S.1 INTRODUCTION

Following the recent opening of Phase 1 of the Second Avenue Subway Project (the Project) in Manhattan, the Metropolitan Transportation Authority (MTA) is now advancing Phase 2 of the Project, the portion of the new subway between 96th Street and 125th Street. Phase 2 will provide three new stations on the Second Avenue Subway line: 106th Street Station, 116th Street Station, and 125th Street Station. MTA Capital Construction (MTACC) is responsible for the planning, design, and construction of the Project and related public outreach, and MTA New York City Transit (NYCT) will operate and maintain the service. This *Supplemental Environmental Assessment to the Second Avenue Subway Final Environmental Impact Statement: Phase 2* (Supplemental EA) has been prepared in accordance with the National Environmental Policy Act (NEPA) for the Federal Transit Administration (FTA) as lead agency to evaluate potential impacts related to the advancing design of Phase 2.

The Second Avenue Subway will be constructed in four phases and, when complete, will provide new subway service from 125th Street to Lower Manhattan. A Final Environmental Impact Statement (FEIS) and Record of Decision (ROD) were issued in 2004 for the full-length Project to evaluate its impacts as required by NEPA. The 2004 FEIS and ROD concluded that the Project would result in temporary but significant adverse impacts during construction. Once complete, the Project would result in overall benefits but would also cause some permanent adverse impacts.

Temporary adverse construction impacts identified in the 2004 FEIS applicable to Phase 2 of the subway included traffic, parking displacement, service disruptions to Metro-North Railroad and the Lexington Avenue (4/5/6) subway line, the potential for dust and air pollutant emissions, construction noise and vibration, visual appearance of construction sites, modified access to and diminished visibility of buildings, temporary displacements of building occupants for up to 12 months for certain properties at the southwest corner of Second Avenue and 125th Street, potential accidental damage to historic resources, potential impacts to buried archaeological resources (to be determined closer to construction), and potential exposure of contaminated materials during ground disturbance. MTA developed extensive measures to mitigate these impacts, as detailed in the technical chapters of this Supplemental EA.

The 2004 FEIS concluded that once complete, the new subway would have largely beneficial impacts as a result of enhanced transit service, which would expand transit options for travelers, alleviate crowding on the Lexington Avenue (4/5/6) subway line, and reduce automobile dependency and associated air emissions. Adverse permanent impacts identified in the 2004 FEIS relevant to Phase 2 included full and partial property acquisitions (and associated residential and business displacements) for subway entrances and ancillary facilities, and an adverse impact to the historic Metro-North Harlem-125th Street Station as a result of a direct subsurface connection from the new subway. Displacements and relocation were to be conducted in accordance with the federal Uniform Relocation Assistance and Real Property Acquisition Policies Act (Uniform Act) and the New York State Eminent Domain Procedure Law (EDPL). Impacts to the historic railroad

station were to be addressed pursuant to a Programmatic Agreement executed under Section 106 of the National Historic Preservation Act.

The 2004 FEIS was prepared based on conceptual design; at this time, design for Phase 2 is advancing. Each technical chapter of this Supplemental EA evaluates whether the advanced design for Phase 2 (the "Modified Design") would change the conclusions of the 2004 FEIS. As demonstrated in each chapter, the overall impacts of Phase 2 would remain consistent with those described in the 2004 FEIS. Station entrances and required ancillary buildings would be larger than described in the 2004 FEIS (see Chapter 2, "Description of Phase 2 Modified Design") and therefore would require greater property acquisitions and displacements (see Chapter 6, "Displacement and Relocation"), but displacements, relocations, and appropriate compensation would continue to be conducted in accordance with the Uniform Act and the EDPL. In some cases, construction impacts would be reduced, particularly along 125th Street where the subway tunnel would be deeper than originally planned. The deeper tunnel would require less surface-level disruption and less potential for disruption to Metro-North Railroad and the Lexington Avenue (4/5/6) subway line. In addition, the direct connection to the historic Metro-North Harlem-125th Street Station has been removed, thereby eliminating the adverse impact to the historic structure.

Pursuant to 23 CFR § 771.130, FTA's procedures for conducting supplemental environmental review, the Modified Design has been evaluated in accordance with NEPA to determine if it would alter the conclusions of the 2004 FEIS. FTA, in consultation with MTA, determined that the Modified Design should be evaluated in a Supplemental EA.

This Supplemental EA evaluates each of the environmental impact areas considered in the 2004 FEIS to determine whether the Modified Design would result in any new adverse impacts not disclosed in the 2004 FEIS or require mitigation measures not identified in the 2004 FEIS. Following public review of this Supplemental EA, and consideration of all public comments, if FTA determines that no new or different significant adverse impacts would result, a Finding of No Significant Impact (FONSI) would be issued. If new or different significant adverse impacts would occur as a result of the Modified Design, a Supplemental EIS would be required.

S.2 PROJECT BACKGROUND

In 2004, an FEIS and ROD were issued in accordance with NEPA for the proposed full-length Second Avenue Subway. The full-length Second Avenue Subway will extend about 8.5 miles on Manhattan's East Side from Hanover Square in Lower Manhattan to 125th Street in Harlem (see **Figure S-1**). The new subway will be a two-track heavy rail rapid transit line in two new parallel tunnels generally following the alignment of Second Avenue. The full Project will include 16 new stations, mostly with center island platforms between the two tracks. The Second Avenue Subway will expand and tie into the existing NYCT system. The Second Avenue Subway will be constructed in four phases:

- **Phase 1 (opened in January 2017):** Extends the Broadway (Q) subway line along Second Avenue from about 63rd Street to 96th Street, with new stations at 72nd, 86th, and 96th Streets;
- **Phase 2 (the subject of this Supplemental EA):** Will extend the existing Second Avenue Subway (Q) service north to 125th Street, with new stations at 106th, 116th, and 125th Streets;

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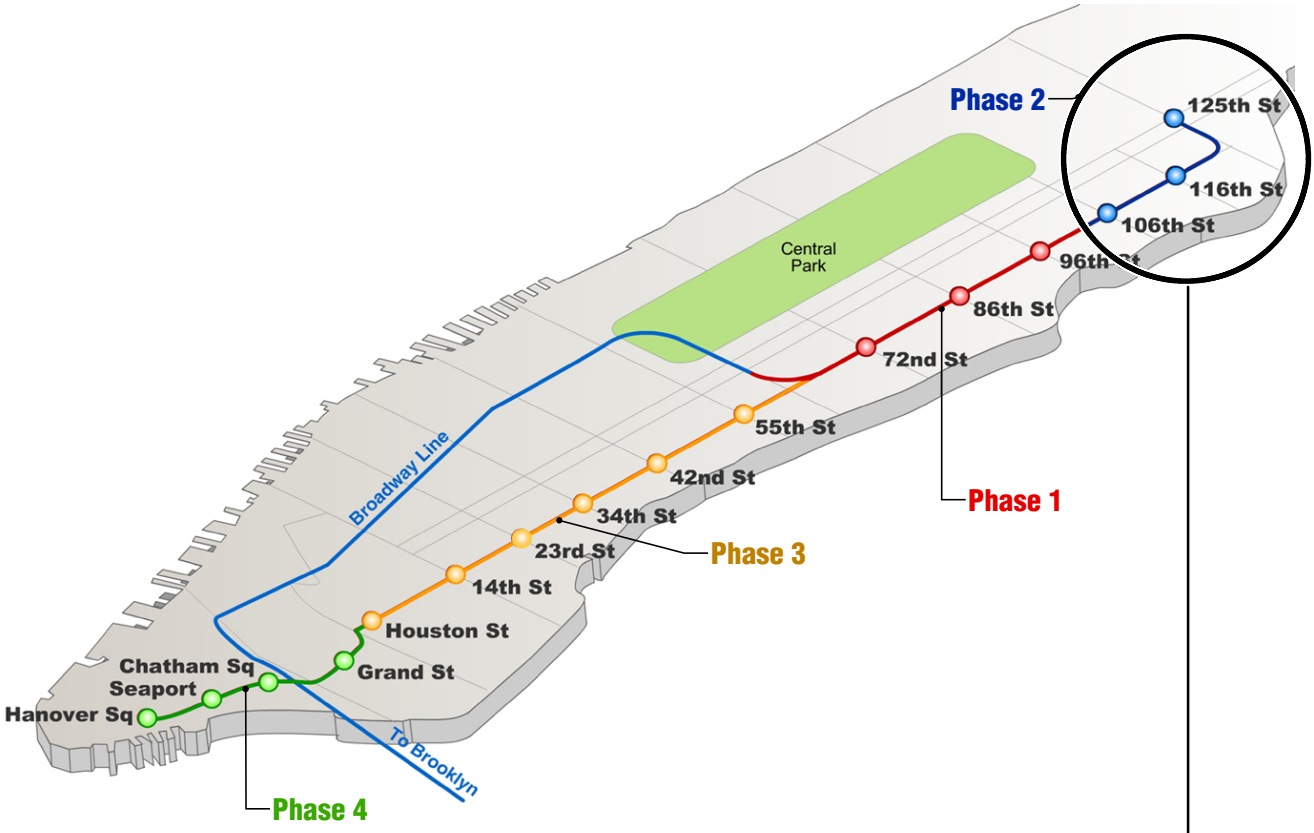
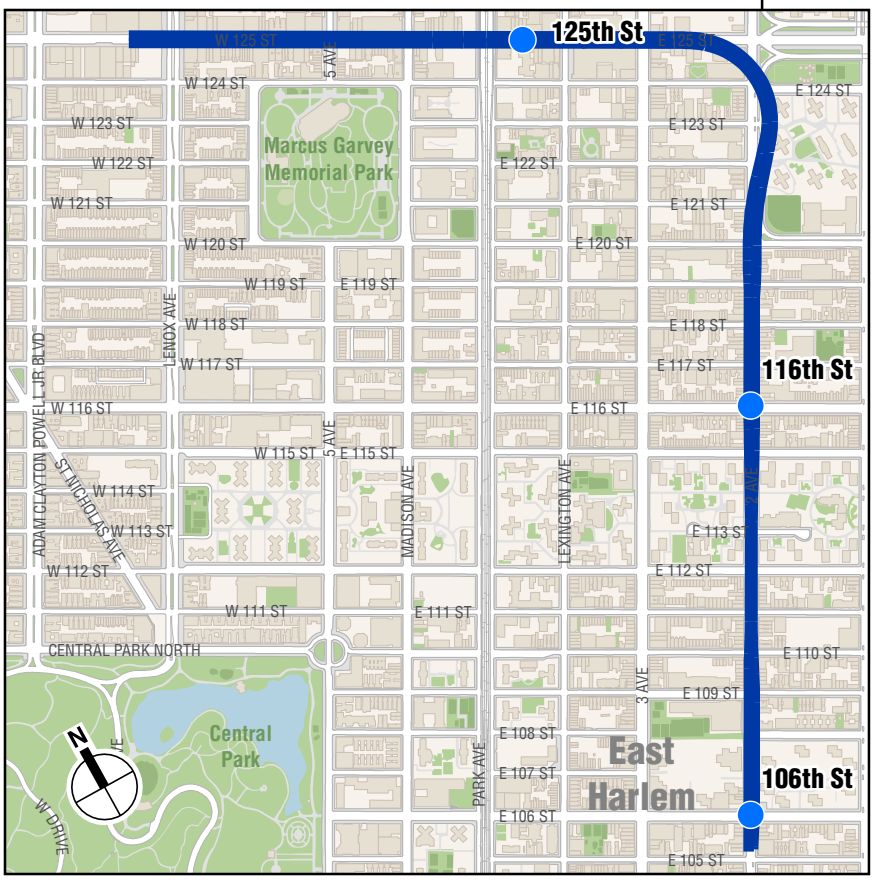




SECOND AVENUE SUBWAY PHASE 2

Project Location
Figure S-1

- **Phase 3:** Will extend the Second Avenue Subway south of Phases 1 and 2 from the 72nd Street Station/63rd Street area to Houston Street, with new stations at Houston, 14th, 23rd, 34th, 42nd, and 55th Streets. The entire line will also become designated as the T subway line; and
- **Phase 4:** Will extend the Second Avenue Subway (T) service farther south from Houston Street to Lower Manhattan, with new stations at Hanover Square, Seaport, Chatham Square, and Grand Street.

With the recent opening of Phase 1, preliminary engineering for Phase 2 has advanced. Details of the Phase 2 design are provided in Section S.3 below and Chapter 2 of this Supplemental EA.

S.2.1 PLANNING FOR THE FULL-LENGTH SUBWAY

The purpose of the full Second Avenue Subway Project, as defined in the 2004 FEIS, is to "address the problems and deficiencies in access and mobility associated with an overburdened transit infrastructure that is struggling to accommodate existing customers and the continuing growth on Manhattan's East Side." Phase 2 of the Second Avenue Subway will provide incremental progress toward achieving the Project's purpose.

The Project's purpose statement was derived based on a number of needs identified in the corridor, which, in summary, relate to the high population and density of Manhattan's East Side and its limited rapid rail transit services. Together, these result in overcrowding, overtaxing, and reduced levels of service on the existing subway and bus services. East Harlem, where Phase 2 will be located, is currently only served by one rapid rail transit line (the Lexington Avenue, 4/5/6 subway line). East Harlem is also served by a number of bus routes, but these services are also plagued with overcrowding and resultant delays.

During the planning and alternatives development for the Second Avenue Subway, three goals, along with supporting objectives, were developed for the full-length Project to meet the Project's purpose statement:

- Goal 1: Improve Mobility on the East Side of Manhattan
- Goal 2: Achieve Economic Feasibility and Cost-Effectiveness
- Goal 3: Maintain or Improve Environmental Conditions

As the 2004 FEIS was being developed, MTA and its design consultants also developed preliminary engineering for the full-length subway, through an interactive process combining transportation planning, preliminary engineering, environmental analysis, and community outreach. Design criteria were developed to guide the preliminary engineering for the full-length subway, as follows:

- The system should deliver fast, reliable service to provide an attractive alternative to the Lexington Avenue line and relieve overcrowding on that line.
- All new facilities, including tracks and termini, must generally be able to accommodate up to 30 trains per hour[1] in each peak direction (for the full-length subway once all four phases are complete).

[1] Once the full-length subway is complete.

- The already built segments of the Second Avenue Subway should be used, if practicable. These are located on Second Avenue between 120th and 110th Streets, on Second Avenue between 105th and 99th Streets, and on the Bowery between Canal and Pell Streets.
- The Second Avenue Subway should use the existing bellmouths[2] constructed as part of the 63rd Street Tunnel to provide a West Side service and to facilitate future connections between the 63rd Street line and the Second Avenue line.
- Enclosed transfer connections should be provided to existing stations and other public transit facilities wherever practicable—in other words, when they can be provided at a reasonable cost and when the expected benefits to passengers outweigh the expected adverse impacts.
- The system should be built so as not to preclude, and where possible, accommodate, future connections or extensions to other boroughs in New York City.
- The system should be designed to provide flexibility in its construction methods and contracting process.
- The system should be designed to achieve a balance between ease of construction and passenger convenience in terms of both tunnel depth (a very deep tunnel might be easier to construct, but passenger access time to and from the street would increase), and a balance between speed of operation and passenger convenience in terms of station spacing (having fewer stations allows faster service for those already on the train, but also means pedestrians may need to walk farther to reach a station entrance).
- The system should be designed to minimize environmental and community impacts to the extent practicable and should be reasonably responsive to community concerns. This goal affects construction techniques selected as well as the basic design of the system in terms of station placement and alignment.
- The system must comply with passenger safety requirements, including the National Fire Protection Association (NFPA); all applicable codes; and with the Americans with Disabilities Act (ADA).
- All new facilities should respond to sustainable/green design criteria.

These design criteria were the basis for the preliminary engineering conducted for the full-length subway. This design phase identified the alignment for the new subway (including its depth, or vertical alignment) as well as the specific locations of new subway stations, including station shells and platforms. The level of design provided information on potential construction methodologies and anticipated permanent subway features to support the environmental review (the 2004 FEIS) and to allow an estimate of potential operations, ridership benefits, capital costs, and ongoing operational and maintenance costs. This included initial identification of general characteristics, sizing, and locations for station entrances and above-ground ancillary structures. The 2004 FEIS described the general characteristics of the station features, based on the design that was available at that time, and noted that these features would evolve as the design advanced.

[2] A bellmouth is a widened tunnel area. Bellmouths are often constructed at the terminus of a tunnel to allow for future extensions from that point.

S.2.2 DESIGN DEVELOPMENT AND CONSTRUCTION: PHASE 1

Following completion of the 2004 FEIS and ROD in 2004, MTA continued to advance preliminary engineering and design for Phase 1 of the Second Avenue Subway. The advanced preliminary engineering for Phase 1 resulted in better definition of Project elements. During final design and construction, further modifications were made to the design and construction staging for Phase 1 based on additional information collected in the field, a review of constructability and cost considerations, community comments, and other factors.

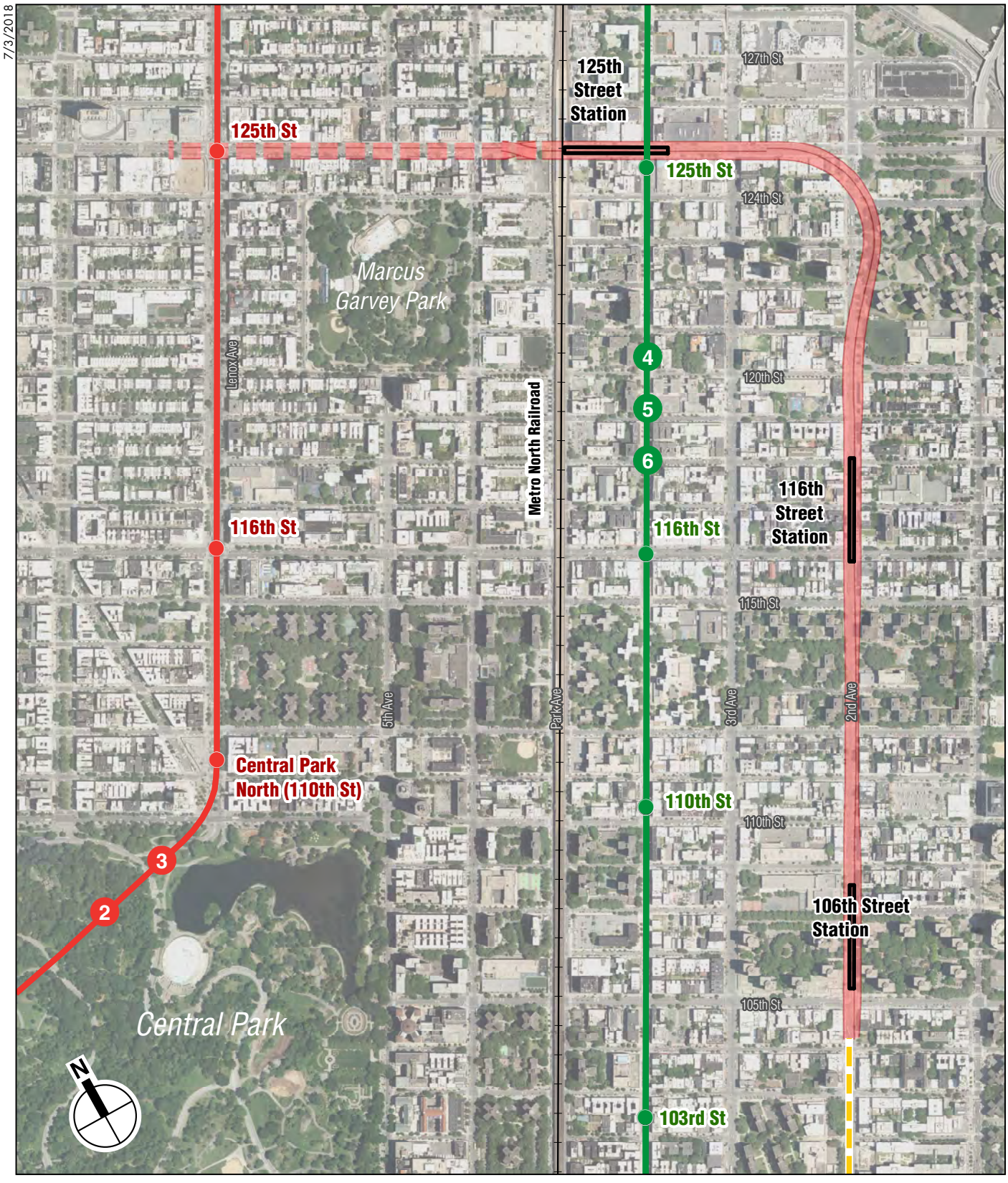
S.2.3 DESIGN DEVELOPMENT: PHASE 2

To advance the design for Phase 2 beyond what was completed in 2004, MTA and its design consultant are now developing more detailed designs for the alignment, tunnel and station structures, ancillary facilities, including their components (substations, pump stations, signal rooms, communications rooms, fan plants, emergency exits, etc.), and other systems involved in subway operation. The design process for Phase 2 of the Second Avenue Subway was established to advance the original preliminary engineering design that was developed for the 2004 FEIS and update it by incorporating changes in background conditions, advanced preliminary engineering design, and updated construction methods. In addition, MTA and its design consultants also used the experience gained during final design and construction of Phase 1 to make additional modifications to the design for Phase 2. In this way, design engineers sought to improve the Phase 2 design to improve constructability and the efficiency of future train operations, similar to the design modifications made for Phase 1 after the 2004 FEIS.

S.3 PHASE 2 MODIFIED DESIGN

At this time, MTA and its design consultants are developing advanced preliminary engineering for Phase 2 of the Second Avenue Subway, which will extend new subway service along Second Avenue from the 96th Street Station to a new terminal on 125th Street. Based on the engineering conducted to date, the preliminary design of Phase 2 has been changed from the design presented in the 2004 FEIS (the 2004 FEIS Design). The primary reasons for design modifications are: 1) changes in background conditions; 2) advanced preliminary engineering where further site-specific reconnaissance and additional analyses have been conducted; and 3) updated construction methods where attempts have been made to further support one of the Project's objectives to "minimize community disruption during construction." More information on the reasons for these modifications is provided in Chapter 2, "Description of Phase 2 Modified Design" of this Supplemental EA. The revised design, referred to as the Modified Design, is described below and summarized in **Table S-1** toward the end of this chapter.

The overall alignment of Phase 2 with the Modified Design remains similar to that presented in the 2004 FEIS Design. Phase 2 would extend from 105th Street (the terminus of Phase 1's storage tracks) to about 120th Street, where the tracks would curve to 125th Street and end near Lenox Avenue (see **Figure S-2**). Like the 2004 FEIS Design, the Modified Design would have three new stations: at 106th Street and Second Avenue, 116th Street and Second Avenue, and 125th Street between Lexington and Park Avenues. The 125th Street Station would provide direct transfers to the existing Lexington Avenue (4/5/6) subway line and connections to Metro-North Railroad at the Metro-North Harlem-125th Street Station at Park Avenue. All three new stations would be accessible in compliance with the Americans with Disabilities Act (ADA).



SECOND AVENUE SUBWAY PHASE 2

Proposed Second Avenue Subway - Phase 2

Figure S-2

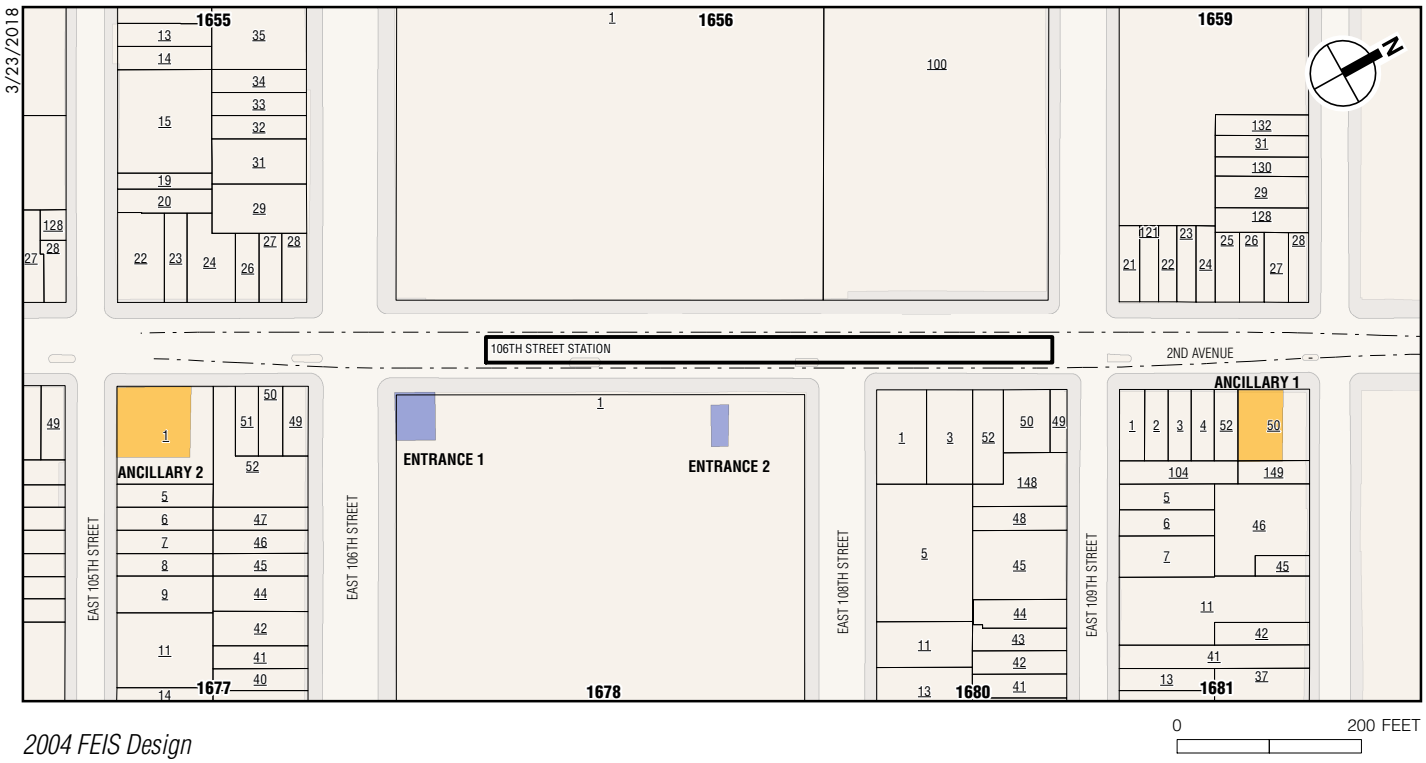
Consistent with the 2004 FEIS Design, each new station would include at least two entrances and two above-ground ancillary buildings that house ventilation, electrical, and mechanical equipment. However, as design has advanced and because of changes in background conditions, engineering standards, and constructability considerations learned during construction of Phase 1, the entrances and ancillary facilities in the Modified Design would be larger than those shown in the 2004 FEIS Design. Some proposed ancillary facilities and entrances would also be on different sites than the preliminary sites identified in the 2004 FEIS, to align with other revisions made to the stations or because new private developments and other constructability considerations have made previous sites no longer feasible (see **Figures S-3 through S-7**).

The Modified Design would be about 20 feet deeper beneath the street beginning at the tunnel curve at 125th Street. In addition, the new 125th Street Station would be slightly farther west. This modification was made to reduce the construction impacts associated with building the new tunnel and station at the curve and beneath 125th Street, consistent with one of the Project's objectives of minimizing construction impacts. Whereas the 2004 FEIS Design proposed cut-and-cover construction (i.e., excavation from the surface) along 125th Street between Third Avenue and Park Avenue for the 125th Street Station, the Modified Design would involve deeper construction in rock, which would be done with a Tunnel Boring Machine (TBM). This would greatly reduce surface construction impacts along this highly commercial corridor and important crosstown roadway. The modification would also reduce disruption to the Lexington Avenue line and to the private properties on the southwest corner of Second Avenue at 125th Street during construction.

In addition, with the Modified Design, the underground storage tracks west of the new terminal station at 125th Street would extend farther west than anticipated in the 2004 FEIS Design, and would end either just east or just west of Lenox Avenue, depending on the design option selected. A new ancillary facility would be constructed on the south side of 125th Street at the end of the tracks. The 2004 FEIS Design included possible additional storage tracks under Second Avenue from 125th to 129th Street with an ancillary building along those tracks, but these storage tracks are no longer proposed with the Modified Design.

S.4 COMPARISON OF IMPACTS BETWEEN 2004 FEIS DESIGN AND MODIFIED DESIGN

While the overall Phase 2 alignment remains generally consistent between the 2004 FEIS Design and the Modified Design, there have been some design modifications and there have been changes in background conditions since the 2004 FEIS. **Table S-2** at the end of this chapter provides a summary of impacts of the Modified Design in comparison to the 2004 FEIS Design. Expanded discussions of potential changes in impacts are provided in the following technical chapters of this Supplemental EA.

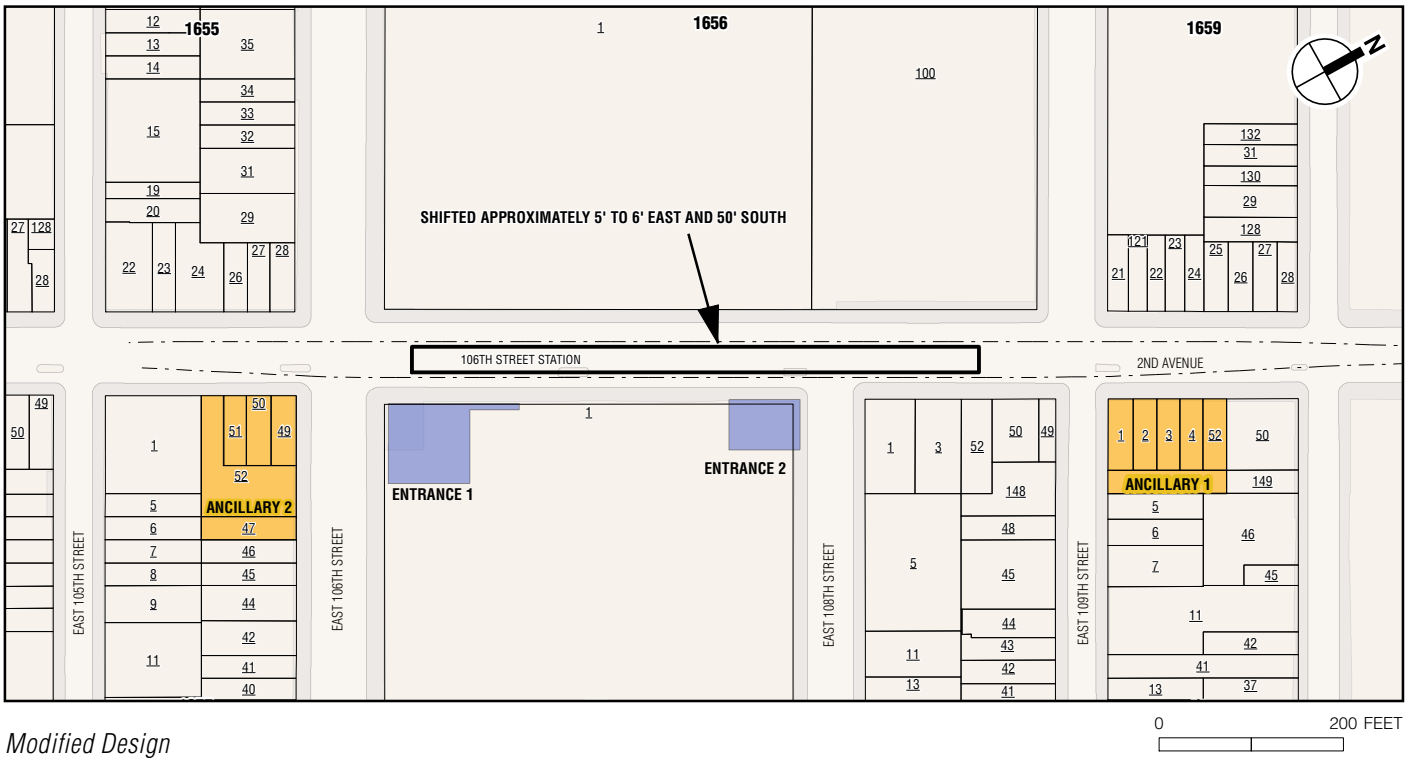


2004 FEIS Design

Entrance

Ancillary

Station Platform



Modified Design

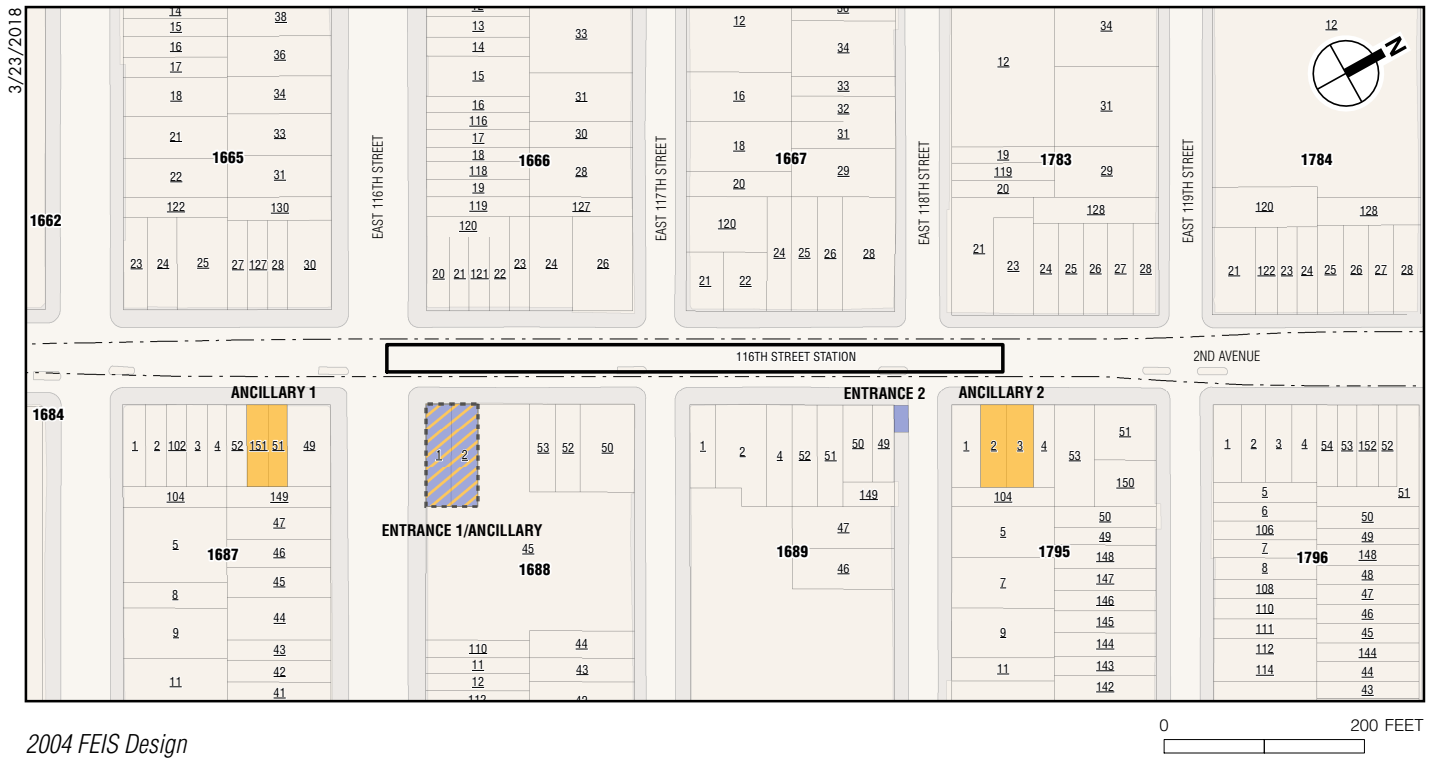
Entrance

Ancillary

Station Platform

Comparison of 2004 FEIS Design and Modified Design
106th Street Station
Figure S-3

SECOND AVENUE SUBWAY PHASE 2



2004 FEIS Design

Ancillary

Entrance/Ancillary

Station Platform

Modified Design

Entrance

Ancillary

Station Platform

Comparison of 2004 FEIS Design and Modified Design
116th Street Station

SECOND AVENUE SUBWAY PHASE 2

Figure S-4

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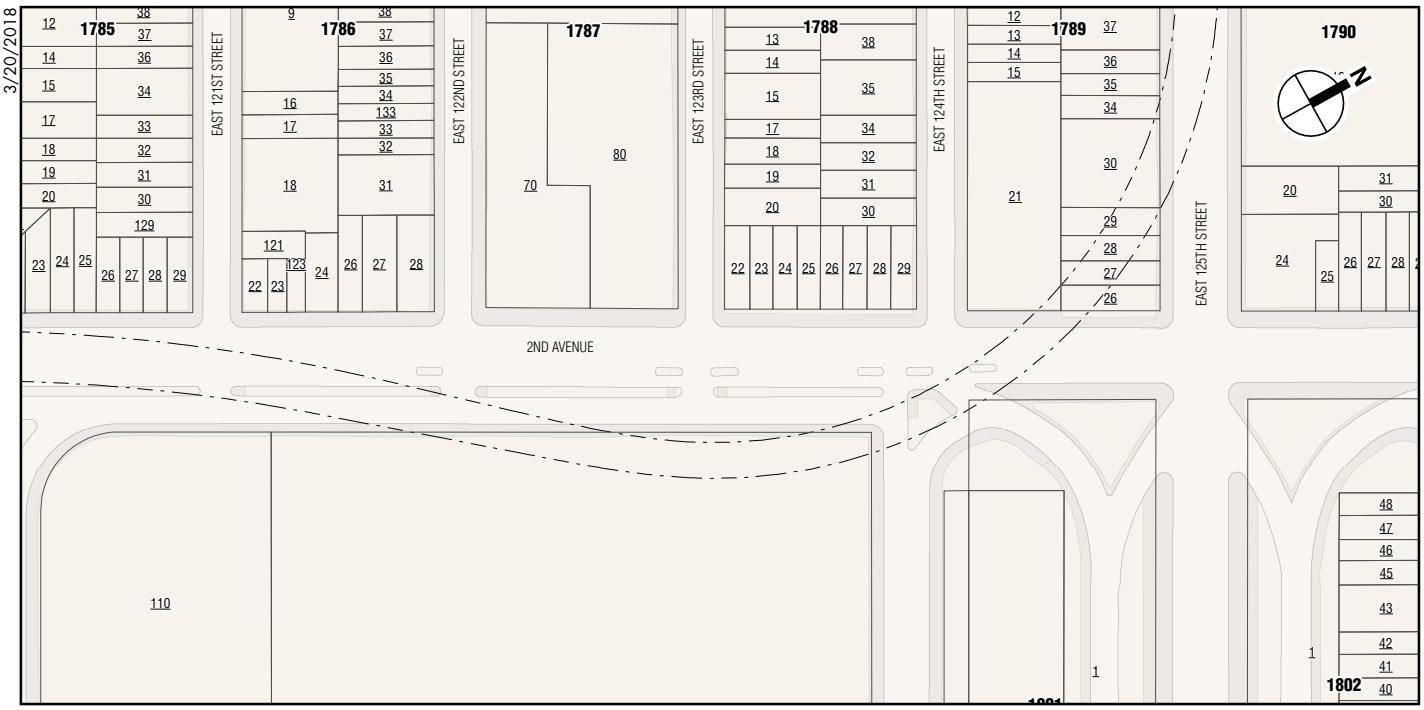
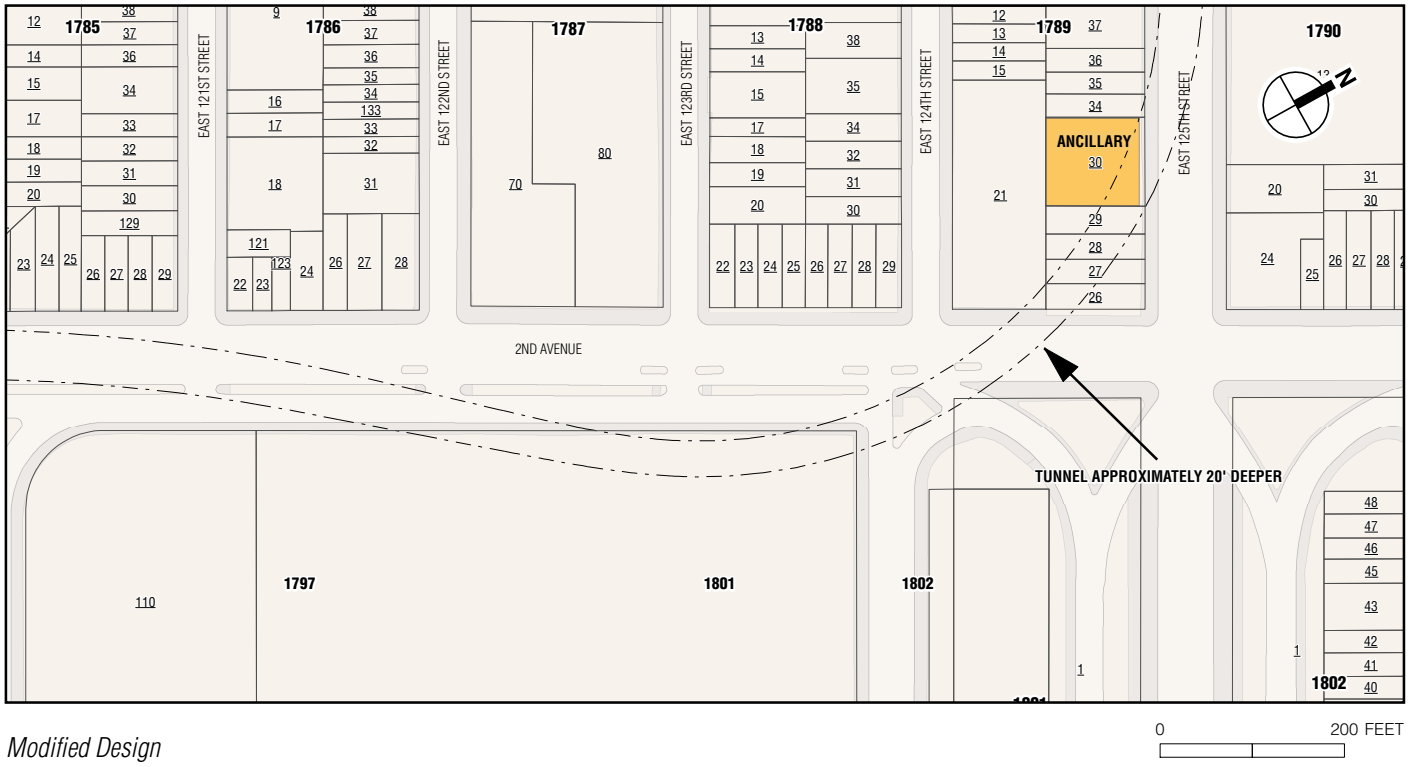


2004 FEIS Design



Modified Design

Ancillary

Comparison of 2004 FEIS Design and Modified Design
125th Street Curve

SECOND AVENUE SUBWAY PHASE 2

Figure S-5

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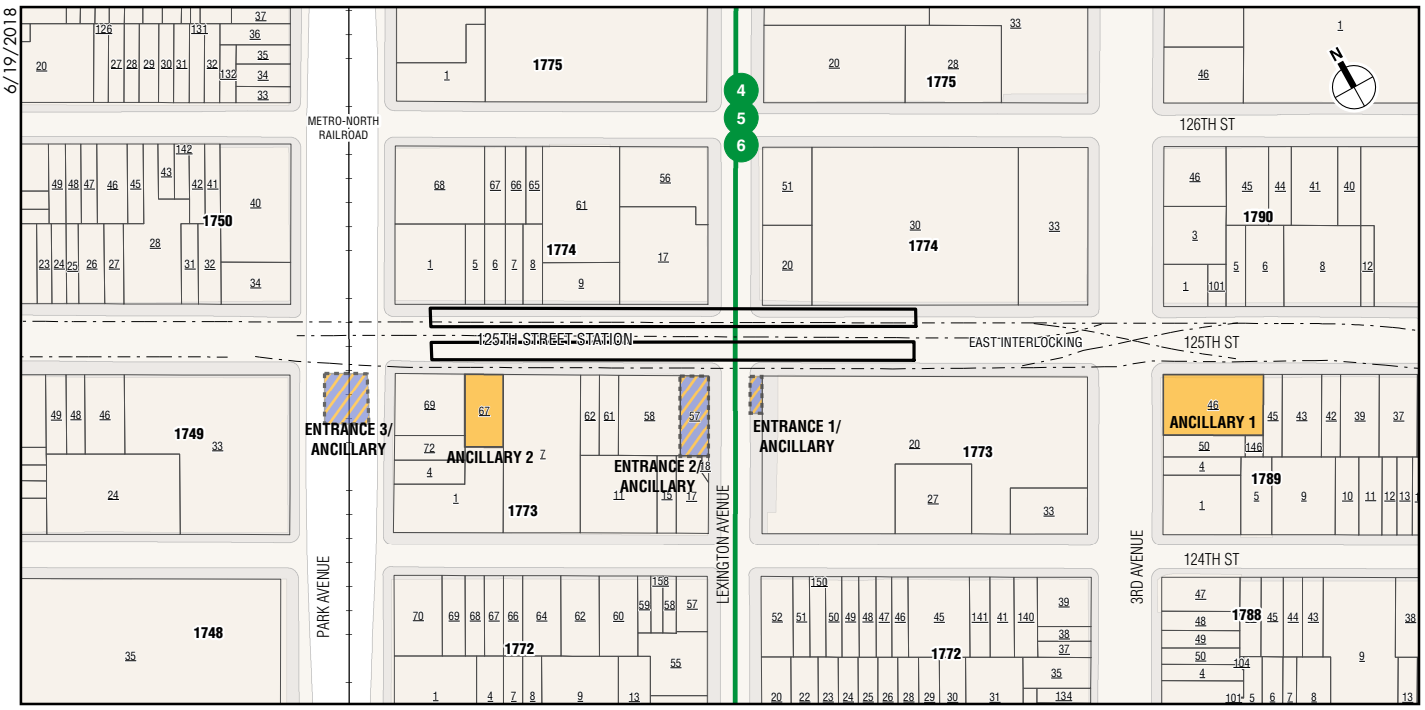


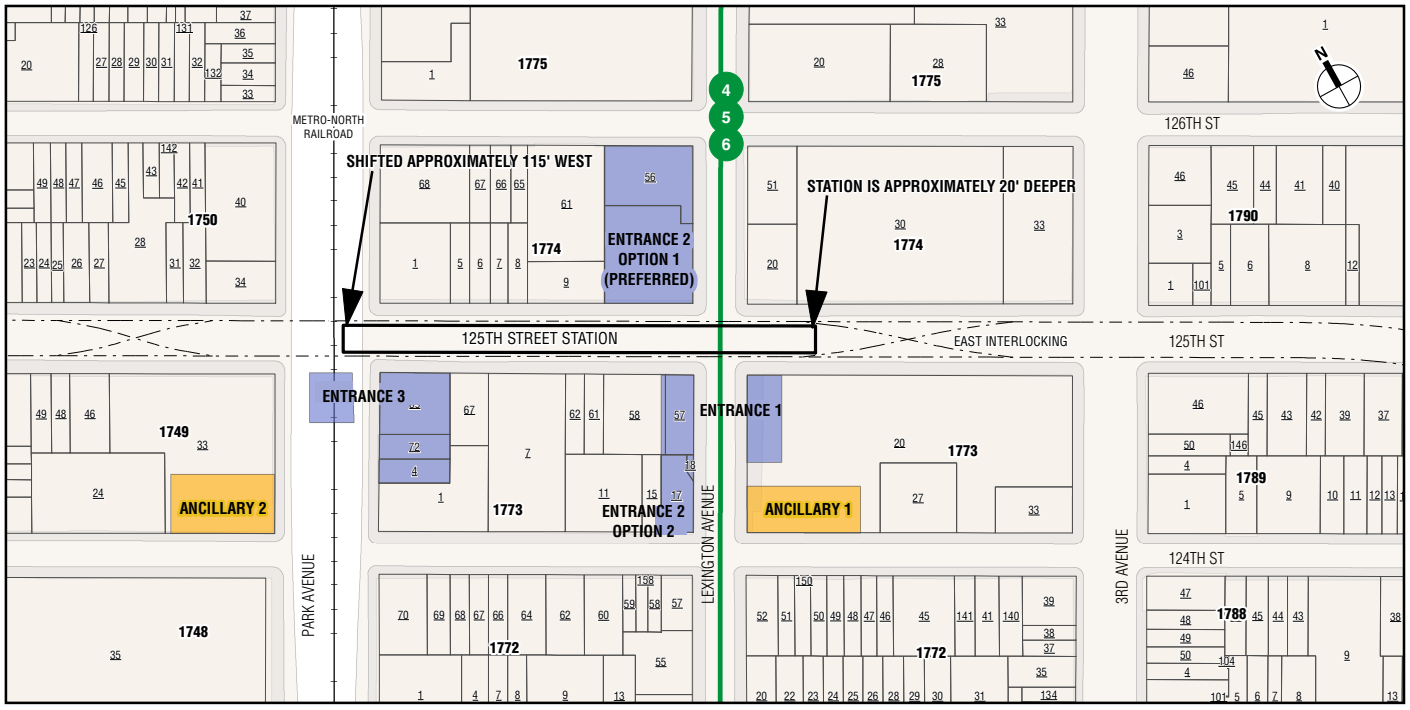
2004 FEIS Design

0 200 FEET

Ancillary

Entrance/Ancillary

Station Platform



Modified Design

0 200 FEET

Entrance

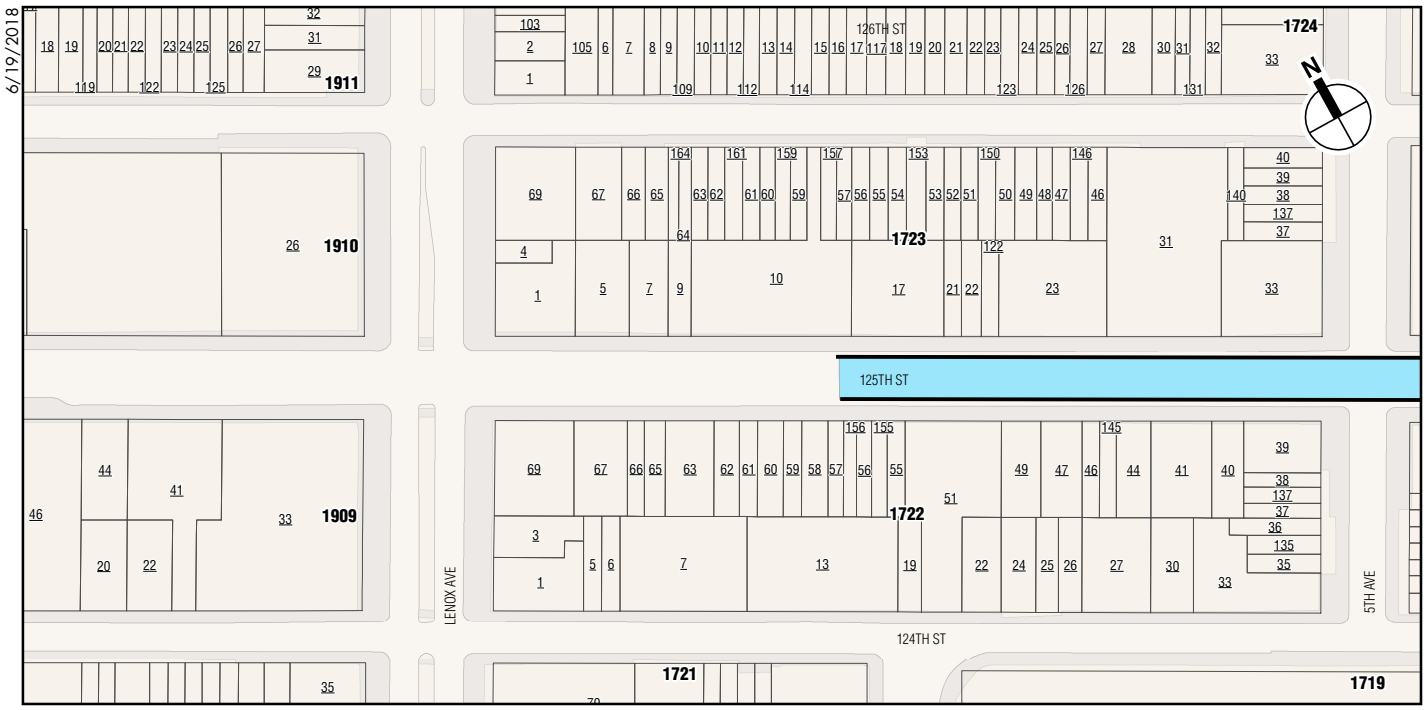
Ancillary

Station Platform

Comparison of 2004 FEIS Design and Modified Design
125th Street Station

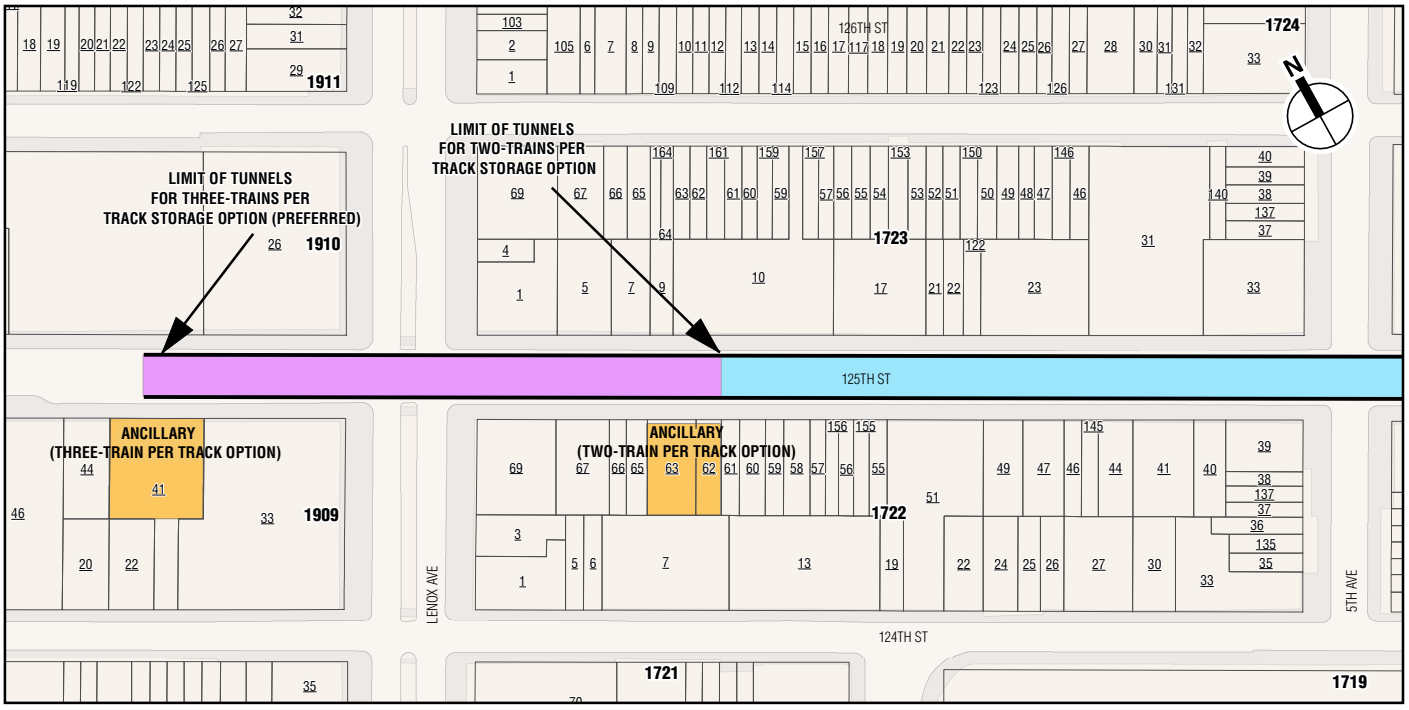
SECOND AVENUE SUBWAY PHASE 2

Figure S-6



2004 FEIS Design

Note: The 2004 FEIS also included potential storage tracks along Second Avenue from 122nd Street to 129th Street



Modified Design

Entrance

Ancillary

Note: The potential storage tracks along Second Avenue to 129th Street have been eliminated with the Modified Design

Comparison of 2004 FEIS Design and Modified Design
125th Street Tail Tracks

SECOND AVENUE SUBWAY PHASE 2

Figure S-7

Table S-1
Summary of Phase 2 Design Modifications

Phase 2 Component	Description of Change(s)	Primary Reasons for Design Changes		
		Changes in Background Conditions[1]	Advanced Preliminary Engineering[2]	Updated Construction Methods[3]
106th Street Station (See Figure 2-1a)				
Station/ Platform	Shifted about 5-6 feet east	N/A	N/A	*Shifted east to reduce impacts to Empire City Subway duct bank utility line along west side of Second Avenue.
	Shifted about 50 feet south	N/A	*Shifted south to accommodate modified station entrances and connections to ancillary facilities.	N/A
Entrance 1	Larger	N/A	*Larger entrance required to provide acceptable passenger level of service and emergency egress based on updated ridership estimates.	N/A
Entrance 2	Larger	N/A	*Larger entrance required to provide an elevator and acceptable passenger level of service and emergency egress based on updated ridership estimates.	N/A
	Shifted slightly	N/A	N/A	*Shifted closer to street corner to avoid recent utility connections for adjacent residences.
Ancillary 1	Relocated	*Relocated to avoid displacement of new six-story school on previous site.	Relocated to better meet ventilation needs by being closer to the proposed platform.	
	Larger	*Larger to accommodate more functions above-ground as updated flood protection standards (largely as a result of Hurricane Sandy in 2012) require more critical equipment to be at higher elevations.	Larger above-ground facility to account for shallow tunnel alignment, which limits space in the station box. Modified Design includes dry-cooler system within the building interior, rather than rooftop cooling towers. Dry coolers provide less maintenance, reduce noise, and eliminate rooftop equipment. Modified Design incorporates ground floor retail space to enhance integration with surrounding neighborhood. Larger to accommodate construction staging to consolidate construction activities, limit work area within Second Avenue right-of-way, limit costly and timely remobilization activities, and limit risk to adjacent buildings.	N/A

Table S-1 (Cont'd)
Summary of Phase 2 Design Modifications

Phase 2 Component	Description of Change(s)	Primary Reasons for Design Changes		
		Changes in Background Conditions[1]	Advanced Preliminary Engineering[2]	Updated Construction Methods[3]
106th Street Station (See Figure 2-1a)- Cont'd				
Ancillary 2	Relocated	*Relocated to avoid new seven-story residential and commercial development on previous site.	Relocated to better meet ventilation needs of subway structure by providing a more direct connection to the relocated station box.	N/A
	Larger	*Larger to accommodate more functions above-ground as updated flood protection standards (largely as a result of Hurricane Sandy in 2012) require more critical equipment to be at higher elevations.	Larger above-ground facility to account for shallow tunnel alignment, which limits space in the station box. Modified Design includes dry-cooler system within the building interior, rather than rooftop cooling towers. Dry coolers provide less maintenance, reduce noise, and eliminate rooftop equipment. Modified Design incorporates ground floor retail space to enhance integration with surrounding neighborhood. Larger to accommodate construction staging to consolidate construction activities, limit work area within Second Avenue right-of-way, limit costly and timely remobilization activities, and limit risk to adjacent buildings.	N/A
116th Street Station (See Figure 2-2a)				
Station/ Platform	Shifted about 30 feet north	N/A	*Shifted to meet revised alignment geometry and location of bellmouth structure.	N/A
Entrance 1	Larger	N/A	*Larger entrance required to provide acceptable passenger level of service and emergency egress based on updated ridership estimates.	N/A
Entrance 2	Larger	N/A	*Larger entrance required to provide an elevator and acceptable passenger level of service and emergency egress based on updated ridership estimates.	N/A
	Relocated	N/A	Relocated to better align with the end of the platform.	N/A
Ancillary 1	Relocated	*Relocated to avoid newly designated historic structure (Banca Italiana Commerciale) adjacent to previous site.	Relocated to better meet ventilation needs of the subway structure by providing a more direct connection to the station box.	N/A

Table S-1 (Cont'd)
Summary of Phase 2 Design Modifications

Phase 2 Component	Description of Change(s)	Primary Reasons for Design Changes		
		Changes in Background Conditions[1]	Advanced Preliminary Engineering[2]	Updated Construction Methods[3]
116th Street Station (See Figure 2-2a)- Cont'd				
Ancillary 1 (Cont'd)	Larger	*Larger to accommodate more functions above-ground such as updated flood protection standards that (largely as a result of Hurricane Sandy in 2012) require more critical equipment to be at higher elevations.	Larger above-ground facility to account for shallow tunnel alignment, which limits space in the station box. Modified Design includes dry-cooler system within the building interior, rather than rooftop cooling towers. Dry coolers provide lower maintenance, reduce noise, and eliminate rooftop equipment Modified Design incorporates ground floor retail space to enhance integration with surrounding neighborhood. Larger to accommodate construction staging to consolidate construction activities, limit work area within Second Avenue right-of-way, limit costly and timely remobilization activities, and limit risk to adjacent buildings.	N/A
Ancillary 2	Relocated	N/A	*Relocated to better meet ventilation needs of the subway structure by providing a more direct connection to the station box. New location provides a staging area for the tunnel boring machines (TBMs) operations.	N/A
	Larger	*Larger to accommodate more functions above-ground such as updated flood protection standards that (largely as a result of Hurricane Sandy in 2012) require more critical equipment to be at higher elevations.	Larger above-ground facility to account for shallow tunnel alignment, which limits space in the station box. Modified Design includes dry-cooler system within the building interior, rather than rooftop cooling towers. Dry coolers provide lower maintenance, reduce noise, and eliminate rooftop equipment Modified Design incorporates ground floor retail space to enhance integration with surrounding neighborhood. Larger to accommodate construction staging for station, bellmouth, and tunnel boring machine (TBM), and would consolidate construction activities, limit work area within Second Avenue, limit costly and timely remobilization activities, limit risk to adjacent buildings, and allow space to support TBM operations.	N/A

Table S-1 (Cont'd)
Summary of Phase 2 Design Modifications

Phase 2 Component	Description of Change(s)	Primary Reasons for Design Changes		
		Changes in Background Conditions[1]	Advanced Preliminary Engineering[2]	Updated Construction Methods[3]
125th Street Curve (See Figure 2-3a)				
Bellmouth Structure and TBM Launch Box	Shifted from original location at 120th-122nd Street to new location at 118th-120th Street	N/A	N/A	*Shifted to reduce surface construction impacts by allowing bellmouth structure to be connected with 116th Street Station structure, which also allows for a more compact (i.e., narrower) structure, further reducing cut-and-cover construction needs.
Ancillary	New to project	N/A	*Added to provide intermediate ventilation and emergency egress point, if required. Located on site already identified as construction staging site.	N/A
Tunnel	Modified ground stabilization techniques – use of grouting rather than underpinning	N/A	N/A	*To reduce surface construction impacts and potentially reduce or avoid temporary displacements by conducting ground stabilization from the construction staging site.
	Lowered about 20 feet	N/A	Lowered to connect with lowered 125th Street Station (discussed below) with appropriate track grades.	*Lowered to reduce substantial construction impacts associated with excavation along 125th Street, a heavily traveled commercial corridor, by allowing mined construction instead of cut-and-cover.
Optional Storage Tracks Beneath Second Avenue to 129th Street	Removed from project	N/A	*****Removed optional storage tracks that were considered in 2004 FEIS since advanced operations analysis concluded that the location of these storage tracks is not compatible with the efficient dispatching of trains from storage into revenue service and, therefore is not needed.	N/A
125th Street Station (See Figure 2-4a)				
Station Tunnel Alignment	Lowered 20 feet and shifted 115 feet west	N/A	N/A	*Lowered and shifted west to allow mined construction in bedrock to substantially reduce disruptive cut-and-cover construction impacts otherwise associated with excavation along 125th Street and to reduce impacts with intersection of existing Lexington Avenue (4/5/6) subway line.
Track Configuration	Modified from 3-track to 2-track station	N/A	Modified to facilitate double crossover interlocking system on both sides of station for greater operational flexibility.	*Modified to reduce excavation needs and reduce surface construction impacts along 125th Street.

Table S-1 (Cont'd)
Summary of Phase 2 Design Modifications

Phase 2 Component	Description of Change(s)	Primary Reasons for Design Changes		
		Changes in Background Conditions[1]	Advanced Preliminary Engineering[2]	Updated Construction Methods[3]
125th Street Station (See Figure 2-4a) – Cont'd				
Entrance 1	Larger	N/A	*Larger entrance required to provide acceptable passenger level of based on updated ridership and transfer estimates.	N/A
Entrance 2 – Option 1 *(preferred)*	New to project	N/A	*Could provide higher capacity transfer connection between new subway and existing Lexington Avenue (4/5/6) line. Final option will be selected as design advances.	N/A
Entrance 2 – Option 2 *(Original 2004 Location)*	Larger	N/A	*Larger entrance required to provide acceptable passenger level of based on updated ridership and transfer estimates. Larger to accommodate vertical circulation elements required to access deeper station and for transfers between the new subway and existing Lexington Avenue (4/5/6) line.	N/A
Entrance 3	Larger	N/A	*Larger entrance required to provide acceptable passenger level of based on updated ridership and transfer estimates. Expanded station to accommodate vertical circulation elements for deeper station and to avoid conflicts with the existing Metro-North Railroad Park Avenue viaduct structure and a Comfort Station, which is a contributing element of the historic Metro-North Harlem-125th Street Station.	N/A
Ancillary 1	Relocated	N/A	N/A	*Relocated west to align with shifted station box. Relocated from 125th Street to 124th Street to shift construction impacts away from busy commercial corridor.

Table S-1 (Cont'd)
Summary of Phase 2 Design Modifications

Phase 2 Component	Description of Change(s)	Primary Reasons for Design Changes		
		Changes in Background Conditions[1]	Advanced Preliminary Engineering[2]	Updated Construction Methods[3]
125th Street Station (See Figure 2-4a) – Cont'd				
Ancillary 1 (Cont'd)	Larger	N/A	*Mined station box reduces excavation but provides less volume for ancillary functions. Modified Design includes dry-cooler system within the building interior, rather than rooftop cooling towers. Dry coolers provide less maintenance, reduce noise, and eliminate rooftop equipment Modified Design incorporates ground floor retail space to enhance integration with surrounding neighborhood. Larger to accommodate construction staging to facilitate station cavern excavation and structural lining, which require multiple, large work areas to provide contractor access into the cavern, storage of muck, routing of trucks, storage of construction materials, and concrete operations.	N/A
Ancillary 2	Relocated	N/A	N/A	*Relocated west to align with the shifted station box. Relocated from 125th Street to 124th Street to shift construction impacts away from busy commercial corridor.
	Larger	N/A	*Mined station box reduces excavation but provides less volume for ancillary functions. Modified Design includes dry-cooler system within the building interior, rather than rooftop cooling towers. Dry coolers provide less maintenance, reduce noise, and eliminate rooftop equipment Modified Design incorporates ground floor retail space to enhance integration with surrounding neighborhood. Larger to accommodate construction staging to facilitate station cavern excavation and structural lining, which require multiple, large work areas to provide contractor access into the cavern, storage of muck, routing of trucks, storage of construction materials, and concrete operations.	N/A

Table S-1 (Cont'd)
Summary of Phase 2 Design Modifications

Phase 2 Component	Description of Change(s)	Primary Reasons for Design Changes		
		Changes in Background Conditions[1]	Advanced Preliminary Engineering[2]	Updated Construction Methods[3]
125th Street Tail Tracks (See Figure 2-5a)				
Alignment	Two options now considered	N/A	Two options are being considered, pending further operations and planning analysis: - Option 1: two-train per track storage (four trains total) - Option 2 *(preferred)*: three-train per track storage (six trains total)	N/A
	Both options extend farther west to just east or west of Lenox Avenue	N/A	*Extended farther west as a result of advanced operations planning for rail storage needs and to accommodate shift west of 125th Street Station and reconfiguration of station from 3-track to 2-track.	N/A
Ancillary	New to project	N/A	*Extension of tail tracks farther west require an ancillary facility for emergency ventilation and egress, whereas tail tracks under the 2004 FEIS Design were anticipated to be served by ancillary facilities at the 125th Street Station.	N/A

Notes:

1 **Changes in Background Conditions:** Includes changes in updated flood protection standards that require electrical and other critical equipment to be at higher elevations. Includes changes in site conditions where previously identified real estate is no longer suitable or available (i.e., new developments are typically larger and deconstruction would result in increased displacements and additional project costs). Includes consideration of the East Harlem Historic District centered along 116th Street that was designated in 2017.

2 **Advanced Preliminary Engineering:** Subsequent to the 2004 FEIS, site-specific reconnaissance, further engineering, and advanced operations planning, including new ridership modeling and pedestrian flow studies, have been conducted for Phase 2, which resulted in some refinements to the preliminary engineering design. In addition, experience gained from previous NYCT major capital projects have been incorporated into the design and construction methods.

3 **Updated Construction Methods:** To further support one of the Project's goals and objectives to "Minimize community disruption during construction," as stated in the 2004 FEIS, efforts have been undertaken to reduce surface construction impacts, particularly along 125th Street, which is a major commercial center for the area and has seen extensive development in the past decade. The 2004 FEIS Design proposed cut-and-cover construction along much of this corridor, which would have required substantial surface disruption, whereas the Modified Design proposes primarily mined construction within bedrock, thus minimizing surface construction impacts.

*** Indicates primary reason for the change.**

Table S-2

Comparison of Impacts of Phase 2 of the Second Avenue Subway: 2004 FEIS Design versus Modified Design

Summary of Impacts of 2004 FEIS Design for Phase 2 of the Project	Notable Changes in Background Conditions for Phase 2	Changes in Impacts of Modified Design for Phase 2
Transportation		
Construction • RAIL: Temporary disruptions to Lexington Avenue (4/5/6) subway line; Limited subway platform closures; Temporary speed reductions on Metro-North Railroad service. • TRAFFIC/PARKING: Road detours near construction zones and displaced curbside parking. • SURFACE TRANSIT: Temporary relocation of bus stops on Second Avenue; Potential delays in service from traffic congestion. • PEDESTRIANS: No adverse impacts. **Permanent** • RAIL: No adverse impacts. Beneficial impact from enhanced transit service. • TRAFFIC/PARKING: No adverse impacts. Beneficial impacts from improved transit accessibility. • SURFACE TRANSIT: No adverse impacts. • PEDESTRIANS: Two crosswalk impacts, to be mitigated through crosswalk restriping and widening.	• New protected bicycle lane along Second Avenue. • New Select Bus Service (SBS) on Second Avenue and 125th Street.	**Construction** • RAIL: Deeper 125th Street Station greatly reduces temporary impacts to Metro-North Railroad and Lexington Avenue (4/5/6) subway services. • TRAFFIC/PARKING: No new adverse impacts. • SURFACE TRANSIT: No change with respect to bus services. The new bicycle lane would have temporary detours. • PEDESTRIANS: No new adverse impacts. **Permanent** • RAIL: No new adverse impacts. • TRAFFIC/PARKING: No new adverse impacts. • SURFACE TRANSIT: No new adverse impacts. • PEDESTRIANS: Two additional crosswalk impacts identified, to be mitigated through crosswalk restriping and widening, as with the 2004 FEIS Design.
Social and Economic Conditions		
Construction • Temporary significant adverse impacts due to large construction work zones and related noise, appearance, and modifications to building access. • Mitigation to include extensive community outreach and measures to reduce noise, lighting, and other disruptive elements of construction to the extent practicable. **Permanent** • No adverse impacts. Beneficial impacts related to enhanced transit supporting economic growth and vitality.	• Substantial new residential and commercial development in East Harlem, much of which was predicted in 2004 FEIS. • 2008 Rezoning of 125th Street Corridor, leading to uptick in development. • 2017 Rezoning of East Harlem; encourages greater density along avenues and in transit-rich corridors (including the proposed Second Avenue Subway); modifies the Special Transit Land Use Districts to better align with the Phase 2 Modified Design.	**Construction** • No new adverse impacts. Some entrance and ancillary facilities have been relocated and are larger due to advancements in preliminary engineering and new larger developments on sites previously identified for these facilities. Mitigation measures would be consistent with 2004 FEIS. • Reduced cut-and-cover construction, particularly along 125th Street, would reduce surface impacts. **Permanent** • No new adverse impacts. The Modified Design is compatible with recent land use policy initiatives (e.g., East Harlem Rezoning and current New York City comprehensive plan, *OneNYC*)

Table S-2 (Cont'd)
Comparison of Impacts of Phase 2 of the Second Avenue Subway: 2004 FEIS Design versus Modified Design

Summary of Impacts of 2004 FEIS Design for Phase 2 of the Project	Notable Changes in Background Conditions for Phase 2	Changes in Impacts of Modified Design for Phase 2
Public Open Space		
Construction • Potential temporary adverse impacts from noise, dust, and access limitations at 11 open space resources in proximity to construction areas. • Adverse noise impacts at Wagner Houses Playground, Wagner Houses Pool, Crack is Wack Playground, Harlem River Drive Park, and Triboro Plaza. • Potential adverse impact to 127th Street greenstreet. **Permanent** • No adverse impacts.	• One new recreational area and five community gardens have been created within one block of the Phase 2 alignment.	**Construction** • Reduced impacts. Modified Design avoids previous noise impacts at parks by eliminating potential storage tracks along Second Avenue to 129th Street. **Permanent** • No new adverse impacts.
Acquisitions, Displacements, and Relocations		
Construction • Potential temporary but long-term (up to 12 months) displacement of 11 properties (278 residents and 35 employees) at 125th Street tunnel curve. • A construction staging site would have required demolition of a building at the curve, displacing 21 residents and an auto repair business. **Permanent** • 12 full and 4 partial acquisitions (estimated displacement of 57 residents, 63 employees). • Compensation and displacement to be conducted in accordance with New York State Eminent Domain Procedure Law (EDPL) and federal Uniform Relocation Assistance and Real Property Acquisitions Policies Act of 1970 (Uniform Act).	• Some sites previously identified for acquisition have new or planned larger developments.	**Construction** • Potentially reduced impacts. Updated construction plans would potentially reduce or avoid temporary displacements at the 125th Street curve, pending further advancement of design. • Construction staging site remains, but would now house an ancillary facility for the Modified Design. **Permanent** • 36* to 39 full and 4 to 5* partial acquisitions (estimated displacement of 170 residents, 157 to 505* employees) - Asterisks (*) denotes preferred design option. • While the number of property acquisitions and displacements would be greater under the Modified Design, compensation and displacements would continue to be conducted in accordance with the EDPL and Uniform Act.

Table S-2 (Cont'd)

Comparison of Impacts of Phase 2 of the Second Avenue Subway: 2004 FEIS Design versus Modified Design

Summary of Impacts of 2004 FEIS Design for Phase 2 of the Project	Notable Changes in Background Conditions for Phase 2	Changes in Impacts of Modified Design for Phase 2
Visual and Aesthetic Resources		
Construction • Temporary adverse impacts due to appearance and visibility of construction activities. Mitigation to include measures to reduce visual impacts, such as high-quality design of sidewalk sheds. **Permanent** • No adverse impacts. Ancillary facility dimensions were estimated at about 25 to 40 feet wide (depending if combined with an entrance), 75 feet wide, 75 feet deep. They were to be designed to be compatible with surrounding urban context, with consultation with the local community.	• Substantial new residential and commercial development in East Harlem.	**Construction** • No new adverse impacts. **Permanent** • No new adverse impacts. Entrances and ancillary facilities would be larger, but would continue to be designed to be compatible with the urban design of the surrounding areas. Ancillary facility heights would range from 45 to 75 feet tall along 125th Street and 90 to 140 feet tall along Second Avenue.
Historic and Archaeological Resources		
Construction • Potential adverse effect to the State and National Register (S/NR)-eligible Metro-North Harlem-125th Street Station from direct connection from new subway. • Potential accidental effects to historic resources during construction. Construction Protection Plans (CPPs) were to be developed to establish protective measures. • Potential adverse effects to archaeological resources, to be confirmed as design advances. • Programmatic Agreement executed among FTA, MTA NYCT, and SHPO. NYC Landmarks Preservation Commission (LPC) is a consulting party for the PA. **Permanent** • Unlikely for any significant contextual effects to occur. However, if above-ground elements of the new subway do change the setting or context of architectural resources, permanent effects could occur, and design would be conducted in consultation with SHPO. • Effects to archaeological resources would have occurred during construction.	• East Harlem Historic District established in 2017 centered along East 116th Street. • Some other historic resources along the Phase 2 alignment have been determined S/NR-eligible. • General archaeological sensitivity zone has been established in the area bounded by East 124th Street, Second Avenue, East 127th Street, and a point east of First Avenue associated with two now-redeveloped cemeteries: the Reformed Dutch Church of Harlem Cemetery and the Harlem African Burial Ground. • The Modified Design requires some modifications to the Area of Potential Effect (APE), which also incorporates some additional potential architectural and archaeological resources.	**Construction** • Physical connection to Harlem-125th Street Station has been removed. Other potential construction effects remain consistent with the 2004 FEIS and would be addressed with CPPs. • A Supplemental Phase 1A Archaeological Study was prepared to evaluate the revised APE and identified mitigation measures consistent with the 2004 FEIS and PA. **Permanent** • No known historic resource or any resource contributing to the new East Harlem Historic District would be affected. • Entrances and ancillary facilities would be larger than in the 2004 FEIS Design, but would be designed to be compatible with the surrounding areas. As with the 2004 FEIS, design elements that could affect historic resources would continue to be coordinated with SHPO.

Table S-2 (Cont'd)
Comparison of Impacts of Phase 2 of the Second Avenue Subway: 2004 FEIS Design versus Modified Design

Summary of Impacts of 2004 FEIS Design for Phase 2 of the Project	Notable Changes in Background Conditions for Phase 2	Changes in Impacts of Modified Design for Phase 2
Air Quality		
Construction • No adverse impacts related to carbon monoxide (CO) or particulate matter of 10 micrometers or less (PM_{10}). Adjacent to major construction sites, $PM_{2.5}$ could have exceeded interim thresholds in place at that time. • A rigorous mitigation program to reduce emissions and dust was to be developed and incorporated in the Project's Construction Environmental Protection Plan (CEPP). **Permanent** • No adverse impacts. Beneficial impacts from improved transit access and reduced reliance on automobiles.	• 1-hour nitrogen dioxide (NO_2) standard established in 2010, but methodology for evaluated has not yet been implemented. • Blasting activities during construction of Phase 1 of the Second Avenue Subway resulted in odors and emissions that raised community concerns. MTA undertook several studies to assess adequacy of the contractor's Community Air Monitoring Plan and improve its efficacy as a warning system to take corrective action.	**Construction** • Reduced cut-and-cover construction, particularly along 125th Street, would reduce surface construction activities and associated emissions. Reduced excavation needs at the 125th Street Station would reduce truck traffic to remove spoils. • While 1-hour NO_2 projections are not possible based on existing methods and data, exceedances could occur. To mitigate, land-based non-road diesel-powered vehicles and construction equipment rated Tier 3 or higher would be used where conforming equipment is available, as practicable. • The CEPP would incorporate latest air quality mitigation measures. **Permanent** • No new adverse impacts.
Greenhouse Gas Emissions		
• No greenhouse gas (GHG) emissions analysis was conducted in 2004 FEIS as it was not required or typically performed at that time.	• Legal precedent has established that environmental documents should include an assessment of GHG emissions.	**Construction** • As with any large construction project, construction activities of the Modified Design would generate GHG emissions. Use of lower-carbon and renewable materials, reducing travel distances for materials transport, and using biodiesel or renewable energy can reduce GHG emissions. The use of biodiesel blends (B20) will be recommended for future Project contractors. Materials with recycled content, such as slag and flyash used in cement mixes, may be used during construction. The Modified Design would also comply with MTA and NYCT's latest sustainability guidelines. **Permanent** • Transit projects generally provide a benefit with respect to GHG emissions by providing a more energy-efficient means of travel.

Table S-2 (Cont'd)

Comparison of Impacts of Phase 2 of the Second Avenue Subway: 2004 FEIS Design versus Modified Design

Summary of Impacts of 2004 FEIS Design for Phase 2 of the Project	Notable Changes in Background Conditions for Phase 2	Changes in Impacts of Modified Design for Phase 2
Noise and Vibration		
Construction • Temporary adverse noise impacts were predicted at all stations and shaft sites/spoils removal due to proximity to sensitive uses. Noise from pile-driving would be most severe, but would be for relatively short periods of time (about 3 months) at any location. • Mitigation measures were to include barriers, use of quieter equipment where possible, and time-of-day restrictions, to the extent practicable. Measures were to be incorporated in the CEPP. **Permanent** • No adverse impacts.	• In 2006, FTA issued updated noise and vibration guidance, *Transit Noise and Vibration Impact Assessment* (FTA-VA-90-1003-06).	**Construction** • No new adverse impacts. Some construction activities would be relocated due to changes in proposed sites of entrances and ancillary facilities, but would not substantially alter the location of construction work. • Reduced cut-and-cover construction, particularly along 125th Street, would reduce surface level construction and associated noise. Some construction traffic would also be redirected from 125th Street (to avoid this busy corridor) to 124th Street. While associated noise would occur along the new routes, impacts would similar to those identified in the 2004 FEIS and mitigation measures consistent with the 2004 FEIS would continue to be implemented. **Permanent** • No new adverse impacts.
Infrastructure and Energy		
Construction • No adverse impacts. Utilities would be protected or relocated as needed, with service outages minimized to the extent practicable. Utility work would also be conducted in coordination with the NYC Department of Environmental Protection (NYCDEP) and any other applicable agencies and service providers. **Permanent** • No adverse impacts. Utilities would have been restored once the Project is operational. Some utilities would benefit from new infrastructure.	• No substantial changes.	**Construction** • No new adverse impacts. The Modified Design incorporates measures to reduce utility impacts, such as making minor shifts to avoid the Empire City Subway (ECS) utility duct along Second Avenue. The deeper tunnel at 125th Street would also reduce potential conflicts with utilities. • The construction work zones have been modified and incorporate some adjacent areas along side streets. Utility protection and relocation measures, consistent with the 2004 FEIS, would continue to be implemented. • An early utility relocation program would be implemented to address utility issues in advance of station and tunnel construction. **Permanent** • No new adverse impacts.

Table S-2 (Cont'd)
Comparison of Impacts of Phase 2 of the Second Avenue Subway: 2004 FEIS Design versus Modified Design

Summary of Impacts of 2004 FEIS Design for Phase 2 of the Project	Notable Changes in Background Conditions for Phase 2	Changes in Impacts of Modified Design for Phase 2
Contaminated Materials		
Construction • A preliminary Environmental Site Assessment (ESA) conducted for the full-length Second Avenue Subway identified 21 sites along the Phase 2 alignment recommended for further analysis. Areas to be disturbed were to be further evaluated closer to initiation of construction. Health and Safety Plans (HASPs) were to be developed to protect worker and public safety. All disturbed materials would be handled and disposed of in accordance with all applicable regulations. **Permanent** • No adverse impacts. Hazardous materials associated with operation of the new subway would conform to all applicable regulations and NYCT standards.	• A Contaminated Material Screening Assessment was prepared in November 2017, identifying 29 sites recommended for further investigation.	**Construction** • No new adverse impacts. Phase I ESAs are recommended on all property acquisitions sites, which will determine the need for any further investigations (e.g., Phase II investigations). **Permanent** • No new adverse impacts.
Natural Resources		
Construction • No adverse impacts to geological or soils conditions, terrestrial or aquatic vegetation or wildlife, surface water resources, or groundwater resources. Stormwater runoff would be managed in accordance with a Stomwater Pollutant Discharge Elimination System (SPDES) permit issued by the NYS Department of Environmental Conservation (NYSDEC). **Permanent** • No adverse impacts. The Phase 2 alignment would be within 100- and 500-year floodplains, but would not increase flooding in these areas.	• Floodplain boundaries have been modified following Hurricane Sandy in 2012. NYCT flood protection measures have also been updated. • Peregrine falcon, a state-listed endangered species, was documented within ½-mile from the Phase 2 alignment.	**Construction** • No new adverse impacts. Storm risk management plans for construction zones would adhere to current flood protection standards. **Permanent** • No new adverse impacts. Revised floodplain boundaries and flood protection standards have informed the Modified Design, but the Phase 2 alignment would not affect these floodplains.

Table S-2 (Cont'd)

Comparison of Impacts of Phase 2 of the Second Avenue Subway: 2004 FEIS Design versus Modified Design

Summary of Impacts of 2004 FEIS Design for Phase 2 of the Project	Notable Changes in Background Conditions for Phase 2	Changes in Impacts of Modified Design for Phase 2
Safety and Security		
Construction • No adverse impacts. HASPs were to be prepared to protect worker and public safety, and construction was to be conducted in accordance with NYCT safety standards, and U.S. Occupational Safety and Health Administration (OSHA) and Mine Safety and Health Administration (MSHA) regulations, as applicable. **Permanent** • No adverse impacts. Subway operations were to comply with NYCT safety protocols, and subway facilities were incorporate applicable safety features and emergency exits.	• No substantial changes.	**Construction** • No new adverse impacts. **Permanent** • No new adverse impacts.
Environmental Justice		
• Phase 2 alignment is within environmental justice communities. However, no disproportionately high and adverse effects would result from the Project, as impacts would be experienced along the full subway alignment in environmental justice and non-environmental justice communities. The new subway would provide a benefit to these communities through enhanced transit services.	• No substantial changes.	• No new disproportionately high and adverse effects. Reduced cut-and-cover construction, particularly along 125th Street would reduce surface construction impacts in this area.
Section 4(f) Evaluation		
• Required use of the S/NR-eligible Metro-North Harlem-125th Street Station for a direct physical connection from the new subway.	• The East Harlem Historic District was established in 2017, centered along East 116th Street, and several new historic resources have been determined S/NR-eligible along the Phase 2 alignment, and several new open space resources have been identified (see "Historic and Archaeological Resources" and "Public Open Space" above).	• No use of any Section 4(f) properties would occur with the Modified Design. The use of the Harlem-125th Street Station has been removed, and no new historic or parkland resources would be affected. Consistent with the 2004 FEIS and PA, consultation with SHPO would be conducted to ensure design elements are compatible with historic and architectural qualities of resources near the Modified Design alignment.

Table S-2 (Cont'd)
Comparison of Impacts of Phase 2 of the Second Avenue Subway: 2004 FEIS Design versus Modified Design

Summary of Impacts of 2004 FEIS Design for Phase 2 of the Project	Notable Changes in Background Conditions for Phase 2	Changes in Impacts of Modified Design for Phase 2
Coastal Zone Consistency		
• The Project was found to be consistent with the policies of the New York City Waterfront Revitalization Program (WRP).	• Revisions to WRP policies were implemented in 2011, primarily related to incorporating sea-level rise considerations. • Coastal Zone Boundary Maps were revised following Hurricane Sandy in 2012, now incorporating portions of the Phase 2 alignment.	• An assessment of consistency with the updated WRP policies was conducted for the Modified Design (see **Appendix D**) and Phase 2 remains consistent with these policies.

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