable notice and cure periods afforded Declarant and Named Mortgagee(s) therein.

Section 7.04 Uncontrollable Circumstances.

(a) In the event that, as the result of Uncontrollable Circumstances, Declarant is or believes it will be unable to perform or complete any obligation required to be performed hereunder with respect to the Broad Street Station Improvements prior to accepting a TCO or PCO, Declarant shall promptly after it has actual knowledge of such Uncontrollable Circumstances so notify the Chair in writing (such notice, the "**Delay Notice**"), who may certify the existence of such Uncontrollable Circumstances. Any Delay Notice shall include a description of the Uncontrollable Circumstances, and, if known to Declarant, their cause and estimated impact on performance of the obligation in question. The Chair shall thereafter determine whether the Uncontrollable Circumstances exist, acting in consultation with MTA, and upon notice to Declarant no later than ten (10) days after its receipt of the Delay Notice, certify whether the Uncontrollable Circumstances exist. Failure to certify within ten (10) days after receipt of the Delay Notice shall be deemed a finding of Uncontrollable Circumstances by the Chair. If the Chair certifies that Uncontrollable Circumstances do not exist, the Chair shall set forth with specificity in the certification the reasons therefor. If the Chair certifies that Uncontrollable Circumstances exist, the Chair shall, either concurrently with such certification or no later than ten (10) days thereafter, authorize Declarant to accept a TCO or PCO, as applicable, for the Proposed Building incorporating the Bonus Floor Area or such portions of the Bonus Floor Area as the Chair determines to be warranted. In authorizing such occupancy of the Bonus Floor Area, the Chair may (i) take into account commitments to tenants relating to the occupancy of such space, (ii) require such additional security as the Chair determines is sufficient to assure the performance of Declarant's obligations, and (iii) specify a date whereby performance of Declarant's obligations shall be completed.

(b) Any delay caused as the result of Uncontrollable Circumstances shall be deemed to continue only as long as the Uncontrollable Circumstances continue. Upon cessation of the Uncontrollable Circumstances causing such delay, Declarant shall promptly recommence the work or implement the measure needed to complete the obligation, in accordance with any applicable directive of the Chair, unless an alternative is specified and agreed to by the Chair. Unless as otherwise agreed between Declarant and MTA, as a further condition to granting relief

as aforesaid, if the Chair, acting in consultation with MTA, determines that as a result of such Uncontrollable Circumstances the security provided for completion in accordance with Section 3.02(c)(i) hereof is no longer adequate, the Chair may also require that Declarant post an additional letter of credit ("Completion Letter of Credit") or similar security if acceptable to the Chair and MTA, in a form reasonably acceptable to the Chair and MTA as beneficiary, to secure Declarant's obligation to complete the Broad Street Station Improvements upon cessation of the Uncontrollable Circumstances. The amount of such Completion Letter of Credit or similar security, together with the security provided in accordance with Section 3.02(c)(i) hereof, shall be in a sum of no more than 125% of the estimated cost of completing such work (including but not limited to engineering services, railroad support and compliance with ADA requirements, based upon an estimate provided by Declarant and accepted by MTA to complete the Broad Street Station Improvements. If Declarant fails to resume performance of such work upon cessation of the Uncontrollable Circumstances, the MTA may undertake the performance of such work in accordance with the Transit Improvement Agreement and its own standards and guidelines. Upon final completion of the Broad Street Station Improvements, whether by Declarant, or MTA, MTA shall promptly return the any amount remaining of the aforesaid security (or the undrawn balance thereof) to Declarant in accordance with the terms of the Transit Improvement Agreement.

Section 7.05 Representation. Declarant hereby represents and warrants that (a) there is no restriction of record on the development, enlargement, or use of the Subject Property, nor any present or presently existing estate or interest in the Subject Property, nor any existing lien, obligation, covenant, easement, limitation or encumbrance of any kind that shall preclude the enforcement of the obligations and restrictions as set forth herein; and (b) the Parties-in-Interest listed in the Certification of Party-in-Interest are the only known Parties-in-Interest in the Subject Property as of the date hereof.

ARTICLE VIII.

MISCELLANEOUS

Section 8.01 Notices.

(a) All notices, demands, requests, consents, approvals, or other communications (each of which is hereinafter referred to as **"Notice"**) which may be or are permitted, desirable or required to be given, served or sent hereunder shall be effective only if in writing and (i) mailed to the party for which it is intended by certified or registered mail, return receipt requested, or (ii) sent via nationally recognized overnight courier service, , addressed as follows:

If to Declarant:

MADISON 45 BROAD DEVELOPMENT, LLC
c/o Madison Equities
105 Madison Avenue
New York, NY 10016
Attention: Anthony Labozzetta

with a copy to:

Fried, Frank, Harris, Shriver & Jacobson LLP
One New York Plaza
New York, New York 10004
Attention: David Karnovsky, Esq.

If to the City:

New York City Department of City Planning
120 Broadway, 31st Floor
New York, New York 10271
Attention: General Counsel

If to the MTA

Metropolitan Transportation Authority – New York City Transit
2 Broadway
New York, New York 10004
Attention: General Counsel

(b) Any recipient of Notice may from time to time by Notice designate a new or additional related entity or person or address for receipt of Notices.

(c) Notice shall be deemed given five (5) days after mailing, two (2) Business Days after sending by nationally recognized overnight courier service, , except that a Notice providing for change of Notice name or address shall only be effective upon receipt.

(d) A copy of all Notices to Declarant shall be simultaneously given to any mortgagee or ground lessor of all or a portion of the Subject Property of which the City has been given Notice (any such mortgagee or lessor, a **"Named Mortgagee"**).

(e) In the event that there is more than one Declarant at any time, any Notice from the City or the Commission shall be provided to all Declarants of whom the Commission has notice.

(f) Any Notice or submission to the City and any Notice or approval from the City provided for in this Declaration shall be given to or given by the DCP on behalf of the City, and any approval given by the DCP shall be binding on the City. The foregoing shall not apply to any notices or approvals related to any matters that fall under the jurisdiction of any other agency of the City, including, without limitation, the Department of Buildings or the Department of Transportation.

Section 8.02 Certificates. The City will at any time and from time to time upon not less than fifteen (15) days' prior notice by Declarant or a Named Mortgagee execute, acknowledge and deliver to Declarant or such Named Mortgagee, as the case may be, a statement in writing certifying (a) that this Declaration is unmodified and in full force and effect (or if there have been modifications or supplements that the same is in full force and effect, as modified or supplemented, and stating the modifications and supplements), (b) whether or not to the best knowledge of the signer of such certificate Declarant is in default in the performance of any obligation contained in this Declaration, and, if so, specifying each such default of which the signer may have knowledge, and (c) as to such further matters as Declarant or such Named Mortgagee may reasonably request.

Section 8.03 Conveyance. Nothing contained herein shall be construed as requiring the consent of the DCP, the City, any agency thereof or any other person or entity to any sale, transfer, conveyance, mortgage, lease or assignment of any interest in the Subject Property.

Section 8.04 Successors of Declarant. References in this Declaration to "Declarant" shall be deemed to include any successor to or assign of Declarant. Notwithstanding anything to the contrary contained in this Declaration, (i) no tenant of the Subject Property shall be deemed to be a Declarant for any purpose, and (ii) no holder of a mortgage or other lien in the Subject Property shall be deemed to be a Declarant for any purpose, unless and until such holder obtains either a fee interest in the Subject Property or any portion thereof or a lessee's estate in a ground lease of all or substantially all the Subject Property, and provided further that the holder of any such mortgage or lien shall not be liable for any obligations of Declarant as the "Declarant" hereunder unless such holder commences to develop the Subject Property in accordance or has acquired its interest from a party who has done so.

Section 8.05 Parties-in-Interest. Declarant shall cause any individual, business organization or other entity which, between the date hereof and the effective and recording date and time of this Declaration, becomes a Party-in-Interest in the Subject Property or portion thereof to subordinate its interest in the Subject Property to this Declaration. Any and all mortgages or other liens encumbering the Subject Property after the recording date of this Declaration shall be subject and subordinate hereto as provided herein.

Section 8.06 Condominiums and Cooperative Corporations.

(a) In the event that the Subject Property is subject to a declaration of condominium or if the Subject Property is owned by a cooperative cooperation in accordance with the provisions of New York state law, from and after the date the declaration of condominium has been recorded in the Office of the City Register, or the date that the Subject Property is conveyed to the cooperative corporation, the Board of Directors or the Board of Managers, as the case may be (the "Board"), shall be deemed to be the sole Declarant and Party-in-Interest under this Declaration with respect to the premises owned by the cooperative apartment corporation or held in condominium ownership, and the owners of the shares of stock of the cooperative apartment corporation, the holder of a lien encumbering any such shares, the holder of any other occupancy or other interest in such cooperative apartment, the holder of any unit in the condominium, the holder of a lien encumbering any such condominium unit and the holder of any other occupancy or other interest in such condominium unit (each of the foregoing,

hereinafter, a "Unit Interested Party") shall not be deemed to be a Declarant or a Party-in-Interest. Each and every Unit Interested Party hereby (x) irrevocably consents to any amendment, modification, cancellation, revision or other change in this Declaration by the Board; (y) waives and subordinates any rights it may have to enter into an amended Declaration or other instrument amending, modifying, canceling, revising or otherwise changing this Declaration, and (z) nominates, constitutes and appoints the Board its true and lawful attorney-in-fact, coupled with an interest, to execute any documents or instruments that may be required in order to amend, modify, cancel, revise or otherwise change this Declaration.

(b) In the event that cooperative or condominium units are offered for sale in the Proposed Development, a summary of the terms of this Declaration shall be included in any offering plan or "red herring" issued in connection therewith. Such offering plan or "red herring" shall clearly identify the rights and obligations pursuant to this Declaration of the unit owners or the owners of shares of stock in the cooperative cooperation, as the case may be, that may be formed.

Section 8.07 Governing Law. This Declaration shall be governed and construed by the laws of the State of New York, without regard to principles of conflicts of law.

Section 8.08 Severability. In the event that any provision of this Declaration shall be deemed, decreed, adjudged or determined to be invalid or unlawful by a court of competent jurisdiction, such provision shall be severed and the remainder of this Declaration shall continue to be of full force and effect.

Section 8.09 Applications. Declarant shall include a copy of this Declaration as part of any application pertaining to the Subject Property submitted to the DOB or any other interested governmental agency or department having jurisdiction over the Subject Property.

Section 8.09 Incorporation by Reference. Any and all exhibits, appendices and attachments referred to herein are hereby incorporated fully and made an integral part of this Declaration by reference.

[SIGNATURE LINES ON FOLLOWING PAGE]

IN WITNESS WHEREOF, Declarant has executed this Declaration as of the date first above written.

MADISON 45 BROAD DEVELOPMENT, LLC

By: _____
Name:
Title: Authorized Signatory

STATE OF NEW YORK)
) ss.:
COUNTY OF NEW YORK)

On the ___ day of _____ in the year 2018, before me, the undersigned, a Notary Public in and for said State, personally appeared _____, personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his capacity(ies), and that by his signatures on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

_____

SCHEDULE OF EXHIBITS

EXHIBIT A	Metes and Bounds Description of the Subject Property
EXHIBIT B	Metes and Bounds Description of Lot 10
EXHIBIT C	Declaration of Zoning Lot Restrictions
EXHIBIT D	Certification of Parties-in-Interest
EXHIBIT E	Broad Street Station Improvements
EXHIBIT F	Wall Street Station Improvements
EXHIBIT G	Additional Scope Items

EXHIBIT A

Metes and Bounds Description of the Subject Property

Lot 7

Parcel I

ALL that certain plot, piece or parcel of land, situate, lying and being in the Borough of Manhattan, County, City and State of New York, bounded and described as follows:

BEGINNING at a point on the easterly side of Broad Street, distant one-hundred thirty feet nine and three-fourths inches northerly from the corner formed by the intersection of the said easterly side of Broad Street with the northerly side of Beaver Street;

RUNNING THENCE easterly along a line which forms an angle on its northerly side with said easterly side of Broad Street of 82 degrees 30 minutes 10 seconds and along the northerly face of northerly walls of buildings adjoining on the South, and along southerly face of the Southerly wall of the brick building on the premises hereby described; 146 feet and 2 1/4 inches (Tax Map 145.93/Survey 145.87) to the westerly face of the westerly wall of the building on the premises adjoining on the East;

THENCE northerly along said westerly face of said westerly wall of 60 feet 3 3/4 inches to the southerly face of the southerly wall of the one story brick building on the rear of the premises adjoining on the North;

THENCE westerly along a line which forms an angle on its southerly side with the easterly side of Broad Street of 96 degrees 2 minutes 20 seconds 128 feet 1 1/2 inches to the said easterly side of Broad Street; and

THENCE southerly along said easterly side of Broad Street, 63 feet 5 1/4 inches to the point or place of BEGINNING.

TOGETHER with the benefits of the easements set forth, defined and limited in that certain Zoning Lot Development and Easement Agreement dated as of February 26, 2007, by and between Walwilhal Associates, LLC and 45 Broad LLC, and recorded in the Office of the City Register of the City of New York, on March 2, 2007 under CRFN 2007000122089.

Parcel II

ALL that certain plot, piece or parcel of land situate, lying and being in the Borough of Manhattan, City, County and State of New York, bounded and described as follows:

BEGINNING at a point the following two (2) courses and distances from the corner formed by the intersection of the easterly side of Broad Street and the northerly side of Beaver Street;

(1) northerly along the said easterly side of Broad Street 130.81 feet to a point; and
(2) easterly along a line which forms an angle on its northerly side with said easterly side of Broad Street of 82 degrees 30 minutes 10 seconds and along the northerly face of northerly walls of buildings adjoining on the South, a distance of 145.87 feet to the easterly face of the building adjoining on the west at the point or place of BEGINNING;

RUNNING THENCE from said point of beginning southerly along a line which forms an angle on its westerly side with the preceding course of 99 degrees 04 minutes 25 seconds and along the easterly face of the easterly wall of the building adjoining on the West, a distance of 16.75 (Survey and Tax Map 16.73) feet to the northerly face of the building adjoining to the South;

THENCE easterly along a line which forms an angle on its northerly side with the preceding course of 89 degrees 38 minutes 45 seconds and along the northerly face of the building adjoining to the South and an open space, a distance of 48.21 feet to a point in said open space;

THENCE northerly through said open space which forms an angle on its westerly side with the preceding course of 88 degrees 29 minutes 00 seconds, a distance of 74.47 feet to a point in said open space;

THENCE westerly along a line which forms an angle on its southerly side with the preceding course of 125 degrees 52 minutes 30 seconds and along the southerly face of the southerly wall of the building adjoining on the North, a distance of 55.22 feet to the easterly face of a building adjoining on the West;

THENCE southerly along a line which forms an angle on its easterly side with the preceding course of 55 degrees 59 minutes 45 seconds, a distance of 88.79 feet to the point or place of BEGINNING.

Perimeter Description

ALL that certain plot, piece or parcel of land situate, lying and being in the Borough of Manhattan, City, County and State of New York, bounded and described as follows:

BEGINNING at a point the following one (1) course and distance from the corner formed by the intersection of the easterly side of Broad Street and the northerly side of Beaver Street;

(1) Northerly along the said easterly side of Broad Street 130.81 feet to the point or place of BEGINNING;

RUNNING THENCE from said point of beginning easterly along a line which forms an angle on its northerly side with said easterly side of Broad Street of 82 degrees 30 minutes 10 seconds and along the northerly face of northerly walls of buildings adjoining on the South, a distance of 145.87 (Tax Map 145.93) feet to the easterly face of the building adjoining on the West;

THENCE southerly along a line which forms an angle on its westerly side with the preceding course of 99 degrees 04 minutes 25 seconds and along the easterly face of the easterly wall of the building adjoining on the West, a distance of 16.75 (16.73 Survey and Tax Map) feet to the northerly face of the building adjoining to the South;

THENCE easterly along a line which forms an angle on its northerly side with the preceding course of 89 degrees 38 minutes 45 seconds and along the northerly face of the building adjoining to the South and an open space, a distance of 48.21 feet to a point in said open space;

THENCE northerly through said open space which forms an angle on its westerly side with the preceding course of 88 degrees 29 minutes 00 seconds, a distance of 74.47 feet to a point in said open space;

THENCE westerly along a line which forms an angle on its southerly side with the preceding course of 125 degrees 52 minutes 30 seconds and along the southerly face of the southerly wall of the building adjoining on the North, a distance of 55.22 feet to the easterly face of a building adjoining on the West;

THENCE southerly along a line which forms an angle on its easterly side with the preceding course of 55 degrees 59 minutes 45 seconds, a distance of 28.48 feet to the southerly face of the southerly wall of the building on the premises adjoining on the North;

THENCE westerly along a line which forms an angle on its southerly side with the easterly side of Broad Street of 96 degrees 2 minutes 20 seconds, 128.12 feet to said easterly side of Broad Street;

THENCE southerly along said easterly side of Broad Street, 63.44 feet to the point or place of
BEGINNING.

EXHIBIT B

Metes and Bounds Description of Lot 10

Lot 10

BEGINNING at a point on the easterly side of Broad Street, distant 106 feet 8 inches southerly from the southeasterly corner of Broad Street and Exchange Place, which point is opposite the northerly face of the northerly wall of the northerly building on the premises herein described;

THENCE southerly along the easterly side of Broad Street, 46 feet 1-1/2 inches to an angle in the easterly side of Broad Street;

THENCE southerly still along the easterly side of Broad Street, 60 feet 7 inches to a point on the easterly side of Broad Street, distant 194 feet 3 inches northerly from the corner formed by the intersection of the easterly side of Broad Street and the northerly side of Beaver Street, which point is opposite the southerly face of the southerly wall of the southerly building on the premises herein described;

THENCE easterly along the said southerly face of said wall, 128 feet 1-1/2 inches to the westerly face of the westerly wall of the building adjoining on the east;

THENCE northerly along said westerly face of said last mentioned wall and on a line which makes an interior angle with the last mentioned course of 79 degrees 28 minutes 0 seconds, 31 feet 2 inches to the northerly face of the northerly wall of the southerly building on the premises herein described;

THENCE northerly on a line which makes an interior angle with the last mentioned course of 190 degrees 7 minutes 50 seconds, 16 feet 11-1/4 inches;

THENCE northerly along a line which makes an interior angle with the last mentioned course of 178 degrees 39 minutes, 13 feet 4- 1/2 inches to the northerly face of the independent wall of the rear building on premises known as 39 Broad Street;

THENCE westerly along the same and on a line which makes an interior angle with the last mentioned course, 91 degrees 42 minutes 0 seconds, 6 feet 7-1/2 inches to the easterly face of the easterly wall of the rear building on the premises known as 35 Broad Street;

THENCE northerly along the same and on a line which makes an exterior angle with the last mentioned course of 75 degrees 12 minutes 0 seconds, 29 feet 6- 1/4 inches to the northerly side of the northerly wall of the said building;

THENCE westerly along the same and along the northerly face of the northerly wall of the front building on the premises known as 35 Broad Street and on a line which makes an interior angle with the last mentioned course of 83 degrees 16 minutes 30 seconds, 102 feet 9-1/2 inches to the point or place of BEGINNING.

EXHIBIT C

Declaration of Zoning Lot Restrictions

NYC DEPARTMENT OF FINANCE
OFFICE OF THE CITY REGISTER

This page is part of the instrument. The City Register will rely on the information provided by you on this page for purposes of indexing this instrument.The information on this page will control for indexing purposes in the event of any conflict with the rest of the document.

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RECORDING AND ENDORSEMENT COVER PAGE **PAGE 1 OF 14**

Document ID: 2015060300981002 Document Date: 06-01-2015 Preparation Date: 06-03-2015
Document Type: SUNDRY MISCELLANEOUS
Document Page Count: 13

PRESENTER:
MADISON ABSTRACT, INC. (NY 15 17623)
670 WHITE PLAINS ROAD, SUITE 121
AS AGENT TO
SCARSDALE, NY 10583
914-725-7200
AFRIEDMAN@MADISONABSTRACT.COM

RETURN TO:
MADISON ABSTRACT, INC. (NY 15 17623)
670 WHITE PLAINS ROAD, SUITE 121
AS AGENT TO
SCARSDALE, NY 10583
914-725-7200
AFRIEDMAN@MADISONABSTRACT.COM

PROPERTY DATA

Borough	Block	Lot		Unit	Address
MANHATTAN	25	7	Entire Lot		43-45 BROAD STREET

Property Type: NON-RESIDENTIAL VACANT LAND

Borough	Block	Lot		Unit	Address
MANHATTAN	25	10	Entire Lot		35-41 BROAD STREET

Property Type: OTHER

CROSS REFERENCE DATA

CRFN: 2007000122083

PARTIES

PARTY 1:
45 BROAD STREET L/CAL LLC
C/O LCOR INCORPORATED, 850 CASSATT ROAD,
SUITE 300
BERWYN, PA 19312

FEES AND TAXES

Mortgage :		
Mortgage Amount:	$	0.00
Taxable Mortgage Amount:	$	0.00
Exemption:		
TAXES: County (Basic):	$	0.00
City (Additional):	$	0.00
Spec (Additional):	$	0.00
TASF:	$	0.00
MTA:	$	0.00
NYCTA:	$	0.00
Additional MRT:	$	0.00
TOTAL:	$	0.00
Recording Fee:	$	105.00
Affidavit Fee:	$	0.00

Filing Fee:	$	0.00
NYC Real Property Transfer Tax:	$	0.00
NYS Real Estate Transfer Tax:	$	0.00

RECORDED OR FILED IN THE OFFICE OF THE CITY REGISTER OF THE CITY OF NEW YORK
Recorded/Filed 06-11-2015 11:47
City Register File No.(CRFN): **2015000198455**

City Register Official Signature

DECLARATION OF ZONING LOT RESTRICTIONS

THIS DECLARATION OF ZONING LOT RESTRICTIONS ("this Declaration"), dated as of June 1, 2015, made by 45 Broad Street L/CAL LLC a Delaware limited liability company, having an address c/o LCOR Incorporated, 850 Cassatt Road, Suite 300, Berwyn, Pennsylvania 19312, (hereafter called "45 Broad Street" or "Declarant Party").

RECITALS

1. 45 Broad Street is the owner of the land described on Exhibit A-1 hereto, which land is designated as a portion of Tax Lot 7 in Block 25 on the Tax Map of the City of New York, County of New York (the "Tax Map") (which land is hereafter called the "Original Lot 7 Land").

2. The Original Lot 7 Land is a part of a combined zoning lot created in accordance with the terms of the Zoning Resolution of the City of New York, effective December 15, 1961, as amended from time to time (the "Zoning Resolution"), pursuant to a certain Declaration of Zoning Lot Restrictions (the "Existing Declaration"), dated as of February 26, 2007, and recorded on March 6, 2007 under CRFN 2007000122083 in the Office of the New York City Register, New York County (the "Register's Office"). The combined zoning lot created by the Existing Declaration (the "Existing Combined Zoning Lot") consists of (i) the Original Lot 7 Land (ii) the land parcel described in Exhibit A-2 hereto, which land parcel is designated as Tax Lot 10 in Block 25 on the Tax-Map (which land is hereafter called the "Lot 10 Land") (the Original Lot 7 Land and the Lot 10 Land being hereafter collectively called the "Existing CZL Lands").

3. 45 Broad Street is also the owner of the land described on Exhibit B hereto, which land is designated as a portion of Tax Lot 7 in Block 25 as shown on the Tax Map (which land is hereafter called the "Acquired Lot 7 Land"). The Acquired Lot 7 Land is adjacent to, and contiguous for a minimum of ten (10) linear feet with, one or more of the Existing CZL Lands.

4. As certified by Madison Abstract Inc., as agent for First American Title Insurance Co., pursuant to the Certification of Parties in Interest attached as Exhibit C hereto (i) 45 Broad Street is the only "party in interest" (as defined in Section 12-10 {definition of "Zoning Lot" subdivision (d)}of the Zoning Resolution) with respect to the Existing CZL Lands, except for those parties in interest with respect to the Existing CZL Lands that have previously waived their respective rights to join herein, and (ii) 45 Broad Street is the only "party in interest" with respect to the Acquired Lot 7 Land, except for those parties in interest with respect to the Acquired Lot 7 Land that have previously waived their respective rights to join herein.

5. Pursuant to this Declaration, the Declarant Party intends, *inter alia,* to merge the Existing Combined Zoning Lot with the Acquired Lot 7 Land pursuant to the Zoning Resolution.

NY15 17623

3055050-11

NY
B: 25
L: 7 AND 10

Record & Return To:
Madison Abstract Inc.
670 White Plains Road
Scarsdale, NY 10583

MERGER

The Declarant Party, for good and valuable consideration, and with intent to bind all persons in whom title to any portion of the Existing CZL Lands or the Acquired Lot 7 Land is now or shall hereafter become vested, as well as all persons having, or hereafter acquiring, any interest of any nature whatsoever in the Existing CZL Lands (or any portion thereof) or the Acquired Lot 7 Land (or any portion thereof),

DOES HEREBY state, confirm, declare and covenant that the Existing Combined Zoning Lot is hereby merged with the Acquired Lot 7 Land into a single zoning lot, such that the Existing CZL Lands and the Acquired Lot 7 Land are to be treated as a single zoning lot for the purposes of the Zoning Resolution and in accordance with the provisions thereof (such combined zoning lot being herein called the "Enlarged Combined Zoning Lot," and the Existing CZL Lands and the Acquired Lot 7 Land being herein collectively called the "Enlarged CZL Lands").

AGREEMENTS

In respect of the foregoing, the Declarant Party hereby acknowledges as follows:

1. Defined Terms. Terms used herein that are defined in the Zoning Resolution shall have the meanings assigned to them therein, unless the context requires otherwise.

2. Merger Unaffected by Breach. No breach by a Declarant Party of this Declaration (or of any agreement ancillary hereto) shall affect the treatment of all the lands included within the Enlarged Combined Zoning Lot as one zoning lot, and, notwithstanding any such breach, all such lands shall continue to be treated as one zoning lot unless and until such zoning lot is subdivided in accordance and in conformity with the provisions of the Zoning Resolution.

3. Governing Law. This Declaration shall be governed by, and construed in accordance with, the laws of the State of New York.

4. Declaration Runs with the Land. This Declaration, and all the covenants contained herein, runs with the land, and shall bind, and inure to the benefit of, the Declarant Party and its respective successors and assigns, as well as each and every party now having, or hereafter acquiring, any right, title or interest in the Enlarged CZL Lands or any part thereof.

5. Recordation. This Declaration shall be recorded in the Office of the Register of the City of New York, New York County in accordance with the Zoning Resolution.

[SIGNATURE APPEARS ON FOLLOWING PAGE]

IN WITNESS WHEREOF, the declarant has executed this instrument this 1st day of June, 2015.

45 BROAD STREET L/CAL LLC

By: _____
Name: Seth R. Landau
Title: Auth. Signatory

STATE OF Pennsylvania)
) SS:
COUNTY OF Chester)

On this 1st day of JUNE, 2015, before me, the undersigned, a Notary Public in and for said State, personally appeared Seth R. Landau, personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to in the within instrument and acknowledged to me that s/he executed the same in her/his capacity, and that by her/his signature on the instrument, the individual, or the person on behalf of which the individual acted, executed the instrument.

_____
Notary Public

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
KELLY J HUGHES
Notary Public
TREDYFFRIN TWP., CHESTER COUNTY
My Commission Expires Aug 27, 2018

SEAL

EXHIBIT A-1
Original Lot 7 Land

ALL that certain plot, piece or parcel of land, situate, lying and being in the Borough of Manhattan, County, City and State of New York, bounded and described as follows:

BEGINNING at a point on the easterly side of Broad Street, distant one-hundred thirty feet nine and three-fourths inches northerly from the corner formed by the intersection of the said Easterly side of Broad Street with the Northerly side of Beaver Street;

RUNNING THENCE Easterly along a line which forms an angle on its Northerly side with said Easterly side of Broad Street of 82 degrees 30 minutes 10 seconds and along the northerly face of Northerly walls of buildings adjoining on the south, and along southerly face of the Southerly wall of the brick building on the premises hereby described; 146 feet and 2 1/4 inches to the Westerly face of the Westerly wall of the building on the premises adjoining on the East;

THENCE Northerly along said Westerly face of said Westerly wall of 60 feet 3 3/4 inches to the Southerly face of the Southerly wall of the one story brick building on the rear of the premises adjoining on the North;

THENCE Westerly along a line which forms an angle on its southerly side with the Easterly side of Broad Street of 96 degrees 2 minutes and 20 seconds 128 feet 1 1/2 inches to the said Easterly side of Broad Street; and

THENCE Southerly along said easterly side of Broad Street, 63 feet 5 1/4 inches to the point or place of BEGINNING.

TOGETHER WITH the benefits of the negative covenants and easement for light and air set forth, defined and limited in that certain Zoning Lot Development and Easement Agreement dated as of February 26, 2007, by and between Walwilhal Associates, LLC and 45 Broad LLC, and recorded in the Office of the City Register of the City of New York, on March 2, 2007 under CRFN 2007000122089.

EXHIBIT A-2
Lot 10 Land

ALL THAT CERTAIN plot, piece or parcel of land, with the buildings and improvements thereon erected, situate, lying and being in the Borough of Manhattan, County, City and State of New York, bounded and described as follows:

BEGINNING at a point on the easterly side of Broad Street, distant 106 feet 8 inches southerly from the southeasterly comer of Broad Street and Exchange Place, which point is opposite the northerly face of the northerly wall of the northerly building on the premises herein described;

RUNNING THENCE southerly along the easterly side of Broad Street, 46 feet 1-1/2 inches to an angle in the easterly side of Broad Street;

THENCE southerly still along the easterly side of Broad Street, 60 feet 7 inches to a point on the easterly side of Broad Street, distant 194 feet 3 inches northerly from the corner formed by the intersection of the easterly side of Broad Street and the northerly side of Beaver Street, which point is opposite the southerly face of the southerly wall of the southerly building on the premises herein described;

THENCE easterly along the said southerly face of said wall, 128 feet 1-1/2 inches to the westerly face of the westerly wall of the building adjoining on the east;

THENCE northerly along said westerly face of said last mentioned wall and on a line which makes an interior angle with the last mentioned course of 79 degrees 28 minutes 0 seconds, 31 feet 2 inches to the northerly face of the northerly wall of the southerly building on the premises herein described;

THENCE northerly on a line which makes an interior angle with the last mentioned course of 190 degrees 7 minutes 50 seconds, 16 feet 11-1/4 inches;

THENCE northerly along a line which makes an interior angle with the last mentioned course of 178 degrees 39 minutes, 13 feet 4-1/2 inches to the northerly face of the independent wall of the rear building on premises known as 39 Broad Street;

THENCE westerly along the same and on a line which makes an interior angle with the last mentioned course, 91 degrees 42 minutes 0 seconds, 6 feet 7-1/2 inches to the easterly face of the easterly wall of the rear building on the premises known as 35 Broad Street;

THENCE northerly along the same and on a line which makes an exterior angle with the last mentioned course of 75 degrees 12 minutes 0 seconds, 29 feet 6-1/4 inches to thenortherly side ofthe northerly wall of the said building;

THENCE westerly along the same and along the northerly face of the northerly wall of the front building on the premises known as 35 Broad Street and on a line which makes an interior angle with the last mentioned course of 83 degrees 16 minutes 30 seconds, 102 feet 9-1/2 inches to the point or place of BEGINNING.

EXHIBIT B
Acquired Lot 7 Land

ALL that certain plot, piece or parcel of land situate, lying and being in the Borough of Manhattan, City, County and State of New York, bounded and described as follows:

BEGINNING at a point the following two (2) courses and distances from the corner formed by the intersection of the easterly side of Broad Street and the northerly side of Beaver Street;

(1) northerly along the said easterly side of Broad Street 130.81 feet to a point; and
(2) easterly along a line which forms an angle on its northerly side with said easterly side of Broad Street of 82 degrees 30 minutes 10 seconds and along the northerly face of northerly walls of buildings adjoining on the South, a distance of 145.87 feet to the easterly face of the building adjoining on the west at the point or place of BEGINNING;

RUNNING THENCE from said point of beginning southerly along a line which forms an angle on its westerly side with the preceding course of 99 degrees 04 minutes 25 seconds and along the easterly face of the easterly wall of the building adjoining on the West, a distance of 16.75 feet to the northerly face of the building adjoining to the South;

THENCE easterly along a line which forms an angle on its northerly side with the preceding course of 89 degrees 38 minutes 45 seconds and along the northerly face of the building adjoining to the South and an open space, a distance of 48.21 feet to a point in said open space;

THENCE northerly through said open space which forms an angle on its westerly side with the preceding course of 88 degrees 29 minutes 00 seconds, a distance of 74.47 feet to a point in said open space;

THENCE westerly along a line which forms an angle on its southerly side with the preceding course of 125 degrees 52 minutes 30 seconds and along the southerly face of the southerly wall of the building adjoining on the North, a distance of 55.22 feet to the easterly face of a building adjoining on the West;

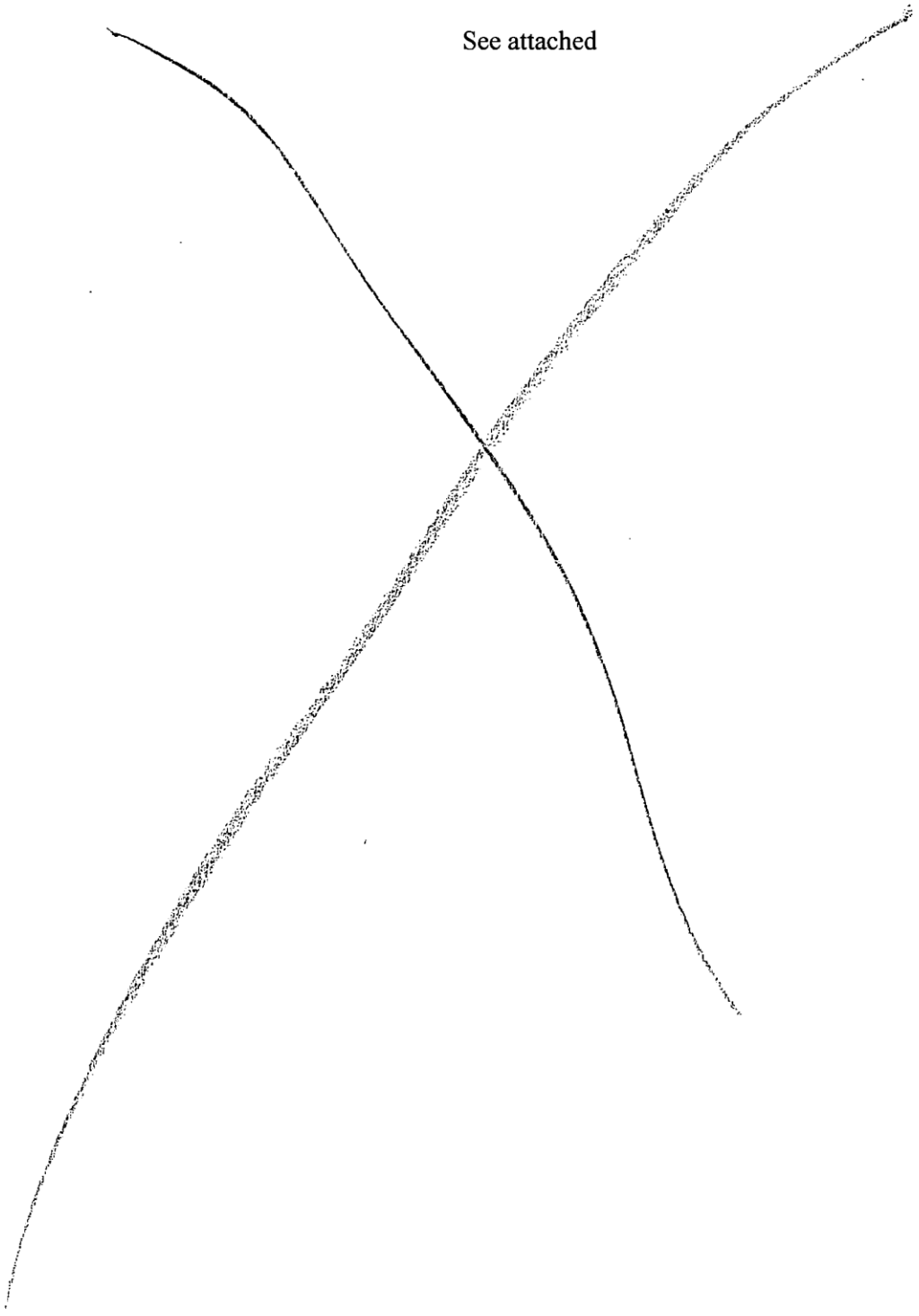
THENCE southerly along a line which forms an angle on its easterly side with the preceding course of 55 degrees 59 minutes 45 seconds, a distance of 88.79 feet to the point or place of BEGINNING.

TOGETHER WITH the benefits of the easements and subject to the burdens set forth, defined and limited by the terms of those certain Easement Modification Agreement dated as of June 20, 2008, by and between 25 Broad, LLC and SDS William Street LLC, and recorded in the Office of the City Register of the City of New York, on November 21, 2008 under CRFN 2008000450552 and Relocation and Modification Agreement dated as of June 20, 2008 by and between 40 Exchange Place Corp. and SDS William Street LLC and recorded in the Office of the City Register of the City of New York, on November 21, 2008 under CRFN 2008000450553, together with the benefits of all other covenants and agreements set forth in Liber 14, cp. 190, Liber 1398 cp. 408, Liber 1504 cp. 182, Liber 3082 cp. 329, Liber 1409, cp. 80 and Liber 4072, cp. 411 and subject to the limitations contained therein.

EXHIBIT C

Certification of Parties in Interest

See attached



N.B.#_____
or
Alt.#_____

Exhibit "II"

CERTIFICATION PURSUANT TO ZONING LOT SUBDIVISION D OF SECTION 12-10 OF THE ZONING RESOLUTION OF DECEMBER 15, 1961 OF THE CITY OF NEW YORK, AS AMENDED EFFECTIVE AUGUST 18, 1977

Madison Abstract Inc., as agent for First American Title Insurance Co., a title company licensed to do business in the State of New York and having its principal office at 670 White Plains Road, Scarsdale, New York, hereby certifies that as to the land hereafter described being a tract of land, either unsubdivided or consisting of two or more lots of record, contiguous for a minimum of ten linear feet, located within a single block, that all the parties in interest constituting a party as defined in Section 12-10 subdivision (d) of the Zoning Resolution of the City of New York, effective December 15, 1961, as amended, are the following:

NAME	ADDRESS	INTEREST
45 Broad Street L/Cal LLC	c/o LCOR Incorporated 850 Cassett Road Suite 300 Berwyn, Pennsylvania 19312	Fee owner/ Lot 7 CRFN-2012000218743 and CRFN-2013000219394
Walwilhal Associates LLC	820 Morris Turnpike Short Hills, NJ 07078	Fee owner/ Lot 10 Waiver recorded in CRFN-2007000122089
Claremont Preparatory School, LLC	150 East 58th Street 31st Floor New York, New York 10155	Tenant/ Lot 10 Waiver recorded in CRFN-2007000122086
Capital One, National Association by Assignment of Mortgage from Landesbank Hessen-Thuringen Girozentrale	275 Broadhollow Road Melville, NY 11747	Mortgagee/ Lot10 Waiver recorded in CRFN-2007000122085 and CRFN-2007000122089

The subject tract of land with respect to which the foregoing parties are the parties in interest as aforesaid is known as Lots 10 and 7, in Block 25, as shown on the tax map of the City of New York, New York County, and is more particularly bounded and described as follows:

Lot 7

Parcel I

ALL that certain plot, piece or parcel of land, situate, lying and being in the Borough of Manhattan, County, City and State of New York, bounded and described as follows:

BEGINNING at a point on the easterly side of Broad Street, distant one-hundred thirty feet nine and three-fourths inches northerly from the corner formed by the intersection of the said easterly side of Broad Street with the northerly side of Beaver Street;

RUNNING THENCE easterly along a line which forms an angle on its northerly side with said easterly side of Broad Street of 82 degrees 30 minutes 10 seconds and along the northerly face of northerly walls of buildings adjoining on the South, and along southerly face of the Southerly wall of the brick building on the premises hereby described; 146 feet and 2 1/4 inches (Tax Map 145.93/Survey 145.87) to the westerly face of the westerly wall of the building on the premises adjoining on the East;

THENCE northerly along said westerly face of said westerly wall of 60 feet 3 3/4 inches to the southerly face of the southerly wall of the one story brick building on the rear of the premises adjoining on the North;

THENCE westerly along a line which forms an angle on its southerly side with the easterly side of Broad Street of 96 degrees 2 minutes 20 seconds 128 feet 1 1/2 inches to the said easterly side of Broad Street; and

THENCE southerly along said easterly side of Broad Street, 63 feet 5 1/4 inches to the point or place of BEGINNING.

TOGETHER with the benefits of the easements set forth, defined and limited in that certain Zoning Lot Development and Easement Agreement dated as of February 26, 2007, by and between Walwilhal Associates, LLC and 45 Broad LLC, and recorded in the Office of the City Register of the City of New York, on March 2, 2007 under CRFN 2007000122089.

Parcel II

ALL that certain plot, piece or parcel of land situate, lying and being in the Borough of Manhattan, City, County and State of New York, bounded and described as follows:

BEGINNING at a point the following two (2) courses and distances from the corner formed by the intersection of the easterly side of Broad Street and the northerly side of Beaver Street;

(1) northerly along the said easterly side of Broad Street 130.81 feet to a point; and
(2) easterly along a line which forms an angle on its northerly side with said easterly side of Broad Street of 82 degrees 30 minutes 10 seconds and along the northerly face of northerly walls of buildings adjoining on the South, a distance of 145.87 feet to the easterly face of the building adjoining on the west at the point or place of BEGINNING;

RUNNING THENCE from said point of beginning southerly along a line which forms an angle on its westerly side with the preceding course of 99 degrees 04 minutes 25 seconds and along the easterly face of the easterly wall of the building adjoining on the West, a distance of 16.75 (Survey and Tax Map 16.73) feet to the northerly face of the building adjoining to the South;

THENCE easterly along a line which forms an angle on its northerly side with the preceding course of 89 degrees 38 minutes 45 seconds and along the northerly face of the building adjoining to the South and an open space, a distance of 48.21 feet to a point in said open space;

THENCE northerly through said open space which forms an angle on its westerly side with the preceding course of 88 degrees 29 minutes 00 seconds, a distance of 74.47 feet to a point in said open space;

THENCE westerly along a line which forms an angle on its southerly side with the preceding course of 125 degrees 52 minutes 30 seconds and along the southerly face of the southerly wall of the building adjoining on the North, a distance of 55.22 feet to the easterly face of a building adjoining on the West;

THENCE southerly along a line which forms an angle on its easterly side with the preceding course of 55 degrees 59 minutes 45 seconds, a distance of 88.79 feet to the point or place of BEGINNING.

BEGINNING at a point on the easterly side of Broad Street, distant 106 feet 8 inches southerly from the southeasterly corner of Broad Street and Exchange Place, which point is opposite the northerly face of the northerly wall of the northerly building on the premises herein described;

THENCE southerly along the easterly side of Broad Street, 46 feet 1-1/2 inches to an angle in the easterly side of Broad Street;

THENCE southerly still along the easterly side of Broad Street, 60 feet 7 inches to a point on the easterly side of Broad Street, distant 194 feet 3 inches northerly from the corner formed by the intersection of the easterly side of Broad Street and the northerly side of Beaver Street, which point is opposite the southerly face of the southerly wall of the southerly building on the premises herein described;

THENCE easterly along the said southerly face of said wall, 128 feet 1-1/2 inches to the westerly face of the westerly wall of the building adjoining on the east;

THENCE northerly along said westerly face of said last mentioned wall and on a line which makes an interior angle with the last mentioned course of 79 degrees 28 minutes 0 seconds, 31 feet 2 inches to the northerly face of the northerly wall of the southerly building on the premises herein described;

THENCE northerly on a line which makes an interior angle with the last mentioned course of 190 degrees 7 minutes 50 seconds, 16 feet 11-1/4 inches;

THENCE northerly along a line which makes an interior angle with the last mentioned course of 178 degrees 39 minutes, 13 feet 4- 1/2 inches to the northerly face of the independent wall of the rear building on premises known as 39 Broad Street;

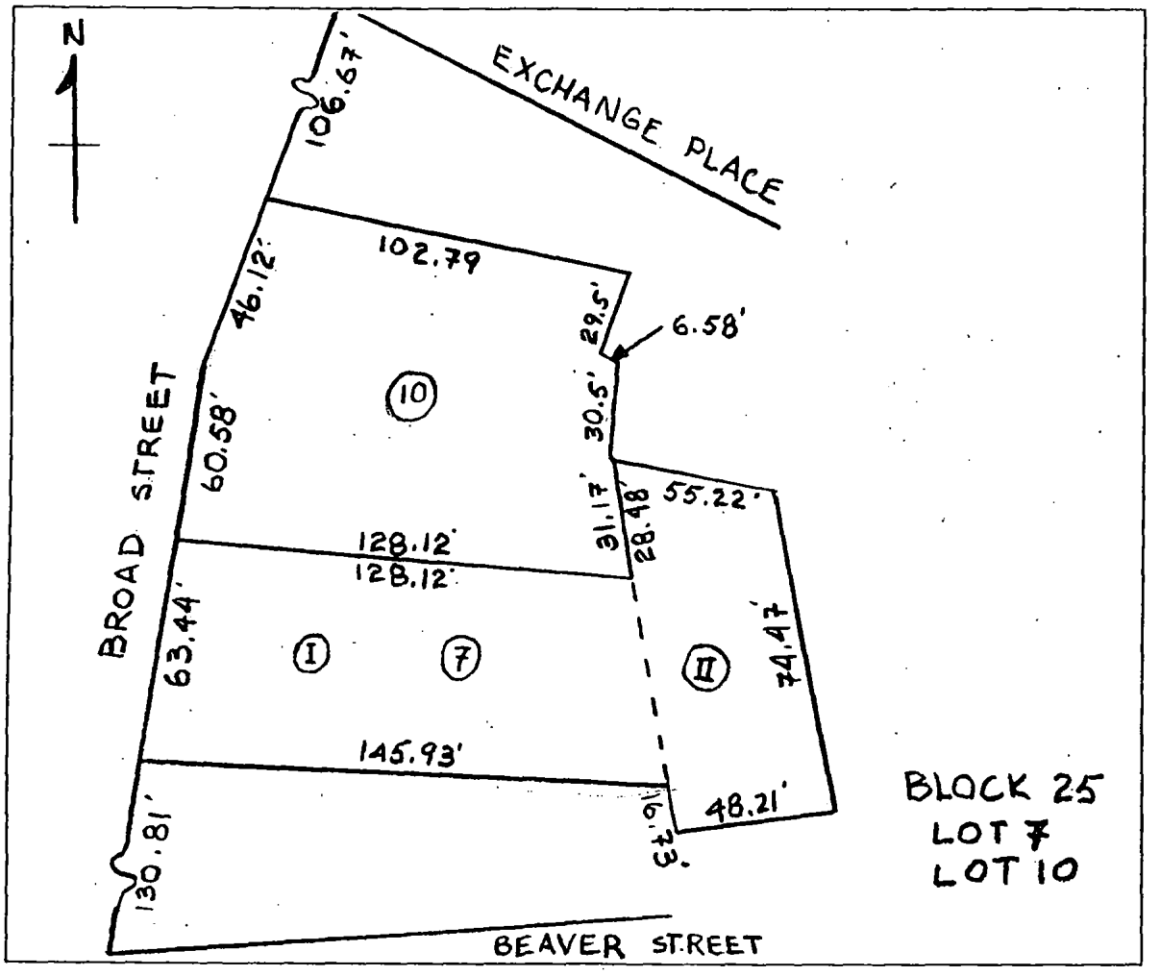
THENCE westerly along the same and on a line which makes an interior angle with the last mentioned course, 91 degrees 42 minutes 0 seconds, 6 feet 7-1/2 inches to the easterly face of the easterly wall of the rear building on the premises known as 35 Broad Street;

THENCE northerly along the same and on a line which makes an exterior angle with the last mentioned course of 75 degrees 12 minutes 0 seconds, 29 feet 6- 1/4 inches to the northerly side of the northerly wall of the said building;

THENCE westerly along the same and along the northerly face of the northerly wall of the front building on the premises known as 35 Broad Street and on a line which makes an interior angle with the last mentioned course of 83 degrees 16 minutes 30 seconds, 102 feet 9-1/2 inches to the point or place of BEGINNING.

That the said premises are known as and by street address, 35-41 Broad Street and 43-45 Broad Street New York, New York, and as shown on the following diagram:

DIAGRAM



Certified this 2 day of JUNE, to 45 Broad Street L/Cal LLC, the applicant for this certification.

Note: A zoning lot may or may not coincide with a lot as shown on the Official Tax Map of the City of New York, or on any recorded subdivision plot or deed. A zoning lot may be subdivided into two or more zoning lots provided all of the resulting zoning lots and the buildings thereon shall comply with the applicable provisions of the zoning lot resolution.

This certificate is made for and accepted by the applicant upon the express understanding that liability hereunder is limited to one thousand ($1,000) dollars.

MADISON ABSTRACT INC.

By: _____
William Cryan, Vice President

State of New York)
)ss.:
County of Westchester)

On the 2 day of June, 2015 before me, the undersigned, personally appeared, WILLIAM CRYAN personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that he/she executed the same in his/her capacity and that by his/her signature on the instrument the individual or person upon behalf of which the individual acted, executed the instrument.

_____
Notary Public

SEAL

DENISE D. MATTHEWS
NOTARY PUBLIC-STATE OF NEW YORK
No. 01MA6144637
Qualified in Westchester County
My Commission Expires May 01, 2018

EXHIBIT D

Certification of Parties-in-Interest

NYC DEPARTMENT OF FINANCE
OFFICE OF THE CITY REGISTER

This page is part of the instrument. The City Register will rely on the information provided by you on this page for purposes of indexing this instrument.The information on this page will control for indexing purposes in the event of any conflict with the rest of the document.

2018051700489001001EE7B8

RECORDING AND ENDORSEMENT COVER PAGE **PAGE 1 OF 8**

Document ID: 2018051700489001 Document Date: 04-25-2018 Preparation Date: 05-17-2018
Document Type: CERTIFICATE
Document Page Count: 7

PRESENTER:

MADISON ABSTRACT, INC. (NY 15 17623B)
670 WHITE PLAINS ROAD, SUITE 121
AS AGENT TO
SCARSDALE, NY 10583
914-725-7200
AFRIEDMAN@MADISONABSTRACT.COM

RETURN TO:

MADISON ABSTRACT, INC. (NY 15 17623B)
670 WHITE PLAINS ROAD, SUITE 121
AS AGENT TO
SCARSDALE, NY 10583
914-725-7200
AFRIEDMAN@MADISONABSTRACT.COM

PROPERTY DATA

Borough	Block	Lot	Unit	Address
MANHATTAN	25	7	Entire Lot	45 BROAD STREET

Property Type: COMMERCIAL REAL ESTATE

Borough	Block	Lot	Unit	Address
MANHATTAN	25	10	Entire Lot	41 BROAD STREET

Property Type: COMMERCIAL REAL ESTATE

CROSS REFERENCE DATA

CRFN_____ *or* DocumentID_____ *or* _____ Year____ Reel____ Page_____ *or* File Number_____

PARTIES

PARTY 1:
MADISON ABSTRACT INC.
670 WHITE PLAINS ROAD
SCARSDALE, NY 10583

FEES AND TAXES

Mortgage :

Mortgage Amount:	$	0.00
Taxable Mortgage Amount:	$	0.00
Exemption:		
TAXES: County (Basic):	$	0.00
City (Additional):	$	0.00
Spec (Additional):	$	0.00
TASF:	$	0.00
MTA:	$	0.00
NYCTA:	$	0.00
Additional MRT:	$	0.00
TOTAL:	$	0.00
Recording Fee:	$	75.00
Affidavit Fee:	$	0.00

Filing Fee:	$	0.00
NYC Real Property Transfer Tax:	$	0.00
NYS Real Estate Transfer Tax:	$	0.00

RECORDED OR FILED IN THE OFFICE OF THE CITY REGISTER OF THE CITY OF NEW YORK
Recorded/Filed 05-21-2018 12:45
City Register File No.(CRFN): **2018000169144**

City Register Official Signature

N.B.#_____
or
Alt.#_____

Exhibit "II"

CERTIFICATION PURSUANT TO ZONING LOT SUBDIVISION D OF SECTION 12-10 OF THE ZONING RESOLUTION OF DECEMBER 15, 1961 OF THE CITY OF NEW YORK, AS AMENDED EFFECTIVE AUGUST 18, 1977

Madison Abstract Inc., as agent for First American Title Insurance Co., a title company licensed to do business in the State of New York and having its principal office at 670 White Plains Road, Scarsdale, New York, hereby certifies that as to the land hereafter described being a tract of land, either unsubdivided or consisting of two or more lots of record, contiguous for a minimum of ten linear feet, located within a single block, that all the parties in interest constituting a party as defined in Section 12-10 subdivision (d) of the Zoning Resolution of the City of New York, effective December 15, 1961, as amended, are the following:

NAME	ADDRESS	INTEREST
Madison 45 Broad Development LLC	c/o Madison Equities LLC 105 Madison Avenue New York, N.Y. 10016	Fee owner/ Lot 7 CRFN-2015000391828
HSBC Bank USA, National Association	452 Fifth Avenue, New York, N.Y. 10018	Mortgagee/ Lot 7 CRFN-2017000281060
Walwilhal Associates LLC	820 Morris Turnpike Short Hills, NJ 07078	Fee owner/ Lot 10 Waiver recorded in CRFN-2007000122089
Claremont Preparatory School, LLC	150 East 58th Street 31st Floor New York, New York 10155	Tenant/ Lot 10 Waiver recorded in CRFN-2007000122086
Capital One, National Association by Assignment of Mortgage from Landesbank Hessen-Thuringen Girozentrale	275 Broadhollow Road Melville, NY 11747	Mortgagee/ Lot10 Waivers recorded in CRFN-2007000122085 CRFN-2007000122089

The subject tract of land with respect to which the foregoing parties are the parties in interest as aforesaid is known as Lots 7 and 10, in Block 25, as shown on the tax map of the City of New York, New York County, and is more particularly bounded and described as follows:

Lot 7

Parcel I

ALL that certain plot, piece or parcel of land, situate, lying and being in the Borough of Manhattan, County, City and State of New York, bounded and described as follows:

BEGINNING at a point on the easterly side of Broad Street, distant one-hundred thirty feet nine and three-fourths inches northerly from the corner formed by the intersection of the said easterly side of Broad Street with the northerly side of Beaver Street;

RUNNING THENCE easterly along a line which forms an angle on its northerly side with said easterly side of Broad Street of 82 degrees 30 minutes 10 seconds and along the northerly face of northerly walls of buildings adjoining on the South, and along southerly face of the Southerly wall of the brick building on the premises hereby described; 146 feet and 2 1/4 inches (Tax Map 145.93/Survey 145.87) to the westerly face of the westerly wall of the building on the premises adjoining on the East;

THENCE northerly along said westerly face of said westerly wall of 60 feet 3 3/4 inches to the southerly face of the southerly wall of the one story brick building on the rear of the premises adjoining on the North;

THENCE westerly along a line which forms an angle on its southerly side with the easterly side of Broad Street of 96 degrees 2 minutes 20 seconds 128 feet 1 1/2 inches to the said easterly side of Broad Street; and

THENCE southerly along said easterly side of Broad Street, 63 feet 5 1/4 inches to the point or place of BEGINNING.

TOGETHER with the benefits of the easements set forth, defined and limited in that certain Zoning Lot Development and Easement Agreement dated as of February 26, 2007, by and between Walwilhal Associates, LLC and 45 Broad LLC, and recorded in the Office of the City Register of the City of New York, on March 2, 2007 under CRFN 2007000122089.

Parcel II

ALL that certain plot, piece or parcel of land situate, lying and being in the Borough of Manhattan, City, County and State of New York, bounded and described as follows:

BEGINNING at a point the following two (2) courses and distances from the corner formed by the intersection of the easterly side of Broad Street and the northerly side of Beaver Street;

(1) northerly along the said easterly side of Broad Street 130.81 feet to a point; and
(2) easterly along a line which forms an angle on its northerly side with said easterly side of Broad Street of 82 degrees 30 minutes 10 seconds and along the northerly face of northerly walls of buildings adjoining on the South, a distance of 145.87 feet to the easterly face of the building adjoining on the west at the point or place of BEGINNING;

RUNNING THENCE from said point of beginning southerly along a line which forms an angle on its westerly side with the preceding course of 99 degrees 04 minutes 25 seconds and along the easterly face of the easterly wall of the building adjoining on the West, a distance of 16.75 (Survey and Tax Map 16.73) feet to the northerly face of the building adjoining to the South;

THENCE easterly along a line which forms an angle on its northerly side with the preceding course of 89 degrees 38 minutes 45 seconds and along the northerly face of the building adjoining to the South and an open space, a distance of 48.21 feet to a point in said open space;

THENCE northerly through said open space which forms an angle on its westerly side with the preceding course of 88 degrees 29 minutes 00 seconds, a distance of 74.47 feet to a point in said open space;

THENCE westerly along a line which forms an angle on its southerly side with the preceding course of 125 degrees 52 minutes 30 seconds and along the southerly face of the southerly wall of the building adjoining on the North, a distance of 55.22 feet to the easterly face of a building adjoining on the West;

THENCE southerly along a line which forms an angle on its easterly side with the preceding course of 55 degrees 59 minutes 45 seconds, a distance of 88.79 feet to the point or place of BEGINNING.

Perimeter Description

ALL that certain plot, piece or parcel of land situate, lying and being in the Borough of Manhattan, City, County and State of New York, bounded and described as follows:

BEGINNING at a point the following one (1) course and distance from the corner formed by the intersection of the easterly side of Broad Street and the northerly side of Beaver Street;

(1) Northerly along the said easterly side of Broad Street 130.81 feet to the point or place of BEGINNING;

RUNNING THENCE from said point of beginning easterly along a line which forms an angle on its northerly side with said easterly side of Broad Street of 82 degrees 30 minutes 10 seconds and along the northerly face of northerly walls of buildings adjoining on the South, a distance of 145.87 (Tax Map 145.93) feet to the easterly face of the building adjoining on the West;

THENCE southerly along a line which forms an angle on its westerly side with the preceding course of 99 degrees 04 minutes 25 seconds and along the easterly face of the easterly wall of the building adjoining on the West, a distance of 16.75 (16.73 Survey and Tax Map) feet to the northerly face of the building adjoining to the South;

THENCE easterly along a line which forms an angle on its northerly side with the preceding course of 89 degrees 38 minutes 45 seconds and along the northerly face of the building adjoining to the South and an open space, a distance of 48.21 feet to a point in said open space;

THENCE northerly through said open space which forms an angle on its westerly side with the preceding course of 88 degrees 29 minutes 00 seconds, a distance of 74.47 feet to a point in said open space;

THENCE westerly along a line which forms an angle on its southerly side with the preceding course of 125 degrees 52 minutes 30 seconds and along the southerly face of the southerly wall of the building adjoining on the North, a distance of 55.22 feet to the easterly face of a building adjoining on the West;

THENCE southerly along a line which forms an angle on its easterly side with the preceding course of 55 degrees 59 minutes 45 seconds, a distance of 28.48 feet to the southerly face of the southerly wall of the building on the premises adjoining on the North;

THENCE westerly along a line which forms an angle on its southerly side with the easterly side of Broad Street of 96 degrees 2 minutes 20 seconds, 128.12 feet to said easterly side of Broad Street;

THENCE southerly along said easterly side of Broad Street, 63.44 feet to the point or place of
BEGINNING.

Lot 10

BEGINNING at a point on the easterly side of Broad Street, distant 106 feet 8 inches southerly from the southeasterly corner of Broad Street and Exchange Place, which point is opposite the northerly face of the northerly wall of the northerly building on the premises herein described;

THENCE southerly along the easterly side of Broad Street, 46 feet 1-1/2 inches to an angle in the easterly side of Broad Street;

THENCE southerly still along the easterly side of Broad Street, 60 feet 7 inches to a point on the easterly side of Broad Street, distant 194 feet 3 inches northerly from the corner formed by the intersection of the easterly side of Broad Street and the northerly side of Beaver Street, which point is opposite the southerly face of the southerly wall of the southerly building on the premises herein described;

THENCE easterly along the said southerly face of said wall, 128 feet 1-1/2 inches to the westerly face of the westerly wall of the building adjoining on the east;

THENCE northerly along said westerly face of said last mentioned wall and on a line which makes an interior angle with the last mentioned course of 79 degrees 28 minutes 0 seconds, 31 feet 2 inches to the northerly face of the northerly wall of the southerly building on the premises herein described;

THENCE northerly on a line which makes an interior angle with the last mentioned course of 190 degrees 7 minutes 50 seconds, 16 feet 11-1/4 inches;

THENCE northerly along a line which makes an interior angle with the last mentioned course of 178 degrees 39 minutes, 13 feet 4- 1/2 inches to the northerly face of the independent wall of the rear building on premises known as 39 Broad Street;

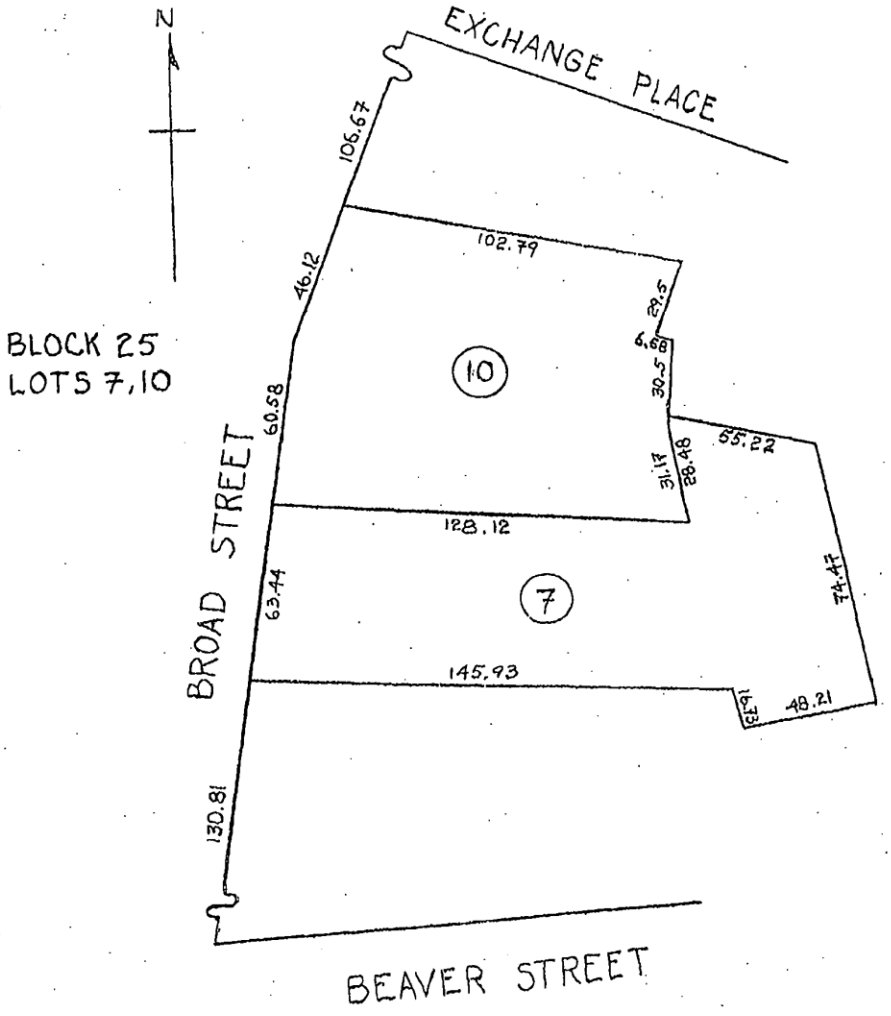
THENCE westerly along the same and on a line which makes an interior angle with the last mentioned course, 91 degrees 42 minutes 0 seconds, 6 feet 7-1/2 inches to the easterly face of the easterly wall of the rear building on the premises known as 35 Broad Street;

THENCE northerly along the same and on a line which makes an exterior angle with the last mentioned course of 75 degrees 12 minutes 0 seconds, 29 feet 6- 1/4 inches to the northerly side of the northerly wall of the said building;

THENCE westerly along the same and along the northerly face of the northerly wall of the front building on the premises known as 35 Broad Street and on a line which makes an interior angle with the last mentioned course of 83 degrees 16 minutes 30 seconds, 102 feet 9-1/2 inches to the point or place of BEGINNING.

DIAGRAM

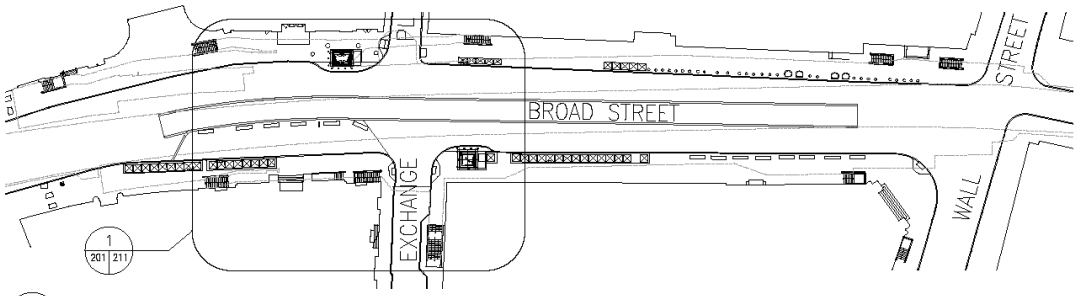
That the said premises are known as and by the street address 45 Broad Street, lot 7, and 41 Broad Street, lot 10, New York, N.Y., as shown on the following diagram:



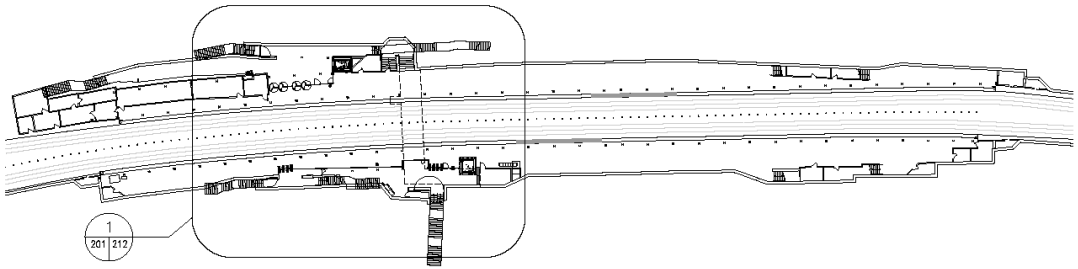
The image cannot currently be displayed.

EXHIBIT E

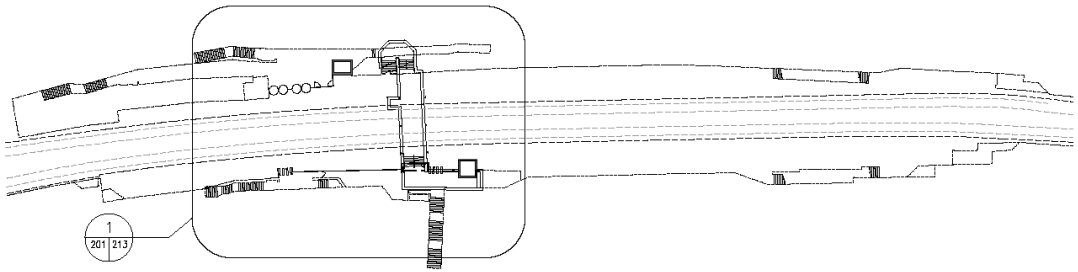
Broad Street Station Improvements



1 / 201 – KEY PLAN – STREET LEVEL
SCALE: 1/32"=1'-0"
SCALE: 1/32"=1'-0"



2 / 201 – KEY PLAN – PLATFORM LEVEL
SCALE: 1/32"=1'-0"
SCALE: 1/32"=1'-0"



3 / 201 – KEY PLAN – UNDERPASS LEVEL
SCALE: 1/32"=1'-0"
SCALE: 1/32"=1'-0"

STREET LEVEL CONSTRUCTION NOTES

1. SEE NEW CONSTRUCTION KEY NOTES ON DWG. A–202
2. SEE ARCHITECTURAL SYMBOLS MATERIALS AND ABBREVIATIONS ON DWG. A–001.
3. SEE GENERAL NOTES ON DWGS. G–101 AND A–002.
4. SEE WALL TYPES ON DWG. A–607
5. PRESERVE AND PROTECT ALL EXISTING SIDEWALK ADJOINING TO PART OF AREA OF WORK. CONTRACTOR SHALL RESTORE ALL FINISHES TO ORIGINAL CONDITION AS REQUIRED AND DIRECTED BY THE ENGINEER.
6. CONTRACTOR SHALL COORDINATE UNDERPINNING OF EXISTING STRUCTURE WITH STRUCTURAL DRAWINGS.

PLATFORM LEVEL CONSTRUCTION NOTES

1. SEE NEW CONSTRUCTION KEY NOTES ON DWG. A–202.
2. SEE GENERAL NOTES ON DWGS. G–101 AND A–002.
2. SEE ARCHITECTURAL SYMBOLS MATERIALS AND ABBREVIATIONS ON DWG. A–001.
3. SEE WALL TYPES ON DWG. A–607
4. FOR PLATFORM LEVEL CONSTRUCTION WORK, COORDINATE WITH STRUCTURAL DRAWING.
5. CONTRACTOR TO PRESERVE AND PROTECT ALL EXISTING ADJOINING AREA OF WORK AND SHALL RESTORE ALL FINISHES TO ORIGINAL CONDITION AS REQUIRED AND DIRECTED BY THE ENGINEER.

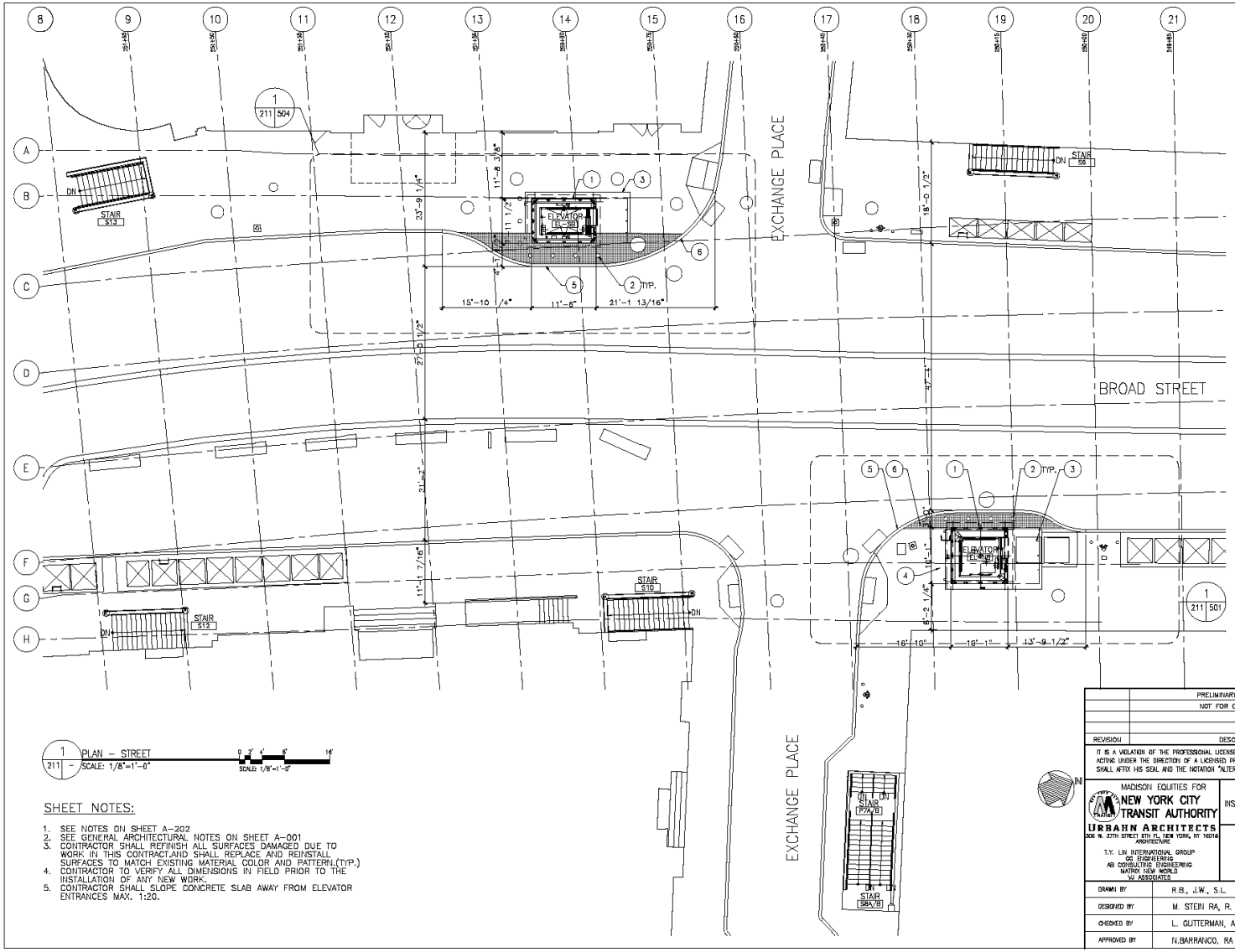
REVISION	DESCRIPTION	DATE	APPROVED
	PRELIMINARY ENGINEERING		
	NOT FOR CONSTRUCTION		

MADISON EQUITIES FOR
NEW YORK CITY TRANSIT AUTHORITY
URBAHN ARCHITECTS
305 W. 37TH STREET 8TH FL, NEW YORK, NY 10018
ARCHITECTURE
T.Y. LIN INTERNATIONAL GROUP
GC ENGINEERING
AB CONSULTING ENGINEERING
MATRIX NEW WORLD
VJ ASSOCIATES

PROJECT: T_13001
INSTALLATION OF TWO (2) ELEVATORS AT BROAD ST. STATION, NASSAU ST. LINE (BMT), BOROUGH OF MANHATTAN

KEY PLANS STREET, PLATFORM AND UNDERPASS LEVEL

DRAWN BY	R.B., J.W., S.L.		DATE: 04-19-2018
DESIGNED BY	M. STEIN RA, R. BIEBER		DRAWING NO.: A-201
CHECKED BY	L. GUTTERMAN, AIA		
APPROVED BY	N.BARRANCO, RA		REVISION:



1 / 211 – PLAN – STREET
SCALE: 1/8"=1'-0"

SCALE: 1/8"=1'-0"

SHEET NOTES:

1. SEE NOTES ON SHEET A-202
2. SEE GENERAL ARCHITECTURAL NOTES ON SHEET A-001
3. CONTRACTOR SHALL REFINISH ALL SURFACES DAMAGED DUE TO WORK IN THIS CONTRACT,AND SHALL REPLACE AND REINSTALL SURFACES TO MATCH EXISTING MATERIAL COLOR AND PATTERN.(TYP.)
4. CONTRACTOR TO VERIFY ALL DIMENSIONS IN FIELD PRIOR TO THE INSTALLATION OF ANY NEW WORK.
5. CONTRACTOR SHALL SLOPE CONCRETE SLAB AWAY FROM ELEVATOR ENTRANCES MAX. 1:20.

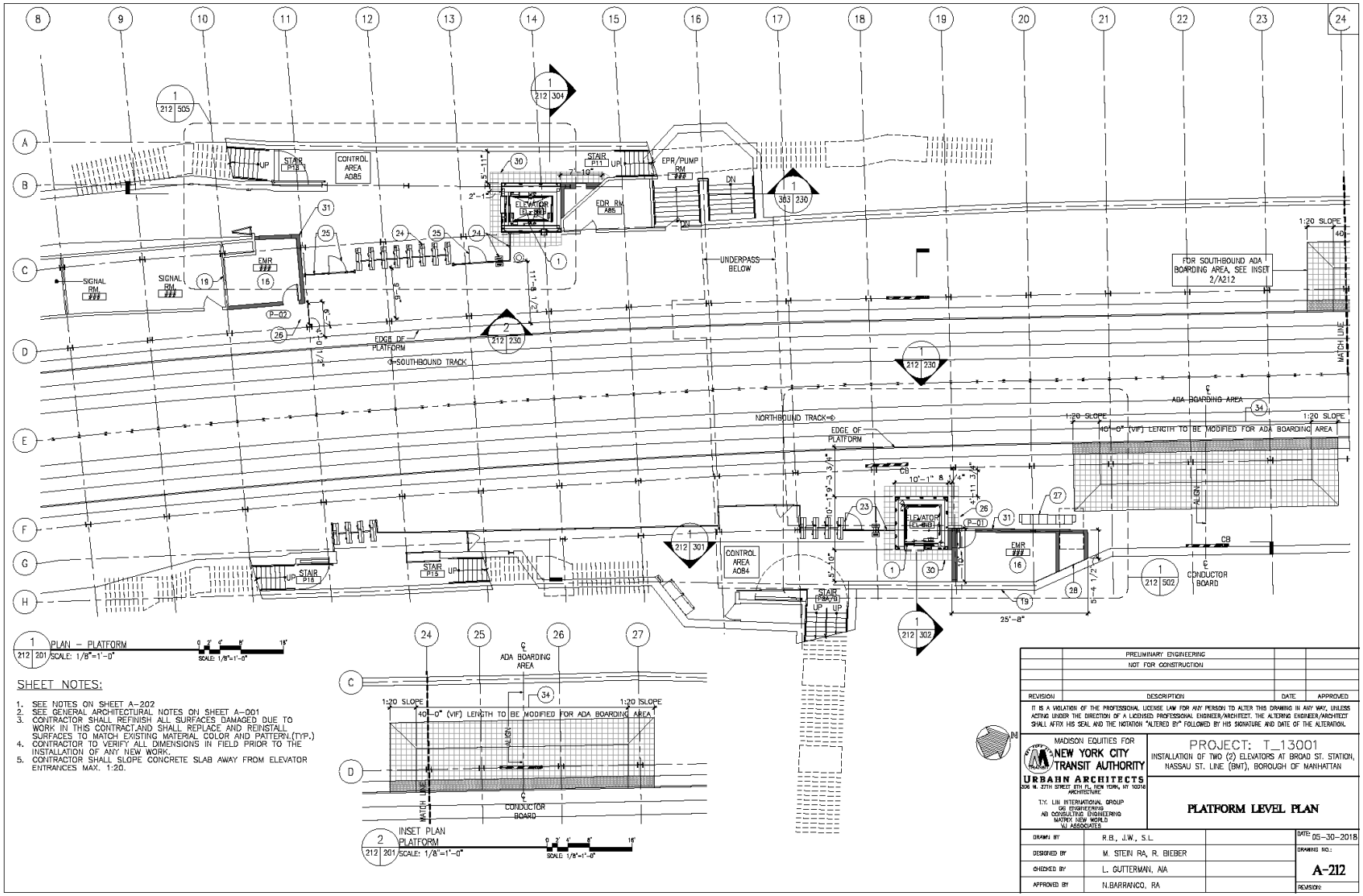
REVISION	DESCRIPTION	DATE	APPROVED
	PRELIMINARY ENGINEERING NOT FOR CONSTRUCTION		

MADISON EQUITIES FOR
NEW YORK CITY TRANSIT AUTHORITY
URBAHN ARCHITECTS
300 W. 37TH STREET 8TH FL. NEW YORK, NY 10018
ARCHITECTURE
T.Y. LIN INTERNATIONAL GROUP
GC ENGINEERING
AB CONSULTING ENGINEERING
MATRIX NEW WORLD
VJ ASSOCIATES

PROJECT: T_13001
INSTALLATION OF TWO (2) ELEVATORS AT BROAD ST. STATION, NASSAU ST. LINE (BMT), BOROUGH OF MANHATTAN

STREET LEVEL PLAN

DRAWN BY	R.B., J.W., S.L.		DATE: 04-19-2018
DESIGNED BY	M. STEIN RA, R. BIEBER		DRAWING NO.: A-211
CHECKED BY	L. GUTTERMAN, AIA		
APPROVED BY	N.BARRANCO, RA		REVISION:



1 212 201 PLAN – PLATFORM SCALE: 1/8"=1'-0"

0 2' 4' 8' 16'
SCALE 1/8"=1'-0"

SHEET NOTES:

1. SEE NOTES ON SHEET A-202
2. SEE GENERAL ARCHITECTURAL NOTES ON SHEET A-001
3. CONTRACTOR SHALL REFINISH ALL SURFACES DAMAGED DUE TO WORK IN THIS CONTRACT,AND SHALL REPLACE AND REINSTALL SURFACES TO MATCH EXISTING MATERIAL COLOR AND PATTERN.(TYP.)
4. CONTRACTOR TO VERIFY ALL DIMENSIONS IN FIELD PRIOR TO THE INSTALLATION OF ANY NEW WORK.
5. CONTRACTOR SHALL SLOPE CONCRETE SLAB AWAY FROM ELEVATOR ENTRANCES MAX. 1:20.

2 212 201 INSET PLAN PLATFORM SCALE: 1/8"=1'-0"

0 2' 4' 8' 16'
SCALE 1/8"=1'-0"

REVISION	DESCRIPTION	DATE	APPROVED
	PRELIMINARY ENGINEERING		
	NOT FOR CONSTRUCTION		

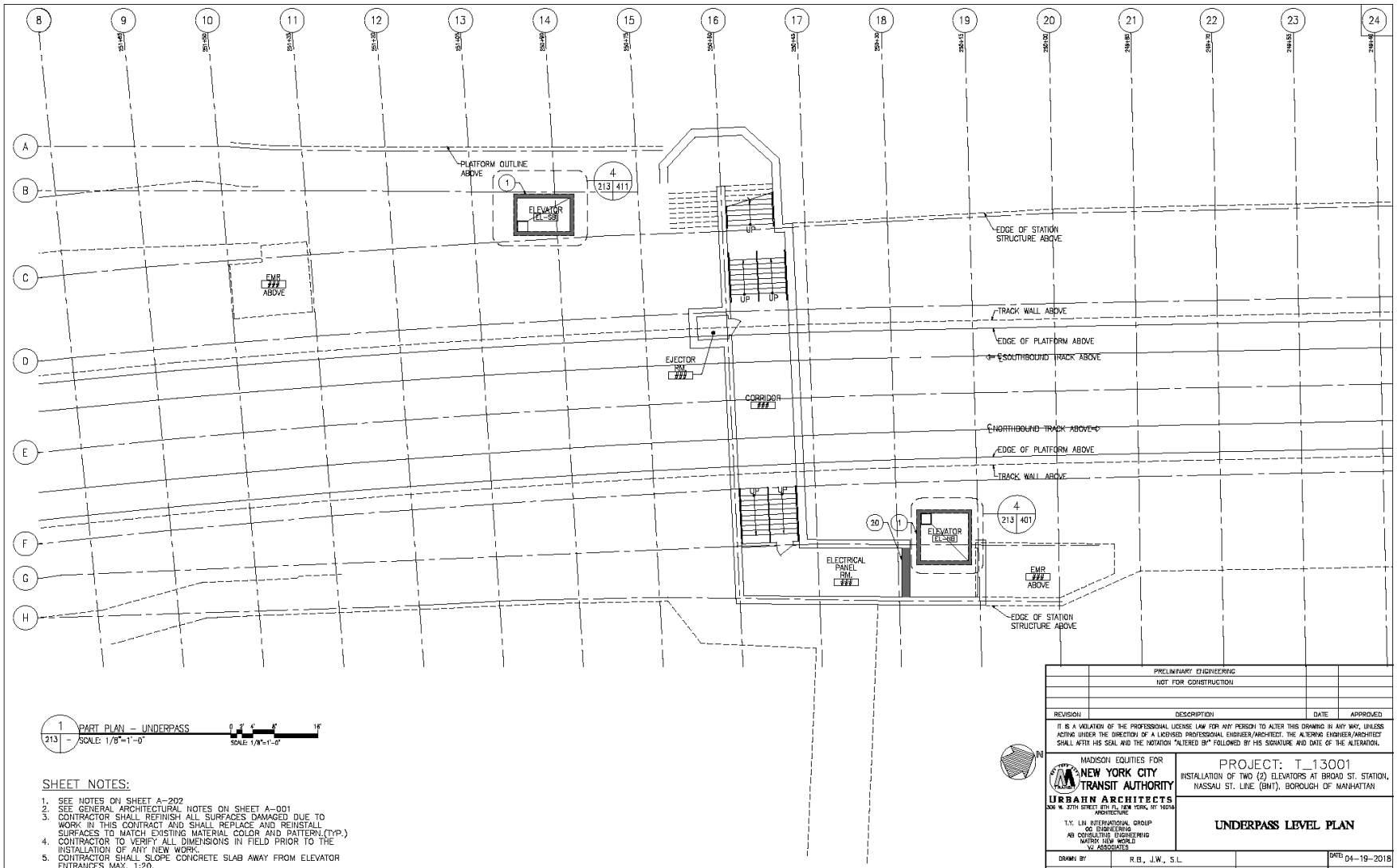
MADISON EQUITIES FOR
NEW YORK CITY TRANSIT AUTHORITY

URBAHN ARCHITECTS
306 W. 37TH STREET 8TH FL. NEW YORK, NY 10018
ARCHITECTURE
T/C: LIN INTERNATIONAL GROUP
GG ENGINEERING
AB CONSULTING ENGINEERING
MATRIX NEW WORLD
VJ ASSOCIATES

PROJECT: T_13001
INSTALLATION OF TWO (2) ELEVATORS AT BROAD ST. STATION, NASSAU ST. LINE (BMT), BOROUGH OF MANHATTAN

PLATFORM LEVEL PLAN

DRAWN BY	R.B., J.W., S.L.		DATE: 05-30-2018
DESIGNED BY	M. STEIN RA, R. BIEBER		DRAWING NO.: A-212
CHECKED BY	L. GUTTERMAN, AIA		
APPROVED BY	N.BARRANCO, RA		REVISION:



1 / 213 – PART PLAN – UNDERPASS
SCALE: 1/8"=1'-0"

0' 4' 8' 16'
SCALE: 1/8"=1'-0"

SHEET NOTES:

1. SEE NOTES ON SHEET A-202
2. SEE GENERAL ARCHITECTURAL NOTES ON SHEET A-001
3. CONTRACTOR SHALL REFINISH ALL SURFACES DAMAGED DUE TO WORK IN THIS CONTRACT AND SHALL REPLACE AND REINSTALL SURFACES TO MATCH EXISTING MATERIAL COLOR AND PATTERN.(TYP.)
4. CONTRACTOR TO VERIFY ALL DIMENSIONS IN FIELD PRIOR TO THE INSTALLATION OF ANY NEW WORK.
5. CONTRACTOR SHALL SLOPE CONCRETE SLAB AWAY FROM ELEVATOR ENTRANCES MAX. 1:20.

REVISION	DESCRIPTION	DATE	APPROVED
	PRELIMINARY ENGINEERING		
	NOT FOR CONSTRUCTION		

MADISON EQUITIES FOR
NEW YORK CITY TRANSIT AUTHORITY

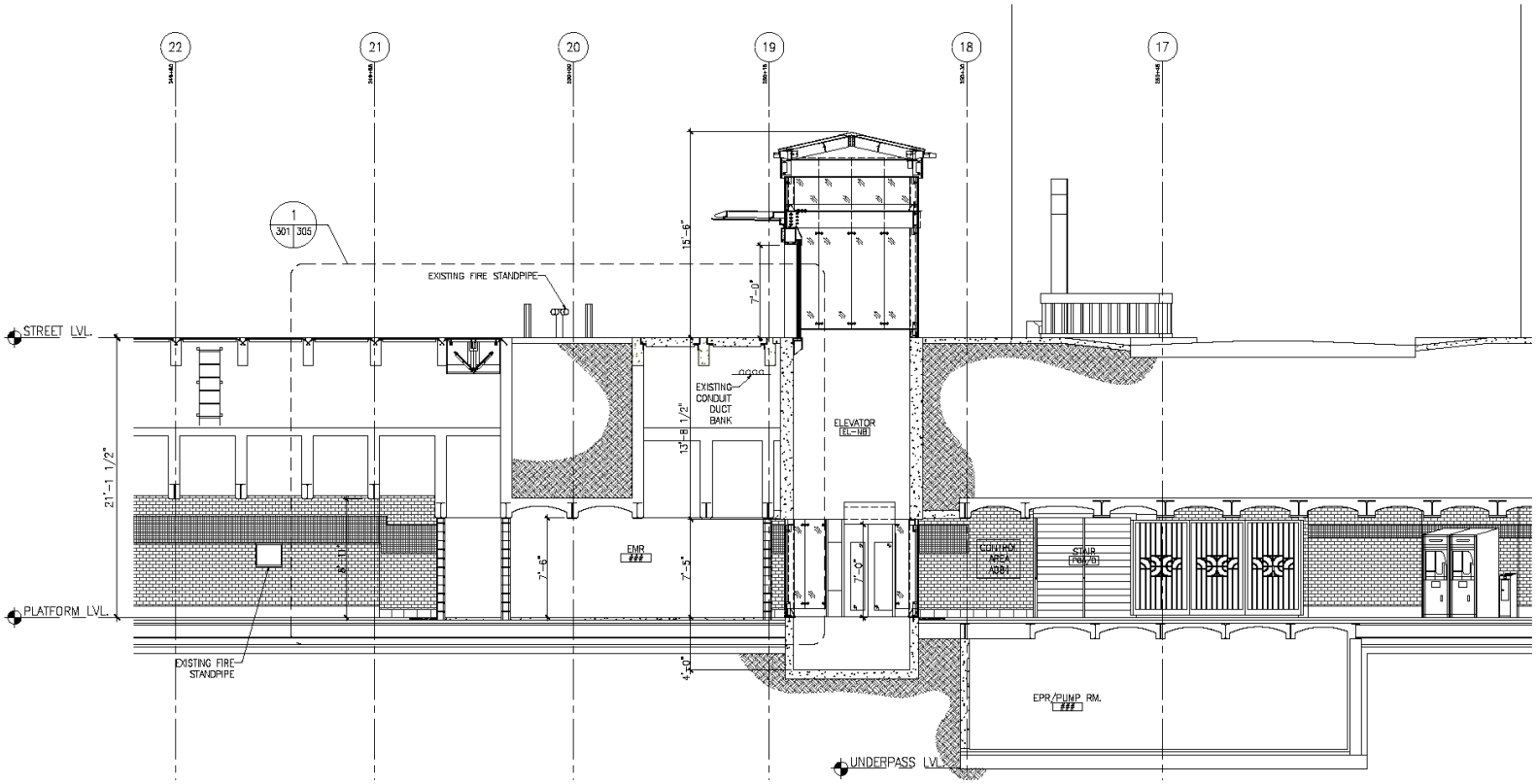
URBAHN ARCHITECTS
306 W. 37TH STREET 8TH FL. NEW YORK, NY 10018
ARCHITECTURE

T.Y. LIN INTERNATIONAL GROUP
OC ENGINEERING
AB CONSULTING ENGINEERING
MATRIX NEW WORLD
VJ ASSOCIATES

PROJECT: T_13001
INSTALLATION OF TWO (2) ELEVATORS AT BROAD ST. STATION, NASSAU ST. LINE (BMT), BOROUGH OF MANHATTAN

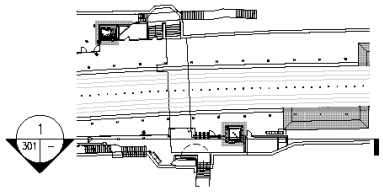
UNDERPASS LEVEL PLAN

DRAWN BY	R.B., J.W., S.L.		DATE: 04-19-2018
DESIGNED BY	M. STEIN RA, R. BIEBER		DRAWING NO.: A-213
CHECKED BY	L. GUTTERMAN, AIA		
APPROVED BY	N.BARRANCO, RA		REVISION:



1 / 212 301 SECTION THROUGH NORTHBOUND ELEVATORS
SCALE: 1/4"=1'-0"

0 1' 2' 4' 8'
SCALE: 1/4"=1'-0"



KEY PLAN

	PRELIMINARY ENGINEERING		
	NOT FOR CONSTRUCTION		
REVISION	DESCRIPTION	DATE	APPROVED

IT IS A VIOLATION OF THE PROFESSIONAL LICENSE LAW FOR ANY PERSON TO ALTER THIS DRAWING IN ANY WAY, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER/ARCHITECT. THE ALTERING ENGINEER/ARCHITECT SHALL AFFIX HIS SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE AND DATE OF THE ALTERATION.

MADISON EQUITIES FOR
NEW YORK CITY TRANSIT AUTHORITY

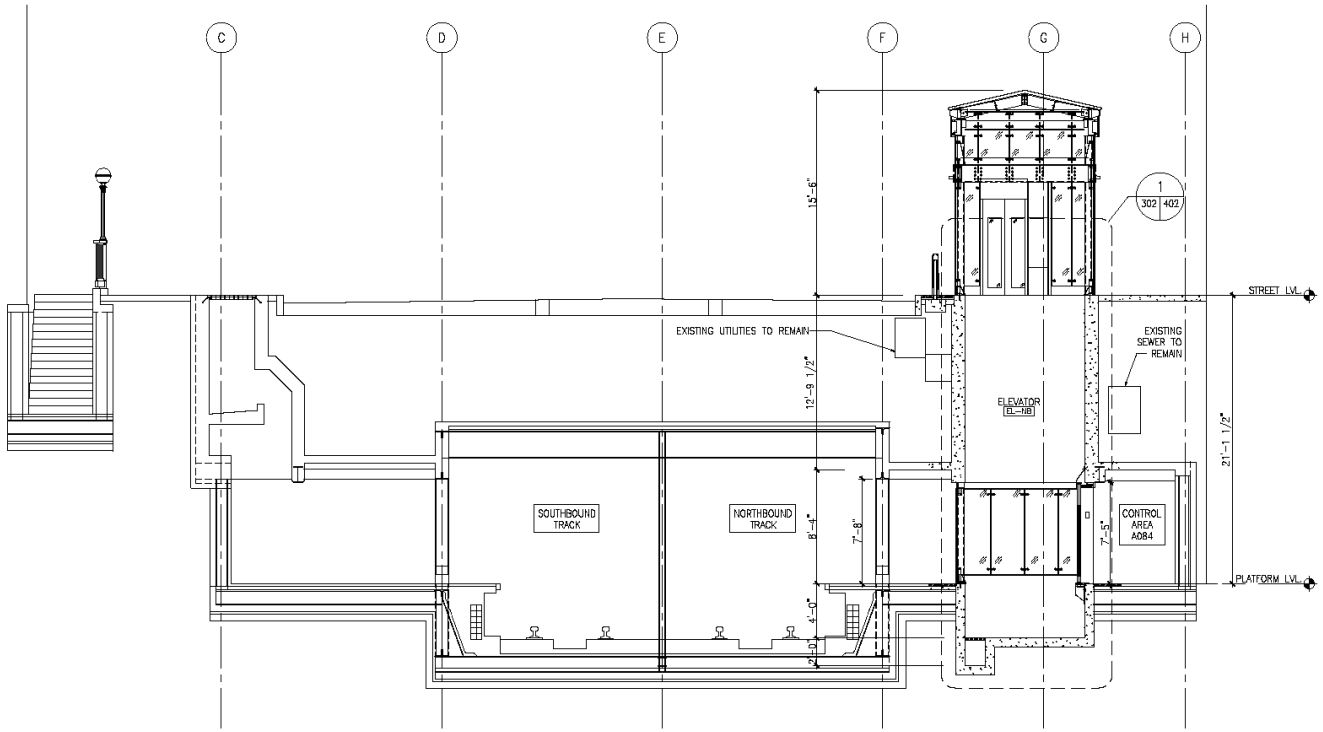
URBAHN ARCHITECTS
306 W. 37TH STREET 8TH FL. NEW YORK, NY 10018
ARCHITECTURE

T.Y. LIN INTERNATIONAL GROUP
GG ENGINEERING
AB CONSULTING ENGINEERING
MATRIX NEW WORLD
VJ ASSOCIATES

PROJECT: T_13001
INSTALLATION OF TWO (2) ELEVATORS AT BROAD ST. STATION, NASSAU ST. LINE (BMT), BOROUGH OF MANHATTAN

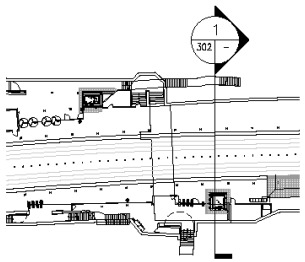
LONGITUDINAL SECTION THROUGH NORTHBOUND ELEVATOR

DRAWN BY	R.B., J.W., S.L.		DATE: 04-19-2018
DESIGNED BY	M. STEIN RA, R. BIEBER		DRAWING NO.: A-301
CHECKED BY	L. GUTTERMAN, AIA		
APPROVED BY	N.BARRANCO, RA		REVISION:



1 / 212 | 302 SECTION THROUGH ELEVATORS
SCALE: 1/4"=1'-0"

0 1' 2' 4' 8'
SCALE: 1/4"=1'-0"



KEY PLAN

	PRELIMINARY ENGINEERING NOT FOR CONSTRUCTION		
REVISION	DESCRIPTION	DATE	APPROVED

IT IS A VIOLATION OF THE PROFESSIONAL LICENSE LAW FOR ANY PERSON TO ALTER THIS DRAWING IN ANY WAY, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER/ARCHITECT. THE ALTERING ENGINEER/ARCHITECT SHALL AFFIX HIS SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE AND DATE OF THE ALTERATION.

MADISON EQUITIES FOR
NEW YORK CITY TRANSIT AUTHORITY

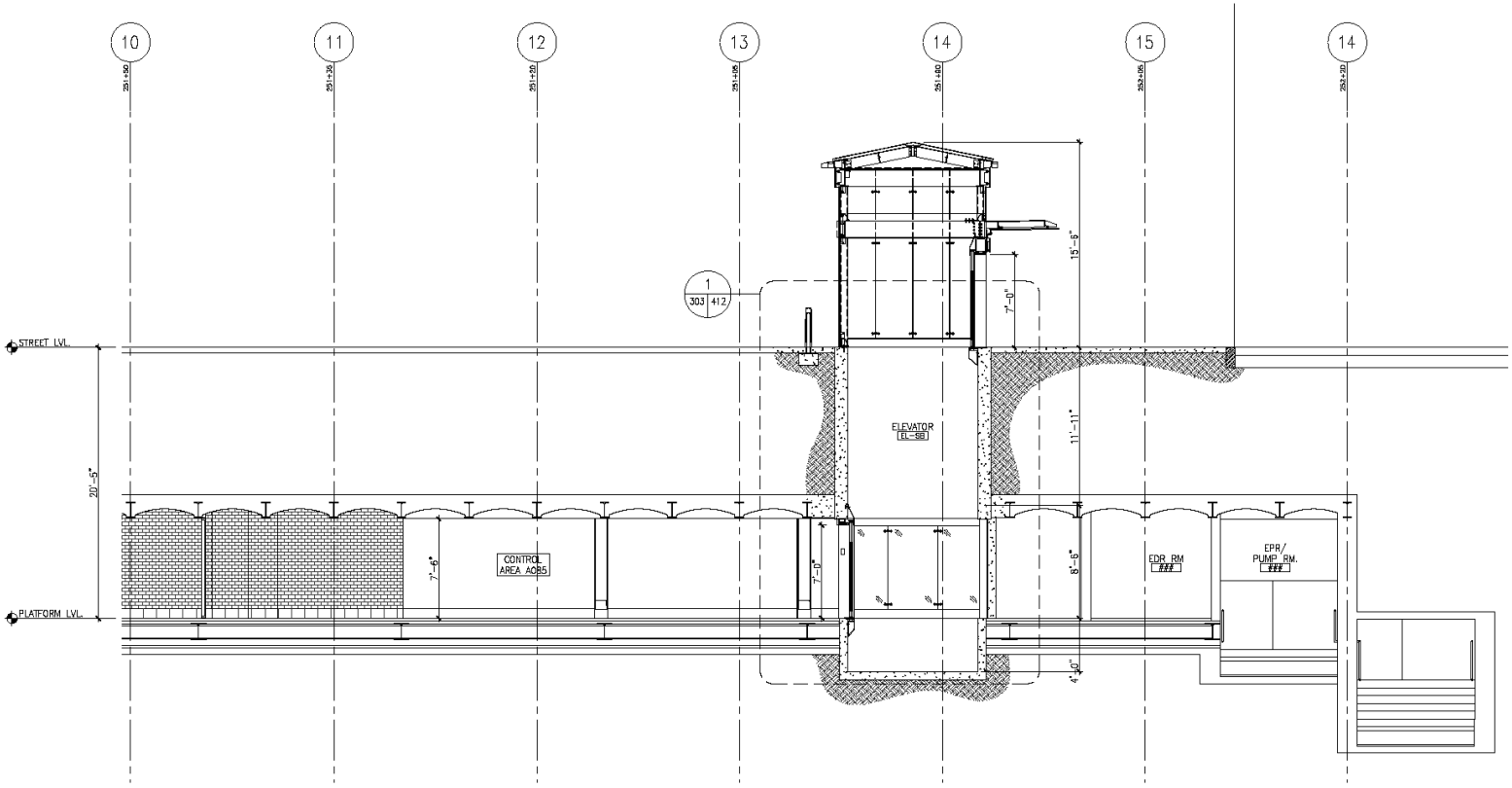
URBAHN ARCHITECTS
306 W. 37TH STREET 8TH FL. NEW YORK, NY 10018
ARCHITECTURE

T.Y. LIN INTERNATIONAL GROUP
GC ENGINEERING
AB CONSULTING ENGINEERING
MATRIX NEW WORLD
WJ ASSOCIATES

PROJECT: T_13001
INSTALLATION OF TWO (2) ELEVATORS AT BROAD ST. STATION, NASSAU ST. LINE (BMT), BOROUGH OF MANHATTAN

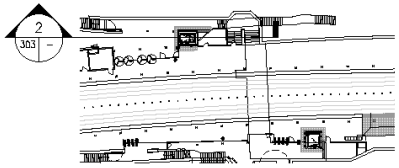
CROSS SECTION THROUGH NORTHBOUND ELEVATOR

DRAWN BY	R.B., J.W., S.L.		DATE: 04-19-2018
DESIGNED BY	M. STEIN RA, R. BIEBER		DRAWING NO.: A-302
CHECKED BY	L. GUTTERMAN, AIA		
APPROVED BY	N.BARRANCO, RA		REVISION:



1 212 303 SECTION THROUGH SOUTHBOUND ELEVATORS
SCALE: 1/4"=1'-0"

0 1' 2' 4' 8'
SCALE: 1/4"=1'-0"



KEY PLAN

REVISION	DESCRIPTION	DATE	APPROVED
	PRELIMINARY ENGINEERING		
	NOT FOR CONSTRUCTION		

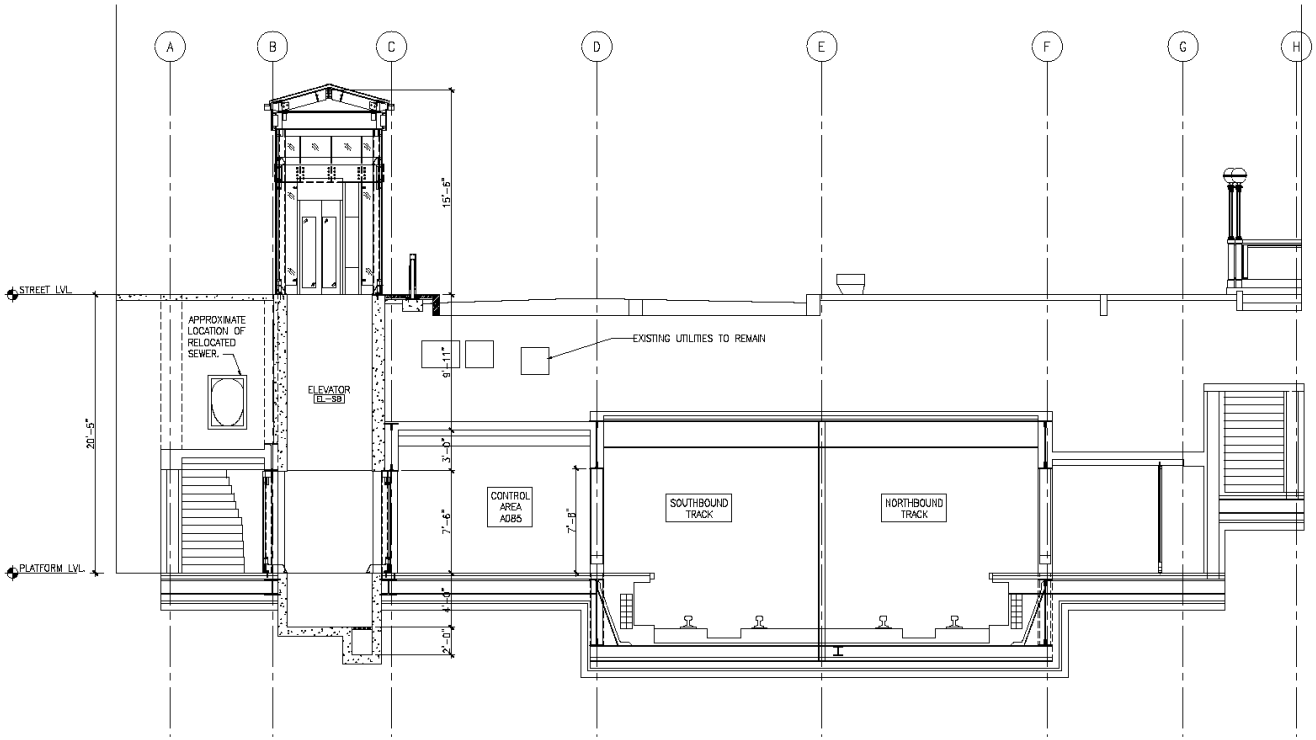
MADISON EQUITIES FOR
NEW YORK CITY TRANSIT AUTHORITY

URBAHN ARCHITECTS
305 W. 27TH STREET 8TH FL NEW YORK, NY 10018
ARCHITECTURE
T.Y. LIN INTERNATIONAL GROUP
GG ENGINEERING
AB CONSULTING ENGINEERING
MATRIX NEW WORLD
VJ ASSOCIATES

PROJECT: T_13001
INSTALLATION OF TWO (2) ELEVATORS AT BROAD ST. STATION, NASSAU ST. LINE (BMT), BOROUGH OF MANHATTAN

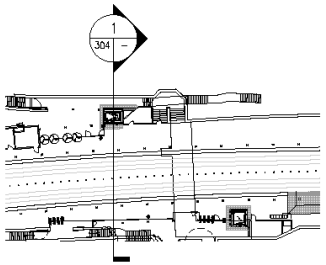
LONGITUDINAL SECTION THROUGH SOUTHBOUND ELEVATORS

DRAWN BY	R.B., J.W., S.L.		DATE: 04-19-2018
DESIGNED BY	M. STEIN RA, R. BIEBER		DRAWING NO.: A-303
CHECKED BY	L. GUTTERMAN, AIA		
APPROVED BY	N.BARRANCO, RA		REVISION:



1 / 212 / 304 SECTION THROUGH SOUTHBOUND ELEVATOR
SCALE: 1/4"=1'-0"

0 1' 2' 4' 8"
SCALE: 1/4"=1'-0"



KEY PLAN

REVISION	DESCRIPTION	DATE	APPROVED
	PRELIMINARY ENGINEERING		
	NOT FOR CONSTRUCTION		

MADISON EQUITIES FOR
NEW YORK CITY TRANSIT AUTHORITY

URBAHN ARCHITECTS
305 W. 37TH STREET 8TH FL. NEW YORK, NY 10018
ARCHITECTURE

T.Y. LIN INTERNATIONAL, GROUP
OG ENGINEERING
AB CONSULTING ENGINEERING
MATRIX NEW WORLD
VJ ASSOCIATES

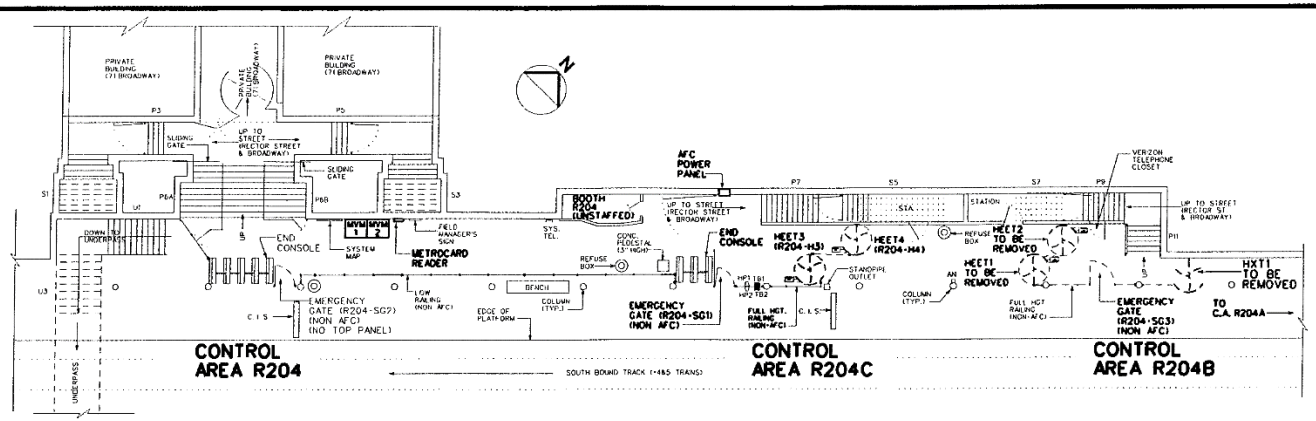
PROJECT: T_13001
INSTALLATION OF TWO (2) ELEVATORS AT BROAD ST. STATION, NASSAU ST. LINE (BMT), BOROUGH OF MANHATTAN

CROSS SECTION THROUGH SOUTHBOUND ELEVATOR

DRAWN BY	R.B., J.W., S.L.		DATE: 04-19-2018
DESIGNED BY	M. STEIN RA, R. BIEBER		DRAWING NO.: A-304
CHECKED BY	L. GUTTERMAN, AIA		
APPROVED BY	N.BARRANCO, RA		REVISION:

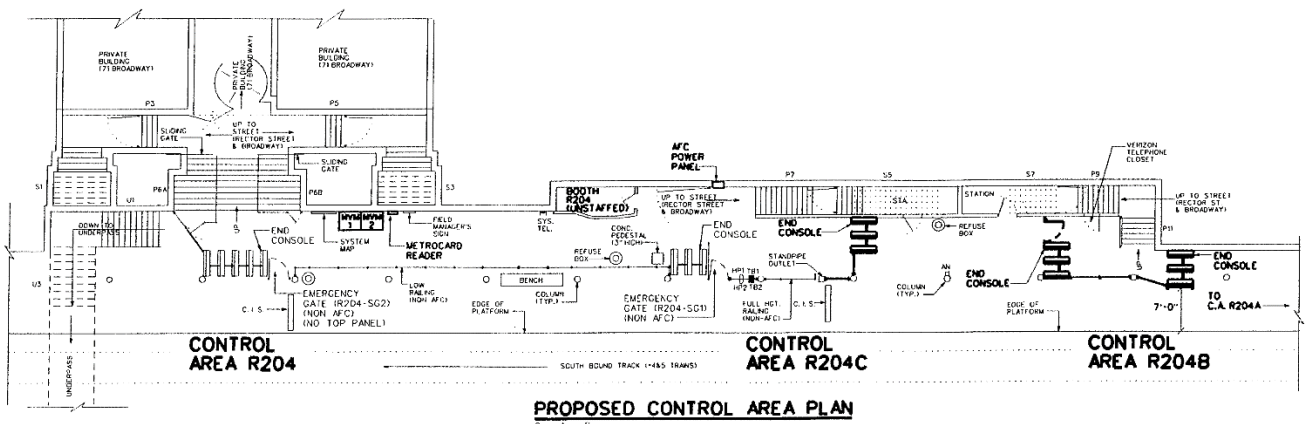
EXHIBIT F

Wall Street Station Improvements



EXIST. CONTROL AREA PLAN

0 4 8 FT



PROPOSED CONTROL AREA PLAN

0 4 8 FT

PROPOSED AFC OPERATIONAL SCHEMATIC DRAWING

LEGEND

- METROCARD VENDING MACHINE (MVM)
- METROCARD EXPRESS MACHINE (MEM)
- METROCARD READER (MCR)
- ADA FARE ACCESS SYSTEM (AFAS)
- TURNSTILE (T.S.)
- END CONSOLE (E.C.)
- CONSOLE BOX (C. BOX)
- AGENT OPERATED GATE (A.O.G.)
- EMERGENCY GATE (E. GATE)
- HIGH EXIT TURNSTILE (HXT)
- HIGH ENTRY/EXIT TURNSTILE (HEET)

PROPOSAL

CONTROL AREA NO.: R204 R204B R204C

	NEW	RELOCATE	EXIST.	REMOVAL
BOOTH		1		
T.S.	6	6		
E.C.	3	2		
C. BOX				
HEET				4
HXT				1
MVM			2	
MEM				
MCR			1	
A.O.G.				
AFAS				
E. GATE	1		3	
T.S.GATE				
HP			2	
TB			2	
CAMERA				

STATION MASTER REFERENCE NO. 413

New York City Transit

CONTROL AREA PLAN

AFC EQUIPMENT MAINTENANCE

P.E. PROJECT DESIGN ENGINEER

P.E. PROJECT DESIGN MANAGER

SCALE: AS SHOWN

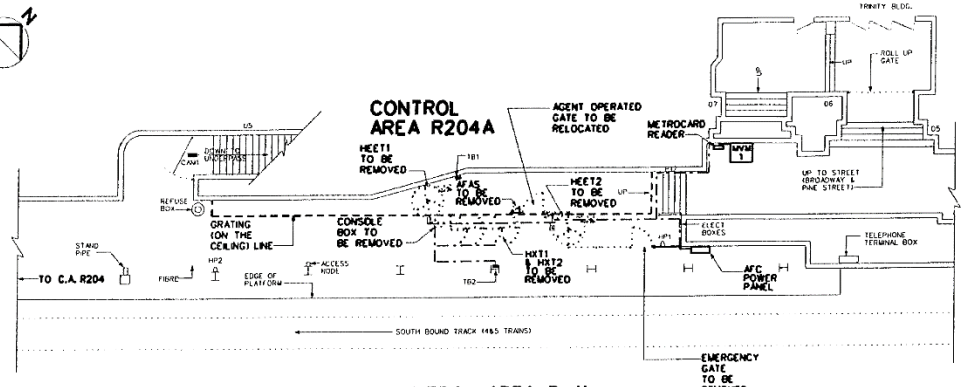
DATE: JANUARY 28, 2017

DRAWING NO.: R204 R204B R204C

DRAWN BY	S. PARKH, P. E.
REVIEWED BY	S. RASTGIR, P. E.

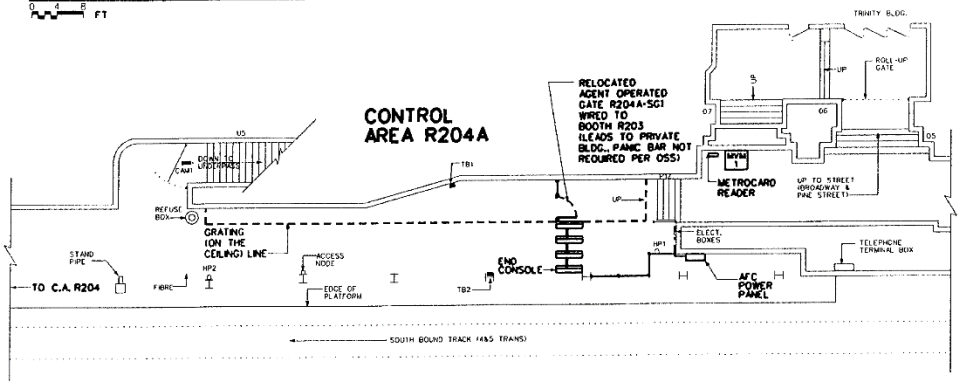
CONTROL AREA R204,R204B, R204C - WALL ST. STA. LEX. AVE. LINE, IRT

Printed on: $DATE$OF$PLOTTING$ CADD File Location:$DESIGN$FILE$EXPANDED$SPEC$ Old file name: R204AX,R204X1& R204



EXIST. CONTROL AREA PLAN

0 4 8 FT



PROPOSED CONTROL AREA PLAN (OPTION-1)

0 4 8 FT

LEGEND

- METROCARD VENDING MACHINE (MVM)
- METROCARD EXPRESS MACHINE (MEM)
- METROCARD READER (MCR)
- ADA FARE ACCESS SYSTEM (AFAS)
- TURNSTILE (T.S.)
- END CONSOLE (E.C.)
- CONSOLE BOX (C. BOX)
- AGENT OPERATED GATE (A.O.G.)
- EMERGENCY GATE (E. GATE)
- EMERGENCY EGRESS GATE (E.E.G.)
- HIGH ENTRY/EXIT TURNSTILE (HEET)
- HIGH EXIT TURNSTILE (HXT)
- P — POWER CONDUIT
- C — COMMUNICATIONS CONDUIT
- J.B. — JUNCTION BOX
- TALK-BACK SYSTEM (TB)
- OR • CCTV CAMERA (CAM)
- H.P. — HELP POINT
- C.I.C. — CUSTOMER INFORMATION CENTER
- C.I.S. — CUSTOMER INFORMATION SCREEN
- O.T.G. — ON THE GO
- A.N. — ACCESS NODE

PROPOSAL
CONTROL AREA NO. : R204A

	NEW	RELOCATE	EXIST.	REMOVAL
BOOTH				
T.S.	3			
E.C.	1			
C. BOX				1
HEET				2
HXT				2
MVM				1
MEM				
MCR				1
A.O.G.		1		
AFAS				2
E. GATE				1
T.S.GATE				
HP			2	
TB			2	
CAMERA			1	

CONTROL AREA R204A		
DEVICE	S/R	CH.
MVM1	1277	7
HEET1	R204A-H1	6
HEET2	R204A-H2	6

PROPOSED AFC OPERATIONAL SCHEMATIC DRAWING

STATION MASTER REFERENCE NO. 413

New York City Transit

CONTROL AREA PLAN

AFC EQUIPMENT MAINTENANCE

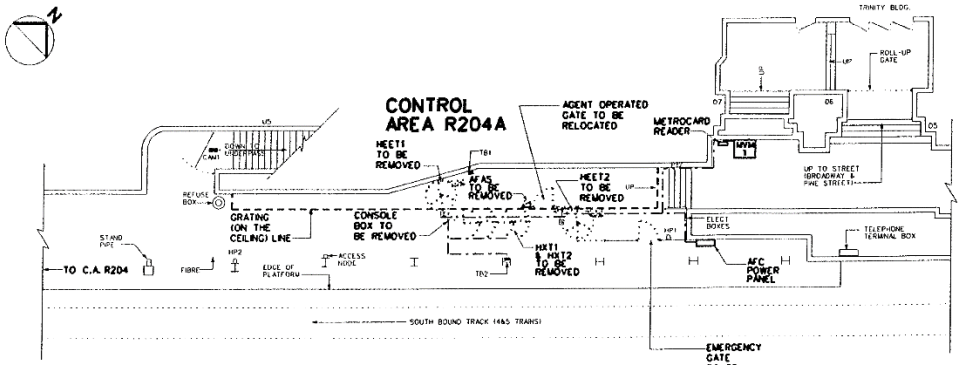
	P.E.		P.E.
PROJECT DESIGN ENGINEER		PROJECT DESIGN MANAGER	

SCALE: AS SHOWN
DATE: JANUARY 26, 2017
DRAWING NO. : R204A

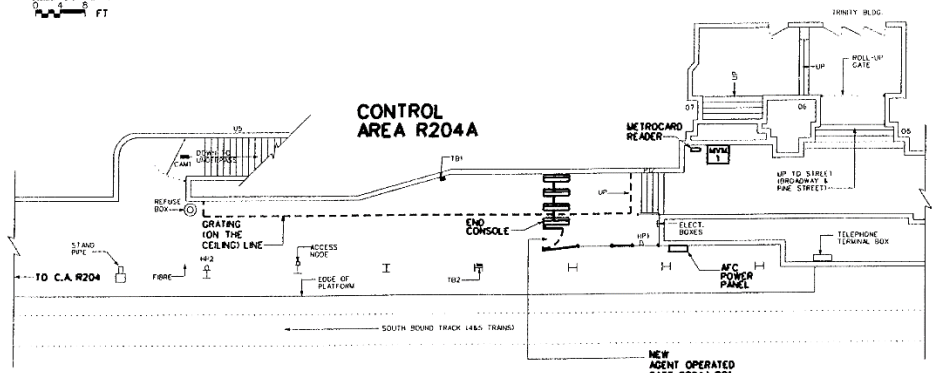
DRAWN BY	S. PARIKH, P. E.
REVIEWED BY	S. RASTGIR, P. E.

CONTROL AREA R204A- WALL STREET STATION, LEXINGTON AVE. LINE, IRT

Printed on: $DATE$OF$PLOTTING$ CADD File Location:$DESIGN$FILE$EXPANDED$SPEC$ Old file name: R204AX



EXIST. CONTROL AREA PLAN



PROPOSED CONTROL AREA PLAN (OPTION-II)

LEGEND

- MVM — METROCARD VENDING MACHINE (MVM)
- MEM — METROCARD EXPRESS MACHINE (MEM)
- MCR — METROCARD READER (MCR)
- AFAS — ADA FARE ACCESS SYSTEM (AFAS)
- T.S. — TURNSTILE (T.S.)
- E.C. — END CONSOLE (E.C.)
- C. BOX — CONSOLE BOX (C. BOX)
- A.O.G. — AGENT OPERATED GATE (A.O.G.)
- E. GATE — EMERGENCY GATE (E. GATE)
- E.E.G. — EMERGENCY EGRESS GATE (E.E.G.)
- HEET — HIGH ENTRY/EXIT TURNSTILE (HEET)
- HXT — HIGH EXIT TURNSTILE (HXT)
- P — POWER CONDUIT
- C — COMMUNICATIONS CONDUIT
- J.B. — JUNCTION BOX
- TB — TALK-BACK SYSTEM (TB)
- CAM — CCTV CAMERA (CAM)
- H.P. — HELP POINT
- C.I.C. — CUSTOMER INFORMATION CENTER
- C.I.S. — CUSTOMER INFORMATION SCREEN
- O.T.G. — ON THE GO
- A.N. — ACCESS NODE

PROPOSAL
CONTROL AREA NO. = R204A

	NEW	RELOCATE	EXIST.	REMOVAL
BOOTH				
T.S.	3			
E.C.	1			
C. BOX				1
HEET				2
HXT				2
MVM				1
MEM				
MCR				1
A.O.G.	1			1
AFAS				2
E. GATE				1
T.S.GATE				
HP			2	
TB			2	
CAMERA			1	

CONTROL AREA R204A		
DEVICE	S/R	CH.
MVM1	1277	7
HEET1	R204A-H1	6
HEET2	R204A-H2	6

PROPOSED AFC OPERATIONAL SCHEMATIC DRAWING

STATION MASTER REFERENCE NO. 413

New York City Transit

CONTROL AREA PLAN

AFC EQUIPMENT MAINTENANCE

DRAWN BY	S. PARIKH, P. E.
REVIEWED BY	S. RASTGIR, P. E.

	P.E.	P.E.
PROJECT DESIGN ENGINEER		PROJECT DESIGN MANAGER
SCALE: AS SHOWN		DRAWING NO.: R204A
DATE: JANUARY 26, 2017		

CONTROL AREA R204A - WALL STREET STATION, LEXINGTON AVE. LINE, IRT

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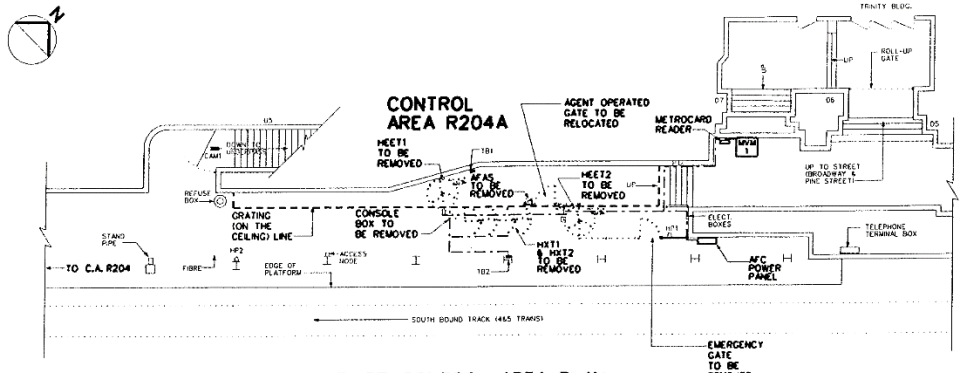
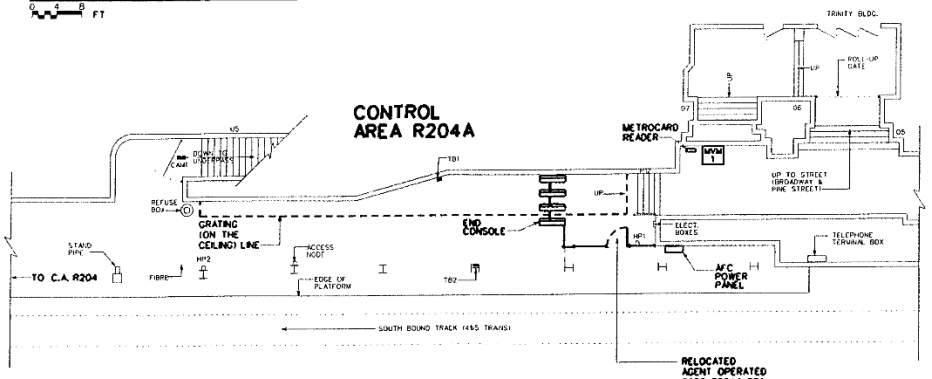


EXIST. CONTROL AREA PLAN

0 4 8 FT



PROPOSED CONTROL AREA PLAN (OPTION-III)

0 4 8 FT

PROPOSED AFC OPERATIONAL SCHEMATIC DRAWING

LEGEND

- MVM 1 — METROCARD VENDING MACHINE (MVM)
- METROCARD EXPRESS MACHINE (MEM)
- METROCARD READER (MCR)
- ADA FARE ACCESS SYSTEM (AFAS)
- TURNSTILE (T.S.)
- END CONSOLE (E.C.)
- CONSOLE BOX (C. BOX)
- AGENT OPERATED GATE (A.O.G.)
- EMERGENCY GATE (E. GATE)
- EMERGENCY EGRESS GATE (E.E.G.)
- HIGH ENTRY/EXIT TURNSTILE (HEET)
- HIGH EXIT TURNSTILE (HXT)
- P — POWER CONDUIT
- C — COMMUNICATIONS CONDUIT
- J.B. — JUNCTION BOX
- TALK-BACK SYSTEM (TB)
- OR • CCTV CAMERA (CAM)
- H.P. — HELP POINT
- C.I.C. — CUSTOMER INFORMATION CENTER
- C.I.S. — CUSTOMER INFORMATION SCREEN
- O.T.G. — ON THE GO
- A.N. — ACCESS NODE

PROPOSAL

CONTROL AREA NO. : R204A

	NEW	RELOCATE	EXIST.	REMOVAL
BOOTH				
T.S.	3			
E.C.	1			
C. BOX				1
HEET				2
HXT				2
MVM				1
MEM				
MCR				1
A.O.G.		1		1
AFAS				2
E. GATE				1
T.S.GATE				
HP			2	
TB			2	
CAMERA			1	

CONTROL AREA R204A		
DEVICE	S/R	CH.
MVM1	1277	7
HEET1	R204A-H1	6
HEET2	R204A-H2	6

STATION MASTER REFERENCE NO. 413

New York City Transit

CONTROL AREA PLAN

AFC EQUIPMENT MAINTENANCE

P.E. PROJECT DESIGN ENGINEER

P.E. PROJECT DESIGN MANAGER

SCALE: AS SHOWN

DATE: JANUARY 26, 2017

DRAWING NO. : R204A

DRAWN BY	S. PARKH, P. E.
REVIEWED BY	S. RASTGIR, P. E.

CONTROL AREA R204A - WALL STREET STATION, LEXINGTON AVE. LINE, IRT

Printed on: $DATE$OF$PLOTTING$ CADD File Location:$DESIGN$FILE$EXPANDED$SPEC$ Old file name: R204AX

EXHIBIT G

Additional Scope Items

- Flood protection at street level for both sidewalk elevators
- New York City Department of Transportation (DOT) to approve final dimensioned location of sidewalk elevators and location of bollards; adjust as necessary.
- Madison responsible to pay for any NYCT "General Orders" required for construction (service shut-down or re-routing)
- Any stairs, vents or mechanical closing devices temporarily closed during construction must be cleaned and repaired as necessary prior to reopening
- Madison to install additional bollards to those shown on 3/26/18 drawings (subject to DOT approval)
- Madison responsible for all costs associated with relocating any Transit Wireless equipment
- A design for support of excavation and demolition to be provided during design phase
- Alternate method to driving sheet piles to be proposed and developed during the design phase.
- New vent bays must be installed within the station to replace any vents closed as a result of the elevator project construction and must include flood protection.
- In addition to the CCTV equipment shown on the drawings, Madison to provide two cameras and two intercoms for remote AFAS gate monitoring.
- New Themis CCTV server with Genetec licenses to be provided to support the new equipment needed for the elevator (if the existing server does not support the capabilities needed for the elevator).
- Extend existing PSLAN infrastructure by installing application nodes in the area of work.
- Install and configure (N) Cisco 3850 switch inside Application Cabinet in Comm room if required for the elevator work.
- Replace (E) Nortel 1648 with switch Cisco IE-5000 and IE-4010 inside Data Cabinet if required for the elevator work.
- Madison responsible to manufacture and install all station signage pending NYCT Station Signage review and approval
- ~~Provide low turnstiles at the fare array at the south end of the southbound platform (control area #A085)~~