CHAPTER 4: CONSTRUCTION METHODS AND ACTIVITIES

4.1 INTRODUCTION

This chapter describes the probable construction methods and activities that are reasonably expected by New York City Transit (NYCT) and Metropolitan Transportation Authority Capital Construction Company (MTA CC) to be employed and undertaken during the construction of the Fulton Street Transit Center (FSTC). Detailed discussions of the potential environmental effects and impacts that may be associated with these activities and potential mitigation measures that could be implemented are presented in subsequent resource chapters. Detailed estimates of truck and equipment quantities associated with construction of this and other projects occurring in the same timeframe, that have been assumed for the purposes of the Final Environmental Impact Statement (FEIS), are included in Appendix C.

At the time of preparation of this FEIS, the FSTC is undergoing final Preliminary Engineering and detailed project and construction information is still being developed. Thus, construction methods and activities described in this chapter are based on conceptual studies which will continue to be advanced and refined as design progresses.

This chapter presents a description of the construction process for the purposes of quantification of environmental-effect-causing activities only; it is not intended to describe the precise construction method that may ultimately be used nor is it intended to dictate or confine the construction process. Where a variety of alternative construction methods or techniques could be utilized, the analysis evaluates the method that is considered to have the greatest potential for adverse environmental impact. By selecting construction methods with the greatest potential for adverse impacts for analysis, this conservative approach ensures that the analysis considers construction methods that have the same or worse potential environmental impacts than those ultimately used for the construction of the FSTC.

This FEIS assumes the “peak” construction scenario for the purpose of impact analysis. The assumption of a sustained construction “peak”, overlaid with the construction peak of other Lower Manhattan projects (see Chapter 2: Analysis Framework for list of projects), ensures that the impact analyses performed in subsequent resource chapters of this FEIS evaluate the highest potential level and combination of construction activity that could reasonably be assumed to occur. During compilation of the DEIS, the timing and duration of this peak was assumed to be a period of one (1) year during 2005/2006. As indicated in the DEIS, the actual timing and duration of this peak could shift, without affecting the substance and validity of the analyses. Since the DEIS was published, the construction schedule has been further refined and the peak construction activities will generally occur during the latter part (fourth quarter) of 2005, and during 2006. The refinement of the schedule was evaluated and found not to result in substantive changes to the impact analyses. Future substantive changes in activities will be evaluated for their potential to change the results of environmental impact analyses conducted as part of the environmental review process. Based on the expected construction schedule of FSTC and other Lower

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1 Since the construction analysis was conducted, the Lower Manhattan Recovery Projects participating in the Lower Manhattan Construction Coordination Group have continued to coordinate their refined construction schedules. As a result of this process, the extent of overlap of construction activities is being reduced from that originally assumed for the analysis, when few details on the projects’ design were available and highly conservative assumptions had to be made to account for uncertainty. MTA NYCT will continue this construction coordination process during actual construction to avoid logistical interference. For example, recognizing the limited space available for actual construction at Dey Street and Church Street, MTA NYCT and PANYNJ are actively coordinating to minimize interference of construction activities, resulting in a reduced overlap compared to that originally assumed for analysis purposes and thus reducing potential cumulative effects relative to those predicted by the environmental analysis.
Manhattan projects, it is not considered likely that the cumulative construction peak of these projects would last for more than one (1) year.

For the purposes of estimating potential cumulative effects associated with the construction of multiple projects in Lower Manhattan concurrent with the FSTC, this chapter includes assumptions with respect to the construction methods and activities that are expected to be implemented during the construction of these other projects, which include:

- The World Trade Center (WTC) Memorial and Redevelopment Plan (construction expected from mid 2004 to end of 2014);
- The Permanent WTC Port Authority Trans-Hudson (PATH) Terminal (construction expected early 2005 to the end of 2008);
- The West Street/Route 9A Reconstruction (construction expected mid 2004 to late 2008);
- The Reconstruction of the South Ferry Subway Terminal (construction expected late 2004 to end 2006);
- Various other Lower Manhattan construction projects such as the Federal Office/Post Office Building redevelopment, and the new Verizon Building, expected to be constructed during 2004 to 2010; and,
- The reconstruction of Lower Manhattan streets undertaken by the New York City Department of Transportation (NYCDOT) and the New York City Department of Design and Construction (NYCDDC) (construction expected from 2003 through 2007).

These assumptions have been reviewed with the Port Authority of New York and New Jersey (PANYNJ), the New York State Department of Transportation (NYSDOT), the Lower Manhattan Development Corporation (LMDC), and the NYCDOT (further details are included in Appendix C).

The chapter is organized as follows:

Section 4.2 - presents a listing of the major construction elements of the Full Build Alternative.

Section 4.3 - presents a summary of the potential differences between the two (2) Build Alternatives in terms of construction impacts.

Section 4.4 - presents an outline of typical construction management issues that apply to the entire project. Such issues include schedule timelines, maintenance and protection of traffic, spoils removal, and groundwater control.

Section 4.5 - presents a description of the types of construction activities that may occur on this project. These are presented as generic construction activities that may occur in multiple locations on different project elements.

Section 4.6 - presents a description of the management of EIS, Environmental Performance Commitments (EPC) and other environmental commitments during construction to ensure minimizing the cumulative effects that are adverse and maximizing environmental stewardship and economic recovery.

4.2 MAJOR CONSTRUCTION ELEMENTS

In general, the construction methods to be used for the FSTC are common to both Alternative 9 and Alternative 10 - the Preferred Alternative (see Chapter 3: Alternatives for the description of alternatives). Where the construction of a particular project element differs between alternatives, the differences are elaborated upon within the relevant technical resource chapters of this FEIS, and summarized in Section 4.3.
1. FSTC Entry Facility, with Central Station Concourse.
2. Potential modification of the Conbin Building and incorporation within the FSTC Entry Facility in the Preferred Alternative (which includes access from John Street, or location in Alternative 8 which does not allow John Street access).
3. New sidewalk stairs from street level to the 2 platform at Cortlandt Street and Maiden Lane. Entrance at Liberty Plaza within exiting esplanade.
4. Rehabilitation of the 2 Station at Fulton Street, including interior renovation and enhancements, such as signage, lighting, improved handrails, tiling, floor and wall surfaces and reorganization of exit and fare areas to improve pedestrian flow.
5. Underpass beneath the 2 Line.
6. New access structure leading to the Dey Street Passageway on Dey Street at 185 Broadway: Dey Street Access Plaza.
7. Pedestrian passageway beneath Dey Street; the Dey Street Passageway, between Broadway and Church Streets connecting the Entry Facility and the 2 line with the 2 line and farther west with the WTC site.
8. Passageway beneath the 2 line beneath Church Street connecting to the Dey Street Passageway.
9. New street-level elevator adjacent to the WTC site providing access to the 2 Cortlandt Street northbound platform and Dey Street Passageway.
10. Extension of the 2 mezzanine.
11. New staircases and potential escalators linking the Entry Facility with the southbound 2 platform in the basement of 185 Broadway.
12. Demolition of existing buildings at 194, 196, 200 and 204 Broadway and 185 Broadway. (See number 1 and 8 above.)
13. Widening of the 2 mezzanine between Broadway and Nassau Street.
14. New street-level elevator on Fulton Street providing access to the 2 mezzanine and northbound 2 (within 129 Fulton Street).
15. Renovation of the 2 mezzanine between Nassau and William Streets, including removal of existing ramps.
16. New stairs and escalator from the 2 mezzanine to the 2 line mezzanine on Fulton Street.
17. Possible expansion of existing stairs at 87 Nassau Street.
18. Rehabilitation of the 2 Station at Fulton Street, including interior renovation and enhancements, such as signage, lighting, improved handrails, tiling, floor and wall surfaces and reorganization of exit and fare areas to improve pedestrian flow and extension of mezzanine.
19. New elevator at one of two potential locations on William Street providing access from the 2 line mezzanine to platforms.
20. 2 to 2 connector within WTC site.
21. New stairs and escalator from the 2 lower mezzanine to the northbound 2 platform.
22. New 2 platform to 2 platform stairs.
23. New street-level entrance (within building) and stairs to 2 line mezzanine.
25. New stairs entrees to 2 Station.
26. New stair access to Dey Street Passageway at the Millennium Hotel.
27. New elevator to Dey Street Passageway at the Millennium Hotel.
28. Rehabilitation of stair entrance to 2 lines at Church Street.
Based on currently available engineering information, both Alternative 9 and Alternative 10, the Preferred Alternative, would be feasible, although Alternative 10 will require more extensive structural support for the Corbin building. Two key issues require further evaluation prior to assessing the feasibility of Alternative 10: structural integrity and subsurface conditions of the Corbin building. Final engineering investigations will be conducted prior to construction to determine the structural integrity and subsurface conditions of the Corbin building. If unanticipated engineering conditions are discovered, NYCT will assess the feasibility of constructing Alternative 10. Should the construction of Alternative 10 prove infeasible, Alternative 9 will be advanced. Until these factors are resolved, Alternative 9 and Alternative 10 remain under consideration and the project impacts of each Build Alternative are discussed in this FEIS.

The two (2) Build Alternatives, Alternative 9 and the Preferred Alternative, are comprised of multiple project elements, as described in Chapter 3: Alternatives. Figure 4-1 provides a description and location of each project element. The FSTC consists of the construction and operation of a rehabilitated, reconfigured, and enhanced multi-level (i.e. street-level and subsurface) station complex in Lower Manhattan that would serve 12 existing NYCT subway lines.

The proposed FSTC, an integrated complex of four (4) subway stations and associated connecting corridors, includes improved platforms, mezzanines and connection corridors, and a new Central Station Concourse, with surface presence distinguished by a street-level entry facility (the “Entry Facility”) on Broadway. It would include improvements to four (4) connected subway stations (see Chapter 1: Purpose and Need, for further details). The FSTC would be located on Broadway between Fulton and John Streets with a subsurface passageway extending on Dey Street west to Church Street. The major construction elements include new construction, rehabilitation areas and removal of existing structures as listed below:

New Construction

New construction elements principally include:

- The FSTC main building, or Entry Facility, located on Broadway between Fulton and John Streets;
- The Dey Street Passageway, a subsurface pedestrian passageway beneath Dey Street that will extend from Church Street to Broadway;
- A concourse beneath the 23 line beneath Church Street connecting to the Dey Street Passageway between Church Street and Broadway and passing under the 45 line beneath Broadway;
- New street entrance building leading to the Dey Street Passageway on Dey Street at 189 Broadway;
- New staircases and escalators linking the Entry Facility with the southbound 45 Fulton Street Station platform;
- New staircases to the 45 line on both east and west side of Broadway at Cortlandt Street;
- New entrances/connections to the 23 line at Fulton Street Station at several locations along William Street; and,
- A new elevator from the street to the 23 Cortlandt Street northbound platform and Dey Street Passageway.

Rehabilitation of Existing Structures

Rehabilitation work elements include:

- Modification of the Corbin Building for appropriate incorporation into the FSTC Entry Facility, under the Preferred Alternative;
- Rehabilitation of the 23 and 45 Stations at Fulton Street and the mezzanine extension;
• Widening of the AC mezzanine under Fulton Street from Nassau Street to the east side of Broadway;
• Widening of the 45 northbound platform; and,
• Improving the entrance to the south end of the southbound platform of the 45 Fulton Street Station at Cortlandt Street at One Liberty Plaza.

Removal of Existing Structures

Removal work elements include:

• Deconstruction of existing buildings at 194-6, 198, 200-2 and 204-210 Broadway and 189 Broadway;
• Removal of existing vaults under the sidewalk at various locations; and,
• Removal of existing ramp systems.

4.3 DIFFERENCES BETWEEN ALTERNATIVES - SUMMARY

Although the two (2) Full Build Alternatives are similar with respect to most of their principal construction elements, activities and potential associated impacts, the major difference between Alternative 9 and the Preferred Alternative relates to the construction and operation impact upon the Corbin Building, a National Register-listed historic property located at 192 Broadway. The implications of these differences for construction are described below.

CONSTRUCTION SCHEDULE

The Preferred Alternative requires excavation beneath, and complex underpinning of the Corbin Building. Alternative 9 would not require excavation beneath the Corbin Building although some underpinning or grout support may be required. This will be determined during the final design and would be dependent on whether or nor it is determined that there is a risk of excessive movement of the Corbin Building under Alternative 9. Such a risk could have implications for the project cost and schedule, and would necessitate the use of underpinning or a similar approach, such as compensation grouting. If underpinning of the Corbin Building is required in Alternative 9, project construction could experience delays due to unforeseen geotechnical and structural conditions that might be encountered during the underpinning process.

CONSTRUCTION STAGING AND MAINTENANCE AND PROTECTION OF TRAFFIC (MPT) PLANS

Under the Preferred Alternative, the historic terra cotta façade of the Corbin Building would be temporarily supported by structural steel bracing constructed on John Street and Broadway. As such, this alternative would entail the closure of the northern John Street sidewalk and eastern Broadway sidewalk for the width of the building frontage for the duration of construction of the Entry Facility. This duration is estimated to be approximately 28 months. Under Alternative 9, sidewalk closure on John Street may be less likely and/or less severe. Details of underpinning will become known during final design. Additional details of construction staging and MPT Plans are provided in Appendix C.

DISPLACEMENT AND RELOCATION

The Preferred Alternative requires an additional acquisition in comparison to Alternative 9, the Corbin Building, and the permanent relocation of this building’s occupants. Current conceptual design proposes the retention of the Broadway and John Street building façades and the partial removal of interior floor, northern wall, and basement structures. The building’s interior space would then be incorporated into the space created by the new Entry Facility. Alternative 9 would not require the acquisition of the Corbin
Building, which would be structurally isolated from the Entry Facility. Under Alternative 9, building occupants would not be displaced, unless the building was required to be stabilized through compensation grouting which would entail the temporary relocation of the building’s basement tenants. Further details on potential displacements and relocations associated with the FSTC are provided in Chapter 10: Displacement and Relocation.

**LATERAL SUPPORT FOR THE ENTRY FACILITY AND DEY STREET ACCESS PLAZA**

Under the Preferred Alternative, a separate subsurface site retention wall is required at the Corbin Building southern building line on John Street. Construction of this wall would also entail the temporary closure of the northern sidewalk of John Street for approximately 6 months however, other activities may necessitate the closure of the sidewalk for up to 28 months. This will also encroach into the northern lane of John Street. Unless otherwise indicated by future geotechnical and structural investigations, this support may not be necessary under Alternative 9. Therefore, the temporary sidewalk closure needed for the Preferred Alternative may not be required under Alternative 9.

**NEW BUILDINGS AND STRUCTURES/UNDERPINNING OF BUILDINGS**

The Preferred Alternative entails substantial structural modification to the foundations of the Corbin Building. The northwest quadrant of existing strip spread footings would be underpinned in stages and the load spread through an appropriate transfer structure to new columns. In contrast, Alternative 9 could either require the use of a similar simplified support system, or avoid this by the successful isolation of the building with a subsurface lateral earth retention system (a structural support structure which provides lateral support for the soil and buildings adjacent to a deep excavation). This would be dependent on the findings of future geotechnical and structural investigations.

**TUNNELING FOR 45 UNDERPASSES**

The subsurface Dey Street Passageway structure that extends from the WTC site to the Entry Facility is common to both alternatives. However, under Alternative 9, the passageway under the 45 must shift on an angle to the north as it enters the Entry Facility in order to clear the foundations of the Corbin Building. Under the Preferred Alternative, the passageway continues directly beneath the west end of the Corbin Building foundation and utilizes the basement levels of the Corbin Building.

**4.4 CONSTRUCTION MANAGEMENT ISSUES**

This section addresses principal construction management issues for the FSTC concerning: schedule, staging and traffic planning, spoils removal and waste management, dewatering and ground modification, and historic structures.

*International Organization for Standardization (ISO)*

On March 17, 1999, NYCT Capital Program Management became the first Design and Construction Management public transportation entity to be registered to the ISO 14001 Environmental Management System. This registration indicates NYCT’s commitment to incorporate ISO 14001 standards in its future designs and construction projects, including the FSTC. The ISO 14001 standards are designed to encourage the provision of products and services in accordance with internationally agreed environmental management criteria.
4.4.1 CONSTRUCTION SCHEDULE

Although construction planning is still evolving, a conceptual construction schedule has been prepared for the purposes of conservative impact assessment (see Figure 4-2). The proposed approach to construction staging assumes that construction of certain minor project components (such as new street entrances, new elevators, and 23 station rehabilitation) would occur first, commencing from outlying areas to the east and west, inwards to the Entry Facility. By mid-2005, it is anticipated that construction will commence on the Dey Street Passageway. In late 2005 and early 2006, it is assumed that the buildings on the site of the proposed Entry Facility, and the Dey Street Access Plaza, would be deconstructed and the site cleared. As the structures are removed, construction would start on the Entry Facility by mid-2006. Following the removal of the buildings on the site, the subsurface lateral earth retention system would be installed, and the site excavated to the required elevation. It is assumed that the majority of construction activities associated with the widening of the AC mezzanine between Broadway and Nassau Street, the new stair connection at 195 Broadway, and the 45 line underpasses would occur during 2006, and would be concurrent with the ongoing construction of the Entry Facility. In addition, construction of the Dey Street Passageway will be completed in early 2007. The majority of the construction activities associated with the Dey Street Passageway in 2006 will occur below grade, beneath a traffic decking system. The AC mezzanine widening would be sequenced to minimize the overall disruption to NYCT operations and passengers.

It is assumed that construction activity would be carried out in two (2) eight (8)-hour shifts, six (6) days per week, for the majority of construction tasks. Some activities, particularly subsurface construction, safety-related work and activities that require coordination with NYCT services, would occur anytime within a 24 hour/seven (7) day per week period. Due to the need to maintain peak hour services to the existing Fulton Street subway stations during the construction period, certain construction activities must be scheduled between 10 PM and 6 AM. Such activities will be generally related to peripheral project elements such as the new 45 entrance stairs, 23 station rehabilitation, AC mezzanine widening, and other entrances and stairwells used to access the JMZ, 23, and AC lines.

These activities include the placement of small (less than 8 truck loads – 80CY) concrete pours, and the delivery and preliminary placement of structural steel, so that the construction of such specific elements can be completed during daytime hours. It is not expected that such activities will occur on a regular basis, nor over long time frames. Generally, material delivery and placement will occur intermittently over short periods in localized areas of the project site. For example, the mezzanine extension work for the 23 station will entail minor concrete pours and steel placement between 10 PM and 6 AM on less than ten occasions over the 8 month period of construction.

The majority of truck movements may occur at any time within a 16-hour, six (6) day week that includes some essential truck movements during morning and evening peak hours. Efforts would be made to avoid truck movements during peak hours wherever possible, and work scheduling would aim to avoid and/or minimize street and lane closures during seasonal peaks, such as December. This would be implemented via a Construction Environmental Protection Program (CEPP) (Appendix C) and related plans, described below, which would be developed by NYCT; enforced via contractual specifications; and which would incorporate a range of measures designed to protect the environment and avoid or reduce adverse environmental impacts.

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2 Deconstruction entails a planned and contained removal of building elements to minimize environmental impacts such as noise, dust, vibration, and traffic disruption.
CONSTRUCTION ENVIRONMENTAL PROTECTION PROGRAM (CEPP)

The Construction Environmental Protection Program (CEPP) describes the environmental requirements to be met by the contractor for the FSTC. The CEPP assigns specific responsibilities for environmental compliance and communication, addresses monitoring procedures, and provides an overview of the types of mitigation measures and coordination necessary to limit potential impacts to the environment, protected resources, and communities within and abutting the construction area. This includes site inspections, environmental compliance meetings, non-compliance reporting, resolution procedures, emergency and complaint procedures, mitigation techniques, and training. The objectives of the CEPP are to:

- Define specific requirements for compliance with federal, state, and local conditions, permit conditions, the Environmental Impact Statement (EIS), and environmental aspects of the contract documents;
- Define the responsibilities and actions required to maintain compliance with environmental requirements and to effectively respond to problem situations or agency/public concerns;
- Establish the necessary procedures for communication, documentation and review of environmental compliance activities; and,
- Describe the protected resources within the project area and the kinds of mitigation measures needed to protect them.

The overall goal of the CEPP is to help ensure that the project proceeds as scheduled, while protecting environmental resources and communities within the project area. The Contractor involved in construction will be required to comply with the relevant environmental compliance requirements in this plan. Examples of measures to achieve environmental compliance are provided in Appendix C and include: details on ground and surface water protection; specifications for work involving hazardous materials; guidelines for scheduling truck movements; and directions on the use of equipment generating high levels of noise.

PEAK CONSTRUCTION PERIOD

It is assumed that the peak construction activity on this project would occur within a 12-month period from late 2005 to the end of 2006, with the overall construction duration lasting from late 2004 to mid-2008. This schedule assumes essential property acquisitions associated with the proposed project are completed in a timely manner.

CONSTRUCTION SEQUENCING

It is assumed that the following components of the FSTC would be under construction simultaneously within the Peak Construction Period (see Figures 4-3a to 4-3e):

- **Transit Center Entry Facility** – building removal and site retention;
- **Dey Street Passageway** – equipment installation and permanent street re-instatement;
- **Widening of AC mezzanine** – utility relocation, site retention, excavation;
- **Connection between the E and RW lines** – site retention, excavation; and,
- **Other project components**: the Dey Street Access Plaza, 45 line underpasses, 195 Broadway stairs, rehabilitation of the 23 Fulton Street Station, and widening of 45 platform.

It is expected that acquisition and removal of the buildings on the site of the Entry Facility would be complete by mid-2006. It is also assumed that construction of the underpass under the 45 subway line could not occur until either the Entry Facility or the Dey Street Passageway had been excavated.
Figure 4-3(a)
Figure 4-3(b)

Stairwell Connection to 45 Platform

Dey Street Passageway

23 Station Rehabilitation

23 Connector

AC Mezzanine Reconstruction

Under Construction

Construction Completed
Figure 4-3(c)
Figure 4-3(d)
4.4.2 CONSTRUCTION STAGING AND MAINTENANCE AND PROTECTION OF TRAFFIC (MPT) PLANS

Construction staging is the planning and management of equipment storage, site access, temporary truck parking, and crane access during construction. For the purposes of the analysis, construction staging is assumed to be limited to areas within the proposed FSTC site, including neighborhood streets and sidewalks. While off-site staging will be required, it is not possible to confirm the location of these areas at this stage. The requirement for, and location of, such an area would be the responsibility of the contractor. The contractor in the establishment of such staging areas would be required as part of the contract specification to comply with all applicable local zoning laws, and other applicable local rules and regulations and obtain all necessary permits and approvals.

It is expected that, following acquisition of the properties on the site of the Entry Facility, all buildings would be deconstructed, except for 192 Broadway (the Corbin Building). During deconstruction, the Corbin Building would be protected by use of appropriate construction techniques, such as the construction of a subsurface lateral support system and underpinning. The actual method would depend on the Build Alternative ultimately selected. Details of protection measures would be included in the CEPP.

Construction of the Entry Facility would proceed almost immediately following deconstruction of the existing buildings, limiting the available time for use of the cleared site for staging activities. Staging laydown for the 45 underpass would occur from the Dey Street Passageway. The construction of the widened AC mezzanine at the western end would also be undertaken from the Entry Facility site prior to construction of the Entry Facility.

Construction activities would affect pedestrian and vehicular circulation due to potential street-level disruption. If the entire width of a street is excavated, the street would be closed to vehicular traffic. Pedestrian access to excavated areas may be disrupted or prevented during cut-and-cover operations. Additional streets may also be required to incur full or partial lane closures in order to provide staging areas and to allow the relocation of utilities and other infrastructure. Traffic and pedestrian impacts can be managed to minimize impacts, using construction sequencing and lane closure management measures within an overall MPT Plan. Traffic management would, therefore, be a key component of the construction of the FSTC.

The majority of the work to be undertaken on the site would necessitate the design, development, implementation and organization of a traffic management scheme, which would also be a critical component of the work planning. Satisfactory traffic management would need to be undertaken by the contractor under the oversight of NYCT and given the highest priority in all aspects of planning for the sequencing of the work.

Construction contractors would need staging space immediately adjacent to construction areas (such as lane and sidewalk closures in Broadway, Dey Street, Fulton Street, John Street, and Church Street), in addition to larger staging and lay-down areas in remote locations. A detailed map of potential staging and lay-down areas is shown on Figures 4-4a to 4-4g. For the purposes of the FEIS, the analysis was confined to a discussion of on-site staging requirements; potential off-site staging areas were not evaluated as it was considered that the Preliminary Engineering of the project is not sufficiently advanced to allow reasonable estimation of the need for such sites. While off-site staging areas will definitely be required for storage of construction equipment and materials, sufficient data is not yet available to assess locations and impact of potential sites. The requirement for, and location of, such an area would be the responsibility of the Contractor. The Contractor in the establishment of such staging areas would be required as part of the contract specifications to comply with all applicable local zoning laws and other applicable local rules and regulations and obtain all necessary permits and approvals.
This diagram is for summary purposes only. A full description of likely construction equipment can be found in Appendix C. A full description of Staging and Laydown areas can be found in section 4.4.2 Maintenance and Protection of Traffic.

NOTE (1): NYC DOT/DDC Roadwork is anticipated to be coordinated with MTA/NYCT.
The development and coordination of MPT plans has been ongoing since the inception of the FSTC. During weekly meetings, NYCT has been coordinating with NYCDOT, utility companies and other parties involved in the reconstruction of Lower Manhattan, to develop and update its MPT planning efforts for the FSTC. During these weekly meetings the latest design information is shared, and issues are addressed and resolved. NYCT has also been reaching out to property owners potentially affected by construction of the FSTC and their concerns are also being addressed in the development of MPT plans. MPT plans are being developed for different areas of construction to ensure maximum flexibility, responsiveness to community concerns and to be enforceable based on anticipated contracting procedures. The MPT planning process is an ongoing process that is continuously updated with new design information on the project itself as well as the evolving context in Lower Manhattan in terms of street reconstruction activities, utility relocations and new land use development. For this reason the illustrative preliminary MPT plans that have been included in Appendix C should be considered an interim “snapshot” of the status of current MPT planning efforts and are subject to change. Additional detail will be developed as project design and coordination continue.

The discussion below provides a general, preliminary overview of the MPT aspects of the construction planning effort. This general description is complemented by preliminary, illustrative MPT plans included in Appendix C. These illustrative plans show a general overview of proposed MPT planning measures throughout the entire construction period and do not yet reflect the sequential nature of the various measures presented.

Development of the MPT Plans is also being coordinated with the development of the MPT Plans of other project sponsors in Lower Manhattan, including the PANYNJ with respect to the Permanent WTC PATH Terminal, the LMDC with respect to the WTC Memorial, the development of the WTC site and the improvements being planned for Fulton Street, and with NYSDOT for the proposed modifications to Route 9A. NYCDOT approvals will assist the coordination of the construction projects that would be occurring simultaneously in Lower Manhattan.

NYCT will also actively implement EPCs, which are proactive construction management measures agreed upon by NYCT, PANYNJ, LMDC and NYSDOT (see Appendix A). These measures include specific provisions for maintaining pedestrian and vehicular access and circulation. Preliminary MPT planning and coordination efforts indicate the following measures to maintain and protect vehicular and pedestrian circulation (see Table 4-1 and Appendix C for reference and greater detail).

**Fulton Street:** One (1) lane and the southern sidewalk would be reserved for truck parking and staging requirements throughout the construction period for a distance of approximately 180 feet east of Broadway to the eastern extent of the FSTC. The remainder of Fulton Street between Broadway and Nassau Street would be temporarily closed to vehicular traffic for the duration of the mezzanine widening. Lanes would be open for deliveries or emergencies, but through traffic would not be permitted since the widening would require opening the entire width of the street.

**Dey Street:** It is anticipated that full closure of Dey Street to vehicular traffic and sequential closure of entire segments of the northern and southern sidewalks would be necessary for the duration of construction. Pedestrian access would be restricted to a five (5)-foot egress sidewalk on the north and south sides of the street. Temporary truck loading areas would be established at both ends of Dey Street, as it is the main access route for vehicles servicing the supplies to the Century 21 retail store. Emergency access and essential local deliveries would be maintained at either end of the street, depending upon the construction sequence. Such limited street access would permit a cut-and-cover excavation width of up to 28 feet, which would expedite construction.
Table 4-1
Potential Street Closures

<table>
<thead>
<tr>
<th>Street Name</th>
<th>R.O.W Width (Feet)</th>
<th>Existing Street Width (Curb to Curb)</th>
<th>Proposed No. and Width (feet) of Vehicular Travel Lanes During Certain Construction Period</th>
<th>Proposed Sidewalk Widths During Construction</th>
<th>Proposed Street Opening Width During Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fulton Street</td>
<td>55</td>
<td>30</td>
<td>No through traffic. Provisions will be made for emergency vehicle and local delivery access.</td>
<td>5’ North &amp; 5’-8’ South.</td>
<td>12’</td>
</tr>
<tr>
<td>Dey Street</td>
<td>50</td>
<td>25</td>
<td>1 - 12’; emergency vehicles and local deliveries only.</td>
<td>5’ North &amp; 5’ South.</td>
<td>28’</td>
</tr>
<tr>
<td>John Street*</td>
<td>44</td>
<td>22</td>
<td>1 - 10’</td>
<td>5’ North &amp; 11’ South.</td>
<td>8’</td>
</tr>
<tr>
<td>Church Street</td>
<td>130</td>
<td>56</td>
<td>2 - 12’</td>
<td>5’-8’ East side &amp; Existing West Side.</td>
<td>Approx. 20’.</td>
</tr>
<tr>
<td>Broadway</td>
<td>5</td>
<td>40</td>
<td>2 - 12’</td>
<td>5’-8’ East &amp; 5’-8’ West.</td>
<td>21’</td>
</tr>
<tr>
<td>Nassau Street</td>
<td>32</td>
<td>19</td>
<td>1 - 12’; emergency vehicles and local deliveries only.</td>
<td>5’-8’ East &amp; 5’ West.</td>
<td>10’</td>
</tr>
<tr>
<td>Dutch Street</td>
<td>22</td>
<td>14</td>
<td>1 - 10’</td>
<td>5’</td>
<td>7’</td>
</tr>
<tr>
<td>William Street</td>
<td>40</td>
<td>22</td>
<td>All Lanes Closed</td>
<td>5’ East &amp; 5’ West.</td>
<td>11’</td>
</tr>
</tbody>
</table>

* Note: The northern sidewalk on John Street will remain open under Alternative 9.


**John Street:** The northern travel lane and sidewalk would be closed for a distance of approximately 180 feet east of Broadway to the eastern extent of the FSTC under the Preferred Alternative. Shorter term closure of the southern sidewalk would be required when existing street stairs are removed after new access has been provided to the south at Maiden Lane. Throughout construction, NYCT will seek to maintain one (1) travel lane for vehicular traffic, and one (1) travel lane for pedestrian movements while the adjacent sidewalk is closed. These closures would not be necessary under Alternative 9.

**Church Street:** The eastern travel lane and the eastern sidewalk would be closed at the intersection with Dey Street, and between Fulton and Dey Streets, throughout the period of the passageway construction. The eastern sidewalk between Dey and Fulton Street is required to be under construction for the purposes of utility relocation. This element of the project will be performed in conjunction with NYCDOT’s regional program of street resurfacing and utility replacement. Closure of the sidewalk would place access limitations on patrons of the Millenium Hotel. In addition, the western sidewalk and one (1) western lane would be closed during the construction of the RW - E connector. This construction would be coordinated with the WTC construction.

**Broadway:** It is anticipated that two (2) eastern lanes and the sidewalk would be closed from Fulton Street to John Street due to the widening of the A5 mezzanine between Nassau Street and Broadway, which extends beneath the eastern lane of Broadway. It is expected that the sidewalk would be used for truck and equipment parking and that pedestrians would be re-routed onto the eastern traffic lane of Broadway, which would be closed to vehicular traffic. Construction of the A5 underpass stairs at 195 Broadway would necessitate the closure of the entire western sidewalk of Broadway. Construction of this and work on the station roof would require some sidewalk closure during construction. The construction of the Dey Street Passageway would require temporary closure of Dey Street at Broadway, which serves as the path of travel along the western sidewalk of Broadway. This activity would be coordinated with the closure of the eastern sidewalk. East and west lane closures on Broadway could potentially occur simultaneously, which would limit Broadway to two (2) southbound vehicular lanes.
Nassau, Dutch, and William Streets: Construction of other related elements of this project, such as new entrances and the installation of elevators, will involve temporary closure of vehicle lanes and sidewalks on Nassau, Dutch, and William Streets. The proposed work on the AC mezzanine under Fulton Street between Nassau and William Streets is anticipated to require penetration from the street-level downward, resulting in some street-level disruption to pedestrians and traffic on William Street. During this work, the eastern sidewalk adjacent to 150 William Street will be closed. A five (5) foot temporary walkway for pedestrians would be maintained within the eastern traffic lane. Access to 150 William Street would be maintained via a temporary bridge, decking or similar structure.

During the 26 mezzanine extension, William Street between John Street and Fulton Street will be closed to through traffic. A 10-foot wide travel lane will be maintained from Fulton Street for emergency vehicles. In addition, a seven (7)-foot wide pedestrian walkway will be maintained on the east side of William Street and a 10-foot wide walkway will be maintained on the south side of Fulton Street. During all phases of construction at William Street and Fulton Street, a 12-foot wide travel lane will be maintained on Fulton Street.

Intersection of Maiden Lane, Cortlandt Street, and Broadway: All four (4) corners of this intersection will be subject to intermittent and/or particular sidewalk and lane closures during construction of the southern 45 entrances.

During all stages of construction, an eight (8)-foot wide walkway will be maintained on Broadway, two (2) 10-foot wide travel lanes will be maintained on Broadway, and one (1) 12-foot wide travel lane will be maintained on Cortlandt Street/Maiden Lane.

SUMMARY OF POTENTIAL CONSTRUCTION STAGING AND MPT PLAN ISSUES

Potential issues associated with construction staging, lay-down, and MPT Plans include the following:

- Accidental release of hazardous materials (e.g., asbestos from steam pipes, benzene in abandoned gas lines) (see Chapter 16: Contaminated Materials);
- Noise associated with the use and movement of construction equipment and vehicles within the staging area (see Chapter 13: Noise and Vibration);
- Emission of air pollutants associated with equipment and vehicles and dust generation (see Chapter 12: Air Quality);
- Potential soil, water and air contamination associated with hazardous materials storage (see Chapter 16: Contaminated Materials);
- Disruption of traffic (see Chapter 6: Transportation and Traffic, and Appendix C: MPT Plans);
- Disruption of pedestrian circulation (see Chapter 6: Transportation and Traffic, and Chapter 10: Displacement and Relocation); and,
- Socioeconomic effects on businesses affected by the disruption of pedestrian traffic and business displacements (see Chapter 7: Social and Economic Conditions, and Chapter 10: Displacement and Relocation).

4.4.3 SPOILS REMOVAL AND WASTE MANAGEMENT

The volume of spoils, soil, and construction and demolition debris (C&D) to be removed for the FSTC was estimated for purposes of the environmental analysis (see Table 4-2). Current estimates are expected to be refined as new information is developed during the continuing engineering of the FSTC. Estimates exclude soil quantities credited as backfill and represent the excess material to be transported from the FSTC construction site.
Table 4-2
Spoils Removal Estimates for the FSTC

<table>
<thead>
<tr>
<th>Activity</th>
<th>Soil (Cubic Yards (CY))</th>
<th>Construction and Demolition Debris (CY)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrian Underpass Excavation</td>
<td>21,000</td>
<td>&lt;100</td>
</tr>
<tr>
<td>Dey Street Passageway Excavation</td>
<td>29,500</td>
<td>&lt;100</td>
</tr>
<tr>
<td>Entry Facility Excavation</td>
<td>49,000 -Alt 10</td>
<td>29,600 –Alt 9</td>
</tr>
<tr>
<td></td>
<td>42,000 -Alt 9</td>
<td>37,000 – Alt 10</td>
</tr>
<tr>
<td>Building Deconstruction</td>
<td>&lt;100</td>
<td>29,600 –Alt 9</td>
</tr>
<tr>
<td>ABC mezzanine Widening</td>
<td>2,000</td>
<td>1,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>101,500</td>
<td>38,000</td>
</tr>
</tbody>
</table>

* See Section 4.5.1


SPOILS REMOVAL TRANSPORTATION ALTERNATIVES

Spoils would be removed by truck. There would not be a substantial difference between Alternative 9 and the Preferred Alternative with respect to quantities of spoils to be removed. A detailed discussion of truck routes is included in Chapter 6: Transportation and Traffic. Truck and other vehicle trips, together with estimated construction equipment quantities, are presented for each major FSTC construction activity in Appendix C. The options of removal of spoils and delivery of construction materials by either barge or via the existing subway system, as opposed to by truck, were evaluated as part of the EIS development process. These options, discussed in more detail in Section 4.2.9, were not considered feasible due to logistical, economic, and operational constraints (see Appendix C for further details). Should the use of barges ever be reconsidered, the National Marine Fisheries Service (NMFS), U.S. Army Corps of Engineers (USACE) and U.S. Fish and Wildlife Service (USFWS) would need to be consulted prior to starting operations. The use of barges could also result in potential adverse effects on water quality and the aquatic ecosystem and emission of air pollutants by barges. Construction of barge facilities (including dredging) and barge operations could also result in impacts to peregrine falcons nesting in the vicinity of Pier 6 and to federally listed Endangered and Threatened Species (such as the shortnose sturgeon and sea turtle), anadromous and resident fish, forage and benthic species, as indicated by resource agencies consulted during the EIS process, including the NMFS, USFWS and the USACE (see Appendix K).

HAZARDOUS MATERIALS

Construction activities would require the use and storage of potentially hazardous materials (e.g., solvents, fuel oil and lubricants). It is anticipated that a temporary staging area would be designated for the storage of such materials. Materials deposited could be removed from this area by authorized personnel only, and removals would be recorded by a designated Site Safety Officer. All liquid storage areas would have secondary containment systems in place, to reduce the risk of potential spillage. Fuel oil and other flammable or explosive substances would be stored in above-ground storage tanks protected by secondary containment systems. The storage of hazardous materials on site would be minimized or avoided where practicable (e.g., fuel oil for operational equipment would be transported to the site by fuel trucks). Details on the staging and management of hazardous materials, including relevant information on coordination of staging of hazardous materials with other Lower Manhattan projects, would be developed later and included in the CEPP.
BENEFICIAL USE OF SPOILS

In accordance with its ISO 14001 certification, NYCT CPM will consider employing methods that maximize energy efficiency, the use of cleaner fuels, source reduction by the use of recycled and reusable materials, and other efforts to prevent and reduce environmental degradation.

New York State regulations promote sound waste management procedures. One component of State regulations is the reduction of waste at the source. Title 6 New York Codes, Rules and Regulations (NYCRR) Part 360 regulations establish standards and criteria for solid waste management. The Beneficial Use Determination (BUD) regulations identify certain solid wastes that are no longer subject to regulation under Part 360 when used in a particular manner. For solid waste not specifically named in 6 NYCRR 360-1.15(b), procedures and criteria are included to enable the New York State Department of Environmental Conservation (NYSDEC) to grant case-specific BUDs. Once NYSDEC grants a BUD, the waste material ceases to be considered a solid waste. If granted a BUD, materials excavated for the FSTC would not be considered solid waste and would thereby mitigate construction impacts. If a BUD is not granted, the spoils would be considered a “solid waste” under Part 360. According to representatives of DEC’s Solid Waste Division, soil and other spoils generated during construction may be granted a BUD.

CONSTRUCTION WASTE MANAGEMENT PLAN

The contractor would be required to develop, institute, and maintain a Waste Management Plan pursuant to the CEPP, and subject to acceptance by MTA, NYCT, and MTA CC during the execution of the Scope of Work. The Waste Management Plan would include the identification of:

- Beneficial use opportunities and outreach process sites;
- Disposal needs and potential sites;
- C&D debris disposal sites;
- Quantities to be excavated;
- The split between waste and inert materials;
- Measures to prevent nuisance, etc.;
- The amounts intended to be stored temporarily on site and the location of such storage;
- Intended transport means; and,
- Organization of the Contractor’s approach to Waste Management, including permit details, etc.

POTENTIAL ISSUES ASSOCIATED WITH SPOILS REMOVAL

Potential issues associated with spoils removal include:

- Traffic from truck trips (see Chapter 6: Transportation and Traffic);
- Air pollutant and noise emissions associated with truck trips (see Chapter 12: Air Quality, and Chapter 13: Noise and Vibration);
- Air pollutant and noise emissions associated with on-site construction equipment and vehicle emissions and dust generation (see Chapter 12: Air Quality);
- Vibration caused by construction truck traffic (see Chapter 13: Noise and Vibration); and,
- Potential release of hazardous materials during removal and transportation of contaminated materials (see Chapter 16: Contaminated Materials and Waste Management).

4.4.4 DEWATERING AND GROUND MODIFICATION

Construction of several of the components of the FSTC would require excavation below the groundwater table. In the vicinity of the FSTC, groundwater is expected to be located at a range of 25-35 feet below grade, although the existence of dewatered deep basements and subway tunnels may indicate deeper groundwater levels. Construction in such areas carries the risk of impacts on existing structures from soil displacement.
Groundwater drawdown can result in the unacceptable settlement of adjacent building elements. Excavation activity, including that associated with other local construction sites, has the potential to affect soil stability in areas where the water table is higher than the depth of the new excavation. As excavations progress, unbalanced water (hydrostatic) pressure can cause flooding of the excavation and lower the nearby groundwater elevation. Where buildings are supported by spread footings, or where basement slabs are founded on subsurface soil, substantial settlement may occur if no precautionary measures are taken.

The control of groundwater is essential to preventing ground movements which may occur at excavation faces. Ground movements sometimes occur in areas where unstable excavation subsurface can result in uncontrolled movements of earth support systems. Some lowering of the water table may be possible without resulting structure settlements exceeding acceptable values.

Where relatively deep (20 feet) cut-and-cover construction is employed, it is anticipated that ground displacements would be controlled by installing rigid, watertight walls such as secant pile walls or slurry walls. These walls would extend into underlying impermeable soils, thus providing a groundwater cutoff, which would preclude the need for ground modification to stabilize granular soils. Where new passageways extend under existing subways, or where existing passageways are to be widened, a combination of ground modification, underpinning, and dewatering would be required to support the subway tunnel and tunnel subsurface during construction.

Dewatering may be required for the widening of the AC mezzanine, as well as for the excavation beneath RW subway structures. For the purposes of this analysis, it is assumed that the contractor would be responsible for prevention of groundwater draw-down, or the mitigation of its adverse effects. This would include the protection of potentially affected structures, including the Corbin Building. The Corbin Building would be protected from adverse effects associated with dewatering by the construction of a slurry wall or similar lateral earth retention system. Prior to implementation, stabilization measures developed by a licensed professional engineer would be presented to NYCT for review. NYCT would notify the affected property owner prior to authorizing the contractor to proceed.

The evaluation in this FEIS is confined to a determination of the impacts of groundwater draw-down prevention techniques. Measures would be taken during the dewatering processes to minimize changes in groundwater flow and elevation in order to protect nearby structures. Groundwater removed during the construction processes would be pumped to the municipal sewer system. A New York City Department of Environmental Protection (NYCDEP) Sewer Discharge Permit would be obtained by the contractor prior to dewatering.

There are no substantial differences in dewatering requirements between Alternative 9 and the Preferred Alternative. Further details of potential impacts associated with dewatering are provided in Chapter 15: Natural Resources, and Chapter 16: Contaminated Materials and Waste Management.

### 4.4.5 HISTORIC PRESERVATION

As part of the FSTC, existing historic elements of the 45 and 23 Fulton Street Stations, and the Corbin Building would be retained and preserved as described in Chapter 3: Alternatives and Chapter 11: Cultural Resources.

### 4.5 OVERVIEW OF SPECIFIC CONSTRUCTION ACTIVITIES

The construction methods outlined below are assumed to be likely elements of the construction process for the FSTC. Appendix C includes estimates of construction equipment and traffic that are anticipated to be associated with the construction of the FSTC.
4.5.1 DECONSTRUCTION AND REMOVAL OF BUILDINGS AT 189, 194, 196, 200, AND 204 BROADWAY

Removal of existing buildings at 189, 194, 196, 200, and 204 Broadway would be required to clear the sites for the construction of the FSTC Entry Facility and Dey Street Access Plaza. Building removal would be achieved via a process of controlled demolition termed “deconstruction.” Deconstruction entails an extensively planned and contained removal of building elements to minimize environmental impacts such as noise, dust, vibration and traffic disruption. Affected buildings would be vacated and stripped of all internal furnishings. Pre-deconstruction activities would include the identification of utilities, building condition surveys, and hazardous materials assessments. A comprehensive process of contaminant assessment would then follow (this may be completed prior to the vacating of tenants) to determine the level of potential airborne particulates from deconstruction activities, and to assess the nature of construction debris for disposal. Hazardous materials such as lead or asbestos present in any buildings or structures proposed for deconstruction would be identified and removed prior to deconstruction, in compliance with NYSDEC regulations and NYCT’s existing active abatement program for hazardous materials. A discussion of potential impacts associated with the presence of contaminated materials, together with a discussion of relevant removal and transportation techniques, is provided in Chapter 16: Contaminated Materials and Waste Management.

The buildings at 194, 200, and 204 Broadway would be deconstructed from within the footprint of the existing buildings. The building at 198 Broadway would be deconstructed from the top down from within the site, with debris brought to the ground level for sorting and loading out. Material would be removed via dump trucks that would stage on the eastern Broadway sidewalk and western section of Fulton Street. Specific details of the deconstruction sequence are included in Appendix C.

Under the Preferred Alternative, the Corbin Building would be acquired and the building occupants relocated prior to deconstruction of the adjacent buildings. As described previously, the internal space of the Corbin Building would then be incorporated into the internal space created by the new Entry Facility. Under Alternative 9, the Corbin Building would not be acquired and the building occupants would not be substantially affected by direct construction impacts, unless the building was required to be protected against the risk of movement through the use of compensation grouting. In this case, the tenants in the basement could be temporarily displaced.

SUMMARY OF ISSUES ASSOCIATED WITH DECONSTRUCTION

Potential environmental impacts associated with deconstruction and building removal include:

- Noise and vibration affecting pedestrians and occupants of adjacent buildings (see Chapter 13: Noise and Vibration);
- Effects of dust generated during deconstruction and building removal on air quality (see Chapter 12: Air Quality);
- Traffic disruption (see Chapter 6: Traffic and Transportation);
- Temporary Displacements of Businesses (see Chapter 10: Displacement and Relocation);
- Vibratory effects on historic properties (see Chapter 11: Cultural Resources and Chapter 13: Noise and Vibration);
- Effects of dust generated during deconstruction and building removal on historic properties (see Chapter 12: Air Quality and Chapter 11: Cultural Resources); and,
- Potential release of hazardous materials during removal and transportation of contaminated materials (see Chapter 16: Contaminated Materials and Waste Management).

4.5.2 RELOCATION OF UTILITIES

Typical subsurface utilities expected to be encountered during the construction of the FSTC include gas, steam, electric, telecommunications, water, and sewer. The excavation and relocation of utilities beneath street-level is a major preliminary activity for the construction of the FSTC and has particular
implications for construction activities on Dey and Fulton Streets. Some utility relocation would be required prior to the commencement of any cut-and-cover construction process. Other relocations would take place along with excavation operations or after final structures are in place. Utility relocation is a critical path activity that has the potential to delay the progress of the project. (Prior to completion of site surveys proposed during the engineering of the FSTC, currently known locations of utilities are approximate.) Utility relocation requires the pavement surface of the street, and sometimes the sidewalk, to be broken up, and the subsurface course to be excavated to a depth of approximately five (5) feet, depending on the nature of the utilities. Commonly, this involves the use of pavement breakers, jack hammers, and backhoes. Utility modification commonly requires the use of grinders, welding machines, and “ringing and ripping” equipment used to pry open old cast iron services.

For the FSTC, as engineering progresses, utility relocation activities would be completed prior to the construction of lateral support and subsurface excavation. It is expected that utilities would be either temporarily suspended in place during construction or temporarily or permanently relocated, depending on the impacts on the project design. In many instances, new utilities would have to be installed prior to the de-commission of existing services. Utility design would proceed after the completion of a comprehensive study of all existing facilities, which would be refined to include the potential temporary and/or permanent locations for relocated utilities.

New service trenches would be built on either, or both, sides of Dey Street and Fulton Street. These may be located beneath sidewalks or incorporated into a designated “utility zone” between the roadway surface and passageway, or mezzanine ceiling. A major exception to temporary relocation is the existing sanitary interceptor sewer that runs north-south at the west end of the Dey Street Passageway. This sewer would be supported in place during construction and relocated at the Dey and Church Streets intersection to allow for the stairway access at the Millenium Hotel.

A detailed discussion of utilities is presented in Chapter 14: Infrastructure, Energy and Solid Waste Management.

There are some differences in utility relocation requirements between Alternative 9 and the Preferred Alternative.

SUMMARY OF ISSUES ASSOCIATED WITH UTILITY RELOCATION

Utility relocation activities are by nature extremely unpredictable and could lead to some outages in the vicinity, although care would be taken to minimize this risk. Utility work would also require street, traffic lane, and sidewalk closures.

Potential issues associated with utility relocation include:

- Street access restrictions affecting the construction schedule, which in turn can prolong the duration of construction effects;
- Street closures affecting vehicular and pedestrian circulation (see Chapter 6: Traffic and Transportation);
- Noise emissions from relocation activities that potentially affect pedestrians and building occupants (see Chapter 13: Noise and Vibration);
- Emission of air pollutants and dust generation as a result of construction equipment (see Chapter 12: Air Quality);
- The effect of street closures on customer patronage and deliveries of goods to retail and businesses, potentially affecting revenues (see Chapter 7: Social and Economic Conditions);
- Potential disruption of utility service (see Chapter 14: Infrastructure, Energy and Solid Waste); and,
- Potential to encounter hazardous material (see Chapter 16: Contaminated Materials and Waste Management).
4.5.3 BUILDING STABILIZATION AND UNDERPINNING

Excavation and construction adjacent to existing buildings can result in structural instability if adequate foundation and underpinning measures are not employed. Construction of the Dey Street Passageway, the Dey Street Access Plaza, the 45 and RW underpasses, widening of the AC mezzanine, isolation or adaptive reuse of the Corbin Building, and the creation of new vertical circulation access points would entail excavation immediately adjacent to existing buildings. Excavation and construction adjacent to existing buildings can also result in some disruption to the building owners and some advanced enabling works in the form of underpinning of the buildings may be required.

Under the Preferred Alternative, the Corbin Building would be acquired by NYCT. The building occupants would be permanently relocated (see Chapter 10: Displacement and Relocation), and the structure retained in some capacity with the south, west and east elevations of the façade being restored. It is anticipated that the north wall would be incorporated into the FSTC Entry Facility. Irrespective of the approach taken in the final design to retention and incorporation of the Corbin Building in the FSTC (see Section 4.3.4, below), the façade would require temporary lateral support for the duration of Entry Facility construction activities. This is expected to require a structural steel skeleton erected within the sidewalk area of Broadway and John Street to temporarily support the façade. This activity would last approximately the duration of construction of the Entry Facility (28 months). Incorporating the Corbin Building in some capacity would entail the construction of a lateral earth support system, both along the existing building’s northern boundary, and along the John Street building line.

For any excavation under, or adjacent to, the Corbin Building, as required in the Preferred Alternative, a detailed sequence of staged underpinning and load transferal would be prepared. Alternative 9 also entails excavation adjacent to the Corbin Building. This would require extensive monitoring of the structure for movement. Erection of the temporary support structure for the façade would be from the John Street side of the Corbin Building, including the installation of support piles in the sidewalk area. The sidewalk and one (1) lane on John Street would need to be closed during erection.

Under Alternative 9, the Corbin Building would be isolated from the FSTC Entry Facility. The building would not be expected to require the extensive underpinning that would be required in the Preferred Alternative, unless future structural and geotechnical investigations determined that there is a risk of excessive movement of the Corbin Building as a result of the adjacent excavation. Assuming underpinning or similar is not required, a new lateral earth retention wall would be installed immediately adjacent to the Corbin Building northern property line. This new wall would protrude approximately six (6) feet into the site of the Entry Facility and would offer lateral support for the soil that provides vertical support for the Corbin Building foundations. Under this alternative, no additional vertical support is proposed for the Corbin Building, and its foundations would not be modified. Under Alternative 9, basement tenants may need to be relocated temporarily.

If it is determined that there is a considerable risk of excessive movement of the Corbin Building under Alternative 9, which could result in costly project delays, two (2) options for advanced works are currently available to protect against such movement: underpinning or compensation grouting.

Compensation grouting would entail installation of grouting tubes under the Corbin Building foundations prior to the excavation of soil from the north wall. The tubes would likely be installed from within the basement of the Corbin Building; however, this may cause disruption to, and require displacement of, occupants at basement level. If the monitoring equipment reflected excessive movement, the movement could be mitigated by selective grout injection beneath the building to lift the settling portions of the building back into place (i.e., “compensating” for the settlement).

Underpinning would entail installation of micro-piles beneath the north side of the building (adjacent to the excavation). Underpinning or compensation grouting would be done from the north side of the Corbin Building, within the construction lay down area for the Entry Facility, avoiding the need to displace
occupants of the building. The underpinning piles would remain permanently in place, but would not be visible as they would be installed outside of the building, beneath the ground surface.

The need for advanced works, such as compensation grouting or underpinning, to mitigate the risk of movement would be determined by a soil-structure interaction analysis during Final Design. Factors that will influence the outcome of the analysis include the rigidity of the soil retaining wall, the soil properties, and the structural make-up and foundation of the Corbin Building. Under the Preferred Alternative, it is likely that portions of the western strip footing of the Dennison Building would have to be underpinned.

**SUMMARY OF ISSUES ASSOCIATED WITH UNDERPINNING**

Potential issues associated with underpinning include:

- Effects of underpinning the Corbin Building on cultural resources (see Chapter 11: Cultural Resources);
- Noise and vibration caused by the construction of structural support systems (see Chapter 13: Noise and Vibration);
- Emission of air pollutants and dust by construction equipment and construction vehicles (see Chapter 12: Air Quality);
- Structural effects on adjacent structures during the construction of lateral support systems;
- The potential to encounter hazardous material (see Chapter 16: Contaminated Materials and Waste Management); and,
- The potential temporary displacement of building tenants (see Chapter 10: Displacement and Relocation: Section 10.1.2 and Table 10-1).

### 4.5.4 CUT-AND-COVER CONSTRUCTION OF THE DEY STREET PASSAGEWAY AND **AC** MEZZANINE

Cut-and-cover construction is a common method of subsurface construction in New York City. In this method, the roadway surface is removed, utilities relocated, lateral earth support systems installed, excavation and construction completed, and the roadway surface reinstated to enclose the new subsurface tunnel. The majority of the rail and subway lines in New York have been constructed in this manner. Generally, cut-and-cover is employed in areas requiring shallow or limited construction into soil or fill, where the alternative method that can be used, mining, is unsuitable for economical or geotechnical factors. Consequently, the Dey Street Passageway, the **AC** mezzanine, and other subsurface elements of the project would be constructed using cut-and-cover techniques. For additional details regarding the features of cut-and-cover and other tunneling methods see Appendix C.

Central to cut-and-cover construction methods is the stabilization of the side walls of the excavation prior to the removal of subsurface material. There are several different types of lateral earth support systems that may be used depending upon site conditions, depth of water table, type of soil, and proximity of adjacent building foundations. These include slurry wall construction, driven sheet-piles and drilled concrete secant piles. For the purposes of the analysis, slurry walls have been assumed to be the method that would be used, as this method is considered to have the greatest potential for disturbance and allows the ‘reasonable worst-case’ scenario to be evaluated. Driven sheet piles are pre-fabricated steel sheets that are driven, or forced, into the subsurface material. This method can cause substantial noise emissions and vibration and is not considered a likely method of construction for the FSTC.

Slurry wall construction is a method that creates a watertight contiguous wall to the base of the required excavation preventing the ingress and localized draw-down of the ground water table. Slurry wall construction does not require the use of pile driving equipment. Disadvantages include the fact that slurry walls are generally thicker than conventional retaining structures and they require substantial site space to locate the slurry batch plant and recycling facility. Slurry wall construction has greater potential to cause leakages that may adversely affect groundwater or enter sewers.
DEY STREET PASSAGeway CONSTRUCTION

A lateral earth support system would be installed to facilitate the construction of the Dey Street Passageway. The use of the slurry wall lateral earth support system is assumed to be the potentially worst method of lateral support construction methods for the passageway with respect to adverse environmental impacts, and this is used for the purposes of the analysis, although alternative methods are also likely to be employed such as secant piles in the vicinity of historic building. For further details of alternative site retention systems see Appendix C. Following the installation of slurry walls on the northern and southern sides of Dey Street, subsurface excavation would begin. As fill is excavated and removed by dump trucks staged at each end of Dey Street, the walls would be braced for stability. A temporary road deck would be installed over the excavation, depending on construction conditions. Temporary road decks permit vehicular access during subsurface construction. For the purposes of the FEIS, it is assumed that excavation would proceed at a rate of four (4) vertical and 50 linear feet per day. The passageway would occupy an area between approximately 15 and 45 feet below the street.

Following the construction of concrete slurry walls on both sides of Dey Street, the subsurface width between the retaining walls would be excavated to the proposed invert elevation of the Passageway. Excavation would be slowed at intermediate levels to allow the installation of struts to brace the concrete retaining walls across the excavation. It is assumed that struts would be installed to support the temporary roadway decking above the tunnel. Excavation work would be performed within the closed portion of Dey Street and would require a lane closing on Church Street or Broadway to accommodate a staging area for dump trucks and material deliveries of structural steel for support of the slurry wall and of the temporary precast roadway over the excavation. As the excavation progresses, the spoil would be lifted to the surface via crane.

The restoration of Dey Street after the completion of the Passageway would require the placement of select backfill material and reconstruction of the roadway and sidewalks. Fill material would be placed to a depth of approximately 12 feet prior to roadway and sidewalk construction.

AC WEST MEZZANINE CONSTRUCTION

A cut-and-cover method is expected to be used for the widening of the AC west mezzanine for the same reasons it would likely be adopted for the Dey Street Passageway (see above).

It is expected that the entire width of Fulton Street from property line to property line would be excavated during the widening of the AC west mezzanine, and the street would also be closed to vehicular traffic during this process (see Figure 4-5). The AC west mezzanine widening would be accomplished using a sequential cut-and-cover operation. The operation would require a minimum of one (1) lane closure along Fulton Street to accommodate the operation and staging area for equipment and materials for the duration of the construction. Other temporary lane closures would be required as the cut-and-cover operation progresses across the entire width of the street. Construction activities may include grouting, temporary bracing, deconstruction and excavation of roadway, slurry wall construction, concrete construction, interior fitout of mezzanine, and reconstruction of Fulton Street over the widened mezzanine. Again, secant piles will be used in lieu of slurry walls in the vicinity of historic buildings.

Although the amount of actual required volume of excavation for the AC west mezzanine is far less than that required for the Dey Street Passageway, the AC west mezzanine widening is complicated by the need to maintain operation of the AC platforms. In addition, the structure of the rail tunnel itself is extremely sensitive to reductions and increases of weight applied to the subway tunnel structure. Transferring transit passengers may be re-routed to street-level using temporary stairwells located on either side of the temporary closure.

Roadway deconstruction and slurry wall construction would require lane closing for the work as well as a staging area for equipment and materials.
SUMMARY OF ISSUES ASSOCIATED WITH CUT-AND-COVER CONSTRUCTION

The use of cut-and-cover construction is a likely method of construction for the Dey Street Passageway and AC west mezzanine widening. The intensity and significance of issues varies depending on the length of time a street is opened and on how many other streets in the vicinity are also affected. A summary of these potential issues is presented below.

Potential issues associated with cut-and-cover construction include:

- Spoils removal, surface disruption and street and traffic lane closures that affect pedestrian and vehicular access circulation (see Chapter 6: Traffic and Transportation);
- Temporary disruption to access to residential and commercial buildings, potentially resulting in socioeconomic changes (see Chapter 7: Social and Economic Conditions, and Chapter 10: Displacement and Relocation);
- Noise and vibration caused by construction of lateral earth retention and temporary road decking (see Chapter 13: Noise and Vibration);
- Emission of air pollutants and dust by surface equipment and removal of spoils (see Chapter 12: Air Quality);
- Potential utility service disruption caused by utility relocation and inadvertent utility damage caused by construction equipment (see Chapter 14: Infrastructure, Energy and Solid Waste); and,
- The potential to encounter hazardous materials (see Chapter 16: Contaminated Materials).

Potential issues associated with slurry wall construction include (relevant to slurry wall construction on all project elements):

- Groundwater and soil contamination, if not properly managed (see Chapter 15: Natural Resources);
- Instability of adjacent structures;
- Temporary use of land for slurry plant;
- Restricted pedestrian access on sidewalks adjacent to slurry wall construction (see Chapter 6: Traffic and Transportation);
- Reduced patronage of businesses and retail as a result of restricted pedestrian access (see Chapter 7: Social and Economic Conditions); and,
- Vibration and noise impacts due to clam-shovel operation.

There would not be any substantial differences between alternatives with respect to cut-and-cover construction.

4.5.5 CONSTRUCTION OF NEW BUILDINGS AND STRUCTURES

New buildings and structures to be constructed for the FSTC include the Entry Facility, the Dey Street Access Plaza, and minor elements including stairways, elevators and other project structures (see Figure 4-1).

ENTRY FACILITY

After the Entry Facility site has been cleared, new slurry walls would be installed around the perimeter. Full height site retention would be installed on the eastern and southern boundaries. Shorter walls would be installed on the north and south, and would extend from rock level to the base of the subway platforms. Following the completion of the earth retention systems, the Entry Facility site would be excavated to the proposed grade; approximately 45 feet below street-level.

Excavation work would be performed within the footprint of the Entry Facility. A lane closing would be required on Broadway and Fulton Street to queue dump trucks and to allow access to the site. As the excavation progresses, installation of subsurface site-retention support struts may be required to temporarily support the slurry wall and soldier beams.
The foundations and superstructure of the Entry Facility would be constructed within the site footprint. Access to the site from Fulton Street would need to be maintained to allow equipment access to the subsurface. It is assumed that an earthen ramp or one constructed of a temporary bridge structure would be the means of access. It is expected that the Entry Facility would be supported on drilled concrete piles. Such piles are installed by pouring concrete into pre-drilled holes that extend to bedrock.

At this stage of engineering, it is envisaged that a typical sequence may occur of steel erection, followed by concrete floor slab placement, continuing until the building is complete. As in-fill floor diaphragms and horizontal beam “braces” are installed, the temporary internal bracing would be removed.

**DEY STREET ACCESS PLAZA**

Due to its location adjacent to Dey Street, the construction of the Dey Street Access Plaza would be incorporated within the construction sequence of the Dey Street Passageway. The Access Building excavation would extend to the same approximate depth as the Passageway; approximately 45 feet below the street. The Dey Street Access Plaza would be constructed within the slurry wall installed for the Passageway. The Access Building would also be supported by drilled concrete piles. Construction would consist of cast-in-place reinforced concrete and fit out for Heating, Ventilation, and Air Conditioning (HVAC) equipment. The Millennium Hotel entrance building would also be constructed within the Passageway construction sequence.

Under the Preferred Alternative, the Corbin Building would be incorporated into the design of the Entry Facility. The existing internal floor at one (1) level above street-level would be removed and large openings created in the northern support wall so as to link the two (2) structures. The northern wall’s strip footing would be underpinned through the use of an appropriate transfer structure and the load spread to new columns to avoid the need to divert the Dey Street Passageway to clear the building footings. The incorporation of the Corbin Building into the Entry Facility would require substantial alterations to the existing structure of the Corbin Building. These alterations would be large new openings in the north wall of the Corbin Building. This new system of load transfer would necessitate a seismic upgrade in compliance with relevant State and City codes. The upgrade will consist of strengthening the building lateral load system and floor diaphragms.

Under Alternative 9, the Corbin Building would be isolated and the interior spaces would not be incorporated into the design of the Entry Facility. The building would continue to operate as an independent structure and would maintain its existing entrances on John Street and Broadway. Irrespective of whether or not underpinning or compensation grouting was required, no seismic upgrades would be necessary.

For the construction of the Entry Facility under the Preferred Alternative, a slurry wall (or secant pile wall) would be installed along the southern boundary of the Corbin Building to provide structural support. This would be located beneath the northern John Street sidewalk. This activity would require the closure of one (1) sidewalk and one (1) lane of John Street from Broadway to the eastern extent of the Entry Facility. A number of existing vaults beneath the sidewalk would also need to be removed before the wall could be installed. A slurry wall would also need to be installed along the eastern boundary of the Corbin Building. This would need to be constructed beneath an existing load-bearing wall and would be required to penetrate to bedrock to ensure adequate water cut-off would be achieved.

Under Alternative 9, there would be a new slurry wall (or secant pile wall) installed on the northern property line of the Corbin Building. The new wall would be installed adjacent to the existing strip footings of the Corbin Building and would provide lateral earth support.

The FSTC design would ensure that the Corbin Building would continue to be compliant with relevant fire safety codes. Under Alternative 9, appropriate fire egress would be provided through the utilization, and where appropriate, upgrading of the existing fire escapes currently located on the north face of the Corbin Building. This would be implemented by the provision of an enclosed stair tower to grade, or by
continuing existing fire escapes down to grade level, with both options leading to a fire rated exit
discharge path leading to Broadway. This would not affect the interior of the Corbin Building, and would
not trigger any requirement for alterations to the existing interior fire safety system of the building.
Specific details of the fire safety egress appropriate for Alternative 9 would be provided during Final
Design.

Under the Preferred Alternative, the Corbin Building would be integrated into the Entry Facility and
would be designed to be fully compliant with relevant fire safety codes.

For the purposes of impact analysis, it is assumed that construction of minor project elements such as
stairs, entrances, and vault modifications would be programmed in conjunction with major construction
activities.

4.5.6 TUNNELING FOR 4 5 AND RW, RW UNDERPASS, AND RW –
E CONNECTOR

The current FSTC conceptual design locates one (1) new underpass beneath the 4 5 line located beneath
Broadway. An underpass beneath the RW line under Church Street, and a new subsurface pedestrian and
passenger connector beneath Church Street would also be constructed, connecting the RW and E
stations to the Dey Street Passageway. To maintain traffic on Broadway, and to limit disruption to
subway service, the tunneling operation would likely require an incremental underpinning sequence of
adjoining station structures along the east side of Broadway between Fulton and John Streets, in
conjunction with careful monitoring of vibration and subway track movement. It is assumed here that
access for construction of the underpass would be from the Dey St. passageway. Underpinning of the
RW line and the 4 5 line subway structures would be required during construction. There are a
number of approaches that could be used for the underpinning of subway structures, but these differ
primarily in technical approach and are not considered to be significantly different in terms of potential
environmental impacts.

The existing subway lines are founded on soil overlaying the rock strata below. The proposed tunneling
operations may commence with some ground stabilization. Under the Preferred Alternative, the Dey
Street Passageway would continue directly beneath the northwest corner of the Corbin Building’s
foundation and that building’s basement space would be incorporated into the subsurface Central Station
Concourse space. The Corbin Building’s northern footing would be underpinned and the load transferred
to new columns. Under Alternative 9, the Dey Street Passageway would be diverted to the north to avoid
the northern strip footing and basement of the Corbin Building, and the new slurry wall would be
installed on the north side of the isolated Corbin Building.

4.5.7 STATION REHABILITATION

4 5 FULTON STREET STATION

The rehabilitation and extension of platforms, new stairway access, and connection of the 4 5 Fulton
Street Station to the proposed FSTC would be integral to the construction of the FSTC and would be
sequenced to maintain passenger operations of the existing station. No additional heavy equipment would
be associated with the rehabilitation of the station. Removal of demolition debris would most likely occur
through existing stairways and shaftways for proposed stairs and elevators. Some minor truck
movements would be added to the overall truck trips of the major construction activities to remove the
demolition materials and deliver new construction materials. Since the majority of the work would be
within the existing station structure, it is anticipated that no construction equipment would be operating at
street-level to support the rehabilitation of the station and platforms, except for the delivery and
placement of materials. It is also assumed that the work within the station would be more cosmetic than
structural (except for the connections to the entry facility and Dey Street Passageway) and would be
performed by hand with handheld demolition and cutting tools. The construction of new stairways at
Cortlandt Street and Broadway would involve minimal surface activity to open up the shaftways and to construct the stair structures within them. The existing John Street entrance would be closed and a new entrance opened at Dey Street. The original historic walls located along the southbound platform would be retained intact, with minimal intervention.

In addition, it is proposed that the roof slab of the southbound station platform be replaced to reduce the ingress of water from street-level. This activity would involve the removal of the sidewalk concrete slab on the west of Broadway between Fulton Street and the storefront of 189 Broadway (immediately south of Dey Street). During this activity, the sidewalk will be closed to pedestrians and the western lane of Broadway will be closed from Fulton Street and 189 Broadway. Temporary egress for north/south bound pedestrians on the west side of Broadway will be provided in the western traffic lane of Broadway. It is expected that this activity could coincide with lane closures on the east side of Broadway (see Chapter 6: Transportation and Traffic).

**2 3 Fulton Street Station**

The rehabilitation of the Fulton Street Station is assumed to occur entirely within the confines of the existing station, with removal of demolition debris and delivery of new interior construction materials being the only activities that would occur at street-level. It is possible that demolition activities within the station would require compressed air to operate demolition tools such as pavement breakers and jack hammers. This may require the positioning of an air compressor at street-level within a staging area adjacent to a stairway or shaftway. As part of the rehabilitation of this station it is proposed that the platforms and mezzanine be extended south to the intersection of John Street. This new space will incorporate the new ADA elevator between the mezzanine and platform levels.

**ADA Access and New Entrances on Nassau, William and Fulton Streets**

The construction of new elevators, escalators, and stairs to provide access, including Americans with Disabilities Act (ADA) access, to the platform at the east end of the west mezzanine would be performed from within the confines of the existing station. The removal of demolition debris and delivery and placement of new interior construction materials would be the only activities that would occur at street-level. It is possible that demolition activities within the station would require compressed air to operate demolition tools such as pavement breakers and jack hammers. This may require the positioning of an air compressor at street-level within a staging area adjacent to a stairway or shaftway. The installation of new stairs and elevators for the and line stations will entail similar construction techniques. Entrances connecting into the line Fulton Street Station may be constructed from street level, resulting in some minor traffic and pedestrian disruption.

**4.6 Management of EIS, EPC and Other Environmental Commitments During Construction**

Where mitigation is required, planned actions are identified and/or applicable EPCs and other commitments are made, it would be essential to develop and implement a unified approach among the Recovery Project sponsors to the extent practicable. Under FTA auspices, these commitments would be documented, implemented, monitored, continually reviewed with the stakeholders, and improved as required. NYCT plans to continue to work with the other Recovery Project sponsors throughout the course of the design, construction, commissioning and operation of the FSTC to ensure minimizing the cumulative effects that are adverse and maximizing environmental stewardship and economic recovery. This continued cooperative effort would be based on the past and current cooperative efforts and process, characterized by:

- Formal Adoption of the Lower Manhattan Federal Transportation Recovery Projects Common Environmental Performance Commitments (EPCs) by sponsoring agencies. The EPCs provide
performance commitments from agencies to be implemented prior to and during the construction period.

- Formation of the Lower Manhattan Construction Coordination Group (LMCCG) consisting of sponsoring government agencies and key stakeholders, that would ensure that Lower Manhattan Recovery Projects move forward expeditiously while minimizing the impact to residents, businesses, workers, commuters, pedestrians, and vehicles. The LMCCG’s mission includes providing the framework or vehicle for a command center or similar entity that would: coordinate the work of the participants in the rebuilding process on a daily basis and throughout the planning process; institute and implement construction coordination protocols and requirements for all government agencies, developers, construction managers, general contractors, and contractors to follow for all Lower Manhattan Recovery Projects; mediate conflicts in schedules and street and site access among construction projects, agencies, and the Lower Manhattan community; and utilize technology to facilitate coordination of Lower Manhattan Transportation Recovery Projects.

- Enactment of the Coordinated Construction Act for Lower Manhattan. The Coordinated Construction Act includes the following provisions:
  - Allows public agencies to pre-qualify bidders, which ensures speed and high quality;
  - Allows the City and the utility and telecommunications companies to bid together on infrastructure projects, which greatly reduces the need to rip up streets repeatedly;
  - Requires the use of contractors with state-certified apprenticeship programs on large projects, which increases safety on the worksite, ensures minority access to construction jobs and trains a future skilled workforce;
  - Requires the City to follow the State's laws on the hiring of minority- and women-owned businesses, which ensures wide opportunities;
  - Allows the use of owner-controlled insurance programs and the use of alternate dispute resolution if so desired, which would help win insurance at an affordable rate and reduce costs;
  - Requires all public agencies to use ultra low diesel fuel with construction vehicles, which keeps the air clean and the workers healthy;
  - Makes it easy for public agencies to purchase construction goods, cooperatively and thus, more inexpensively.