Alternatives Analysis and Feasibility Evaluation

for the

Proposed Emergency Ventilation Plant

for the

Lexington Avenue Subway Line

between the

33rd Street/Park Avenue South Station

and the

Grand Central Terminal/42nd Street Station

January 2017

New York City Transit

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ACRONYMS

ADT	average daily traffic
bsg	below surface grade
cf	cubic feet
cfm	cubic feet per minute
EDR	electrical distribution room
EIS	environmental impact statement
FAR	Floor Area Ratio
LPC	Landmarks Preservation Commission
MTA NYCT	Metropolitan Transportation Authority, New York City Transit
MPT	maintenance and protection of traffic
NFPA	National Fire Protection Association
NYCDOT	New York City Department of Transportation
RCP	reinforced concrete pipe
SEQRA	State Environmental Quality Review Act
sf	square feet
S/NR	State/National Registers of Historic Places
UN	United Nations
vpd	vehicles per day
vph	vehicles per hour

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A. INTRODUCTION

A.1 BACKGROUND

This report presents the results of the integrated engineering, environmental, and economic evaluation of alternatives conducted to select a site for a proposed emergency ventilation plant for the IRT Lexington Avenue Subway Line section between the 33rd Street and 42nd Street Stations in the Murray Hill neighborhood of New York City. The project sponsor is the Metropolitan Transportation Authority, New York City Transit (MTA NYCT).

The purpose of the emergency ventilation plant, hereinafter also referred to as the **proposed project**, is to provide necessary mechanical emergency ventilation to improve life safety to a tunnel section of the New York City subway system between the East 33rd Street/Park Avenue South Station and Grand Central Terminal/42nd Street Station (see Figure A-1, page 2). This section of subway tunnel currently has no such protection.

The proposed project is part of MTA's 2015–2019 Capital Program to construct new or expanded fan plants at the highest priority locations in the subway system.[1] In 1994, MTA NYCT completed a comprehensive ventilation study[2] that evaluated every subway tunnel section in New York City to determine the magnitude of requirements to comply with the National Fire Protection Association (NFPA) 130 Standard[3] for emergency ventilation. A hazard assessment that included engineering, construction, and economic factors was also conducted to prioritize the locations that should be addressed first. This priority index ranked each MTA NYCT subway tunnel section in order of priority, from 1—as the highest priority for life safety—to 252—the lowest priority. The tunnel section being addressed by the proposed project has **a priority index ranking of 5**. The proposed project is needed to create tenable atmospheric conditions for subway riders to escape and for emergency services to intervene in the event of emergency conditions such as a fire. The section of tunnel to be protected by this project is approximately 2,500 feet in length from the north end of the 33rd Street Station platform to the south end of the 42nd Street Station platform.

A.2 ALTERNATIVES DEVELOPMENT

To achieve the goal of providing emergency ventilation to the tunnel section on the Lexington Avenue Subway Line, various preliminary design methods and sites were initially considered, including:

- Construction of an emergency ventilation plant above-grade on property adjacent to Park Avenue between East 33rd and East 42nd Streets.
- Constructing an emergency ventilation plant below-grade (in the streetbed) east or west of Park Avenue and the Lexington Avenue Subway Line tunnels (Note: the Lexington Avenue Subway Line runs under Park Avenue in this area of Manhattan between the East 33rd and East 42nd Street stations).
- Constructing an emergency ventilation plant below the exit ramp of the New York City Department of Transportation (NYCDOT) Park Avenue roadway tunnel (between East 39th and East 40th Streets).

[1] MTA Capital Program 2015-2019. Page 58. Available at http://web.mta.info/capital/pdf/Board_2015-2019_Capital_Program.pdf.

[2] Authority-Wide Ventilation System Strategy Study, Parsons Brinkerhoff, ICF Kaiser Engineers, Rhodes and Basso Engineers, Schirmer Engineers, and Scharf-Godfrey, 1994.

[3] *NFPA 130: Standard for Fixed Guideway Transit and Passenger Rail Systems.*

Legend

- Alternative Locations
- NYC Subway Stations

NYC Subway Lines

- 4-5-6
- 7
- B-D-F-M
- S

Source : New York City Transit; New York City Department of City Planning (PLUTO data); ESRI World Street Map.

Project Study Area

Emergency Ventilation Plant
Lexington Avenue Line

E 33rd Street to E 42nd Street,
Manhattan, New York

Louis Berger

Figure A-1

- Constructing an emergency ventilation plant below-grade between the northbound and southbound subway tunnels and under the Park Avenue roadway tunnel (between East 36th and East 39th Streets).
- Constructing a single-level emergency ventilation plant below northbound lanes of Park Avenue (above the northbound subway tunnel) between East 36th and East 39th Streets.

Alternatives within the streetbed of Park Avenue southbound were found not feasible because the ventilation plant plenum would be unable to tie into the existing subway tunnels given the tunnel configurations approaching Grand Central.

A **preliminary screening analysis** was performed to eliminate alternatives that clearly would not be feasible and to further develop the engineering, economic, and environmental analyses on the most promising design options (potential alternatives). The results of the preliminary screening are summarized below.

Above-Grade Alternatives

There are no suitable vacant properties in the vicinity of the subject Lexington Avenue Subway Line tunnels to support an above-grade emergency ventilation plant. An above-grade emergency ventilation plant in the area would involve substantial acquisition of existing commercial or residential property for MTA NYCT use. Therefore, MTA NYCT would only consider an above-grade option if all below-grade options are found to be not feasible.

Below-Grade Alternatives South of East 36th Street or North of East 40th Street

Below-grade emergency ventilation plant alternatives east or west of Park Avenue and south of East 36th Street or north of East 40th Street were found to be not feasible. The air dynamics of ventilation generally indicate that, in a uniform tunnel segment, the ideal emergency ventilation location from a mechanical ventilation perspective is, nominally, the midpoint of the tunnel segment between stations. However, the subway segment in this section splits into several branches as it approaches Grand Central; that shifts the ventilation "centroid" farther north from the geographical midpoint to a position nominally at East 38th Street. The emergency ventilation plant, however, could be located away from that "ideal," but the fan capacity, structure size, and project cost increase as the plant is moved away from the "ideal," towards either station. An emergency ventilation plant located south of East 36th or north of East 40th Street would need a capacity substantially greater than 500,000 cubic feet per minute (cfm).[4] To achieve greater capacity, the plant would require additional fans and a larger space to house the fans, and consequently would cost more and result in greater construction impacts than an emergency ventilation plant closer to the ventilation centroid. Therefore, alternatives located south of East 36th Street or north of East 40th Street were eliminated from further consideration.

Results for Analysis

The preliminary screening identified thirteen (13) below-grade alternatives for the proposed emergency ventilation plant:

- **East 36th Street** immediately **east** or immediately **west** of Park Avenue;
- **East 37th Street** immediately **east** or immediately **west** of Park Avenue;

[4] During the subsequent evaluation of alternatives, it was determined that an alternative on East 36th Street would also require a capacity greater than 500,000 cfm. Nevertheless, the alternatives on East 36th Street (Alternatives 1 and 2) are retained in this report to document the analysis process undertaken.

- **East 38th Street** immediately **east** or immediately **west** of Park Avenue;
- **East 39th Street** immediately **east** or immediately **west** of Park Avenue;
- **Below the Park Avenue roadway tunnel**, between East 37th and East 38th Streets;
- **Below the Park Avenue roadway tunnel exit ramp**, between East 39th and East 40th Streets;
- **Below the northbound lanes of Park Avenue**, between East 36th and East 38th Streets;
- **Below the northbound lanes of Park Avenue**, between East 37th and East 39th Streets; and
- **Below the northbound lanes of Park Avenue**, between East 36th and 37th Streets.

A.3 OVERVIEW OF THE ALTERNATIVES ANALYSIS/FEASIBILITY EVALUATION REPORT

This report is organized as follows:

- The features of the thirteen (13) alternatives in terms of engineering, construction, and operation.
- A comparative **engineering** evaluation of the alternatives.
- A comparative **environmental** evaluation of the alternatives.
- A comparative **economic** evaluation of the alternatives.
- An ***integrated evaluation*** based on the analyses described above, which concludes with the selection of those alternatives that best present the opportunity to minimize the ***engineering, environmental, and economic*** impacts of the emergency ventilation plant construction and operation.

The evaluation concludes by eliminating alternatives that: (1) would not adequately ventilate the tunnel segment; (2) are not feasible to construct because of physical constraints of underground infrastructure; and (3) have the greatest engineering, environmental, and economic impacts. The remaining most promising alternatives will be evaluated further in a Draft Environmental Impact Statement (EIS) pursuant to the State Environmental Quality Review Act (SEQRA), as discussed in the Draft Scoping Document.

A.4 OVERVIEW OF ALTERNATIVES CONSIDERED

The thirteen (13) potential alternatives were further evaluated as the MTA NYCT design team gathered information about the underground utility and transportation infrastructure in the area along the subway tunnel sections and the above-ground characteristics of the Murray Hill neighborhood. MTA NYCT considered engineering, economic, and environmental considerations to narrow the range of alternatives. A broad overview of the alternatives is provided below; detailed information and conceptual plans for each alternative are provided in Chapter B. Figure A-2 at the end of this section (page 9) indicates the location of the alternatives.

A.4.1 Alternative 1

Alternative 1 would construct an emergency ventilation plant in the streetbed of East 36th Street between Park Avenue and Madison Avenue. The distribution plenum would extend east toward Park Avenue from the plant, under the Park Avenue roadway tunnel and over the top of the southbound Lexington Avenue tunnel, and then drop to track level to serve the northbound and southbound tunnels of the Lexington IRT. Wall penetrations from the plenum and shaft would connect to the east wall of the Lexington IRT southbound tunnel and to the west wall of the Lexington IRT northbound tunnel. New vent bays would

be constructed at street level along adjacent sidewalks of East 36th Street. Sidewalk hatches would also be constructed for MTA NYCT personnel and equipment access.

Cut-and-cover excavation would be required in the streetbed; in the sidewalks on both sides of East 36th Street for a distance of approximately 200 feet west of Park Avenue; and in the streetbed of the southbound side of Park Avenue within the intersection. Mining techniques would be used to advance the excavation under the Park Avenue roadway tunnel and between the subway tunnels.

A.4.2 Alternative 2

Alternative 2 would construct an emergency ventilation plant in the streetbed of East 36th Street between Park Avenue and Lexington Avenue. The distribution plenum would extend west toward Park Avenue from the plant, over the top of the northbound Lexington Avenue tunnel, and then drop to track level to serve the northbound and southbound tunnels of the Lexington IRT. Wall penetrations from the plenum and shaft would connect to the east wall of the Lexington IRT southbound tunnel and to the west wall of the Lexington IRT northbound tunnel. New vent bays would be constructed at street level along adjacent sidewalks of East 36th Street. Sidewalk hatches also would be constructed for MTA NYCT personnel and equipment access.

Cut-and-cover excavation would be required: in the streetbed; in the sidewalks on both sides of East 36th Street for a distance of approximately 200 feet east of Park Avenue; and in the streetbed of the northbound side of Park Avenue within the intersection. Mining techniques would be used to advance the excavation under the Park Avenue roadway tunnel and between the subway tunnels.

A.4.3 Alternative 3

Alternative 3 would construct an emergency ventilation plant in the streetbed of East 37th Street between Park Avenue and Madison Avenue. The distribution plenum would extend east toward Park Avenue from the plant, over the Lexington Avenue IRT southbound subway tunnel and under the Park Avenue roadway tunnel, and then drop to track level to serve the northbound and southbound tunnels of the Lexington Avenue IRT. The wall penetrations from the plenum and shaft would connect to the east wall of the Lexington Avenue IRT southbound tunnel and to the west wall of the Lexington Avenue IRT northbound tunnel. New vent bays would be constructed at street level along adjacent sidewalks of East 37th Street. Sidewalk hatches would also be constructed for MTA NYCT personnel and equipment access.

Cut-and-cover excavation would be required in the streetbed; in the sidewalks on both sides of East 37th Street for a distance of approximately 200 feet west of Park Avenue; and in the streetbed of the southbound side of Park Avenue within the intersection. Mining techniques would be used to advance the excavation under the Park Avenue roadway tunnel and between the subway tunnels.

A.4.4 Alternative 4

Alternative 4 would construct an emergency ventilation plant in the streetbed of East 37th Street between Park Avenue and Lexington Avenue. The distribution plenum would extend west toward Park Avenue from the plant, over the top of the northbound Lexington Avenue tunnel, and drop to track level to serve the northbound and southbound tunnels of the Lexington IRT. Under Alternative 4, wall penetrations from the plenum and shaft would connect to the east wall of the Lexington Avenue IRT southbound tunnel and to the west wall of the Lexington Avenue IRT northbound tunnel. New vent bays would be constructed at street level along adjacent sidewalks of East 37th Street. Sidewalk hatches would also be constructed for MTA NYCT personnel and equipment access.

Cut-and-cover excavation would be required in the streetbed; in the sidewalks on both sides of East 37th Street for a distance of approximately 200 feet east of Park Avenue; and in the streetbed of the northbound side of Park Avenue within the intersection. Mining techniques would be used to advance the excavation under the Park Avenue roadway tunnel and between the subway tunnels.

A.4.5 Alternative 5

Alternative 5 would construct an emergency ventilation plant in the streetbed of East 38th Street between Park Avenue and Madison Avenue. The distribution plenum would extend east toward Park Avenue from the plant, over the top of the southbound Lexington Avenue IRT tunnel and under the Park Avenue roadway tunnel, and drop to track level to serve the northbound and southbound tunnels of the Lexington IRT. Wall penetrations from the plenum and shaft would connect to the east wall of the Lexington IRT southbound tunnel and to the west wall of the Lexington IRT northbound tunnel. New vent bays would be constructed at street level along adjacent sidewalks of East 38th Street. Sidewalk hatches also would be constructed for MTA NYCT personnel and equipment access.

Cut-and-cover excavation would be required in the streetbed; in the sidewalks on both sides of East 38th Street for a distance of approximately 200 feet west of Park Avenue; and in the streetbed of the southbound side of Park Avenue within the intersection. Mining techniques would be used to advance the excavation under the Park Avenue roadway tunnel and between the subway tunnels.

A.4.6 Alternative 6

Alternative 6 would construct an emergency ventilation plant in the streetbed of East 38th Street between Park Avenue and Lexington Avenue. The distribution plenum would extend west toward Park Avenue from the plant, over the top of the northbound Lexington Avenue tunnel, and drop to track level to serve the northbound and southbound tunnels of the Lexington IRT. Wall penetrations from the plenum and shaft would connect to the east wall of the Lexington IRT southbound tunnel and to the west wall of the Lexington IRT northbound tunnel. New vent bays would be constructed at street level along adjacent sidewalks of East 38th Street. Sidewalk hatches would also be constructed for MTA NYCT personnel and equipment access.

Cut-and-cover excavation would be required in the streetbed; in the sidewalks on both sides of East 38th Street for a distance of approximately 200 feet east of Park Avenue; and in the streetbed of the northbound side of Park Avenue within the intersection. Mining techniques would be used to advance the excavation under the Park Avenue roadway tunnel and between the subway tunnels.

A.4.7 Alternative 7

Alternative 7 would construct an emergency ventilation plant in the streetbed of East 39th Street between Park Avenue and Madison Avenue. The distribution plenum would drop down from the plant, extend east toward Park Avenue underneath the subway tunnels, and up to track level to serve the tunnels. The plenum would be routed below the subway tunnels because there is insufficient vertical clearance between the top of the Lexington Avenue IRT tunnels and the bottom of the Park Avenue roadway tunnel (5 feet, 9 inches) for a plenum to be routed over the top of the subway tunnels. Wall penetrations from the plenum and shaft would connect to the east wall of the Lexington IRT southbound tunnel and to the west wall of the Lexington IRT northbound tunnel. New vent bays would be constructed at street level along adjacent sidewalks of East 39th Street. Sidewalk hatches would also be constructed for MTA NYCT personnel and equipment access.

Cut-and-cover excavation would be required in the streetbed; in the sidewalks on both sides of East 39th Street for a distance of approximately 200 feet west of Park Avenue; and in the streetbed of the southbound side of Park Avenue within the intersection. Mining techniques would be used to advance the excavation under the subway tunnels, the Park Avenue roadway tunnel, and between the subway tunnels.

A.4.8 Alternative 8

Alternative 8 would construct an emergency ventilation plant in the streetbed of East 39th Street between Park Avenue and Lexington Avenue. The distribution plenum would drop down from the plant and extend west toward Park Avenue underneath the subway tunnels and then up to track level. (Similar to the case for Alternative 7, there is insufficient vertical clearance between the top of the Lexington Avenue IRT tunnels and the bottom of the Park Avenue roadway tunnel [5 feet, 9 inches] for a plenum to be routed over the top of the subway tunnels.) Wall penetrations from the plenum and shaft would connect to the east wall of the Lexington IRT southbound tunnel and to the west wall of the Lexington IRT northbound tunnel. New vent bays would be constructed at street level along adjacent sidewalks of East 39th Street. Sidewalk hatches would also be constructed for MTA NYCT personnel and equipment access.

Cut-and-cover excavation would be required in the streetbed; in the sidewalks on both sides of East 39th Street for a distance of approximately 200 feet east of Park Avenue; and in the streetbed of the northbound side of Park Avenue within the intersection. Mining techniques would be used to advance the excavation under the subway tunnels, the Park Avenue roadway tunnel, and between the subway tunnels.

A.4.9 Alternative 9

Alternative 9 would construct an emergency ventilation plant under the Park Avenue roadway tunnel (in the median in Park Avenue) between East 39th Street and East 40th Street. The emergency ventilation plant would need to extend the full width of the Park Avenue roadway tunnel ramp and under northbound and southbound Park Avenue. The plant would be located above the Lexington Avenue line northbound and southbound tunnels and would connect to the tunnels with a distribution plenum. A ventilation plenum connecting to the sidewalk of Park Avenue would be required, passing over the Lexington Avenue IRT northbound tunnel. An access tunnel would also be required in the Park Avenue northbound streetbed.

The available vertical clearance between the top of the subway tunnels and the bottom of the Park Avenue roadway tunnel narrows to less than 6 feet at East 39th Street.

A.4.10 Alternative 10

Alternative 10 would construct a bi-level emergency ventilation plant under the streetbed of Park Avenue roadway tunnel between East 37th Street and East 38th Street. The emergency ventilation plant would be located between the Lexington Avenue line northbound and southbound tunnels and would connect directly to the tunnels without a distribution plenum. Vent bays connecting to the east sidewalk of Park Avenue would be required, passing over the Lexington Avenue IRT northbound tunnel. An access tunnel would also be required in the Park Avenue northbound streetbed. The fan chamber would necessarily be located below base of rail,[5] and directly below the Park Avenue roadway tunnel, requiring extensive support of the tunnel. The emergency ventilation plant would interfere with a combined gravity sewer located in the streetbed, which would have to be relocated.

[5] Locating the plant at a point below "base of rail" would potentially lead to flooding of the plant.

A.4.11 Alternative 11

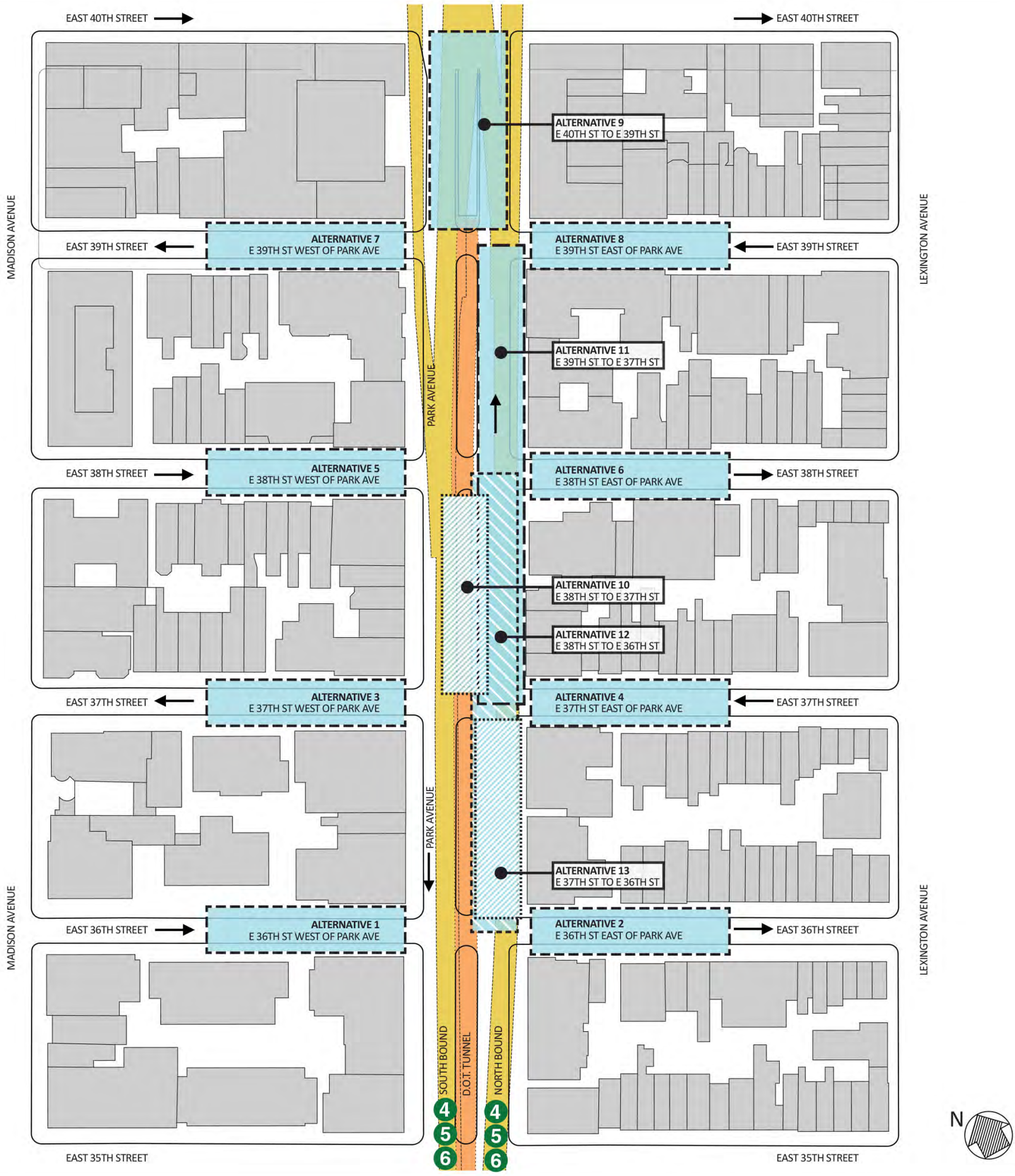
Alternative 11 would construct an emergency ventilation plant under the northbound traffic lanes of Park Avenue between East 37th Street and East 39th Street. The emergency ventilation plant would be located directly above the Lexington Avenue line northbound tunnel, and the distribution plenum would lead from the bottom of the fan chamber and drop down to the track level to reach the northbound and southbound subway tunnels. The emergency ventilation plant would be composed of two chambers, one between East 37th and East 38th Streets and one between East 38th and East 39th Streets. A plenum connecting the two would be located under the intersection of East 38th Street and Park Avenue. The total length of excavation would be approximately 380 feet.

A.4.12 Alternative 12

Alternative 12 would construct an emergency ventilation plant under the northbound traffic lanes of Park Avenue between East 36th Street and East 38th Street. The emergency ventilation plant would be located directly above the Lexington Avenue line northbound tunnel, and the distribution plenum would lead from the bottom of the fan chamber and drop down to the track level to reach the northbound and southbound subway tunnels. The emergency ventilation plant would be composed of two chambers, one between East 36th and East 37th Streets and one between East 37th and East 38th Streets. A plenum connecting the two would be located under the intersection of East 37th Street and Park Avenue. The total length of excavation would be approximately 380 feet.

A.4.13 Alternative 13

Alternative 13 would construct a single-level emergency ventilation plant under the northbound lanes of Park Avenue and the adjacent sidewalk, between East 36th Street and East 37th Street. The emergency ventilation plant would be located directly above the Lexington Avenue line northbound tunnel, and the distribution plenum would lead from the bottom of the emergency ventilation plant chamber to reach the northbound and southbound subway tunnels. Because of the single-chamber design (unlike the double-chamber design of Alternatives 11 and 12), the width of the chamber for Alternative 13 would be approximately 55 feet, potentially extending under the adjacent residential buildings.



Legend

Proposed Alternative Locations

Traffic Direction

Source : New York City Transit; New York City Department of City Planning (PLUTO data); ESRI World Street Map.

Overview of Alternatives

Park Avenue Between East 35th and East 40th Street

Emergency Ventilation Plant
Lexington Avenue Line

E 33rd Street to E 42nd Street,
Manhattan, New York

Louis Berger

Figure A-2

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B. ENGINEERING FEATURES OF ALTERNATIVES

B.1 INTRODUCTION

The purpose of this chapter is to present an engineering profile of the potential development, construction, and operation features of each of the thirteen (13) alternatives identified in Chapter A. For each of the alternatives, the following information is provided:

- A descriptive narrative.
- A discussion of the *civil engineering* considerations attending the construction aspects of the alternative (e.g., the general configuration of the site vis-à-vis the emergency ventilation plant chamber, characteristics of the site, site excavation, utility interference, construction schedule, and sidewalk relocation).
- A discussion of *mechanical/electrical engineering* considerations related to the alternative (e.g., type and arrangement of fans, the location of ventilation plant in relation to critical velocity, potential locations of Con Edison service vaults, electrical distribution room (EDR) and control room, and the structural footprint and volume).
- A discussion of *structural engineering* considerations related to the alternative (e.g., depth of excavation and soil conditions, need for underpinning nearby affected structures, and construction materials).

No comparative analysis of the alternatives is given in this chapter; Chapter C presents the comparative engineering analysis. Chapter D presents a comparative environmental analysis of the alternatives, and Chapter E presents a comparative economic analysis of the thirteen (13) alternatives. Chapter F presents an integrated engineering, environmental, and economic comparative analysis of the alternatives.

B.2 DESCRIPTION OF ALTERNATIVES

This section provides a description of the alternatives in terms of civil engineering, mechanical/electrical, and structural considerations. Figure B-1 (page 13) provides an overview of the location of the alternatives discussed in this section.

Table B-1 provides a summary of the building-line to building-line and property-line to property-line distances for each alternative location, which relate to the potential for temporary or permanent building line intrusion and/or property easements. These data are discussed in detail for each alternative in the narratives that follow.

TABLE B-1: OVERVIEW OF BUILDING-LINE TO BUILDING-LINE AND PROPERTY-LINE TO PROPERTY-LINE DISTANCES

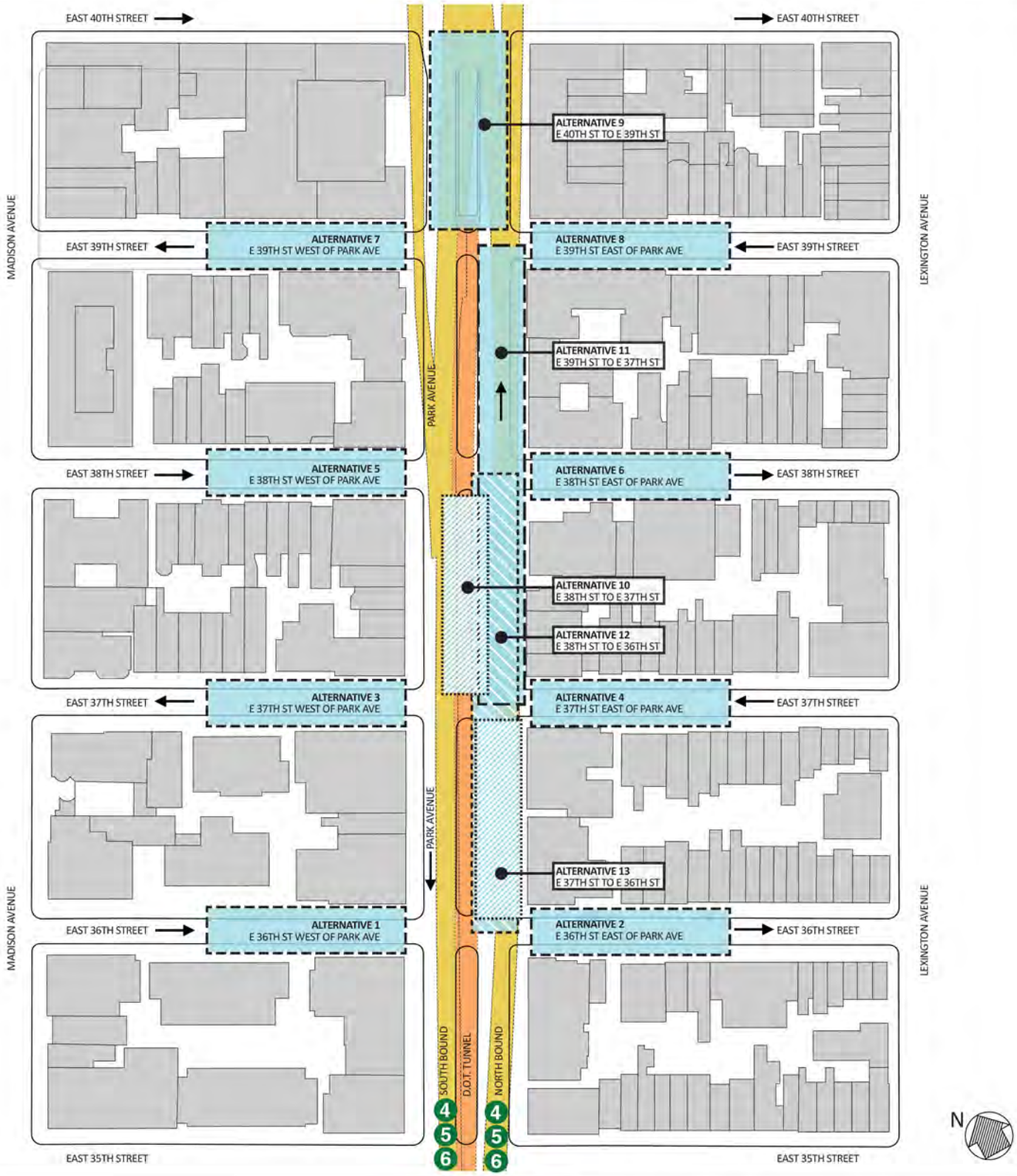
Alternatives 1 - 8								
Alt.	Location	Fan Plant Width/ Construction Zone Width	Building Line to Building Line Distance (Feet)*	Permanent Building Line Intrusion Likely?	Temporary Building Line Intrusion Likely?	Property Line to Property Line Distance (Feet)†	Permanent Property Easement Likely?	Temporary Property Easement Likely?
1	East 36th Street, west of Park Ave.	55/60	60	No	No	51.1	Yes	Yes
2	East 36th Street, east of Park Ave.	55/60	60	No	No	57.6	No	Yes

Alternatives 1 - 8								
Alt.	Location	Fan Plant Width/ Construction Zone Width	Building Line to Building Line Distance (Feet)*	Permanent Building Line Intrusion Likely?	Temporary Building Line Intrusion Likely?	Property Line to Property Line Distance (Feet)†	Permanent Property Easement Likely?	Temporary Property Easement Likely?
3	East 37th Street, west of Park Ave.	55/60	60	No	No	50.6	Yes	Yes
4	East 37th Street, east of Park Ave.	55/60	60	No	No	54.9	Yes	Yes
5	East 38th Street, west of Park Ave.	55/60	59	No	Yes	53.1	Yes	Yes
6	East 38th Street, east of Park Ave.	55/60	59	No	Yes	55.1	No	Yes
7	East 39th Street, west of Park Ave.	55/60	60	No	No	54.5	Yes	Yes
8	East 39th Street, east of Park Ave.	55/60	60	No	No	53.8	Yes	Yes
Alternatives 9 - 13‡								
Alt.	Location	Fan Plant Width/ Construction Zone Width	Building Line to Park Avenue Mall Distance (Feet)*	Permanent Building Line Intrusion Likely?	Temporary Building Line Intrusion Likely?	Property Line to Park Avenue Mall Distance (Feet)†	Permanent Property Easement Likely?	Temporary Property Easement Likely?
9	Park Ave., East 39th to East 40th	55/60	60	No	No	56	No	No
10	Park Ave., East 37th to East 38th	40/45	60	No	No	57	No	No
11	Park Ave., East 37th to East 39th	44/49	60	No	No	58	No	No
12	Park Ave., East 36th to East 38th	44/49	60	No	No	58	No	No
13	Park Ave., East 36th to East 37th	55/60	60	Yes	Yes	58	Yes	Yes

* Field measurements collected on November 17 and 18, using a Bosch Laser Distance Measurer (Model DLR130K) and a measuring wheel (DuraWheel Model DW 500). Dimensions were measured from main building base to main building base (or the Park Avenue Mall for Alternatives 9-13) at the narrowest distance.

† Property Line dimensions derived from GIS measurements of NYC Department of City Planning, Information Technology Division data.

‡ Alternatives 9 and 10 are centered under the Park Avenue Mall; Alternatives 11 to 13 are under Park Avenue northbound lanes.



Legend

Proposed Alternative Locations

Traffic Direction

Source : New York City Transit; New York City Department of City Planning (PLUTO data); ESRI World Street Map.

Overview of Alternative Locations

Park Avenue Between East 35th and East 40th Street

Emergency Ventilation Plant
Lexington Avenue Line

E 33rd Street to E 42nd Street,
Manhattan, New York

Louis Berger

Figure B-1

B.2.1 Alternative 1

Descriptive Narrative

Alternative 1 is located in the streetbed of East 36th Street between Park Avenue and Madison Avenue. The emergency ventilation plant would be approximately 55 feet wide. The roadway itself is 30 feet wide, and sidewalk widths vary on each side of the street. Photographs of the site area are provided on Figures B-2 and B-3 (page 16). Refer to Figure B-4 (page 17) for the site plan and Figures B-5 and B-6 (pages 17 and 18) for typical cross sections for Alternative 1. The Figure B-6 (page 18) typical cross section is common to Alternatives 1 through 8 (i.e., alternatives with a fan chamber on a side street).

The streetbed would house the proposed 850,000 cfm[6] emergency ventilation plant structure, consisting of a control room, EDR, Con Edison service vault, one-level fan chamber housing three 283,000 cfm fans, silencer chamber and distribution plenums with track isolation dampers and louvers, and plenums extending to the two subway tunnels to be served. Specifically, the plenum would be situated as follows:

- The plenum would extend east from the emergency ventilation plant structure below the Park Avenue roadway tunnel to the Lexington Avenue Subway Line to serve the northbound and southbound tunnels. The plenum would be routed between the two subway tunnels. Penetrations from the plenum would align with openings in the east wall of the Lexington Avenue southbound tunnel and the west wall of the northbound tunnel. Construction of the fan chamber would be accomplished with cut-and-cover excavation, while the plenum would be constructed using mining techniques.

The emergency ventilation plant structure would be constructed entirely below grade. The fan chamber and all ancillary support facilities for this emergency ventilation plant would be located in a horizontal, longitudinal configuration.

The 55-foot-wide emergency ventilation plant physically could fit within the smallest distance (approximately 60 feet) between the *building lines* on the north and south sides of the street (the building-line-to-building-line).

The width between *property lines* on the north and south sides of the street, however, is generally less than 55 feet. The permanent footprint of the 55-foot-wide facility could thus extend beyond property lines along the north side and south side of the street, requiring permanent property easements.

Construction of the facility would require about an additional 2.5 feet on either side of the facility's permanent width to provide construction access and shoring, resulting in a temporary construction footprint width of about 60 feet (55 feet + 2.5 feet + 2.5 feet). Because the shortest distance between property lines along the north side and south side of the street is less than 60 feet, temporary construction easements may be required for Alternative 1.

[6] Considering the configuration of the subway tunnels and the locations of the stations at either end of the affected subway tunnel segment (i.e., the 33rd Street/Park Avenue South Station and Grand Central Terminal/42nd Street Station), and the air-moving capacity of ventilation facilities, the optimal location of the proposed emergency ventilation plant would be between East 36th Street and East 39th Street. In a uniform tunnel segment, the ideal emergency ventilation plant location from a mechanical ventilation perspective would be the midpoint of the tunnel between stations. However, there are numerous subway tunnel branches as the Lexington Avenue line approaches Grand Central that shift the ventilation "centroid" for this project from the geographical midpoint to a position at East 38th Street. The emergency ventilation plant can be located away from that "ideal," but the fan capacity, structure size, and project cost would increase as the project location is moved along the tunnel alignment away from the "ideal" towards either station.

Construction activities are not likely to intrude within building lines because the narrowest distance between building lines is approximately 60 feet, which could accommodate the 60-foot-wide construction zone. However, if temporary tiebacks to stabilize shoring need to be constructed, these tiebacks could extend beyond the construction zone and intrude into the building line. Construction could potentially affect features such as sidewalk vaults and other easements previously granted by NYCDOT to property owners that may extend into the construction zone. As applicable, such features would be investigated in coordination with NYCDOT as the environmental review process advances.

Property acquisition would not be required for this alternative; however, as noted above, permanent and temporary property easements *would* be required.

Civil Engineering Considerations

An existing 42-inch reinforced concrete pipe (RCP) storm sewer located below the Park Avenue roadway tunnel would be temporarily flumed. The storm sewer would be reconstructed at the same location as the existing storm sewer below the Park Avenue roadway tunnel. Catch basins and chute connections would require replacement, and an existing 12-inch water main would require support or relocation and replacement within the project's excavation limits. Gas, electric, and telephone duct banks would also be supported from the temporary decking installed in East 36th Street and where it intersects with Park Avenue and would be replaced as required. The 4-foot by 2-foot, 8-inch combined city sewer would be flumed[7] along the entire length of plenum on Park Avenue during construction. Following construction, the existing combined sewer falling in the influence line of excavation would be replaced with a new combined sewer of the same size and location, including manholes. Finally, Alternative 1 would require the reconstruction of one 11-foot utility vault in the south sidewalk of East 36th Street (68 feet from the Park Avenue building line), <u>and one 10-foot utility vault in the north sidewalk of East 36th Street (6 feet from the Park Avenue building line)</u>.

Temporary storm sewer relocation would be complex because of spatial restrictions at the intersection of East 36th Street and Park Avenue. There would be insufficient cross-sectional area for the plenum below Park Avenue because of the spatial constraint imposed by the Park Avenue roadway tunnel and the 42-inch RCP storm sewer located beneath the roadway tunnel. Specifically, the vertical separation between the roadway tunnel/storm sewer and southbound subway tunnel (11 feet, 7 inches) is insufficient for the preferred plenum size. This would result in an unacceptably "flattened" plenum that is 80 feet wide between the Park Avenue roadway tunnel, the storm sewer, and subway tunnel roof.

There is also insufficient height to transition the orientation of the plenum to fit over the southbound Lexington Subway Line tunnel. Therefore, Alternative 1 is considered ***not feasible***.

The following general utility work procedures would apply to ***all alternatives***, including Alternative 1:

1. The combined city sewer would be maintained and flumed during construction of the fan plant. It would be removed and a new RCP sewer of the same size built in the same location.
2. The water main would be replaced with new ductile iron water main of same size and in approximately the same location.

[7] Fluming involves replacing an existing sewer pipe segment with a temporary flume: a sealed, steel pipe that carries the sewer flow while allowing construction to proceed around it.

1. East 36th Street Facing East towards Park Avenue
Morgan Library Open Space on the Left
40.748751, -73.981308

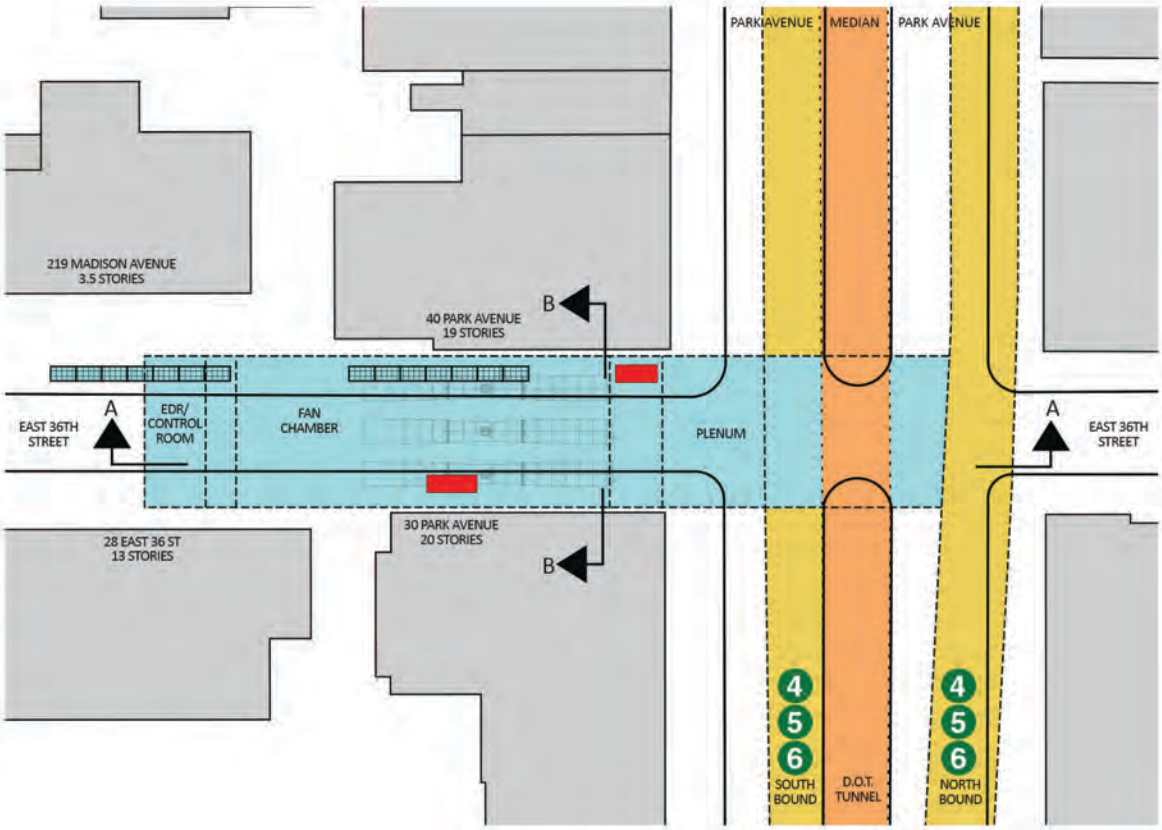
Construction Perimeter
(Construction varies by location within the construction perimeter)

Figure B-2

2. East 36th Street Facing West towards Madison Avenue
40.748414, -73.980506

Construction Perimeter
(Construction varies by location within the construction perimeter)

Figure B-3

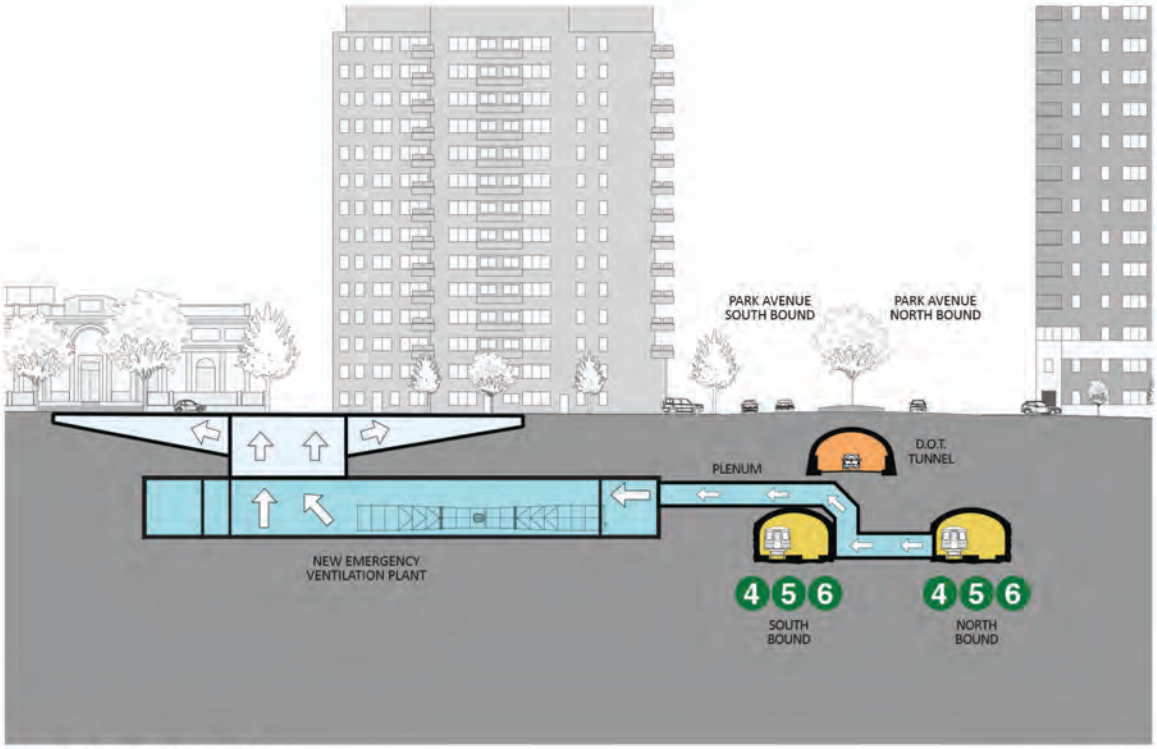


Alternative 1 - Plan
East 36th Street West of Park Avenue

Utility Vaults (NTS)

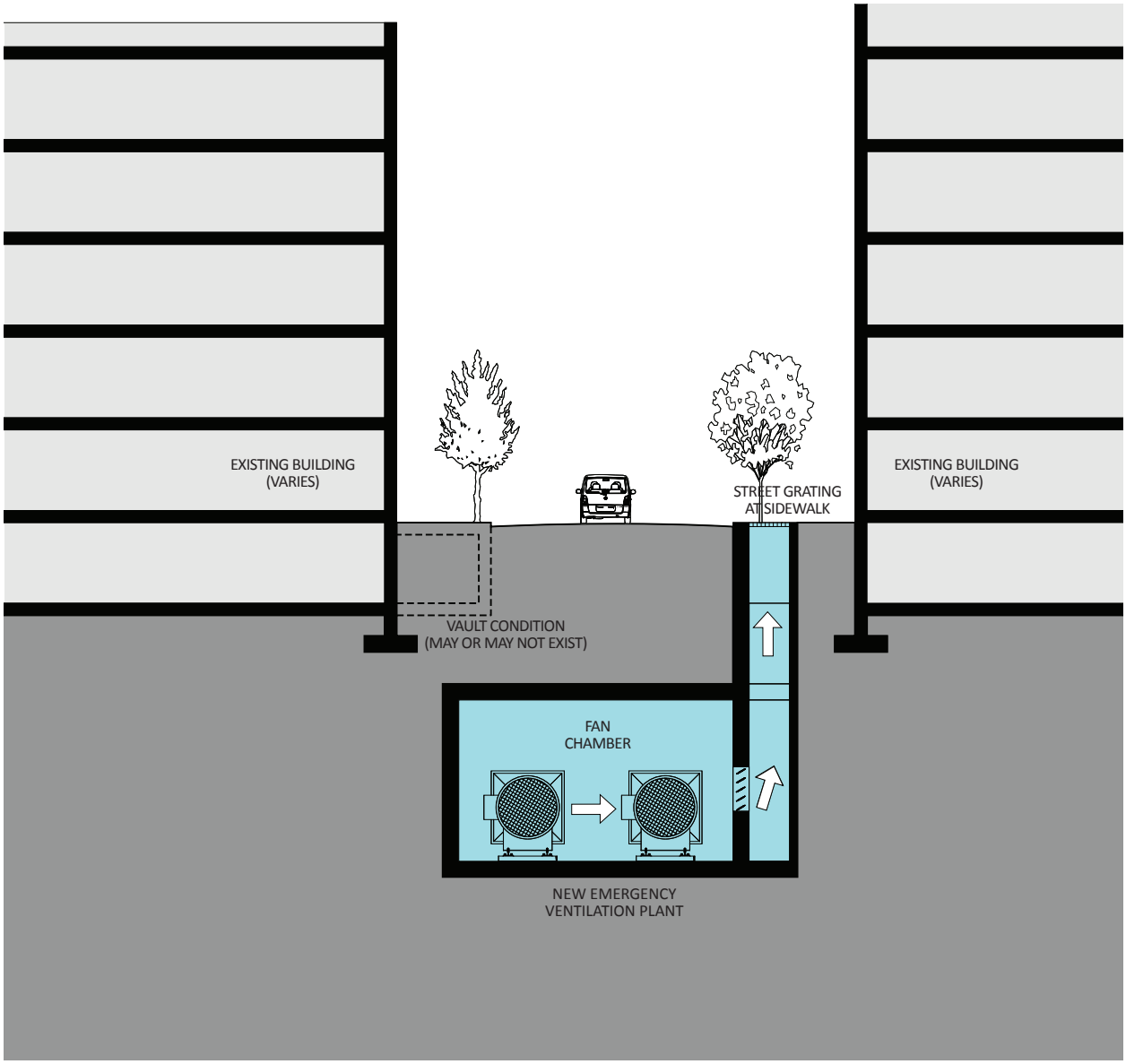
N

Figure B- 4



Alternative 1 - Section A-A
East 36th Street West of Park Avenue

Figure B- 5



Alternatives 1 - 8
Typical Cross-Section B-B

Figure B- 6

3. All cast iron gas mains would be replaced with steel gas mains. The steel gas mains within the limit of excavation would be supported in steel casing and vented through decking if approved by the utility company and or replaced with new steel pipe as required by the utility company.
4. All Con Edison conduits and manholes would be broken out, and cables would be supported through decking during construction of the fan plant. After construction of the fan plant, a new duct bank would be constructed, and new cables would be installed through the duct system.
5. All telephone conduits and manholes would be broken, and cables would be supported through decking. After construction of the fan plant, new split conduits and manholes would be constructed around cables.
6. Active Oil-o-Static lines would be maintained, supported, and protected in the same location. Retired Oil-o-Static lines would be either removed or supported as required by Con Edison.
7. Existing NYCT conduits within the plenum area would be maintained, protected, and supported during construction.

Street-level considerations would include significant disruptions to the residential areas and a New York City Landmarked community facility (the Morgan Library and Museum). Installation of vent gratings in the sidewalks would result in an interruption of the sidewalk at building exterior stairs and entrance doors. Residential access would be maintained at all times; however, access to buildings could require temporary bridging. Partial closure of East 36th Street would be required during the daytime for installation of sheeting, and shorter term full closure would be required for installation of temporary street decking. Travel would be restricted to one lane during active construction periods. Full-time parking lane closure would be required throughout the duration of construction. Two southbound daytime travel lane closures would also likely be required on Park Avenue for the installation of sheeting and decking panels. The plenum would be constructed in two stages and would require the partial closure of Park Avenue southbound traffic lanes. The west curb parking lanes on Park Avenue between East 35th and East 36th Streets and/or between East 36th and East 37th Streets would be utilized as construction materials and equipment staging and storage areas. The anticipated construction duration is 4.5 years, including 2 years for installation of sheeting and decking and slightly more than 2 years for emergency ventilation plant and plenum construction.

Mechanical/Electrical Considerations

This below-ground emergency ventilation plant would have intake/exhaust vent bays constructed at street level along adjacent sidewalks. Underground plenums with accessible track isolation dampers would connect the tunnel sections to the emergency ventilation plant. In order to provide the necessary critical air velocity of 850,000 cfm required at this alternative site, three 283,000 cfm tube axial fans would be required. The three tube axial fans with upstream and downstream silencers and fan isolation dampers would be laid out in a horizontal, longitudinal configuration. Alternative 1 would require a significant increase in fan capacity compared to the 500,000 cfm required at locations closer to the ventilation "centroid" at East 38th Street to provide the critical velocity necessary to move/remove smoke during a fire in the subway tunnel.

Permanent personnel and equipment access and equipment removal would be through sidewalk access hatches. Track isolation dampers would be located at the plenum/track interface to control air flow. Natural ventilation dampers would be located parallel with the fan arrangement in the fan chamber and in existing sidewalk vent bays. A control room with motor control center, and EDR with electrical distribution board, service switch, and meter would also be located below grade as part of the emergency ventilation plant. Con Edison service vaults would be located below the sidewalk.

Because it would require an 850,000 cfm fan (as opposed to a nominal 500,000 cfm fan), this alternative is considered **not feasible**.

Structural Considerations

This emergency ventilation plant would be constructed from building-line-to-building-line in East 36th Street between Park Avenue and Madison Avenue and would require the construction of a one-level emergency ventilation plant. The narrow width of the street would impose certain construction difficulties, such as a limited ability to maneuver heavy construction equipment while maintaining space for vehicle/pedestrian access. The depth of excavation for the construction of the emergency ventilation plant would be approximately 46 feet below surface grade (bsg). A portion of this excavation (18 feet to 22 feet) would be in miscellaneous fill, and the remainder of the excavation would be in rock. This soil profile information is based on the historical borings taken in the vicinity and would have to be verified. There are four buildings (a 20-story, a 13-story, a 19-story residential/commercial buildings, and the 3.5-story Morgan Library and Museum) that could be within the influence zone of the excavation and could require installation of a load-sustaining construction support. A structural system composed of steel members would be installed to support the street decking during the construction of the emergency ventilation plant. Suitability of pre-cast concrete elements for the plenum would be evaluated during design to expedite the construction. The ventilation plant chamber would be higher in elevation than base of rail of the subway tunnel to prevent flooding of the plant.

B.2.2 Alternative 2

Descriptive Narrative

Alternative 2 is located in the streetbed of East 36th Street between Park Avenue and Lexington Avenue. The width of the emergency ventilation plant would be approximately 55 feet. The roadway itself is 30 feet wide, plus varying sidewalk widths on each side of the street. Photographs of the site area are provided on Figures B-7 and B-8 (page 21). Refer to Figure B-9 (page 22) for the site plan, and refer to Figure B-10 (page 22) for a typical cross section for Alternative 2 (the "section B-B" cross section is provided in Figure B-6 [page 18]).

The streetbed would house the proposed 850,000 cfm[8] emergency ventilation plant structure, consisting of a control room, EDR, Con Edison service vault, one-level fan chamber housing three 283,000 cfm fans, silencer chamber and distribution plenums with track isolation dampers and louvers, and flue extending to the two subway tunnels to be served. Specifically, the plenum would be situated as follows:

[8] Considering the configuration of the subway tunnels and the locations of the stations at either end of the affected segment (i.e., the 33rd Street/Park Avenue South Station and Grand Central Terminal/42nd Street Station), and the air-moving capacity of ventilation facilities, the optimal location of the proposed emergency ventilation plant would be between East 36th Street and East 39th Street. In a uniform tunnel segment, the ideal emergency ventilation plant location from a mechanical ventilation perspective would be the midpoint of the tunnel between stations. However, there are numerous subway tunnel branches as the Lexington Avenue line approaches Grand Central that shift the ventilation "centroid" for this project from the geographical midpoint to a position at East 38th Street. The emergency ventilation plant can be located away from that "ideal," but the fan capacity, structure size, and project cost would increase as the project location is moved along the tunnel alignment away from the "ideal" towards either station.

1. East 36th Street Facing West towards Park Avenue
40.747914, -73.979378

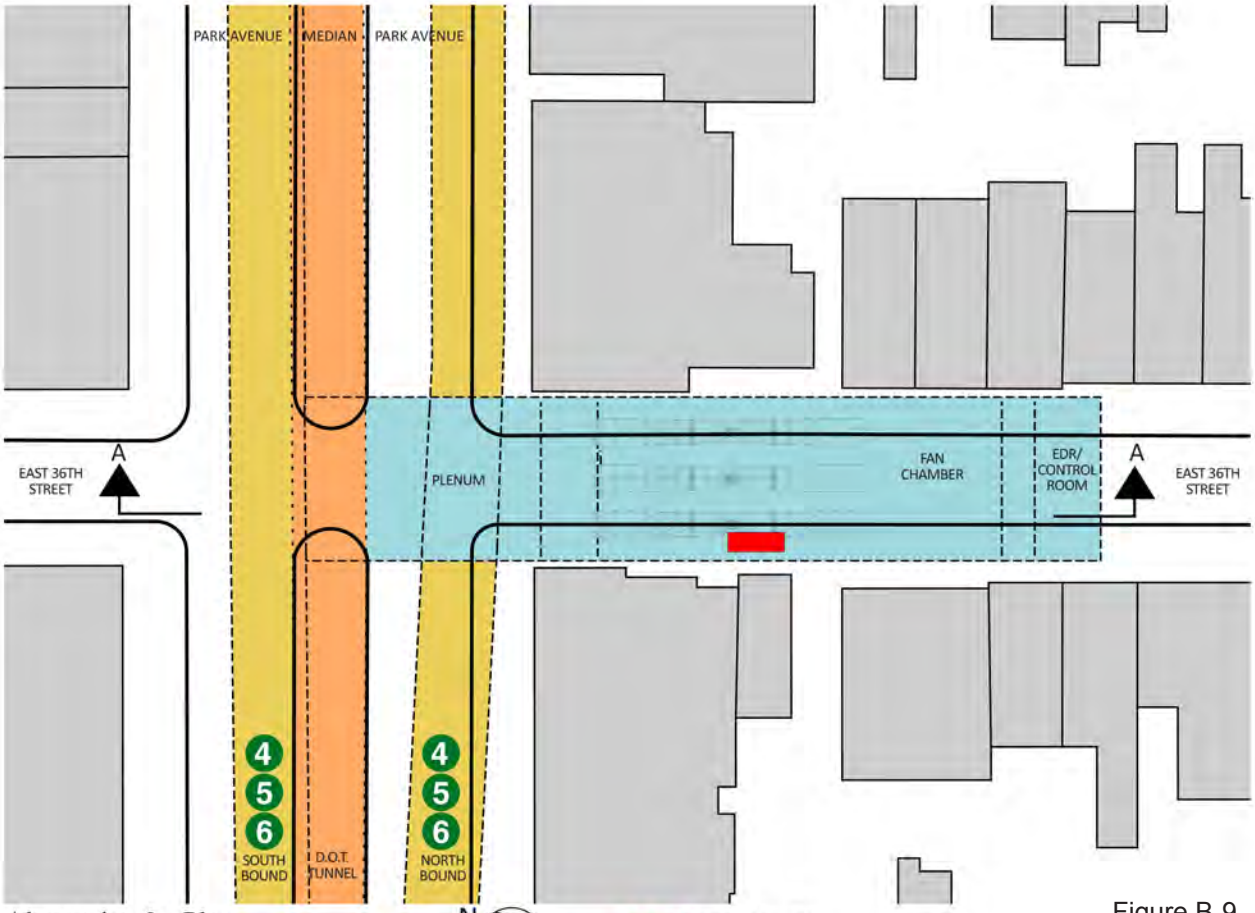
Construction Perimeter
(Construction varies by location within the construction perimeter)

Figure B-7

2. East 36th Street Facing East towards Lexington Avenue
40.748313, -73.980320

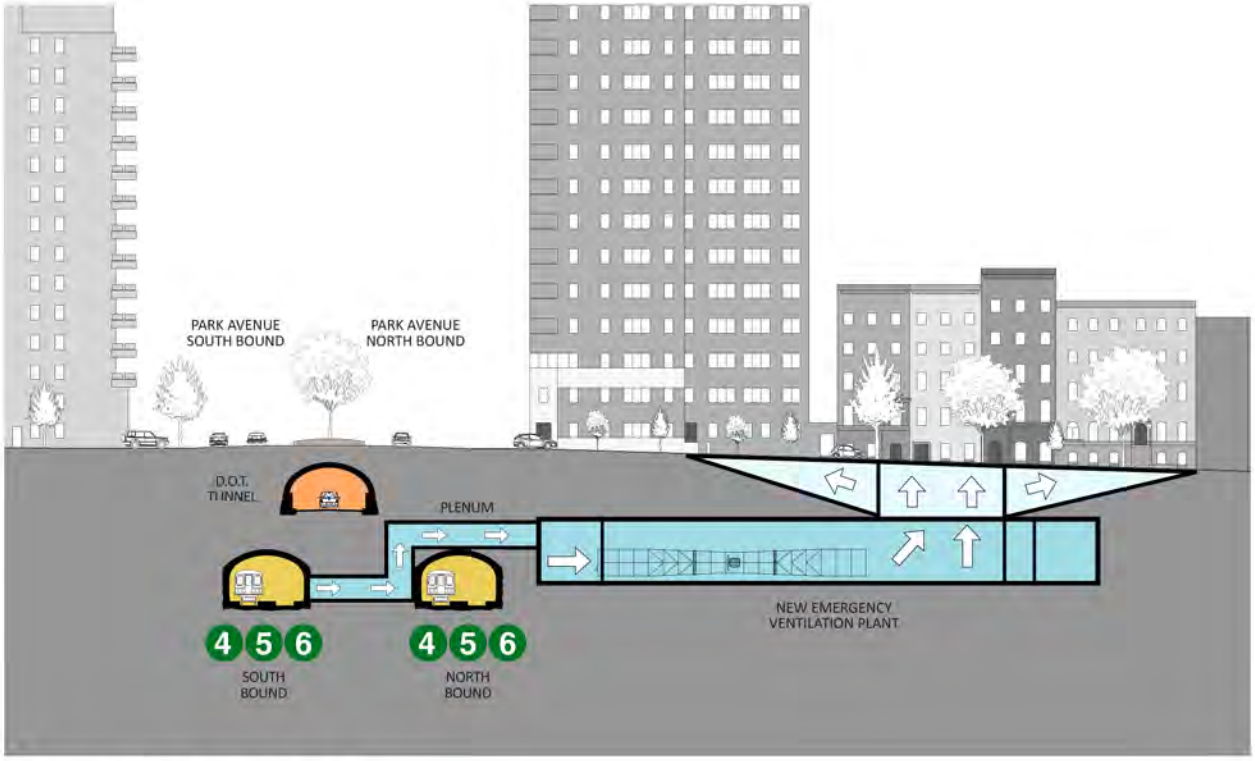
Construction Perimeter
(Construction varies by location within the construction perimeter)

Figure B-8



Alternative 2 - Plan
East 36th Street East of Park Avenue

Figure B-9



Alternative 2 - Section A-A
East 36th Street East of Park Avenue

Figure B-10

- The plenum would extend west from the emergency ventilation plant structure below East 36th Street towards Park Avenue and be constructed over the top of the northbound Lexington Avenue subway tunnel. It would then descend to track level to serve the northbound and southbound tunnels of the Lexington IRT. The plenum would be routed between the two subway tunnels to provide connections for ventilation. Wall penetrations from the plenum would connect to the east wall of the Lexington IRT southbound tunnel and the west wall of the Lexington IRT northbound tunnel. Construction of the fan chamber would be accomplished with cut-and-cover excavation, while the plenum would be constructed using mining techniques.

The emergency ventilation plant structure would be entirely below grade. The fan chamber and all ancillary support facilities for this emergency ventilation plant would be located in a horizontal, longitudinal configuration.

The 55-foot-wide emergency ventilation plant physically could fit within the smallest distance (approximately 60 feet) between the *building lines* on the north and south sides of the street (the building-line-to-building-line).

The shortest distance between *property lines* on the north and south sides of the street is more than 55 feet. Thus, the permanent footprint of the 55-foot-wide facility could fit between the property lines along the north and south sides of the street, and permanent property easements likely would not be required.

Construction of the facility would require approximately an additional 2.5 feet on either side of the facility's permanent width to provide construction access and shoring, resulting in a temporary construction footprint width of approximately 60 feet (55 feet + 2.5 feet + 2.5 feet). Because the shortest distance between property lines along the north side and south side of the street is less than 60 feet, temporary construction easements may be required for Alternative 2.

Construction activities are not likely to intrude within building lines because the narrowest distance between building lines is approximately 60 feet, which could accommodate the 60-foot-wide construction zone. However, if temporary tiebacks to stabilize shoring need to be constructed, these tiebacks could extend beyond the construction zone and intrude into the building line. Construction could potentially affect features such as sidewalk vaults and other easements previously granted by NYCDOT to property owners that may extend into the construction zone. As applicable, such features would be investigated in coordination with NYCDOT as the environmental review process advances.

No property acquisition would be required for Alternative 2; however, as noted above temporary easements would be required

Civil Engineering Considerations

Emergency ventilation plant construction in the streetbed would provide temporary fluming for the existing 4-foot by 2-foot, 8-inch combined city sewer under East 36th Street. After completion of the emergency ventilation plant construction, the combined sewer would be replaced using a 42-inch RCP. A 12-inch water line would be replaced within excavation limits at Park Avenue. Con-Edison high voltage Oil-o-Static lines under Park Avenue would be supported from decking during construction of the plenum and replaced after construction, and Oil-o-Static lines under East 36th Street would be rerouted or maintained and supported in place. Gas, electric, and telephone duct banks would also be supported from the temporary decking installed at East 36th Street and where they intersect with Park Avenue and would be replaced as required. Finally, Alternative 2 would require the reconstruction of one 10-foot utility vault in the south sidewalk of East 36th Street, 51 feet from the Park Avenue building line. The general utility work procedures listed under Alternative 1 would also be applicable to Alternative 2.

The plenum routing of this alternative would avoid impacts to the storm sewer located under the Park Avenue roadway tunnel. There would be sufficient cross-sectional area to install a plenum because of the spatial arrangement of the Park Avenue roadway tunnel and the 42-inch RCP storm sewer located beneath the roadway tunnel.

Street-level considerations would include significant disruptions to the residential areas along East 36th Street. Installation of vent gratings in the sidewalks would result in an interruption of the sidewalk at exterior stairs and entrance doors to buildings. Residential access would be maintained at all times; however, access to buildings could require temporary bridging. Partial closure of East 36th Street would be required during the daytime for installation of sheeting, and shorter term full closure would be required for installation of temporary street decking. The travel lanes would be restricted to one lane during active construction. Full-time parking lane closures would be required throughout the duration of construction. Two northbound daytime travel lane closures would likely be required on Park Avenue for the installation of sheeting and decking panels. The plenum would be constructed in two stages and would require the partial closure of Park Avenue northbound traffic lanes. The east curb lane of Park Avenue either between East 36th Street and East 37th Street and/or between East 36th Street and East 35th Street would be utilized as staging and storage areas. The anticipated construction duration is 4.5 years, including 2 years for installation of sheeting and decking and slightly more than 2 years for emergency ventilation plant and plenum construction.

Mechanical/Electrical Considerations

This below-ground emergency ventilation plant would have intake/exhaust vent bays at street level along adjacent sidewalks. Underground plenums with accessible track isolation dampers would connect the tunnel sections to the emergency ventilation plant. In order to provide the necessary critical air velocity of 850,000 cfm required at this alternative site, three 283,000 cfm tube axial fans would be required. The three tube axial fans with upstream and downstream silencers and fan isolation dampers would be laid out in a horizontal, longitudinal configuration. Alternative 2 would require a significant increase in fan capacity compared to the 500,000 cfm required at locations closer to the ventilation centroid at East 38th Street to provide the critical velocity necessary to move/remove smoke during a fire in the subway tunnel. As discussed under Alternative 1, the "ideal" location for a ventilation plant for this tunnel segment from a mechanical engineering perspective is the vicinity of East 38th Street.

Permanent personnel and equipment access and equipment removal would be through sidewalk access hatches. Track isolation dampers would be located at the plenum/track interface to control air flow. Natural ventilation dampers would be located parallel with the fan arrangement in the fan chamber and in existing sidewalk vent bays. A control room with motor control center, and EDR with electrical distribution board, service switch, and meter would be located below grade as part of the emergency ventilation plant. Con Edison service vaults would be located below the sidewalk.

Because it would require an 850,000 cfm fan (as opposed to a nominal 500,000 cfm fan), this alternative is considered **not feasible**.

Structural Considerations

This emergency ventilation plant would be constructed in the streetbed of East 36th Street between Park Avenue and Lexington Avenue and would require the construction of a one-level emergency ventilation plant. The narrow width of the street would impose certain construction difficulties, such as a limited ability to maneuver heavy construction equipment while maintaining space for vehicle/pedestrian access. The depth of excavation for construction of the emergency ventilation plant would be about 46 feet bsg. Part of this excavation (18 feet to 24 feet) would be in miscellaneous fill, and the remainder would be in rock. This soil profile information is based on the historical borings taken in the vicinity and would have to

be verified. There are nine buildings (eight residential buildings ranging from 4 to 18 stories and one 5-story commercial/office building) that could be within the influence zone of the excavation and could require installation of a load-sustaining construction support. A structural system composed of steel members would be installed to support the street decking during the construction of the emergency ventilation plant. Suitability of pre-cast concrete elements for the plenum would be examined during design to expedite the construction. The ventilation plant chamber would be higher in elevation than base of rail of the subway tunnel to prevent flooding of the plant.

B.2.3 Alternative 3

Descriptive Narrative

Alternative 3 is located in the streetbed of East 37th Street between Park Avenue and Madison Avenue. The width of the emergency ventilation plant would extend across 55 feet of this approximately 60-foot-wide (building-line-to-building-line) street. The roadway is 30 feet wide, plus varying sidewalk widths on each side of the street. The distance between property lines on this street is approximately 60 feet. Photographs of the site area are shown on Figures B-11 and B-12 (page 26). Refer to Figure B-13 (page 27) for the site plan and to Figure B-14 (page 27) for a typical cross section for Alternative 3 (the "section B-B" cross section is provided in Figure B-6 [page 18]).

This streetbed would house the proposed 500,000 cfm emergency ventilation plant structure, consisting of a control room, EDR, Con Edison service vault, one-level fan chamber housing three 167,000 cfm fans, silencer chamber and distribution plenums with track isolation dampers and louvers, and flue extending to the two subway tunnels to be served. Specifically, the plenum would be situated as follows:

- The plenum would extend east from the emergency ventilation plant structure toward Park Avenue over the Lexington Avenue IRT southbound subway tunnel and under the Park Avenue roadway tunnel, then descend to track level to serve the northbound and southbound tunnels of the Lexington Avenue IRT. The plenum would be routed between the two subway tunnels to provide connections for ventilation. The wall penetrations from the plenum would connect to the east wall of the Lexington Avenue IRT southbound tunnel and to the west wall Lexington Avenue IRT northbound tunnel. Construction of the chamber would be accomplished with cut-and-cover excavation, while the plenum would be constructed using mining techniques.

The emergency ventilation plant structure would be entirely below grade. The fan chamber and all ancillary support facilities for this emergency ventilation plant would be located in a horizontal, longitudinal configuration.

The 55-foot-wide emergency ventilation plant physically could fit within the smallest distance (approximately 60 feet) between the *building lines* on the north and south sides of the street (the building-line-to-building-line).

The width between *property lines* on the north and south sides of the street, however, is generally smaller than 55 feet. Thus, the permanent footprint of the 55-foot-wide facility could extend beyond property lines along the north and south sides of the street, requiring permanent property easements.

Construction of the facility would require approximately an additional 2.5 feet on either side of the facility's permanent width to provide construction access and shoring, resulting in a temporary construction footprint width of approximately 60 feet (55 feet +2.5 feet +2.5 feet). Because the shortest distance between property lines along the north side and south side of the street is less than 60 feet, temporary construction easements may be required for Alternative 3.

1. East 37th Street Facing East towards Park Avenue
40.748751, -73.981308

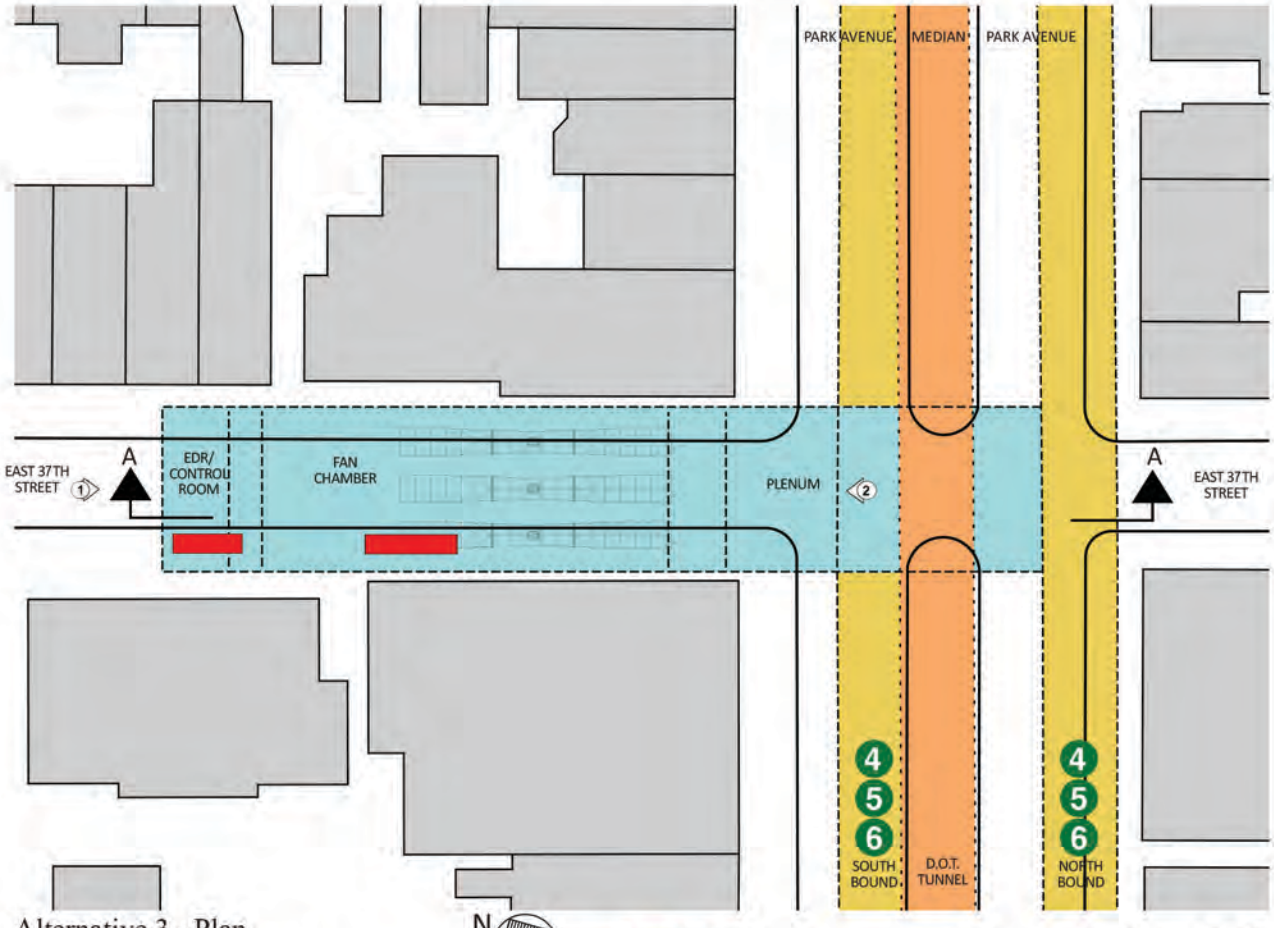
Construction Perimeter
(Construction varies by location within the construction perimeter)

Figure B-11

2. East 37th Street Facing West towards Madison Avenue
40.748943, -73.979849

Construction Perimeter
(Construction varies by location within the construction perimeter)

Figure B-12

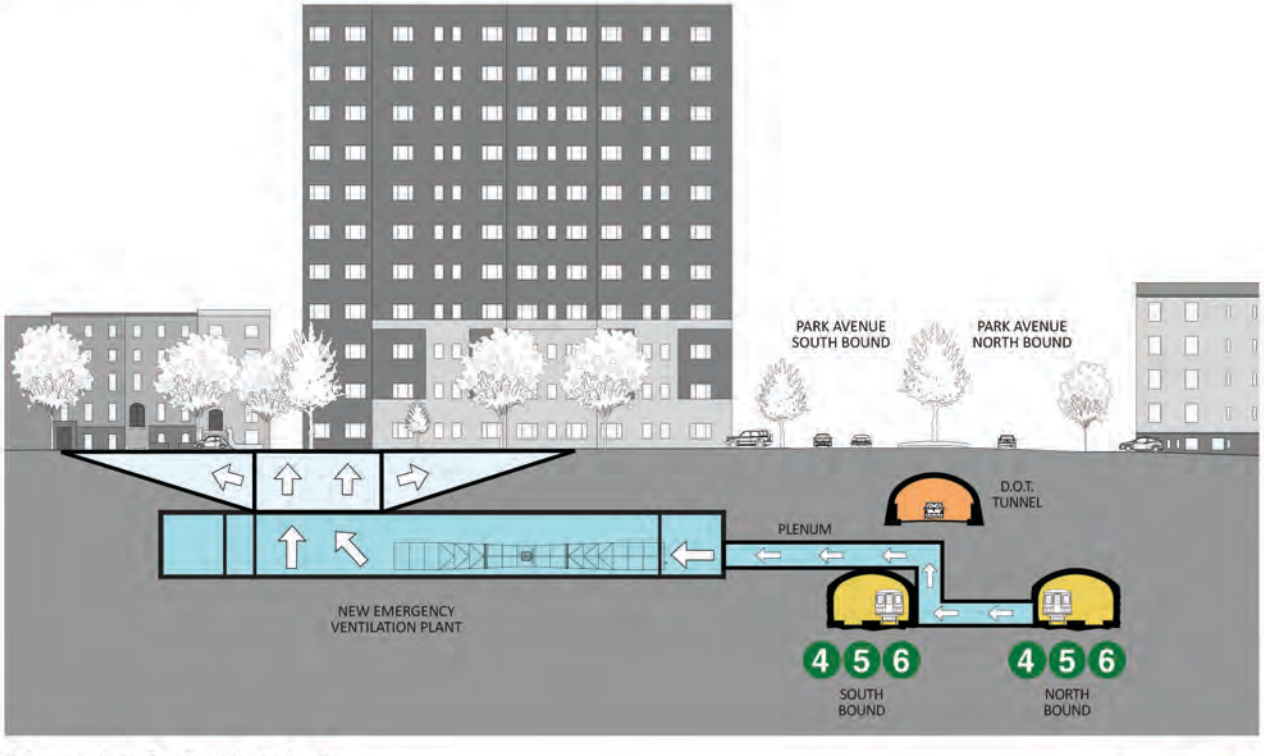


Alternative 3 - Plan
East 37th Street West of Park Avenue

N

Utility Vaults (NTS)
Photo Location

Figure B-13



Alternative 3 - Section A-A
East 37th Street West of Park Avenue

Figure B-14

Construction activities are not likely to intrude within building lines because the narrowest distance between building lines is approximately 60 feet, which could accommodate the 60-foot-wide construction zone. However, if temporary tiebacks to stabilize shoring need to be constructed, these tiebacks could extend beyond the construction zone and intrude into the building line. Construction could potentially affect features such as sidewalk vaults and other easements previously granted by NYCDOT to property owners that may extend into the construction zone. As applicable, such features would be investigated in coordination with NYCDOT as the environmental review process advances.

No property acquisition would be required for Alternative 3; however, as noted above permanent and temporary easements would be required.

Civil Engineering Considerations

Emergency ventilation plant construction in the streetbed would require temporary fluming of the existing 4-feet by 2-feet and 8-inch combined sewer in East 37th Street. After completion of the emergency ventilation plant construction, the combined sewer would be replaced using a 42-inch reinforced concrete pipe. In addition, the storm sewer located below the Park Avenue roadway tunnel would be temporarily flumed during construction. The storm sewer could be reconstructed at the same location as the existing storm sewer below the Park Avenue roadway tunnel. Catch basins and chute connections would need to be replaced, and an existing 12-inch water main would require support or relocation and replacement within excavation limits. Gas, electric, and telephone duct banks could also be supported from the temporary decking installed at East 37th Street and where it intersects with Park Avenue and would be replaced as required. Oil-o-Static lines under Park Avenue would be supported from decking during construction of the plenum and replaced after construction. Finally, Alternative 3 would potentially require the reconstruction of one 27-foot-long utility vault in the south sidewalk of East 37th Street, 95 feet from the Park Avenue building line, and one 9-foot-long utility vault in the south sidewalk 136 feet from the Park Avenue building line.

Temporary storm sewer relocation would be complex because of the spatial restrictions at the intersection of East 37th Street and Park Avenue. There is sufficient cross-sectional area (approximately 14 feet clearance) between the roof of the southbound Lexington Avenue Subway Line tunnel and the floor of the Park Avenue roadway tunnel for the preferred plenum size. However, the storm sewer under the Park Avenue roadway tunnel would require extensive support to accommodate the plenum. Construction difficulties associated with the plenum routing also include extensive underpinning of the Park Avenue roadway tunnel and extensive excavation in the southbound lanes of Park Avenue. The general utility work procedures listed under Alternative 1 would also be applicable to Alternative 3.

Street-level considerations would include significant disruptions to the residential areas and a New York City Landmarked institution, the Union League Club, at the southwest corner of Park Avenue and East 37th Street. Construction is also proximate to the Consulate General of the Republic of Poland at 233 Madison Avenue. Installation of vent gratings in the sidewalks would result in an interruption of the sidewalk at exterior stairs and entrance doors of buildings. Residential access would be maintained at all times; however, access to buildings could require temporary bridging. Partial closure of East 37th Street would be required during the daytime for installation of sheeting, and shorter term full closure would be required for installation of temporary decking. The travel lanes would be restricted to one lane during active construction. Full-time parking lane closures would be required throughout the duration of construction. Two southbound daytime travel lane closures would likely be required on Park Avenue for the installation of sheeting and decking panels. The plenum could be constructed in two stages and would require the partial closure of Park Avenue southbound traffic lanes. Staging and storage would be accommodated in the west curb lane of Park Avenue, either between East 36th Street and East 37th Street or between East 37th Street and East 38th Street. The anticipated construction duration is 4.5 years and

would include 2 years for installation of sheeting and decking and slightly more than 2 years for emergency ventilation plant and plenum construction.

Mechanical/Electrical Considerations

This below-ground emergency ventilation plant would have intake/exhaust vent bays at street level along adjacent sidewalks. Underground plenums with accessible track isolation dampers would connect the tunnel sections to the emergency ventilation plant. In order to provide the necessary critical air velocity of 500,000 cfm required at this alternative site, three 167,000 cfm tube axial fans would be required. The three tube axial fans with upstream and downstream silencers and fan isolation dampers would be laid out in a horizontal, longitudinal configuration.

Personnel and equipment access and equipment removal would be through sidewalk access hatches. Track isolation dampers would be located at the plenum/track interface to control air flow. Natural ventilation dampers would be located parallel with the fan arrangement in the fan chamber and in existing sidewalk vent bays. A control room with motor control center and EDR with electrical distribution board, service switch, and meter would be located below grade as part of the emergency ventilation plant. Con Edison service vaults would be located below the sidewalk.

Structural Considerations

This emergency ventilation plant would be constructed in the streetbed of East 37th Street between Park Avenue and Madison Avenue and would require the construction of a one-level emergency ventilation plant. The narrow width of the street would impose certain construction difficulties, such as a limited ability to maneuver heavy construction equipment while maintaining space for vehicle/pedestrian access. The depth of excavation for the construction of the emergency ventilation plant would be approximately 46 feet bsg. A portion of this excavation (17 feet to 22 feet) would be in miscellaneous fill, and the remainder of the excavation would be in rock. This soil profile information is based on the historical borings taken in the vicinity and would have to be verified. There are five buildings (a 12-story residential/commercial, a 17-story residential, two 4-story residential, and the 12-story Union League Club, a New York City Landmark) that could be within the influence zone of the excavation and could require installation of a load-sustaining construction support. A structural system composed of steel members would be installed to support the street decking during the construction of the emergency ventilation plant. Suitability of pre-cast concrete elements for the plenum would be examined during design to expedite the construction. The ventilation plant chamber would be higher in elevation than base of rail of the subway tunnel to prevent flooding of the plant.

B.2.4 Alternative 4

Descriptive Narrative

Alternative 4 is located in the streetbed of East 37th Street between Park Avenue and Lexington Avenue. The width of the emergency ventilation plant would extend 55 feet across the approximately 60-foot-wide (building-line-to-building-line) street. The roadway itself is 30 feet wide, plus varying sidewalk widths on each side of the street. The distance between property lines on this street is approximately 60 feet. Photographs of the site area are provided on Figures B-15 and B-16 (page 31). Refer to Figure B-17 (page 32) for the site plan, and refer to Figure B-18 (page 32) for a typical cross section for Alternative 4 (the "section B-B" cross section is provided in Figure B-6 [page 18]).

The streetbed would house the proposed 500,000 cfm emergency ventilation plant structure, consisting of a control room, EDR, Con Edison service vault, one-level fan chamber housing three 167,000 cfm fans,

silencer chamber and distribution plenums with track isolation dampers and louvers, and flue extending to the two subway tunnels to be served. Specifically, the plenum would be situated as follows:

- The plenum would extend west toward Park Avenue from the emergency ventilation plant, over the top of the northbound Lexington Avenue tunnel, and descend to track level to serve the northbound and southbound tunnels of the Lexington IRT. The plenum would be routed between the two subway tunnels to provide connections for ventilation. Wall penetrations from the plenum would connect to the east wall of the Lexington Avenue IRT southbound tunnel and to the west wall Lexington Avenue IRT northbound tunnel. Construction of the chamber would be accomplished with cut-and-cover excavation, while the plenum would be constructed using mining techniques.

The emergency ventilation plant structure would be entirely below grade. The fan chamber and all ancillary support facilities for this emergency ventilation plant would be located in a horizontal, longitudinal configuration.

The 55-foot-wide emergency ventilation plant physically could fit within the smallest distance (approximately 60 feet) between the *building lines* on the north and south sides of the street (the building-line-to-building-line).

The width between *property lines* on the north and south sides of the street, however, is generally smaller than 55 feet. Thus, the permanent footprint of the 55-foot-wide facility could extend beyond property lines along the north and south sides of the street, requiring permanent property easements.

Construction of the facility would require approximately an additional 2.5 feet on either side of the facility's permanent width to provide construction access and shoring, resulting in a temporary construction footprint width of approximately 60 feet (55 feet +2.5 feet +2.5 feet). Because the shortest distance between property lines along the north side and south side of the street is less than 60 feet, temporary construction easements may be required for Alternative 4.

Construction activities are not likely to intrude within building lines because the narrowest distance between building lines is approximately 60 feet, which could accommodate the 60-foot-wide construction zone. However, if temporary tiebacks to stabilize shoring need to be constructed, these tiebacks could extend beyond the construction zone and intrude into the building line. Construction could potentially affect features such as sidewalk vaults and other easements previously granted by NYCDOT to property owners that may extend into the construction zone. As applicable, such features would be investigated in coordination with NYCDOT as the environmental review process advances.

No property acquisition would be required for Alternative 4; however, as noted above permanent and temporary easements would be required.

Civil Engineering Considerations

With approval from Con Edison, an approximately 225-foot-long, existing 24-inch steam main along Park Avenue on East 37th Street would be temporarily installed outside of the limit of excavation. After completion of the emergency ventilation plant, a new 24-inch steam main would be installed in its original location. Emergency ventilation plant construction in the streetbed would require temporary fluming of the existing 4-foot by 2-foot, 8-inch combined city sewer under East 37th Street. After completion of the emergency ventilation plant construction, the combined sewer would be replaced using a 42-inch RCP. A 12-inch water line would need to be replaced within excavation limits at Park Avenue. Oil-o-Static lines under Park Avenue would be supported from decking during construction of the plenum and replaced after construction.

1. East 37th Street Facing West towards Park Avenue
40.748774, -73.979434

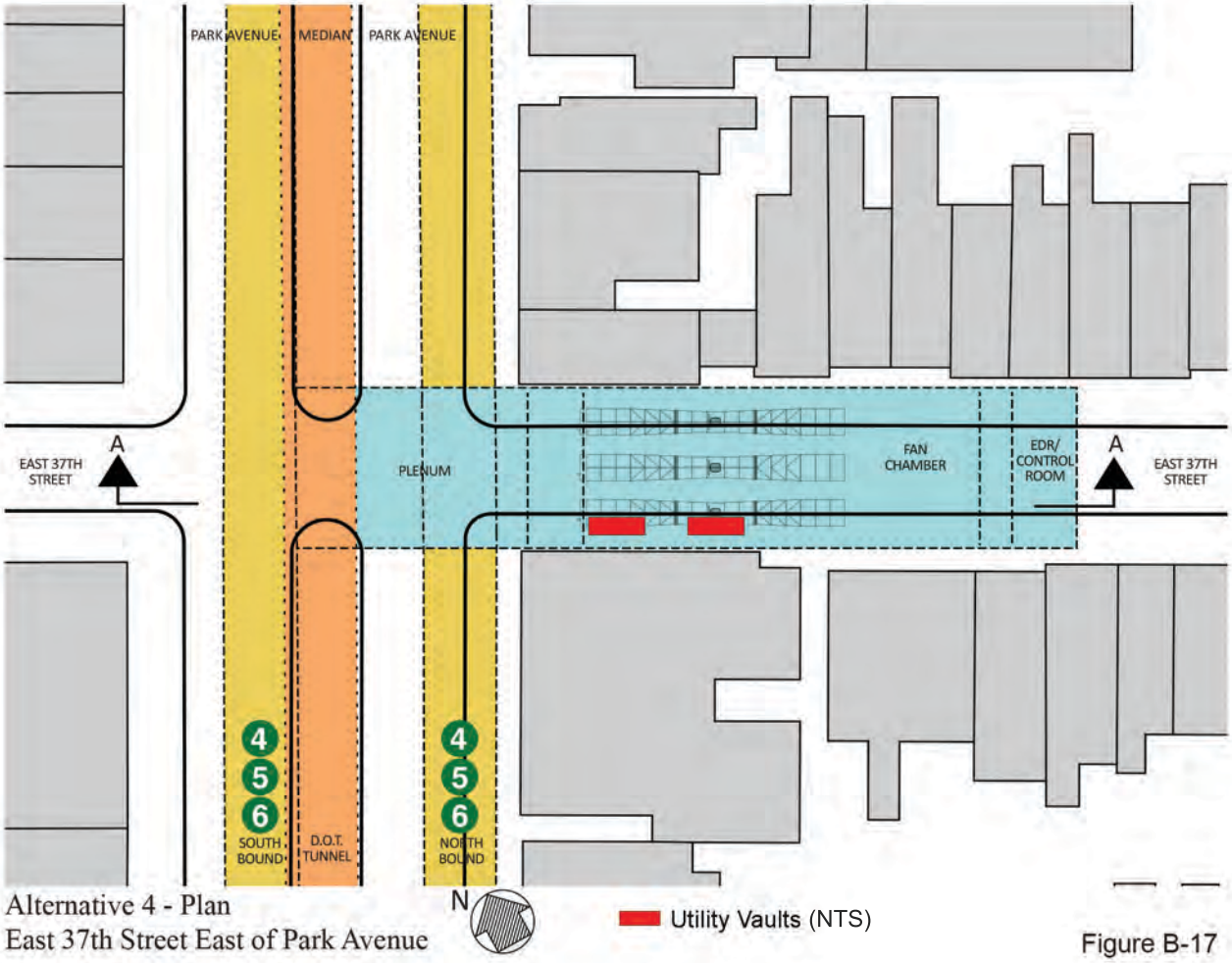
Construction Perimeter
(Construction varies by location within the construction perimeter)

Figure B-15

2. East 37th Street Facing East towards Lexington Avenue
40.748924, -73.979831

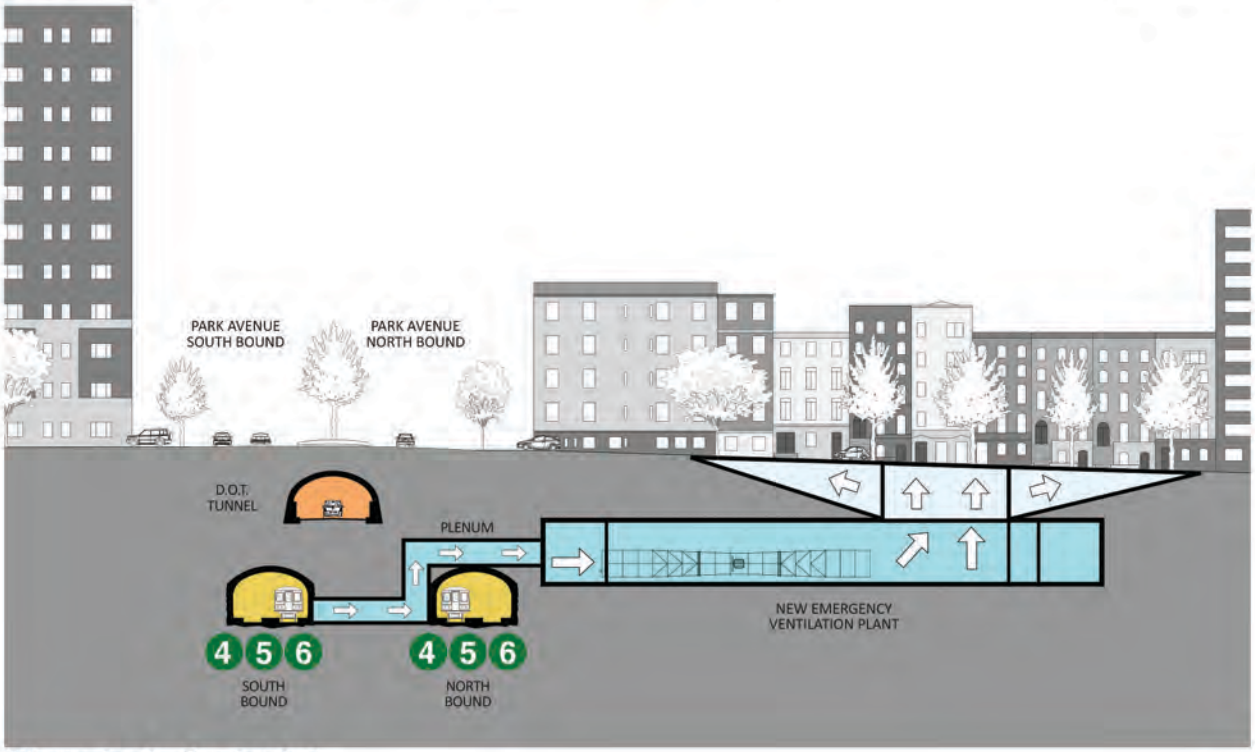
Construction Perimeter
(Construction varies by location within the construction perimeter)

Figure B-16



Alternative 4 - Plan
East 37th Street East of Park Avenue

Figure B-17



Alternative 4 - Section A-A
East 37th Street East of Park Avenue

Figure B-18

Gas, electric, and telephone duct banks could also be supported from the temporary decking installed at East 37th Street and where it intersects with Park Avenue and would be replaced as required. Finally, Alternative 4 would require the reconstruction of two utility vaults in the south sidewalk of East 37th Street (a 10-foot-long utility vault located 32 feet from the Park Avenue building line and a 15-foot-long utility vault located 47 feet from the Park Avenue building line). The general utility work procedures listed under Alternative 1 would also be applicable to Alternative 4.

The plenum routing of this alternative would avoid impacts to the storm sewer under the Park Avenue roadway tunnel. There is sufficient clearance (approximately 16 feet) between the roof of the northbound Lexington Avenue Subway Line tunnel and the floor of the Park Avenue roadway tunnel for the preferred plenum size (i.e., height-to-width ratio) and required underpinning of the Park Avenue roadway tunnel. A plenum in this location would need to be approximately 45 feet wide.

Street-level considerations would include significant disruptions to the residential areas along East 37th Street. Installation of vent gratings in the sidewalks would result in an interruption of the sidewalk at building exterior stairs and entrance doors. Residential access would be maintained at all times; however, access to buildings could require temporary bridging. Partial closure of East 37th Street would be required during the daytime for installation of sheeting, and shorter term full closure would be required for installation of decking. The travel lanes would be restricted to one lane during active construction. Full-time parking lane closures would be required throughout the duration of construction. Two southbound daytime travel lane closures likely would be required on Park Avenue for the installation of sheeting and decking panels. The plenum would be constructed in two stages and would require the partial closure of Park Avenue southbound traffic lanes. Staging and storage would be accommodated in the east curb lane of Park Avenue, either between East 36th Street and East 37th Street or between East 37th Street and East 38th Street. The anticipated construction duration is 4.5 years and would include 2 years for installation of sheeting and decking and slightly more than 2 years for emergency ventilation plant and plenum construction.

Mechanical/Electrical Considerations

This below-ground emergency ventilation plant would have intake/exhaust vent bays at street level along adjacent sidewalks. Underground plenums with accessible track isolation dampers would connect the tunnel sections to the emergency ventilation plant. In order to provide the necessary critical air velocity of 500,000 cfm required at this alternative site, three 167,000 cfm tube axial fans would be required. The three tube axial fans with upstream and downstream silencers and fan isolation dampers would be laid out in a horizontal, longitudinal configuration.

Personnel and equipment access and equipment removal would be through sidewalk access hatches. Track isolation dampers would be located at the plenum/track interface to control air flow. Natural ventilation dampers would be located parallel with the fan arrangement in the fan chamber and in existing sidewalk vent bays. A control room with motor control center, and EDR with electrical distribution board, service switch, and meter would be located below grade as part of the emergency ventilation plant. Con Edison service vaults would be located below the sidewalk.

Structural Considerations

This emergency ventilation plant would be constructed in the streetbed of East 37th Street between Park Avenue and Lexington Avenue and would require the construction of a one-level emergency ventilation plant. The narrow width of the street would impose certain construction difficulties, such as a limited ability to maneuver heavy construction equipment while maintaining space for vehicle/pedestrian access. The depth of excavation for the construction of the emergency ventilation plant would be approximately 46 feet bsg. A portion of this excavation (18 feet to 22 feet) would be in miscellaneous fill, and the

remainder of the excavation would be in rock. This soil profile information is based on the historical borings taken in the vicinity and would have to be verified. There are 11 residential/commercial buildings ranging from 4 to 21 stories that could be within the influence zone of the excavation and could require installation of a load-sustaining construction support. A structural system composed of steel members would be installed to support the street decking during the construction of the emergency ventilation plant. Suitability of pre-cast concrete elements for the plenum would be examined to expedite the construction. The ventilation plant chamber would be higher in elevation than base of rail of the subway tunnel to prevent flooding of the plant.

B.2.5 Alternative 5

Descriptive Narrative

Alternative 5 is located in the streetbed of East 38th Street between Park Avenue and Madison Avenue. The width of the emergency ventilation plant would be approximately 55 feet. The roadway itself is 30 feet wide, plus varying sidewalk widths on each side of the street. Photographs of the site area are provided on Figures B-19 and B-20 (page 35). Refer to Figure B-21 (page 36) for the site plan, and refer to Figure B-22 (page 36) for a typical cross section for Alternative 5 (the "section B-B" cross section is provided in Figure B-6 [page 18).

The streetbed would house the proposed 500,000 cfm emergency ventilation plant structure, consisting of a control room, EDR, Con Edison service vault, one-level fan chamber housing three 167,000 cfm fans, silencer chamber and distribution plenums with track isolation dampers and louvers, and flue extending to the two subway tunnels to be served. Specifically, the plenum would be situated as follows:

- The plenum would extend east toward Park Avenue from the emergency ventilation plant structure, over the top of the southbound Lexington Avenue IRT tunnel and under the Park Avenue roadway tunnel, and descend to track level to serve the northbound and southbound tunnels of the Lexington IRT. The plenum would be routed between the two subway tunnels to provide connections for ventilation. Wall penetrations from the plenum would connect to the east wall of the Lexington IRT southbound tunnel and to the west wall of the Lexington IRT northbound tunnel. Construction of the fan chamber would be accomplished with cut-and-cover excavation, while the plenum would be constructed using mining techniques.

The emergency ventilation plant structure would be entirely below grade. The fan chamber and all ancillary support facilities for this emergency ventilation plant would be located in a horizontal, longitudinal configuration.

The 55-foot-wide emergency ventilation plant physically could fit within the smallest distance (approximately 59 feet) between the *building lines* on the north side and south side of the street (the building-line-to-building-line). The smallest distance between *property lines* on the north and south sides of the street, however, is less than 55 feet. Thus, the permanent footprint of the 55-foot-wide facility could extend beyond property lines along the north side and south side of the street, requiring permanent property easements.

Construction of the facility would require approximately an additional 2.5 feet on either side of the facility's permanent width to provide construction access and shoring, resulting in a temporary construction footprint width of approximately 60 feet (55 feet +2.5 feet +2.5 feet). Because the distance between property lines along the north and south sides of the street is generally less than 60 feet, temporary construction easements may be required for Alternative 5.

1. East 38th Street Facing East towards Park Avenue
40.749997, -73.980467

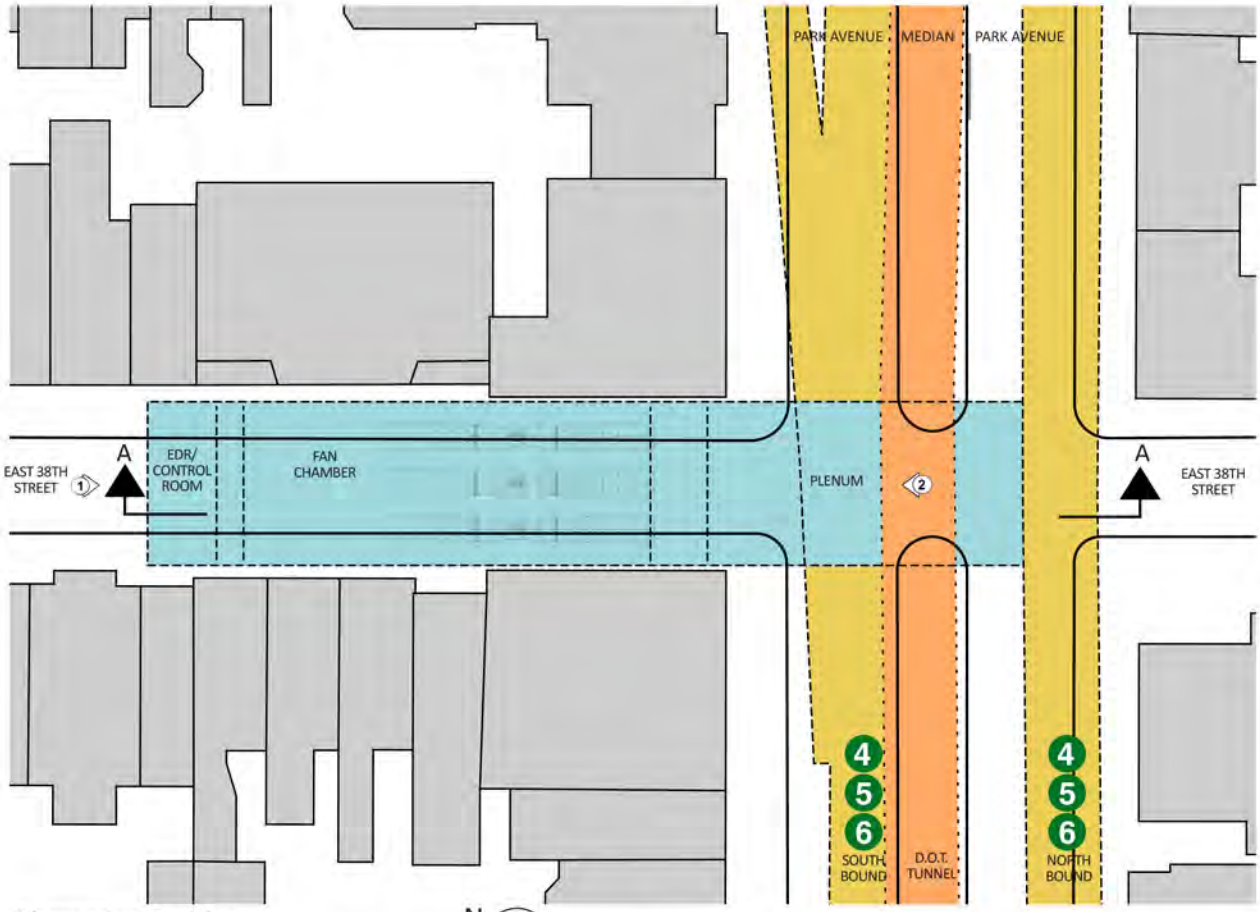
Construction Perimeter
(Construction varies by location within the construction perimeter)

Figure B-19

2. East 38th Street Facing West towards Madison Avenue
40.749849, -73.979616

Construction Perimeter
(Construction varies by location within the construction perimeter)

Figure B-20

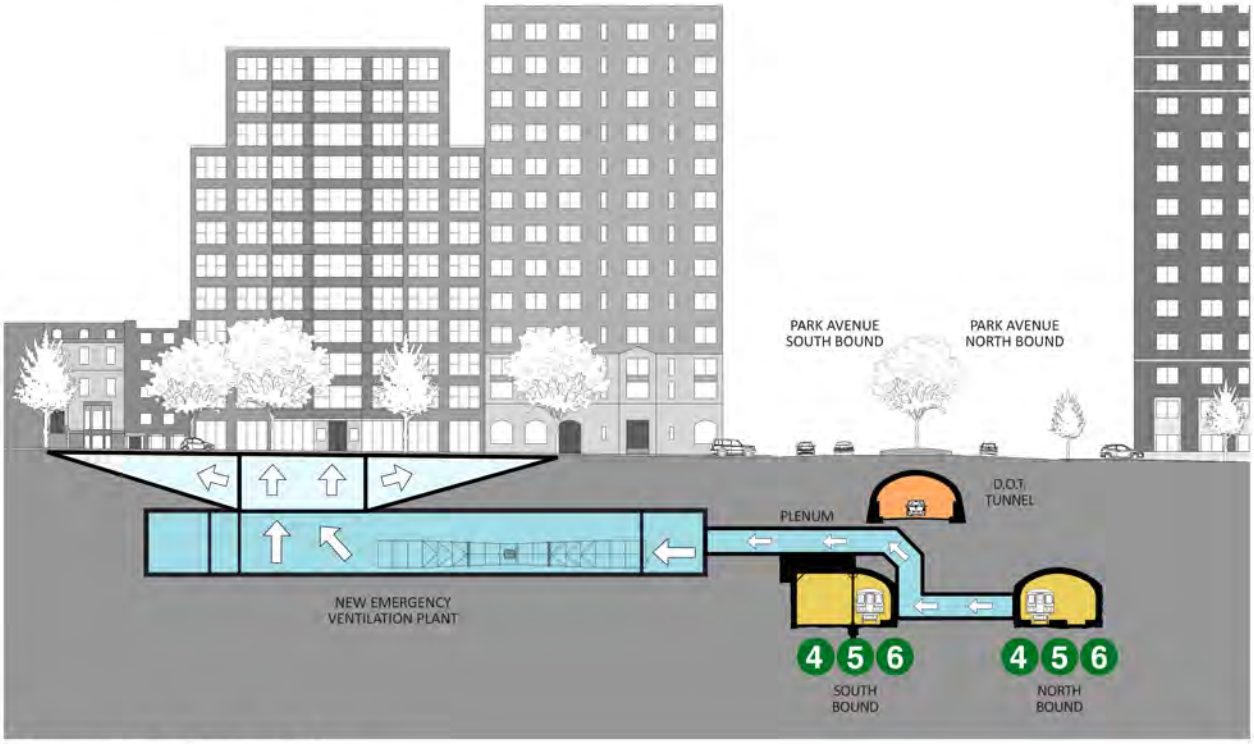


Alternative 5 - Plan
East 38th Street West of Park Avenue

N

Photo Location

Figure B-21



Alternative 5 - Section A-A
East 38th Street West of Park Avenue

Figure B-22

Construction activities could intrude within building lines because construction activities would extend beyond a width of 60 feet, and the shortest distance between building lines is approximately 59 feet. If temporary tiebacks to stabilize shoring need to be constructed, these tiebacks also could intrude into the building line.

Construction could potentially affect features such as sidewalk vaults and other easements previously granted by NYCDOT to property owners that may extend into the construction zone. As applicable, such features would be investigated in coordination with NYCDOT as the environmental review process advances.

Property acquisition would not be required for Alternative 5; however, as noted above, permanent and temporary property easements *would* be required.

Civil Engineering Considerations

Emergency ventilation plant construction in the streetbed would require that the existing 42-inch RCP storm sewer located below the Park Avenue roadway tunnel be temporarily flumed. The storm sewer could be reconstructed at the same location as the existing storm sewer below the Park Avenue roadway tunnel. Catch basins and chute connections would need to be replaced, and an existing 20-inch water main would require replacement within excavation limits. With approval from Con Edison, an existing 24-inch, approximately 275-foot-long steam main under East 38th Street and Park Avenue would be temporarily installed outside of the limit of excavation. After completion of the emergency ventilation plant, a new 24-inch steam main would be installed in its original location. Oil-o-Static lines in East 38th Street and Park Avenue would be protected in place during construction and potentially replaced. Gas, electric, and telephone duct banks could also be supported from the temporary decking installed at East 38th Street and where it intersects with Park Avenue and would be replaced as required. The 4-foot by 2-foot, 8-inch combined city sewer would require fluming along the entire length of plenum on Park Avenue during construction. Following construction, the existing combined sewer falling in the influence line of excavation would be replaced with a new combined sewer of the same size and location, including manholes. The general utility work procedures listed under Alternative 1 would also be applicable to Alternative 5.

Temporary storm sewer relocation would be complex because of spatial restrictions below the intersection of East 38th Street and Park Avenue. There would be insufficient cross-sectional area for the plenum below the Park Avenue because of the spatial constraint imposed by the Park Avenue roadway tunnel and the 42-inch RCP storm sewer located beneath the roadway tunnel. Specifically, the vertical separation between the roadway tunnel/storm sewer and southbound subway tunnel (10 feet, 7 inches) is insufficient for the preferred plenum size. This would result in an unacceptably “flattened” plenum that is 80 feet wide between the Park Avenue roadway tunnel, the storm sewer, and subway tunnel roof. This would severely compromise the air flow. Moreover, there is insufficient height to transition the orientation of the plenum to fit over the southbound Lexington Avenue Subway Line tunnel. Therefore, this alternative is considered ***not feasible***.

Street-level considerations would include significant disruptions to the residential areas along East 38th Street. Installation of vent gratings in the sidewalks would result in an interruption of the sidewalk at building exterior stairs and entrance doors. Residential access would be maintained at all times; however, access to buildings could require temporary bridging. Partial closure of East 38th Street would be required during the daytime for installation of sheeting, and shorter term full closure would be required for installation of decking. The travel lanes would be restricted to one lane during active construction. Full-time parking lane closures would be required throughout the duration of construction. Two southbound daytime travel lane closures likely would be required on Park Avenue for the installation of sheeting and

decking panels. The plenum could be constructed in two stages and would require the partial closure of Park Avenue southbound traffic lanes. Staging and storage would be accommodated in the west curb lane of Park Avenue, either between East 38th Street and East 39th Street or between East 37th Street and East 38th Street. The anticipated construction duration is 4.5 years and would include 2 years for installation of sheeting and decking and slightly more than 2 years for emergency ventilation plant and plenum construction.

Mechanical/Electrical Considerations

This below-ground emergency ventilation plant would have intake/exhaust vent bays at street level along adjacent sidewalks. Underground plenums with accessible track isolation dampers would connect the tunnel sections to the emergency ventilation plant. In order to provide the necessary critical air velocity of 500,000 cfm required at this alternative site, three 167,000 cfm tube axial fans would be required. The three tube axial fans with upstream and downstream silencers and fan isolation dampers would be laid out in a horizontal, longitudinal configuration. As discussed under Alternative 1, the "ideal" location for a ventilation plant for this tunnel segment from a mechanical engineering perspective is the vicinity of East 38th Street.

Permanent personnel and equipment access and equipment removal would be through sidewalk access hatches. Track isolation dampers would be located at the plenum/track interface to control air flow. Natural ventilation dampers would be located parallel with the fan arrangement in the fan chamber and in existing sidewalk vent bays. A control room with motor control center, and EDR with electrical distribution board, service switch, and meter would be located below grade as part of the emergency ventilation plant. Con Edison service vaults would be located below the sidewalk.

Structural Considerations

This emergency ventilation plant would be constructed in the streetbed of East 38th Street between Park Avenue and Madison Avenue and would require the construction of a one-level emergency ventilation plant. The narrow width of the street would impose certain construction difficulties, such as a limited ability to maneuver heavy construction equipment while maintaining space for vehicle/pedestrian access. The depth of excavation for the construction of the emergency ventilation plant would be approximately 46 feet bsg. A portion of this excavation (18 feet to 22 feet) would be in miscellaneous fill, and the remainder of the excavation would be in rock. This soil profile information is based on the historical borings taken in the vicinity and would have to be verified. There are eight buildings (six residential/commercial buildings ranging from 4 to 14 stories, a 16-story commercial/office building and a 15-story hotel) that could be within the influence zone of the excavation and could require installation of a load-sustaining construction support. A structural system composed of steel members would be installed to support the street decking during the construction of the emergency ventilation plant. Suitability of pre-cast concrete elements for the plenum would be examined to expedite the construction. The ventilation plant chamber would be higher in elevation than base of rail of the subway tunnel to prevent flooding of the plant.

B.2.6 Alternative 6

Descriptive Narrative

Alternative 6 is located in the streetbed of East 38th Street between Park Avenue and Lexington Avenue. The width of the emergency ventilation plant would extend across 60 feet of this approximately 62-foot-wide (building-line-to-building-line) street. The distance between property lines on this street is approximately 55 feet. The roadway itself is 30 feet wide, plus varying sidewalk widths on each side of the street. Photographs of the site area are provided on Figures B-23 and B-24 (page 41). Refer to Figure B-25

(page 42) for the site plan, and refer to Figure B-26 (page 42) for a typical cross section for Alternative 6 (the "section B-B" cross section is provided in Figure B-6 [page 18]).

The streetbed would house the proposed 500,000 cfm emergency ventilation plant structure, consisting of a control room, EDR, a Con Edison service vault, a one-level fan chamber housing three 167,000 cfm fans, a silencer chamber and distribution plenums with track isolation dampers and louvers, and a flue extending to the two subway tunnels to be served. Specifically, the plenum would be situated as follows:

- The plenum would extend west toward Park Avenue from the emergency ventilation plant structure, over the top of the northbound Lexington Avenue Subway Line tunnel, and descend to track level to serve the northbound and southbound tunnels of the Lexington IRT. The plenum would be routed between the two subway tunnels to provide connections for ventilation. Wall penetrations from the plenum would connect to the east wall of the Lexington IRT southbound tunnel and to the west wall of the Lexington IRT northbound tunnel. Construction of the chamber would be accomplished with cut-and-cover excavation, while the plenum would be constructed using mining techniques.

The emergency ventilation plant structure would be entirely below grade. The fan chamber and all ancillary support facilities for this emergency ventilation plant would be located in a horizontal, longitudinal configuration.

The 55-foot-wide emergency ventilation plant physically could fit within the smallest distance (approximately 59 feet) between the *building lines* on the north and south sides of the street (the building-line-to-building-line). The smallest distance between *property lines* on the north and south sides of the street, however, is smaller than 55 feet. Thus, the permanent footprint of the 55-foot-wide facility could extend beyond property lines along the north and south sides of the street, requiring permanent property easements.

Construction of the facility would require approximately an additional 2.5 feet on either side of the facility's permanent width to provide construction access and shoring, resulting in a temporary construction footprint width of approximately 60 feet (55 feet +2.5 feet +2.5 feet). Because the distance between property lines along the north and south sides of the street is generally less than 60 feet, temporary construction easements may be required for Alternative 5.

Construction activities could intrude within building lines because construction activities would extend beyond a width of 60 feet, and the shortest distance between building lines is approximately 59 feet. If temporary tiebacks to stabilize shoring need to be constructed, these tiebacks also could intrude into the building line.

Construction could potentially affect features such as sidewalk vaults and other easements previously granted by NYCDOT to property owners that may extend into the construction zone. As applicable, such features would be investigated in coordination with NYCDOT as the environmental review process advances.

Property acquisition would not be required for Alternative 6; however, as noted above, permanent and temporary property easements *would* be required.

Civil Engineering Considerations

Ventilation plant construction would require temporarily relocating an approximately 225-foot-long, 8-inch steam main extending along East 38th Street, outside of the limit of excavation. After completion of the emergency ventilation plant, a new 8-inch steam main would be installed in its original location. Gas, electric, and telephone duct banks could also be supported from the temporary decking installed at

East 38th Street and where it intersects with Park Avenue and would be replaced as required. Oil-o-Static lines would require protection in place along both Park Avenue and East 38th Street. The 4-foot by 2-foot, 8-inch combined city sewer would be flumed along the entire length of plenum on Park Avenue during construction. Following construction, the existing combined sewer falling in the influence line of excavation would be replaced with a new combined sewer of the same size and location, including manholes. Gas, electric, and telephone duct banks would require support and protection. A 20-inch water line would require replacement within excavation limits at Park Avenue. The general utility work procedures listed under Alternative 1 would also be applicable to Alternative 6.

There would sufficient space for plenum routing under Alternative 6.

Street-level considerations would include significant disruptions to residential buildings and the Church of Our Saviour at the southeast corner of the intersection of Park Avenue and East 38th Street. Installation of vent gratings in the sidewalks would result in an interruption of the sidewalk at building exterior stairs and entrance doors. Residential access would be maintained at all times; however, access to buildings could require temporary bridging. Partial closure of East 38th Street would be required during the daytime for installation of sheeting, and shorter term full closure would be required for installation of decking. The travel lane would be restricted to one lane during active construction. Full-time parking lane closures would be required throughout the duration of construction. Two northbound daytime travel lane closures likely would be required on Park Avenue for the installation of sheeting and decking panels. The plenum could be constructed in two stages and would require the partial closure of Park Avenue northbound traffic lanes. Staging and storage would be accommodated in the east curb lane of Park Avenue, either between East 38th Street and East 39th Street or between East 37th Street and East 38th Street. The anticipated construction duration is 4.5 years, including 2 years for installation of sheeting and decking and slightly more than 2 years for emergency ventilation plant and plenum construction.

Mechanical/Electrical Considerations

This below-ground emergency ventilation plant would have intake/exhaust vent bays at street level along adjacent sidewalks. Underground plenums with accessible track isolation dampers would connect the tunnel sections to the emergency ventilation plant. In order to provide the necessary critical air velocity of 500,000 cfm required at this alternative site, three 167,000 cfm tube axial fans would be required. The three tube axial fans with upstream and downstream silencers and fan isolation dampers would be laid out in a horizontal, longitudinal configuration. As discussed under Alternative 1, the “ideal” location for a ventilation plant for this tunnel segment from a mechanical engineering perspective is the vicinity of East 38th Street.

Permanent personnel and equipment access and equipment removal would be through sidewalk access hatches. Track isolation dampers would be located at the plenum/track interface to control air flow. Natural ventilation dampers would be located parallel to the fan arrangement in the fan chamber and in existing sidewalk vent bays. A control room with motor control center, and EDR with electrical distribution board, service switch, and meter would be located below grade as part of the emergency ventilation plant. Con Edison service vaults would be located below the sidewalk.

1. East 38th Street Facing West towards Park Avenue
40.749219, -73.978597

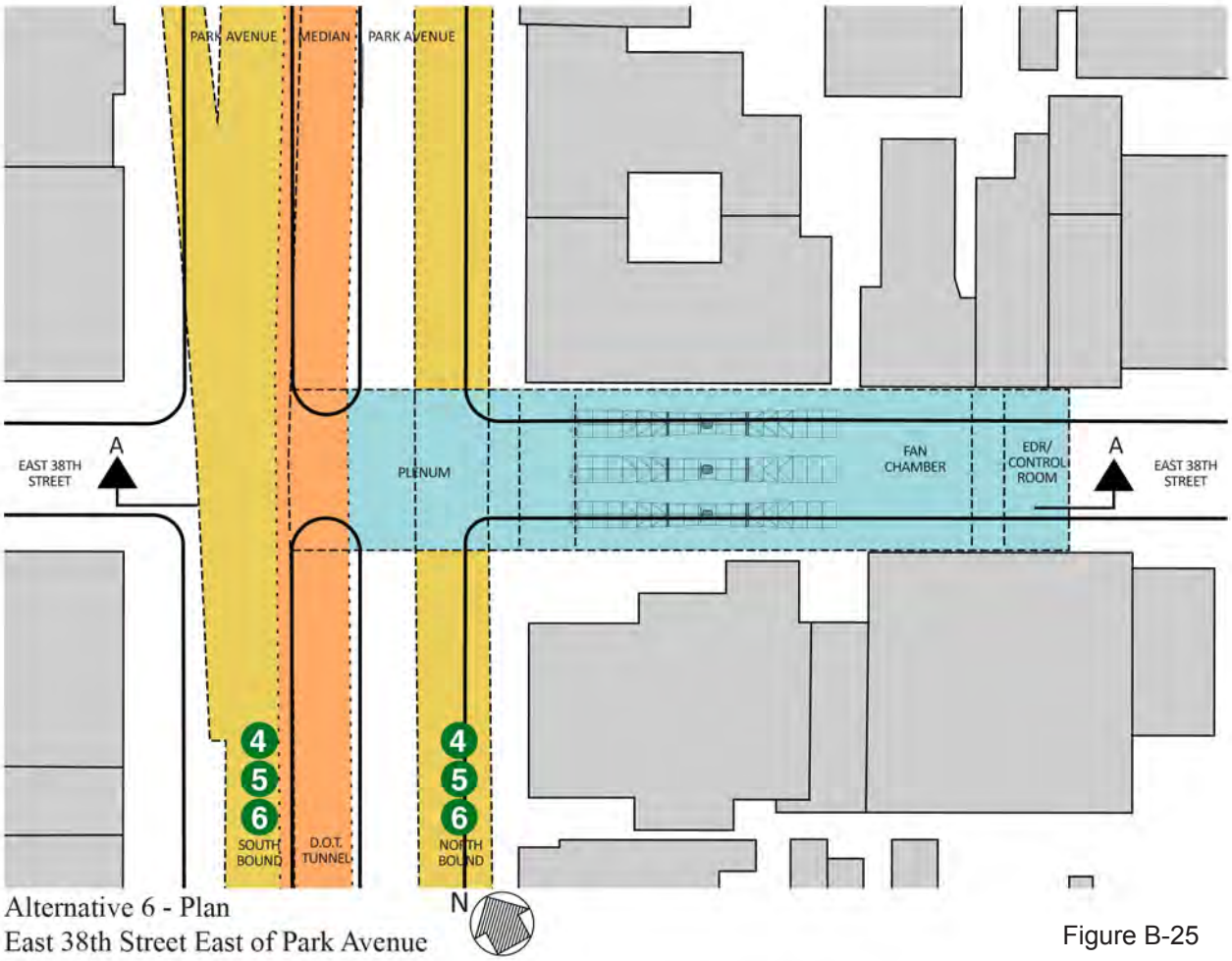
Construction Perimeter
(Construction varies by location within the construction perimeter)

Figure B-23

2. East 38th Street Facing East towards Lexington Avenue
40.748414, -73.980506

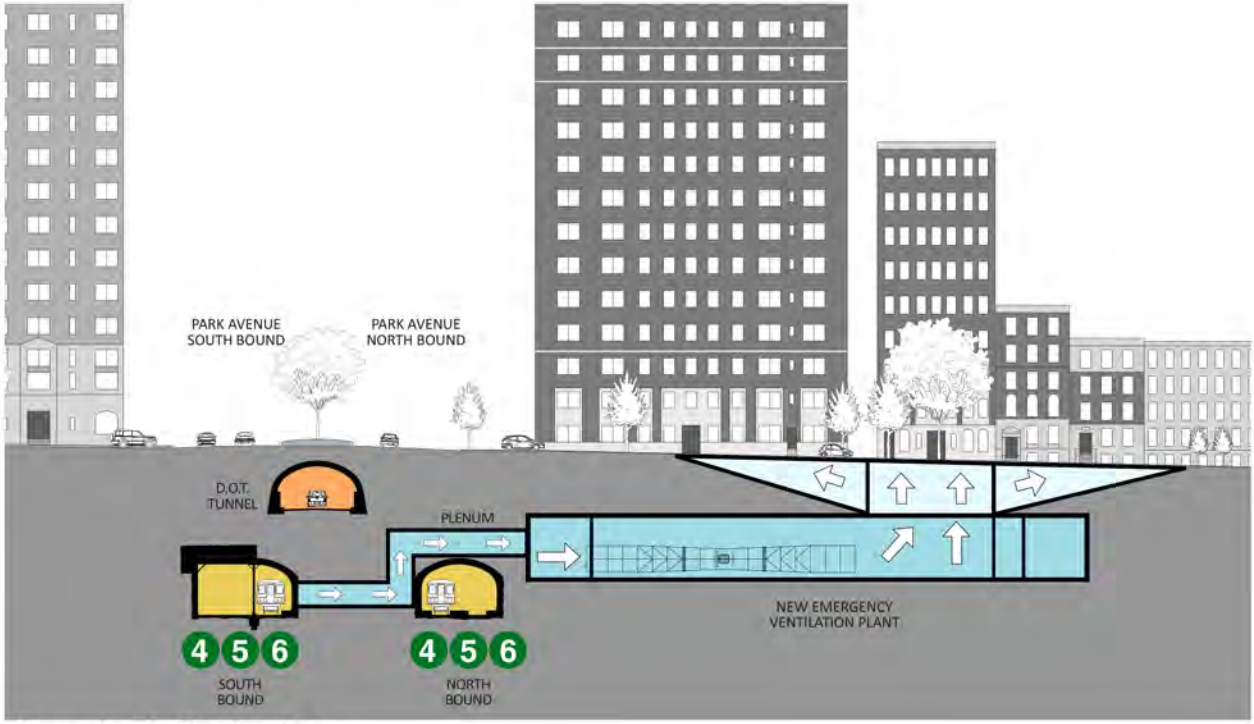
Construction Perimeter
(Construction varies by location within the construction perimeter)

Figure B-24



Alternative 6 - Plan
East 38th Street East of Park Avenue

Figure B-25



Alternative 6 - Section A-A
East 38th Street East of Park Avenue

Figure B-26

Structural Considerations

This emergency ventilation plant would be constructed in the streetbed of East 38th Street between Park Avenue and Lexington Avenue and would require the construction of a one-level emergency ventilation plant. The narrow width of the street would impose certain construction difficulties, such as a limited ability to maneuver heavy construction equipment while maintaining space for vehicle/pedestrian access. The depth of excavation for the construction of the emergency ventilation plant would be approximately 46 feet bsg. A portion of this excavation (18 feet to 22 feet) would be in miscellaneous fill, and the remainder of the excavation would be in rock. This soil profile information is based on the historical borings taken in the vicinity and would have to be verified. There are six buildings (the 3-story Church of Our Saviour, a 24-story residential building, a 15-story residential building, a 10-story residential building, a 5-story residential building, and a 5-story residential/commercial building) that could be within the influence zone of the excavation and would require installation of a load-sustaining construction support. A structural system composed of steel members would be installed to support the street decking during the construction of the emergency ventilation plant. Suitability of pre-cast concrete elements for the plenum would be examined to expedite the construction. The ventilation plant chamber would be higher in elevation than base of rail of the subway tunnel to prevent flooding.

B.2.7 Alternative 7

Descriptive Narrative

Alternative 7 is located in the streetbed of East 39th Street between Park Avenue and Madison Avenue. The width of the emergency ventilation plant would extend across 55 feet of this approximately 61-foot-wide (building-line-to-building-line) street. The roadway itself is 30 feet wide, plus varying sidewalk widths on each side of the street. The distance between property lines on this street is approximately 54 feet. Photographs of the site area are provided on Figures B-27 and B-28 (page 45). Refer to Figure B-29 (page 46) for the site plan, and refer to Figure B-30 (page 46) for a typical cross section for Alternative 7 (the "section B-B" cross section is provided in Figure B-6 [page 18]).

The streetbed would house the proposed 500,000 cfm emergency ventilation plant structure, consisting of a control room, EDR, Con Edison service vault, one-level fan chamber housing three 167,000 cfm fans, silencer chamber and distribution plenums with track isolation dampers and louvers, and flue extending to the two subway tunnels to be served. Specifically, the plenum would be situated as follows:

- The plenum would descend from the emergency ventilation plant structure then extend east toward Park Avenue underneath the subway tunnels and up to track level to serve the subway tunnels. (There is insufficient vertical clearance between the top of the Lexington Avenue IRT tunnels and the bottom of the Park Avenue roadway tunnel [5 feet, 9 inches] for a plenum to be routed over the top of the subway tunnels at this location.) The plenum would then be routed between the two subway tunnels to provide connections for ventilation. Wall penetrations from the plenum would connect to the east wall of the Lexington IRT southbound tunnel and to the west wall of the Lexington IRT northbound tunnel. Construction of the fan chamber would be accomplished with cut-and-cover excavation, while the plenum would be constructed using mining techniques.

The emergency ventilation plant structure would be entirely below grade. The fan chamber and all ancillary support facilities for this emergency ventilation plant would be located in a horizontal, longitudinal configuration.

The 55-foot-wide emergency ventilation plant physically could fit within the smallest distance (approximately 60 feet) between the *building lines* on the north and south sides of the street (the building-line-to-building-line).

The width between *property lines* on the north and south sides of the street, however, is generally smaller than 55 feet. The permanent footprint of the 55-foot-wide facility could thus extend beyond property lines along the north and south sides of the street, requiring permanent property easements. The roadway itself is 30 feet wide and sidewalk widths vary on each side of the street.

Construction of the facility would require approximately an additional 2.5 feet on either side of the facility's permanent width to provide construction access and shoring, resulting in a temporary construction footprint width of approximately 60 feet (55 feet +2.5 feet +2.5 feet). Because the shortest distance between property lines along the north and south sides of the street is less than 60 feet, temporary construction easements may be required for Alternative 7.

Construction activities are not likely to intrude within building lines because the narrowest distance between building lines is approximately 60 feet, which could accommodate the 60-foot-wide construction zone. However, if temporary tiebacks to stabilize shoring need to be constructed, these tiebacks could extend beyond the construction zone and intrude into the building line. Construction could potentially affect features such as sidewalk vaults and other easements previously granted by NYCDOT to property owners that may extend into the construction zone. As applicable, such features would be investigated in coordination with NYCDOT as the environmental review process advances.

No property acquisition would be required for Alternative 7; however, as noted above, permanent and temporary easements would be required.

Civil Engineering Considerations

Emergency ventilation plant construction in the streetbed would require Oil-o-Static lines under Park Avenue to be supported from decking during construction of the plenum and replaced after construction, and Oil-o-Static lines under East 39th Street would rerouted or maintained and supported in place. The Oil-o-Static lines would require support in two separate boxes because they are more than 2 feet apart and may have to be completely encased in steel plates and steel beams to avoid accidental damage while exposed in excavation. Gas, electric, and telephone duct banks could also be supported from the temporary decking installed at East 39th Street and where it intersects with Park Avenue and would be replaced as required. The existing 4-foot by 2-foot, 8-inch combined city sewer in East 39th Street would be flumed during construction and subsequently replaced with a 42-inch RCP. A 12-inch water line would require replacement within excavation limits at Park Avenue. Finally, Alternative 7 would require the reconstruction of one 64-foot-long utility vault in the north sidewalk of East 39th Street, 65 feet from the Park Avenue building line, <u>and two utility vaults on the south sidewalk: one 14-foot located 18 feet from the building line and one 21-foot-long located 34 feet from the building line.</u> The general utility work procedures listed under Alternative 1 would also be applicable to Alternative 7.

There is insufficient clearance (approximately 5 feet, 9 inches) between the roof of the southbound Lexington Avenue Subway Line tunnel and the base of the Park Avenue roadway tunnel for a plenum to be routed above the subway tunnel. Therefore, Alternative 7 was developed with the plenum routing below the two southbound subway tunnels (the southbound local and southbound express tracks diverge between East 38th Street and East 39th Street and occupy separate tunnels north of East 38th Street), then extend up to track level to connect to the northbound tunnel and the southbound express tunnel. A plenum extending under the subway tunnels would require extensive underpinning of the two tunnels and entail a high level of complexity and risks.

1. East 39th Street Facing East towards Park Avenue

40.751236, -73.981460

Construction Perimeter
(Construction varies by location within the construction perimeter)

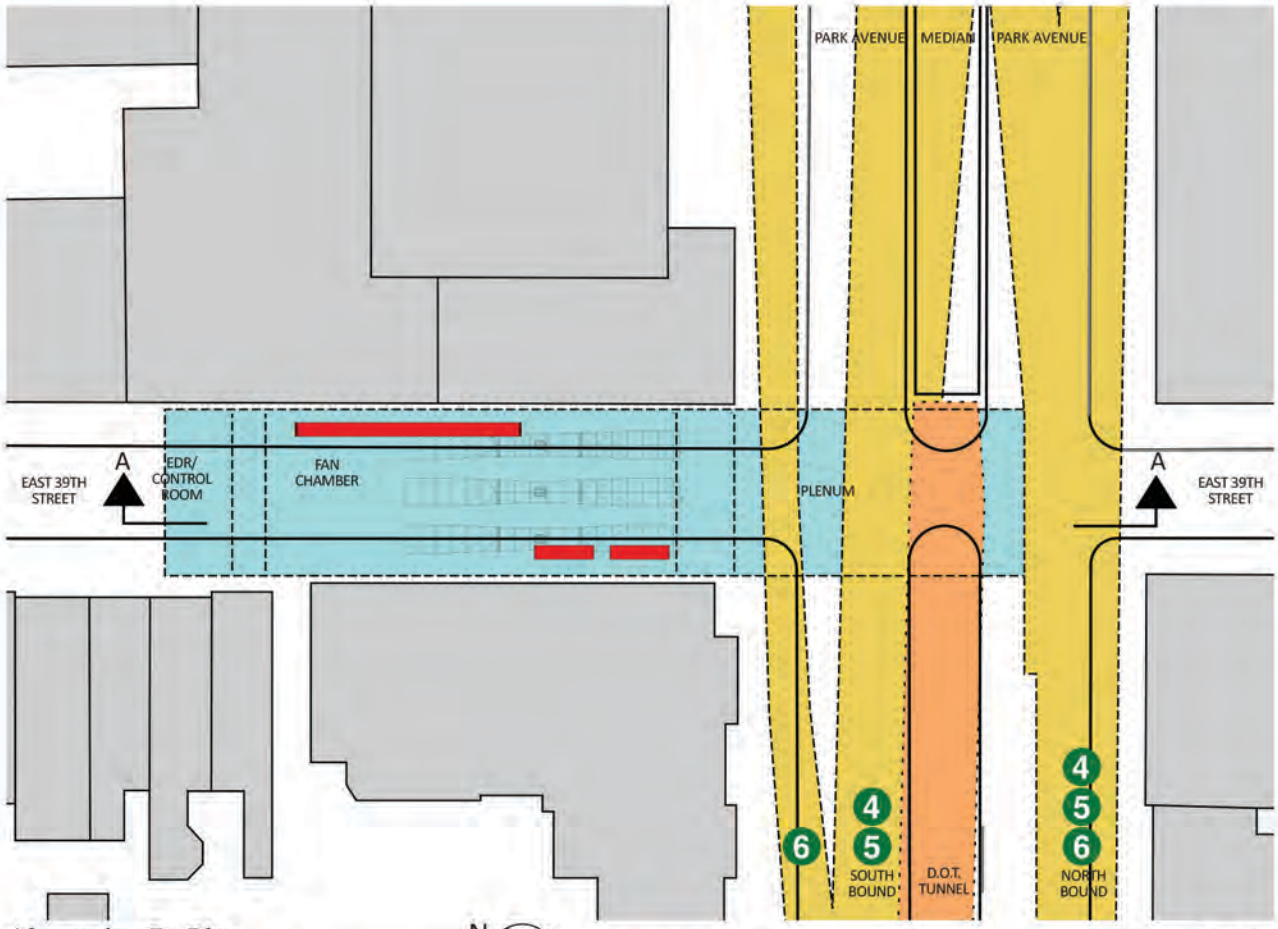
Figure B-27

2. East 39th Street Facing West towards Madison Avenue

40.750888, -73.980657

Construction Perimeter
(Construction varies by location within the construction perimeter)

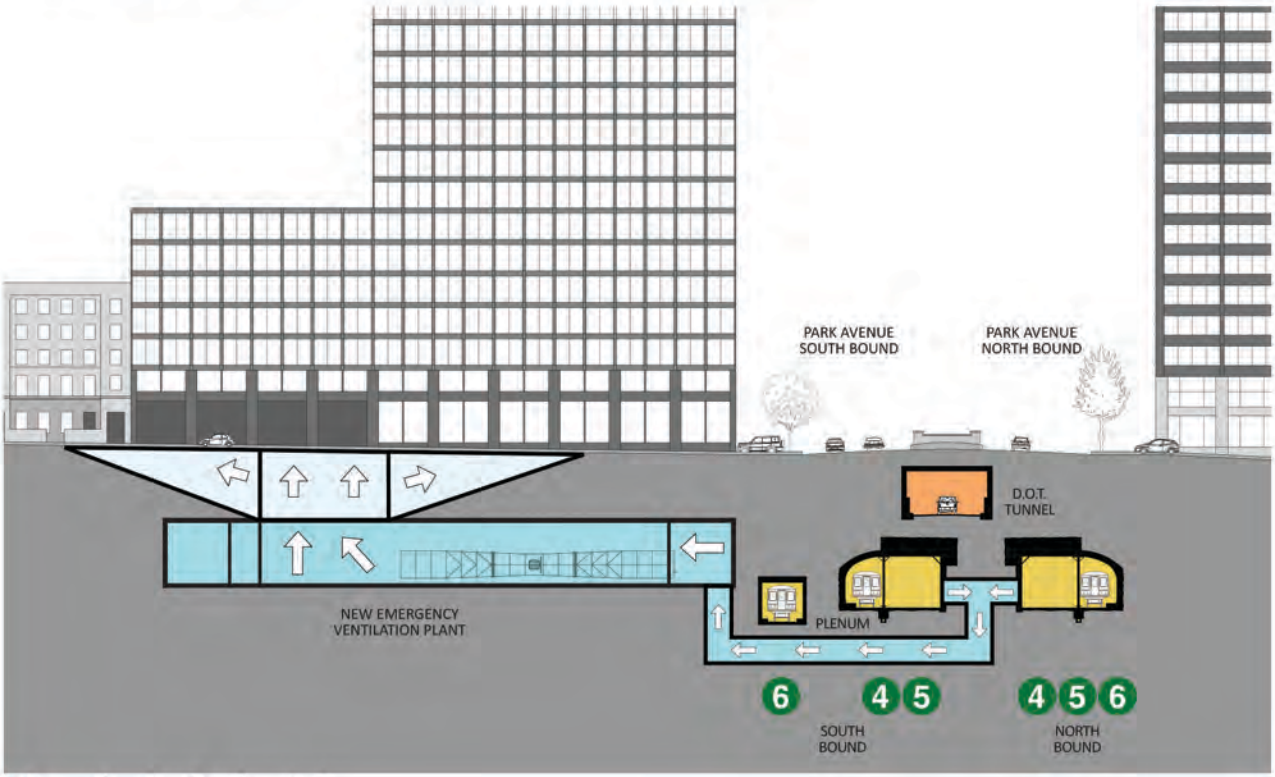
Figure B-28



Alternative 7 - Plan
East 39th Street West of Park Avenue

Utility Vaults (NTS)

Figure B-29



Alternative 7 - Section A-A
East 39th Street West of Park Avenue

Figure B-30

Street-level considerations would include disruptions to residential areas and hotels, although fewer residential buildings would be affected compared to the side streets to the south of East 39th Street, as commercial uses become more predominant. Installation of vent gratings in the sidewalks of East 39th Street would result in an interruption of the sidewalk at exterior stairs and entrance doors. Residential access would be maintained at all times; however, access to buildings could require temporary bridging. Partial closure of East 39th Street would be required during the daytime for installation of sheeting, and shorter term full closure would be required for installation of decking. The travel lane would be restricted to one lane during active construction. Full-time parking lane closures would be required throughout the duration of construction. Two southbound daytime travel lane closures would likely be required on Park Avenue for the installation of sheeting and decking panels. The plenum could be constructed in two stages and would require the partial closure of Park Avenue southbound traffic lanes. Staging and storage would be accommodated in the west curb lane of Park Avenue, either between East 38th Street and East 39th Street or between East 39th Street and East 40th Street. The anticipated construction duration is 4.5 years, including 2 years for installation of sheeting and decking and slightly more than 2 years for emergency ventilation plant and plenum construction.

Mechanical/Electrical Considerations

This below-ground emergency ventilation plant would have intake/exhaust vent bays at street level along adjacent sidewalks. Underground plenums with accessible track isolation dampers would connect the tunnel sections to the emergency ventilation plant. In order to provide the necessary critical air velocity of 500,000 cfm required at this alternative site, three 167,000 cfm tube axial fans would be required. The three tube axial fans with upstream and downstream silencers and fan isolation dampers would be laid out in a horizontal, longitudinal configuration.

Personnel and equipment access and equipment removal would be through sidewalk access hatches. Track isolation dampers would be located at the plenum/track interface to control air flow. Natural ventilation dampers would be located parallel to the fan arrangement in the fan chamber and in existing sidewalk vent bays. A control room with motor control center, and EDR with electrical distribution board, service switch, and meter would be located below grade as part of the emergency ventilation plant. Con Edison service vaults would be located below the sidewalk.

Structural Considerations

This emergency ventilation plant would be constructed in the streetbed of East 39th Street between Park Avenue and Madison Avenue and would require the construction of a one-level emergency ventilation plant. The narrow width of the street would impose certain construction difficulties, such as a limited ability to maneuver heavy construction equipment while maintaining space for vehicle/pedestrian access. The depth of excavation for the construction of the emergency ventilation plant would be approximately 46 feet bsg. A major portion of this excavation (18 feet to 24 feet) would be in miscellaneous fill, and the remainder of the excavation would be in rock. This soil profile information is based on the historical borings taken in the vicinity and would have to be verified. There are six buildings (commercial office buildings ranging from 5 to 41 stories, plus the 5-story Consulate General of Mexico in New York) that could be within the influence zone of the excavation and would require installation of a load-sustaining construction support. A structural system composed of steel members would be installed to support the street decking during the construction of the emergency ventilation plant. Suitability of pre-cast concrete elements for the plenum would be examined to expedite the construction. The ventilation plant chamber would be higher in elevation than base of rail of the subway tunnel to prevent flooding of the plant.

B.2.8 Alternative 8

Descriptive Narrative

Alternative 8 is located in the streetbed of East 39th Street between Park Avenue and Lexington Avenue. The width of the emergency ventilation plant would extend across 55 feet of this approximately 60-foot-wide (building-line-to-building-line) street. The roadway itself is 30 feet wide, plus varying sidewalk widths on each side of the street. The distance between property lines on this street is approximately 54 feet. Photographs of the site area are provided on Figures B-31 and B-32 (page 50). Refer to Figure B-33 (page 51) for the site plan, and refer to Figure B-34 (page 51) for a typical cross section for Alternative 8 (the "section B-B" cross section is provided in Figure B-6 [page 18]).

The streetbed would house the proposed 500,000 cfm emergency ventilation plant structure, consisting of a control room, EDR, Con Edison service vault, one-level fan chamber housing three 167,000 cfm fans, silencer chamber and distribution plenums with track isolation dampers and louvers, and flue extending to the two subway tunnels to be served. Specifically, the plenum would be situated as follows:

- The plenum would descend from the emergency ventilation plant structure then extend west toward Park Avenue underneath the subway tunnels then up to track level. (There is insufficient vertical clearance between the top of the Lexington Avenue IRT tunnels and the bottom of the Park Avenue roadway tunnel [5 feet, 9 inches] for a plenum to be routed over the top of the subway tunnels.) The plenum would then be routed between the two subway tunnels to provide connections for ventilation. Wall penetrations from the plenum would connect to the east wall of the Lexington IRT southbound tunnel and to the west wall of the Lexington IRT northbound tunnel. New vent bays would be constructed at street level along the sidewalk on the north side of East 39th Street. Construction of the chamber would be accomplished with cut-and-cover excavation, while the plenum would be constructed using mining techniques.

The emergency ventilation plant structure would be entirely below grade. The fan chamber and all ancillary support facilities for this emergency ventilation plant would be located in a horizontal, longitudinal configuration.

The 55-foot-wide emergency ventilation plant physically could fit within the smallest distance (approximately 60 feet) between the *building lines* on the north and south sides of the street (the building-line-to-building-line).

The width between *property lines* on the north and south sides of the street, however, is generally smaller than 55 feet. The permanent footprint of the 55-foot-wide facility could thus extend beyond property lines along the north and south sides of the street, requiring permanent property easements.

Construction of the facility would require approximately an additional 2.5 feet on either side of the facility's permanent width to provide construction access and shoring, resulting in a temporary construction footprint width of approximately 60 feet (55 feet + 2.5 feet + 2.5 feet). Because the shortest distance between property lines along the north and south sides of the street is less than 60 feet, temporary construction easements may be required for Alternative 8.

Construction activities are not likely to intrude within building lines because the narrowest distance between building lines is approximately 60 feet, which could accommodate the 60-foot-wide construction zone. However, if temporary tiebacks to stabilize shoring need to be constructed, these tiebacks could extend beyond the construction zone and intrude into the building line. Construction could potentially affect features such as sidewalk vaults and other easements previously granted by NYCDOT to property owners that may extend into the construction zone. As applicable, such features would be investigated in coordination with NYCDOT as the environmental review process advances.

No property acquisition would be required for Alternative 8; however, as noted above, permanent and temporary easements would be required.

Civil Engineering Considerations

Emergency ventilation plant construction in the streetbed would require temporarily relocating an approximately 180-foot-long, 12-inch steam main extending along East 39th Street outside of the limit of excavation. After completion of the emergency ventilation plant, a new 12-inch steam main would be installed in its original location. The existing 4-foot by 2-foot, 8-inch combined city sewer in East 39th Street would be flumed during construction and subsequently replaced with a 42-inch RCP. Gas, electric, and telephone duct banks would require support and protection. A 12-inch water line would require replacement within the excavation limits at Park Avenue. Alternative 8 would require the reconstruction of one utility vault—a 53-foot-long utility vault in the north sidewalk (83 feet from the Park Avenue building line). The general utility work procedures listed under Alternative 1 would also be applicable to Alternative 8.

The plenum routing under Alternative 8 would require mining underneath and underpinning the northbound subway tunnel and would entail a high level of construction complexity and risk.

Street-level considerations would include disruptions to residential areas, although fewer residential buildings would be affected compared to the side streets to the south of East 39th Street, as commercial uses become more predominant. Installation of vent gratings in the sidewalks of East 39th Street would result in an interruption of the sidewalk at exterior stairs and entrance doors. Residential and commercial access would be maintained at all times; however, access to buildings could require temporary bridging. Partial closure of East 39th Street would be required during the daytime for installation of sheeting, and shorter term full closure would be required for installation of decking. The travel lane would be restricted to one lane during active construction. Full-time parking lane closures would be required throughout the duration of construction. Two northbound daytime travel lane closures likely would be required on Park Avenue for the installation of sheeting and decking panels. The plenum would be constructed in two stages and would require the partial closure of Park Avenue northbound traffic lanes. Staging and storage would be accommodated in the east curb lane of Park Avenue, either between East 38th Street and East 39th Street or between East 39th Street and East 40th Street. The anticipated construction duration is 4.5 years, including 2 years for installation of sheeting and decking and slightly more than 2 years for emergency ventilation plant and plenum construction.

Mechanical/Electrical Considerations

This below-ground emergency ventilation plant would have intake/exhaust vent bays at street level along adjacent sidewalks. Underground plenums with accessible track isolation dampers would connect the tunnel sections to the emergency ventilation plant. In order to provide the necessary critical air velocity of 500,000 cfm required at this alternative site, three 167,000 cfm tube axial fans would be required. The three tube axial fans with upstream and downstream silencers and fan isolation dampers would be laid out in a horizontal, longitudinal configuration. As discussed under Alternative 1, the “ideal” location for a ventilation plant for this tunnel segment from a mechanical engineering perspective is the vicinity of East 38th Street.

1. East 39th Street Facing West towards Park Avenue
40.750628, -73.980028

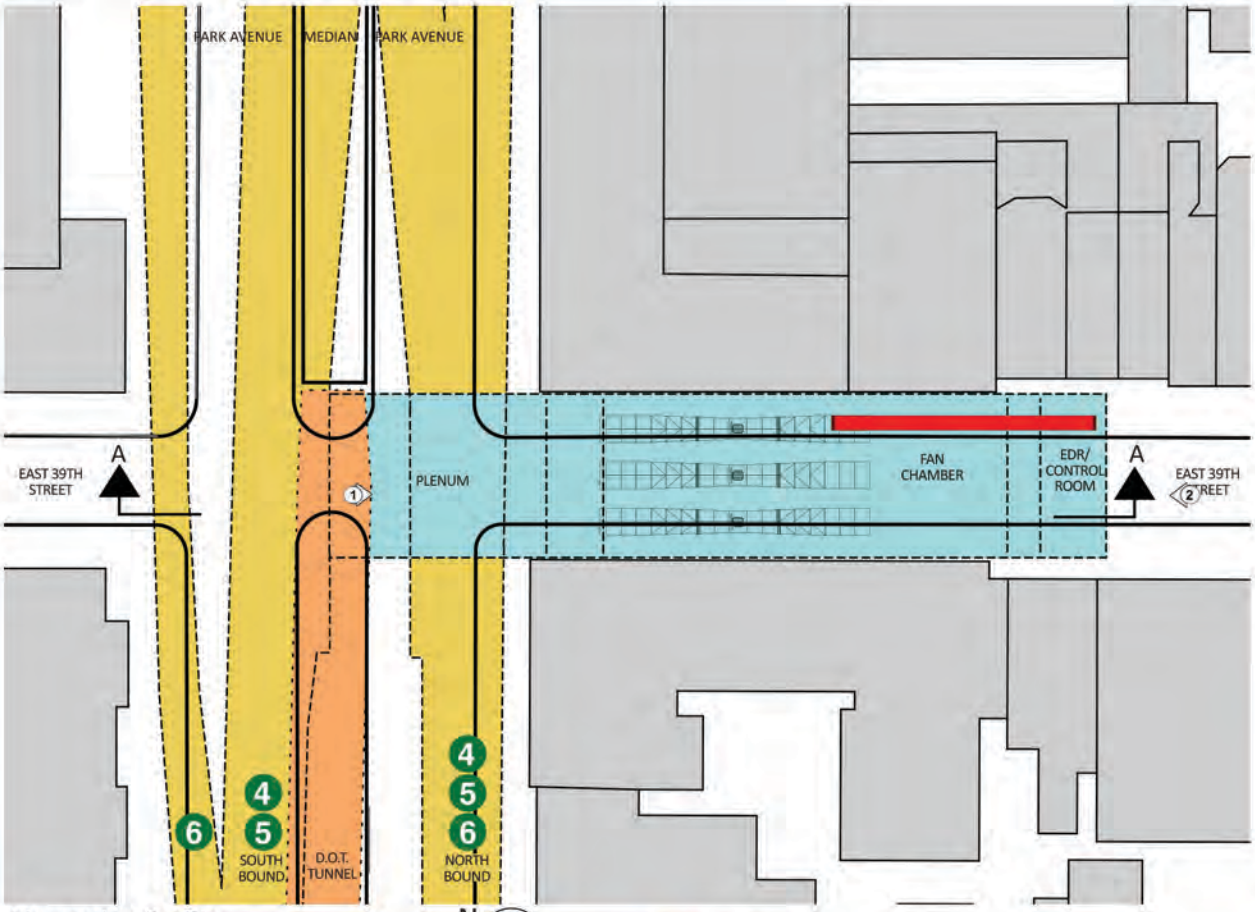
Construction Perimeter
(Construction varies by location within the construction perimeter)

Figure B-31

2. East 39th Street Facing West towards Madison Avenue
40.748414, -73.980506

Construction Perimeter
(Construction varies by location within the construction perimeter)

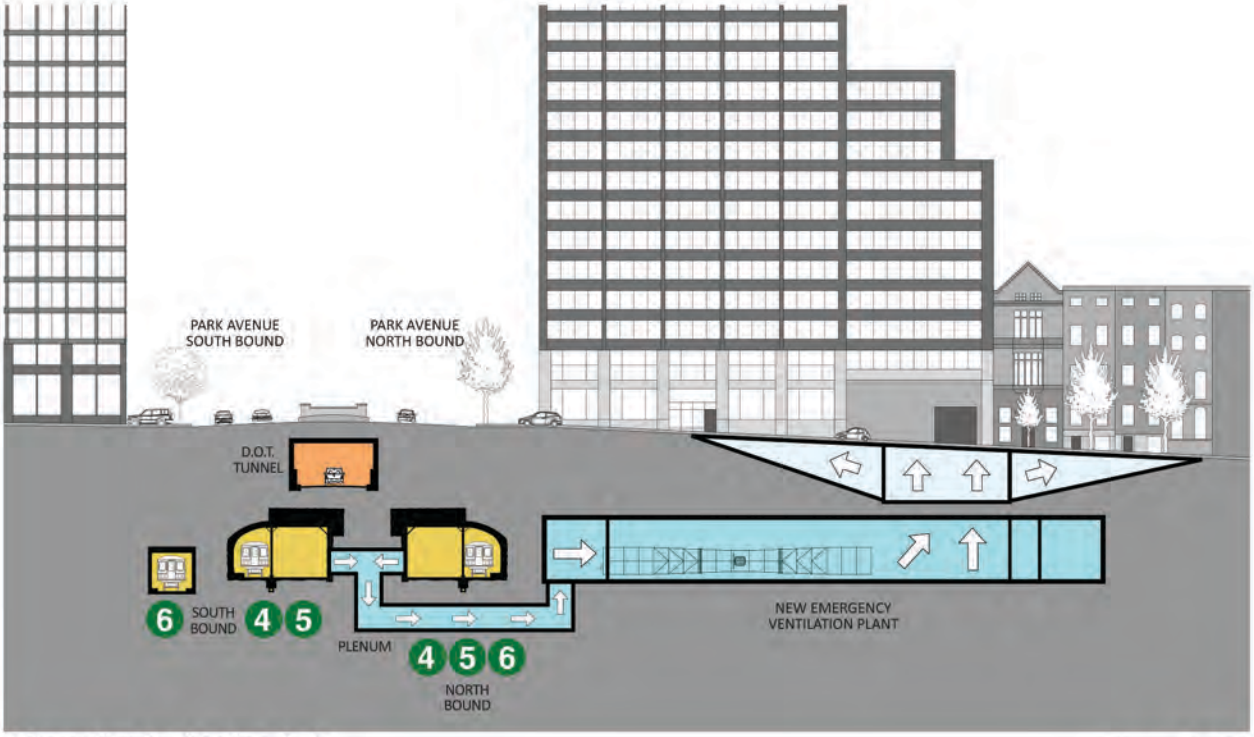
Figure B-32



Alternative 8 - Plan
East 39th Street East of Park Avenue

Utility Vaults (NTS)
Photo Location

Figure B-33



Alternative 8 - Section A-A
East 39th Street East of Park Avenue

Figure B-34

Personnel and equipment access and equipment removal would be through sidewalk access hatches. Track isolation dampers would be located at the plenum/track interface to control air flow. Natural ventilation dampers would be located parallel to the fan arrangement in the fan chamber and in existing sidewalk vent bays. A control room with motor control center, and EDR with electrical distribution board, service switch, and meter would be located below grade as part of the emergency ventilation plant. Con Edison service vaults would be located below the sidewalk.

Structural Considerations

This emergency ventilation plant would be constructed in the streetbed of East 39th Street between Park Avenue and Lexington Avenue and would require the construction of a one-level emergency ventilation plant. The narrow width of the street would impose certain construction difficulties, such as a limited ability to maneuver heavy construction equipment while maintaining space for vehicle/pedestrian access. The depth of excavation for the construction of the emergency ventilation plant would be approximately 46 feet bsg. A major portion of this excavation (17 feet to 22 feet) would be in miscellaneous fill, and the remainder of the excavation would be in rock. This soil profile information is based on the historical borings taken in the vicinity and would have to be verified. There are seven buildings (a 14-story residential, a 4-story residential, a 16-story commercial/office, a 25-story commercial/office, the 4-story Society of Jewish Science, a 5-story residential, and a 4-story residential) that would be within the influence zone of the excavation and would require installation of a load-sustaining construction support. A structural system composed of steel members would be installed to support the street decking during the construction of the emergency ventilation plant. Suitability of pre-cast concrete elements for the plenum would be examined to expedite the construction. The ventilation plant chamber would be lower in elevation than the base of rail of the subway tunnel, which is undesirable because the emergency ventilation plant would be vulnerable to flooding or require complex sump pump systems to remove the water. Consistent with current post-Sandy judgements by NYCT operations staff concerning resiliency, emergency ventilation plant alternatives resulting in an invert below base-of-rail should be avoided to minimize potential flooding of the emergency ventilation plant.

B.2.9 Alternative 9

Descriptive Narrative

Alternative 9 is located in the streetbed under the Park Avenue roadway tunnel sloping ramp between East 39th and East 40th Street. The ventilation plant would be approximately 55 feet wide and 190 feet long. Ventilation gratings would be installed in the sidewalk on the east side of Park Avenue. Park Avenue between East 39th Street and East 40th Street is approximately 95 feet wide, with three northbound lanes and three southbound lanes. The Park Avenue roadway tunnel emerges from underground at the north edge of the intersection of East 39th Street and Park Avenue and merges with northbound Park Avenue at the intersection with East 40th Street. The distance between property lines on this street is approximately 134 feet. A photograph of the site area is provided on Figure B-35 (page 55). Refer to Figure B-36 (page 55) for the site plan. Refer to Figure B-37 (page 56) for a typical cross section, and refer to Figure B-38 (page 56) for a typical longitudinal section for Alternative 9.

The streetbed would house the proposed 500,000 cfm emergency ventilation plant structure, consisting of a control room, EDR, a Con Edison service vault, a one-level fan chamber housing three 167,000 cfm fans, a silencer chamber and distribution plenums with track isolation dampers and louvers, and a flue extending to the two subway tunnels to be served. Specifically, the plenum would be situated as follows:

- The plenum would extend downward from the emergency ventilation plant structure to the Lexington Avenue Subway Line northbound and southbound tunnels. The plenum would then be

routed between the two subway tunnels to provide connections for ventilation. Penetrations from the plenum would align with openings in the wall of the subway tunnels to provide the ventilation access to the northbound and southbound tunnels. Construction of the chamber would be accomplished with cut-and-cover excavation, while the plenum would be constructed using mining techniques. Construction would have to consider removal and rebuilding part of the NYCDOT Park Avenue roadway tunnel.

The emergency ventilation plant structure would be entirely below grade. The fan chamber and all ancillary support facilities for this emergency ventilation plant would be located in a horizontal, longitudinal configuration. The 55-foot-wide emergency ventilation plant could horizontally fit under the roadway tunnel sloping ramp between East 39th and East 40th Streets and the adjacent lanes of Park Avenue and would not encroach on the building line or property lines on either side of Park Avenue.

The width of the sidewalk, from building line to curb, on each side of Park Avenue is approximately 21 feet and sidewalk grating would not likely intrude within the property line on either side of the avenue. Construction of Alternative 9 would require the relocation of utility transmission lines. Sufficient width exists between the property lines on the east side of the avenue and the fan plant structure to accommodate the relocated utility lines.

Construction of the facility would require approximately an additional 2.5 feet on either side of the facility's permanent width to provide construction access and shoring, resulting in a temporary construction footprint width of approximately 60 feet (55 feet + 2.5 feet + 2.5 feet). Construction of the sidewalk grating for Alternative 9 would involve excavation under the sidewalks east and west of Park Avenue and would not extend into property lines.

Construction activities are not likely to intrude within building lines because the distance between building lines is more than 90 feet, which could accommodate the 60-foot-wide construction zone, the sidewalk grating, and temporary tiebacks to stabilize shoring if needed.

No property acquisition and no property easements would be required for Alternative 9.

Civil Engineering Considerations

Emergency ventilation plant construction in the streetbed would require that the existing 42-inch RCP storm sewer located below the Park Avenue roadway tunnel be temporarily flumed. The storm sewer could be reconstructed at the same location as the existing storm sewer below the Park Avenue roadway tunnel. Catch basins and chute connections would require replacement, and an existing 12-inch water main would require support or relocation and replacement within excavation limits. With approval from Con Edison, an approximately 180-foot, 24-inch steam main extending along Park Avenue would be temporarily installed outside of the limit of excavation. After completion of the emergency ventilation plant, a new 24-inch steam main would be installed in its original location. Gas, electric, and telephone duct banks could also be supported from the temporary decking installed on Park Avenue and would be replaced as required. The general utility work procedures listed under Alternative 1 would also be applicable to Alternative 9.

The minimum vertical clearance between the subway tunnels and the Park Avenue roadway tunnel is 5 feet and 9 inches (at East 39th Street), and the maximum vertical clearance is 27 feet (at East 40th Street). Because the vertical clearance is too shallow to accommodate the emergency ventilation plant that requires a depth of at least 24 feet, removal and reconstruction of part of the NYCDOT Park Avenue roadway tunnel could be required. As a result, the concept of an emergency ventilation plant under Park Avenue between East 39th Street and East 40th Street was determined to be ***not feasible***.

Street-level considerations would primarily include traffic impacts, the location of this alternative in the center of Park Avenue would minimize disruption to residences and commercial properties. Construction of Alternative 9 would require partial closure of the northbound and southbound lanes of Park Avenue during excavation and installation of sheeting for decking. Decking would be installed on one-half of the northbound street width at a time, shifting to the southbound side when the northbound lanes are reopened. At least one travel lane northbound and southbound would be maintained at all times. Construction would require the closure of the Park Avenue roadway tunnel and the elimination of parking on Park Avenue between East 39th Street and East 40th Street.

Because Alternative 9 was found to be ***not feasible*** prior to developing a construction schedule, no information regarding the schedule or staging areas was prepared.

Mechanical/Electrical Considerations

This below-ground emergency ventilation plant would have intake/exhaust vent bays at street level along adjacent sidewalks. Underground plenums with accessible track isolation dampers would connect the tunnel sections to the emergency ventilation plant. In order to provide the necessary critical air velocity of 500,000 cfm required at this alternative site, three 167,000 cfm tube axial fans would be required. The three tube axial fans with upstream and downstream silencers and fan isolation dampers would be laid out in a horizontal, longitudinal configuration.

Permanent personnel and equipment access and equipment removal would be through sidewalk access hatches. Track isolation dampers would be located at the plenum/track interface to control air flow. Natural ventilation dampers would be located parallel to the fan arrangement in the fan chamber and in existing sidewalk vent bays. A control room with motor control center, and EDR with electrical distribution board, service switch, and meter would be located below grade as part of the emergency ventilation plant. Con Edison service vaults would be located below the sidewalk.

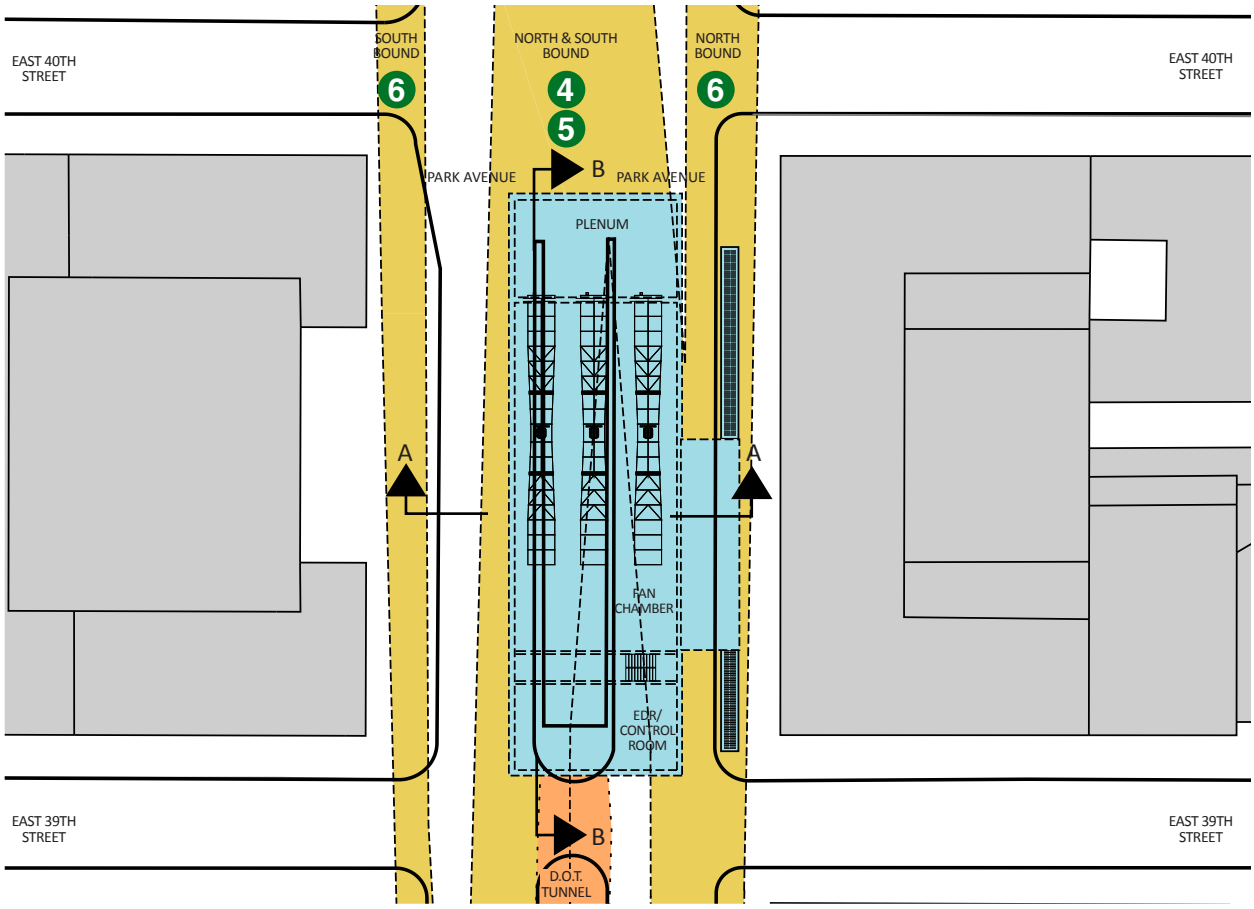
Structural Considerations

This emergency ventilation plant would be constructed in the streetbed of Park Avenue and would require the construction of a one-level emergency ventilation plant. As noted above, there is insufficient space available for a ventilation plant to fit between the Park Avenue Roadway Tunnel exit ramp and the subway tunnels. As a result, this alternative is ***not feasible***. The depth of excavation for the construction of the emergency ventilation plant would be approximately 27 feet bsg. A portion of this excavation (6 feet) would be in miscellaneous fill, and the remainder of the excavation would be in rock. This soil profile information is based on the historical borings taken in the vicinity and would have to be verified. There are no buildings within the influence zone of the excavation that could require installation of a load-sustaining construction support. Suitability of pre-cast concrete elements for the plenum would be examined to expedite the construction. The ventilation plant chamber would be higher in elevation than base of rail of the subway tunnel to prevent flooding of the plant.

1. Park Avenue Facing North From East 39th Street
40.750203, -73.979008

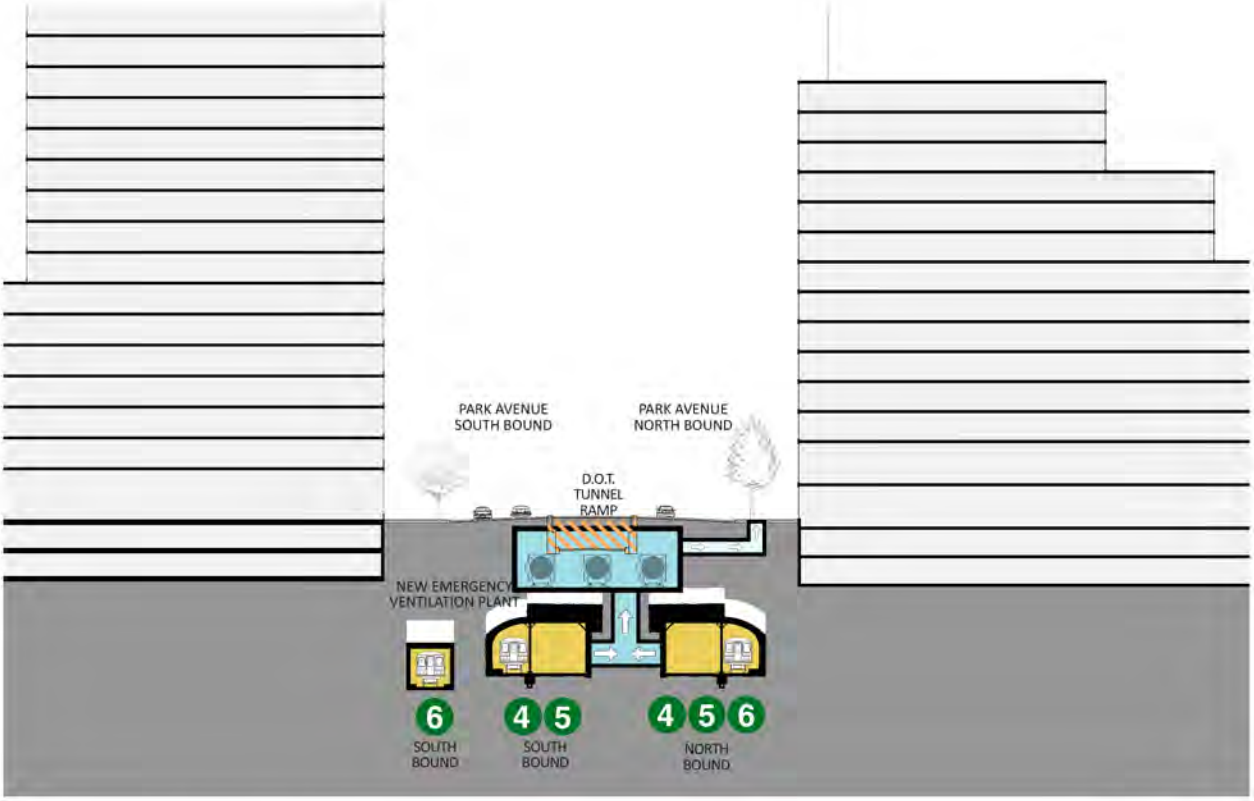
Construction Perimeter
(Construction varies by location within the construction perimeter)

Figure B-35



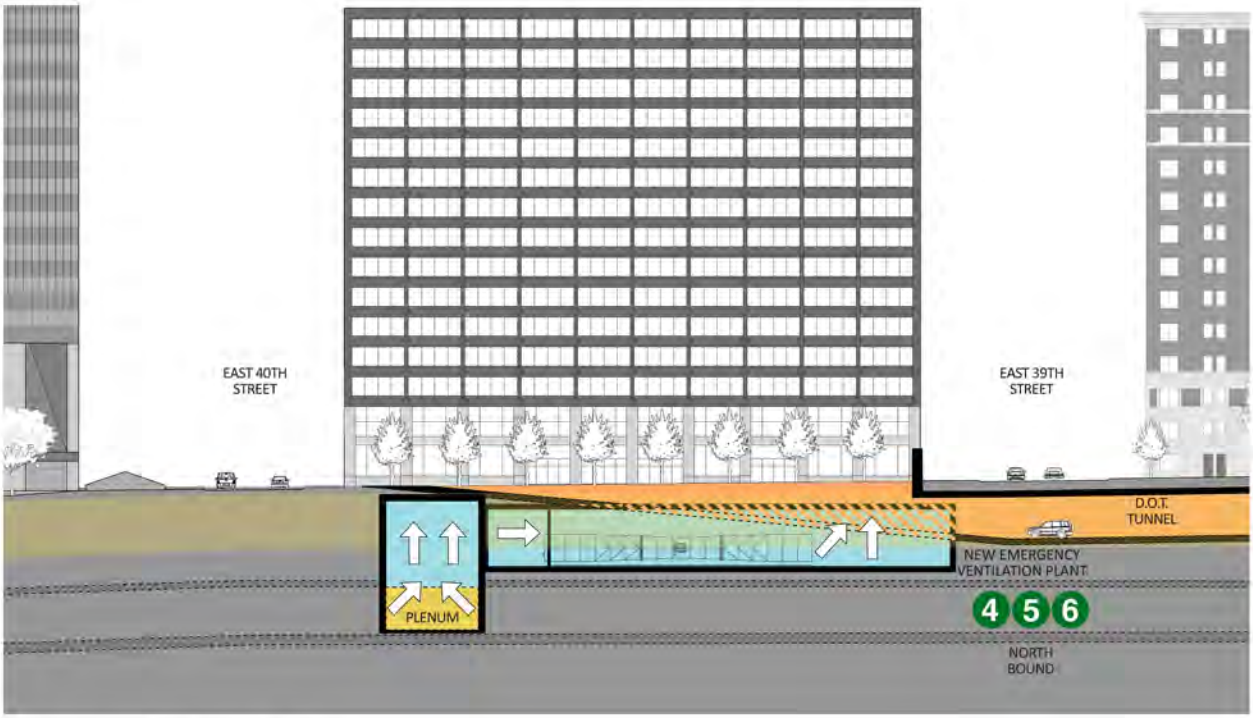
Alternative 9 Plan
Park Avenue Between East 39th and East 40th Street

Figure B-36



Alternative 9 - Section A-A
Park Avenue Between East 39th Street and East 40th Street

Figure B-37



Alternative 9 - Section B-B
Park Avenue Between East 39th Street and East 40th Street

Figure B-38

B.2.10 Alternative 10

Descriptive Narrative

Alternative 10 would be a two-level ventilation plant located below grade in the streetbed under the Park Avenue roadway tunnel between East 37th Street and East 38th Street. An emergency ventilation plant at this location would require a fan chamber approximately 190 feet long and 40 feet wide. Park Avenue between East 37th Street and East 38th Street is approximately 95 feet wide, with three northbound lanes and three southbound lanes. Ventilation gratings would be installed in the sidewalk on the east side of Park Avenue. The distance between property lines on this street is approximately 132 feet. A photograph of the site area is provided on Figure B-39 (page 58). Refer to Figure B-40 (page 59) for the site plan. Refer to Figure B-41 (page 59) for a typical cross section, and refer to Figure B-42 (page 60) for a typical longitudinal section for Alternative 10.

The streetbed would house the proposed 500,000 cfm emergency ventilation plant structure, consisting of a control room, EDR, a Con Edison service vault, a two-level fan chamber housing three 167,000 cfm fans, a silencer chamber and distribution plenums with track isolation dampers and louvers, and a ventilation plenum.

The emergency ventilation plant would be located between the Lexington Avenue line northbound and southbound tunnels, connecting directly to the tunnels. An air shaft from the plant connecting to ventilation gratings on the east sidewalk of Park Avenue would be required, passing over the Lexington Avenue IRT northbound tunnel. Permanent maintenance access by a shaft from the northbound Park Avenue streetbed to the ventilation plant would provide access for NYCT personnel and equipment access.

The emergency ventilation plant structure would be entirely below grade. The fan chamber and all ancillary support facilities for this emergency ventilation plant would be located in a horizontal configuration parallel to the subway tunnels.

The 40-foot-wide emergency ventilation plant could horizontally fit under the Park Avenue roadway tunnel between East 37th and East 38th Streets and the adjacent lanes of Park Avenue, and would not encroach on the building line or property lines on either side of Park Avenue.

The width of the sidewalk from building line to curb on the east side of Park Avenue is approximately 21 feet, and sidewalk grating would not likely intrude within the property line on the east side of the avenue. Construction of Alternative 10 would require the relocation of utility transmission lines. Sufficient width exists between the property lines on the east side of the avenue and the fan plant structure to accommodate the relocated utility lines.

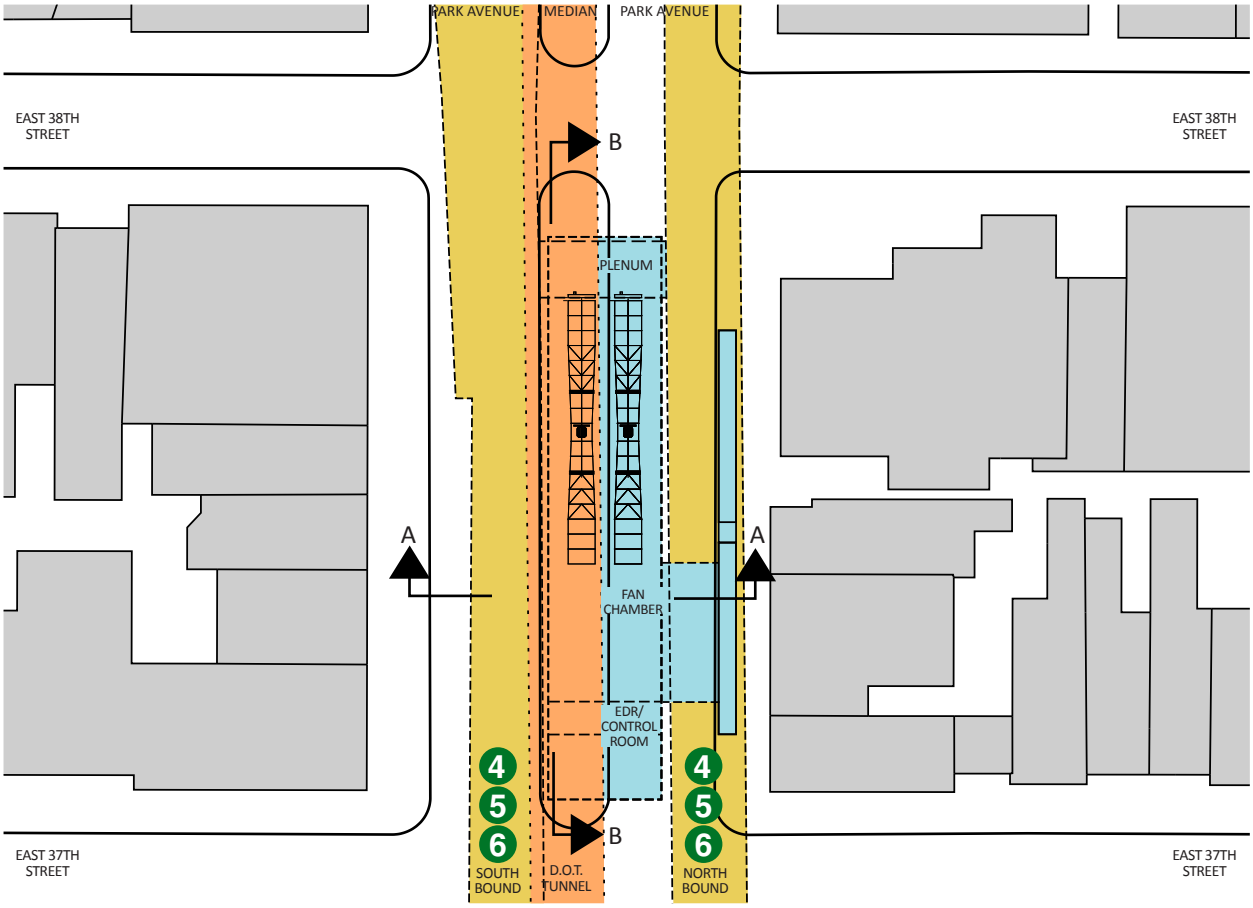
Construction of the facility would require approximately an additional 2.5 feet on either side of the facility's permanent width to provide construction access and shoring, resulting in a temporary construction footprint width of approximately 49 feet (45 feet +2.5 feet +2.5 feet). Because the shortest distance between property lines along the west side and east side of the avenue is more than 60 feet, temporary construction easements would not be required for Alternative 10.

Construction activities are not likely to intrude within building lines because the distance between building lines is more than 90 feet, which could accommodate the 45-foot-wide construction zone and temporary tiebacks to stabilize shoring, if needed.

1. Park Avenue Facing South From East 38th Street
40.749575, -73.979437

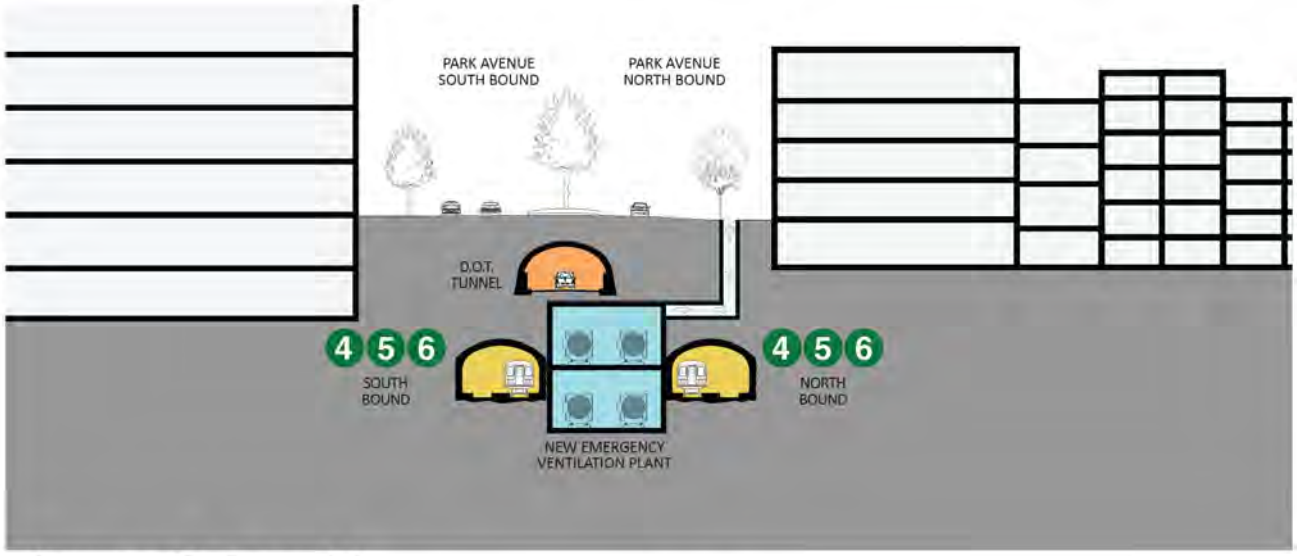
Construction Perimeter
(Construction varies by location within the construction perimeter)

Figure B-39



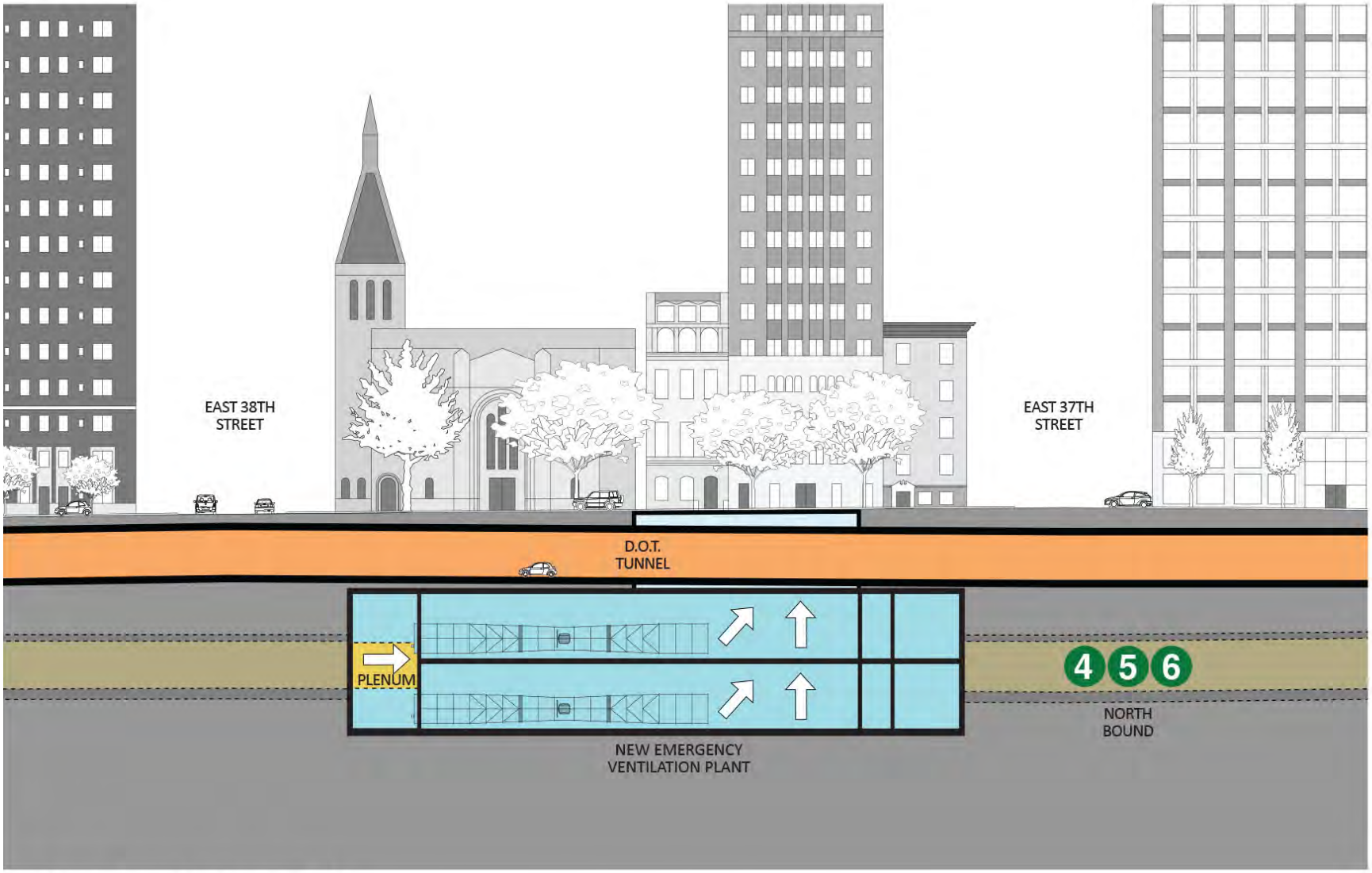
Alternative 10 - Plan
Park Avenue Between East 37th Street and East 38th Street

Figure B-40



Alternative 10 - Section A-A
Park Avenue Between East 37th Street and East 38th Street

Figure B-41



Alternative 10 - Section B-B

Park Avenue Between East 37th Street and East 38th Street

Figure B-42

No property acquisition and no permanent or temporary easements would be required for Alternative 10. Construction could potentially affect features such as sidewalk vaults and other easements previously granted by NYCDOT to property owners that may extend into the construction zone. As applicable, such features would be investigated in coordination with NYCDOT as the environmental review process advances.

Civil Engineering Considerations

Emergency ventilation plant construction in the streetbed would require that the existing 42-inch RCP storm sewer located below the Park Avenue roadway tunnel be temporarily flumed. The storm sewer could be reconstructed at the same location as the existing storm sewer below the Park Avenue roadway tunnel. Catch basins and chute connections would require replacement, and an existing 12-inch water main would require support or relocation and replacement within excavation limits. With approval from Con Edison, an approximately 225-foot-long, existing 24-inch steam main under East 37th Street and Park Avenue would be temporarily installed outside of the limit of excavation. After completion of the emergency ventilation plant, a new 24-inch steam main would be installed in its original location. Gas, electric, and telephone duct banks could also be supported from the temporary decking installed at East 38th Street and where it intersects with Park Avenue and would be replaced as required. The 4-foot by 2-foot, 8-inch combined city sewer would be flumed along the entire length of the emergency ventilation plant on Park Avenue during construction. Following construction, the existing combined sewer falling in the influence line of excavation would be replaced with a new combined sewer of the same size and location, including manholes. The general utility work procedures listed under Alternative 1 would also be applicable to Alternative 10.

Street-level considerations would include traffic/access/noise disruptions to institutions such as the House of Worship (Church of Our Saviour), the Permanent Mission of Guatemala to the United Nations (UN), and residential buildings along Park Avenue. Construction of Alternative 10 would require partial closure of the northbound lanes of Park Avenue during excavation and installation of sheeting for decking. Decking would be installed on one-half of the northbound street width at a time, shifting to the other half when the first half is reopened. At least one travel lane northbound would be maintained at all times. Construction would require the intermittent closure of the Park Avenue roadway tunnel and the temporary elimination of parking on the east side of Park Avenue between East 37th Street and East 38th Street. The total duration of construction is estimated to be almost 5 years, which would include 2 years for support of excavation, deck installation, underpinning and mining, and almost 3 years for the construction of the emergency ventilation plant and vent gratings. Staging and storage would be accommodated in the east curb lane of Park Avenue between East 37th Street and East 38th Street.

Mechanical/Electrical Considerations

This below-ground emergency ventilation plant would have intake/exhaust vent bays at street level along the adjacent east sidewalk. The tunnel sections would connect directly to the emergency ventilation plant. In order to provide the necessary critical air velocity of 500,000 cfm at this alternative site, three 167,000 cfm tube axial fans would be required. The three tube axial fans with upstream and downstream silencers and fan isolation dampers would be laid out in a horizontal, longitudinal configuration.

Permanent personnel and equipment access and equipment removal would be through a sidewalk access hatch on the east side of Park Avenue. (Note: The location of the access hatch within a roadway [as opposed to a sidewalk] is not acceptable because every occurrence of fan chamber inspection or maintenance would result in lane closures/traffic disruption.) Track isolation dampers would be located at the vent plant/track interface to control air flow. Natural ventilation dampers would be located parallel to the fan arrangement in the fan chamber and in existing sidewalk vent bays. A control room with motor

control center, and EDR with electrical distribution board, service switch, and meter would be located below grade as part of the emergency ventilation plant. Con Edison service vaults would be located below the sidewalk.

Structural Considerations

The emergency ventilation plant would be constructed in the streetbed of Park Avenue and require the construction of a two-level emergency ventilation plant. The depth of excavation for the construction of the emergency ventilation plant would be approximately 76 feet bsg. A portion of this excavation (8 feet to 10 feet) would be in miscellaneous fill, and the remainder of the excavation would be in rock. This soil profile information is based on the historical borings taken in the vicinity and would have to be verified.

This alternative requires underpinning the Park Avenue Roadway Tunnel and also potentially affects the adjacent subway tunnels, resulting in a high level of complexity and risks. There are eight buildings (a 5-story residential, a 16-story residential, the 6-story Permanent Mission of Guatemala to the UN, the 3-story Church of Our Saviour, a 15-story residential, a 13-story residential/commercial, a 14-story residential, and a 25-story commercial/office building) that could be within the influence zone of the excavation and could require installation of a load-sustaining construction support. A structural system composed of steel members would be installed to support the street decking during the construction of the emergency ventilation plant. Suitability of pre-cast concrete elements would be examined to expedite the construction. The ventilation plant chamber would be lower in elevation than the base of rail of the subway tunnel, which is undesirable because the emergency ventilation plant would be vulnerable to flooding or require complex sump pump systems to remove the water. Consistent with current post-Sandy judgements by NYCT operations staff concerning resiliency, emergency ventilation plant alternatives resulting in an invert below base-of-rail should be avoided to minimize potential flooding of the emergency ventilation plant.

B.2.11 Alternative 11

Descriptive Narrative

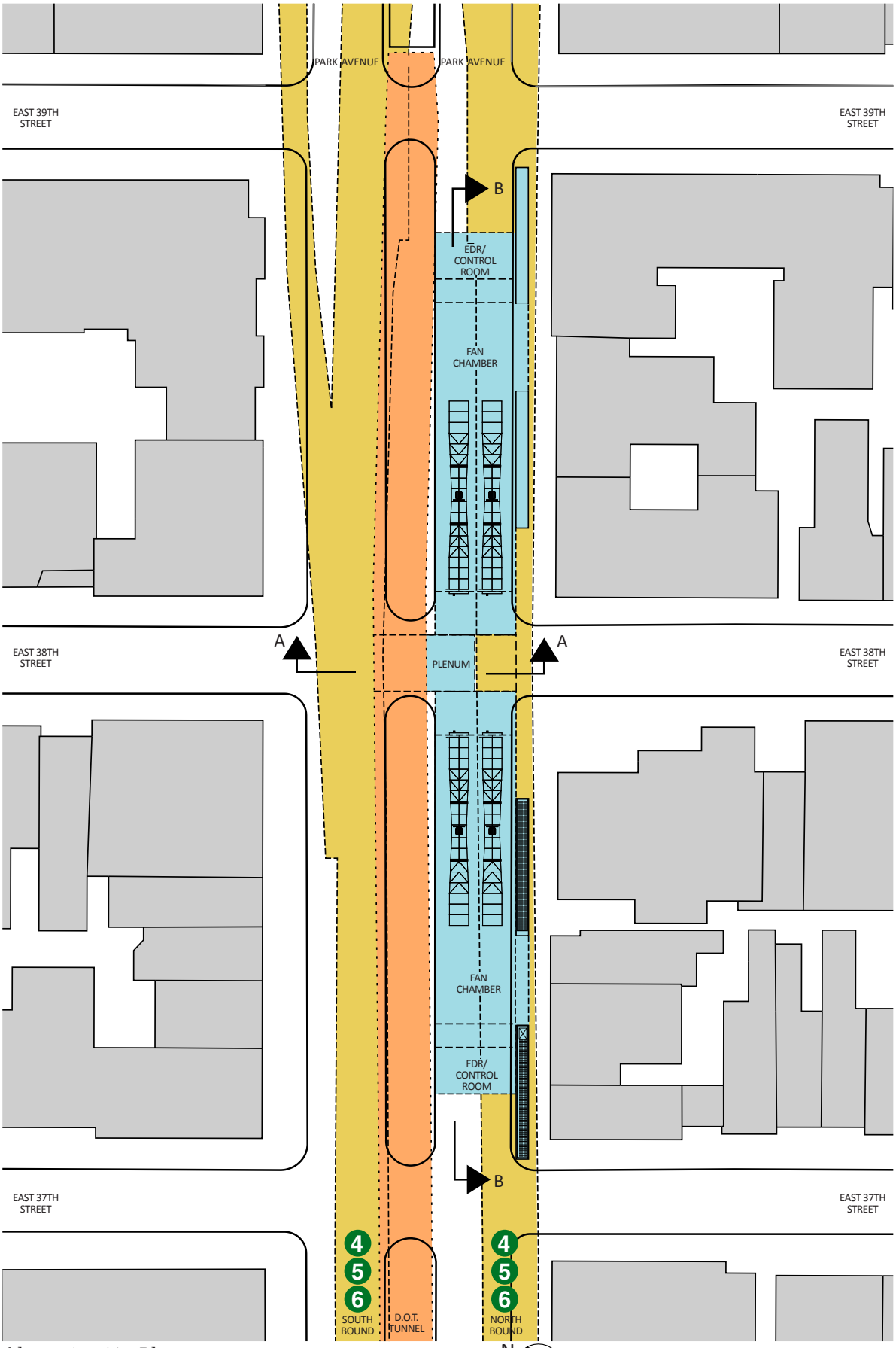
Alternative 11 would be a single-level emergency ventilation facility located in the streetbed of northbound Park Avenue between East 37th Street and East 39th Street. The ventilation plant would be located directly above the Lexington Avenue line northbound tunnel. An emergency ventilation plant at this location would require two fan chambers, each approximately 200 feet long and 44 feet wide. Park Avenue between East 37th Street and East 39th Street is approximately 95 feet wide, with three northbound lanes and three southbound lanes. Ventilation gratings would be installed in the sidewalk on the east side of Park Avenue. The distance between property lines on this street is approximately 132 feet. The sidewalk on the east side of Park Avenue is 22 feet wide and it would be temporarily narrowed to 5 feet (adjacent to the buildings) during construction. Photographs of the site area are shown on Figure B-43 (page 63). Refer to Figure B-44 (page 64) for the site plan. Refer to Figure B-45 (page 65) for a typical cross section and Figure B-46 (page 66) for a typical longitudinal section for Alternative 11.

The streetbed would house the proposed 500,000 cfm emergency ventilation plant structure, consisting of a Control Room, EDR, Con Edison Service Vault, two single-level Fan Chambers each housing two 125,000 cfm fans, Silencer Chambers and distribution plenums with track isolation dampers and louvers, and flue extending to the two subway tunnels to be served. One fan chamber would be located between East 37th and East 38th Streets and one fan chamber would be between East 38th and East 39th Streets. A plenum connecting the two fan chambers would be located under the intersection of East 38th Street and Park Avenue.

1. Park Avenue Facing South From East 39th Street
40.750184, -73.979021

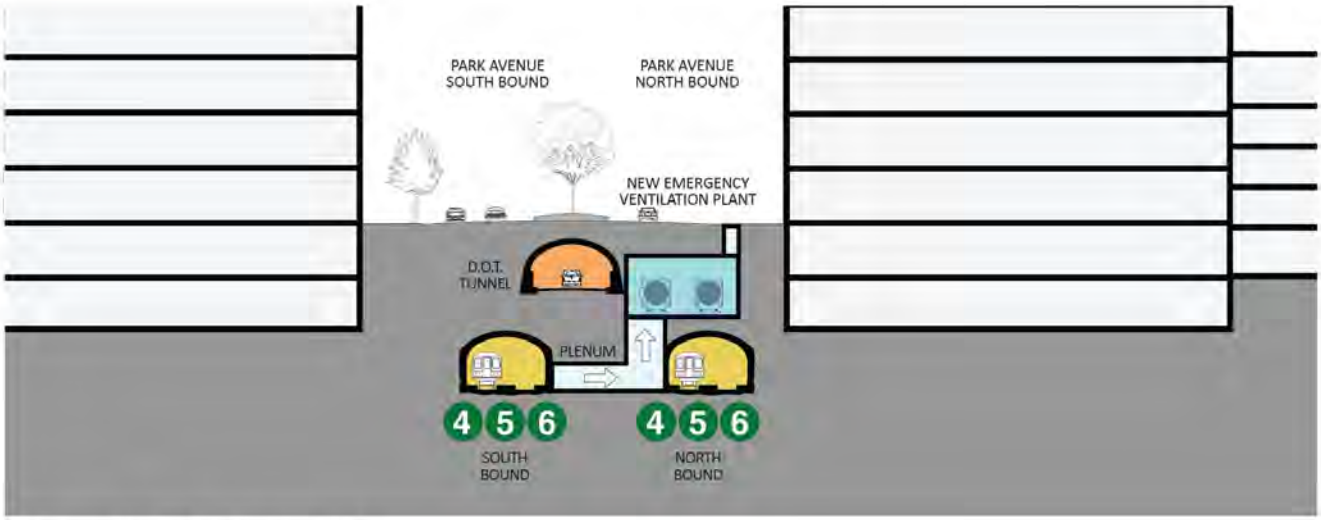
Construction Perimeter
(Construction varies by location within the construction perimeter)

Figure B-43



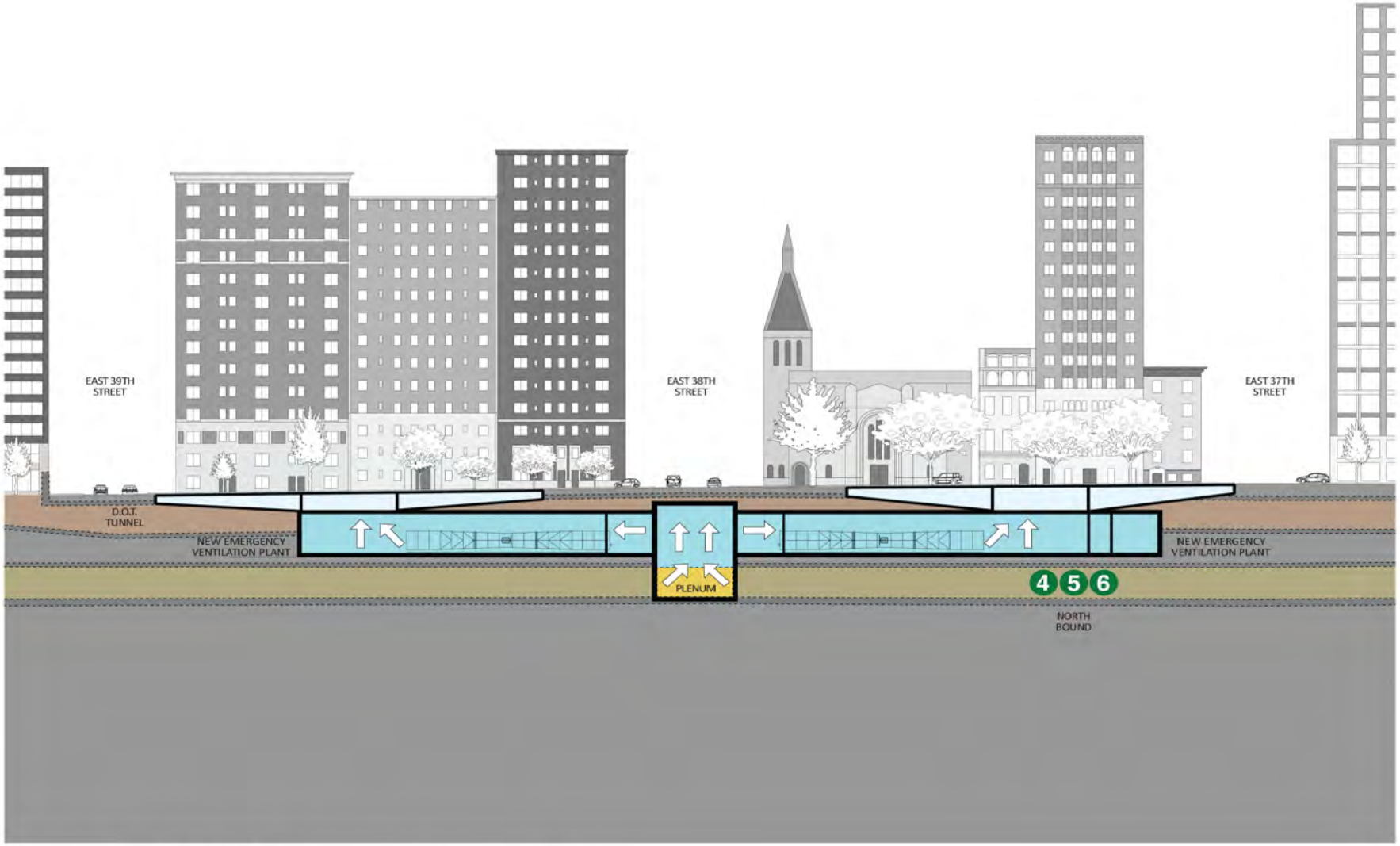
Alternative 11 - Plan
Park Avenue Between East 37th Street and East 39th Street

Figure B-44



Alternative 11 - Section A-A
Park Avenue Between East 37th Street and East 39th Street

Figure B-45



Alternative 11 - Section B-B
Park Avenue Between East 37th Street and East 39th Street

Figure B-46

The distribution plenum would lead from the bottom of the fan chamber and descend to track level to reach the northbound and southbound subway tunnels. Penetrations from the plenum would align with openings in the west wall of the northbound tunnel and with the east wall of the southbound tunnel to provide the ventilation access. Construction of the chamber would be accomplished with cut-and-cover excavation, while the plenum would be constructed using mining techniques.

The emergency ventilation plant structure would be entirely below grade. The fan chamber and all ancillary support facilities for this emergency ventilation plant would be located in a horizontal configuration parallel to the subway tunnels.

The 44-foot-wide emergency ventilation plant could horizontally fit in the streetbed of Park Avenue between East 37th and East 39th Streets, extending under the sidewalk on the east side of the avenue, and would not encroach on the building line or property lines on the east side of Park Avenue.

The width of the sidewalk, from building line to curb, on each side of Park Avenue is approximately 21 feet and sidewalk grating would not likely intrude within the property line on either side of the avenue. Construction of Alternative 11 would require the relocation of the steam line and combined sewer to the area under the east sidewalk of Park Avenue. Sufficient width exists between the property lines on the east side of the avenue and the fan plant structure to accommodate the relocated utility lines.

Construction of the facility would require approximately an additional 2.5 feet on either side of the facility's permanent width to provide construction access and shoring, resulting in a temporary construction footprint width of approximately 49 feet (44 feet +2.5 feet +2.5 feet). Construction of the sidewalk grating for Alternative 11 would involve excavation under the sidewalk east of Park Avenue and would not extend into property lines.

Construction activities would not intrude within building lines because the distance between building Park Avenue mall and the building lines is greater than 60 feet, which could accommodate the 49-foot-wide construction zone, the sidewalk grating, and temporary tiebacks to stabilize shoring, if needed.

No property acquisition would be required for Alternative 11, and no property easements would be required. Construction could potentially affect features such as sidewalk vaults and other easements previously granted by NYCDOT to property owners that may extend into the construction zone. As applicable, such features would be investigated in coordination with NYCDOT as the environmental review process advances.

Civil Engineering Considerations

Emergency ventilation plant construction in the streetbed would require that the existing 42-inch RCP storm sewer located below the Park Avenue roadway tunnel be temporarily flumed. The storm sewer could be reconstructed at the same location as the existing storm sewer, below the Park Avenue roadway tunnel. Catch basins and chute connections would require replacement, and an existing 12-inch water main would require support or relocation and replacement within excavation limits. Alternative 11 would maintain, protect, and support Oil-o-static lines under Park Avenue in an excavation trench. The Oil-o-static lines would need to be supported in two separate boxes because they are approximately 2 feet or more apart and may need to be completely boxed in by steel plates and steel beams to avoid accidental damage to the pipes and/or cables while exposed in the trench. There are also two Oil-o-static lines that extend along East 38th Street that dead end directly east of Park Avenue. These lines would be maintained and protected during construction. With approval from Con Edison, an existing 24-inch steam main under Park Avenue, approximately 450 feet in length, would be temporarily installed outside of the limit of excavation. After completion of the emergency ventilation plant, a new 24-inch steam main would be installed in its original location. Gas, electric, and telephone duct banks could also be supported from the

temporary decking installed on Park Avenue, and would be replaced as required. The 4-foot by 2-foot, 8-inch combined city sewer would flumed along the entire length of plenum on Park Avenue during construction. Following construction, the existing combined sewer falling in the influence line of excavation would be replaced with a new combined sewer of the same size and location, including manholes. The general utility work procedures listed under Alternative 1 would also be applicable to Alternative 11.

There is sufficient space for plenum routing in Alternative 11.

Construction of Alternative 11 would require partial closure of the northbound lanes of Park Avenue between East 37th and East 39th Streets during excavation and installation of sheeting for decking. Decking would be installed on one-half of the northbound street width at a time, shifting to the other half when the first half is reopened. At least one travel lane northbound would be maintained at all times. Construction would require the temporary elimination of parking on the east side of Park Avenue between East 37th Street and East 39th Street. Staging and storage would be accommodated in the east curb lane of Park Avenue between East 37th Street and East 39th Street. The total duration of construction is estimated to be approximately 4.5 years, which would include 2 years for support of excavation, deck installation, underpinning, and mining, and almost 2.5 years for the construction of the emergency ventilation plant and plenum.

Mechanical/Electrical Considerations

This below-ground emergency ventilation plant would have intake/exhaust vent bays at street level along adjacent sidewalks on the east side of Park Avenue. Underground plenums with accessible track isolation dampers would connect the tunnel sections to the emergency ventilation plant. In order to provide the necessary critical air velocity of 500,000 cfm at this alternative site, four 125,000 cfm tube axial fans would be required (two in each fan chamber). The four tube axial fans with upstream and downstream silencers and fan isolation dampers would be laid out in a horizontal configuration, parallel to the subway tunnels.

Permanent personnel and equipment access and equipment removal would be through sidewalk access hatches. Track isolation dampers would be located at the plenum/track interface to control air flow. Natural ventilation dampers would be located in parallel with the fan arrangement in the fan chamber and in existing sidewalk vent bays. A Control Room with motor control center and EDR with electrical distribution board, service switch and meter would be located below grade as part of the emergency ventilation plant. Con Edison service vaults would be located below the sidewalk.

Structural Considerations

This emergency ventilation plant would be constructed in the streetbed of Park Avenue and would require the construction of a one-level, double-sided emergency ventilation plant. The depth of excavation would be approximately 28 feet bsg for the fan chamber, plus an additional 23 feet for the plenum that connects the fan chamber to the two subway tunnels (51 feet total). A portion of this excavation (7 feet to 10 feet) would be in miscellaneous fill, and the remainder of the excavation would be in rock. This soil profile information is based on the historical borings taken in the vicinity and would have to be verified. There are eight buildings (a 5-story residential, a 16-story residential, the 6-story Permanent Mission of Guatemala to the UN, the 3-story Church of Our Saviour, a 15-story residential, a 13-story residential/commercial, a 14-story residential, and a 25-story commercial/office building) which could be within the influence zone of the excavation and could require installation of a load-sustaining construction support. A structural system comprised of steel members would be installed to support the street decking during the construction of the emergency ventilation plant. Suitability of pre-cast concrete elements for the plenum would be examined to expedite the construction. The ventilation plant chamber would be higher in elevation than base of rail of the subway tunnel to prevent flooding of the plant.

B.2.12 Alternative 12

Descriptive Narrative

Alternative 12 would include a single-level, double-sided ventilation facility located below grade in the streetbed of northbound Park Avenue between East 36th Street and East 38th Street. The ventilation plant would be located directly above the Lexington Avenue line northbound tunnel. An emergency ventilation plant at this location would require two fan chambers, each approximately 200 feet long and 44 feet wide. Park Avenue between East 36th Street and East 38th Street is approximately 95 feet wide, with three northbound lanes and three southbound lanes. Ventilation gratings would be installed in the sidewalk on the east side of Park Avenue. The distance between property lines on this street is approximately 132 feet. The sidewalk on the east side of Park Avenue is 22 feet wide, and the sidewalk would be temporarily narrowed to 5 feet (adjacent to the buildings) during construction. A photograph of the site area is provided on Figure B-47 (page 70). Refer to Figure B-48 (page 71) for the site plan. Refer to Figure B-49 (page 72) for a typical cross section, and refer to Figure B-50 (page 73) for a typical longitudinal section for Alternative 12.

The streetbed would house the proposed 500,000 cfm emergency ventilation plant structure, consisting of a control room, EDR, a Con Edison service vault, two single-level fan chambers each housing two 125,000 cfm fans, silencer chambers and distribution plenums with track isolation dampers and louvers, and a flue extending to the two subway tunnels to be served. One chamber would be located between East 36th and East 37th Streets and another between East 37th and East 38th Streets. A plenum connecting the two fan chambers would be under the East 37th Street and Park Avenue intersection.

The distribution plenum would lead from the bottom of the fan chamber and descend to track level to reach the northbound and southbound subway tunnels. Penetrations from the plenum would align with openings in the west wall of the northbound tunnel and with the east wall of the southbound tunnel to provide the ventilation access. Construction of the chamber would be accomplished with cut-and-cover excavation, while the plenum would be constructed using mining techniques.

The emergency ventilation plant structure would be entirely below grade. The fan chamber and all ancillary support facilities for this emergency ventilation plant would be located in a horizontal configuration parallel to the subway tunnels.

The 44-foot-wide emergency ventilation plant could horizontally fit in the streetbed of Park Avenue between East 36th and East 38th Streets and would not encroach on the building line or property lines on the east side of Park Avenue.

The width of the sidewalk, from building line to curb, on each side of Park Avenue is approximately 21 feet, and sidewalk grating would not likely intrude within the property line on either side of the avenue. Construction of Alternative 12 would require the relocation of utility transmission lines to the area under the east sidewalk of Park Avenue. Sufficient width exists between the property lines on the east side of the avenue and the fan plant structure to accommodate the relocated utility lines.

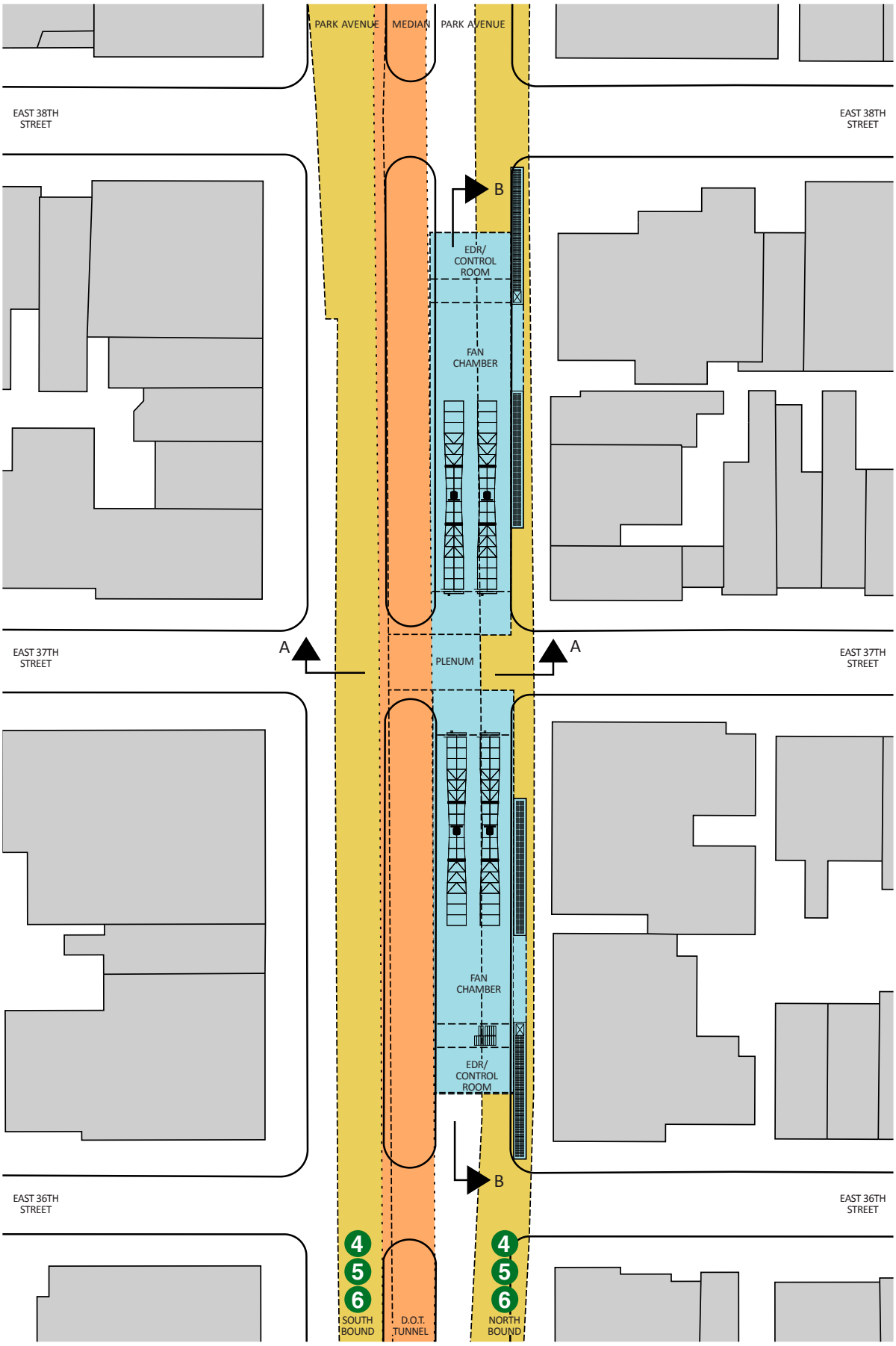
Construction of the facility would require approximately an additional 2.5 feet on either side of the facility's permanent width to provide construction access and shoring, resulting in a temporary construction footprint width of approximately 49 feet (44 feet +2.5 feet +2.5 feet). Construction of the sidewalk grating for Alternative 12 would involve excavation under the sidewalk east of Park Avenue and would not extend into property lines.

1. Park Avenue at 36th Street Facing North Towards Grand Central

40.748339, -73.980309

Construction Perimeter
(Construction varies by location within the construction perimeter)

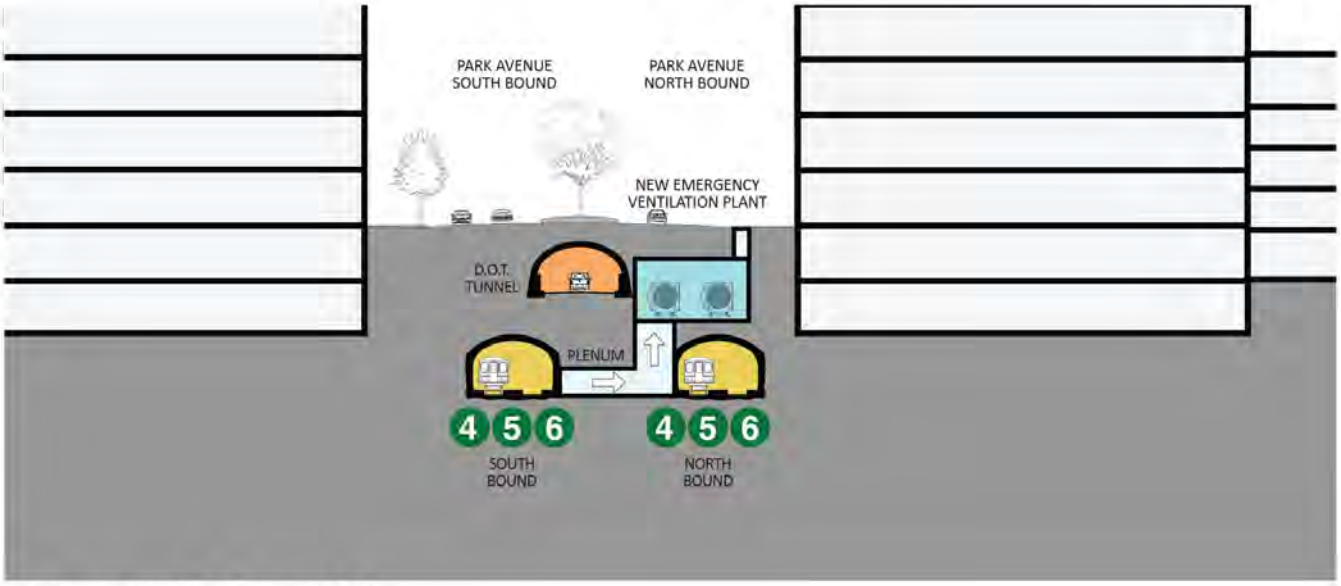
Figure B-47



Alternative 12 - Plan
Park Avenue Between East 36th Street and East 38th Street

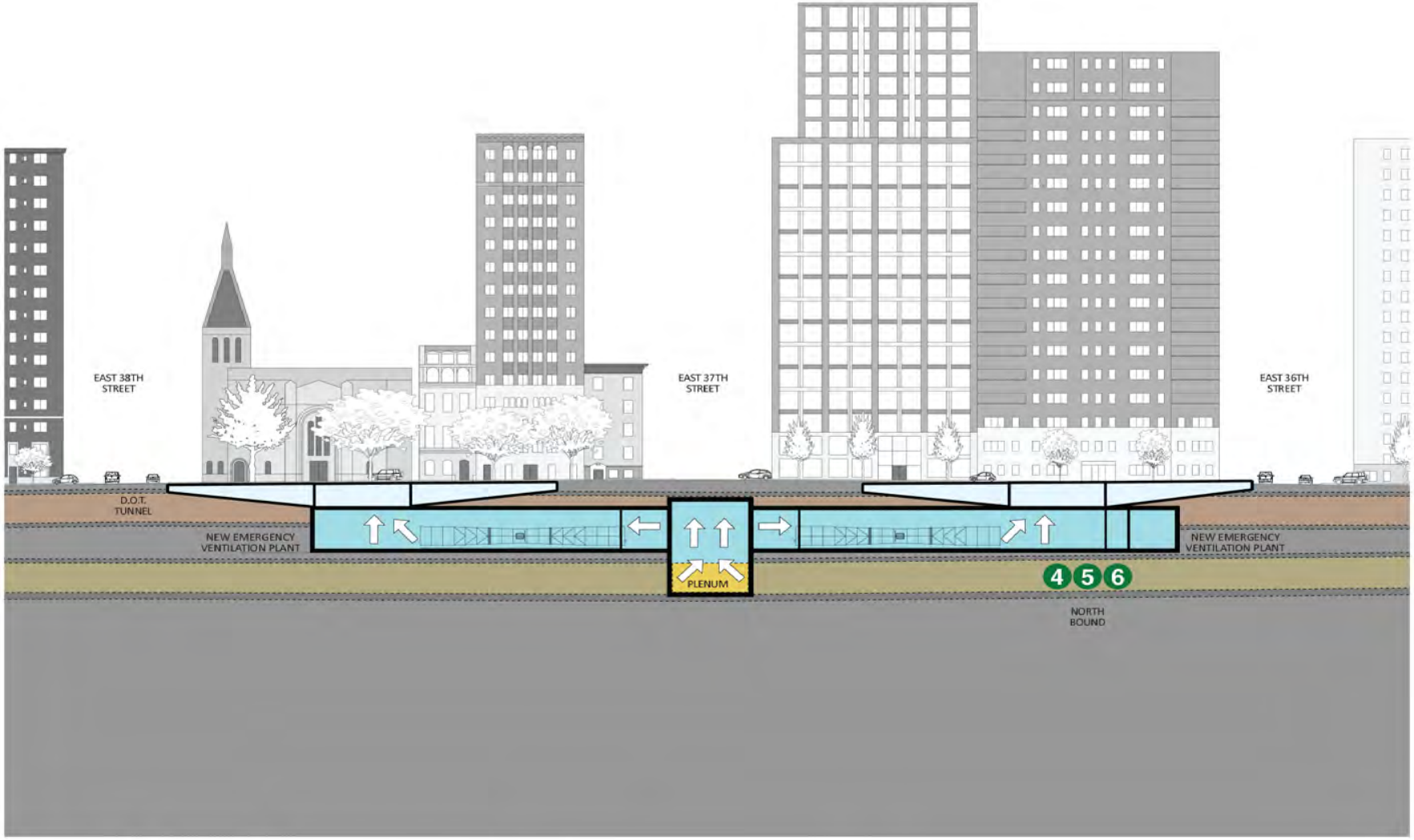
N

Figure B-48



Alternative 12 - Section A-A
Park Avenue Between East 36th Street and East 38th Street

Figure B-49



Alternative 12 - Section B-B
Park Avenue Between East 36th Street and East 38th Street

Figure B-50

Construction activities would not intrude within building lines because the distance between the Park Avenue mall and the building lines is greater than 60 feet, which could accommodate the 49-foot-wide construction zone, the sidewalk grating, and temporary tiebacks to stabilize shoring, if needed.

No property acquisition would be required for Alternative 12 and no property easements would be required. Construction could potentially affect features such as sidewalk vaults and other easements previously granted by NYCDOT to property owners that may extend into the construction zone. As applicable, such features would be investigated in coordination with NYCDOT as the environmental review process advances.

Civil Engineering Considerations

Emergency ventilation plant construction in the streetbed would require that the existing 42-inch RCP storm sewer located below the Park Avenue roadway tunnel be temporarily flumed. The storm sewer could be reconstructed at the same location as the existing storm sewer below the Park Avenue roadway tunnel. Catch basins and chute connections would require replacement, and an existing 12-inch water main would require support or relocation and replacement within excavation limits. With approval from Con Edison, an approximately 450-foot-long, existing 24-inch steam main under Park Avenue would be temporarily installed outside of the limit of excavation. After completion of the emergency ventilation plant, a new 24-inch steam main would be installed in its original location. Gas, electric, and telephone duct banks could also be supported from the temporary decking installed on Park Avenue and would be replaced as required. The 4-foot by 2-foot, 8-inch combined city sewer would be flumed along the entire length of plenum on Park Avenue during construction. Following construction, the existing combined sewer falling in the influence line of excavation would be replaced with a new combined sewer of the same size and location, including manholes. The general utility work procedures listed under Alternative 1 would also be applicable to Alternative 12.

There is sufficient space for plenum routing under Alternative 12.

Construction of Alternative 12 would require partial closure of the northbound lanes of Park Avenue between East 36th and East 38th Streets during excavation and installation of sheeting for decking. Decking would be installed on one-half of the northbound street width at a time, shifting to the other half when the first half is reopened. At least one travel lane northbound would be maintained at all times. Excavation below the southbound lanes would not be required. Construction would require the temporary elimination of parking on the east side of Park Avenue between East 36th Street and East 38th Street. Staging and storage would be accommodated in the east curb lane of Park Avenue between East 36th Street and East 38th Street. The total duration of construction is estimated to be approximately 4.5 years, which would include 2 years for support of excavation, deck installation, underpinning, and mining, and more than 2.5 years for the construction of the emergency ventilation plant and plenum.

Mechanical/Electrical Considerations

This below-ground emergency ventilation plant would have intake/exhaust vent bays at street level along adjacent sidewalks on the east side of Park Avenue. Underground plenums with accessible track isolation dampers would connect the tunnel sections to the emergency ventilation plant. In order to provide the necessary critical air velocity of 500,000 cfm at this alternative site, four 125,000 cfm tube axial fans would be required (two in each fan chamber). The four tube axial fans with upstream and downstream silencers and fan isolation dampers would be laid out in a horizontal configuration, parallel to the subway tunnels.

Permanent personnel and equipment access and equipment removal would be through sidewalk access hatches. Track isolation dampers would be located at the plenum/track interface to control air flow. Natural ventilation dampers would be located parallel to the fan arrangement in the fan chamber and in

existing sidewalk vent bays. A control room with motor control center, and EDR with electrical distribution board, service switch, and meter would be located below grade as part of the emergency ventilation plant. Con Edison service vaults would be located below the sidewalk.

Structural Considerations

This emergency ventilation plant would be constructed in the streetbed of Park Avenue and would require the construction of a one-level emergency ventilation plant. The depth of excavation for the construction of the emergency ventilation plant would be approximately 28 feet bsg for the fan chamber, plus an additional 23 feet for the plenum that connects the fan chamber to the two subway tunnels (51 feet total). A portion of this excavation (7 feet to 10 feet) would be in miscellaneous fill, and the remainder of the excavation would be in rock. This soil profile is based on the historical borings taken in the vicinity and would have to be verified. There are six buildings (a 5-story residential, a 16-story residential, the 6-story Permanent Mission of Guatemala to the UN, the 3-story Church of Our Saviour, a 16-story residential/commercial, and a 21-story residential/commercial) that would be within the influence zone of the excavation and would require installation of a load-sustaining construction support. A structural system composed of steel members would be installed to support the street decking during the construction of the emergency ventilation plant. Suitability of pre-cast concrete elements for the plenum would be examined to expedite the construction. The ventilation plant chamber would be higher in elevation than base of rail of the subway tunnel to prevent flooding of the plant.

B.2.13 Alternative 13

Descriptive Narrative

Alternative 13 would be a single-level ventilation facility located below grade in the streetbed of northbound Park Avenue between East 36th Street and East 37th Street. The emergency ventilation plant would be located above the northbound subway tunnel, east of the Park Avenue roadway tunnel and would extend east past the building line, underneath the building. An emergency ventilation plant at this location would require a single fan chamber approximately 200 feet long and 55 feet wide (the greater width compared to Alternatives 11 and 12 is a result of the single fan chamber design). Park Avenue between East 36th Street and East 37th Street is approximately 95 feet wide, with three northbound lanes and three southbound lanes. Ventilation gratings would be installed in the sidewalk on the east side of Park Avenue. The distance between property lines on this street is approximately 132 feet. Decking would be required to maintain sidewalk connectivity because the extent of excavation would encompass the entire width of the existing sidewalk. A photograph of the site area is provided on Figure B-51 (page 76). Refer to Figure B-52 (page 77) for the site plan. Refer to Figure B-53 (page 77) for a typical cross section, and to Figure B-54 (page 78) for a typical longitudinal section for Alternative 13.

The streetbed would house the proposed 500,000 cfm emergency ventilation plant structure, consisting of a control room, EDR, a Con Edison service vault, a one-level fan chamber housing three 167,000 cfm fans, a silencer chamber and distribution plenum with track isolation dampers and louvers, and a flue extending to the two subway tunnels to be served.

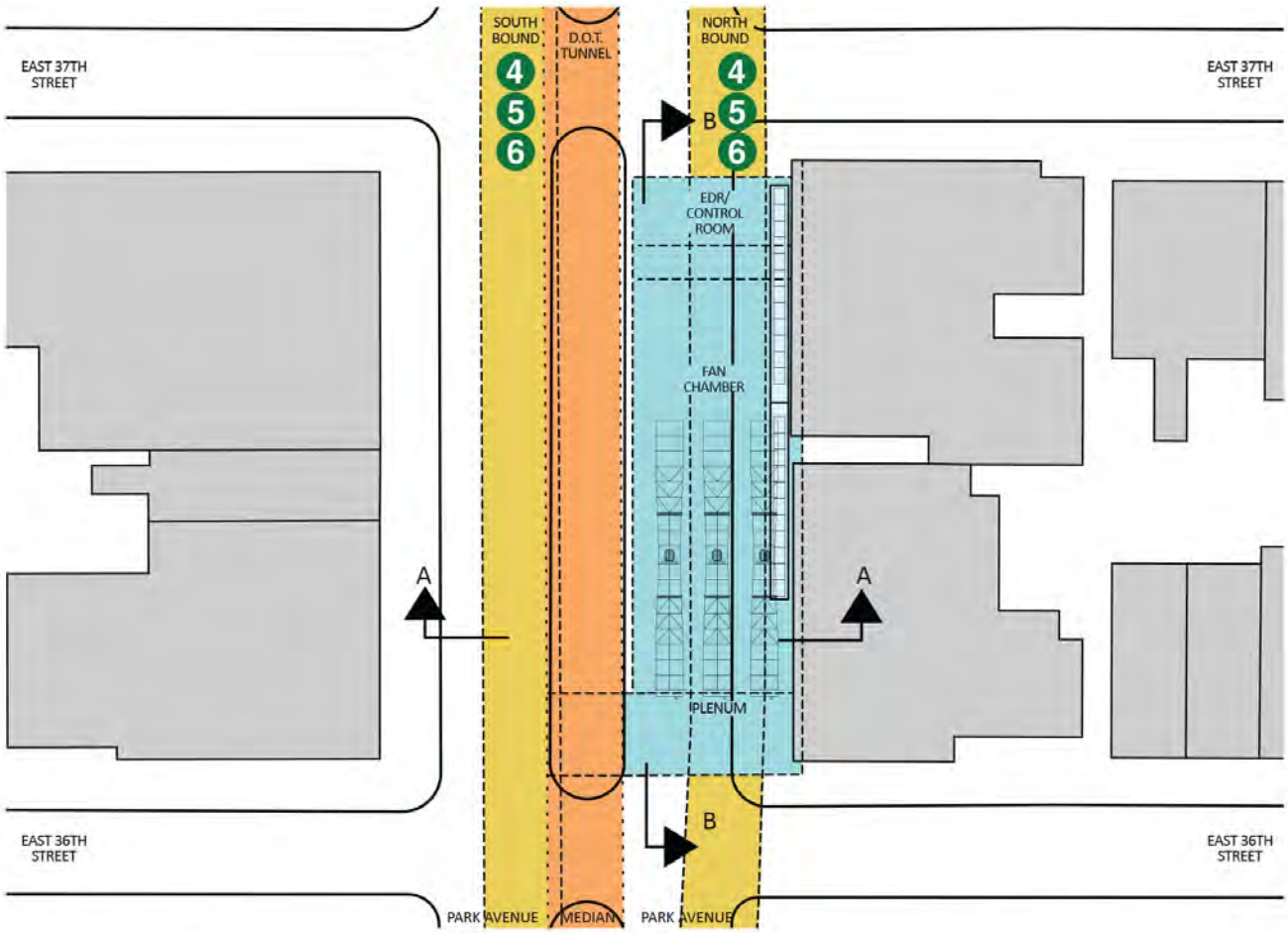
The distribution plenum would lead from the bottom of the fan chamber and descend to track level to reach the northbound and southbound subway tunnels. Penetrations from the plenum would align with openings in the west wall of the northbound tunnel and with the east wall of the southbound tunnel to provide the ventilation access. Construction of the chamber would be accomplished with cut-and-cover excavation, while the plenum would be constructed using mining techniques.

1. Park Avenue Facing South From East 37th Street

40.748950, -73.979859

Construction Perimeter
(Construction varies by location within the construction perimeter)

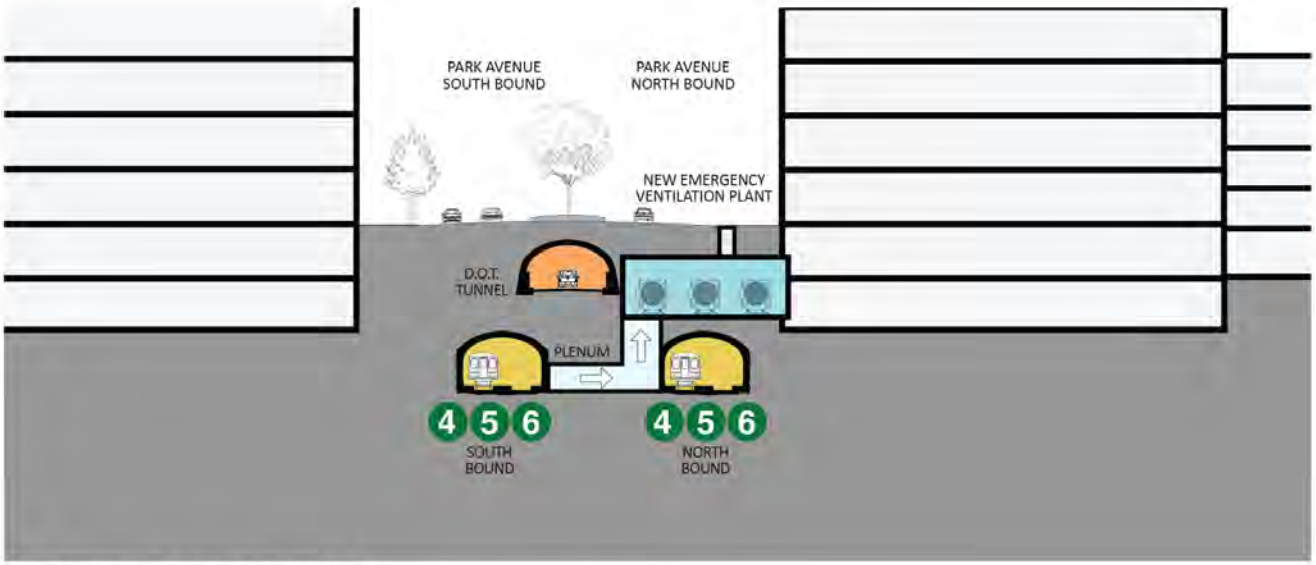
Figure B-51



Alternative 13 - Plan
Park Avenue Between East 36th Street and East 37th Street

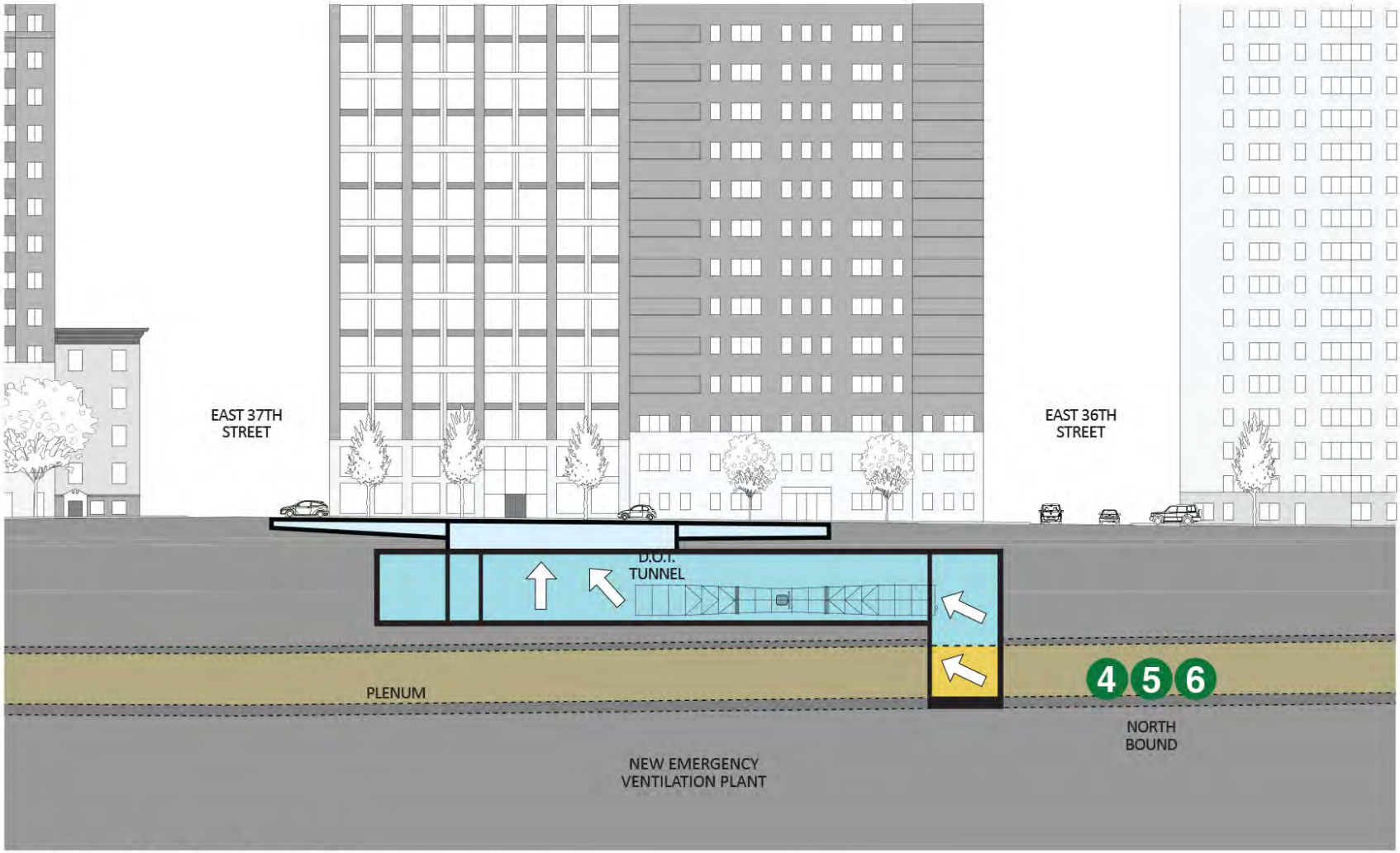
N

Figure B-52



Alternative 13 - Section A-A
Park Avenue Between East 36th Street and East 37th Street

Figure B-53



Alternative 13 - Section B-B
Park Avenue Between East 36th Street and East 37th Street

Figure B-54

The emergency ventilation plant structure would be entirely below grade. The fan chamber and all ancillary support facilities for this emergency ventilation plant would be located in a horizontal, longitudinal configuration.

The 55-foot-wide emergency ventilation plant could fit horizontally in the streetbed of Park Avenue between East 36th and East 37th Streets. However, because the facility would be located on the east side of the Park Avenue roadway tunnel, the width of the fan plant would encroach on the building line and property lines on the east side of Park Avenue.

The width of the sidewalk from building line to curb on each side of Park Avenue is approximately 21 feet, and sidewalk grating would not likely intrude within the property line on either side of the avenue. Construction of Alternative 13 would require the relocation of utility transmission lines to the area under the east sidewalk of Park Avenue. Sufficient width exists between the property lines on the east side of the avenue and the fan plant structure to accommodate the relocated utility lines.

Construction of the facility would require approximately an additional 2.5 feet on either side of the facility's permanent width to provide construction access and shoring, resulting in a temporary construction footprint width of approximately 60 feet (55 feet +2.5 feet +2.5 feet). Construction of the sidewalk grating for Alternative 13 would involve excavation under the sidewalk east of Park Avenue and would extend into property lines.

Construction activities would intrude within building lines because the distance between the Park Avenue roadway tunnel and the building lines is less than 55 feet, which could not accommodate the 55-foot-wide fan plant or the 60-foot-wide construction zone.

The width of this alternative would encroach under the existing buildings, rendering it ***not feasible*** because of potential property acquisition and displacement impacts.

Civil Engineering Considerations

Emergency ventilation plant construction in the streetbed would require that the existing 42-inch RCP storm sewer located below the Park Avenue roadway tunnel be temporarily flumed. The storm sewer could be reconstructed at the same location as the existing storm sewer below the Park Avenue roadway tunnel. Catch basins and chute connections would require replacement, and an existing 12-inch water main would require support or relocation and replacement within excavation limits. Gas, electric, and telephone duct banks could also be supported from the temporary decking installed on Park Avenue and would be replaced as required. The 4-foot by 2-foot, 8-inch combined city sewer would be flumed along the entire length of plenum on Park Avenue during construction. Following construction, the existing combined sewer falling in the influence line of excavation would be replaced with a new combined sewer of the same size and location, including manholes. The general utility work procedures listed under Alternative 1 would also be applicable to Alternative 13.

Construction of Alternative 13 would require partial closure of the northbound lanes of Park Avenue between East 36th and East 37th Streets during excavation and installation of sheeting for decking. Decking would be installed on one-half of the northbound street width at a time, shifting to the other half when the first half is reopened. The east sidewalk of Park Avenue would be decked to allow excavation below. Access to buildings would require sidewalk bridges. At least one travel lane northbound would be maintained at all times, and access to buildings would be maintained at all times. Excavation below the southbound lanes of Park Avenue would not be required. Construction would require the temporary elimination of parking on the east side of Park Avenue between East 36th Street and East 37th Street. Staging and storage would be accommodated in the east curb lane of Park Avenue between East 36th

Street and East 37th Street and on a curb lane of either East 36th Street or East 37th Street between Park Avenue and Lexington Avenue. The total duration of construction is expected to be almost 5 years.

Mechanical/Electrical Considerations

This below-ground emergency ventilation plant would have intake/exhaust vent bays at street level along the adjacent sidewalk. Underground plenums with accessible track isolation dampers would connect the tunnel sections to the emergency ventilation plant. In order to provide the necessary critical air velocity of 500,000 cfm at this alternative site, three 167,000 cfm tube axial fans would be required. The three tube axial fans with upstream and downstream silencers and fan isolation dampers would be laid out in a horizontal configuration parallel to the subway tunnels.

Permanent personnel and equipment access and equipment removal would be through sidewalk access hatches. Track isolation dampers would be located at the plenum/track interface to control air flow. Natural ventilation dampers would be located parallel to the fan arrangement in the fan chamber and in existing sidewalk vent bays. A control room with motor control center, and EDR with electrical distribution board, service switch, and meter would be located below grade as part of the emergency ventilation plant. Con Edison service vaults would be located below the sidewalk.

Structural Considerations

Alternative 13 would be constructed in the streetbed of northbound Park Avenue between East 36th and East 37th Streets; the width of the street from property line to property line would not allow for a construction support system installation leaving adequate space for the construction of a single-level emergency ventilation plant. The 55-foot width of the plant would extend beyond the building line on the east side of Park Avenue. The depth of excavation for the construction of the emergency ventilation plant would be approximately 30 feet bsg plus an additional 23 feet for the plenum connecting the fan chamber to the two subway tunnels (53 feet total). A small portion of this excavation (7 feet to 10 feet) would be in miscellaneous fill, and the remainder of the excavation would be in rock. This soil profile information is based on the historical borings taken in the vicinity and would have to be verified. There are two buildings (a 16-story residential/commercial building and a 21-story residential/commercial building) that would be within the influence zone of the excavation and would require installation of a load-sustaining construction support. A structural system composed of steel members would be installed to support the street decking during the construction of the emergency ventilation plant. Suitability of pre-cast concrete elements for the plenum would be examined to expedite the construction. The ventilation plant chamber would be higher in elevation than the base of rail of the subway tunnel to prevent flooding of the plant.

C. COMPARATIVE ENGINEERING ANALYSIS OF ALTERNATIVES

C.1 INTRODUCTION AND METHODOLOGY

The purpose of this chapter is to present a comparative engineering analysis among the alternative sites. The analysis is based on:

- *Comparing* how alternatives achieve the potential to *minimize* impacts related to various engineering domains. Four domains are included for analysis:
    - Utilities
    - Structural/civil/mechanical
    - Institutional/community
    - Maintenance and protection of traffic (MPT)/staging/storage
- Presenting evaluation *criteria* representing each engineering domain.
- Presenting the comparison in *narrative and notation format*; the notation format is given in Table C-1.
- *Progressively eliminating alternatives* that have the least potential to minimize engineering effects/impacts of constructing/operating the alternatives.
- Characterizing those alternatives that result from the analysis.

C.2 ENGINEERING EVALUATION CRITERIA

Engineering evaluation criteria help identify particular aspects of the emergency ventilation plant alternatives that could cause complications/implications in building and operating the alternatives. **Importantly, those alternatives that reflect an amalgam of the *least or minimum* engineering complications/implications are preferred**. The minimization of such complications and implications in these engineering categories is an important element in identifying potential alternatives to move forward for further consideration in the Draft EIS. Objective and relevant criteria have been identified to the extent possible at this early concept stage in the overall project and have been applied to the thirteen (13) alternatives.

The engineering evaluation criteria address three levels of effect: **Major**, designated by a (-), detracts from the particular engineering criterion; **Moderate**, designated by a (o), indicates a limited or marginal concern for the complications/implication for the engineering criterion; and **Minor**, designated by a (+), indicates no serious implications/complications when applied to the given alternative and, in fact, supports the engineering criterion. Those alternatives with a preponderance of **Major** (-) potential complications/implications would be avoided in deference to those with fewer. Similarly, those with a preponderance of **Moderate** (o) potential complications/implications would be avoided in deference to those with fewer. As the screening process proceeds, a "pool" of remaining alternatives results **yielding minimum potential for engineering complications/implications during construction/operations**. (Note: A similar screening notation process is applied to economic and environmental criteria and is discussed in subsequent chapters of this report.)

C.2.1 Utility Impact Criteria

- **Major (-):** construction of the alternative would require removal and replacement of utilities entailing significant engineering challenges, coordination with utility owners/operators, and complexity such as 24-inch steam main, Oil-o-Static lines, combined city sewers, Park Avenue roadway tunnel storm sewer, or utility vaults.
- **Moderate (o):** construction of the alternative would require the removal and replacement of utilities such as smaller steam mains, electrical, traffic signal, and other utility infrastructure not requiring extraordinary engineering challenges and coordination.
- **Minor (+):** construction of the alternative would involve protection of utilities in-place using common construction techniques.

C.2.2 Structural/Civil/Mechanical/Base of Rail Impact Criteria

- **Major (-):** construction of the alternative would involve one or more of the following:
    - The distance away from the optimal ventilation plant location (East 38th Street) or the "centroid" would require additional fan units and/or higher capacity fans (more than at the centroid location) to attain the actual velocity necessary for effective smoke management in the tunnels. Due to the distance from the project centroid, the fan capacity of the emergency ventilation plant must be greater than the "centroidal" capacity 500,000 cfm.
    - Inadequate space is available for the installation of the fan chamber or routing of the plenum among the various underground infrastructure (e.g., construction is physically not possible).
    - Underpinning of buildings or major transportation infrastructure (roadway tunnel, subway tunnels) would be required.
    - Alternative would require construction adjacent to structures sensitive to damage from vibration.
    - The elevation of the fan chamber would be lower than the base of the subway tunnel rail. This consideration is consistent with current post-Sandy judgements by NYCT operations staff concerning resiliency—emergency ventilation plant alternatives resulting in an invert below base-of-rail should be avoided to minimize potential flooding of the emergency ventilation plant. (Note: If the subway tunnel gets flooded, and the fan chamber is below the elevation of the subway tunnel base of rail, the chamber would be vulnerable to flooding because flood water would move towards the lowest point, which would be in the plenums/fan chamber).
- **Moderate (o):** construction of the alternative would involve one or more of the following:
    - Limited, but less than usual and customary space, is available for the installation of the emergency ventilation plant and/or its components among the various underground infrastructure.
    - No underpinning of buildings would be required; load-sustaining construction support system would be required for excavation within the influence zone of the existing buildings adjacent to the excavation.

- **Minor (+):** construction of the alternative would involve one or more of the following:
  - The ventilation plant would be located in or adjacent to the centroid location (no additional or higher capacity fan units would be required for smoke management in the tunnels).
  - Adequate or more than usual and customary space would be available for the construction of the emergency ventilation plant and/or its components among the various underground infrastructure.
  - No underpinning or load-sustaining construction support systems would be required.
  - Elevation of the fan chamber would be above the base of the subway tunnel rail.

C.2.3 Institutional/Community Impact Criteria

- **Major (-): Considerations include:**
  - Construction would occur less than 5 feet from the building line of a public/private institution or residential building, requiring the removal of stoops or stepped entrances and/or temporary/permanent easements.
  - Construction of the alternative would require removal of sidewalk vaults.
  - Need for sidewalk bridges to maintain building access and/or replacing access to buildings/businesses.
- **Moderate (o): Considerations include:**
  - Construction of the alternative would require the removal of sidewalk vaults.
  - Construction would occur within the property of public/private institution or residential building and require temporary changes in building access, sidewalk space or off-street parking.
- **Minor (+): Considerations include:**
  - Construction beyond 5 feet away from the property line of residential/commercial/institutional buildings and institutional land uses.
  - Construction of the alternative would not require removal of sidewalk vaults or stoops.

C.2.4 Maintenance and Protection of Traffic/Staging/Storage Criteria

- **Major (-):** construction would require long-term (more than 6 months) lane closures of high volume roadways (NYCDOT THRU Streets, Park Avenue, or Park Avenue Roadway Tunnel), with major detours required for traffic rerouting; inadequate staging and storage space in the parking lanes adjacent and reasonably near the work zone; materials would be stored at locations requiring transport across moving lanes.
- **Moderate (o):** construction would require closure of parking lanes and daytime lane closures but would not require a detour for the rerouting of pedestrians; short-term closures for streetbed deck installation are considered a moderate impact.
- **Minor (+):** construction would only require closures of parking lanes and partial widths of sidewalks; no moving lane closures would be required other than disruptions for very short periods of time; adequate space exists in abutting parking lanes for staging and storage.

C.3 COMPARISON OF ALTERNATIVES REGARDING ENGINEERING CRITERIA

Table C-1 below provides a summary of the rating of each alternative relative to the four engineering criteria. The table also provides a brief notation of the primary reason the alternative was given each rating. A narrative discussion of the issues associated with each alternative that further explains the basis for the ratings is provided in the sections below.

C.3.1 Alternative 1

Utility Impact

Major utility issues associated with Alternative 1 include reconstruction of the storm sewer below the Park Avenue roadway tunnel and replacement of two utility vaults.

Structural/Civil/Mechanical Impact

The spatial separation between the road tunnel/storm sewer and the subway tunnel would be too shallow, insufficient for the routing of the plenum between the fan chamber and each of the subway tunnels, resulting in an extremely "pancaked" plenum and restricting air flow, thus rendering construction of the ventilation plant at this location ***not feasible***. Construction of the emergency ventilation plant in the streetbed of East 36th Street west of Park Avenue would require a fan capacity of 850,000 cfm (compared to 500,000 cfm for the other alternatives) to meet the critical air velocity because of its distance from the project centroid at East 38th Street, further increasing excavation requirements and impacts to provide a larger fan chamber.

Institutional/Community Impact

Alternative 1 would result in disruption to residential buildings and a public institution, the Morgan Library and Museum, as a result of building-line-to-building-line construction along a narrow and primarily residential street. No property acquisitions would be required; however, temporary and permanent easement would be required. Two sidewalk vaults would be secured from NYCDOT. Access to the residential structures would require sidewalk bridges.

Maintenance and Protection of Traffic/Staging/Storage

Alternative 1 would require partial closure of East 36th Street (a NYCDOT THRU Street), lane closures on Park Avenue southbound, loss of parking (to accommodate staging/storage areas), and special measures to maintain building access.

Summary

As given in overview notation form on Table C-1, this alternative presents **Major (-)** concerns regarding utilities, institutional/community impacts, and MPT/staging/storage. Due to the infeasibility related to structural/civil/mechanical criteria, Alternative 1 is ***eliminated*** from further engineering consideration.

C.3.2 Alternative 2

Utility Impact

Alternative 2 would avoid impacting the storm sewer below the Park Avenue roadway tunnel but would require replacement of a utility vault.

Structural/Civil/Mechanical Impact

The separation between the road tunnel/storm sewer and the subway tunnel would be sufficient for the routing of the plenum between the fan chamber and each of the subway tunnels. However, construction of the emergency ventilation plant in the streetbed of East 36th Street east of Park Avenue would require a fan capacity of 850,000 cfm (compared to 500,000 cfm for the other alternatives) to meet the critical air velocity because of its distance from the project centroid at East 38th Street, further increasing excavation requirements and impacts to provide a larger fan chamber. Thus, this alternative is not feasible.

Institutional/Community Impact

Alternative 2 would result in disruption to residential buildings as a result of building-line-to-building-line construction along a narrow residential street. A total of seven stoops/step-down entrances would need to be removed during construction and rebuilt at the conclusion of construction. No property acquisitions would be required; however, temporary and permanent easement would be required. Two sidewalk vaults would be secured from NYCDOT. Access to the residential structures would require sidewalk bridges.

Maintenance and Protection of Traffic/Staging/Storage

Alternative 2 would require partial closure of East 36th Street (a NYCDOT THRU Street), lane closures on Park Avenue northbound, loss of parking (to accommodate staging/storage areas), and special measures to maintain building access.

Summary

As given in overview notation form on Table C-1, this alternative presents **Major (-)** concerns regarding utilities, institutional/community impacts, and MPT/staging/storage. Due to the infeasibility related to structural/civil/mechanical criteria, Alternative 2 is ***eliminated*** from further engineering consideration.

C.3.3 Alternative 3

Utility Impact

Major utility issues would include the need to reconstruct the storm sewer below the Park Avenue Roadway Tunnel and to replace two utility vaults.

Structural/Civil/Mechanical Impact

The space between the road tunnel/storm sewer and the subway tunnel would result in difficulties routing the plenum between the fan chamber and each of the subway tunnels. Construction of the emergency ventilation plant in the streetbed of East 37th Street west of Park Avenue would require a fan capacity of 500,000 cfm to meet the critical air velocity.

Institutional/Community Impact

Alternative 3 would result in disruption to residential buildings and a private institution (the Union League Club) as a result of building-line-to-building-line construction along a narrow residential street. A total of five stoops/step-down entrances would need to be removed during construction and rebuilt at the conclusion of construction. No property acquisitions would be required; however, temporary and permanent easement would be required. Two sidewalk vaults would be secured from NYCDOT. Access to the residential structures would require sidewalk bridges.

Maintenance and Protection of Traffic/Staging/Storage

Alternative 3 would require partial closure of East 37th Street (a NYCDOT THRU Street), lane closures on Park Avenue southbound, loss of parking (to accommodate staging/storage areas), and special measures to maintain building access.

Summary

As given in overview notation form on Table C-1, this alternative presents **Major (-)** concerns regarding utilities and impacts related to structural/civil/mechanical and institutional/community issues and MPT/staging/storage.

C.3.4 Alternative 4

Utility Impact

Major utility issues would include the need to relocate a 24-inch steam main and replace two utility vaults.

Structural/Civil/Mechanical Impact

The separation between the road tunnel/storm sewer and the subway tunnel would be sufficient for plenum routing, and this alternative would avoid impacts to the Park Avenue roadway tunnel storm sewer. Construction of the emergency ventilation plant in the streetbed of East 37th Street east of Park Avenue would require a fan capacity of 500,000 cfm to meet the critical air velocity.

Institutional/Community Impact

Alternative 4 would result in disruption to residential buildings as a result of building-line-to-building-line construction along a narrow residential street. A total of 11 stoops/step-down entrances would need to be removed during construction and rebuilt at the conclusion of construction. No property acquisitions would be required; however, temporary and permanent easement would be required. Two sidewalk vaults would be secured from NYCDOT. Access to the residential structures would require sidewalk bridges.

Maintenance and Protection of Traffic/Staging/Storage

Alternative 4 would require partial closure of East 37th Street (a NYCDOT THRU Street), lane closures on Park Avenue northbound, loss of parking (to accommodate staging/storage areas), and special measures to maintain building access.

Summary

As given in overview notation form on Table C-1, this alternative presents **Major (-)** concerns regarding utilities, institutional/community impacts, and MPT/staging/storage; and **Moderate (o)** concerns regarding structural/civil/ mechanical engineering.

C.3.5 Alternative 5

Utility Impact

Major utility issues would include the need to relocate a 24-inch steam main and reconstruct the Park Avenue roadway tunnel storm sewer.

Structural/Civil/Mechanical Impact

The separation between the road tunnel/storm sewer and the subway tunnel would be insufficient for the routing of the plenum between the fan chamber and each of the subway tunnels, rendering

construction of the ventilation plant at this location ***not feasible***. Construction of the emergency ventilation plant in the streetbed of East 38th Street west of Park Avenue would require a fan capacity of 500,000 cfm to meet the critical air velocity.

Institutional/Community Impact

Alternative 5 would result in major disruption to residential buildings and hotels as a result of building-line-to-building-line construction along a narrow residential street. A total of nine stoops/step-down entrances would need to be removed during construction and rebuilt at the conclusion of construction. No property acquisitions would be required; however, temporary and permanent easement would be required. Six sidewalk vaults would be secured from NYCDOT. Access to the residential structures would require sidewalk bridges.

Maintenance and Protection of Traffic/Staging/Storage

Alternative 5 would require partial closure of East 38th Street, lane closures on Park Avenue southbound, loss of parking (to accommodate staging/storage areas), and special measures to maintain building access.

Summary

As given in overview notation form on Table C-1, this alternative presents **Major (-)** concerns regarding utilities, institutional/community impacts, and MPT/staging/storage. Due to the infeasibility related to structural/civil/mechanical criteria, Alternative 5 is ***eliminated*** from further engineering consideration.

C.3.6 Alternative 6

Utility Impact

Utility issues would include the need to relocate a smaller 8-inch steam main and protect Oil-o-Static lines.

Structural/Civil/Mechanical Impact

The separation between the road tunnel/storm sewer and the subway tunnel is sufficient for plenum routing and this alternative would avoid impacts to the Park Avenue roadway tunnel storm sewer. Construction of the emergency ventilation plant in the streetbed of East 38th Street east of Park Avenue would require a fan capacity of 500,000 cfm to meet the critical air velocity.

Institutional/Community Impact

Alternative 6 would result in major disruption to residential buildings and a community facility (the Church of Our Saviour) as a result of building-line-to-building-line construction along a narrow residential street. A total of 11 stoops/step-down entrances would need to be removed during construction and rebuilt at the conclusion of construction. No property acquisitions would be required; however, temporary and permanent easement would be required. Four sidewalk vaults would be secured from NYCDOT. Access to the residential structures would require sidewalk bridges.

Maintenance and Protection of Traffic/Staging/Storage

Alternative 6 would require partial closure of East 38th Street, lane closures on Park Avenue northbound, loss of parking (to accommodate staging/storage areas), and special measures to maintain building access.

Summary

As given in overview notation form on Table C-1, this alternative presents **Major (-)** concerns regarding institutional/community impacts and MPT/staging/storage; and **Moderate (o)** concerns regarding utilities and structural/civil/mechanical engineering.

C.3.7 Alternative 7

Utility Impact

Utility issues would include the need to protect Oil-o-Static lines and to replace three utility vaults.

Structural/Civil/Mechanical Impact

This alternative would avoid impacts to the Park Avenue roadway tunnel storm sewer. However, the necessary plenum routing underneath the two active subway tunnels via mining would entail a high level of complexity and risks. Construction of the emergency ventilation plant in the streetbed of East 39th Street west of Park Avenue would require a fan capacity of 500,000 cfm to meet the critical air velocity.

Institutional/Community Impact

Alternative 7 would result in disruption to residential and commercial buildings as a result of building-line-to-building-line construction along a narrow street. A total of eight stoops/step-down entrances would need to be removed during construction and rebuilt at the conclusion of construction. No property acquisitions would be required; however, temporary and permanent easement would be required. Three sidewalk vaults would be secured from NYCDOT. Access to the residential structures would require sidewalk bridges.

Maintenance and Protection of Traffic/Staging/Storage

Alternative 7 would require partial closure of East 39th Street, lane closures on Park Avenue southbound, loss of parking (to accommodate staging/storage areas), and special measures to maintain building access.

Summary

As given in overview notation form on Table C-1, this alternative presents **Major (-)** concerns regarding utilities, structural/civil/mechanical engineering, institutional/community impacts, and MPT/staging/storage.

C.3.8 Alternative 8

Utility Impact

Utility issues would include the relocation of an 8-inch steam main and the replacement of one utility vault.

Structural/Civil/Mechanical Impact

The necessary plenum routing underneath the two active subway tunnels via mining would entail a high level of complexity and risks. Construction of the emergency ventilation plant in the streetbed of East 39th Street east of Park Avenue would require a fan capacity of 500,000 cfm to meet the critical air velocity. The fan chamber would be below base of rail, a condition that is undesirable because of the risk of flooding.

Institutional/Community Impact

Alternative 8 would result in disruption to residential and commercial buildings as a result of building-line-to-building-line construction along a narrow street. A total of ten stoops/step-down entrances would need to be removed during construction and rebuilt at the conclusion of construction. No property acquisitions would be required; however, temporary and permanent easement would be required. Access to the residential structures would require sidewalk bridges.

Maintenance and Protection of Traffic/Staging/Storage

Alternative 8 would require a partial closure of East 39th Street, lane closures on Park Avenue northbound, loss of parking (to accommodate staging/storage areas), and special measures to maintain building access.

Summary

As given in overview form on Table C-1, this alternative presents **Major (-)** concerns regarding utilities, structural/civil/mechanical engineering, institutional/community impacts, and MPT/staging/storage.

C.3.9 Alternative 9

Utility Impact

Utility issues would include impacts to the Park Avenue roadway tunnel storm sewer and relocation of an 8-inch steam main.

Structural/Civil/Mechanical Impact

This alternative is ***not feasible*** because there is insufficient space available between the roadway tunnel and the subway tunnels to construct a ventilation plant. Hypothetically, construction of the emergency ventilation plant in the streetbed of Park Avenue between 39th and 40th Streets would require a fan capacity of 500,000 cfm to meet the critical air velocity.

Institutional/Community Impact

Alternative 9 would avoid construction directly adjacent to occupied buildings by locating the ventilation plant under the Park Avenue roadway tunnel exit ramp. There would be no impact to residential stoops. No sidewalk vaults would be removed.

Maintenance and Protection of Traffic/Staging/Storage

This alternative would result in major traffic impacts from the closure of the Park Avenue roadway tunnel and temporary closure of travel lanes on Park Avenue northbound and southbound based on the footprint of excavation and additional land needed to accommodate staging/storage needs.

Summary

As given in overview notation form on Table C-1, this alternative presents **Major (-)** concerns regarding utilities and MPT/staging/storage; and **Moderate (o)** concerns regarding institutional/community impacts. Due to the infeasibility related to structural/civil/mechanical criteria, Alternative 9 is ***eliminated*** from further engineering consideration.

C.3.10 Alternative 10

Utility Impact

Alternative 10 would require reconstruction of the Park Avenue roadway tunnel storm sewer and relocation of a 24-inch steam main.

Structural/Civil/Mechanical Impact

Alternative 10 would require mining underneath and underpinning of the Park Avenue roadway tunnel, resulting in substantial complexity and risks. It also potentially impacts both subway tunnels with mining of the fan chamber between the two tunnels. Because the distance between the two subway tunnels restricts the width of the fan chamber, this alternative requires a bi-level emergency ventilation plant. The fan chamber would be below base of rail, a condition that is undesirable because of the risk of

flooding. Construction of the emergency ventilation plant in the streetbed of Park Avenue between 37th and 38th Streets would require a fan capacity of 500,000 cfm to meet the critical air velocity.

Institutional/Community Impact

Alternative 10 would involve disruption to residential buildings and institutions adjacent to Park Avenue northbound, such as the Church of Our Saviour and the Permanent Mission of Guatemala to the UN. However, there would be greater separation between the excavation area and adjacent land uses compared to the side street ventilation plant locations. There would be no impact to residential stoops. Three sidewalk vaults within the excavation area would be secured from NYCDOT.

Maintenance and Protection of Traffic/Staging/Storage

Park Avenue northbound would be reduced to one lane during portions of construction, and parking would be eliminated on the east side of Park Avenue between East 37th and East 38th Streets based on the footprint of excavation and additional land needed to accommodate staging/storage needs.

Summary

As given in overview notation form on Table C-1, this alternative presents **Major (-)** concerns regarding utilities, structural/civil/mechanical engineering, and MPT/staging/storage; and **Moderate (o)** concerns regarding institutional/community impacts.

C.3.11 Alternative 11

Utility Impact

Alternative 11 would require reconstruction of new combined city sewer and new 24-inch steam main under the sidewalk. It would also require maintenance, protection and support of existing oil-o-statics running beneath Park Avenue and East 38th St.

Structural/Civil/Mechanical Impact

This alternative location presents favorable conditions for ventilation plant construction because it would not require underpinning the Park Avenue roadway tunnel or the subway tunnels. A load-sustaining structural support system would be required. Construction of the emergency ventilation plant in the streetbed of Park Avenue between East 37th and East 39th Streets would require a fan capacity of 500,000 cfm to meet the critical air velocity.

Institutional/Community Impact

Alternative 11 would involve disruption of residential buildings and institutions adjacent to Park Avenue northbound, such as the Church of Our Saviour and the Permanent Mission of Guatemala to the UN. However, there would be greater separation between the excavation area and adjacent land uses compared to the side street ventilation plant locations. Sidewalks on the east side of Park Avenue would be narrowed but maintained during construction, and no building stoops would be impacted. Two sidewalk vaults within the excavation area would be secured from NYCDOT.

Maintenance and Protection of Traffic/Staging/Storage

Park Avenue northbound would be reduced to two lanes during portions of construction, and as such, parking would be eliminated on the east side of Park Avenue between East 37th and East 39th Streets.

Summary

As given in overview notation form on Table C-1, this alternative presents **Major (-)** concerns regarding utilities and MPT/staging/storage; and **Moderate (o)** concerns regarding institutional/community impacts and structural/civil/mechanical engineering.

C.3.12 Alternative 12

Utility Impact

In terms of utilities, this alternative would require reconstruction of new combined city sewer and new 24-inch steam main under the sidewalk. It would also require maintenance, protection and support of existing oil-o-statics running beneath Park Avenue and East 38th Street.

Structural/Civil/Mechanical Impact

This alternative location presents favorable conditions for ventilation plant construction because it would not require underpinning the Park Avenue roadway tunnel or the subway tunnels. A load-sustaining structural support system would be required. Construction of the emergency ventilation plant in the streetbed of Park Avenue between East 36th and East 38th Streets would require a fan capacity of 500,000 cfm to meet the critical air velocity.

Institutional/Community Impact

Alternative 12 would involve disruption to residential buildings and institutions adjacent to Park Avenue northbound, such as the Church of Our Saviour and the Permanent Mission of Guatemala to the UN. However, there would be greater separation between the excavation area and adjacent land uses compared to the side street ventilation plant locations. Sidewalks on the east side of Park Avenue would be narrowed but maintained during construction, and no building stoops would be impacted. One sidewalk vault within the excavation area would be removed.

Maintenance and Protection of Traffic/Staging/Storage

Park Avenue northbound would be reduced to two lanes during portions of construction, and as such, parking would be eliminated on the east side of Park Avenue between East 36th and East 38th Streets based on the footprint of excavation and additional land needed to accommodate staging/storage needs.

Summary

As given in overview notation form on Table C-1, this alternative presents **Major (-)** concerns regarding utilities, and MPT/staging/storage; and **Moderate (o)** concerns regarding institutional/community impacts and structural/civil/mechanical engineering.

C.3.13 Alternative 13

Utility Impact

The major utility issue associated with this alternative is existing combined sewers that there is not enough room above the top of vent plant structure for reconstruction of sewer.

Structural/Civil/Mechanical Impact

Alternative 13 involves a 55-foot-wide single-level ventilation plant that would extend into the building line of Park Avenue between East 36th and East 37th Streets. This would require major property acquisition and displacement impacts; consequently, this alternative is ***not feasible***. Construction of the

emergency ventilation plant in the streetbed of Park Avenue between 36th and 37th Streets would require a fan capacity of 500,000 cfm to meet the critical air velocity.

Institutional/Community Impact

As noted above, Alternative 13 is ***not feasible*** because of the potential for encroachment into the property and may result in residential and business displacements.

Maintenance and Protection of Traffic/Staging/Storage

Park Avenue northbound would be limited to one lane during portions of construction, and parking would be eliminated along Park Avenue northbound between East 36th and East 37th Streets based on the footprint of excavation and additional land needed to accommodate staging/storage needs.

Summary

As given in overview notation form on Table C-1, this alternative presents **Major (-)** concerns regarding utilities and MPT/staging/storage. Due to the infeasibility related to structural/civil/mechanical and institutional/community impact criteria, Alternative 13 is ***eliminated*** from further engineering consideration.

C.3.14 Conclusion—Alternatives Advanced for Further Consideration from an Engineering Standpoint

The following conclusions are reached based on the foregoing analysis and the intent of MTA NYCT to ***best minimize engineering implications/complications*** regarding the Lexington Avenue emergency ventilation plant construction and operation:

- Alternatives 1, 2, 5, 9, and 13 are not feasible and, as such, are deleted from further consideration.
- From among the remaining alternatives, Alternatives, 3, 4, 7, 8, and 10 exhibit a preponderance of major engineering concerns.
- Alternatives 6, 11, and 12 present the greatest potential to minimize adverse engineering effects.

Only Alternatives 6, 11, and 12 will be given further consideration for decision-analysis from the engineering standpoint. Alternatives 11 and 12 are located within Park Avenue (east side), and Alternative 6 is located on East 38th Street on the east side of Park Avenue.

TABLE C-1: COMPARATIVE ENGINEERING ANALYSIS

	Alternative												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Utilities	– Reconstruct Park Ave. roadway tunnel storm sewer and two utility vaults	– Reconstruct one utility vault	– Reconstruct Park Ave. roadway tunnel storm sewer and two utility vaults	– Reconstruct 24'' steam main and two utility vaults	– Reconstruct 24" steam main and Park Ave. roadway tunnel storm sewer	O Protect 8" steam main and Oil-o-Static	– Reconstruct three utility vaults	– Reconstruct one utility vault	– Reconstruct Park Ave. roadway tunnel storm sewer	– Reconstruct 24-inch steam main and Park Ave. roadway tunnel storm sewer	– Reconstruct 24-inch steam main and Park Ave. roadway tunnel storm sewer	– Reconstruct 24-inch steam main and Park Ave. roadway tunnel storm sewer	– Reconstruct Park Ave. roadway tunnel storm sewer
Structural/Civil/ Mechanical	– Not feasible due to lack of room for plenum between road tunnel/storm sewer and subway tunnel and need for over 500,000 cfm fan capacity	– Not feasible need for over 500,000 cfm fan capacity	– Difficult plenum routing, including support of Park Avenue roadway tunnel	O Sufficient space for plenum	– Not feasible due to lack of room for plenum between road tunnel/storm sewer and subway tunnel	O Sufficient space for plenum	– Mining under subway tunnels for plenum	– Mining under subway tunnels for plenum and below base of rail (vulnerable to flooding)	– Not feasible due to lack of space between Park Ave. roadway tunnel and subway tunnels	– Mining under Park Ave. roadway tunnel and below base of rail (vulnerable to flooding)	O Sufficient space for plenum	O Sufficient space for plenum	– Width of ventilation plant encroaches on building line underground, not feasible
Institutional/ Community	– construction adjacent to residences and Morgan Library and Museum on narrow street; easements required	– construction adjacent to residences on narrow street; easements required	– construction adjacent to residences and Union League Club on narrow street; easements required	– construction adjacent to residences on narrow street; easements required	– construction adjacent to residences on narrow street; easements required	– construction adjacent to residences and the Church of Our Saviour on narrow street; easements required	– construction on narrow street adjacent to residences and businesses; easements required	– construction adjacent to residences and businesses on narrow street; easements required	O Construction separated from buildings in center of Park Ave.	O Construction within 50 feet residential buildings and Church of Our Saviour	O Construction within 50 feet residential buildings and Church of Our Saviour	O Construction within 50 feet residential buildings and Church of Our Saviour	– Major property acquisition and displacement due to encroachment on building line
MPT/Staging/ Storage	– Lane closures on East 36th St. (NYCDOT THRU Street) and Park Ave.	– Lane closures on East 36th St. (NYCDOT THRU Street) and Park Ave.	– Lane closures on East 37th St. (NYCDOT THRU Street) and Park Ave.	– Lane closures on East 37th St. (NYCDOT THRU Street) and Park Ave.	– Lane closures on Park Ave.	– Lane closures on Park Ave.	– Lane closures on Park Ave.	– Lane closures on Park Ave.	– Lane closures on Park Ave. and closures of Park Ave. roadway tunnel	– Lane closures on Park Ave.	– Lane closures on Park Ave.	– Lane closures on Park Ave.	– Lane closures on Park Ave.
Summary													
– Major Impact (count)	**NF***	**NF***	**4**	**3**	**NF***	**2**	**4**	**4**	**NF***	**3**	**2**	**2**	**NF***
O Moderate Impact (count)			**-**	**1**		**2**	**-**	**-**		**1**	**2**	**2**	
+ Minor Impact (count)			**-**	**-**		**-**	**-**	**-**		**-**	**-**	**-**	

***NF Not Feasible (also indicated by orange shading).**

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D. COMPARATIVE ENVIRONMENTAL EVALUATION OF ALTERNATIVES

D.1 INTRODUCTION

The purpose of this environmental evaluation of alternatives is to compare the alternatives to each other and identify those that would have **the least potential for adverse environmental impacts**. Conceptual plans are described for each alternative in Chapter B, including diagrammatic cross-sections that depict the general location and the construction technique relative to the Lexington Avenue Subway Line tunnel, the Park Avenue roadway tunnel, and surrounding structures. Street-level photos of the areas affected by each alternative are also provided in Chapter B.

The primary environmental impacts of the project are construction-related; construction would last approximately 4.5 years. The proposed emergency ventilation plant would be located under the streetbed, where the only visible component of the operating ventilation plant would be ventilation grates in the sidewalk, and operation of the facility would only occur during an emergency and for periodic system testing. Operational impacts, therefore, were considered minimal, and the following analysis concerns the construction impacts of the alternatives. The conclusions of the environmental evaluation are summarized in Table D-1 in notation format wherein each alternative is characterized in terms of its ability to support a range of criteria. No numeric rating or weighting is applied to each of the environmental categories. The notations in Table D-1 result from the discussions that follow.

The Murray Hill Historic District is a dense urban area of mixed commercial, institutional, and residential uses, as well as historic resources and community facilities. Various street views of the area are provided in Figures D-1 to D-6 (pages 97 to 99), and a land use map is presented in Figure D-7 (page 100). Figures D-8, D-9, and D-10 (pages 101 to 103), respectively, identify historic resources, community facilities, and the location of unique buildings in the District. Within the District, Park Avenue is a wide, multi-lane thoroughfare with traffic lanes separated by a median, wide sidewalks, and lined by large apartment buildings and commercial buildings, as well as such notable buildings as the Union League Club and the Church of Our Saviour. In contrast, cross-town streets in the District are narrow and have a smaller-scale neighborhood setting. Many of the cross-town streets in the District are lined with brownstone-type row houses and large apartment buildings (mostly at the corners with Park Avenue) as well as with professional offices and institutions (including the Morgan Library and Museum). The area plays an important role in the City's transportation network: not only is Park Avenue a major north-south connector (for surface transportation as well as the subway system), but certain of the cross-streets in the area serve a critical function in the City's east-west connectivity, and cross-town traffic can be heavy at times. In particular, East 36th Street (eastbound) and East 37th Street (westbound) link Manhattan to the Queens/Midtown Tunnel; tunnel entrances/exits are only about two blocks east of Park Avenue. Based on a preliminary review of the Murray Hill neighborhood, including the historic character of the area, the mixed land use, and the implications of construction, the following environmental resource categories were identified as particularly sensitive to potential environmental impacts and served as the basis for evaluating the alternatives:

- Historic and Cultural Resources;
- Traffic;
- Parking;
- Pedestrians;
- Noise and Vibration;

- Air Quality;
- Socioeconomic Effects;
- Open Space Resources;
- Community Facilities;
- Community Character, Visual Resources, and Urban Design;
- Cumulative Effects.

Other environmental impact categories, such as transit service, coastal zone and flood zone, infrastructure, solid waste, and environmental justice, were not included in this alternatives evaluation because they would not be affected by the proposed project.

Park Avenue Mall Looking North from East 36th Street

Figure D-1

East 38th Street Between Lexington Avenue and Park Avenue

Figure D-2

Church of Our Saviour Looking South from North East Corner of Park Avenue and East 38th Street

Figure D-3

East 39th Street Looking East from Park Avenue

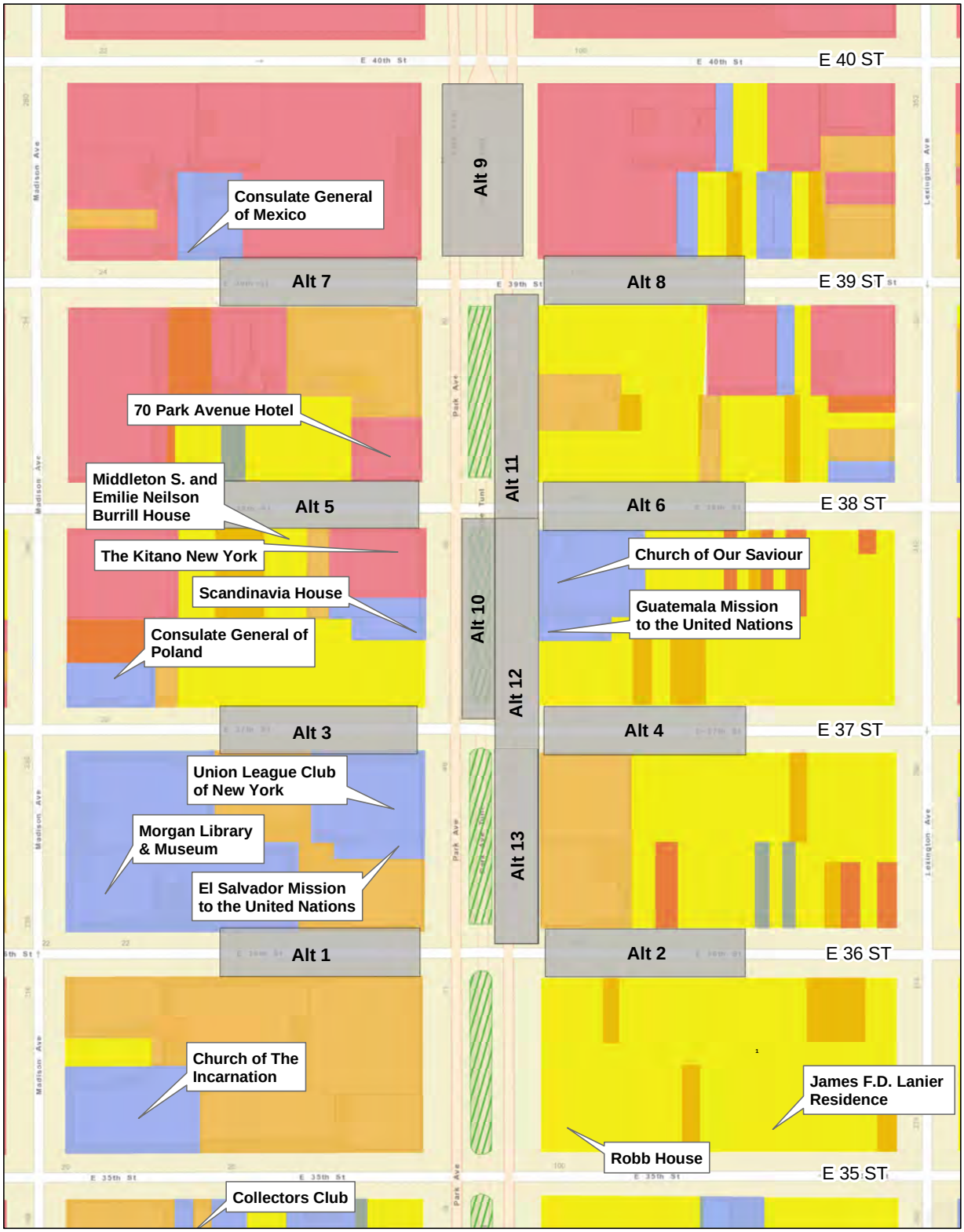
Figure D-4

East 39th Street Commerical Use

Figure D-5

Park Avenue Tunnel Looking South from East 40th Street

Figure D-6



Legend

Alternative Locations

Existing Land Use

- Mixed Use
- Commercial & Office
- Industrial & Manufacturing
- Transportation & Utility
- Public Facilities
- ParkAvenueMalls
- ResidentialClusters

0 50 100 200 Feet

Existing Land use

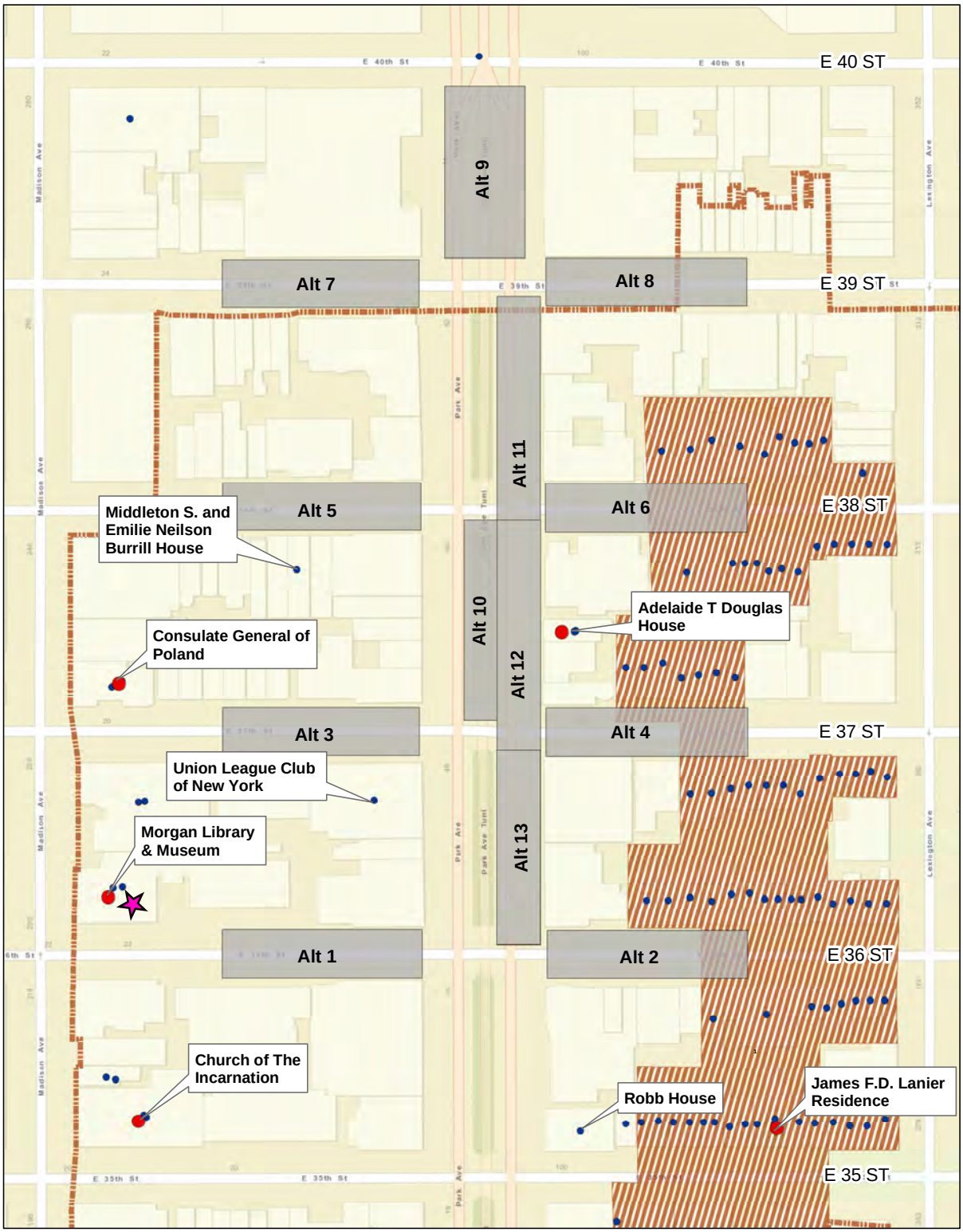
Emergency Ventilation Plant
Lexington Avenue Line

E 33rd Street to E 42nd Street,
Manhattan, New York

Louis Berger

Figure D-7

Source : New York City Transit; New York City Department of City Planning (PLUTO data); ESRI World Street Map.



Legend

- Proposed Alternative Locations
- National Register Historic District
- Murray Hill Historic District - Local (NYC)
- National Register of Historic Places
- NYC Individual Landmarks
- National Historic Landmarks

0 50 100 200 Feet

Source : New York City Transit; New York City Department of City Planning (PLUTO data); ESRI World Street Map.

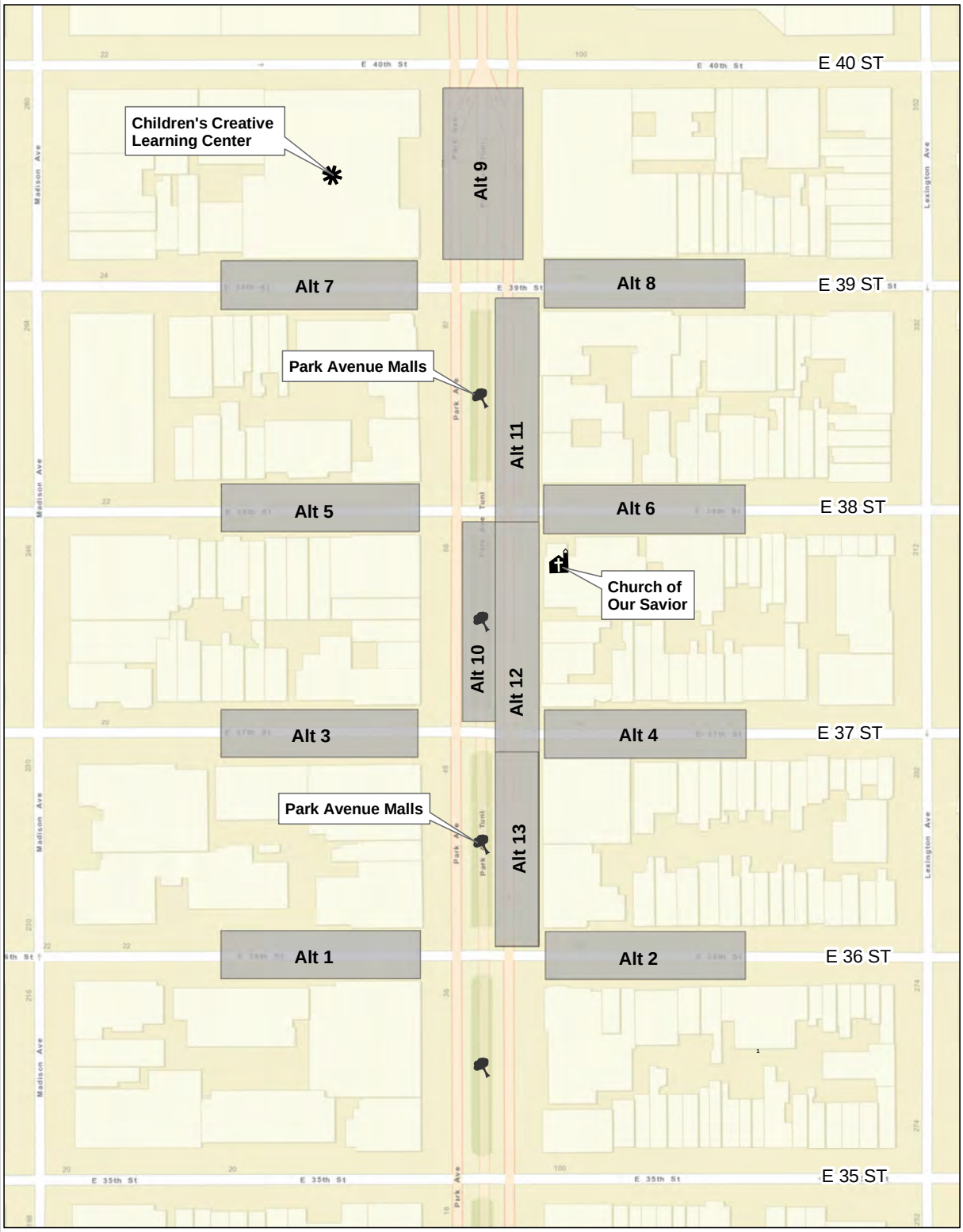
Historic Resources

Emergency Ventilation Plant
Lexington Avenue Line

E 33rd Street to E 42nd Street,
Manhattan, New York

Louis Berger

Figure D-8



Legend

- Alternative Locations
- Green Street - Park Avenue Malls
- Day Care / Facility for Children
- Religious Institutions

0 50 100 200 Feet

Community Facilities

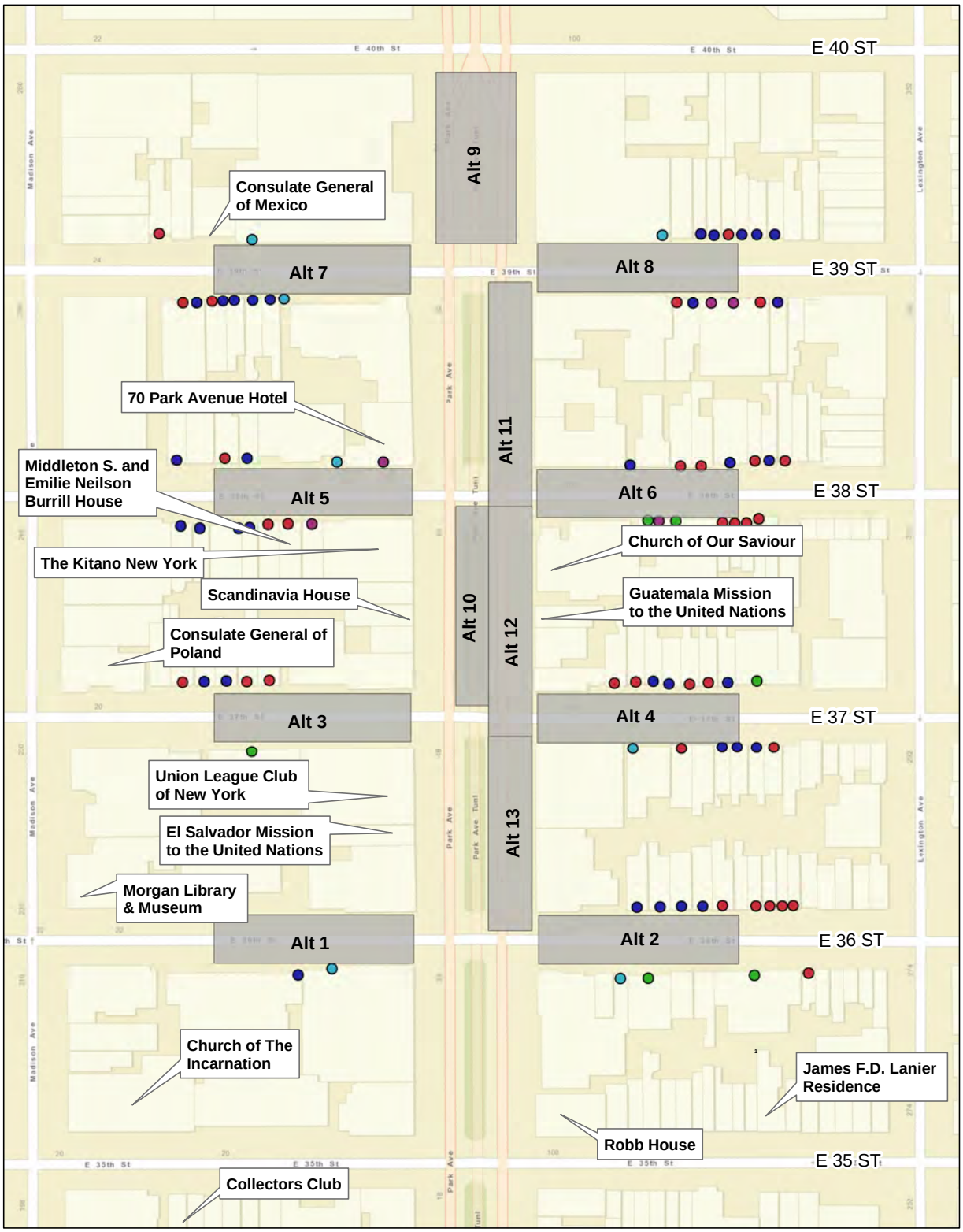
Emergency Ventilation Plant
Lexington Avenue Line

E 33rd Street to E 42nd Street,
Manhattan, New York

Louis Berger

Figure D-9

Source : New York City Transit; New York City Department of City Planning (PLUTO data); ESRI World Street Map.



Legend

Alternative Locations

Existing Elements

- Business
- Canopy
- Parking
- Stepdown Entrance
- Stoop

0 50 100 200 Feet

Unique Buildings and Streetscape Elements

Emergency Ventilation Plant
Lexington Avenue Line

E 33rd Street to E 42nd Street, Manhattan, New York

Louis Berger

Figure D-10

Source : New York City Transit; New York City Department of City Planning (PLUTO data); ESRI World Street Map.

D.2 ENVIRONMENTAL EVALUATION RESOURCE CRITERIA

The environmental criteria used in this comparative evaluation of alternatives address three levels of potential effect:

- **Major Effect (-):** the proposed alternative detracts from supporting the goal of minimizing potential adverse effects on the environmental resource;
- **Moderate Effect (o):** the proposed alternative achieves limited or marginal support of the goal of minimizing potential adverse effects on the environmental resource; and
- **Minor Effect (+):** the proposed alternative supports the goal of minimizing potential adverse effects on the environmental resource.

The environmental resource category criteria are identified below and a detailed analysis of the environmental effects/impacts associated with each alternative is provided in the following subsections. Also, a summary of the findings, together with a comparative environmental matrix utilizing a notation format (i.e., -, o, +), is provided in Table D-1.

D.2.1 Historic and Cultural Resources Criteria

- **Major Effect (-):** construction would occur on or adjacent to a designated historic resource.[9]
- **Moderate (o):** construction would occur within a historic district, but would not be adjacent to any listed or eligible historic structure.
- **Minor (+):** construction would occur outside of an historic district and not adjacent to any listed or eligible historic structure.

D.2.2 Traffic Criteria

- **Major (-):** construction would require**:**
  - taking two moving lanes of traffic on an approach with three moving lanes of traffic; or
  - taking one lane on a NYCDOT THRU street with two moving lanes of traffic; or
  - completely closing a street (or one direction of a two-way street) for more than 6 months such that more than 300 vehicles would be diverted per hour for four or more hours on an average weekday.
- **Moderate (o):** construction would require taking one moving lane of traffic on an approach with two (2) moving lanes of traffic (no temporary roadway closures to through traffic would be required);
- **Minor (+):** construction would require taking one moving lane of traffic on an approach with three (3) moving lanes of traffic (no temporary roadway closures to through traffic would be required).

[9] A historic resource is defined as follows for purposes of this alternatives analysis: a resource identified as a designated New York City Landmark; properties calendared for consideration as landmarks by the New York City Landmarks Preservation Commission (LPC); properties listed in the State/National Registers of Historic Places (S/NR) or contained within a district listed in or formally determined eligible for S/NR listing; properties designated by the New York State Historic Preservation Office within the Office of Parks, Recreation and Historic Preservation as eligible for listing on the S/NR; National Historic Landmarks; and properties not identified by one of the programs or agencies listed above, but that meet their eligibility requirements.

D.2.3 Parking Criteria

- **Major (-)**: construction would require:
  - removing on-street parking on both sides of a side street for an entire block or,
  - removing on-street parking on one side of a street or avenue for two or more blocks or,
  - significantly impede/obstruct/eliminate deliveries to businesses and residents.
- **Moderate (o):** construction would require:
  - removing on-street parking on one side of a side street or avenue for an entire block, or,
  - removing on-street parking for both sides of a side street or avenue for one-half or less of an entire block.
- **Minor (+):** construction would require removing on-street parking for one-half or less of an entire block for one side of the street or avenue.

D.2.4 Pedestrians Criteria

- **Major (-):** construction would require decking of sidewalks and creating sidewalk bridges to building entrances.
- **Moderate (o):** construction would require decking of sidewalks but no sidewalk bridges.
- **Minor (+):** construction would require no decking of sidewalks or sidewalk bridges.

D.2.5 Noise and Vibration Criteria

- **Major (-):** construction would be required to occur at night, or would occur in areas adjacent to noise sensitive land uses (i.e., residential, institutions, medical offices, schools, hotels, and embassies) and/or would produce vibration within 90 feet of historic structures.[10]
- **Moderate (o):** construction would occur beyond 90 feet of historic resources and primarily in areas adjacent to commercial/industrial land uses considered relatively less sensitive to noise and vibration.
- **Minor (+):** construction would occur primarily in areas with a potential buffer between the construction activity and the nearest occupied buildings and/or with usual and customary mitigation.

D.2.6 Air Quality Criteria

- **Major (-):** construction activities (diesel equipment and trucks) would occur adjacent to publicly accessible sidewalks and sensitive land uses (e.g., residential, hospitals, schools).
- **Moderate (o):** construction would occur within 100 to 300 feet of sensitive land uses.
- **Minor (+):** construction site is beyond 300 feet from sensitive land uses.

D.2.7 Socioeconomic Effects Criteria

- **Major (-):** project would displace active business (es).

[10] 90-foot threshold for historic resources based on New York City Department of Buildings Technical Policy and Procedure Notice #10/88. See http://www.nyc.gov/html/dob/downloads/ppn/tppn1088.pdf

- **Moderate (o):** project would limit the use of local business operations or require access diversions for local businesses for a period of 6 months or more.
- **Minor (+):** construction would not disrupt or only minimally disrupt businesses.

D.2.8 Open Space Resources Criteria

For purposes of this analysis, open space resources include all publicly accessible open space (as defined by the 2014 CEQR Technical Manual). This includes landscaped medians, such as the New York City Department of Parks and Recreation's Park Avenue Malls.

- **Major (-):** the alternative would permanently encroach on public open space resources.
- **Moderate (o):** construction would temporarily limit the use (e.g., access) or enjoyment of public open space for extended periods, or conflict with documented community open space objectives.
- **Minor (+):** construction and operation of the alternative would have no direct impact on open space and minimal indirect impacts (such as noise).

D.2.9 Community Facilities Criteria

- **Major (-):** the project location would significantly interfere with the access, operation, or safety of a community facility or its patrons.
- **Moderate (o):** the proposed project may limit access and require rerouting of vehicular access of emergency vehicles or persons working at or attending an institution (e.g. hospital/school/house-of-worship/ firehouse).
- **Minor (+):** the proposed project would not affect/interfere with major institutions/community facilities or operation of these facilities.

D.2.10 Community Character, Visual Resources and Urban Design Criteria

- **Major (-):** construction would substantially impair streetscape features (e.g., street trees, curb cuts, street walls, street furniture) and/or community activities during the construction period and/or beyond.
- **Moderate (o):** construction would have continuing impacts on streetscape elements/community activities for 6 months.
- **Minor (+):** construction would result in intermittent interruptions to streetscape features and occasionally affect community activities.

D.2.11 Cumulative Effects Criteria

- **Major (-):** other major construction project(s) within immediate proximity to the proposed project (less than 1 city block) would occur simultaneously with the construction of the proposed project and would affect adjacent nearby sensitive land uses for an extended period.
- **Moderate (o):** other major construction project(s) would occur simultaneous with the construction of the proposed project within 300 to 500 feet (1 to 2 city blocks) of each other and would affect sensitive land uses for a period of more than 6 months.
- **Minor (+):** other major construction project(s) would occur simultaneously with the construction of the proposed project but are more than 500 feet (2 city blocks) from the proposed project's work area; or no other major construction projects would occur simultaneously.

D.3 ENVIRONMENTAL FEATURES/EFFECTS OF ALTERNATIVES

D.3.1 Alternative 1

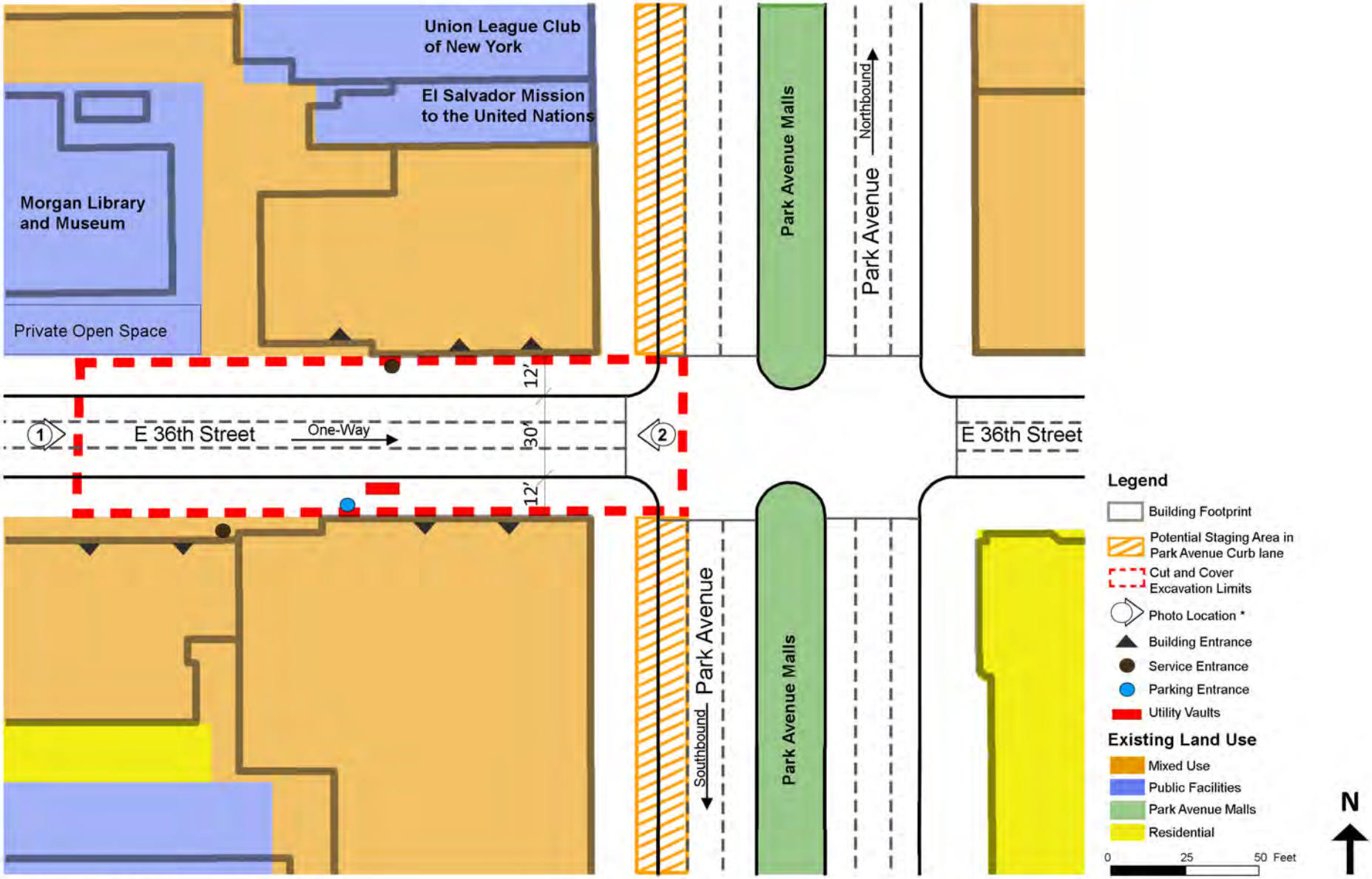
Local Context

Alternative 1 is located in the Murray Hill neighborhood, on East 36th Street between Park Avenue and Madison Avenue. Figure D-11 (page 108) presents a location sketch that shows the construction zone of the alternative. Figure B-3 (page 16) provides an image of the view facing west on East 36th Street from Park Avenue towards Madison Avenue.

From Park Avenue towards the west on the north side of East 36th Street is a 19-story residential apartment building followed by the Morgan Library and Museum's 1906 Building designed by Charles McKim of noted architecture firm McKim, Mead, and White (a National Historic Landmark and New York City Landmark, see Figure D-12 [page 109]). The south side of the street is lined with several large residential apartment buildings (between 10 and 20 stories) with some commercial use. There is a commercial parking garage on the south side of East 36th Street under one of the apartment buildings. Trees line both sides of the street at regular intervals, with larger mature trees occurring on the north sidewalk in front of the Morgan Library and Museum.

East 36th Street between Park Avenue and Madison Avenue is approximately 30 feet wide curb to curb, with three traffic lanes eastbound. The north side curb lane is identified by signage stating "No Standing Anytime"; however, consular and commercial parking is permitted in the south side curb lane from 7 AM to 7 PM. From 7 PM to 7 AM, non-commercial parking is permitted in the south side curb lane only. East 36th Street is a NYCDOT THRU Street, a designation of NYCDOT, implemented to reduce congestion on major east-west cross streets in midtown by prohibiting vehicles from making most turns between Third Avenue and Sixth Avenue between 10 AM and 6 PM on weekdays, among other measures.[11] The sidewalk on each side of the street is approximately 12 to 15 feet wide.

[11] However, turns onto Park Avenue are allowed.



Alternative 1 Overview Map

Figure D-11

FIGURE D-12: THE MORGAN LIBRARY AND MUSEUM (1906 MCKIM BUILDING)

Figure D-11 (page 108) identifies approximate construction limits of Alternative 1 in relation to existing land uses and environmental features. Cut-and-cover excavation with decking would extend across the entire width of East 36th Street. The contractor's staging/storage area would be located along Park Avenue. Cut-and-cover excavation would also be required within Park Avenue southbound to allow construction of a portion of the plenum (the remainder of plenum would be constructed via mining to connect to the two subway tunnels).

Historic and Cultural Resources

Alternative 1 is within the boundaries of the Murray Hill National Register Historic District, and the excavation for the fan chamber and control room would be adjacent to the Morgan Library and Museum, which is a National Historic Landmark and a New York City Landmark. The apartment buildings adjacent to the construction site (30 Park Avenue, 40 Park Avenue, and 36 East 36th Street) were built in the 1950s.[12] Construction activities at this site would require support-of-excavation of several buildings, including the 1906 McKim Building of the Morgan Library and Museum. Construction would require monitoring of four buildings, including the Morgan Library and Museum. Construction staging would require the removal of one traffic lane on East 36th Street and the west curb lane of Park Avenue. The curb lane staging area on Park Avenue would potentially have an adverse visual effect on the historic Union League Club, a New York City Landmark.

[12] MAP PLUTO

Traffic

Construction of Alternative 1 would restrict the street from two to one travel lane for approximately 24 months during: excavation of the fan chamber; installing support-of-excavation; and, relocation/supporting utilities. It would, thus, significantly reduce capacity on this high-volume THRU Street, which is specifically designated by NYCDOT to carry cross-town traffic and connect to the Queens/Midtown Tunnel in order to take the "pressure" off other streets. (Note: Daily peak traffic volumes carried by East 36th Street are almost twice the traffic volumes carried by other nearby side streets of Park Avenue.[13]) The narrowing of the street would not only reduce capacity and increase traffic congestion on East 36th Street, but drivers would also divert to other streets to avoid congestion, thereby increasing congestion on other eastbound streets in the vicinity.

Parking

Parking would be eliminated on East 36th Street between Park Avenue and Madison Avenue for approximately 24 months. Staging and storage activities required for construction would be accommodated in the west curb lane of Park Avenue between either East 35th and East 36th Streets, or between East 36th and East 37th Streets. This would temporarily eliminate parking on the west curb lane of Park Avenue on the block used for construction staging. The removal of on-street parking at these locations would affect parking supply in the area. Access to the parking garage on the south side of East 36th Street would be maintained, but would be significantly impacted thorough the construction for an extended period of time (over 4 years).

Pedestrians

Construction would occur on a relatively narrow side street and would require sidewalk closure, decking, and bridging to maintain access to some buildings. Construction would also impact the sidewalks on the west side of Park Avenue near the intersection of the street. Construction would require partial sidewalk closure (reduction in sidewalk width) for a period of approximately 2 years on each side of the East 36th Street from Park Avenue to a point approximately 200 feet west. As such, pedestrian circulation\flow\travel would be disrupted. Although access would be maintained, access to businesses, building service entrances, residences, a garage, and the Morgan Library and Museum would be adversely affected.

Noise and Vibration

Construction and excavation of sidewalks and streets would be up to the building lines of the building structures and affect the entire width of East 36th Street for approximately 200 feet west of the Park Avenue intersection. As a result, there would be noise impacts to sensitive receptors such as institutions (Morgan Library and Museum) and residences adjacent to the construction activities for approximately 2 years. There could be an increase in traffic noise related to traffic diversions caused by reduction in travel lanes and intermittent closures of East 36th Street.

The potential vibration impact during construction and excavation activities in proximity to historic/sensitive structures could significantly affect them. Extensive support of excavation measures and monitoring would be required for these structures.

[13] East 36th Street has a daily peak of about 760 vehicles per hour (vph) during the PM peak hour, while Average Daily Traffic (ADT) is approximately 11,800 vehicles per day (vpd). These volumes are considered high relative to the side streets to the north such as East 38th Street, which has 480 to 580 vph in the peak hour.

Air Quality

The potential for air quality (dust and air emissions) impacts would be expected to be comparatively high in Alternative 1 based on the proximity of the construction activity and heavy equipment to sensitive land uses. Additionally, the potential for increased traffic congestion on this Queens/Midtown Tunnel access route may result in increases in vehicular emissions associated with idling conditions.

Socioeconomic Effects

No business or residential displacements would occur as a result of construction. However, construction activity would impair accessibility to some business offices[14] along East 36th Street. A parking garage on the south side of East 36th Street (approximately 80 feet west of Park Avenue) would also be impacted as a result of the reduced lanes and/or street closures during construction.

Open Space Resources

There would be no direct impacts to the Park Avenue Malls or other open space resources. Under Alternative 1, access to and use of the private open space along the south side of the Morgan Library and Museum would be indirectly impacted by construction activity (e.g., noise, visual).

Community Facilities

The Morgan Library and Museum holds approximately 25 exhibitions per year, attended by nearly 200,000 people in 2013.[15] Although the main entrance to the building is located on Madison Avenue, temporary lane closures on East 36th Street could affect vehicle and pedestrian access by increasing congestion in the vicinity. Noise and vibration impacts could interfere with the function of the library and exhibitions.

Community Character, Visual Resources and Urban Design

Construction of Alternative 1 would result in substantial disruption to the adjacent residential area and cultural resource (The Morgan Library and Museum). The temporary disruption of building entrances would change the aesthetics of the street for the 4.5-year duration of construction. Seven (7) mature trees from East 36th Street would be removed and change the aesthetics of the street. Of these, three (3) trees in the south sidewalk could be replanted, but four (4) trees in the north sidewalk would be permanently eliminated due to ventilation gratings.

The only visual element of the operating emergency ventilation plant would be the introduction of street and sidewalk gratings.

Cumulative Effects

The area that would be affected by Alternative 1 is a long-established neighborhood and fully built out. No development plans in the area were identified at this preliminary level of analysis. The East Side Access project has a tunnel access hatch for personnel and concrete deliveries on the west side of Park Avenue just south of East 37th Street. However, the use of this access hatch for deliveries is expected to end in the second quarter of 2016[16]; therefore, it would not overlap with the construction time period anticipated for this project (2017).

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[14] The New York Otolaryngology Group is located at 36 East 36th Street, and the GemVie Medical Spa is located at 27 East 36th Street. Both businesses are located on the south side of East 36th Street; the Otolaryngology Group is directly adjacent to the excavation area, and the Medical Spa is at the end of the block.

[15] http://www.themorgan.org/sites/default/files/pdf/report_to_donors14.pdf

[16] http://web.mta.info/capital/esa_docs/Technical%20Memo%203%20Environmental%20Review%20 of%20 Potential%20Design%20Changes.pdf

The Special Midtown District (located north of East 39th Street) was the subject of the 2013 East Midtown Rezoning proposal that would have allowed up to 30 FAR (Floor Area Ratio) for certain developments and provided a mechanism to fund infrastructure improvements through new development. The East Midtown Zoning proposal was not adopted, but a more focused proposal to redevelop the block bounded by East 43rd Street to the north, East 42nd Street to the south, Madison Avenue to the west, and Vanderbilt Avenue to the east was approved by the City Planning Commission in March 2015. The One Vanderbilt development involves a 65-story commercial tower containing approximately 1.8 million gross square feet of space. The excavation and foundation work for One Vanderbilt is expected to be completed in 2017, with overall construction completed by 2021, and could contribute to cumulative construction traffic impacts associated with this alternative, depending on the final construction schedules of both projects.

Summary

As illustrated in overview notation on Table D-1, this alternative presents **Major (-)**impacts to historic resources, traffic, parking, pedestrians, noise and vibration, air quality, community facilities, and community character/visual resources/urban design resources; **Moderate (o)** socioeconomic effects and cumulative impacts; and **Minor (+)** concerns related to open space resource impacts.

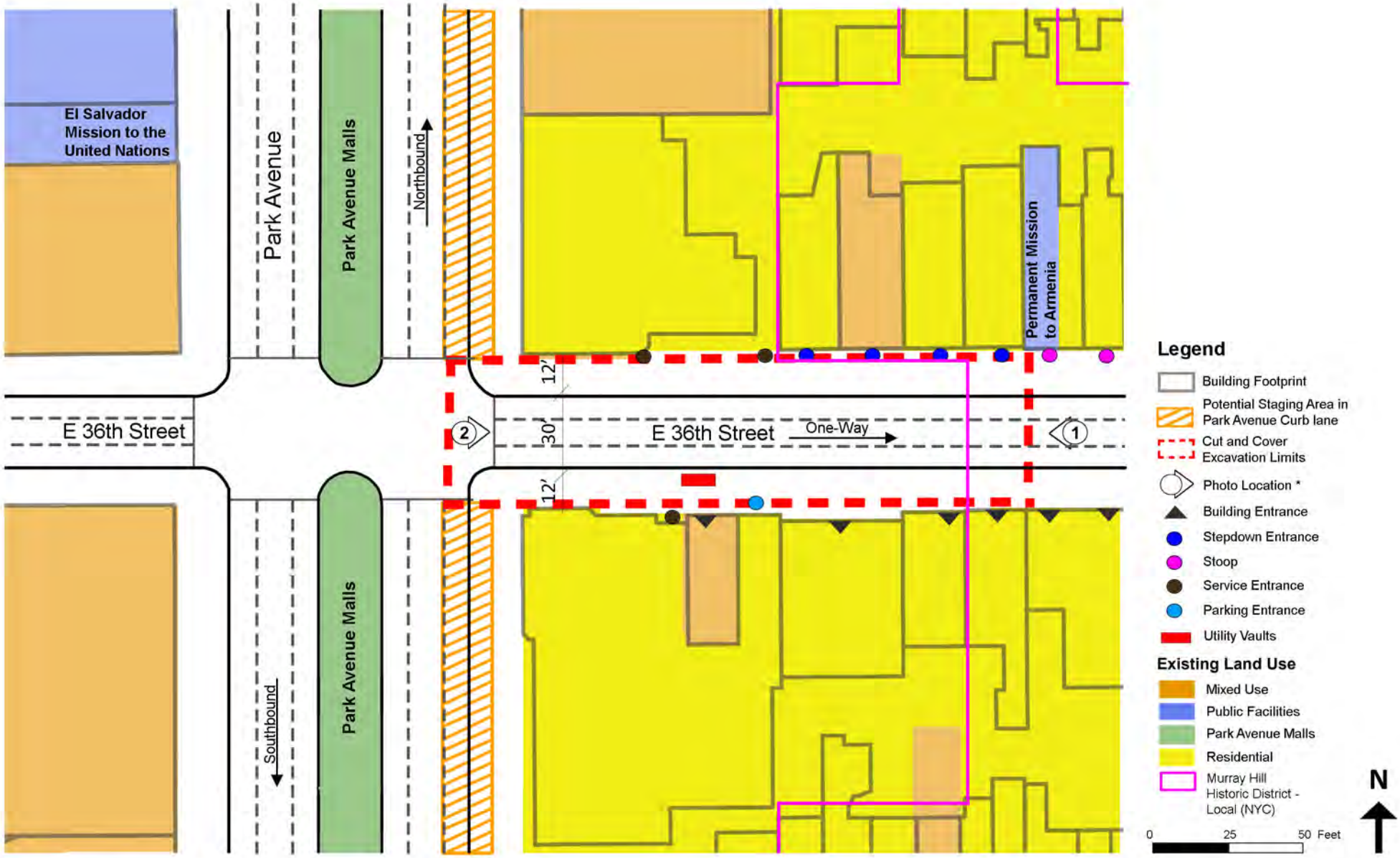
D.3.2 Alternative 2

Local Context

Alternative 2 is located in the Murray Hill neighborhood, on East 36th Street between Park Avenue and Lexington Avenue. Figure D-13 (page 113) presents an overview of Alternative 2. Figure B-8 (page 21) provides an image of the view facing east on East 36th Street from Park Avenue towards Lexington Avenue.

From Park Avenue towards the east on the north side of East 36th Street is a large residential apartment building followed by brownstone-type row houses (many with stoops) to the end of the block. Several foreign embassies are located on the north side of East 36th Street, including the Namibia Permanent Mission to the UN at 135 East 36th Street, and the Permanent Mission of Armenia to the UN at 119 East 36th Street. The south side has a combination of large residential apartment buildings and row houses. It also provides access to off-street parking under the apartment building at 106 East 36th Street. Mature trees line both sides of the street at regular intervals.

East 36th Street between Park Avenue and Lexington Avenue is approximately 30 feet wide curb to curb, with three traffic lanes eastbound. The north side curb lane is identified by signage stating “No Standing Anytime.” Commercial parking is permitted in the south side curb lane from 7 AM to 7 PM, and toward Lexington Avenue, consular and diplomat parking is permitted on the south side of the street. From 7 PM to 7 AM, non-commercial parking is permitted in the south side curb lane only. East 36th Street is a NYCDOT THRU Street, a designation NYCDOT implemented to reduce congestion on major east-west cross streets in midtown by prohibiting vehicles from making most turns between Third Avenue and Sixth Avenue between 10 AM and 6 PM on weekdays, among other measures. The sidewalk on the street is approximately 12 to 15 feet wide (6 feet where there are stoops).



Alternative 2 Overview Map

* Note: Photos Provided in Chapter B

Figure D-13

Figure D-13 (page 113) identifies approximate construction limits of Alternative 2 in relation to existing land uses and environmental features. Cut-and-cover excavation with decking would extend across the entire width of East 36th Street. The contractor's staging/storage area would be located along Park Avenue. Cut-and-cover excavation would also be required within Park Avenue northbound to allow construction of a portion of the plenum (the remainder of plenum would be constructed via mining to connect to the two subway tunnels).

Historic and Cultural Resources

Alternative 2 is within the boundaries of the Murray Hill National Register Historic District and partially within the City's Murray Hill Historic District. Excavation for the fan chamber and control room would occur adjacent to row houses constructed in the 1860s, including 107, 109, and 111 East 36th Street.[17] Construction activities at this site would require support-of-excavation and monitoring of several buildings. Construction staging would require the removal of one traffic lane on East 36th Street and the east curb lane of Park Avenue. The staging areas on Park Avenue would be within the National Register Historic District, but would not be adjacent to any designated historic properties.

Traffic

Construction of Alternative 2 would restrict the street from two to one travel lanes for approximately 24 months during: excavation of the fan chamber; installing support-of-excavation; and, relocation/supporting utilities. It would, thus, significantly reduce capacity on this high-volume THRU Street, which is specifically designated by NYCDOT to carry cross-town traffic and connect to the Queens/Midtown Tunnel in order to take the "pressure" off other streets. (Note: Daily peak traffic volumes carried by East 36th Street are almost twice the traffic volumes carried by other nearby side streets of Park Avenue.[18]) The narrowing of the street would not only reduce capacity and increase traffic congestion on East 36th Street, but drivers would also divert to other streets to avoid congestion, thereby increasing congestion on other eastbound streets in the vicinity.

Parking

Parking would be eliminated on East 36th Street between Park Avenue and Lexington Avenue for approximately 24 months. Staging and storage activities required for construction would be accommodated in the east curb lane of Park Avenue between either East 35th and East 36th Streets, or between East 36th and East 37th Streets. This would temporarily eliminate parking on the east curb lane of Park Avenue on the block used for construction staging. The removal of on-street parking at these locations would affect parking supply in the area. Access to the parking garage on the south side of East 36th Street would be maintained but would be significantly impacted throughout construction for an extended period of time (over 4 years).

Pedestrians

Construction would occur on a relatively narrow side street and would require sidewalk closure, decking, and bridging to maintain access to some buildings. Construction would also impact the sidewalks on the east side of Park Avenue near the intersection of the street. Construction would require partial sidewalk closure (reduction in sidewalk width) for a period of approximately 2 years on each side of the East 36th Street from Park Avenue to a point approximately 200 feet east. As such, pedestrian

[17] http://www.nyc.gov/html/lpc/downloads/pdf/reports/MURRAY_HILL_HISTORIC_DISTRICT.pdf

[18] East 36th Street has a daily peak of about 760 vehicles per hour (vph) during the PM peak hour, while Average Daily Traffic (ADT) is approximately 11,800 vehicles per day (vpd). These volumes are considered high relative to the side streets to the north such as East 38th Street, which has 480 to 580 vph in the peak hour.

circulation/flow/travel would be disrupted. Although access would be maintained, access to businesses, residences, and a garage would be adversely affected.

Noise and Vibration

Construction and excavation of sidewalks and streets would be up to the building lines of the building structures and affect the entire width of East 36th Street for approximately 200 feet east of the Park Avenue intersection. As a result, there would be noise impacts to sensitive receptors, such as residences, adjacent to the construction activities for approximately 2 years. There could be an increase in traffic noise related to traffic diversions caused by reduction in travel lanes and intermittent closures of East 36th Street.

The potential vibration impact during construction and excavation activities in proximity to historic/sensitive structures could significantly affect them. Extensive support of excavation measures and monitoring would be required for these structures.

Air Quality

The potential for air quality (dust and air emissions) impacts would be expected to be high in Alternative 2 based on the proximity of the construction activity and heavy equipment to sensitive land uses. Additionally, the potential for increased traffic congestion on this Queens/Midtown Tunnel access route may result in increases in vehicular emissions associated with idling conditions.

Socioeconomic Effects

No business or residential displacements would occur as a result of construction. However, construction activity would impair access to commercial businesses along East 36th Street, including several physicians' offices and a parking garage on the south side of East 36th Street, as a result of reduced lanes and/or street closures during construction.

Open Space Resources

There would be no direct impacts to the Park Avenue Malls or other open space resources.

Community Facilities

Construction impacts to a private nursery school/preschool[19] located at 128 East 36th Street would potentially relate to limited auto and pedestrian access to this facility as result of lane closures and sidewalk narrowing during construction, although access would be maintained at all times. The facility would also potentially experience construction noise impacts, particularly during the initial excavation activities.

Community Character, Visual Resources, and Urban Design

Construction of Alternative 2 would result in substantial disruption to the adjacent residential area and cultural resources (historic row houses). The temporary removal of entrances would change the aesthetics of the street for the 4.5-year duration of construction. Fifteen (15) street trees in the north and south sidewalks of East 36th Street would be removed, changing the aesthetics of the street. Of these, two (2) trees could be replanted, but 13 trees would be permanently eliminated due to ventilation gratings.

The only visual element of the operating emergency ventilation plant would be the introduction of street and sidewalk gratings.

[19] Wee Ones Club

Cumulative Effects

Other projects potentially contributing to cumulative construction impacts would be the same as those described for Alternative 1.

Summary

As illustrated in overview notation on Table D-1, this alternative presents **Major (-)** concerns for potential impacts to historic and cultural resources, traffic, parking, pedestrians, noise and vibration, air quality, and community character/visual resources/urban design; **Moderate (o)** concerns for potential socioeconomics effects, community facilities, and cumulative impacts; and **Minor (+)** concerns related to open spaces resources.

D.3.3 Alternative 3

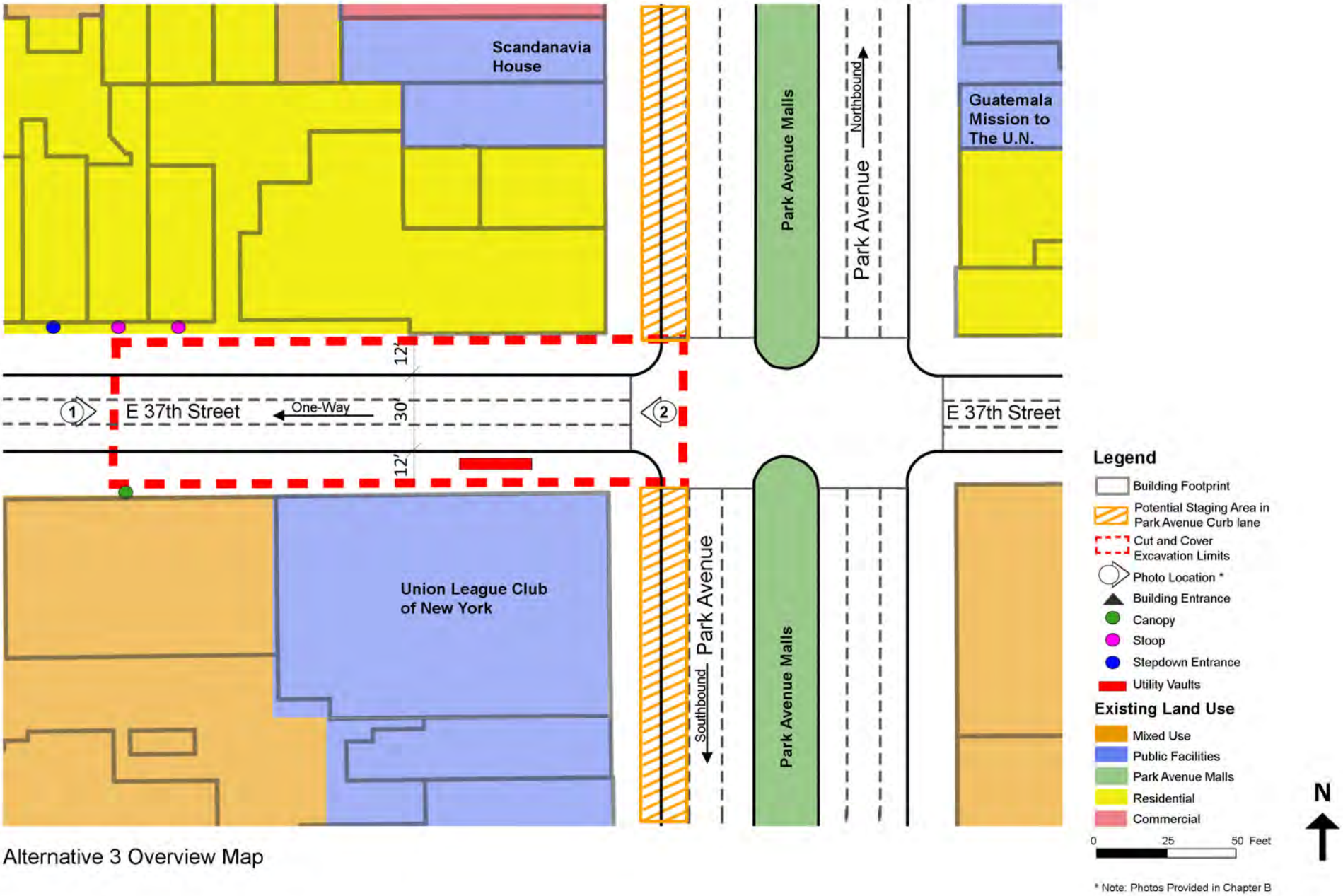
Local Context

Alternative 3 is located in the Murray Hill neighborhood, on East 37th Street between Park Avenue and Madison Avenue. Figure D-14 (page 117) presents a location sketch that shows the construction zone of the alternative. Figure B-12 (page 26) provides an image of the view facing west on East 37th Street from Park Avenue towards Madison Avenue.

From Park Avenue towards the west along the south side of East 37th Street is the Union League Club followed by a multi-story apartment building and at the end of the block, the Morgan Library and Museum. On the north side of the street there is a large multi-story residential building at the corner with Park Avenue, followed by several brownstones and the Consulate General of the Republic of Poland at the end of the block. Mature trees line both sides of the street at regular intervals.

East 37th Street between Park Avenue and Madison Avenue is approximately 30 feet wide curb to curb, with three traffic lanes westbound. The north side curb lane is identified by signage stating “No Standing 7 AM to 7 PM”; however, consular and commercial parking from 7 AM to 7 PM is permitted on the south side curb lane. From 7 PM to 7 AM, non-commercial parking is permitted on both sides of the street. East 37th Street is a NYCDOT THRU Street, a designation NYCDOT implemented to reduce congestion on major east-west cross streets in midtown by prohibiting vehicles from making most turns between Third Avenue and Sixth Avenue between 10 AM and 6 PM on weekdays, among other measures. The sidewalk on the street is approximately 12 to 15 feet wide.

Figure D-14 (page 117) identifies approximate construction limits of Alternative 3 in relation to existing land uses and environmental features. Cut-and-cover excavation with decking would extend across the entire width of East 37th Street adjacent to the Union League Club on the south side and the residential building on the north side. The contractor’s staging/storage area would be located along Park Avenue. Cut-and-cover excavation would also be required within Park Avenue southbound to allow construction of a portion of the plenum (the remainder of plenum would be constructed via mining to connect to the two subway tunnels).



Alternative 3 Overview Map

Figure D-14

Historic and Cultural Resources

Alternative 3 is within the boundaries of the Murray Hill National Register Historic District and would involve excavation for the fan chamber and control room adjacent to the Union League Club, which is a New York City Landmark. Construction activities at this site would require support-of-excavation and monitoring of several buildings. Construction would occur adjacent to row houses dating to the 1860s on the north side of the street (27 and 29 East 37th Street). One 1950s residential apartment building adjacent to Alternative 3 (30 East 37th Street) is considered a non-contributing property to the historic district.[20] Several additional historic properties are located at the western end of the block adjacent to Madison Avenue, including the Phelps Stokes–J.P. Morgan Jr. House at 231 Madison Avenue (which is a component the Morgan Library and Museum, a National Historic Landmark as discussed in Alternative 1), the Joseph De Lamar Mansion (currently the Consulate General of the Republic of Poland) at 233 Madison Avenue. These properties are not directly adjacent to the excavation area, but could require monitoring during construction. The curb lane staging area on Park Avenue and on East 37th Street would potentially have an adverse effect on the historic Union League Club at 48 Park Avenue.

Traffic

Construction of Alternative 3 would restrict the street from two to one travel lanes for approximately 24 months during: excavation of the fan chamber; installing support-of-excavation; and, relocation/supporting utilities. It would, thus, significantly reduce capacity on this high-volume THRU Street, which is specifically designated by NYCDOT to carry cross-town traffic and connect to the Queens/Midtown Tunnel in order to take the "pressure" off other streets. (Note: Daily peak traffic volumes carried by East 37th Street are almost twice the traffic volumes carried by other nearby side streets of Park Avenue.[21]) The narrowing of the street would not only reduce capacity and increase traffic congestion on East 37th Street, but drivers would also divert to other streets to avoid congestion, thereby increasing congestion on other westbound streets in the vicinity.

Parking

Parking would be eliminated on East 37th Street between Park Avenue and Madison Avenue for approximately 24 months. Staging and storage activities required for construction would be accommodated in the west curb lane of Park Avenue between either East 36th and East 37th Streets, or between East 37th and East 38th Streets. This would temporarily eliminate parking on the west curb lane of Park Avenue on the block used for construction staging. The removal of on-street parking at these locations would affect parking supply in the area.

Pedestrians

Construction would occur on a relatively narrow side street and would require sidewalk closure, decking, and bridging to maintain access to some buildings. Construction would also impact the sidewalks on the west side of Park Avenue near the intersection of East 37th Street. Construction would require partial sidewalk closure (reduction in sidewalk width) for a period of approximately 2 years on each side of the East 37th Street from Park Avenue to a point approximately 200 feet west. As such, pedestrian circulation would be restricted. The stoops of two row houses that extend into the construction limits would have to be removed and reconstructed following the completion of construction. Although access would be maintained, access to businesses, residences, and the Union League Club would be adversely affected.

[20] http://www.nps.gov/nr/feature/places/pdfs/13000039.pdf

[21] Traffic volumes on East 37th Street are high with an ADT of approximately 13,800 vehicles, and peak-hour flows are within an 890-950 vph range, compared to less than 580 vph on East 38th Street.

Noise and Vibration

Construction and excavation of sidewalks and streets would be up to the building lines of the building structures and affect the entire width of East 37th Street for approximately 200 feet west of the Park Avenue intersection. As a result, there would be noise impacts to sensitive receptors, such as the Union League Club and residences, adjacent to the construction activities for approximately 2 years. There could be an increase in traffic noise related to traffic diversions caused by reduction in travel lanes and intermittent closures of East 37th Street.

The potential vibration impact during construction and excavation activities very close to historic/sensitive structures could significantly affect them. Extensive support of excavation measures and monitoring would be required.

Air Quality

The potential for air quality (dust and air emissions) impacts would be expected to be high in Alternative 3 based on the proximity of the construction activity and heavy equipment to sensitive land uses. Additionally, the potential for increased traffic congestion on this Queens/Midtown Tunnel access route may result in increases in vehicular emissions associated with idling conditions.

Socioeconomic Effects

No business or residential displacements would occur as a result of construction. However, Alternative 3 would affect access to businesses such as the Morgan Shop at the Morgan Library and Museum and several physician offices resulting from street closures during construction.

Open Space Resources

There would be no direct impacts to the Park Avenue Malls or other open space resources.

Community Facilities

Alternative 3 would involve construction impacts to the adjacent Union League Club (a private organization), the Morgan Library and Museum, and the Consulate General of the Republic of Poland. For example, although access would be maintained, travelling East 37th Street by motor vehicle would be affected by lane closures and lack of on-street parking. Construction noise and dust emissions (particularly during the excavation phase) could interfere with the function of community facilities.

Community Character, Visual Resources, and Urban Design

Construction of Alternative 3 would result in substantial disruption to the adjacent residential area and cultural resources (Union League Club, among others). The temporary obstruction of entrances would change the aesthetics of the street for the 4.5-year duration of construction. Twelve (12) street trees along the north and south sidewalks of East 37th Street would be temporarily removed, changing the aesthetics of the street. Of these, six (6) trees would be replanted, but 6 trees would be permanently eliminated by ventilation gratings.

The only visual element of the operating emergency ventilation plant would be the introduction of street and sidewalk gratings.

Cumulative Effects

Other projects potentially contributing to cumulative construction impacts would be the same as those described for Alternative 1.

Summary

As illustrated in overview notation on Table D-1, this alternative presents **Major (-)** concerns for potential impacts on historic and cultural resources, traffic, parking, pedestrians, noise and vibration, air quality, community facilities and community character/visual resources/urban design; **Moderate (o)** concerns regarding socioeconomics effects and cumulative impacts; and **Minor (+)** concerns related to open space resources.

D.3.4 Alternative 4

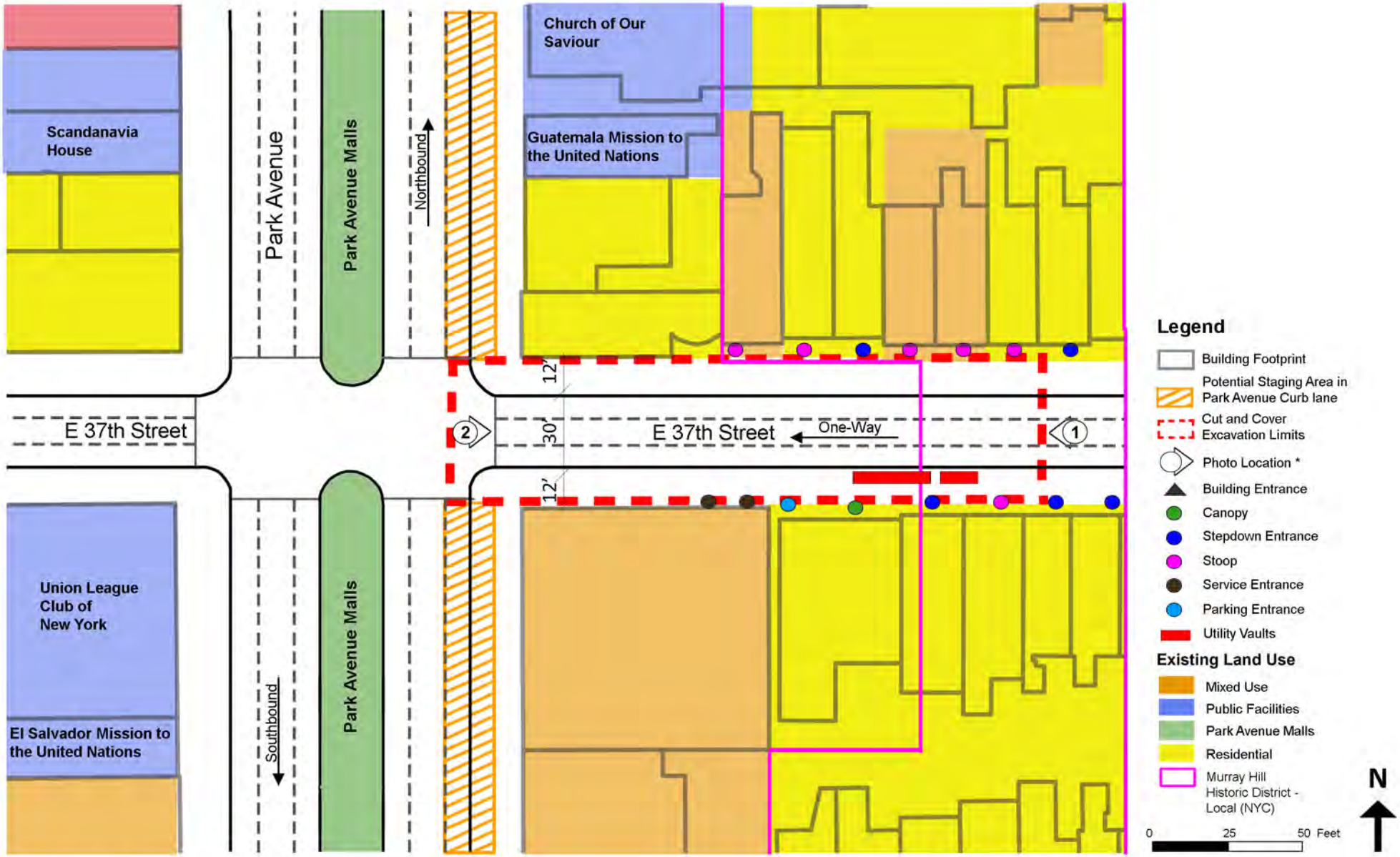
Local Context

Alternative 4 is located in the Murray Hill neighborhood, on East 37th Street between Park Avenue and Lexington Avenue. Figure D-15 (page 121) presents a location sketch that shows the construction zone of the alternative. Figure B-16 (page 31) provides an image of the view facing east on East 37th Street from Park Avenue towards Lexington Avenue.

From Park Avenue towards the east on the north side of East 37th Street is a small residential apartment building followed by brownstone-type row houses and larger apartment buildings until the end of the block. The south side has a combination of large residential apartment buildings and row houses. An active driveway is located on the south side of the street approximately 100 feet east of Park Avenue. Mature trees line both sides of the street at regular intervals.

East 37th Street between Park Avenue and Lexington Avenue is approximately 30 feet wide curb to curb, with three traffic lanes westbound. The north side curb lane is identified by signage stating “No Standing 7 AM to 7 PM including Sunday” and “No Standing 7 AM to 10 AM except Sunday” on the south side curb lane. Metered commercial parking is permitted on the south curb lane from 10 AM to 7 PM. From 7 PM to 7 AM, non-commercial parking is permitted on the south curb lane. East 37th Street is a NYCDOT THRU Street, a designation of NYCDOT implemented to reduce congestion on major east-west cross streets in midtown by prohibiting vehicles from making most turns between Third Avenue and Sixth Avenue between 10 AM and 6 PM on weekdays, among other measures. The sidewalk on the street is approximately 12 to 15 feet wide.

Figure D-15 (page 121) identifies approximate construction limits of Alternative 4 in relation to existing land uses and environmental features. Cut-and-cover excavation with decking would extend across the entire width of East 37th Street. The contractor’s staging/storage area would be located along Park Avenue. Cut-and-cover excavation would also be required within Park Avenue northbound to allow construction of a portion of the plenum (the remainder of plenum would be constructed via mining to connect to the two subway tunnels).



Alternative 4 Overview Map

* Note: Photos Provided in Chapter B

Figure D- 15

Historic and Cultural Resources

Alternative 4 is within the boundaries of the Murray Hill National Register Historic District and partially within the City's Murray Hill Historic District. Excavation for the fan chamber and control room would occur adjacent to row houses constructed in the early 1860s.[22] Construction activities at this site would require support-of-excavation of several buildings, including 45 and 49 Park Avenue, and 103, 104, 105, 107, 108, 109 110, 111 and 113 East 37th Street. Historic resources would require careful monitoring during construction. Construction staging would require the removal of one traffic lane on East 37th Street and the east curb lane of Park Avenue. The curb lane staging area on Park Avenue would potentially have an adverse visual effect on the historic Adelaide L.T. Douglas Residence (the Permanent Mission of Guatemala to the UN) at 57 Park Avenue, a New York City Landmark. The Park Avenue curb lane staging area also would potentially affect the Church of Our Saviour, identified as a contributing element of the National Register Historic District.

Traffic

Construction of Alternative 4 would restrict the street from two to one travel lanes for approximately 24 months during: excavation of the fan chamber; installing support-of-excavation; and relocation/supporting utilities. It would significantly reduce capacity on this high-volume THRU Street, which is specifically designated by NYCDOT to carry cross-town traffic and connect to the Queens/Midtown Tunnel in order to take the "pressure" off other streets. [Note: Daily peak traffic volumes carried by East 37th Street are almost twice the traffic volumes carried by other nearby side streets of Park Avenue.[23]] The narrowing of the street would not only reduce capacity and increase traffic congestion on East 37th Street, but drivers would also divert to other streets to avoid congestion, thereby increasing congestion on other westbound streets in the vicinity.

Parking

Parking would be eliminated on East 37th Street between Park Avenue and Lexington Avenue for approximately 24 months. Staging and storage activities required for construction would be accommodated in the east curb lane of Park Avenue between either East 36th and East 37th Streets, or between East 37th and East 38th Streets. This would temporarily eliminate parking in the east curb lane of Park Avenue on the block used for construction staging. The removal of on-street parking at these locations would affect parking supply in the area. Access to the parking garage on the south side of East 37th Street would be maintained, but would be significantly impacted thorough the construction for an extended period of time (over 4 years).

Pedestrians

Construction would occur on a relatively narrow side street and would require sidewalk closure, decking, and bridging to maintain access to some buildings. Construction would also impact the sidewalks on the east of Park Avenue near the intersection with East 37th Street. Construction would require partial sidewalk closure (reduction in sidewalk width) for a period of approximately 2 years on each side of the East 37th Street from Park Avenue to a point approximately 200 feet east. As such, pedestrian circulation would be restricted. The stoops of six row houses that extend into the construction limits would have to be removed and reconstructed following the completion of construction, along with at least two step-down building entrances. Although access would be maintained, access to businesses and residences would be adversely affected.

[22] http://www.nyc.gov/html/lpc/downloads/pdf/reports/MURRAY_HILL_HISTORIC_DISTRICT.pdf

[23] Traffic volumes on East 37th Street are high with an ADT of approximately 13,800 vehicles, and peak-hour flows are within an 890-950 vph range, compared to less than 580 vph on East 38th Street.

Noise and Vibration

Construction and excavation of sidewalks and streets would be up to the building lines of the building structures and affect the entire width of East 37th Street for approximately 200 feet east of the Park Avenue intersection. As a result, there would be noise impacts to sensitive receptors such as residences adjacent to the construction activities for approximately 2 years. Several buildings along the south side of East 37th Street have private rooftop outdoor space/gardens that would be sensitive to construction noise. There could be an increase in traffic noise related to traffic diversions caused by reduction in travel lanes and intermittent closures of East 37th Street.

The potential vibration impact during construction and excavation activities very close to historic/sensitive structures could significantly affect them. Extensive support of excavation measures and monitoring would be required.

Air Quality

The potential for air quality (dust and air emissions) impacts would be expected to be high in Alternative 4 based on the proximity of the construction activity and heavy equipment to sensitive land uses. Additionally, the potential for increased traffic congestion on this Queens/Midtown Tunnel access route may result in increases in vehicular emissions associated with idling conditions.

Socioeconomic Effects

No business or residential displacements would occur as a result of construction. However, Alternative 4 would affect access to several physicians' offices and a parking garage located on the south side of East 37th Street as a result the reduced land and/or street closures during construction.

Open Space Resources

There would be no direct impacts to the Park Avenue Malls or other open space resources.

Community Facilities

Alternative 4 would not be adjacent to community facilities. However, parking and building access at the Permanent Mission of Guatemala to UN and the Church of Our Saviour would be affected by the location of the staging area in the Park Avenue curb lane.

Community Character, Visual Resources, and Urban Design

Construction of Alternative 4 would result in substantial disruption to the adjacent residential area and cultural resources (historic row houses). The temporary obstruction of entrances would change the aesthetics of the street for the 4.5-year duration of construction. Nine (9) street trees in the north and south sidewalks of East 37th Street would be removed, changing the aesthetics of the street. Of these, four trees could be replanted, but five trees would be permanently eliminated by ventilation gratings.

The only visual element of the operating emergency ventilation plant would be the introduction of street and sidewalk gratings.

Cumulative Effects

Other projects potentially contributing to cumulative construction impacts would be the same as those described for Alternative 1.

Summary

As illustrated in overview notation on Table D-1, this alternative presents **Major (-)** concerns for potential impacts on historic and cultural resources, traffic, parking, pedestrians, noise and vibration, air quality,

and community character/visual resources/urban design; **Moderate (o)** concerns regarding socioeconomic effects, community facilities, and cumulative impacts; and **Minor (+)** concerns related to open space resources.

D.3.5 Alternative 5

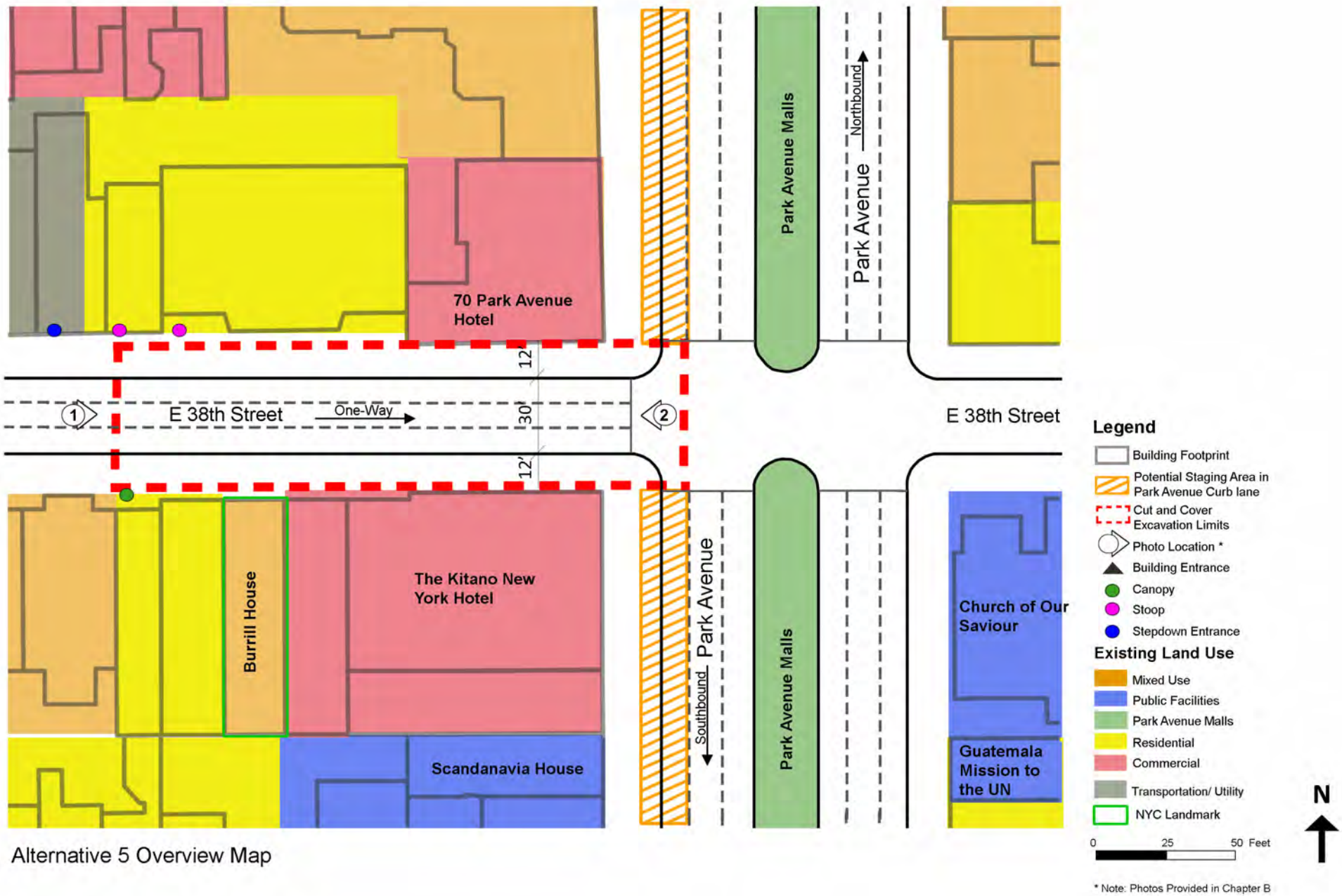
Local Context

Alternative 5 is located in the Murray Hill neighborhood, on East 38th Street between Park Avenue and Madison Avenue. Figure D-16 (page 125) presents a location sketch that shows the construction zone of the alternative. Figure B-20 (page 35) provides an image of the view facing west on East 38th Street from Park Avenue towards Madison Avenue.

From Park Avenue towards the west on the north side of East 38th Street are large residential apartment buildings and a few brownstone-type row houses in the middle of the block. The south side of East 38th Street from Park Avenue toward the west includes a large apartment building followed by brownstone-type row houses interspersed with larger apartment buildings. At the west end of the block is an active driveway. Trees line both sides of the street at regular intervals.

East 38th Street between Park Avenue and Madison Avenue is approximately 30 feet wide curb to curb, with three traffic lanes eastbound. The north side curb lane is reserved for commercial parking from 8 AM to 7 PM except on Sunday. The south side curb lane is identified by signage stating “No Standing 8 AM to 6 PM, except Sunday” and toward Madison Avenue, “No Standing, Hotel Loading Zone.” The sidewalk on the street is approximately 12 to 15 feet wide.

Figure D-16 (page 125) identifies approximate construction limits of Alternative 5 in relation to existing land uses and environmental features. Cut-and-cover excavation with decking would extend across the entire width of East 38th Street. The contractor’s staging/storage area would be located along Park Avenue. Cut-and-cover excavation would also be required within Park Avenue southbound to allow construction of a portion of the plenum (the remainder of plenum would be constructed via mining to connect to the two subway tunnels).



Alternative 5 Overview Map

Figure D-16

Historic and Cultural Resources

Alternative 5 is within the boundaries of the Murray Hill National Register Historic District. Excavation for the fan chamber and control room would be adjacent to the Middleton S. and Emilie Neilson Burrill House, which is a New York City Landmark at 36 East 38th Street. Construction activities at this site would require support-of-excavation and monitoring of several buildings, including the aforementioned building. Several row houses adjacent to the construction area on the south side of East 38th Street were built from the 1860s to early 1900s.[24] Two buildings adjacent to the construction area are considered non-contributing properties to the historic district: 66 Park Avenue (Kitano Hotel) and 35 East 38th Street (1959 apartment building). Construction staging would require the removal of one traffic lane on East 38th Street and the west curb lane of Park Avenue. The staging areas on Park Avenue would be within the National Register Historic District but would not be adjacent to any designated historic properties. Construction staging for this alternative would potentially affect historic properties on East 38th Street as a result of interference with access to historic resources and temporary aesthetic impacts.

Traffic

Construction of Alternative 5 would restrict the street from two to one travel lanes for approximately 24 months during: excavation of the fan chamber; installing support-of-excavation; and, relocation/supporting utilities. East 38th Street is not a designated THRU Street and carries lower traffic volumes (480 to 580 vph) than the THRU Streets to the south. The narrowing of the street would not only reduce capacity and increase traffic congestion on East 38th Street, but drivers would also divert to other streets to avoid congestion, thereby increasing congestion on other eastbound streets in the vicinity.

Parking

Parking would be eliminated on East 38th Street between Park Avenue and Madison Avenue for approximately 24 months. Staging and storage activities required for construction would be accommodated in the west curb lane of Park Avenue between either East 37th and East 38th Streets, or between East 38th and East 39th Streets. This would temporarily eliminate parking on the west curb lane of Park Avenue on the block used for construction staging. The removal of on-street parking at these locations would affect parking supply in the area as well as the pick-up/drop-of operations of taxis transporting patrons to and from the hotels at the northwest and southwest quadrants of the intersection of Park Avenue and East 38th Street (the 70 Park Avenue Hotel and the Kitano New York).

Pedestrians

Construction would occur on a relatively narrow side street and would require sidewalk closure, decking, and bridging to maintain access to some buildings. Construction would also impact the sidewalks on the west side of Park Avenue near the intersection of the street. Construction would require partial sidewalk closure (reduction in sidewalk width) for a period of approximately 2 years on each side of the East 38th Street from Park Avenue to a point approximately 200 feet west. As such, pedestrian circulation would be restricted. The stoops of two buildings that extend into the construction limits would have to be removed and reconstructed following the completion of construction. Although access would be maintained, access to businesses (such as the 70 Park Avenue Hotel) and residences would be adversely affected.

Noise and Vibration

Construction and excavation of sidewalks and streets would be up to the building lines of the building structures and affect the entire width of East 38th Street for approximately 200 feet west of the Park Avenue intersection. As a result, there would be noise impacts to sensitive receptors such as hotels and

[24] http://www.nps.gov/nr/feature/places/pdfs/13000039.pdf

residences adjacent to the construction activities for approximately 2 years. There could be an increase in traffic noise related to traffic diversions caused by reduction in travel lanes and intermittent closures of East 38th Street.

The potential vibration impact during construction and excavation activities very close to historic/sensitive structures could significantly affect them. Extensive support of excavation measures and monitoring would be required.

Air Quality

The potential for construction air quality impacts would be expected to be comparatively high under Alternative 5 based on the proximity of dust and air emissions generated by the construction activity and heavy equipment to sensitive land uses. Additionally, the potential for increased traffic congestion on the street may result in increases in vehicular emissions associated with idling conditions.

Socioeconomic Effects

No business or residential displacements would occur as a result of construction. However, Alternative 5 would affect access to commercial businesses[25] along East 38th Street as a result of the reduced lanes and/or street/sidewalk closures during construction.

Open Space Resources

There would be no direct impacts to the Park Avenue Malls or other open space resources.

Community Facilities

No impacts to institutional uses or other community facilities in the immediate vicinity are anticipated.

Community Character, Visual Resources, and Urban Design

Construction of Alternative 5 would result in substantial disruption to the adjacent residential area and cultural resources (historic row houses). The temporary removal of entrances would change the aesthetics of the street for the 4.5-year duration of construction. Ten (10) street trees along the north and south sidewalks of East 38th Street would be removed, changing the aesthetics of the street. Of these, six trees could be replanted, but four (4) trees would be permanently eliminated due to ventilation gratings.

The only visual element of the operating emergency ventilation plant would be the introduction of street and sidewalk gratings.

Cumulative Effects

Other projects potentially contributing to cumulative construction impacts would be the same as those described for Alternative 1.

Summary

As illustrated in overview notation on Table D-1, this alternative presents **Major (-)** concerns for potential impacts on historic and cultural resources, parking, pedestrians, noise and vibration, air quality, and community character/visual resources/urban design; **Moderate (o)** concerns regarding traffic, socioeconomic effects, and cumulative impacts; and **Minor (+)** concerns related to open space resources and community facilities.

[25] Potentially affected businesses include The 70 Park Avenue Hotel, the Kitano New York Hotel at 66 Park Avenue, and the Silverleaf Tavern located at 43 East 38th Street.

D.3.6 Alternative 6

Local Context

Alternative 6 is located in the Murray Hill neighborhood, on East 38th Street between Park Avenue and Lexington Avenue. Figure D-17 (page 129) presents a location sketch that shows the construction zone of the alternative. Figure B-24 (page 41) provides an image of the view facing east on East 38th Street from Park Avenue towards Lexington Avenue.

From Park Avenue toward the east on the north side of the street are large residential apartment buildings followed by brownstone-type row houses. A house-of-worship (the Church of Our Saviour) is located on the southeast corner of East 38th Street and Park Avenue, followed by a large apartment building and brownstone-type row houses. Trees line both sides of the street at regular intervals.

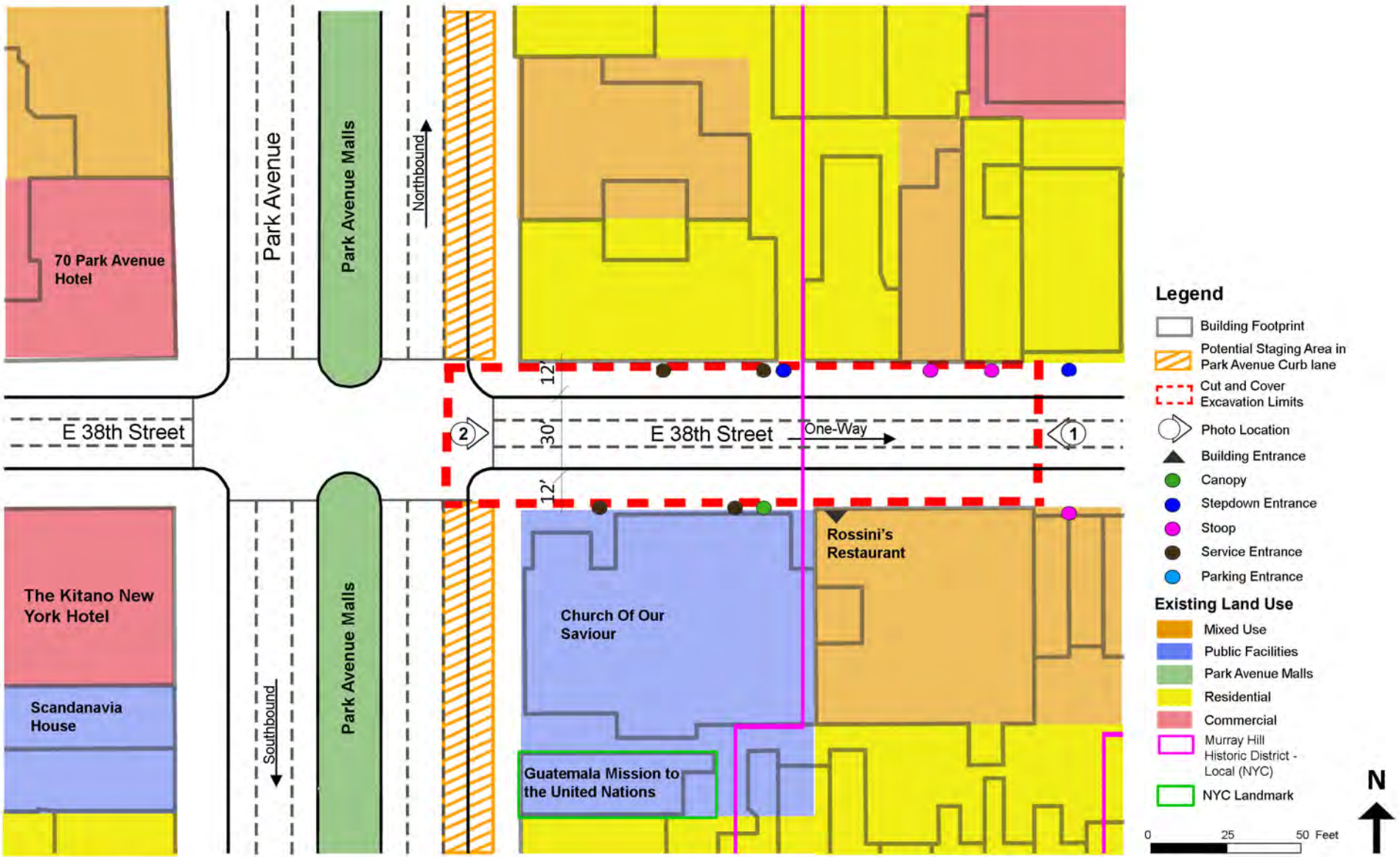
East 38th Street between Park Avenue and Lexington Avenue is approximately 30 feet wide curb to curb, with three traffic lanes eastbound. The north side curb lane prohibits all but metered commercial parking from 8 AM to 7 PM except Sunday, and the south side curb lane is identified with signage stating "No Standing" from 8 AM to 7 PM. East 38th Street is not a NYCDOT THRU Street. The sidewalk on the street is approximately 12 to 15 feet wide.

Figure D-17 (page 129) identifies approximate construction limits of Alternative 6 in relation to existing land uses and environmental features. Cut-and-cover excavation with decking would extend across the entire width of East 38th Street. The contractor's staging/storage area would be located along Park Avenue. Cut-and-cover excavation would also be required within Park Avenue northbound to allow construction of a portion of the plenum (the remainder of plenum would be constructed via mining to connect to the two subway tunnels).

Historic and Cultural Resources

Alternative 6 is within the boundaries of the Murray Hill National Register Historic District and partially within the City's Murray Hill Historic District. Excavation for the fan chamber and control room would be adjacent to buildings constructed between 1920 and 1930 (except for the Church of Our Saviour, which was constructed in 1956).[26] Construction activities at this site would require support-of-excavation and monitoring of several buildings. Construction staging would require the removal of one traffic lane on East 38th Street and the east curb lane of Park Avenue. The curb lane staging area on Park Avenue would potentially have an adverse visual effect on the historic Adelaide L.T. Douglas Residence (the Permanent Mission of Guatemala to the UN) at 57 Park Avenue, a New York City Landmark.

[26] MAP PLUTO



Alternative 6 Overview Map

* Note: Photos Provided in Chapter B

Figure D-17

Traffic

Construction of Alternative 6 would restrict the street from two to one travel lanes for approximately 24 months during: excavation of the fan chamber; installing support-of-excavation; and, relocation/supporting utilities. East 38th Street is not a designated THRU Street and carries lower traffic volumes (480 to 580 vph) than the THRU Streets to the south. The narrowing of the street would not only reduce capacity and increase traffic congestion on East 38th Street, but drivers would also divert to other streets to avoid congestion, thereby increasing congestion on other eastbound streets in the vicinity.

Parking

Parking would be eliminated on East 38th Street between Park Avenue and Lexington Avenue for approximately 24 months. Staging and storage activities required for construction would be accommodated in the west curb lane of Park Avenue between either East 37th and East 38th Streets, or between East 38th and East 39th Streets. This would temporarily eliminate parking on the east curb lane of Park Avenue on the block used for construction staging. The removal of on-street parking at these locations would affect parking supply in the area.

Pedestrians

Construction would occur on a relatively narrow side street and would require sidewalk closure, decking, and bridging to maintain access to some buildings. Construction would also impact the sidewalks on the east side of Park Avenue near the intersection of the street. Construction would require partial sidewalk closure (reduction in sidewalk width) for a period of approximately 2 years on each side of the East 38th Street from Park Avenue to a point approximately 200 feet east. As such, pedestrian circulation would be disrupted. The stoops of two buildings that extend into the construction limits would have to be removed and reconstructed following the completion of construction, along with at least one step-down building entrance. Although access would be maintained, access to businesses, residences, and the Church of Our Saviour would be adversely affected.

Noise and Vibration

Construction and excavation of sidewalks and streets would be up to the building lines of the building structures and affect the entire width of East 38th Street for approximately 200 feet west of the Park Avenue intersection. As a result, there would be noise impacts to sensitive receptors such the Church of Our Saviour and residences adjacent to the construction activities for approximately 2 years. There could be an increase in traffic noise related to traffic diversions caused by reduction in travel lanes and intermittent closures of East 38th Street.

The potential vibration impact during construction and excavation activities very close to historic/sensitive structures could significantly affect them. Extensive support of excavation measures and monitoring would be required.

Air Quality

The potential for air quality (dust and air emissions) impacts would be expected to be high in Alternative 6 based on the proximity of the construction activity and heavy equipment to sensitive land uses. Additionally, the potential for increased traffic congestion on the street may result in increases in vehicular emissions associated with idling conditions.

Socioeconomic Effects

No business or residential displacements would occur as a result of construction. However, Alternative 6 would affect access to one restaurant located at 108 East 38th Street (Rossini's) as a result of reduced lanes and/or closures (as well as reduced sidewalk width).

Open Space Resources

There would be no direct impacts to the Park Avenue Malls or other open space resources.

Community Facilities

Alternative 6 would involve construction impacts to the adjacent Church of Our Saviour. Excavation would occur near the building line on East 38th Street and on-street parking would not be available in front of the church on Park Avenue (due to a staging/storage area) or on East 38th Street east of Park Avenue. Temporary lane closures on East 38th Street could affect vehicle and pedestrian access by increasing congestion in the vicinity. Noise and vibration impacts could interfere with events and functions at the church (construction is not expected to occur on weekends, but weekday events could be affected).[27]

Community Character, Visual Resources, and Urban Design

Construction of Alternative 6 would result in substantial disruption to the adjacent residential area and cultural/community facilities (Church of Our Saviour). The disruption of entrances would change the aesthetics of the street for the 4.5-year duration of construction. Nine (9) street trees in the north and south sidewalks of East 38th Street would be removed, changing the aesthetics of the street. Of these, six (6) trees could be replanted, but three (3) trees would be permanently eliminated due to ventilation gratings.

The only visual element of the operating emergency ventilation plant would be the introduction of street and sidewalk gratings.

Cumulative Effects

Other projects potentially contributing to cumulative construction impacts would be the same as those described for Alternative 1.

Summary

As illustrated in overview notation on Table D-1, this alternative presents **Major (-)** concerns for potential impacts on historic and cultural resources, parking, pedestrians, noise and vibration, air quality, community facilities, and community character/visual resources/urban design; **Moderate (o)** concerns regarding traffic, socioeconomic effects, and cumulative impacts; and **Minor (+)** concerns regarding potential impacts on open space resources.

D.3.7 Alternative 7

Local Context

Alternative 7 is located in the Murray Hill neighborhood, on East 39th Street between Park Avenue and Madison Avenue. Figure D-18 (page 133) presents a location sketch that shows the construction zone of the alternative. Figure B-28 (page 45) provides an image of the view facing west on East 39th Street from Park Avenue towards Madison Avenue.

[27] The Church of Our Saviour has Mass and other functions at various times seven days per week. See http://oursaviournyc.org/

From Park Avenue toward the west on the north side of the street are large commercial buildings followed by smaller institutional buildings, including the Mexican Consulate, and a few small residential/commercial buildings. There is an apartment building at the end of the block, at the northeast corner of East 39th Street and Madison Avenue. On the south side of East 39th Street, from Park Avenue toward the west, is a large apartment building followed by six brownstone-type row houses and a large apartment/commercial building. The large apartment/commercial buildings at either end of the block on the south side of the street include parking garages. The large commercial building at the east end of the block on the south side has three bays for access to off-street parking and truck deliveries for the building. Trees line the south side of the street at regular intervals, but few trees are on the north side at the west end of the block.

East 39th Street between Park Avenue and Madison Avenue is approximately 30 feet wide curb to curb, with three traffic lanes westbound. The north side curb lane is reserved for commercial parking from 8 AM to 7 PM, except on Sunday. The south side curb lane is identified as "No Standing Except Commercial Vehicles" for metered parking from 7 AM to 7 PM, except Sunday at the east and west ends of the block, and diplomatic parking mid-block. The sidewalk on the street is approximately 12 to 15 feet wide.

Figure D-18 (page 133) identifies approximate construction limits of Alternative 7 in relation to existing land uses and environmental features. Cut-and-cover excavation with decking would extend across the entire width of East 39th Street. The contractor's staging/storage area would be located along Park Avenue. Cut-and-cover excavation would also be required within Park Avenue southbound to all construction of a portion of the plenum (the remainder of plenum would be constructed via mining to connect to the two subway tunnels).

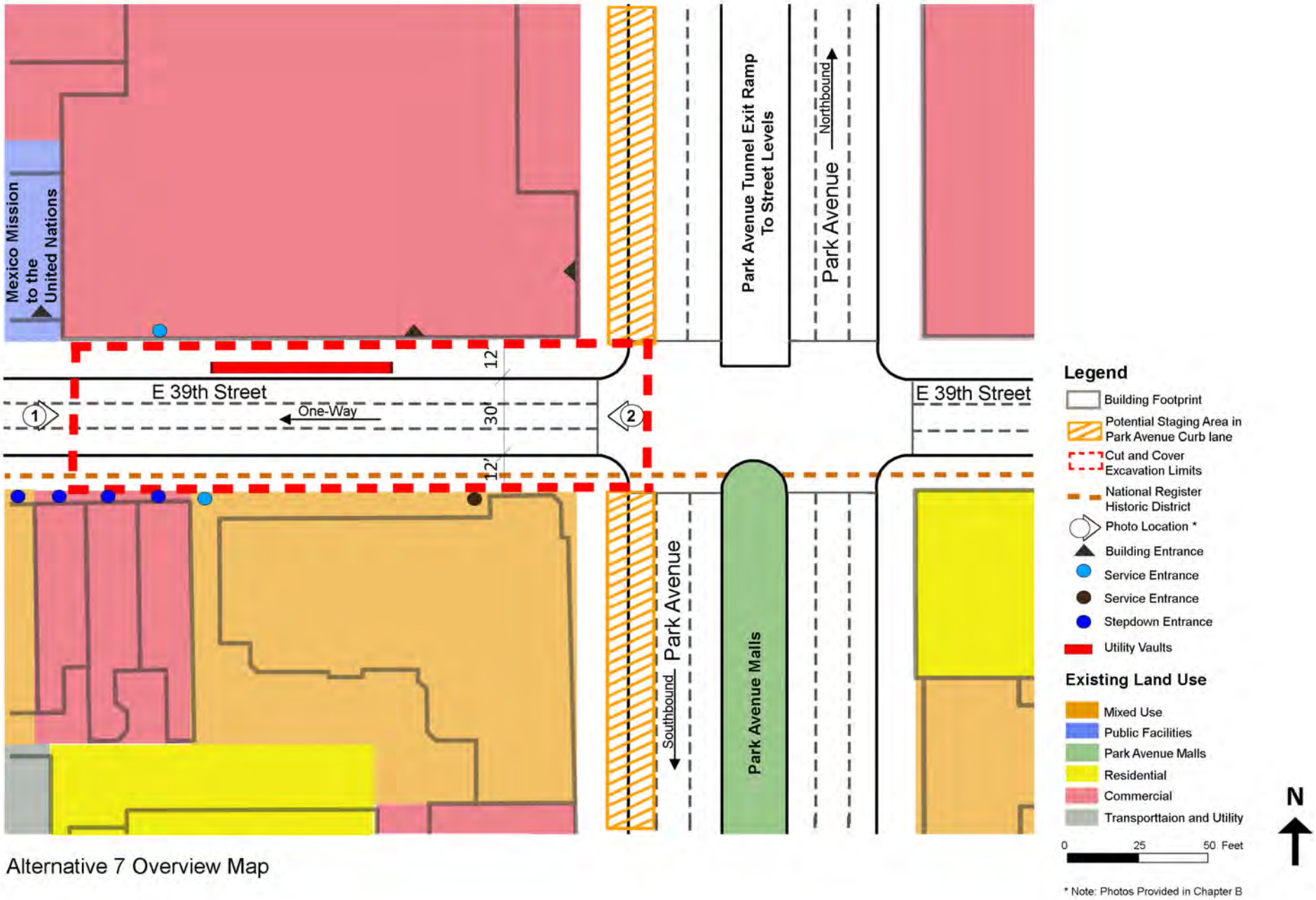
Historic and Cultural Resources

Alternative 7 is located outside the boundaries of the Murray Hill National Register Historic District, which includes the buildings on the south side of East 39th Street only. Construction would be adjacent to the historic district, including the 19-story apartment building built in 1955 at 80 Park Avenue, and row houses from the 1860s at 32 and 34 East 39th Street.[28] Construction activities at this site would require support-of-excavation and monitoring of several buildings. Construction staging would require the removal of one traffic lane on East 39th Street and the west curb lane of Park Avenue. The curb lane staging area on Park Avenue south of East 39th Street would be within the National Register Historic District, but would not be adjacent to any designated historic properties. The curb lane staging area on Park Avenue north of East 39th Street would be outside the National Register Historic District.

Traffic

Construction of Alternative 7 would restrict the street from two to one travel lanes for approximately 24 months during: excavation of the fan chamber; installing support-of-excavation; and, relocation/supporting utilities. East 39th Street is not a designated THRU Street and carries lower traffic volumes (480 to 620 vph) than the THRU Streets to the south. The narrowing of the street would not only reduce capacity and increase traffic congestion on East 39th Street, but drivers would also divert to other streets to avoid congestion, thereby increasing congestion on other westbound streets in the vicinity.

[28] http://www.nps.gov/nr/feature/places/pdfs/13000039.pdf



Alternative 7 Overview Map

Figure D-18

Parking

Parking would be eliminated on East 39th Street between Park Avenue and Madison Avenue for approximately 24 months. Staging and storage activities required for construction would be accommodated in the west curb lane of Park Avenue between either East 38th and East 39th Streets, or between East 39th and East 40th Streets. This would temporarily eliminate parking on the west curb lane of Park Avenue on the block used for construction staging. The removal of on-street parking at these locations would affect parking supply in the area. Access to two parking garages on the north and south sides of East 39th Street, respectively, would be maintained, but would be significantly impacted thorough the construction for an extended period of time (over 4 years).

Pedestrians

Construction would occur on a relatively narrow side street and would require sidewalk closure, decking, and bridging to maintain access to some buildings. Construction would also impact the sidewalks on the west side of Park Avenue near the intersection of the street. Construction would require partial sidewalk closure (reduction in sidewalk width) for a period of approximately 2 years on each side of the East 39th Street from Park Avenue to a point approximately 200 feet west. As such, pedestrian circulation would be restricted. The step-down entrances of at least two buildings that extend into the construction limits would have to be bridged and reconstructed following the completion of construction. Although access would be maintained, access to businesses and residences would be adversely affected.

Noise and Vibration

Construction and excavation of sidewalks and streets would be up to the building lines of the building structures and affect the entire width of East 39th Street for approximately 200 feet west of the Park Avenue intersection. As a result, there would be noise impacts to sensitive receptors such as residences (on the south side of the street) adjacent to the construction activities for approximately 2 years. There could be an increase in traffic noise related to traffic diversions caused by reduction in travel lanes and intermittent closures of East 39th Street.

The potential vibration impact during construction and excavation activities adjacent or near to historic/sensitive structures could significantly affect them. Extensive support of excavation measures and monitoring would be required.

Air Quality

The potential for air quality (dust and air emissions) impacts would be expected to be high in Alternative 7 based on the proximity of the construction activity and heavy equipment to sensitive land uses. Additionally, the potential for increased traffic congestion on the street may result in increases in vehicular emissions associated with idling conditions.

Socioeconomic Effects

No business or residential displacements would occur as a result of construction. However, Alternative 7 would affect access to businesses and two parking garages along East 39th Street[29] as a result of the reduced lanes and/or street closures during construction.

Open Space Resources

There would be no direct impacts to the Park Avenue Malls or other open space resources.

[29] This includes the Shakespeare restaurant at 24 East 39th Street.

Community Facilities

Alternative 7 would impact auto/pedestrian access to one institution, the Consulate General of Mexico, located at 27 East 39th Street (adjacent to the excavation area). A daycare facility is located on the west side of Park Avenue between East 39th Street and East 40th Street in a 41-story commercial building. Access to the facility could be affected by the loss of curb lane parking on this block of Park Avenue for construction staging/storage.

Community Character, Visual Resources, and Urban Design

Construction of Alternative 7 would result in substantial disruption to the adjacent residential area and cultural resources (historic row houses) on the south side of the street. The north side of the street consists of commercial uses. The temporary obstruction of entrances would change the aesthetics of the street for the 4.5-year duration of construction. Four (4) street trees along the south sidewalks of East 39th Street would be removed, changing the aesthetics of the street. Of these, all could be replanted.

The only visual element of the operating emergency ventilation plant would be the introduction of street and sidewalk gratings.

Cumulative Effects

Other projects potentially contributing to cumulative construction impacts would be the same as those described for Alternative 1.

Summary

As illustrated in overview notation on Table D-1, this alternative presents **Major (-)** concerns for potential impacts on historic and cultural resources, parking, pedestrians, noise and vibration, air quality, community facilities, and community character/visual resources/urban design; **Moderate (o)** concerns regarding traffic, socioeconomic effects, and cumulative impacts; and **Minor (+)** concerns regarding potential impacts on open space resources.

D.3.8 Alternative 8

Local Context

Alternative 8 is located in the Murray Hill neighborhood on East 39th Street between Park Avenue and Lexington Avenue. Figure D-19 (page 137) presents a location sketch that shows the construction zone of the alternative. Figure B-32 (page 50) provides an image of the view facing east on East 39th Street from Park Avenue towards Lexington Avenue.

From Park Avenue toward the east on the north side of the street is a large commercial building followed by brownstone-type row houses. On the south side of the street is a large apartment building followed by brownstone-type row houses, a hotel, more brownstone-type row houses, and another hotel. Trees line both sides of the street at regular intervals.

East 39th Street between Park Avenue and Lexington Avenue is approximately 30 feet wide curb to curb, with three traffic lanes westbound. The north side and south side curb lanes prohibit all but metered commercial parking from 7 AM to 7 PM except Sunday. East 39th Street is not a NYCDOT THRU Street.

Figure D-19 (page 137) identifies approximate construction limits of Alternative 8 in relation to existing land uses and environmental features. Cut-and-cover excavation with decking would extend across the entire width of East 39th Street. The contractor's staging/storage area would be located along Park Avenue. Cut-and-cover excavation would also be required within Park Avenue northbound to allow

construction of a portion of the plenum (the remainder of plenum would be constructed via mining to connect to the two subway tunnels).

Historic and Cultural Resources

Alternative 8 is partially within the National Register Murray Hill Historic District. The boundary of the National Register Historic District includes the buildings on the south side of East 39th Street and on both sides of the street at midblock. Construction of the fan chamber and control room would be adjacent to row houses from the 1860s to 1880s (109, 111, 114, and 113 East 39th Street).[30] The apartment building at the southeast corner of Park Avenue and East 39th Street (77 Park Avenue) was built in 1924.[31] Construction activities at this site would require support-of-excavation and monitoring of several buildings. Construction staging would require the removal of one traffic lane on East 39th Street and the east curb lane of Park Avenue. The curb lane staging area on Park Avenue south of East 39th Street would be within the National Register Historic District but would not be adjacent to any designated historic properties. The curb lane staging area on Park Avenue north of East 39th Street would be outside the National Register Historic District.

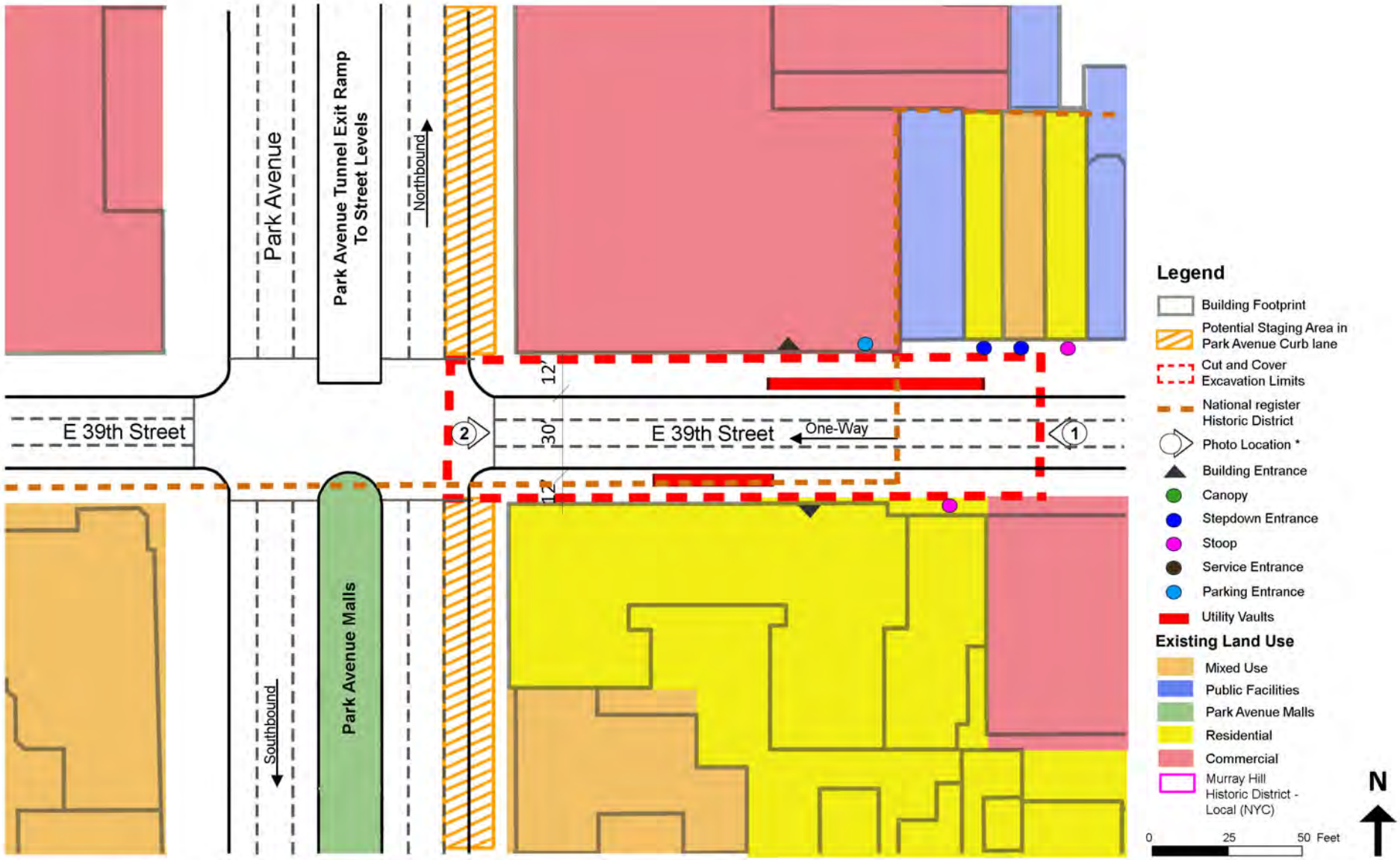
Traffic

Construction of Alternative 8 would restrict the street from two to one travel lanes for approximately 24 months during: excavation of the fan chamber; installing support-of-excavation; and, relocation/supporting utilities. East 39th Street is not a designated THRU Street and carries lower traffic volumes (480 to 620 vph) than the THRU Streets to the south. The narrowing of the street would not only reduce capacity and increase traffic congestion on East 39th Street, but drivers would also divert to other streets to avoid congestion, thereby increasing congestion on other westbound streets in the vicinity.

Parking

Parking would be eliminated on East 39th Street between Park Avenue and Lexington Avenue for approximately 24 months. Staging and storage activities required for construction would be accommodated in the east curb lane of Park Avenue between either East 38th and East 39th Streets, or between East 39th and East 40th Streets. This would temporarily eliminate parking on the east curb lane of Park Avenue on the block used for construction staging. The removal of on-street parking at these locations would affect parking supply in the area. Access to the parking garage on the north side of East 39th Street would be maintained, but would be significantly impacted throughout the construction period (over 4 years).

[30] http://www.nps.gov/nr/feature/places/pdfs/13000039.pdf
[31] MAP PLUTO



Alternative 8 Overview Map

* Note: Photos Provided in Chapter B

Figure D-19

Pedestrians

Construction would occur on a relatively narrow side street and would require sidewalk closure, decking, and bridging to maintain access to some buildings. Construction would also impact the sidewalks on the east side of Park Avenue near the intersection of the street. Construction would require partial sidewalk closure (reduction in sidewalk width) for a period of approximately 2 years on each side of the East 39th Street from Park Avenue to a point approximately 200 feet east. As such, pedestrian circulation would be restricted. The stoops of two buildings that extend into the construction limits would have to be removed and reconstructed following the completion of construction, along with at least two step-down building entrances. Although access would be maintained, access to businesses and residences would be adversely affected.

Noise and Vibration

Construction and excavation of sidewalks and streets would be up to the building lines of the building structures and affect the entire width of East 39th Street for approximately 200 feet west of the Park Avenue intersection. As a result, there would be noise impacts to sensitive receptors such as residences (on the south side of the street) adjacent to the construction activities for approximately 2 years. There could be an increase in traffic noise related to traffic diversions caused by reduction in travel lanes and intermittent closures of East 39th Street.

The potential vibration impact during construction and excavation activities very close to the historic/sensitive structures could significantly affect them. Extensive support of excavation measures and monitoring would be required.

Air Quality

The potential for construction air quality impacts would be expected to be comparatively high under Alternative 8 based on the proximity of dust and air emissions generated by the construction activity and heavy equipment to sensitive land uses. Additionally, the potential for increased traffic congestion on the street may result in increases in vehicular emissions associated with idling conditions.

Socioeconomic Effects

No business or residential displacements would occur as a result of construction. However, Alternative 8 would affect access to commercial businesses[32] and a parking garage on the north side of East 39th Street as a result of reduced lanes and/or street closures during construction.

Open Space Resources

There would be no direct impacts to the Park Avenue Malls or other open space resources.

Community Facilities

No impacts to institutional uses or other community facilities in the immediate vicinity are anticipated.

Community Character, Visual Resources, and Urban Design

Construction of Alternative 8 would result in substantial disruption to the adjacent residential area and cultural resources (historic row houses) on the south side of the street. The north side of the street consists of some commercial uses near Park Avenue, with residences at midblock. The temporary obstruction of entrances would change the aesthetics of the street for the 4.5-year duration of construction. Eight (8) street trees along the north and south sidewalks of East 39th Street would be

[32] The Tuscany Hotel is located at 110 East 39th Street. There is also a dry cleaner and a restaurant on the street.

removed, changing the aesthetics of the street. Of these, five (5) trees could be replanted, but three (3) trees would be permanently eliminated due to ventilation gratings.

The only visual element of the operating emergency ventilation plant would be the introduction of street and sidewalk gratings.

Cumulative Effects

Other projects potentially contributing to cumulative construction impacts would be the same as those described for Alternative 1.

Summary

As illustrated in overview notation on Table D-1, this alternative presents **Major (-)** concerns for potential impacts on historic and cultural resources, parking, pedestrians, noise and vibration, air quality and community character/visual resources/urban design; **Moderate (o)** concerns regarding traffic, socioeconomic effects, and cumulative impacts; and **Minor (+)** concerns regarding potential impacts on open space resources and community facilities.

D.3.9 Alternative 9

Local Context

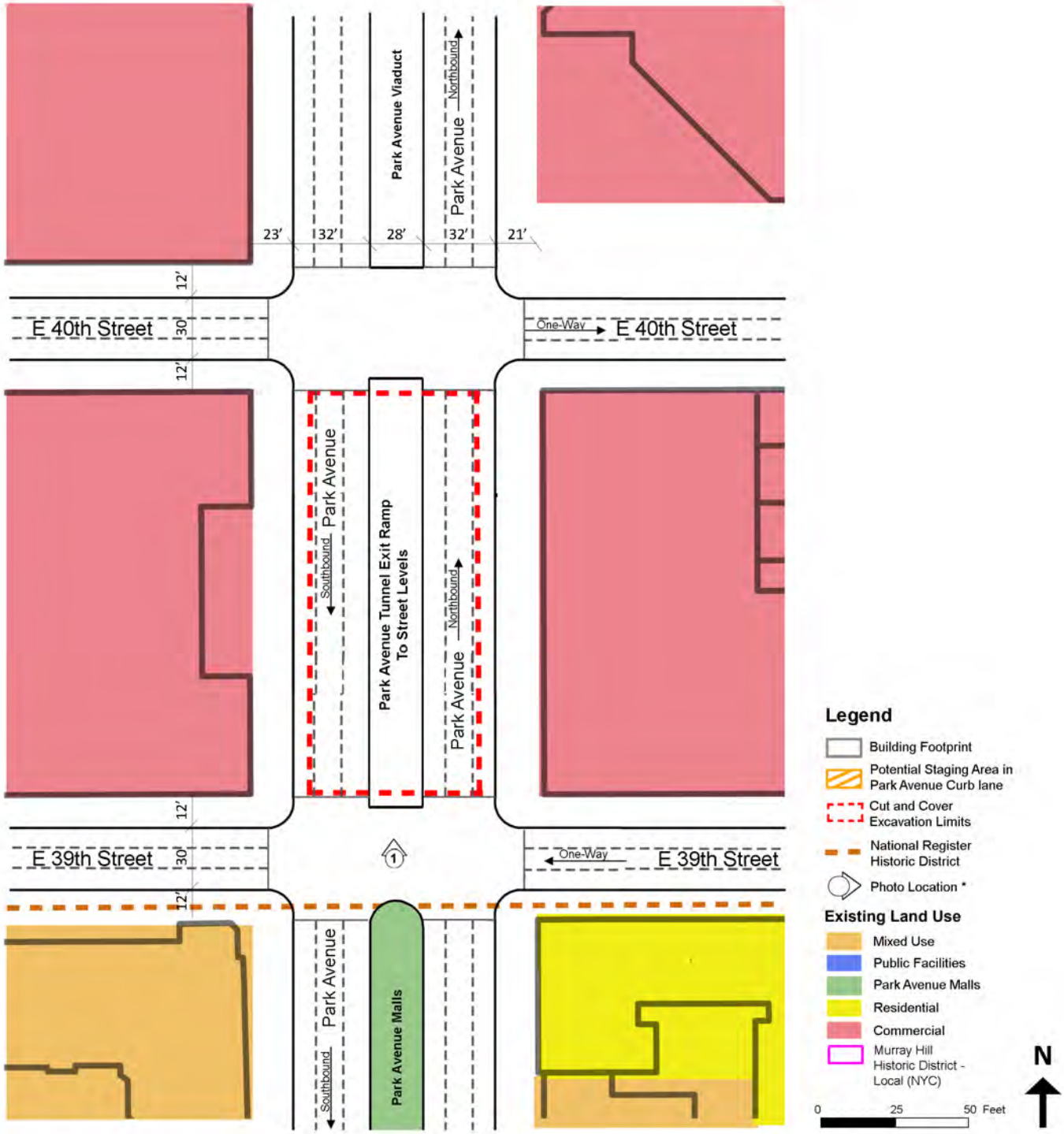
Alternative 9 is located in the Murray Hill neighborhood under the Park Avenue roadway tunnel ramp between East 39th and East 40th Street. Figure D-20 (page 140) presents a location sketch that shows the construction zone of the alternative. The Park Avenue roadway tunnel emerges from underground at the north edge of the intersection of East 39th Street and Park Avenue and merges with northbound Park Avenue at the intersection with East 40th Street. Figure B-35 (page 55) provides an image of the view facing north from Park Avenue at East 39th Street towards Grand Central Station. Large commercial buildings line both sides of Park Avenue in this area.

Park Avenue between East 39th and East 40th Streets is approximately 95 feet wide curb to curb, with three northbound lanes and three southbound lanes. Park Avenue in this area is accessible for trucks with overweight permits. Metered parking is permitted on the northbound curb lane for commercial vehicles from 8 AM to 7 PM, Monday through Friday, and non-commercial parking is permitted at other times. The southbound curb lane of the avenue is identified by signage stating “No Standing Anytime.” Trees line both sides of the street at regular intervals.

Figure D-20 (page 140) identifies approximate construction limits of Alternative 9 in relation to existing land uses and environmental features.

Historic and Cultural Resources

Alternative 9 is located outside the boundaries of the Murray Hill National Register Historic District and would not be adjacent to any individually designated historic resources. The commercial buildings on either side of Park Avenue between East 39th and East 40th Street were constructed in 1953 (east side) and 1963 (west side). The closest historic resource is the National Register-listed Pershing Square Viaduct (Park Avenue Viaduct), which extends from street level starting at East 40th Street, rising to an elevated viaduct between the northbound and southbound lanes of Park Avenue.



Alternative 9 Overview Map

* Note: Photos Provided in Chapter B

Figure D-20

Traffic

Construction of Alternative 9 would require closure of the Park Avenue roadway tunnel for at least 2 years because the emergency ventilation plant would constructed under the tunnel exit ramp to street level. With ADT of 11,800 vehicles, closing the roadway tunnel would divert traffic to Park Avenue itself, incrementally increasing congestion (Park Avenue surface traffic volumes are 1,000 to 1,100 vph in peak directions). The tunnel was converted from a two-direction roadway to a one-way northbound roadway by NYCDOT in 2008. NYCDOT analyzed the impact of eliminating southbound traffic through the tunnel and a similar magnitude of effects may be expected from temporarily eliminating northbound traffic through the tunnel as well.[33] Temporarily eliminating northbound traffic through the tunnel would likely increase northbound Park Avenue and Madison Avenue volumes and congestion as a result of traffic diversions.

Parking

Staging and storage could eliminate parking on northbound Park Avenue between East 39th Street and East 40th Street. (Southbound Park Avenue has no parking on this block).

Pedestrians

Construction would occur in the center of a large avenue and require minor disruption to the east sidewalk of Park Avenue between East 39th and East 40th Street. The fan chamber excavation area would not directly encroach on a sidewalk; the sidewalk may only be affected by staging/storage activities.

Noise and Vibration

Construction activity would be concentrated in the center of Park Avenue and would not occur adjacent to noise-sensitive land use or vibration-sensitive historic buildings. Noise could still affect residential receptors on the southeast and southwest corners of East 39th Street and Park Avenue, although these receptors are situated more than 70 feet from the construction zone.

Air Quality

The potential for construction air quality impacts would be expected to be low in Alternative 9 because the alternative provides approximately 50 feet between the most intense focus of construction activity and commercial buildings on either side of Park Avenue. However, the potential for increased traffic congestion on the street may result in increases in vehicular emissions associated with idling conditions.

Socioeconomic Effects

No business or residential displacements would occur as a result of construction. However, Alternative 9 would affect access to commercial businesses along Park Avenue as a result of reduced lanes and/or street closures during construction. Pedestrian access along sidewalks on Park Avenue would be maintained.

Open Space Resources

There would be no direct impacts to the Park Avenue Malls or other open space resources.

Community Facilities

No impacts to institutional uses or other community facilities in the immediate vicinity are anticipated.

[33] http://www.nyc.gov/html/dot/downloads/pdf/parkavetunnel.pdf
http://www.nyc.gov/html/dot/downloads/pdf/ssi09_parkavenuetunnel.pdf

Community Character, Visual Resources, and Urban Design

Construction of Alternative 9 would result in minimal disruption to community character given its context in the center of Park Avenue, surrounded by large commercial buildings. Eight street trees on the east side of Park Avenue would be permanently removed for construction of sidewalk gratings. Two additional trees could be impacted during construction, but subsequently they could be replanted.

The only visual element of the operating emergency ventilation plant would be the introduction of street and sidewalk gratings.

Cumulative Effects

Other projects potentially contributing to cumulative construction impacts would be the same as those described for Alternative 1.

Summary

As illustrated in overview notation on Table D-1, this alternative presents **Major (-)** concerns for potential impacts on traffic; **Moderate (o)** concerns regarding potential impacts on parking, air quality, socioeconomic effects, community character/visual resources/urban design, and cumulative effects; and **Minor (+)** concern regarding potential impacts on historic and cultural resources, pedestrians, noise and vibration, open space resources, and community facilities.

D.3.10 Alternative 10

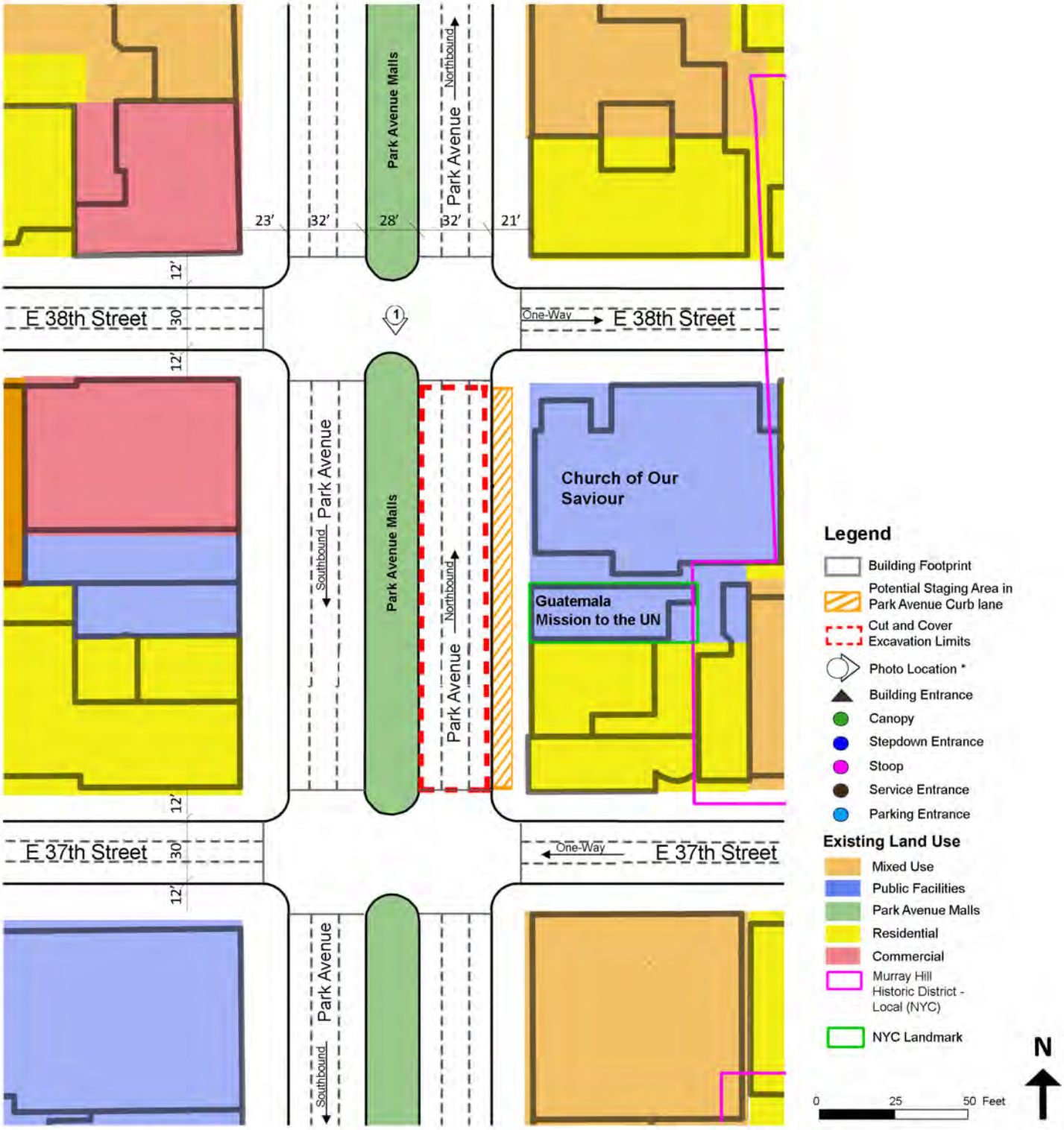
Local Context

Alternative 10 is located in the Murray Hill neighborhood under the Park Avenue roadway tunnel between East 37th and East 38th Streets. Figure D-21 (page 143) presents a location sketch that shows the construction zone of the alternative. Figure B-38 (page 58) provides an image of the view facing south along Park Avenue from East 38th Street.

The predominant building type along Park Avenue between East 37th and East 38th Streets is multi-story apartment buildings, with the majority within the height range of 4 to 15 stories. Trees and other plantings in the Park Avenue Malls separate the northbound and southbound lanes of Park Avenue and contribute to the aesthetics of the area. Moving from north to south along the east side of Park Avenue, notable land uses include the Church of Our Saviour (built in 1955 in a French Romanesque style) and the Permanent Mission of Guatemala to the UN. Notable land uses along the west side of Park Avenue include Scandinavia House (a cultural center/museum). The Union League Club is located at the southwest corner of East 37th Street and Park Avenue.

Park Avenue between East 37th and East 38th Streets is approximately 95 feet wide curb to curb, with three northbound lanes and three southbound lanes. Metered parking is permitted on the northbound curb lane for commercial vehicles from 8 AM to 7 PM, Monday through Friday; non-commercial parking is permitted at other times. Consulate and diplomat parking is permitted toward East 38th Street. The southbound curb lane of the avenue is identified by signage stating “No Standing Anytime.”

Figure D-21 (page 143) identifies approximate construction limits of Alternative 10 in relation to existing land uses and environmental features. The emergency ventilation plant would be located between the Lexington Avenue line northbound and southbound tunnels. Vent bays connecting to the east sidewalk of Park Avenue would be required, passing over the Lexington Avenue IRT northbound tunnel. An access shaft would also be required in the Park Avenue northbound streetbed.



Alternative 10 Overview Map

* Note: Photos Provided in Chapter B

Figure D-21

Historic and Cultural Resources

Alternative 10 is within the boundaries of the Murray Hill National Register Historic District. Excavation for the fan chamber and control room would be adjacent to the National Register-listed Adelaide T. Douglas House at 57 Park Avenue, now occupied by the Permanent Mission of Guatemala to the UN. This property is also a New York City Landmark. The buildings along the east side of Park Avenue between East 37th and East 38th Street were constructed between the early 1900s and the 1950s.[34] Construction activities at this site would require monitoring and support-of-excavation of several buildings, including the Adelaide T. Douglas House. The curb lane staging area on Park Avenue would potentially have an adverse visual effect on the Adelaide T. Douglas House and other contributing elements to the historic district, including the Church of Our Saviour.

Traffic

Construction of Alternative 10 would restrict Park Avenue northbound from three to one travel lane for about 3 years and require intermittent closures of the Park Avenue roadway tunnel (for underpinning). During these periods, traffic would be diverted to the adjacent curb lane to maintain one travel lane throughout construction. The narrowing of Park Avenue northbound would not only reduce capacity and increase congestion on Park Avenue, but drivers would also divert to other streets avoid congestion thereby increasing congestion on other northbound streets in the vicinity (such as Madison Avenue).

Parking

Parking would be eliminated on the east side of Park Avenue between East 37th Street and East 38th Street for approximately 3 years to accommodate staging and storage activities. The removal of on-street parking in these areas would affect parking supply in the area.

Pedestrians

Construction would require a partial sidewalk closure on the east side of Park Avenue between East 37th Street and East 38th Street. The sidewalk closure is necessary to construct the plenum that would connect the emergency ventilation plant to outside air via ventilation grates in the sidewalk. As such, pedestrian circulation would be restricted, but the portion of the sidewalk adjacent to buildings would remain open. No sidewalk bridges would be required, and the overall effect on pedestrian movement would be minor given that the existing sidewalk is approximately 18 feet wide.

Noise and Vibration

Construction and excavation would occur within approximately 20 feet of building lines along the east side of Park Avenue between East 37th Street and East 38th Street. As such, there would be the potential for noise and vibration impacts to sensitive receptors, such as the Permanent Mission of Guatemala to the UN, Church of Our Saviour and residences. There could be an increase in traffic noise related to traffic diversions caused by the reduction in travel lanes on Park Avenue.

The potential vibration impact during construction and excavation activities very close to the historic/sensitive structures could significantly affect them. Extensive support of excavation measures and monitoring would be required.

Air Quality

The potential for air quality (dust and air emissions) impacts would be expected to be moderate in Alternative 10 based on the proximity of the construction activity and heavy equipment to sensitive land uses. Specifically, Alternative 10 provides approximately 20 feet between the most intense focus of

[34] MAP PLUTO

construction activity and adjacent buildings along the east side of Park Avenue. Additionally, the potential for increased traffic congestion on the street may result in increases in vehicular emissions associated with idling conditions.

Socioeconomic Impact Effects

No business or residential displacements would occur as a result of construction. However, Alternative 10 would affect access to commercial businesses along Park Avenue as a result of reduced lanes and/or street closures during construction. Pedestrian access along sidewalks on Park Avenue would be maintained.

Open Space Resources

There would be no direct impacts to the Park Avenue Malls or other open space resources.

Community Facilities

Alternative 10 would involve construction impacts to the adjacent Church of Our Saviour. Excavation would occur near the building and on-street parking would not be available in front of the church on Park Avenue. Temporary lane closures on Park Avenue could affect vehicle and pedestrian access by increasing congestion in the vicinity. Noise and vibration impacts could interfere with events and functions at the church (construction is not expected to occur on weekends, but weekday events could be affected).[35]

Community Character, Visual Resources, and Urban Design

Construction of Alternative 10 would result in disruption to the institutional and residential land uses adjacent to the construction area on the east side of Park Avenue. However, entrances to buildings would not be impacted, and construction activities would be a minimum of 14 feet from the building line. Four (4) street trees in the east sidewalk of Park Avenue would be removed, changing the aesthetics of the street. Of these, two trees could be replanted, but two trees would be permanently eliminated due to ventilation gratings.

The only visual element of the operating emergency ventilation plant would be the introduction of street and sidewalk gratings.

Cumulative Effects

Other projects potentially contributing to cumulative construction impacts would be the same as those described for Alternative 1.

Summary

As illustrated in overview notation on Table D-1, this alternative presents **Major (-)** concerns regarding historic and cultural resources, noise and vibration, air quality, and community facilities; **Moderate (o)** concerns regarding traffic, parking, socioeconomic effects, community character/visual resources/urban design, and cumulative impacts; and **Minor (+)** concerns regarding impacts to pedestrians, and open space resources.

D.3.11 Alternative 11

Local Context

Alternative 11 is located in the Murray Hill neighborhood along northbound Park Avenue between East 37th and East 39th Street. Figure D-22 (page 147) presents a location sketch that shows the construction

[35] The Church of Our Saviour has Mass and other functions at various times seven days per week. See http://oursaviournyc.org/

zone of the alternative. Figure B-42 (page 63) provides an image of the view facing south on Park Avenue from East 39th Street.

Moving south along Park Avenue are high-rise residential apartment buildings between East 39th and East 38th Streets. The Church of Our Saviour is on the southeast corner of Park Avenue and East 38th Street. Mid-rise and high-rise apartment buildings are next to the church.

Park Avenue between East 37th and East 39th Streets is approximately 95 feet wide curb to curb, with three northbound lanes and three southbound lanes. Metered parking and consulate/diplomat parking is permitted on the northbound curb lane for commercial vehicles from 8 AM to 7 PM, Monday through Friday; non-commercial parking is permitted at other times.

Figure D-22 (page 147) provides an overview of the construction limits of Alternative 11 in relation to existing land uses and environmental features. The emergency ventilation plant would be located underground, above the Lexington Avenue line northbound tunnel.

Historic and Cultural Resources

Alternative 11 is within the boundaries of the Murray Hill National Register Historic District. Excavation for the fan chamber and control room would be adjacent to the National Register-listed Adelaide T. Douglas House at 57 Park Avenue, now occupied by the Permanent Mission of Guatemala to the UN. This property is also a New York City Landmark. The buildings along the east side of Park Avenue between East 37th and East 39th Street were constructed between the early 1900s and the 1950s.[36] Construction activities at this site would require monitoring and support-of-excavation of several buildings, including the Adelaide T. Douglas House. The curb lane staging area on Park Avenue would potentially have an adverse visual effect on the Adelaide T. Douglas House and other contributing elements to the historic district, including the Church of Our Saviour.

Traffic

Construction of Alternative 11 would restrict Park Avenue northbound from three to one travel lanes for approximately 2 years. During these periods, traffic would be diverted to the adjacent curb lane to maintain one travel lane throughout construction. The narrowing of Park Avenue northbound would not only reduce capacity and increase congestion on Park Avenue, but drivers would also divert to other streets avoid congestion thereby increasing congestion on other northbound streets in the vicinity (such as Madison Avenue).

Parking

Parking would be eliminated on the east side of Park Avenue between East 37th Street and East 39th Street for approximately 2 years to accommodate staging and storage activities. The removal of on-street parking in these areas would affect parking supply in the area.

[36] MAP PLUTO

Alternative 11 Overview Map

* Note: Photos Provided in Chapter B

Figure D-22

Pedestrians

Construction would require a partial sidewalk closure on the east side of Park Avenue between East 37th Street and East 39th Street. The sidewalk closure is necessary construct the plenum that would connect the emergency ventilation plant to outside air via ventilation gratings in the sidewalk. As such, pedestrian circulation would be restricted, but the portion of the sidewalk adjacent to buildings would remain open. No sidewalk bridges would be required, and the overall effect on pedestrian movement would be minor given that the existing sidewalk is approximately 18 feet wide.

Noise and Vibration

Construction and excavation would occur within approximately 20 feet of building lines along the east side of Park Avenue between East 37th Street and East 39th Street. As such, there would be the potential for noise and vibration impacts to sensitive receptors, such as the Permanent Mission of Guatemala to the UN, Church of Our Saviour and residences. There could be an increase in traffic noise related to traffic diversions caused by the reduction in travel lanes on Park Avenue.

The potential vibration impact during construction and excavation activities very close to the historic/sensitive structures could significantly affect them. Extensive support of excavation measures and monitoring would be required.

Air Quality

The potential for air quality (dust and air emissions) impacts would be expected to be moderate in Alternative 11 based on the proximity of the construction activity and heavy equipment to sensitive land uses. Specifically, Alternative 11 provides approximately 20 feet between the most intense focus of construction activity and adjacent buildings along the east side of Park Avenue. Additionally, the potential for increased traffic congestion on the street may result in increases in vehicular emissions associated with idling conditions.

Socioeconomic Effects

No business or residential displacements would occur as a result of construction. However, Alternative 11 would affect access to commercial businesses along Park Avenue as a result of reduced lanes and/or street closures during construction. Pedestrian access along sidewalks on Park Avenue would be maintained.

Open Space Resources

There would be no direct impacts to the Park Avenue Malls or other open space resources.

Community Facilities

Alternative 11 would involve construction impacts to the adjacent Church of Our Saviour. Excavation would occur near the building and on-street parking would not be available in front of the church on Park Avenue. Temporary lane closures on Park Avenue could affect vehicle and pedestrian access by increasing congestion in the vicinity. Noise and vibration impacts could interfere with events and functions at the church (construction is not expected to occur on weekends, but weekday events could be affected).[37]

Community Character, Visual Resources, and Urban Design

Construction of Alternative 11 would result in disruption to the institutional and residential land uses adjacent to the construction area on the east side of Park Avenue. However, entrances to buildings would not be impacted and construction activities would be a minimum of 14 feet from the building line. Ten

[37] The Church of Our Saviour has Mass and other functions at various times seven days per week. See http://oursaviournyc.org/

(10) street trees in the east sidewalk of Park Avenue would be removed, changing the aesthetics of the street. Of these, three trees could be replanted, but seven trees would be permanently replaced by grating.

The only visual element of the operating emergency ventilation plant would be the introduction of street and sidewalk gratings.

Cumulative Effects

Other projects potentially contributing to cumulative construction impacts would be the same as those described for Alternative 1.

Summary

As illustrated in overview notation on Table D-1, this alternative presents **Major (-)** concerns regarding historic and cultural resources, noise and vibration, air quality, and community facilities; **Moderate (o)** concerns regarding traffic, parking, socioeconomic effects, community character/visual resources/urban design, and cumulative impacts; and **Minor (+)** concerns regarding impacts to pedestrians, and open space resources.

D.3.12 Alternative 12

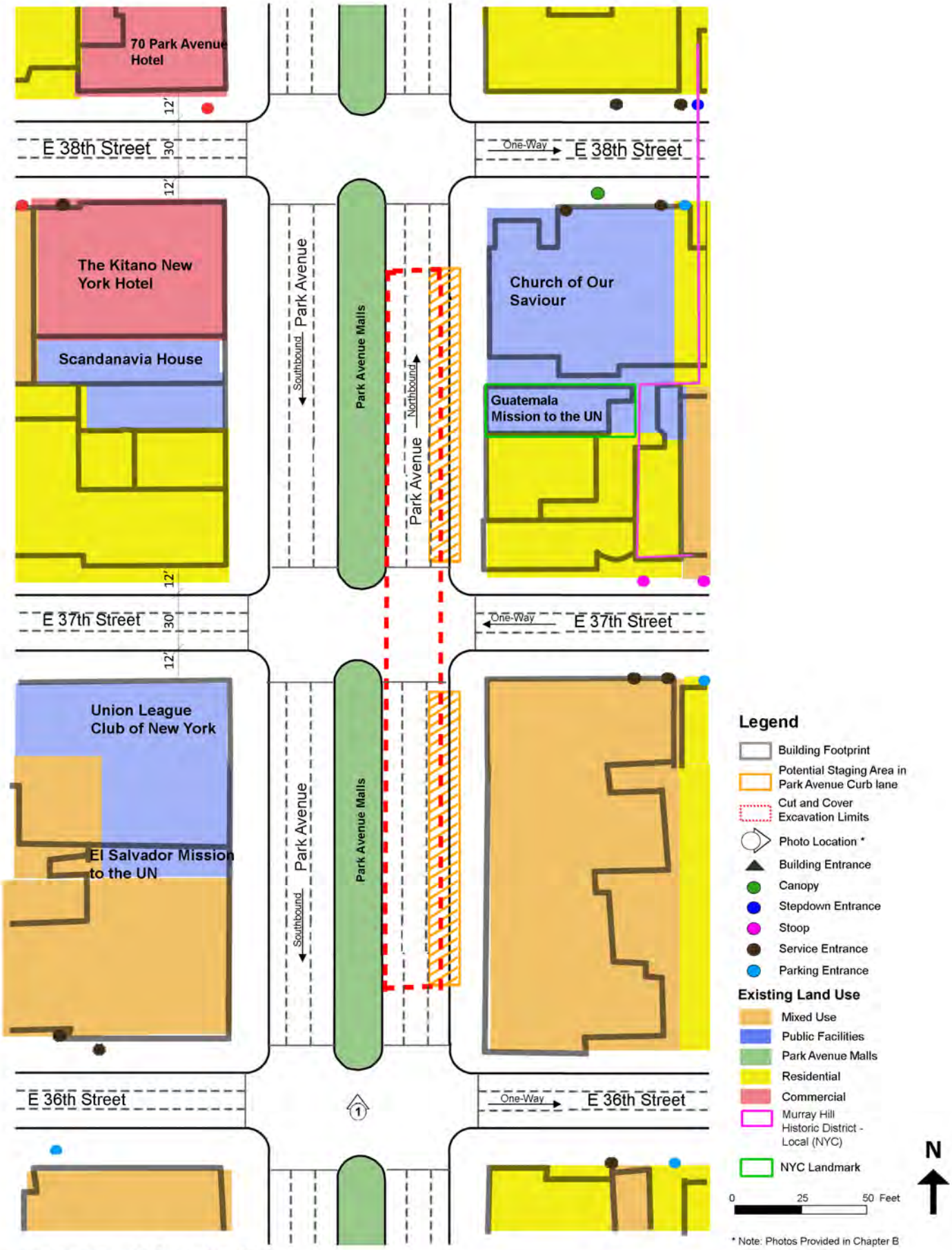
Local Context

Alternative 12 is located in the Murray Hill neighborhood along northbound Park Avenue between East 36th and East 38th Streets. Figure D-23 (page 150) presents a location sketch that shows the construction zone of the alternative. Figure B-46 (page 70) provides an image of the view facing south on Park Avenue from East 38th Street.

Moving south along Park Avenue, the Church of Our Saviour is on the southeast corner of Park Avenue and East 38th Street, followed by mid-rise and high-rise apartment buildings. High-rise residential buildings are on the east of Park Avenue between East 38th and East 39th Streets.

Park Avenue between East 36th and East 38th Streets is approximately 95 feet wide curb to curb, with three northbound lanes and three southbound lanes. Metered parking and consulate/diplomat parking is permitted on the northbound curb lane for commercial vehicles from 8 AM to 7 PM, Monday through Friday; non-commercial parking is permitted at other times. The northeast corner of Park Avenue and 36th Street has a taxi stand.

Figure D-23 (page 150) provides an overview of the construction limits of Alternative 12 in relation to existing land uses and environmental features. The emergency ventilation plant would be located underground, above the Lexington Avenue line northbound tunnel.



Alternative 12 Overview Map

Figure D-23

Historic and Cultural Resources

Alternative 12 is within the boundaries of the Murray Hill National Register Historic District. Excavation for the fan chamber and control room would be adjacent to the National Register-listed Adelaide T. Douglas House at 57 Park Avenue, now occupied by the Permanent Mission of Guatemala to the UN. This property is also a New York City Landmark. The buildings along the east side of Park Avenue between East 36th and East 38th Street were constructed between the early 1900s and the 1950s, except for the 21-story apartment building at 45 Park Avenue (southeast quadrant of the intersection with East 37th Street) that was built in 2006.[38] Construction activities at this site would require monitoring and support-of-excavation of several buildings, including the Adelaide T. Douglas House. The curb lane staging area on Park Avenue would potentially have an adverse visual effect on the Adelaide T. Douglas House and other contributing elements to the historic district, including the Church of Our Saviour.

Traffic

Construction of Alternative 12 would restrict Park Avenue northbound from three to one travel lanes for approximately 2 years. During these periods, traffic would be diverted to the adjacent curb lane to maintain one travel lane throughout construction. The narrowing of Park Avenue northbound would not only reduce capacity and increase congestion on Park Avenue, but drivers would also divert to other streets avoid congestion thereby increasing congestion on other northbound streets in the vicinity (such as Madison Avenue).

Parking

Parking would be eliminated on the east side of Park Avenue between East 36th Street and East 38th Street for approximately 2 years to accommodate staging and storage activities. The removal of on-street parking in these areas would affect parking supply in the area.

Pedestrians

Construction would require a partial sidewalk closure on the east side of Park Avenue between East 36th Street and East 38th Street. The sidewalk closure is necessary construct the plenum that would connect the emergency ventilation plant to outside air via ventilation grates in the sidewalk. As such, pedestrian circulation would be restricted, but the portion of the sidewalk adjacent to buildings would remain open. No sidewalk bridges would be required, and the overall effect on pedestrian movement would be minor given that the existing sidewalk is approximately 18 feet wide.

Noise and Vibration

Construction and excavation would occur within approximately 20 feet of building lines along the east side of Park Avenue between East 36th Street and East 38th Street. As such, there would be the potential for noise and vibration impacts to sensitive receptors, such as the Permanent Mission of Guatemala to the UN, Church of Our Saviour and residences. There could be an increase in traffic noise related to traffic diversions caused by the reduction in travel lanes on Park Avenue.

The potential vibration impact during construction and excavation activities near the historic/sensitive structures could significantly affect them. Extensive support of excavation measures and monitoring would be required.

[38] MAP PLUTO

Air Quality

The potential for air quality (dust and air emissions) impacts would be expected to be moderate under Alternative 12 based on the proximity of the construction activity and heavy equipment to sensitive land uses. Specifically, Alternative 12 provides approximately 20 feet between the most intense focus of construction activity and adjacent buildings along the east side of Park Avenue. Additionally, the potential for increased traffic congestion on the street may result in increases in vehicular emissions associated with idling conditions.

Socioeconomic Effects

No business or residential displacements would occur as a result of construction. However, Alternative 12 would affect access to commercial businesses along Park Avenue as a result of reduced lanes and/or street closures during construction. Pedestrian access along sidewalks on Park Avenue would be maintained.

Open Space Resources

There would be no direct impacts to the Park Avenue Malls or other open space resources.

Community Facilities

Alternative 12 would involve construction impacts to the adjacent Church of Our Saviour. Excavation would occur near the building and on-street parking would not be available in front of the church on Park Avenue. Temporary lane closures on Park Avenue could affect vehicle and pedestrian access by increasing congestion in the vicinity. Noise and vibration impacts could interfere with events and functions at the church (construction is not expected to occur on weekends, but weekday events could be affected).[39]

Community Character, Visual Resources, and Urban Design

Construction of Alternative 12 would result in disruption to the institutional and residential land uses adjacent to the construction area on the east side of Park Avenue. However, entrances to buildings would not be impacted and construction activities would be a minimum of 14 feet from the building line. Ten (10) street trees in the east sidewalk of Park Avenue would be removed, changing the aesthetics of the street. Of these, three trees could be replanted, but seven trees would be permanently eliminated by ventilation gratings.

The only visual element of the operating emergency ventilation plant would be the introduction of street and sidewalk gratings.

Cumulative Effects

Other projects potentially contributing to cumulative construction impacts would be the same as those described for Alternative 1.

Summary

As illustrated in overview notation on Table D-1, this alternative presents **Major (-)** concerns regarding historic and cultural resources, traffic, noise and vibration, air quality, and community facilities; **Moderate (o)** concerns regarding parking, socioeconomic effects, community character/visual resources/urban design, and cumulative impacts; and **Minor (+)** concerns regarding impacts to pedestrians, and open space resources.

[39] The Church of Our Saviour has Mass and other functions at various times seven days per week. See http://oursaviournyc.org/

D.3.13 Alternative 13

Local Context

Alternative 13 is located in the Murray Hill neighborhood along northbound Park Avenue between East 36th and East 37th Streets. Figure D-24 (page 154) presents a location sketch that shows the construction zone of the alternative. Figure B-50 (page 76) provides an image of the view facing south on Park Avenue from East 37th Street.

High rise residential apartment buildings are located along the east side of Park Avenue adjacent to this alternative.

Park Avenue between East 36th and East 37th Streets is approximately 95 feet wide curb to curb, with three northbound lanes and three southbound lanes. Metered parking is permitted part of the northbound curb lane for commercial vehicles from 8 AM to 6 PM, Monday through Friday; non-commercial parking is permitted at other times. The southern part of the block is marked as a taxi stand and no parking anytime.

Figure D-24 (page 154) provides an overview of the construction limits of Alternative 13 in relation to existing land uses and environmental features. The emergency ventilation plant would be located below grade, above the Lexington Avenue line northbound tunnel.

Historic and Cultural Resources

Alternative 13 is within the boundaries of the Murray Hill National Register Historic District and would potentially encroach into a building contributing to the historic district: 41 Park Avenue (18 story-apartment building built in 1950).[40] The potential that the construction/excavation and permanent footprint limits would extend beyond the building line would require, at a minimum, a permanent easement. Considering the likelihood of considerable permanent building footprint intrusion, Alternative 13 would be avoided compared to the other alternatives.

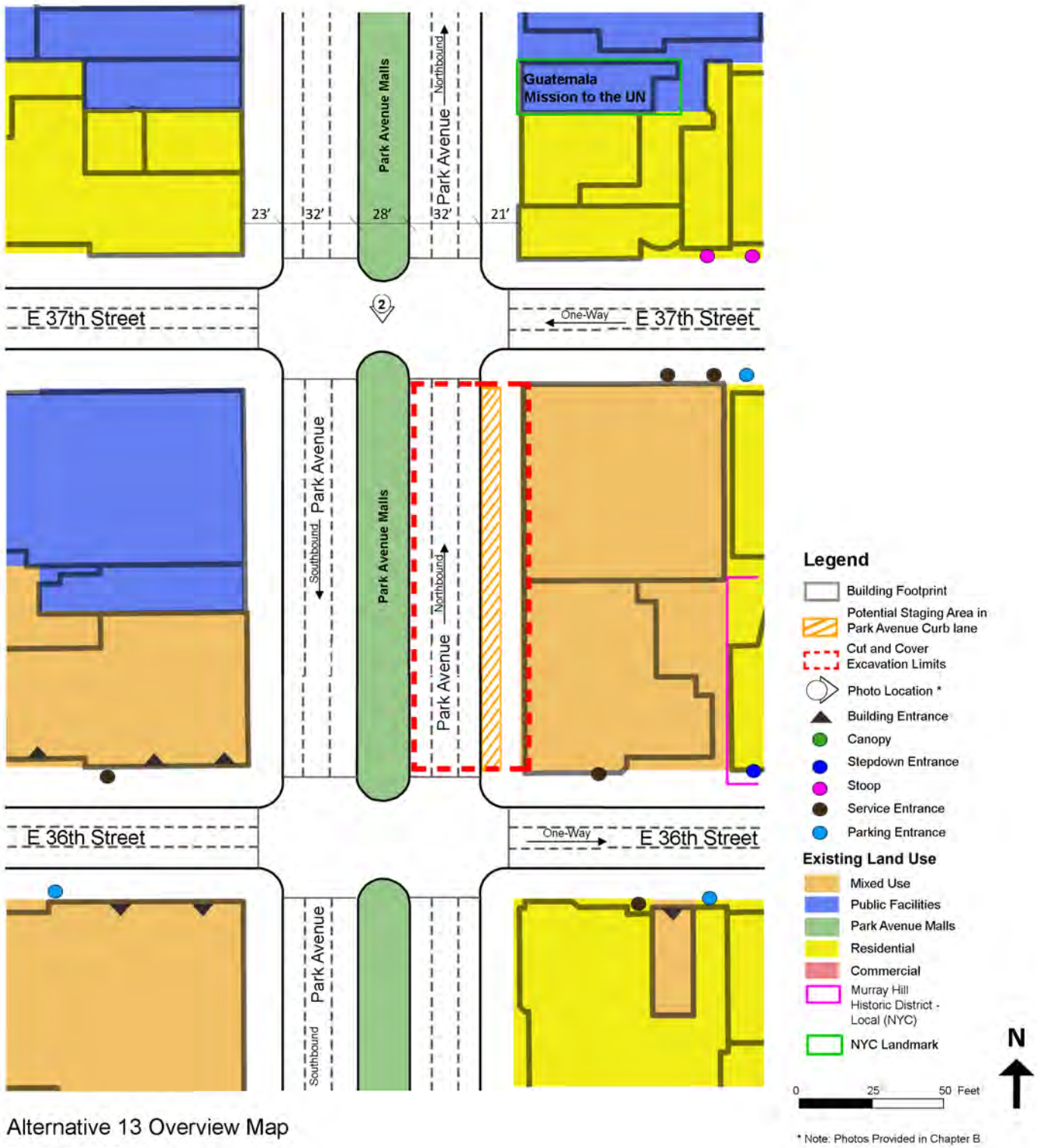
Traffic

Construction of Alternative 13 would restrict Park Avenue northbound from three to one travel lanes for approximately 3 years. During these periods, one travel lane would be maintained throughout construction. The narrowing of Park Avenue northbound would not only reduce capacity and increase congestion on Park Avenue, but drivers would also divert to other streets to avoid congestion thereby increasing congestion on other northbound streets in the vicinity (such as Madison Avenue).

Parking

Parking would be eliminated on the east side of Park Avenue between East 36th Street and East 37th Street for approximately 3 years to accommodate staging and storage activities. The removal of on-street parking in these areas would affect parking supply in the area.

[40] http://www.nps.gov/nr/feature/places/pdfs/13000039.pdf



Alternative 13 Overview Map

Figure D-24

Pedestrians

Construction would require sidewalk closure on the east side of Park Avenue between East 36th Street and East 37th Street because the entire sidewalk is within the excavation area. Sidewalk decking and bridging would be required to maintain access to some buildings. As such, pedestrian circulation would be restricted. Although access would be maintained, access to businesses, and residences, would be adversely affected.

Noise and Vibration

Construction and excavation would occur adjacent to the building line along the east side of Park Avenue between East 36th Street and East 37th Street. As such, there would be the potential for noise and vibration impacts to sensitive receptors, such as residences and historic buildings. There could be an increase in traffic noise related to traffic diversions caused by the reduction in travel lanes on Park Avenue.

Air Quality

The potential for air quality (dust and air emissions) impacts would be expected to be high in Alternative 13 based on the proximity of the construction activity and heavy equipment to sensitive land uses. Additionally, the potential for increased traffic congestion on the street may result in increases in vehicular emissions associated with idling conditions.

Socioeconomic Effects

The width of the fan chamber under Alternative 13 would require encroachment into the building line of structures along the east side of Park Avenue, resulting in substantial residential and displacement impacts. Even if direct displacement could be avoided, there would be indirect impacts to businesses and offices located on the east side of Park Avenue adjacent to the construction zone. During a portion of the construction duration, the sidewalk would be closed and/or restricted, and traffic would be restricted to one travel lane. Although access to buildings would be maintained, a café and other businesses that are located on the east side of Park Avenue between East 36th and East 37th Streets would be adversely affected.

Open Space Resources

There would be no direct impacts to the Park Avenue Malls or other open space resources.

Community Facilities

No impacts to institutional uses or other community facilities in the immediate vicinity are anticipated.

Community Character, Visual Resources, and Urban Design

Alternative 13 would substantially alter community character and visual resources if the removal of existing buildings was to occur. (Note: Alternative 13 has been determined to be ***not feasible*** by MTA NYCT.) Five street trees in the east sidewalk of Park Avenue also would have to be removed, changing the aesthetic character of the street. Of these, one tree could be replanted, but four trees would be permanently eliminated due to ventilation gratings.

Cumulative Effects

Other projects potentially contributing to cumulative construction impacts would be the same as those described for Alternative 1.

Summary

As illustrated in overview notation on Table D-1, this alternative presents: **Major (-)** concerns for potential impacts to historic and cultural resources, pedestrians, noise and vibration, air quality, socioeconomics, and community character/visual resources/urban design; **Moderate (o)** concerns regarding traffic, parking, and cumulative impacts; and **Minor (+)** concerns regarding impacts to open space resources and community facilities.

D.3.14 Conclusion—Alternatives Advanced for Further Consideration from an Environmental Standpoint

The following presents a summary of the environmental evaluation of the alternatives and identifies those alternatives judged appropriate for further analysis. Table D-1 was prepared to summarize the environmental implications of each alternative and to identify the alternatives that have the ***greatest potential to minimize adverse environmental effects***. This table is meant to be used as a tool to facilitate the review of alternatives and is not a substitute for the details given throughout this section of the report. Table D-1 also notes those alternatives found ***not feasible*** based on the engineering evaluation (1, 2, 5, 9, and 13). Inspection of the summary information in Table D-1 indicates that, from the array of thirteen (13) alternatives:

- The preponderance of potential **Major (-)** environmental impacts occurs with the Alternatives 1 through 8 (side street alternatives) and Alternative 13 (along Park Avenue northbound).
- The preponderance of potential **Moderate (O)** and **Minor (+)** environmental impacts relate to Alternatives 9, 10, 11, and 12.

Therefore, only Alternatives 9, 10, 11, and 12 will be considered further for decision-analysis from the environmental standpoint.

TABLE D-1: COMPARATIVE ENVIRONMENTAL EVALUATION

Alternative	1	2	3	4	5	6	7	8	9	10	11	12	13
Historic and Cultural Resources	– Adjacent to National Historic Landmark	– Adjacent to historic row houses	– Adjacent to individual landmark buildings	– Adjacent to historic row houses	– Adjacent to historic row houses	– Adjacent to historic row houses	– Adjacent to historic row houses	– Adjacent to historic row houses	+ Located outside historic districts	– Adjacent to one landmark building and within NR Historic District	– Adjacent to one landmark building and within NR Historic District	– Adjacent to one landmark building and within NR Historic District	– Removal of building within NR Historic District has major impact
Traffic	– Reduce a THRU Street to one lane (East 36th Street)	– Reduce a THRU Street to one lane (East 36th Street)	– Reduce a THRU Street to one lane (East 37th Street)	– Reduce a THRU Street to one lane (East 37th Street)	O Reduce lower volume non-THRU Street to one lane	O Reduce lower volume non-THRU Street to one lane	O Reduce lower volume non-THRU Street to one lane	O Reduce lower volume non-THRU Street to one lane,	– Closure of Park Ave. roadway tunnel	O Lane closures on Park Ave. northbound	O Lane closures on Park Ave. northbound	– Lane closures on THRU Street (East 37th) and Park Ave. northbound	O Lane closures on Park Ave. northbound
Parking	– Loss of parking on both sides of street	– Loss of parking on both sides of street	– Loss of parking on both sides of street	– Loss of parking on both sides of street	– Loss of parking on both sides of street	– Loss of parking on both sides of street	– Loss of parking on both sides of street	– Loss of parking on both sides of street	O Loss of parking on one side of avenue for one block	O Loss of parking on one side of avenue for one block	O Loss of parking on one side of avenue for two blocks	O Loss of parking on one side of avenue for two blocks	O Loss of parking on one side of avenue for one block
Pedestrian	– bridging and sidewalk decking	– bridging and sidewalk decking	– bridging and sidewalk decking	– bridging and sidewalk decking	– bridging and sidewalk decking	– bridging and sidewalk decking	– bridging and sidewalk decking	– bridging and sidewalk decking	+ Sidewalk width restricted	+ Sidewalk width restricted	+ Sidewalk width restricted	+ Sidewalk width restricted	– Construction into building line on Park Ave.
Noise and Vibration	– Construction adjacent to building line	– Construction adjacent to building line	– Construction adjacent to building line	– Construction adjacent to building line	– Construction adjacent to building line	– Construction adjacent to building line	– Construction adjacent to building line	– Construction adjacent to building line	+ Not located adjacent to sensitive receptors	–	–	–	– Construction adjacent to building line
Air Quality	–	–	–	–	–	–	–	–	O	O	O	–	–
Socioeconomic Effects	O access to medical businesses	O access to medical businesses	O access to Morgan Museum Gift Shop	O access to medical businesses	O access to hotel, restaurants	O access to restaurant	O access to hotel, restaurants	O access to hotel, restaurant and drycleaner	O	O	O	O	– Potential for displacements
Open Space Resources	+	+	+	+	+	+	+	+	+	+	+	+	+
Community Facilities	– Morgan Library and Museum	O Private nursery/pre-school	– Morgan Library and Museum and the Union League Club	O Staging area in front of Church of Our Saviour	+	– Church of Our Saviour	– Mexican Consulate	+	+	– Church of Our Saviour	– Church of Our Saviour	– Church of Our Saviour	+
Community Character, Visual Resources and Urban Design	–	–	–	–	–	–	–	–	O	O	O	O	–
Cumulative Effects	O	O	O	O	O	O	O	O	O	O	O	O	O
Summary													
– Major Impact (count)	8	7	8	7	6	7	7	6	1	4	4	5	6
O Moderate Impact (Count)	2	3	2	3	3	3	3	3	5	5	5	4	3
+ Minor Impact (Count)	1	1	1	1	2	1	1	2	5	2	2	2	2

Orange shading - Alternatives **not feasible** based on the engineering evaluation.

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E. COMPARATIVE ECONOMIC ANALYSIS OF ALTERNATIVES

Construction cost estimates have been generated to provide a comparable index of cost for three categories of alternatives: alternatives located on side streets west of Park Avenue; alternatives located on side streets east of Park Avenue; and alternatives located along Park Avenue. Within each of these categories, alternatives construction cost elements include: site preparation; excavation; construction of the physical emergency ventilation plant plenum, and personnel and equipment access; underpinning support; mechanical equipment; and property acquisition costs, where applicable. The comparative costs are given below in mid-2015 dollars, and the primary "driver" of the cost differences among alternatives is the amount of rock excavation that would be required in each alternative:

- Location east of Park Avenue: $93.9 million
- Location west of Park Avenue: $96 million
- Location in Park Avenue: $85.5 million

Each estimate is based on a confidence level of 20 percent given the conceptual nature of the design information. The construction cost for the "in Park Avenue alternatives" is considered **Moderate (O)**; the construction costs for the "east" and "west" of Park Avenue alternatives are considered, comparatively, **Major (-)**.

The graphic representation of the comparative economic evaluation among the alternatives is provided in the Comparative Cost Analysis in Table E-1.

Alternatives 9, 10, 11, 12, and 13 (along Park Avenue) present a **Moderate (O)** capital cost exposure for the proposed emergency tunnel ventilation plant; Alternatives 1, 3, 5, and 7 (west of Park Avenue) and Alternatives 2, 4, 6, and 8 (east of Park Avenue) demonstrate a **Major (-)** exposure.

TABLE E-1: COMPARATIVE ECONOMIC ANALYSIS

Alternative	1	2	3	4	5	6	7	8	9	10	11	12	13
Summary Cost Rating	–	–	–	–	–	–	–	–	O	O	O	O	O

Orange shading - Alternatives **not feasible** based on the engineering evaluation.

Key

– **Major Impact**

O **Moderate Impact**

+ **Minor Impact**

E.1 CONCLUSION—ALTERNATIVES ADVANCED FOR FURTHER CONSIDERATION FROM AN ECONOMIC STANDPOINT

On the basis of capital cost, the alternatives located along Park Avenue (9, 10, 11, 12, and 13) present the ***best opportunity to minimize economic effects*** because they incur the least construction costs from among the thirteen (13) alternatives. ***As such, only Alternatives 9 through 13 will be considered for further decision-analysis from the economic standpoint.*** Alternatives located in streets east and west of Park Avenue would incur approximately 10 percent greater construction costs than those along Park Avenue. (Note: Alternatives east of Park Avenue are approximately 2 percent less than those alternatives west of Park Avenue.)

F. INTEGRATED ENGINEERING/ ECONOMIC/ ENVIRONMENTAL COMPARATIVE ANALYSIS

F.1 ENGINEERING ANALYSIS

Based on the Comparative Engineering Analysis presented in Chapter C of this report, Alternatives 6, 11, and 12 represent the greatest opportunities to *minimize impacts concerning engineering*. Alternatives 1, 2, 5, 9, and 13 were found to be ***not feasible***.

F.2 ENVIRONMENTAL ANALYSIS

Based on the results of the Comparative Environmental Analysis presented in Chapter D of this report, Alternatives 9, 10, 11, and 12 present the greatest potential to *minimize environmental effects*.

F.3 ECONOMIC ANALYSIS

Based on the Comparative Economic Analysis presented in Chapter E of this report, alternatives along Park Avenue (9, 10, 11, 12, and 13) offer the greatest potential to *minimize capital cost*.

F.4 INTEGRATED ANALYSIS TO MINIMIZE ADVERSE EFFECTS—ALTERNATIVES PROPOSED FOR THE DRAFT EIS

Based on the collective and integrated analyses of engineering, economic, and environmental criteria applied to the evaluation of the thirteen (13) alternative sites for the location of the emergency ventilation plant and as shown on Table F-1, Alternative 11 offers the greatest potential to minimize adverse effects and is followed closely by Alternative 12 (the principal difference between Alternatives 11 and 12 from an environmental standpoint being that Alternative 12 would potentially impact East 37th Street, a NYCDOT THRU Street).

MTA NYCT proposes to analyze Alternatives 11 and 12 in further detail in the Draft EIS.

A final decision on the alternatives to be advanced to the Draft EIS will be made following consideration of public input through the scoping process, including substantive comments on this Alternatives Analysis/Feasibility Evaluation.

TABLE F-1: INTEGRATED COMPARATIVE EVALUATION MATRIX

Criteria	Alternative												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Engineering*						✓					✓	✓	
Environmental*									✓	✓	✓	✓	
Economics*									✓	✓	✓	✓	✓

* ✓ denotes those alternatives that provide the greatest potential to minimize adverse effects in the criterion categories noted.

Orange shading indicates those alternatives found not feasible based on the engineering evaluation.