APPENDIX B: EVALUATION OF PRELIMINARY ALTERNATIVES

B.1 INTRODUCTION

B.1.1 BACKGROUND

This Report provides an overview of the preliminary alternatives evaluated as part of the environmental review process under the National Environmental Policy Act (NEPA), for the proposed construction and operation of the Fulton Street Transit Center (FSTC) in Lower Manhattan by the Metropolitan Transportation Authority (MTA) New York City Transit (NYCT) and the Federal Transit Administration (FTA). The construction of the FSTC is proposed as part of the revitalization of Lower Manhattan necessitated by the events of September 11.

The FSTC is one (1) of three (3) priority transit projects meant to address the urgent need for comprehensive transit improvements in Lower Manhattan in response to the events of September 11. The two (2) other priority projects are the Permanent World Trade Center (WTC) Port Authority Trans-Hudson (PATH) Terminal, sponsored by Port Authority New York New Jersey (PANYNJ) and the South Ferry Subway Terminal Project, sponsored by the MTA and NYCT. These priority projects were formally identified by New York Governor George Pataki as the “Lower Manhattan Transportation Recovery Projects” through a coordinated process conducted in late 2002 and early 2003 by the Transportation Working Group, a group of local decision-makers which includes the State of New York, the City of New York, MTA, PANYNJ, and Lower Manhattan Development Corporation (LMDC). On February 27, 2003, U.S. Transportation Secretary Norman Y. Mineta announced the selection of these projects as a group of nationally recognized transportation projects designated to receive high-level attention under President Bush’s September 18, 2002 Executive Order 13274, Environmental Stewardship and Transportation Infrastructure Project Review. This designation is intended to help expedite the rebuilding of the transit system damaged in the events of September 11 as the projects advance through the NEPA review process.

The effects of September 11 resulted in extensive economic, transportation, infrastructure and environmental impacts on Lower Manhattan and the New York City Metropolitan Region. In addition to the impacts on economic resources, several transportation facilities in Lower Manhattan were destroyed or otherwise impacted and overall transportation connectivity between and within Lower Manhattan and the region was severely impaired.

Improvement of regional transit access to Lower Manhattan has been considered essential to the successful revitalization of the area. A coordinated effort has been undertaken to improve transit in Lower Manhattan to maximize the potential benefits for the revitalization process and contribute to a full recovery. Key in this regard is the existing Fulton Street – Broadway-Nassau Subway Station Complex, hereinafter referred to as “the Existing Complex”. The Existing Complex encompasses the following four (4) subway stations:

- 4 5 Fulton Street Station;
- A C Broadway-Nassau Station;
- 2 3 Fulton Street Station; and,
- J M Z Fulton Street Station.

Together, these stations provide the main connections to Lower Manhattan from the region’s commuter hubs which include Grand Central Station, Pennsylvania Station, the Port Authority Bus Terminal in Manhattan and the Atlantic Terminal in Brooklyn. The Existing Complex is also located in close proximity to the proposed Fulton Street Transit Center. This location is important due to the existing foot traffic in the area, and the anticipated increase in pedestrian activity associated with the revitalization efforts following the events of September 11.
proximity to the R W19 and E subway stations and the PATH subway service to the west. The Existing Complex is centrally located on Fulton Street, which is a major east-west pedestrian axis in Lower Manhattan, running from South Street Seaport in the east to Church Street in the west. The Existing Complex thus provides pedestrian access to major centers of economic activity in Lower Manhattan including the Financial District to the east and to the World Financial Center (WFC) and – prior to September 11 – the WTC to the west. This places particular emphasis on the importance of the Existing Complex’s location, and nearby subway lines and transit services as the main public transit access point to Lower Manhattan.

Public planning initiatives for revitalization envision Lower Manhattan as a vibrant 24-hour/seven (7) day a week community with a mix of commercial, residential and recreational land uses, supported by a transportation infrastructure. Considering the instrumental role that the Existing Complex could play in the revitalization of Lower Manhattan, NYCT identified opportunities for improvement of the Existing Complex to enhance its contribution. Studies conducted by NYCT indicated that the Existing Complex is characterized by several issues that detract from its potential to support the revitalization of Lower Manhattan. Specifically, the following issues were identified.

**POOR STATION WAYFINDING:**

The Existing Complex is hampered by the lack of clear orientation and visual cues from the street that are necessary for efficient access to the stations and, once in the Existing Complex, to the platforms. The many entrances to the Existing Complex are obscured, dark, narrow and difficult to find. In addition, many of the subway entrances open directly to narrow, crowded sidewalks and streets, which reduces the visibility of the entrance and creates additional congestion. To access the subway platforms from the street, repeated up-and-down movements through platforms and corridors are often necessary before one finally reaches the destination platform.

**POOR PHYSICAL CONDITIONS AND INEFFICIENT FUNCTIONAL LAYOUT OF THE SUBWAY STATIONS:**

As a result of station age, coupled with a lack of system integration that emerged as the subway system was historically built, existing subway structures are substandard and inefficient by today’s standards in accommodating the current and future ridership. In particular, the 2 3 Fulton Street Station and the 4 5 Fulton Street Station have never been substantially renovated since their opening. They require major improvements in surfaces, lighting, and street and platform access. Improvements or rationalization in fare control and organization of paid and unpaid areas are also needed to more efficiently operate these stations. Stations in the Existing Complex are characterized by long, narrow and winding pedestrian corridors with confusing layouts. Due to their inefficient layout and the absence of efficient connections, stations in the Existing Complex lack the operational flexibility necessary to maximize the efficiency of a modern transit system. In addition, the Existing Complex does not provide direct pedestrian connections to other nearby subway and transit services, such as the R W service at Church Street and the E 19 and PATH services at the WTC site.

**INADEQUATE SUBWAY ACCESS (INCLUDING AMERICANS WITH DISABILITIES ACT (ADA) ACCESS), CONNECTIVITY AND OPERATIONAL ISSUES:**

The Existing Complex is characterized by congested subway stations, confusing station entrances, difficult access to nearby trip destinations, inadequate street access, lack of connectivity among stations and physical deficiencies. These include severe congestion at the north end of the 4 5 platforms, congested flows at several stairways and platforms, and an outmoded pedestrian ramp system at the A C station. These congested conditions are reflected in very poor Levels of Service (LOS) of pedestrian flow at several locations.

Based on the results of the analysis, NYCT determined that, for the Existing Complex, substantial improvements would be needed to maximize its contribution to the economic recovery of Lower Manhattan.
Manhattan and the region and meet the increased transportation demand anticipated with the regeneration and growth in Lower Manhattan. These improvements would serve to realize the following project goals:

- Facilitate access, improve wayfinding, and streamline transfers;
- Allow for intermodal connectivity (PATH, ferry service);
- Promote system flexibility in the event of service disruption;
- Improve east-west pedestrian connectivity across Lower Manhattan;
- Promote safety and reduce congestion at heavily trafficked street crossings;
- Support current land use, recovery and rebuilding of Lower Manhattan through improved transit infrastructure, aiding the revitalization of downtown and providing the opportunity for positive local and regional benefits; and,
- Improve travelers’ experience and transit’s overall attractiveness.

To investigate potential approaches to realizing these goals, NYCT commissioned a preliminary concept study in 2002. This preliminary concept study indicated that the most effective way to integrate existing transit services with potential improvements would involve the construction of:

- A street-level facility on Broadway (the Entry Facility) incorporating a subsurface station concourse (the Central Station Concourse);
- A pedestrian passageway beneath Dey Street connecting the WTC site with the Entry Facility;
- Rehabilitation of the 2 3 and 4 5 Fulton Street stations;
- Improvements to the A C mezzanines and platform;
- Construction of a pedestrian connector between the R W and E routes; and,
- Improved street access to the subway.

This combination of elements was presented as the Proposed Action or Full Build Alternative in the Environmental Impact Statement (EIS) Draft Scoping Document issued for public review and comment on April 3, 2003. The Draft Scoping Document also included a No Action Alternative and a request for public input into variations on Partial Build Alternatives, which represented subsets of the Full Build Alternative, but would not include an Entry Facility. The public scoping process generated a number of additional considerations relevant to the development of alternatives, as follows:

- It was suggested that the Proposed Action should preserve historic resources by considering variations of the Full Build Alternative which would avoid impacts on historic resources in general, and on the Corbin Building in particular. This building, located at 192 Broadway, is a National Register-eligible property of considerable historical interest;
- It was suggested that the EIS should evaluate alternatives that would involve a reduction of the property acquisition and demolition proposed within the Full Build Alternative, and therefore reduce the potential socioeconomic impacts associated with the elimination of existing commercial and retail uses;
- It was also suggested that the Proposed Action should be expanded to enable the acquisition and development of the entire city block with a mix of commercial, retail and residential land uses; and,
- It was recommended that the Proposed Action be expanded from the Full Build Alternative to include broader subway and intermodal connections. Suggestions included connecting to a future Second Avenue Subway (SAS) Station on Water Street; connecting the PATH tracks with the 6 subway at City Hall Station; and connecting the E tracks with the R W tracks at Church Street.

To address potential issues associated with the Proposed Action, the alternatives identified in the scoping document and other alternatives suggested through public comments on the scoping document were analyzed pursuant to 23 CFR 771.123 (c), which states that the draft EIS (DEIS) “shall evaluate all reasonable alternatives to the action and discuss the reasons why the alternatives which may have been
considered were eliminated from detailed study.” The following sections discuss the range of preliminary alternatives considered and the reasons for their elimination or advancement for environmental analysis.

B.1.2 OVERVIEW OF ALTERNATIVES CONSIDERED

As indicated above, the range of alternatives considered was based on public and agency comments received during the scoping process, additional information developed by NYCT, and an elaboration of the project Purpose and Need into various subsets of related planning, design and environmental considerations.

A central focus for the identification and development of alternatives was the recognition that improving access to Lower Manhattan in support of economic recovery and resumed growth could cause short-term construction impacts, notwithstanding the long-term benefits that improved public transportation would provide for Lower Manhattan’s environment and economy. Specifically, the following resource categories were identified as particularly sensitive to potential cumulative construction and operational impacts:

- Access and Circulation;
- Air Quality;
- Noise and Vibration;
- Cultural Resources; and,
- Economic and Business Interests.

Minimization of impacts on these key resources was an important element in identifying potential alternatives. However, because of issues raised during the scoping process, cultural resources and economic/business interests were considered especially important. With regard to cultural resources, the richness of these resources in Lower Manhattan as a key to its identity and a major tourist attraction were a focus of particular consideration in the development of alternatives. More specifically, the alternatives presented herein were developed based on their ability to reduce impacts on the historic Corbin Building at 192 Broadway, which was proposed for demolition in the Full Build Alternative presented in the Scoping Process, as well as other historic structures and districts in the project vicinity. With regard to economic and business interests, alternatives were sought which could avoid or reduce impacts on those interests in the project area from the demolition of buildings and the associated temporary and permanent displacement of commercial and retail activities.

To especially reduce the potential for adverse economic and cultural resources impacts, 10 alternatives were identified beyond the No Action Alternative. These alternatives reflect a spectrum of potential impacts on economic and cultural resources and a range of transit improvement benefits, and comprise seven (7) Partial Build Alternatives and three (3) Full Build Alternatives. All 10 alternatives include the following elements identified in the 2002 preliminary concept study needed to improve transit services at the Existing Complex, and needed to fulfill the Project Purpose and Need:

- A subsurface pedestrian passageway connecting the WTC site with the Existing Complex;
- Rehabilitation of the 2 3 and 4 5 Fulton Street stations;
- Improvements to the A C mezzanines and platform;
- Construction of a pedestrian connector between the R W and E routes; and,
- Improved street access to the subway, including improved access to the J M Z station.

In addition to the elements above, the Full Build Alternatives include an above-ground Entry Facility, whereas the Partial Build Alternatives do not include an Entry Facility. The Full Build and some of the Partial Build Alternatives contain a Central Station Concourse; the other Partial Build Alternatives do not. With one exception, the alternatives propose to locate the subsurface pedestrian passageway between the WTC and the Existing Complex beneath Dey Street; the exception locates the pedestrian passageway below Fulton Street.
Three (3) key design considerations, and their related capacity, operational, and displacement considerations, helped to structure the array of alternatives evaluated. These design considerations include:

- How the connection is implemented between the underground pedestrian passageway and the A C platform;
- How access to the subsurface Central Station Concourse is implemented, e.g. via street stairs, or via an Entry Facility; and,
- How the Corbin Building is affected (i.e. demolition, isolation or “adaptive reuse”\(^1\)).

An overview of the alternatives and their characteristics is presented in Table B-1 and Figure B-1. Table B-1 identifies both the common elements among the alternatives and the unique elements of each alternative. Figure B-1 presents a three (3)-dimensional perspective of each alternative to facilitate identification of the discerning elements among the alternatives. The following section describes the alternatives. A subsequent section evaluates each alternative, based on the potential achievement of project goals. The discussion of alternatives is divided into: the No Action Alternative; the group consisting of the Partial Build Alternatives; and the group consisting of the Full Build Alternatives.

In sum, the following alternatives were evaluated (see Figure B-1):

**NO ACTION ALTERNATIVE**

**Partial Build Alternatives:**

*Category 1: Pedestrian Passageway to the WTC Site Only*

- Alternative 1: Fulton Street Passageway Alternative; and,
- Alternative 2: Dey Street Passageway Alternative.

*Category 2: Dey Street Passageway plus Pedestrian Passageway Between Dey Street and A C Mezzanine*

- Alternative 3: Dey Street Passageway with North-South Tunnel under 4 5 northbound platform; and,
- Alternative 4: Dey Street Passageway with Diagonal Tunnel between 4 5 and A C platforms.

*Category 3: Dey Street Passageway plus Subsurface Central Station Concourse with Plaza Above*

- Alternative 5: Dey Street Passageway and Central Station Concourse, with Plaza above and removal of Corbin Building;
- Alternative 6: Dey Street Passageway and Central Station Concourse and Plaza above, with retention and avoidance of Corbin Building; and,
- Alternative 7: Dey Street Passageway and Central Station Concourse and Plaza above, with adaptive reuse of Corbin Building.

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\(^1\) For the purposes of discussion, “adaptive reuse” can be defined as making use of some or all of the Corbin Building for subway operations without unduly changing the important historic features or appearance of the building. These uses might include pedestrian entry into the FSTC via the Corbin Building, or pedestrian circulation space through lower levels of the Corbin Building. The specific details of the “adaptive reuse” proposal can be found in Chapter 11: Cultural Resources.
**Full Build Alternatives:**

- Alternative 8: Full Street Build Alternative; Dey Street Passageway and Central Station Concourse, with Entry Facility above and removal of Corbin Building;
- Alternative 9: Reduced Street Build Alternative; Dey Street Passageway and Central Station Concourse, with Entry Facility above and isolation of Corbin Building; and,
- Alternative 10: Modified Full Street Build Alternative; Dey Street Passageway and Central Station Concourse, with Entry Facility above and Adaptive Reuse of Corbin Building.

**B.2 EVALUATION OF PRELIMINARY ALTERNATIVES**

**B.2.1 METHODOLOGY**

The Preliminary Alternatives were generated to reflect a reasonable spectrum of potential opportunities to achieve the project goals as defined in the Draft Scoping Document and the project Purpose and Need. These goals support the need for improved transit access to Lower Manhattan and economic revitalization and are as follows.

- Facilitate access, improve wayfinding and streamline transfers;
- Allow for intermodal connectivity (PATH, ferry service);
- Promote system flexibility in the event of service disruption;
- Improve east-west pedestrian connectivity across Lower Manhattan;
- Promote safety and reduce congestion at heavily trafficked street crossings;
- Support current land use, recovery and rebuilding of Lower Manhattan through improved transit infrastructure, aiding the revitalization of downtown and providing the opportunity for positive local and regional benefits; and,
- Improve travelers’ experience and transit’s overall attractiveness.

Each alternative was evaluated against these goals to determine whether the alternative contributed, in fact, to the achievement of the goals. In addition, each alternative was also evaluated against:

- Constructability; and,
- Preliminary environmental considerations during construction and operation (particularly whether historic and socioeconomic concerns exist in the alternatives).

Comparative project cost information for various alternatives is presented in Section B.14.

Where environmental concerns, including displacement of economic activities and historic impacts, would be expected to be associated with a particular alternative, these are also described. Fatal flaws are identified and are those characteristics of any alternative that would clearly result in a level of substantial adverse environmental impacts that could not be mitigated by reasonable means.

In the following subsections, the discussion of each alternative starts with a detailed description of the alternative, followed by a detailed analysis of the operational and construction conditions associated with the alternative. Operational factors are assessed, in part, in terms of LOS and volume to capacity ratios (v/c).
## Table B-1
Overview of Preliminary Alternatives and Associated Improvements

<table>
<thead>
<tr>
<th>PARTIAL BUILD ALTERNATIVES</th>
<th>FULL BUILD ALTERNATIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WTC Connection Only</strong></td>
<td><strong>Central Station Concourse with Plaza Above</strong></td>
</tr>
<tr>
<td>Fulton St.</td>
<td>Dey St.</td>
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<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

### PROJECT ELEMENTS

- **Paid-zone passageway from the WTC Complex (45–E) to the Fulton Street Station Complex:** x
- **ADA Elevators at Fulton and Church Streets:** x
- **Connector between the northbound platform of the (45) and the Fulton Street passageway:** x
- **Free-zone passageway from the WTC Complex (45–E) to the Fulton Street Station Complex:** x x x x x x
- **New entry at Millenium Hotel to provide 45 Street Access Stairs:** x x x x x x x
- **New entrance structure at the southwest corner of Broadway and Dey Street:** x x x x x x x
- **Stairs from Passageway to street (at John Street):** x x x
- **Stairs from Passageway to north bound 45 platform:** x x

- **Paid connector between Dey Street Concourse and lower 45 mezzanine - Running North-South Under Northbound 45 Platform:** x
- **Paid connector between Dey Street Concourse and lower 45 mezzanine - Running Diagonally from NE to SW - including a vertical circulation element midblock on east side of Broadway:** x

- **Below grade Central Station Concourse bounded by John, Broadway and Fulton Streets with Plaza Above Providing Vertical Access:**
  - **45 mezzanine widening between Broadway and Nassau:** x x x x x x x x
  - **East-West Tunnel at 195 Broadway beneath 45 Tracks providing access to SE 45 Platform from Central Station Concourse:** x x x x x x x x

- **Below grade Central Station Concourse bounded by John, Broadway and Fulton Streets with Entry Facility Above Providing Vertical Access:** Removal of Corbin Building No integration of Corbin Building and Entry Facility Corbin Building Integrated with Entry Facility

### COMMON STREET/PLATFORM ACCESS ELEMENTS

- **New entrances on the west side of Fulton Street and Broadway:** x x x x x x x x x
- **New stairs on the southeast and southwest corner of Broadway and Cortlandt Street:** x x x x x x x x x
- **Entrances on south side of John Street between Nassau and William Streets:** x x x x x x x x x x
- **Entrances on north side of Fulton Street to the east of William Street:** x x x x x x x x x x
- **Entrance on west side of Nassau Street to the south of Fulton Street:** x x x x x x x x x x
- **New stairs connecting the east end of the 45 platform to the 45:** x x x x x x x x x

### COMMON STATION REHABILITATION ELEMENTS

- **45 Fulton Street Rehabilitation:** x x x x x x x x
- **45 Rehabilitation:** x x x x x x x x
- **45 Rehabilitation:** x x x x x x x x

### COMMON ADA ELEMENTS

- **45 Nassau Street - ADA connectivity:** x x x x x x x x
- **ADA elevator on John Street for the 45 Fulton Street Station:** x x x x x x x x
- **ADA Access at 45 stairs:** x x x x x x x x

### OTHER COMMON ELEMENTS

- **45 Connector:** x x x x x x x x

Alternative 1: Fulton Street Passageway
A new passageway between Fulton Street from Church Street to Broadway.

Alternative 2: Dey Street Passageway
A new passageway beneath Dey Street from Church Street to Broadway.

Alternative 3: Dey Street Passageway with Tunnel under 45 Northbound Platform
A new passageway beneath Dey Street from Church Street to Broadway with a new passageway below Broadway and beneath the 45 northbound platform.

Alternative 4: Dey Street Passageway with Diagonal Tunnel Between 45 and A C Platform
A new passageway beneath Dey Street from Church Street to Broadway, connecting to the existing Fulton Street 45 pedestrian underpass and to the A C lower mezzanine.
Alternative 5: Dey Street Passageway and Central Station Concourse, with Removal of Corbin Building

A new passageway beneath Dey Street with a subsurface concourse between John Street and Fulton beneath a plaza and connecting the 45 and AC platforms.

Alternative 6: Dey Street Passageway and Central Station Concourse with Retention and Avoidance of the Corbin Building

A new passageway beneath Dey Street with a subsurface concourse between John Street and Fulton beneath a plaza and connecting the 45 and AC platforms and avoiding the Corbin Building.

Alternative 7: Dey Street Passageway and Central Station Concourse with Adaptive Reuse of the Corbin Building

A new passageway beneath Dey Street with a subsurface concourse between John Street and Fulton beneath a plaza and connecting the 45 and AC platforms and adaptively reusing the Corbin Building.

Alternative 8: Full Street Build Alternative

A passageway beneath Dey Street, with an Entry Facility between John and Fulton Streets, connecting the 45 and AC platforms. This alternative requires demolition of all buildings on Broadway, including the Corbin Building.

Alternative 9: Isolation of the Corbin Building

A passageway beneath Dey Street, with an Entry Facility between John and Fulton Streets, connecting the 45 and AC platforms, and avoiding the Corbin Building.

Alternative 10: Adaptive Reuse of the Corbin Building

A passageway beneath Dey Street, with an Entry Facility between John and Fulton Streets, connecting the 45 and AC platforms, and incorporating adaptive reuse of the Corbin Building.
LOS AND (V/C) RATIOS

Key indicators of the operational benefits or detriments of each alternative are: the LOS of pedestrian circulation through passageways and on platforms, and the v/c ratio on stairways and escalators. LOS, which is expressed in values ranging from A (excellent) to F (very poor) provides an indicator of pedestrian congestion. At LOS A or B, passengers enjoy free movement unaffected by the presence of other pedestrians. However, at LOS E or F, passenger densities are high and movement is extremely restricted (see Figure B-2).

Figure B-2: Examples of Pedestrian LOS Conditions

Similarly, v/c ratios of 0.70 indicate that stairways and escalators are close to 100 percent capacity, with ratios greater than 1.00 indicating that a stairway or escalator is expected to be used at greater than its design capacity, resulting in extreme overcrowding. Table B-2 provides an overview of the operational conditions with regard to pedestrian circulation for all alternatives. This table is referenced in the discussion of each alternative to indicate where the alternative is expected to provide an improvement, or in some cases, results in exacerbation of pedestrian circulation problems or creates new pedestrian circulation issues. This, in turn, then provides a basis for the evaluation of the alternative with regard to the achievement of project goals and the Purpose and Need for the Proposed Action.
### Table B-2
#### LOS and V/C Overview of Preliminary Alternatives

<table>
<thead>
<tr>
<th>Element and Description</th>
<th>No Action</th>
<th>1</th>
<th>2</th>
<th>3</th>
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<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>A C platform stairs to mezzanine</td>
<td>C</td>
<td>C</td>
<td>C</td>
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<td>C</td>
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<td>C</td>
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<tr>
<td>Direct stair from FSTC Concourse to NB 4 5 platform</td>
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<td>A</td>
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<tr>
<td>Free zone up escalators from Dey Street to Entry Facility</td>
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<td>0.50</td>
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<td>Free zone up escalators from Dey Street Passageway to 189 Broadway platform level</td>
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<td>-</td>
<td>0.45</td>
<td>0.47</td>
<td>0.47</td>
<td>0.46</td>
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<tr>
<td>New central underpass from FSTC concourse to SB 4 5 platform</td>
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<td>A</td>
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<tr>
<td>Up escalators from central underpass to SB 4 5 platform</td>
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<td>-</td>
<td>0.31</td>
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<td>Diagonal up escalators to platform – N</td>
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<td>0.76</td>
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<td>Diagonal up escalators to platform – S</td>
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<tr>
<td>Down escalators from SB 4 5 platform to underpass</td>
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<td>0.19</td>
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<tr>
<td>New 4 5 line underpass (runs N-S under tracks)</td>
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<td>D</td>
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<tr>
<td>Existing underpass connecting A C mezzanine to SB 4 5</td>
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<td>C</td>
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<td>D</td>
<td>A</td>
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<tr>
<td>Stair from existing ramp-under to SB 4 5 platform</td>
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<td>F</td>
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<td>E</td>
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<tr>
<td>Ramp from A C concourse up to NB 4 5 platform</td>
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<td>D</td>
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<td>-</td>
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<tr>
<td>Stair from Dey Street concourse to N side of John Street</td>
<td></td>
<td>-</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
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<td>-</td>
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<tr>
<td>Open space at north end of NB 4 5 platform</td>
<td></td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
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<td>A</td>
<td>A</td>
<td>A</td>
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<td>A</td>
</tr>
<tr>
<td>FSTC escalator to street (northwest corner)</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.28</td>
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<td>FSTC escalator to street (southwest corner)</td>
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<td>FSTC escalator to street (northeast corner)</td>
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<tr>
<td>Up escalators from Dey Street platform level to 189 Broadway</td>
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<td>Stair - NB 4 5 to Fulton Street N (E of Broadway)</td>
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<td>FSTC - northeast exit to Fulton Street</td>
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<td>FSTC - southwest exit to Broadway</td>
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<td>FSTC - southeast exit to John Street</td>
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**Note:** SB = Southbound; NB = Northbound; N = North; S = South; E = East; W = West.
Blank cells ( - ) indicate that the element is not included in the alternatives and LOS or v/c ratio are therefore not applicable.

**Source:** ARUP, 2003.
B.3 NO ACTION ALTERNATIVE

B.3.1 DESCRIPTION

The No Action Alternative is included for consideration pursuant to 40CFR 1502.14(d) of Council on Environmental Quality (CEQ) Regulations, and assumes that the Existing Complex would remain as is, except for routine maintenance repairs that would not be subject to environmental review. Such maintenance would not necessarily result in stations being brought to a “State of Good Repair” as defined by NYCT Station Rehabilitation Guidelines. Under this alternative, none of the project elements described in Chapter 1: Purpose and Need, would be undertaken.

B.3.2 OPERATIONAL CONDITIONS

Under the No Action Alternative, operational conditions in the Existing Complex would continue as existing, as described below.

PLATFORM AREAS

The AC island platform is predicted to operate at LOS D overall. Operations specific to each side of the platform would actually operate at LOS E. Conditions would deteriorate further with localized bunching in portions of the platform, when substantial numbers of passengers wait for the next train. The 23 island platform is very narrow, and passenger densities would exceed the planning criterion for operations specific to each side.

The 45 and JMZ side platforms are generally of a good width and are not predicted to suffer from overcrowding. However, the platforms may experience temporary crowding upon the unloading of trains. The 45 and JMZ platforms have a number of direct street entrances and exits. However, the AC and 23 platforms have intermediary mezzanines. The AC platform has nine (9) sets of stairs between the platform and the mezzanine, which reduce available platform space and impede movement along the platform. Furthermore, the AC platform mezzanine is intersected by the JMZ line, obliging passengers to use the platform itself as a pedestrian route when transferring between the 23 line and JMZ southbound in the east and the JMZ northbound and 45 line to the west. The 23 line also has a number of vertical elements between the platform and the mezzanine; its mezzanine is bisected below the junction of William and Fulton Streets.

AC mezzanines, comprising several ramps and stairs, were predicted to yield a poor LOS at critical points. These include portions of the West Mezzanine passing the west end stairways. Some of the stairs are also predicted to experience a poor LOS (although this would also depend on the actual distribution of flows between them).

45 transfers would continue to experience poor LOS. The stairs at the north end of the 45 southbound platform and the pinch point at the north end of the northbound platform also form substantial bottlenecks. Flow problems are exacerbated by conflicting flows with the immediately adjacent ticket gates and transfer flows in the opposing direction. The ramp to the 45 northbound platform and the passage to the 45 southbound platform experience poor LOS.

KEY LOS PROBLEMS:

- Stair from existing ramp-under to southbound 45 platform LOS F;
- Ramp from AC concourse up to northbound 45 platform LOS F; and,
- Stair - Northbound 45 to Fulton Street north side east of Broadway LOS D.
B.3.3 ACHIEVEMENT OF PROJECT GOALS

The No Action Alternative would not contribute to project goals. As the FSTC would not be constructed or operational, there would not be any improvements to access, wayfinding and existing transfers. Intermodal connectivity and system flexibility would not be enhanced and east-west pedestrian connectivity across Lower Manhattan would remain as in the current conditions. Congestion and system operational deficiencies would continue. As the project would not contribute to the overall improvement of Lower Manhattan transportation infrastructure, it would not contribute to the restoration and revitalization of downtown. The opportunity for provision of positive local and regional benefits would be lost.

B.3.4 CONSTRUCTABILITY

No construction issues would be associated with the No Action Alternative as no substantial new construction would occur.

B.3.5 PRELIMINARY ENVIRONMENTAL CONSIDERATIONS

The No Action Alternative would not result in any displacement of retail or commercial activities and no properties would need to be acquired. No impacts on the historic Corbin Building would be anticipated. As the poor wayfinding of today would continue, along with poor operational efficiency and convoluted commutation trips, the Existing Complex would continue to detract from the recovery of Lower Manhattan. Continuation of the complex as it is today for decades to come would not contribute to increased usage of transit and associated air quality benefits. An intended long-term effect of the reconstruction and recovery efforts is to restore Lower Manhattan to its role as an important economic engine for the region, and position Lower Manhattan for an appropriate share of the region’s growth. In addition, the projects will also improve the accessibility, livability and economic vitality of Lower Manhattan. These factors typically lead to improved economic activity across various sectors, improved property values, and greater demand for living, shopping and working in an area. If the Proposed Action is not undertaken, and the other recovery projects achieve their intended benefits, the Existing Complex will continue to have a pronounced detrimental effect on the overall recovery effort.

B.4 ALTERNATIVE 1 – FULTON STREET PASSAGEWAY

B.4.1 DESCRIPTION

Alternative 1 was developed as an attempt to improve passenger access between the Existing Facility and the WTC, while avoiding the displacement of retail activity. In addition, this alternative would avoid demolition of the historic Corbin Building and associated construction impacts and allow exploration of opportunities to achieve the project Purpose and Need at a low investment cost.

Alternative 1 provides a paid-zone passageway to the WTC site by slightly widening the existing underpass at the north end of the Fulton Street 4 5 Station and extending it west beneath Fulton Street toward the WTC site (see Figure B-3). An unpaid zone passageway under Fulton Street is not feasible as there is not adequate space at the location of the narrow 4 5 underpass to create a fare area. Space constraints therefore require the placement of fare gates at the WTC end of this passageway, requiring all users to pay a fare prior to entering.
The new Fulton Street Passageway would connect the Existing Complex to the southbound 45 platforms, the R W Cortlandt Street station uptown platform, and farther to the proposed transfer connection between the Cortlandt Street R W downtown platform and the south end of the Chambers Street/WTC E Terminal. The future WTC complex would connect with the R W - E transfer area providing connections along the length of the southbound R W platform, the Cortlandt Street 19 Station, and the new permanent WTC PATH terminal.

Once inside the E to southbound R W paid-zone transfer area, passengers would ascend stairs (or an ADA elevator) to access the new passageway, which would pass over the tunnels of the northbound and southbound R W with a nominal 25-foot width. Beyond the R W tunnels, stairs (or an ADA elevator) and a passageway connection (nominal 10-foot width) would provide access to the north end of the northbound R W platform. The Fulton Street Passageway would continue east with a slight downgrade. Stairs from the south side of the passageway would provide access to the southbound 45 platform. The Fulton Street Passageway would then proceed farther east under the 45 tracks to connect with the west end of the existing A C mezzanine. No changes to the current configuration of the A C mezzanine would be included with this alternative.

Project elements would include:

- New entrances on the west side of Fulton Street and Broadway;
- New stairs on the southeast and southwest corner of Broadway and Cortlandt Street;
- Entrances on the south side of John Street between Nassau and William Streets;
- Entrances on the north side of Fulton Street to the east of William Street;
- Entrance on the west side of Nassau Street to the south of Fulton Street;
- New stairs connecting the east end of the A C platform to the 23;
- 23 Fulton Street Rehabilitation;
- 45 Rehabilitation;
- A C Rehabilitation;
- R W - E Connector;
- J M Z Nassau Street – ADA connectivity;
- ADA elevator on John Street for the 23 Fulton Street Station;
- ADA Access at R W - E stairs;
- A paid-zone passageway from the WTC complex (R W - E) to the Fulton Street Station Complex (45, 23, A C, J M Z);
- Elevators at Fulton and Church Streets; and,
- Connector between the northbound platform of the R W and the Fulton Street passageway.

**B.4.2 OPERATIONAL CONDITIONS**

**LOS**

This alternative would make a connection with the future WTC complex at the northeast corner of the site, north of the main east-west axis for the complex (Winter Garden, permanent WTC PATH terminal, East Concourse). This would require patrons to make a zigzag movement within the WTC complex to access the passageway, with consequent wayfinding implications. Key LOS and v/c locations are identified on Figure B-3.

The proposed Fulton Street connection is at the junction of the E terminus and the proposed connection to the southbound R W platform. It provides a paid-zone connection to the A C at Chambers Street and the 23 at Park Place. These connections, however, pose no advantage for subway travelers. Both the A C and the 23 trains stop at the Existing Complex; patrons on these trains can access any of these other platforms by merely traveling one (1) stop further, except for riders connecting between the J M Z
and the R W or the 45 and R W (these lines are essentially parallel in Lower Manhattan and a short walk from each other).

The connection of the Fulton Street Passageway at the southern end of the E train terminal would concentrate the volumes from four (4) sizable movements to and from the WTC into one (1) location: the E from the Chambers Street station, the RW from the Cortland Street Station and the 45, and the AC from the Existing Complex. In the mornings and evenings, this would lead to overcrowding in the corridors of the WTC complex leading to this corner, instead of supporting a more distributed allocation of movements.

Accessing the paid zone from the WTC would require a sizable expanse of fare control units, ticketing machines and station booth staff to handle the crowding of both the movement to the E and the Existing Complex. Once past the fare array, one would proceed relatively quickly to an expansive stairway leading over the RW tracks to the Existing Complex. The vertical rise in this stair would be approximately five (5) feet; thus, it would not be possible to see beyond to the Fulton Street Passageway, which poses a wayfinding concern. One would climb this short stair (ADA short-lift elevators would be at the sides), proceed over the tracks and promptly descend the same height again. While over the tracks, because one is so close to the street, the ceiling height would be minimal (seven (7) feet - six (6) inches estimated) and the space would contain a large number of columns, reducing overall mobility.

After crossing the tracks, a passage would extend to the south to provide a paid-zone connection to the Cortlandt Street station northbound RW platform. The concourse would continue east with a slight downgrade (a drop of a level must be made before reaching the existing underpass) from west to east. Before passing under the 45 tracks, a switchback stair to the north and a pair of stairs in parallelogram arrangement at the end of a short passage to the south would provide access to the 45 southbound platform and replace the existing stair sets.

The passage would then continue east through the existing narrow (13-foot wide) corridor to access the AC mezzanine. The large volumes from the WTC and WFC that would use the corridor to access the uptown 45, the J MZ, and the AC southbound would have to share use of this corridor with the current high-volume evening transfer movement from the southbound 45 to the AC. With the expected crowding, the walk to the Chambers Street station might be quicker than the walk to the Broadway-Nassau station, though which end of the train the passenger alights at would help assure that both options would be well used). The result is that this passage would experience exceptionally poor LOS because users would be heading against the predominant direction of flow. Upon reaching the AC mezzanine, persons would still have to make use of the ramp system to access the uptown 45 platform, further impeding access of the AC patrons to those platform stairs and resulting in a rather circuitous routing with wayfinding implications.

As indicated in Table B-2 and Figure B-3, the stair from the existing AC ramp underneath the 45 tracks to the southbound 45 platform would still function at a poor LOS F (as under the No Action Alternative). The ramp from the AC concourse up to the northbound 45 platform would remain at a very poor LOS F and would not represent an improvement over existing conditions. The extra length of that walk combined with the expected levels of crowding might persuade persons to instead use the sidewalks of Fulton Street and cross Church Street and Broadway instead of using the Fulton Street Passageway, with consequent safety implications. Finally, the stair from the northbound 45 platform to the north sidewalk of Fulton Street, east of Broadway, would continue to function at a marginal LOS D, as it currently does. Again this would not represent an improvement over existing conditions.

Key LOS and v/c locations of this alternative are identified on Figure B-3 and in Table B-2. The key operational issues of this alternative are as follows:
OPERATIONAL IMPROVEMENTS

- None achieved.

LIMITATIONS

- The stair from the existing A C ramp underneath the 4 5 tracks to the southbound 4 5 platform would still function at a LOS F (as under the No Action Alternative);
- The ramp from the A C concourse up to the northbound 4 5 platform would remain at LOS F and would not represent an improvement over existing conditions; and,
- The stair from the northbound 4 5 platform to the north sidewalk of Fulton Street would continue to function at a marginal LOS D, as it currently does.

TRAIN OPERATIONS

Substantial service diversion would be required for the 4 5 trains and the A C line to widen the existing underpass at the north end of the station. Underpinning of the two (2) 4 5 tracks through the station and protection of the A C tunnels below would likely require intermittent track outages on weeknights and weekends for approximately nine (9)-12 months.

Construction of the Fulton Street Passageway would cause substantial impacts to passenger transfers between the southbound 4 5 and the rest of the Existing Complex. The stairs that rise from this underpass would need to be closed for a substantial period until the new stairs connecting the Fulton Street Passageway and the southbound platform could be constructed. Additionally, the fare control area on the north end of the southbound 4 5 platform would need to be closed for a substantial period. However, it is likely that the existing entrance on the south side of Fulton Street could remain in operation during construction.

The Fulton Street Passageway would likely degrade operations for the southbound 4 5. The north end of the southbound platform is the only transfer point between the southbound 4 5 and the rest of the Existing Complex. This heavy transfer would conflict with patrons from the WTC complex using the new Fulton Street Passageway. The high volume of patrons using the Fulton Street Passageway to reach the Existing Complex from the new WTC complex, the E terminal, the R W, the 1 9 and from the surface near Church Street would make this key transfer difficult.

Having the connection to the WTC complex at the extreme northern end of the Fulton Street 4 5 Station would also likely result in substantial crowding on the northern end of both 4 5 platforms by those trying to make a connection between the 4 5 and the WTC complex. This would be a direct conflict with passengers who currently crowd the north end to make their transfer from/to the A C. Additionally, those trying to reach the WTC complex from the 4 5 would situate themselves at the end cars of both northbound and southbound trains to be near the new passageway. These difficulties could combine to result in increased dwell times, reduced capacity, and unreliability for 4 5 trains, which currently operate at peak capacity.

B.4.3 ACHIEVEMENT OF PROJECT GOALS

Although Alternative 1 would physically connect the WTC site to the subway complex east of Church Street, it would not result in improvements to overall transit conditions and, therefore, would not achieve the project goals. It would, however, increase the passenger volumes at the intersection of the 4 5 and A C platforms and sub-passageway beneath the 4 5 tracks at the northern end of the 4 5 station, further exacerbating the already congested conditions in this area. The Fulton Street Passageway Alternative is also incompatible with the future layout of the WTC concourse because of conflicting passenger flows from the WTC E subway station with passenger flow to and from the Existing Complex.
Space constraints require the placement of fare gates at the WTC end of this passageway, forcing all users to pay a fare prior to entering it and negating a project goal of providing free passage from the Church Street/WTC area to the areas east of Broadway.

Connection to the WTC site would be at a point where four (4) subway lines converge, affecting passenger distribution and creating unbalanced passenger loading of subway cars in each train, which directly conflicts with the objective of improving operations and reducing congestion. Crowding in the passageway during the AM and PM Peak Hours would cause unacceptable pedestrian LOS deficiencies (see Table B-1), and could be expected to make the route impassable for pedestrians traveling against the predominant pedestrian flow. This could also cause passengers to choose to use the aboveground route along Fulton Street and across Church Street or Broadway, which has associated safety implications.

The Fulton Street Passageway Alternative would not create a substantial visual street-level presence, and so would not substantially improve wayfinding. This could be partially alleviated with appropriate signage, but the alternative does not allow for the implementation of substantial improvements to existing street-level entrances to improve street-level wayfinding and subway access. The existing difficulties and inefficiencies of subsurface connections within the Existing Complex would continue. Because of the serious LOS flaws with this alternative, this alternative is not considered reasonable.

**B.4.4 CONSTRUCTABILITY**

The expansion of the existing 45 underpasses to a required width of approximately 17 feet to accommodate a reasonable LOS presents severe engineering challenges. The existing passageway passes vertically between the AC tunnels below and the 45 track bed above. Sufficient support must be provided to the track bed during construction of the passageway without overstressing existing walls, columns and foundations and without altering the load dynamics on the tunnels below. To achieve this, it would be necessary to install additional piles below the current passageway and expand symmetrically by demolishing the existing walls and base slab and reconstructing an extended cantilevered base slab to accommodate the width. The piles could be installed from within the existing passageway using a low headroom-piling rig.

The challenge in constructing a tunnel below Fulton Street at this location relates to the presence of multiple utilities and poor ground conditions. Surface conditions severely constrain the ability to expand the passageway due to the vertical clearance required. In addition, the presence of St Paul’s Chapel and adjoined cemetery to the north of Fulton Street should reduce the number of utility and service connections running transversely below the roadway. The construction technique would employ an open cut method for the entire length of the tunnel.

**B.4.5 PRELIMINARY ENVIRONMENTAL CONSIDERATIONS**

Preliminary environmental screening indicates that the Fulton Street Passageway Alternative would not be anticipated to result in substantial environmental impacts. Because it does not require demolition on the block facing Broadway to construct a Central Station Concourse or an Entry Facility, the construction impacts of this alternative are relatively small and would not result in substantial direct or indirect displacement of retail and commercial activities. The Fulton Street Passageway Alternative would not result in any substantial impacts on the historic Corbin Building and there would not be any impacts on the John Street-Maiden Lane Historic District. However, the Fulton Street Passageway would be bounded along its entire northern perimeter by St. Paul’s Chapel and its cemetery. Construction of the subsurface passageway beneath Fulton Street could therefore impact this historic resource as a result of vibration, subsidence or in the event that archaeological artifacts would be present below the surface. No major property acquisitions would be required, although the use of existing and new easements could be required. There would not be a net loss of retail space, although there could be some temporary impacts on businesses and residencies on Fulton Street during construction of the Passageway.
B.5 ALTERNATIVE 2 – DEY STREET PASSAGEWAY

B.5.1 DESCRIPTION

Alternative 2 provides a free-zone passageway from the Existing Complex to the WTC complex by widening the existing underpass at the center of the Cortlandt Street R W Station and extending it east beneath Dey Street to the Fulton Street 4 5 Station (see Figure B-4). This provides connections to other points within the Existing Complex as the A C mezzanine. The tunnel would be approximately 40 feet in width, and it is assumed that the future WTC complex would connect with the Dey Street Passageway, providing connections to the Cortlandt Street R W Station, the Cortlandt Street 1 9 Station and the permanent WTC PATH terminal.

The Dey Street Passageway would begin two (2) levels below Dey Street at the intersection of Dey and Church Streets and would continue east toward Broadway with a new entrance structure at the south corner of Dey Street at Broadway – the Dey Street Access Building. The property would be acquired and the building demolished to accommodate construction of the Access Building. The Dey Street Access Building would provide access to two (2) levels below Dey Street – the 4 5 southbound platform through the existing fare control area one (1) level below Broadway, and the free zone Dey Street Passageway one (1) level below. The passageway would extend eastward underneath the 4 5 tracks within the street right-of-way to avoid impacts to the existing structures on Broadway between John and Fulton Streets. For passengers destined for northbound 4 5 service and other transit services within the Existing Complex, a connection to a reconstructed fare control area on the northbound 4 5 platform would be provided beneath John Street. Access to the Dey Street Passageway level would also be provided through reconfigured existing street entrances on both the north and south side of John Street.

Project elements would include:

- Passageway to street stairs (John Street);
- A passageway to northbound 4 5 platform;
- A free-zone passageway to the WTC complex (Dey Street Passageway);
- New entrance at Millenium Hotel, at the northeast corner of Dey and Church Streets;
- New entrance structure at the southwest corner of Broadway and Dey Street;
- New entrances on the west side of Fulton Street and Broadway;
- New stairs on the southeast and southwest corners of Broadway and Cortlandt Street;
- Entrances on the south side of John Street between Nassau and William Streets;
- Entrances on the north side of Fulton Street to the east of William Street;
- Entrance on the west side of Nassau Street to the south of Fulton Street;
- New stairs connecting the east end of the A C platform to the 2 3 ;
- 2 3 Fulton Street Rehabilitation;
- 4 5 Rehabilitation;
- A C Rehabilitation;
- R W – E Connector;
- J M Z Nassau Street – ADA connectivity;
- ADA Access at R W - E stairs; and,
- ADA elevator on John Street for the 2 3 Fulton Street Station.
B.5.2 OPERATIONAL CONDITIONS

LOS

This alternative utilizes the concourse from the WTC and passes under the R W and through to the Dey Street Access Building (south corner of Dey Street at Broadway). East of the Access Building, the passageway extends under the 4 5 tracks until just outside of the building line on the east side of Broadway. Short tunnels would extend south and north. The south tunnel would branch into two (2) tunnels under the north and south sidewalks of John Street. These tunnels would become stairs leading from the passageway (two (2) levels below the street) to the street. The north tunnel would pass through a fare control and lead to two (2) sets of stairs providing access to the northbound 4 5 platform.

This alternative principally provides WTC access for the 4 5 line. A C patrons, however, could access the WTC via the Chambers Street Station. They could also access the concourse via the 4 5 platforms and either the Fulton Street underpass or the ramp system. No relief is provided to the current movement between the 4 5 and the A C. Street access would also be provided to John Street. The existing passageways, however, consist of a series of long and narrow maze-like corridors, leading into long stair sets. The end of the existing concourse is a hard turn (at right angles) leading to the transverse corridors. It is believed that these corridors and stairs can be sized with sufficient capacity to accommodate the indicated movements, enabling the alternative to operate satisfactorily. From the perspective of wayfinding, its design obscures the provided movements.

Key LOS and v/c locations of this alternative are identified on Figure B-4 and in Table B-2. The key operational issues of this alternative are as follows.

IMPROVEMENTS

- The existing underpass connecting the A C mezzanine to the southbound 4 5 platform would improve to LOS A, from LOS C under the No Action Alternative;
- A new direct stair would be provided from the FSTC Concourse to northbound 4 5 platform with LOS A; and,
- The stair from the northbound 4 5 platform to the northeast corner of Fulton Street and Broadway would improve from LOS D in the No Action Alternative and the Fulton Street Passageway Alternative (Alternative 1) to LOS A in the Dey Street Passageway Alternative.

LIMITATIONS

- The stair leading from the A C existing ramp underneath the 4 5 tracks to the southbound 4 5 platform would remain at LOS E, and would not improve over the No Action Alternative;
- The ramp from the A C concourse up to the northbound 4 5 platform would also not improve over the No Action Alternative and would remain at LOS F; and,
- New (unpaid zone) up and down escalators would be provided from the Dey Street Passageway to the platform level at the Dey Street Access Building. However, these new escalators would be very overcrowded with a v/c ratio of 1.00 (100 percent capacity) for the down escalator and a v/c ratio of 0.80 for the up escalator. Up escalators from the Dey Street platform level to the Dey Street Access Building would function with a v/c ratio of 1.02, reflecting extremely overcrowded conditions.

TRAIN OPERATIONS

Service diversions would be required for the 4 5 to construct the underpass at Dey Street. Underpinning of the two (2) 4 5 tracks would likely require intermittent track outages on weeknights and weekends for approximately six (6)-nine (9) months. Similarly, widening of the existing R W
underpass at Dey Street would require intermittent track outages on weeknights and weekends for approximately nine (9)-12 months.

Construction of new vertical circulation elements at the Fulton Street 45 station would require elimination of the existing street stairs to both the northbound and southbound platforms. To facilitate entry and exit from the station during construction, the new south end stairs to Cortlandt Street and Maiden Lane would need to be constructed in advance of this work.

Once constructed, this alternative would improve operations of the southbound 45 platform due to the new south end stairs and the new entry facility at 189 Broadway. However, operations on the northbound platform would not be substantially improved. The proposed Dey Street Passageway to the northbound platform connection would rise to the northbound platform precisely in the most crowded location, where transferring passengers from the larger Broadway-Nassau complex queue. As such, it is not expected that this alternative would reduce station dwell times for northbound trains; rather, it would worsen crowding on the northern end of both the platform and trains, reducing 45 capacity and reliability. Additionally, this could cause substantial safety concerns as there would be crowding at the top of the new stairs.

**B.5.3 ACHIEVEMENT OF PROJECT GOALS**

The construction of Alternative 2 would not achieve the project goals. No substantial improvements to existing street-level entrances would be provided to improve street-level wayfinding. This could be partially alleviated with appropriate signage, but Alternative 2 does not allow for the implementation of substantial improvements to existing street-level entrances to improve street-level wayfinding and subway access. The existing difficulties and inefficiencies of subsurface connections within the Existing Complex would continue. In summary, this alternative would not adequately address the wayfinding, circulation and clarity requirements necessary to satisfy the project Purpose and Need. The existing circuitous passenger flows would be further exacerbated by the increase of passenger flow at the northern end of the 45 platforms, and the western end of the A C station, which is already congested (see Table B-2). Fare gates would remain as they presently exist; “unpaid” zone passageway users could walk to the west side of Broadway before having to pay a fare. In summary, this alternative would not adequately address the wayfinding, circulation and clarity requirements necessary to satisfy the project Purpose and Need.

While this alternative does provide for connectivity from the WTC to the subway complex east of Church Street, it also increases the passenger volumes at the intersection of 45 and A C platform ends, further exacerbating the already congested conditions in this area. Passengers coming from Dey Street would be required to use the already congested southbound 45 platform to travel north to use the existing 45 sub-passage at the northern end of the southbound platform. This would contribute to further congestion along this platform. There would still be a substantial amount of additional passenger flow that would need to be accommodated within this already congested area, and there would be a need to accommodate increased passenger volumes due to the additional passenger flow from Dey Street. Because of the serious LOS implications associated with this alternative, it is no longer considered reasonable.

**B.5.4 CONSTRUCTABILITY**

The following issues are highlighted as key issues which would need to be addressed in greater detail if this alternative were to be pursued. The methods suggested are based on concept-level data and further detailed investigation into existing geotechnical profiles, building construction and foundations, utilities and track bed support, among others, would need to be performed before construction methods can be established fully.

The construction of the Dey Street Passageway poses several issues relating to utilities, building vaults extending below the sidewalk, and a requirement for the maintenance of uninterrupted vehicular access to the Century 21 Department Store loading dock on the south side of Dey Street. Due to the proposed
depth of the tunnel and existing sub-soil materials, it is proposed to construct the tunnel using a cut-and-cover method (also termed an “open cut” method). This would require special attention to the maintenance of the utilities that would need to be supported on bridges across open excavations.

A critical aspect of the construction process would be construction of the passageway below the 45 track bed to connect the west side with the east side of the station. This would be done by treating the ground with a grout mixture, then mining below the existing track bed while supporting the existing beams as the mined face advances. The tunneling operation would progress in two (2) to three (3) foot lengths within the treated ground to minimize any effect on the track bed. A permanent structure would be built inside the mined opening. The temporary supports would be incorporated into the permanent structure to avoid the possibility of voids and subsequent settlement of the track bed.

The widening of the existing RW Cortlandt Street underpass is also a key construction issue for this alternative. The construction techniques used for this element would be similar in nature to those employed on the 45 underpass (discussed above). The ground behind the walls of the existing passageway would be treated with a grout mixture to increase strength and stability.

To construct this alternative, the property at 189 Broadway (on the southwest corner of Dey Street) would be acquired for the main vertical circulation building. This element would contain escalators, stairways and elevators from the passageway level to both the street and the southbound 45 platform. The excavation for this element would be enabled by the installation of either a slurry wall or a bored pile wall extending down passed the required depth. Excavation would then commence from ground level and the walls would be temporarily braced internally as the depth increases. In the permanent construction, the floor plates would supply this lateral restraint. Though potentially a slow operation, neither of these methods is uncommon (specific ground conditions notwithstanding) and should pose little in the way of technical problems that cannot be addressed adequately by employing standard industry solutions.

To construct this aspect of the project, the adjacent buildings may need to be underpinned to prevent differential settlement. As with the wall foundation construction discussed above, this may prove to be a potentially slow operation but, in concept, is a common construction technique.

Additional street access would be required on John Street connecting directly into the passageway/tunnel level, as well as a stairway access from passageway level directly onto the northbound platform. The most economical method to install these elements would also be via a cut-and-cover method for both the street stair and the platform stairs, employing a similar method to that for the vertical circulation element at 189 Broadway. Alternatively, raking piles could be installed from the street-level, forming a vertically oblique tunnel for the stairway shaft.

**B.5.5 PRELIMINARY ENVIRONMENTAL CONSIDERATIONS**

Preliminary environmental screening suggests that this alternative would not be anticipated to result in substantial environmental impacts. The Corbin Building would not be affected, and there would not be any impacts on the John Street-Maiden Lane Historic District. The only major property acquisition that would be required would be 189 Broadway. The use of existing and new easements could be required. There would be a net loss of approximately 9,800 square feet of retail space associated with the acquisition of 189 Broadway and there would be some temporary impacts on businesses on Dey Street during construction of the passageway.
B.6 ALTERNATIVE 3 – DEY STREET PASSAGEWAY WITH LONGITUDINAL TUNNEL UNDER THE 4 5 NORTHBOUND PLATFORM

B.6.1 DESCRIPTION

This alternative includes an underground pedestrian passageway, running directly under Dey Street, which connects the WTC complex with the Fulton Street 4 5 and other points within the Existing Complex (see Figure B-5). The tunnel’s western portal is two (2) levels below Dey Street at the intersection of Dey and Church Streets. The tunnel continues eastward under the existing 4 5 subway tracks and terminates on the east side of Broadway, where access to the 4 5 northbound track is permitted, along with street access to the north side and south side of John Street. An Access Facility would be located on the south corner of Dey Street at Broadway, permitting access to the to the 4 5 southbound platform one (1) level down and to the Dey Street Passageway two (2) levels down.

It also includes a pedestrian tunnel two (2) levels below the street, directly underneath the 4 5 northbound platform. The tunnel would connect with the existing 4 5 pedestrian underpass and the west end of the A C mezzanine; it includes one (1) ascent to the 4 5 northbound platform and one (1) ascent to the north and south side of John Street.

Project elements include:

- Concourse to street stairs (John Street);
- Concourse to northbound 4 5 platform;
- Paid connector between Dey Street Passageway and lower A C mezzanine;
- A free-zone passageway to the WTC complex (Dey Street Passageway Connector);
- New entrance at Millenium Hotel to provide R W Street Access Stairs;
- New entrance structure at the southwest corner of Broadway and Dey Street;
- New entrances on the west side of Fulton Street and Broadway;
- New stairs on the southeast and southwest corners of Broadway and Cortlandt Street;
- Entrances on the south side of John Street between Nassau and William Streets;
- Entrances on the north side of Fulton Street to the east of William Street;
- Entrance on the west side of Nassau Street to the south of Fulton Street;
- New stairs connecting the east end of the A C platform to the 2 3 ;
- 2 3 Rehabilitation;
- 4 5 Rehabilitation;
- A C Rehabilitation;
- R W - E Connector;
- J M Z Nassau Street – ADA connectivity;
- ADA Access at R W - E stairs; and,
- ADA elevator on John Street for the 2 3 Fulton Street Station.
Figure B-5

- LOS D: Ramp from A/C concourse to NB Lex platform
- LOS A: Stair up to SB Lex platform
- V/C up = 0.47
  V/C down = 1.12
  Escalators between Dey St concourse and platform
- V/C up = 0.43
  Escalators between platform and Dey St Headhouse
- LOS A: Existing stair to Fulton/Bway NE corner
- LOS A: Stair to north side of John St
B.6.2 OPERATIONAL CONDITIONS

LOS

Key LOS and v/c locations are identified on Figure B-5 and in Table B-2. This alternative is much like Alternative 2, with the addition of a pedestrian tunnel under the 45 northbound platform to connect with the AC mezzanine at its western end. Street access is provided via corridors and stairs to John Street and a pair of stairs would provide access to the northbound 45 platform. The northbound tunnel to the AC would be built outside of the current building lines (including a construction buffer) and outside of the 45 trackway (principally under the 45 northbound platform and existing undersidewalk vaults). At its narrowest, this corridor would be approximately 16 feet wide, adjacent to the stairs to the northbound 45; nominally, it would otherwise be 23 feet wide. It is anticipated that this would result in generally poor LOS in the corridor and at the fare control array. No relief would be provided to the current 45 southbound to AC evening transfer movement, and only modest relief to the AC to 45 northbound morning transfer move. The LOS of the continuing elements is anticipated to be substandard. The LOS of the new corridor to the AC is expected to be poor, with large volumes crowding at the fare controls.

The corridors and stairs to John Street would still present the same maze-like characteristics. The T-configuration of the corridors at the east end of the concourse would still end in a hard turn (at right angles). There are potential safety concerns regarding what may be large pedestrian flows in the corridors to John Street. Under low volume conditions, these same corridors present personal safety concerns because of blind passages.

Key LOS and v/c locations of this alternative are identified on Figure B-5 and in Table B-2. The key operational issues of this alternative are as follows.

IMPROVEMENTS

- The stair from the existing ramp from the AC underneath the 45 tracks to the southbound 45 platform improves from LOS E under Alternative 2 to LOS A under Alternative 3. It was LOS F under the No Action Alternative;
- The up escalators from the platform level at Dey Street to the Dey Street Access Building would improve substantially from a v/c ratio of 1.02 in Alternative 2 to a v/c ratio of 0.45 in Alternative 3;
- The ramp from the AC up to the northbound 45 platform was operating at LOS F under the No Action Alternative, Alternative 1 and Alternative 2 and improves marginally but still operates at a poor LOS E under Alternative 3;
- The free zone up escalators from the Dey Street Passageway to the platform level at the Dey Street Access Building would improve from a v/c ratio of 1.00 under Alternative 2 to a v/c ratio of 0.45 under Alternative 3; and,
- The stair from the northbound 45 platform to the street at the northeast corner of Fulton Street and Broadway would improve substantially from LOS D in the No Action Alternative and Alternative 1 to LOS A in Alternative 3.

LIMITATIONS

- The existing underpass connecting the AC mezzanine to the southbound 45 would deteriorate from LOS A in Alternative 2 (Dey Street Passageway) to LOS D in Alternative 3. This is even worse than the No Action Alternative and Alternative 1 (Fulton Street Passageway Alternative), both of which had LOS C at this location; and,
- The direct stair from the AC concourse to the northbound 45 platform which was LOS A under Alternative 2, would deteriorate to LOS D under Alternative 3.
TRAIN OPERATIONS

Substantial service diversions would be required for 45 trains to construct the underpass tunnel under Broadway. Underpinning of the two (2) 45 tracks would likely require intermittent track outages on weeknights and weekends for approximately six (6)-nine (9) months. Similarly, widening of the existing underpass of the RW at Dey Street would require intermittent track outages on weeknights and weekends for approximately nine (9)-12 months.

Construction of new vertical circulation elements at the Fulton Street 45 station would require elimination of the existing street stairs to both the northbound and southbound platform. To facilitate entry and exit from the station during construction, the new south end stairs to Cortlandt Street and Maiden Lane would need to be constructed in advance of this work.

Once constructed, this alternative would improve operations of the southbound 45 platform due to the new south end stairs and the new Dey Street Access Building at 189 Broadway. These improvements would help to distribute passengers along the platform and within the trains, which would help to reduce dwell times.

Operations of the northbound 45 platform would only be marginally improved. The proposed Dey Street Passageway to northbound platform connection would rise to the northbound platform in the most crowded location, where transferring passengers from the larger Broadway-Nassau Complex queue. However, this alternative also includes a bypass of the northbound platform for Dey Street Passageway users destined for other services in the Existing Complex besides the 45. As such, those passengers would not need to walk along the northbound platform to reach their destination. This would cause less crowding by passengers from/to the northbound 45. Nonetheless, this bypass connection would direct passengers headed for the rest of the Existing Complex to the extreme western end of the AC mezzanine, which would cause more crowded conditions of this area than currently exist. Hence, it is not expected that this alternative would reduce station dwell times for northbound 45 trains, and it would worsen crowding at the junction between the AC mezzanine and the northbound 45 platform.

B.6.3 ACHIEVEMENT OF PROJECT GOALS

The construction of Alternative 3 would not adequately achieve the project goals. No substantial improvements to existing street-level entrances would be provided to improve street-level wayfinding. This could be partially alleviated with appropriate signage, but the alternative does not allow for the implementation of substantial improvements to existing street-level entrances to improve street-level wayfinding and subway access. Many of the existing difficulties and inefficiencies of subsurface connections within the Existing Complex would continue. In summary, Alternative 3 would not adequately address the wayfinding, circulation and clarity requirements necessary to satisfy the project Purpose and Need. The existing circuitous passenger flows would be further exacerbated by the increase of passenger flow at the northern end of the 45 platforms and the western end of the AC station, which is already congested. Although this would be partially alleviated by the presence of the longitudinal tunnel, which would reduce the existing AC to 45 northbound AM Peak hour congestion, LOS is expected to continue to be deficient (see Table B-1). At its narrowest, the longitudinal tunnel would be approximately 16 feet wide (adjacent the stairs to the northbound 45); in other parts, it would be nominally 23 feet wide. It is anticipated that this would result in generally poor LOS in the tunnel and at the fare control array.

Fare gates would remain as they presently exist; “unpaid” zone passageway users could walk to the west side of Broadway before having to pay a fare. In summary, this alternative would not adequately address the wayfinding, circulation and clarity requirements necessary to satisfy the project Purpose and Need.

While Alternative 3 does provide for connectivity from the WTC to the subway complex east of Church Street, it also increases the passenger volumes at the intersection of the 45 and AC platform ends,
further exacerbating the already congested conditions in this area. Passengers coming from Dey Street are also required to use the already congested southbound 45 platform to go north to use the existing 45 sub-passage at the northern end of the southbound platform. This would contribute to further congestion along this platform. There would still be a substantial amount of additional passenger flow that would need to be accommodated within this already congested area, and there would be a need to accommodate increased passenger volumes due to the additional passenger flow from Dey Street.

B.6.4 CONSTRUCTABILITY

The following issues would need to be addressed in greater detail if this alternative were to be pursued. The methods suggested are based on concept level data, and further detailed investigation into existing geotechnical profiles, building construction and foundations, utilities and track bed support, among others, needs to be performed before construction methods can be investigated fully.

The construction of the Dey Street tunnel poses several issues relating to utilities, building vaults extending below the sidewalk and a requirement to maintain uninterrupted vehicular access to the Century 21 Department Store loading dock on the south side of the street near Church Street. Due to the proposed depth of the tunnel and existing sub-soil materials, it is proposed to construct the tunnel using a cut-and-cover method (also termed as an “open cut” method). This would require special attention to the maintenance of the utilities that would need to be supported on bridges across open excavations.

One of the most critical aspects of the construction process would be the construction of the passageway below the 45 track bed to connect the two (2) sides of the station. This would be done by treating the ground with a grout mixture, then mining below the existing track bed while supporting the existing beam as the mined face advances. The tunneling operation would progress in two (2)- to three (3)-foot lengths within the treated ground to minimize any effect on the track bed. A permanent structure would be built inside the mined opening. The temporary supports would be incorporated into the permanent structure to avoid the possibility of voids and subsequent settlement of the track bed.

The widening of the existing R W Cortlandt Street Station underpass is also a key construction issue for this alternative. The construction techniques used for this element would be similar in nature to those employed on the 45 underpass discussed above. The ground behind the walls of the existing passageway would be treated with a grout mixture to increase strength and stability.

To construct this alternative, the property at 189 Broadway (on the southwest corner of Dey Street at Broadway) would need to be acquired for the main vertical circulation building. This element would contain escalators, stairways and elevators from the concourse level to both the southbound 45 platform and the street. The excavation for this element can be enabled by the installation of either a slurry wall or a bored pile wall extending down past the required depth. Excavation then begins from ground level and the walls are temporarily braced internally as the depth increases. In the permanent construction, the floor plates supply this lateral restraint. Though potentially a slow operation, neither method is uncommon (specific ground conditions not withstanding) and should pose little in the way of technical problems that cannot be addressed adequately by employing industry standard solutions.

To construct this aspect of the project, the adjacent buildings may need to be underpinned to prevent differential settlement within their foundations. As with the wall construction discussed above, this may prove to be a potentially slow operation but, in concept, is a common construction technique.

In addition to the above, a passageway is proposed below the northbound platform of the 45 Fulton Street station. This passageway, which would connect the Dey Street Passageway with the west end of the AC mezzanine, extends from the building lines on the east side of Broadway to directly below the platform column line. It does not extend below the track bed. It does, however, require the acquisition of the sidewalk vaults along the east side of Broadway (between John and Fulton Streets) for construction and for vertical circulation between the new tunnel, the northbound 45 platform and the street.
To construct this element, the approach would probably be a combination of a slurry or bored piled wall against the building face (east side) similar to those proposed for cut-and-cover construction techniques to retain the buildings. The existing building foundations may need to be underpinned to prevent any differential settlement. The first step would be to install a series of mini-piles along the platform column line. These piles, installed from platform level, would form a cut off wall below, becoming part of the permanent structure. Once installed, the sub-soil below the northbound track and platform should be stabilized using a grout injected from the platform level. The ground below could then be mined as described for the 4 5 or RW underpass, with structure being constructed as the mined face is progressed. As with the underpasses, work would progress in segments to ensure the safety of the workforce and of the passengers on the platform. The installation of the cut off wall and mini-piles would allow the roof beams or slabs of the new lower passageway to span directly between them, forming the basis of the permanent structure.

B.6.5 PRELIMINARY ENVIRONMENTAL CONSIDERATIONS

Preliminary environmental screening suggests that this alternative would not be anticipated to result in substantial environmental impacts. The Corbin Building would not be affected, and there would not be any impacts on the John Street-Maiden Lane Historic District. The only major property acquisition required would be 189 Broadway. The use of existing and new easements could also be required. There would be a net loss of approximately 9,800 square feet of retail space associated with the acquisition of 189 Broadway, and there would be some temporary impacts on businesses on Dey Street during construction of the passageway.

B.7 ALTERNATIVE 4 – DEY STREET PASSAGEWAY WITH DIAGONAL TUNNEL CONNECTING 4 5 AND A C PLATFORM

B.7.1 DESCRIPTION

This alternative includes an underground pedestrian passageway running directly under Dey Street, which connects the WTC complex with the Fulton Street 4 5 station and other points within the Existing Complex (see Figure B-6). The passageway’s eastern portal is two (2) levels below Dey Street at the intersection of Dey and Church Streets. The passageway continues eastward under the existing 4 5 subway tracks and terminates on the east side of Broadway where access to the 4 5 northbound platform would be affected, along with street access to the north and south sides of John Street. An Access Facility would be located on the southwest corner of Dey Street at Broadway, permitting access to the 4 5 southbound platform one (1) level down and to the Dey Street tunnel two (2) levels down. This alternative includes a pedestrian tunnel two (2) levels below the street, directly underneath the 4 5 northbound platform. The tunnel would connect with the existing 4 5 pedestrian underpass. This alternative includes one (1) ascent up to the 4 5 northbound platform and one (1) ascent up to the north and south sides of John Street.

In this alternative, the pedestrian tunnel would continue northeast, from the intersection of Dey Street at Broadway, terminating at the A C lower mezzanine level. In addition, pedestrians would be permitted to walk due north and connect with the diagonal tunnel.
Figure B-6

Dey Street Passageway with Diagonal Pedestrian Tunnel (Alt. 4)

- LOS D: Ramp from A/C concourse to NB Lex platform
- LOS A: Existing stair to Fulton/Bway NE corner
- LOS A: Stair up to SB Lex platform
- LOS A: Stair to north side of John St

V/C up = 0.47
V/C down = 1.12
Escalators between Dey St concourse and platform

V/C up = 0.43
Escalators between platform and Dey St headhouse
Project elements would include:

- Concourse to street stairs (John Street);
- Paid diagonal (oblique) connector between Dey Street Passageway and lower AC mezzanine including a vertical circulation element;
- Platform to street-level entrance on Broadway;
- A free-zone passageway to the WTC complex (Dey Street Passageway Connector);
- New entrance at Millenium Hotel to provide R W Street Access Stairs;
- New entrance structure at the southwest corner of Broadway and Dey Street;
- New entrances on the west side of Fulton Street and Broadway;
- New stairs on the southeast and southwest corner of Broadway and Cortlandt Street;
- Entrances on the south side of John Street between Nassau and William Streets;
- Entrances on the north side of Fulton Street to the east of William Street;
- Entrance on the west side of Nassau Street to the south of Fulton Street;
- New stairs connecting the east end of the AC platform to the 23;
- 23 Fulton Street Rehabilitation;
- 45 Rehabilitation;
- AC Rehabilitation;
- R W - E Connector;
- J M Z Nassau Street – ADA connectivity;
- ADA Access at R W - E stairs; and,
- ADA elevator on John Street for the 23 Fulton Street Station.

**B.7.2 OPERATIONAL CONDITIONS**

**LOS**

Key LOS and v/c locations of this alternative are presented on Figure B-6. As the Dey Street Passageway passes under the 45, the corridor would skew northeast to bypass the Corbin Building. The paid zone corridor to the AC mezzanine then proceeds diagonally under the existing buildings two (2) levels below the street to the northeast corner of the site to connect with the AC mezzanine. A connection and fare control is provided to access the Fulton Street mezzanine one (1) level below the street. East of the 45, a corridor leads to street stairs on the north and south sides of John Street. Once inside the paid zone, two (2) sets of stairs ascend to the uptown 45.

Under this alternative, no improvement is provided for transfer movement between the downtown 45 and the AC. The LOS of continuing elements is expected to be substandard, though the LOS in the paid-zone corridor is anticipated to be satisfactory. The fare control system would have to process large volumes.

From a wayfinding perspective, the corridor ends in a hard turn (at right angles), while the movements to John or Fulton Streets are hard to locate and maze-like. There are potential safety concerns regarding large pedestrian flows in corridors to John Street, and under low volume conditions there are personal safety concerns in blind passages to John Street.

Key LOS and v/c locations of this alternative are identified on Figure B-6 and in Table B-2. The key operational issues of this alternative are as follows.
IMPROVEMENTS

- The stair from the existing ramp from the A/C underneath the 45 tracks to the southbound 45 platform improves from LOS E under Alternative 2 to LOS A under Alternative 4. It was LOS F under the No Action Alternative;
- The up escalators from the platform level at Dey Street to the Dey Street Access Building would improve substantially from a v/c ratio of 1.02 in Alternative 2 to a v/c ratio of 0.45 in Alternative 4;
- The ramp from the A/C up to the northbound 45 platform was operating at LOS F under the No Action Alternative, Alternative 1 and Alternative 2 and improves marginally but still operates at a LOS D under Alternative 4; and,
- The free zone up escalators from the Dey Street Passageway to the platform level at the Dey Street Access Building would improve from a v/c ratio of 1.00 under Alternative 2 to a v/c ratio of 0.45 under Alternative 4; and,
- The stair from the northbound 45 platform to the street at the northeast corner of Fulton Street and Broadway would improve substantially from LOS D in the No Action Alternative and Alternative 1 to LOS A in Alternative 4.

LIMITATIONS

- The existing underpass connecting the A/C mezzanine to the southbound 45 would improve from LOS E in Alternative 3 to LOS A in Alternative 4, similar to the LOS under Alternative 2;
- Alternative 4 is an improvement over the No Action Alternative as the additional diagonal route between the A/C and 45 platforms and the Dey Street Passageway alleviate existing congestion within the A/C to 45 underpass; and,
- The direct stair from the Concourse to the northbound 45 platform which was LOS A under Alternative 2, would deteriorate to LOS C under Alternative 4.

TRAIN OPERATIONS

Substantial service diversions would be required for 45 trains to construct the underpass tunnel under Broadway. Underpinning of the two (2) 45 tracks would likely require intermittent track outages on weeknights and weekends for approximately six (6)-nine (9) months. Similarly, widening of the existing underpass of the RW at Dey Street would require intermittent track outages on weeknights and weekends for approximately nine (9)-12 months.

Construction of new vertical circulation elements at the Fulton Street 45 station would require elimination of the existing street stairs to both the northbound and southbound platform. To facilitate entry and exit from the station during construction, the new south end stairs to Cortlandt Street and Maiden Lane would need to be constructed in advance of this work.

Once constructed, this alternative would improve operations of the southbound 45 platform due to the new south end stairs and the new major entry facility at 189 Broadway. These improvements would help to distribute passengers along the platform and within the trains, which would help to reduce dwell times.

Operations of the northbound 45 platform would only be marginally improved. The proposed Dey Street Passageway to northbound platform connection would rise to the northbound platform in the most crowded location, where transferring passengers from the larger Broadway-Nassau Complex queue. However, this alternative also includes a bypass of the northbound platform for Dey Street Passageway users destined for other services in the Existing Complex besides the 45. As such, those passengers would not need to walk along the northbound platform to reach their destination. This is therefore preferable to Option 2 and would cause less crowding by passengers from/to the northbound 45. Nonetheless, this bypass connection would direct passengers headed for the rest of the Existing Complex
to the extreme western end of the AC mezzanine, which would cause more crowded conditions in this area than currently exist. Hence, it is not expected that this alternative would reduce station dwell times for northbound 45 trains, and it would worsen crowding at the junction between the AC mezzanine and the northbound 45 platform.

B.7.3 ACHIEVEMENT OF PROJECT GOALS

The construction of Alternative 4 would not adequately achieve the project goals. No substantial improvements to existing street-level entrances would be provided to improve street-level wayfinding. This could be partially alleviated with appropriate signage, but the alternative does not allow for the implementation of substantial improvements to existing street-level entrances to improve street-level wayfinding and subway access. Many of the existing difficulties and inefficiencies of subsurface connections within the Existing Complex would continue. In summary, this alternative would not adequately address the wayfinding, circulation and clarity requirements necessary to satisfy the project Purpose and Need. The existing circuitous passenger flows would not be alleviated as this alternative does not decrease passenger flow at the congested northern end of the 45 platforms and the western end of the AC station, and the existing AC to 45 northbound AM Peak hour congestion is expected to continue to experience poor LOS deficiencies (see Table B-1). The LOS in the new diagonal tunnel is expected to be satisfactory, although the tunnel would terminate just before a hard turn (at right angles), which would not contribute to wayfinding and could present a safety concern in off-peak periods.

Fare gates would remain as they presently exist; “unpaid” zone concourse users could walk to the west side of Broadway before having to pay a fare. In summary, this alternative would not adequately address the wayfinding, circulation and clarity requirements necessary to satisfy the project Purpose and Need.

While this alternative does provide for connectivity from the WTC to the subway complex east of Church Street, this alternative does not reduce the passenger volumes at the intersection of the 45 and AC platform ends. Passengers coming from Dey Street are required to use the already congested southbound 45 platform to go north to the existing 45 sub-passage at the northern end of the southbound platform. This would contribute to further congestion along this platform. There would still be a substantial amount of additional passenger flow that would need to be accommodated within this already congested area, and there would be a need to accommodate increased passenger volumes due to the additional passenger flow from Dey Street.

B.7.4 CONSTRUCTABILITY

The following issues would need to be addressed in greater detail if this alternative were to be pursued. The methods suggested are based on concept level data, and further detailed investigation into existing geotechnical profiles, building construction and foundations, utilities and track bed support among others needs to be performed before construction methods can be investigated fully.

The construction of the Dey Street Passageway poses several issues relating to utilities, building vaults extending below the sidewalk and a requirement to maintain uninterrupted vehicular access to the Century 21 Department Store loading dock on the south side of the street near Church Street. Due to the proposed depth of the tunnel and existing sub-soil materials, it is proposed to construct the tunnel using a cut-and-cover method. This would require special attention to the maintenance of the utilities that would need to be supported on bridges across open excavations.

One of the most critical aspects of the construction process would be the construction of the passageway below the 45 track bed to connect the two (2) sides of the station. This would be done by treating the ground with a grout mixture, then mining below the existing track bed while supporting the existing beam as the mined face advances. The tunneling operation would progress in two (2)- to three (3)-foot lengths within the treated ground to minimize any effect on the track bed. A permanent structure would be built.
inside the mined opening. The temporary supports would be incorporated into the permanent structure to avoid the possibility of voids and subsequent settlement of the track bed.

The widening of the existing R W Cortlandt Street underpass is also a key construction issue for this alternative. The construction techniques used for this element would be similar in nature to those employed on the 4 5 underpass discussed above. The ground behind the walls of the existing passageway would be treated with a grout mixture to increase strength and stability.

To construct this alternative, the property at 189 Broadway (on the southwest corner of Dey Street at Broadway) would need to be acquired for the main vertical circulation building. This element would contain escalators, stairways and elevators from the concourse level to both the southbound 4 5 platform and the street. The excavation for this element could be enabled by the installation of either a slurry wall or a bored pile wall extending down past the required depth. Excavation then begins from ground level and the walls are temporarily braced internally as the depth increases. In the permanent construction the floor plates supply this lateral restraint. Though potentially a slow operation, neither method is uncommon (specific ground conditions notwithstanding) and should pose little in the way of technical problems that cannot be addressed adequately by employing industry standard solutions.

To construct this aspect of the project, the adjacent buildings may need to be underpinned to prevent differential settlement. As with the wall construction discussed above, this may prove to be a potentially a slow operation but, in concept, is a common construction technique.

The skewed tunnel between Broadway and Fulton Street would require easements from the buildings it passes below and would be constructed by first reengineering the buildings’ structure to allow for the easement. The passageway itself could also be constructed to accept and transfer loads from the building above. Modification to the existing foundation in the form of the installation of mini-piles under the footprint of the passageway would probably be required to distribute the additional imposed loading on the passageway structure. This would be constructed in three (3)-foot sections to minimize the effect on the building. This passageway would require easements for the NYCT structure below each of the buildings.

The addition of a vertical circulation element connecting to the existing entrances on Fulton Street could be constructed using the same methodology as for the vertical circulation element on Dey Street described above.

**B.7.5 PRELIMINARY ENVIRONMENTAL CONSIDERATIONS**

Preliminary environmental screening suggests that this alternative would not be anticipated to result in substantial environmental impacts. The Corbin Building would not be affected, and there would not be any impacts on the John Street-Maiden Lane Historic District. The only major property acquisition required would be 189 Broadway. The use of existing and new easements would be required, including new easements for the buildings on Broadway between Fulton and John Streets that are located above the proposed route of the diagonal tunnel. There would be a net loss of approximately 22,000 square feet of retail space associated with the acquisition of 189 Broadway, and there would be some temporary impacts on businesses on Dey Street during construction of the passageway.
B.8 ALTERNATIVE 5 – DEY STREET PASSAGEWAY WITH CENTRAL STATION CONCOURSE AND PLAZA (CORBIN BUILDING REMOVED)

B.8.1 DESCRIPTION

This alternative includes an underground pedestrian tunnel running directly under Dey Street, which connects the WTC complex with the Fulton Street 45 station and other points within the Existing Complex (see Figure B-7). The tunnel’s western portal is two (2) levels below Dey Street at the intersection of Dey and Church Streets. The tunnel continues eastward under the existing 45 subway tracks and terminates on the east side of Broadway where access to the 45 northbound platform is provided, along with street access to the north and south sides of John Street. An Entrance Facility would be located on the southwest corner of Dey Street at Broadway, providing access to the 45 southbound platform one (1) level down and to the Dey Street Passageway two (2) levels down.

In addition, a plaza would occupy the area bordered by Fulton Street, John Street and Broadway. The facility would extend two (2) levels below the street. The plaza is conceived as a central node within the downtown Manhattan transit system. The Dey Street Pedestrian Passageway would connect the plaza with the WTC complex and unify all Existing Complex services, facilitating horizontal and vertical circulation. The plaza would be an open space with canopied entrances along the sidewalks of Fulton Street and Broadway. The facility would contain system wayfinding assets, as well as potential public amenities. This alternative would also include an entrance at 195 Broadway, with a descent underneath the 45 tracks and subsequent access to the plaza facility.

Project elements would include:

- Subsurface circulation mezzanine bounded by John Street, Broadway and Fulton Street with vertical access to open plaza above (Corbin Building demolished);
- A C mezzanine widening between Broadway and Nassau Street;
- Second 45 underpass connecting to vertical circulation element in 195 Broadway leading to the 45 southbound platform;
- A free-zone passageway to the WTC complex (Dey Street Passageway Connector);
- New entrance at Millenium Hotel to provide R W Street Access Stairs;
- New entrance structure at the southwest corner of Broadway and Dey Street;
- New entrances on the west side of Fulton Street and Broadway;
- New stairs on the southeast and southwest corner of Broadway and Cortlandt Street;
- Entrances on the south side of John Street between Nassau and William Streets;
- Entrances on the north side of Fulton Street to the east of William Street;
- Entrance on the west side of Nassau Street to the south of Fulton Street;
- New stairs connecting the east end of the A C platform to the 2 3;
- 2 3 Rehabilitation;
- 45 Rehabilitation;
- A C Rehabilitation;
- R W - E Connector;
- J M Z Nassau Street – ADA connectivity;
- ADA Access at R W - E stairs; and,
- ADA elevator on John Street for the 2 3 Fulton Street Station.
B.8.2 OPERATIONAL CONDITIONS

LOS

This alternative is comprised of three (3) major elements – the Dey Street Passageway, the Dey Street Access Building and the subsurface Central Station Concourse. Key LOS and v/c locations of this alternative are presented on Figure B-7.

The Dey Street Passageway begins two (2) levels below the WTC and runs under Dey Street to a new passageway two (2) levels below east of Broadway. Free zone movement is possible through the concourse and up a set of vertical circulation elements to the first level below the FSTC Central Station Concourse. Stair and escalator routes to Fulton and John Streets, and the east side of Broadway, are provided here. Passengers coming from the WTC can also enter the FSTC plaza through a fare control two (2) levels below, and reach the A C concourse without changing levels.

The Dey Street Access Building is a vertical core on the south corner of Dey Street and Broadway. It contains free zone escalators that connect the Dey Street Passageway with the southbound 4 5 platforms one (1) level below, and a street entrance onto Broadway.

This alternative includes a subsurface Central Station Concourse with a plaza above, at street-level, that covers the entire Broadway frontage of the block from Fulton to John Streets, requiring the removal of the Corbin Building. The Central Station Concourse contains a paid zone concourse two (2) levels below street-level that joins the Dey Street Passageway with the A C mezzanine and contains stairs and escalators up to the northbound and (via a new corridor beneath the 4 5 tracks and partially beneath 195 Broadway) southbound 4 5 platforms. It also contains paid zone stairs and escalators to one (1) level below street-level, where passengers can exit the paid zone and proceed through another set of stairs and escalators to reach the street-level.

Alternative 5 provides wider connections between the A C and 4 5 platforms and improves sightlines and wayfinding between the two (2) subsurface levels for transferring passengers. The new underpass connecting to the southbound 4 5 platform improves the safety and convenience of this transfer movement in peak hours. The option maximizes the options subway and Dey Street Passageway passengers have for reaching the street-level from the Central Station Concourse – taking pressure off existing street stairs – and allows the Dey Street Passageway and Dey Street Access Building to operate without congestion.

Key LOS and v/c locations of this alternative are identified on Figure B-7 and in Table B-2. The key operational issues of this alternative are as follows.

IMPROVEMENTS

- The open space at the north end of the northbound 4 5 platform would be LOS A under this Alternative, improving from LOS C in the No Action Alternative;
- The new central underpass from the Central Station Concourse to the southbound 4 5 platform would operate at LOS A; and,
- All exits from the Central Station Concourse would operate at LOS A.

LIMITATIONS

The A C platform stairs to the mezzanine would remain at LOS C, and would not improve over the No Action Alternative.
B.8.3 ACHIEVEMENT OF PROJECT GOALS

The construction of Alternative 5 would partially achieve several of the project goals. Substantial improvements to existing street-level entrances would be provided to improve street-level wayfinding, although this could be less-than-satisfactory during peak periods, due to the absence of a dedicated passenger circulation space, which could lead to potential functional and wayfinding conflicts with other users of the Central Station Concourse. The Central Station Concourse would also not provide a strong visual presence within its surroundings at street-level, which could detract from wayfinding and pedestrian flow. This could be partially alleviated with appropriate signage. Many of the existing difficulties and inefficiencies of subsurface connections within the Existing Complex would be alleviated. The existing circuitous passenger flows would be alleviated, as this alternative decreases passenger flow at the congested northern end of the \textit{45} platforms and the western end of the \textit{AC} station by allowing for free passenger flow between the \textit{AC} and \textit{45}, and improves sightlines and wayfinding at a subsurface level. The existing congestion associated with the \textit{AC} to \textit{45} transfer is expected to experience an improved LOS under this alternative (see Table B-1). It would not foster economic recovery due to the retail loss and lack of opportunity to replace this loss on-site.

This alternative provides for connectivity from the WTC to the subway complex east of Church Street, while also reducing the passenger volumes at the intersection of \textit{45} and \textit{AC} platform ends. Passengers coming from Dey Street are distributed away from the congested southbound \textit{45} platform when using the existing \textit{45} sub-passage at the northern end of the southbound platform.

B.8.4 CONSTRUCTABILITY

The following issues are highlighted as key issues, which would need to be addressed in great detail if the alternative was to be pursued. The methods suggested are based on concept-level data, and further detailed investigation into existing geotechnical profiles, building construction and foundations, utilities and track bed support, among others, needs to be performed before construction methods can be investigated fully.

The construction of the Dey Street Passageway poses several issues relating to utilities, building vaults extending below the sidewalk and a requirement to maintain uninterrupted vehicular access to the Century 21 Department Store loading dock on the south side of the street near Church Street. Due to the proposed depth of the tunnel and existing sub-soil materials it is proposed to construct the tunnel using a cut-and-cover method. This would require special attention to the maintenance of the utilities that would need to be supported on bridges across open excavations.

One of the most critical aspects of the construction process would be the construction of the passageway below the \textit{45} track bed to connect the two (2) sides of the station. This would be done by treating the ground with a grout mixture, then mining below the existing track bed while supporting the existing beam as the mined face advances. The tunneling operation would progress in two (2)- to three (3)-foot lengths within the treated ground to minimize any effect on the track bed. A permanent structure would be built inside the mined opening. The temporary supports would be incorporated into the permanent structure to avoid the possibility of voids and subsequent settlement of the track bed.

The widening of the existing \textit{RW} Cortlandt Street underpass is also a key construction issue for this alternative. The construction techniques used for this element would be similar in nature to those employed on the \textit{45} underpass discussed above. The ground behind the walls of the existing passageway would be treated with a grout mixture to increase strength and stability.

The inclusion of the circulation area under this alternative allows the western end of the \textit{AC} mezzanine to be modified and widened. To widen this section of the existing mezzanine, the adjacent buildings would first need to be underpinned and, at the same time, the existing utilities moved outside of the
proposed footprint. Secant pile walls would be installed on either side of the existing structure. Great care would be needed to ensure that the base of secant piles does not damage or excessively load the tunnel lining. The secant pile walls are intended to serve as initial support for the excavation only, and would not form the walls of the completed structure. This is because it would be difficult to install reinforcement in the secant pile wall such that it lines up with the locations of existing beams and columns that are to be retained at platform level. As the piles would be located directly over the AC tunnel liners, which should not be excessively loaded, the secant pile walls would not be used to facilitate top-down construction. The area could then be excavated and braced, including the necessary pedestrian protection. The new mezzanine floor slab would then be constructed over the top of the existing floor slab. Construction should be performed sequentially to allow for pedestrian flow.

To construct this alternative, the property at 189 Broadway (on the southwest corner of Dey Street at Broadway) would need to be acquired for the main vertical circulation building. This element would contain escalators, stairways and elevators from the concourse level to both the southbound 45 platform and the street. The excavation for this element could be enabled by the installation of either a slurry wall or a bored pile wall extending down past the required depth. Excavation would then begin from ground level and the walls would be temporarily braced internally as the depth increases. In the permanent construction, the floor plates would supply this lateral restraint. Though potentially a slow operation, neither method is uncommon (specific ground conditions notwithstanding) and should pose little in the way of technical problems that cannot be addressed adequately by employing industry standard solutions.

To construct this aspect of the project, the adjacent buildings may need to be underpinned to prevent differential settlement within their foundations. As with the wall construction above, this may prove to be a potentially slow operation but, in concept, is a common construction technique.

The circulation area bounded by Broadway, Fulton and John Streets is located below a street-level plaza. The existing buildings (including the Corbin Building) are to be demolished, leaving a large site area to begin construction. A containment wall constructed of either bored piles or a slurry wall would bind the area of the plaza. This would be used as a support for the surrounding buildings and roadways while the excavation for the circulation area is progressed, and would also form the permanent retaining/external wall for the structure. It is likely that the adjacent building foundations would require underpinning for assured stability. Once excavation is completed, the foundations for the circulation area structure and constructed, the columns, floors and cover slab would follow. The plaza would be completed on top of the structure and around the penetrations for vertical circulation elements.

B.8.5 PRELIMINARY ENVIRONMENTAL CONSIDERATIONS

Preliminary environmental screening indicates that the Corbin Building would be demolished in this alternative. Alternative 5 would also cause substantial impacts on the John Street-Maiden Lane Historic District as a result of the removal of the Corbin Building.

This alternative would require major property acquisitions. The use of existing and new easements would also be required. There would be a net loss of approximately 65,000 square feet of retail space associated with the acquisition and removal of properties as there would not be an opportunity to replace the retail located in the removed buildings. Of all the alternatives, the greatest amount of retail would be removed by this alternative, similar to Alternatives 6 and 7 due to the construction of a subsurface Central Station Concourse on Broadway between Fulton and John Streets. Of Alternatives 5, 6 and 7, only this alternative would maintain existing retail in the Corbin Building. However, because the retail area in the Corbin Building is small relative to the retail area represented by other four (4) parcels on the block, the reduction in retail loss by not removing the Corbin Building is only marginal. There would be some temporary impacts on businesses and residences on Dey and Fulton Streets during construction of the Dey Street Passageway and AC modifications, respectively. Because this alternative would require
removal of the Corbin Building and cause related cultural resource impacts considered unavoidable, it is not considered reasonable.

**B.9 ALTERNATIVE 6 – DEY STREET PASSAGEWAY WITH CENTRAL STATION CONCOURSE AND PLAZA (ISOLATION OF CORBIN BUILDING)**

**B.9.1 DESCRIPTION**

Alternative 6 includes an underground pedestrian tunnel, running directly under Dey Street, which connects the WTC complex with the Fulton Street 45 station and other points within the Existing Complex (see Figure B-8). The tunnel’s western portal is two (2) levels below Dey Street at the intersection of Dey and Church Streets. The tunnel continues eastward under the 45 subway tracks and terminates on the east side of Broadway where access to the 45 northbound platform is provided. An Entrance Facility would be located on the southwest corner of Dey Street at Broadway providing access to the 45 southbound platform one (1) level down and to the Dey Street tunnel two (2) levels down.

In addition, a plaza would occupy an area bordered by Fulton Street, Broadway and the north side of the Corbin Building. Access would be provided to the plaza through the Corbin Building by adaptively reusing some of its historic features. The facility would extend two (2) levels below the street. The plaza is conceived as a central node within the downtown Manhattan transit system. The Dey Street Pedestrian Passageway would connect the plaza with the WTC complex and unify all Existing Complex services, facilitating horizontal and vertical circulation. The plaza would be an open space with canopied entrances along the sidewalks of Fulton Street and Broadway. The facility would contain system wayfinding assets, as well as potential public amenities such as retail space. This alternative would also include an entrance at 195 Broadway with a descent underneath the 45 tracks and subsequent access to the plaza facility.

Project elements would include:

- Subsurface circulation mezzanine bounded by Fulton Street, Broadway and the north side of the Corbin Building with vertical access to open plaza above (Corbin Building isolated);
- A C mezzanine widening between Broadway and Nassau Street;
- Second 45 underpass connecting to vertical circulation element in 195 Broadway leading to the 45 southbound platform;
- A free-zone passageway to the WTC complex (Dey Street Passageway Connector);
- New entrance at Millenium Hotel to provide R W Street Access Stairs;
- New entrance structure at the southwest corner of Broadway and Dey Street;
- New entrances on the west side of Fulton Street and Broadway;
- New stairs on the southeast and southwest corner of Broadway and Cortlandt Street;
- Entrances on the south side of John Street between Nassau and William Streets;
- Entrances on the north side of Fulton Street to the east of William Street;
- Entrance on the west side of Nassau Street to the south of Fulton Street;
- New stairs connecting the east end of the A C platform to the 2 3 ;
- 2 3 Rehabilitation;
- 45 Rehabilitation;
- A C Rehabilitation;
- R W - E Connector;
- J M Z Nassau Street – ADA connectivity;
- ADA elevator on John Street for the 2 3 Fulton Street Station; and,
- ADA Access at R W - E stair.
B.9.2 OPERATIONAL CONDITIONS

LOS

This alternative is comprised of three (3) major elements – the Dey Street Passageway, the Dey Street Access Building and the FSTC plaza. This alternative does not impact the Corbin Building and does not provide a direct connection from the complex to John Street. Key LOS and v/c locations of this alternative are presented on Figure B-8.

The Dey Street Passageway begins two (2) levels below street-level at the WTC site and runs under Dey Street to a new concourse two (2) levels below and east of Broadway. Free zone movement is possible through the concourse and up a set of vertical circulation elements one (1) level below street-level of the FSTC, which provides stair and escalator routes to Fulton and John Streets and the east side of Broadway. Passengers coming from the WTC can also enter the FSTC plaza through a fare control two (2) levels below street-level, and reach the A C concourse without changing levels.

The Dey Street Access Building is a vertical core on the south corner of Dey Street at Broadway. It contains free zone escalators that connect the Dey Street Passageway with the southbound 4 5 platforms one (1) level below, and a street entrance onto Broadway.

The plaza, in this alternative, consists of a plaza that extends from Fulton Street to the north side of the Corbin Building, with access to the plaza from John Street provided through adaptive reuse of some of Corbin Building’s historic features. The plaza contains a paid zone level concourse two (2) levels below street-level that joins the Dey Street Passageway with the A C mezzanine and contains stairs and escalators up to the northbound and (via a new corridor beneath the 4 5 tracks and partially beneath 195 Broadway) southbound 4 5 platforms. It also contains paid zone stairs and escalators to one (1) level below the street, where passengers can exit the paid zone and proceed through another set of stairs and escalators to reach the street-level.

This alternative provides wider connections between the A C and 4 5 platforms and improves sightlines and wayfinding between the two (2) subsurface levels for transferring passengers. The new underpass connecting to the southbound 4 5 platform improves the safety and convenience of this transfer movement in peak hours. The alternative gives two (2) options to subway and Dey Street Passageway passengers for reaching the street-level from the FSTC plaza. Because it does not include a direct connection from the FSTC plaza to John Street, it requires an additional street stair from the Dey Street Passageway to John Street.

Key LOS and v/c locations of this alternative are identified on Figure B-8 and in Table B-2. The key operational issues of this alternative are as follows.

IMPROVEMENTS

- The open space at the north end of the northbound 4 5 platform would be LOS A under this alternative, improving from LOS C in the No Action Alternative;
- The new central underpass from the Central Station Concourse to the southbound 4 5 platform would operate at LOS A;
- All FSTC stairs to street in the northeast corner of Entry Facility would improve from LOS C under Alternative 5 to LOS A under Alternative 6; and,
- All exits from the Central Station Concourse would operate at LOS A.

LIMITATIONS

- The A C platform stairs to the mezzanine would remain at LOS C, and would not improve over the No Action Alternative;
• The new stair from Dey Street Passageway to north side of John Street would operate at LOS D; and,
• There would not be any escalators up to the street on the south side of FSTC.

B.9.3 ACHIEVEMENT OF PROJECT GOALS

The construction of Alternative 6 would partially achieve several of the project goals. Substantial improvements to existing street-level entrances would improve street-level wayfinding, although this could be less-than-satisfactory during peak periods due to the absence of a dedicated passenger circulation space, which could lead to potential functional and wayfinding conflicts with other users of the Concourse and plaza. The plaza would not provide a strong visual presence within its surroundings, which could detract from wayfinding and pedestrian flow. This could be partially alleviated with appropriate signage. The retention of the Corbin Building would also reduce wayfinding as the Central Station Concourse and plaza would not be visible from the south. Many of the existing difficulties and inefficiencies of subsurface connections within the Existing Complex would be alleviated. The existing circuitous passenger flows would be lessened, as this alternative decreases passenger flow at the congested northern end of the 45 platforms and the western end of the AC station by allowing for free passenger flow between the AC and 45, and improves sightlines and wayfinding at a subsurface level. The existing AC to 45 transfer is expected to experience an improved LOS under this alternative (see Table B-1). This alternative would not foster economic revitalization due to the loss of retail space and the inability to replace this on-site.

This alternative provides for connectivity from the WTC to the subway complex east of Church Street, and does so while also reducing the passenger volumes at the intersection of 45 and AC platform ends. Passengers coming from Dey Street are distributed away from the congested southbound 45 platform when using the existing 45 sub-passage at the northern end of the southbound platform. This would reduce the existing congestion along this platform.

B.9.4 CONSTRUCTABILITY

The following issues are highlighted as key issues, which would need to be addressed in greater detail if this alternative were to be pursued. The methods suggested are based on concept-level data, and further detailed investigation into existing geotechnical profiles, building construction and foundations, utilities and track bed support, among others, needs to be performed before construction methods can be investigated fully.

The construction of the Dey Street tunnel poses several issues relating to utilities, building vaults extending below the sidewalk and a requirement to maintain uninterrupted vehicular access to the Century 21 Department Store loading dock on the south side of the street near Church Street. Due to the proposed depth of the tunnel and existing sub-soil materials, it is proposed to construct the tunnel using a cut-and-cover method. This would require special attention to the maintenance and protection of the existing utilities that would need to be supported on bridges across open excavations.

One of the most critical aspects of the construction process would be the construction of the passageway below the 45 track bed to connect the two (2) sides of the station. This would be done by treating the ground with a grout mixture, then mining below the existing track bed while supporting the existing beam as the mined face advances. The tunneling operation would progress in two (2)- to three (3)- foot lengths within the treated ground to minimize any effect on the track bed. A permanent structure would be built inside the mined opening. The temporary supports would be incorporated into the permanent structure to avoid the possibility of voids and subsequent settlement of the track bed.

The widening of the existing RW Cortlandt Street underpass is also a key construction issue for this alternative. The construction techniques used for this element would be similar in nature to those
employed on the 45 underpass discussed above. The ground behind the walls of the existing passageway would be treated with a grout mixture to increase strength and stability.

The inclusion of the circulation area under this alternative allows the western end of the AC mezzanine to be modified and widened. To widen this section of the existing mezzanine, the adjacent buildings would first need to be underpinned and, at the same time, the existing utilities moved outside of the proposed footprint. Secant pile walls would be installed on either side of the existing structure. Great care would be needed to ensure the base of secant piles does not damage or excessively load the tunnel lining. The secant pile walls are intended to serve as initial support for the excavation only, and would not form the walls of the completed structure. This is because it would be difficult to install reinforcement in the secant pile wall so that it lines up with the locations of existing beams and columns that are to be retained at platform level. As the piles would be located directly over the AC tunnel liners, which should not be excessively loaded, the secant pile walls would not be used to facilitate top-down construction. The area could then be excavated and braced, including the necessary pedestrian protection. The new mezzanine floor slab would then be constructed over the top of the existing floor slab. Construction should be performed sequentially to allow for pedestrian flow.

To construct this alternative, the property at 189 Broadway (on the southwest corner of Dey Street at Broadway) would need to be acquired for the main vertical circulation building. This element would contain escalators, stairways and elevators from the concourse level to both the southbound 45 platform and the street. The excavation for this element could be enabled by the installation of either a slurry wall or a bored pile wall extending down past the required depth. Excavation would then begin from ground level, and the walls would be temporarily braced internally as the depth increases. In the permanent construction, the floor plates would supply this lateral restraint. Though potentially a slow operation, neither method is uncommon (specific ground conditions notwithstanding) and should pose little in the way of technical problems that could not be addressed adequately by employing industry standard solutions.

To construct this aspect of the project, the adjacent buildings may need to be underpinned to prevent differential settlement within their foundations. As with the wall construction discussed above, this may prove to be a potentially a slow operation but, in concept, is a common construction technique.

The circulation area bounded by Broadway, Fulton Street and the north side of the Corbin Building is located below a street-level plaza. The existing buildings (excluding the Corbin Building) would be demolished, leaving a large site area to begin construction. A containment wall constructed of either bored piles or a slurry wall would bind the area of the plaza. This would be used as a support for the surrounding buildings (including the Corbin Building) and roadways, and while the excavation for the circulation area is progressed, it would also form the permanent retaining/external wall for the structure. It is likely that the adjacent building foundations would require underpinning for assured stability. Once excavation is completed, the foundation for the circulation area structure would be constructed and the columns, floors and cover slab would follow. The plaza would be completed on top of the structure and around the penetrations for vertical circulation elements.

B.9.5 PRELIMINARY ENVIRONMENTAL CONSIDERATIONS

Preliminary environmental screening suggests that this alternative would not result in any substantial impacts on historic resources, as the Corbin Building would not be substantially affected, and there would not be any impacts on the John Street-Maiden Lane Historic District. The Corbin Building would remain as existing. The long-term preservation commitment associated with public ownership would not be guaranteed. This alternative would require major property acquisitions. Use of existing and new easements would also be required. There would be a net loss of approximately 65,000 square feet of retail space associated with the acquisition and removal of properties, as there would not be an opportunity to replace the retail located in the removed buildings. Of all the alternatives, the greatest amount of retail would be removed by this alternative, similar to Alternatives 5 and 7 due to the
construction of a subsurface Central Station Concourse on Broadway between Fulton and John Streets. Construction of this subsurface Central Station Concourse would require removal of the structures above. This alternative would not maintain existing retail in the Corbin Building. However, because the retail area in the Corbin Building is small relative to the retail area represented by other four (4) parcels on the block, the reduction in retail loss by not removing the Corbin Building is only marginal. There would be some temporary impacts on businesses and residencies on Dey and Fulton Streets during construction of the Dey Street Passageway and A C modifications, respectively.

B.10 ALTERNATIVE 7 – DEY STREET PASSAGEWAY WITH CENTRAL STATION CONCOURSE AND PLAZA (ADAPTIVE REUSE OF CORBIN BUILDING)

B.10.1 DESCRIPTION

This alternative includes an underground pedestrian tunnel, running directly under Dey Street, which connects the WTC complex with the Fulton Street 4 5 station and other points within the Existing Complex (see Figure B-9). The tunnel’s western portal resides two (2) levels below Dey Street at the intersection of Dey and Church Streets. The tunnel continues eastward under the existing 4 5 subway tracks and terminates on the east side of Broadway where access to the 4 5 northbound platform is provided. An entrance facility would be located on the southwest corner of Dey Street at Broadway, providing access to the 4 5 southbound platform one (1) level down and to the Dey Street tunnel two (2) levels down.

In addition, a plaza would occupy an area bordered by John Street, Broadway and the north side of the Corbin Building. Access would be provided to the plaza through the Corbin Building by adaptively reusing some of its historic features. The facility would extend two (2) levels below the street. The plaza is conceived as a central node within the downtown Manhattan transit system. The Dey Street Passageway would connect the plaza with the WTC complex and unify all Existing Complex services, facilitating horizontal and vertical circulation. The plaza would be an open space with canopied entrances along the sidewalks of Fulton Street and Broadway. The facility would contain system wayfinding assets, as well as potential public amenities. This alternative would also include an entrance at 195 Broadway with a descent underneath the 4 5 tracks and subsequent access to the plaza facility.

Project elements would include:

- Subsurface circulation mezzanine bounded by John Street, Broadway and Fulton Streets with vertical access to open plaza above (Corbin Building integrated at street-level and below);
- A C mezzanine widening between Broadway and Nassau;
- Second 4 5 underpass connecting to vertical circulation element in 195 Broadway leading to the 4 5 southbound platform;
- A free-zone passageway to the WTC complex (Dey Street Passageway Connector);
- New entrance at Millenium Hotel to provide R W Street Access Stairs;
- New entrance structure at the southwest corner of Broadway and Dey Street;
- New entrances on the west side of Fulton Street and Broadway;
- New stairs on the southeast and southwest corner of Broadway and Cortlandt Street;
- Entrances on the south side of John Street between Nassau and William Streets;
- Entrances on the north side of Fulton Street to the east of William Street;
- Entrance on the west side of Nassau Street to the south of Fulton Street;
- New stairs connecting the east end of the A C platform to the 2 3 ;
- 2 3 Rehabilitation;
- 4 5 Rehabilitation;
• A C Rehabilitation;
• R W - E Connector;
• J M Z Nassau Street - ADA connectivity;
• ADA elevator on John Street for the 2 3 Fulton Street Station; and,
• ADA Access at R W - E stairs.

B.10.2 OPERATIONAL CONDITIONS

LOS

This alternative is comprised of three (3) major elements – the Dey Street Passageway, the Dey Street Access Building and the FSTC plaza. Key LOS and v/c locations of this alternative are presented on Figure B-9.

The Dey Street Passageway begins two (2) levels below the street-level of the WTC site and runs under Dey Street to a new concourse two (2) levels below the street east of Broadway. Free zone movement is possible through the concourse and up a set of vertical circulation elements to one (1) level below the street-level of the plaza, which provides stair and escalator routes to Fulton and John Streets, and the east side of Broadway. Passengers coming from the WTC can also enter the plaza through a fare control two (2) levels below the street, and reach the A C concourse without changing levels.

The Dey Street Access Building is a vertical core on the south of Dey Street at Broadway. It contains free zone escalators that connect the Dey Street Passageway with the southbound 4 5 platforms one (1) level below the street, and a street entrance onto Broadway.

The plaza, in this alternative, extends from Fulton Street to the north side of the Corbin Building, with access to the plaza from John Street provided through adaptive reuse of some of the Corbin Building’s historic features. The plaza contains a paid zone level concourse two (2) levels below the street that joins the Dey Street Passageway with the A C mezzanine and contains stairs and escalators up to the northbound and (via a new corridor beneath the 4 5 tracks and partially beneath 195 Broadway) southbound 4 5 platforms. It also contains paid zone stairs and escalators to one (1) level below the street, where passengers can exit the paid zone and proceed through another set of stairs and escalators to reach the street-level.

This alternative provides wider connections between the A C and 4 5 platforms and improves sightlines and wayfinding between the two (2) subsurface levels for transferring passengers. The new underpass connecting to the southbound 4 5 platform improves the safety and convenience of this transfer movement in peak hours. The alternative maximizes the options subway and Dey Street Passageway passengers have for reaching the street-level from the FSTC plaza – taking pressure off existing street stairs – and allows the Dey Street Passageway and Entry Facility to operate without congestion.

Key LOS and v/c locations of this alternative are identified on Figure B-9 and in Table B-2. The key operational issues of this alternative are as follows.

IMPROVEMENTS

• The open space at the north end of the northbound 4 5 platform would be LOS A under this alternative, improving from LOS C in the No Action Alternative;
• The new central underpass from the Central Station Concourse to the southbound 4 5 platform would operate at LOS A;
• All exits from the Central Station Concourse would operate at LOS A; and,
• The direct stair from the Central Station Concourse to the northbound 4 5 platform would operate at LOS A.
LIMITATIONS

- The AC platform stairs to the mezzanine would remain at LOS C, and would not improve over the No Action Alternative.

B.10.3 ACHIEVEMENT OF PROJECT GOALS

The construction of Alternative 7 would partially achieve several of the project goals. Substantial improvements to existing street-level entrances would be provided to improve street-level wayfinding, although this could be less-than-satisfactory during peak periods due to the absence of a dedicated passenger circulation space, which could lead to potential functional and wayfinding conflicts with other users of the Concourse. The Concourse would not provide a strong visual presence within its surroundings, which could also detract from wayfinding and pedestrian flow. This could be partially alleviated with appropriate signage. The retention of the Corbin Building would also reduce wayfinding as the Central Station Concourse would not be visible from the south, although this could be partially alleviated through the use of appropriate signage.

Many of the existing difficulties and inefficiencies of subsurface connections within the Existing Complex would be alleviated. The existing circuitous passenger flows would be alleviated as this alternative decreases passenger flow at the congested northern end of the 45 platforms and the western end of the AC station by allowing for free passenger flow between the AC and 45 and improves sightlines and wayfinding at a subsurface level. The existing AC to 45 transfer is expected to experience an improved LOS under this alternative (see Table B-1). This alternative would not foster economic revitalization due to the loss of retail space and the inability to replace this on-site.

This alternative provides for connectivity from the WTC to the subway complex east of Church Street, and does so while also reducing the passenger volumes at the intersection of the 45 and AC platform ends. Passengers coming from Dey Street are distributed away from the congested southbound 45 platform when using the existing 45 sub-passage at the northern end of the southbound platform. This would reduce the existing congestion along this platform.

This alternative includes a direct connection from the Central Station Concourse to John Street via the Corbin Building. The integration of the Corbin Building would increase the circulation capacity of the Central Station Concourse, further improving wayfinding and LOS. This alternative would not foster economic revitalization due to the loss of retail space and the inability to replace this on-site.

B.10.4 CONSTRUCTABILITY

The following issues are highlighted as key issues, which would need to be addressed in greater detail if this alternative were to be pursued. The methods suggested are based on concept-level data, and further detailed investigation into existing geotechnical profiles, building construction and foundations, utilities and track bed support, among others, needs to be performed before construction methods can be fully investigated.

The construction of the Dey Street Passageway poses several issues relating to utilities, building vaults extending below the sidewalk and a requirement to maintain uninterrupted vehicular access to the Century 21 Department Store loading dock on the south side of the street near Church Street. Due to the proposed depth of the tunnel and existing sub-soil materials, it is proposed to construct the tunnel using a cut-and-cover method. This would require special attention to the maintenance of the utilities that would need to be supported on bridges across open excavations.

One of the most critical aspects of the construction process would be the construction of the passageway below the 45 track bed to connect the two (2) sides of the station. This would be done by treating the ground with a grout mixture and then mining below the existing track bed while supporting the existing
beam as the mined face advances. The tunneling operation would progress in two (2)- to three (3)-foot lengths within the treated ground to minimize any effect on the track bed. A permanent structure would be built inside the mined opening. The temporary supports would be incorporated into the permanent structure to avoid the possibility of voids and subsequent settlement of the track bed.

The widening of the existing R W Cortlandt Street Station underpass is also a key construction issue for this alternative. The construction techniques used for this element would be similar in nature to those employed on the 4 5 underpass discussed above. The ground behind the walls of the existing passageway would be treated with a grout mixture to increase strength and stability.

The inclusion of the circulation area under this alternative allows the western end of the A C mezzanine to be modified and widened. To widen this section of the existing mezzanine, the adjacent buildings would first need to be underpinned and, at the same time, the existing utilities moved outside of the proposed footprint. Secant pile walls would be installed on either side of the existing structure. Great care would be needed to ensure that the base of secant piles does not damage or excessively load the tunnel lining. The secant pile walls are intended to serve as initial support for the excavation only, and would not form the walls of the completed structure. This is because it would be difficult to install reinforcement in the secant pile wall so that it lines up with the locations of existing beams and columns that are to be retained at platform level. As the piles would be located directly over the A C tunnel liners, which should not be excessively loaded, the secant pile walls would not be used to facilitate top-down construction. The area could then be excavated and braced, including the necessary pedestrian protection. The new mezzanine floor slab would then be constructed over the top of the existing floor slab. Construction should be performed sequentially to allow for pedestrian flow.

To construct this alternative, the property at 189 Broadway (on the southwest corner of Dey Street at Broadway) would need to be acquired for the main vertical circulation building. This element would contain escalators, stairways and elevators from the concourse level to both the street and the southbound 4 5 platform. The excavation for this element could be enabled by the installation of either a slurry wall or a bored pile wall extending down past the required depth. Excavation would then begin from ground level and the walls would be temporarily braced internally as the depth increases. In the permanent construction, the floor plates would supply this lateral restraint. Though potentially a slow operation, neither method is uncommon (specific ground conditions notwithstanding) and should pose little in the way of technical problems that could not be addressed adequately by employing industry standard solutions.

To construct this aspect of the project, the adjacent buildings may need to be underpinned to prevent differential settlement within their foundations. As with the wall construction discussed above, this may prove to be a potentially a slow operation but, in concept, is a common construction technique.

The circulation area bounded by Broadway, Fulton Street and the north side of the Corbin Building is located below a street-level plaza. The existing buildings (excluding the Corbin Building) would be demolished, leaving a large site area to begin construction. A containment wall constructed of either bored piles or a slurry wall would bind the area of the complex. This would be used as a support for the surrounding buildings (including the Corbin Building) and roadways while the excavation for the circulation area is progressed, and it would also form the permanent retaining/external wall for the structure. It is likely that the adjacent building foundations would require underpinning for assured stability. Once excavation is completed, the foundation for the circulation area structure would be constructed and the columns, floors and cover slab would follow. The plaza would be completed on top of the structure and around the penetrations for vertical circulation elements. To achieve the integration of the Corbin Building, the basement walls of the building could potentially be removed but the load bearing columns would be left in place and stiffened to counteract the necessary penetrations should the structural analysis determine it would be necessary.
B.10.5 PRELIMINARY ENVIRONMENTAL CONSIDERATIONS

Preliminary environmental screening suggests that this alternative would not result in substantial impacts on historic resources, as the adaptive reuse of the Corbin Building would be developed in close coordination with the New York State Historic Preservation Office (SHPO) to ensure that it would not be adversely affected. There would not be any subsequent impacts on the John Street-Maiden Lane Historic District. This alternative would require major property acquisitions. The use of existing and new easements would also be required. There would be a net loss of approximately 68,000 square feet of retail space associated with the acquisition and removal of properties, as there would not be an opportunity to replace the retail located in the removed buildings. Of all alternatives, the greatest amount of retail would be removed by this alternative, similar to Alternatives 5 and 6, due to the construction of a subsurface Central Station Concourse on Broadway between Fulton and John Streets. Construction of this subsurface Central Station Concourse would require removal of the structures above. This alternative would not maintain existing retail in the Corbin Building. However, because the retail area in the Corbin Building is small relative to the retail area represented by other four (4) parcels on the block, the reduction in retail loss by not removing the Corbin Building is only marginal. There would be some temporary impacts on businesses and residencies on Dey and Fulton Streets during construction of the Dey Street Passageway and AC modifications, respectively.

B.11 ALTERNATIVE 8 – DEY STREET PASSAGEWAY WITH CENTRAL STATION CONCOURSE AND ENTRY FACILITY (REMOVAL OF CORBIN BUILDING)

B.11.1 DESCRIPTION

This alternative includes an underground pedestrian tunnel running directly under Dey Street, which connects the WTC complex with the Fulton Street 4 5 station and other points within the Existing Complex (see Figure B-10). The tunnel’s western portal resides two (2) levels below Dey Street at the intersection of Dey and Church Streets.

The tunnel continues eastward under the existing 4 5 subway tracks and terminates on the east side of Broadway, where access to the 4 5 northbound platform is provided, along with street access to the north and south sides of John Street. An entrance facility would be located on the southwest corner of Dey Street at Broadway, providing access to the 4 5 southbound platform one (1) level down and to the Dey Street tunnel two (2) levels down.

In addition, a new building occupies an area bordered by John Street, Broadway and Fulton Street. The facility would extend two (2) levels below the street. The building is conceived as a central node within the downtown Manhattan transit system. The Dey Street Passageway would connect the plaza with the WTC complex and unify all Existing Complex services, facilitating horizontal and vertical circulation. The facility would contain system wayfinding assets, as well as potential public amenities. This alternative would also include an entrance at 195 Broadway with a descent underneath the 4 5 tracks and subsequent access to the entry facility.
Figure B-10

Full Build Alternative with Removal of Corbin Building (Alt. 8)

- LOS A
  - Existing stair to Fulton/Bway NE corner

- LOS A
  - Platform level connection to NB Lex

- V/C up = 0.31
  - V/C down = 0.19
  - Escalators between SB Lex platform and new concourse-level underpass

- V/C up = 0.46
  - V/C down = 1.03
  - Escalators between Dey St concourse and platform

- V/C up = 0.75
  - Escalators between platform and Dey St headhouse
Project elements would include:

- Subsurface circulation mezzanine bounded by John Street, Broadway and Fulton Street with vertical access to transit center building above (Corbin Building demolished);
- A C mezzanine widening between Broadway and Nassau Street;
- Second 45 underpass connecting to vertical circulation element in 195 Broadway leading to the 45 southbound platform;
- A free-zone passageway to the WTC complex (Dey Street Passageway Connector);
- New entrance at Millenium Hotel to provide RW Street Access Stairs;
- New entrance structure at the southwest corner of Broadway and Dey Street;
- New entrances on the west side of Fulton Street and Broadway;
- New stairs on the southeast and southwest corner of Broadway and Cortlandt Street;
- Entrances on the south side of John Street between Nassau and William Streets;
- Entrances on the north side of Fulton Street to the east of William Street;
- Entrance on the west side of Nassau Street to the south of Fulton Street;
- New stairs connecting the east end of the A C platform to the 2 3;
- 2 3 Rehabilitation;
- 45 Rehabilitation;
- A C Rehabilitation;
- RW - E Connector;
- JMZ Nassau Street – ADA connectivity;
- ADA elevator on John Street for the 2 3 Fulton Street Station; and,
- ADA Access at RW - E stairs.

B.11.2 OPERATIONAL CONDITIONS

LOS

This alternative is comprised of three (3) major elements – the Dey Street Passageway, the Dey Street Access Building and the FSTC. Key LOS and v/c locations of this alternative are presented on Figure B-10.

The Dey Street Passageway begins two (2) levels below the WTC site and runs under Dey Street to a new concourse two (2) levels below the street east of Broadway. Free zone movement is possible through the concourse and up a set of vertical circulation elements to one (1) level below the street-level of the FSTC, which provides stair and escalator routes to Fulton and John Streets, and the east side of Broadway. Passengers coming from the WTC can also enter the FSTC through a fare control two (2) levels below the street, and reach the A C concourse without changing levels.

The Dey Street Access Building is a vertical core on the southwest corner of Dey Street and Broadway. It contains free zone escalators that connect the Dey Street Passageway with the southbound 45 platforms one (1) level below the street, and a street entrance onto Broadway.

The FSTC, in this alternative, consists of a building that covers the entire block from Fulton Street to John Street, requiring the removal of the Corbin Building. The FSTC contains a paid zone concourse two (2) levels below the street that joins the Dey Street Passageway with the A C mezzanine and contains stairs and escalators up to the northbound and (via a new corridor beneath the 45 tracks and partially beneath 195 Broadway) southbound 45 platforms. It also contains paid zone stairs and escalators to one (1) level below the street, where passengers can exit the paid zone and proceed through another set of stairs and escalators to reach the street-level.
This alternative provides wider connections between the AC and 45 platforms and improves sightlines and wayfinding between the two (2) subsurface levels for transferring passengers. The new underpass connecting to the southbound 45 platform improves the safety and convenience of this transfer movement in peak hours. The alternative maximizes the options subway and Dey Street Passageway passengers have for reaching the street-level from the FSTC – taking pressure off existing street stairs – and allows the Dey Street Passageway and Dey Street Access Building to operate without congestion.

Key LOS and v/c locations of this alternative are identified on Figure B-10 and in Table B-2. The key operational issues of this alternative are as follows.

**IMPROVEMENTS**

- The open space at the north end of the northbound 45 platform would be LOS A under this alternative, improving from LOS C in the No Action Alternative;
- The new central underpass from the Central Station Concourse to the southbound 45 platform would operate at LOS A;
- All exits from the Central Station Concourse would operate at LOS A; and,
- The stair from the northeast corner of the Central Station Concourse would improve from LOS under Alternative 7 to LOS A under this alternative.

**LIMITATIONS**

- The AC platform stairs to the mezzanine would remain at LOS C, and would not improve over the No Action Alternative.

**B.11.3 ACHIEVEMENT OF PROJECT GOALS**

The construction of Alternative 8 would achieve the project goals. Substantial improvements to existing street-level entrances would be provided to improve street-level wayfinding. The presence of a dedicated passenger circulation space within the Entry Facility would substantially improve circulation and clarity. At street-level, the prominent visual presence of the Entry Facility, with clear vistas from Church, Fulton and Dey Streets, and Broadway, would improve passenger flows and wayfinding. Below street-level, wayfinding, circulation and clarity would be substantially improved by avoiding congestion at the northern end of the 45 platforms and by the creation of an intuitive, visually reinforced circulation pattern between the center of the 45 platform, the Dey Street Passageway and the center of the AC platform. The Entry Facility would provide a centrally organized space to accommodate a broad range of pedestrian flows in different directions. Because of the openness of the space inside the Entry Facility, destinations would be visible to passengers, thus improving the sense of orientation.

Many of the existing difficulties and inefficiencies of subsurface connections within the Existing Complex would be alleviated. The existing circuitous passenger flows would be alleviated, as this alternative decreases passenger flow at the congested northern end of the 45 platform and the western end of the AC station by allowing for free passenger flow between the AC and 45, and improves sightlines and wayfinding at a subsurface level. The existing AC to 45 transfer is expected to experience an improved LOS under this alternative (see Table B-1). With the provision of a large subsurface open space, passengers would have ample room to circulate and the additional passenger flow utilizing the Dey Street Passageway and entering this space could be more than adequately accommodated. Visual clarity would also reduce circuitous circulation patterns by visitors.

This alternative provides for connectivity from the WTC to the subway complex east of Church Street, and does so while also reducing the passenger volumes at the intersection of 45 and AC platform ends. Passengers coming from Dey Street are distributed away from the congested southbound 45...
platform when using the existing 45 sub-passage at the northern end of the southbound platform. This would reduce the existing congestion along this platform.

This alternative includes a direct connection from the Central Station Concourse to John Street with the removal of the Corbin Building, further improving pedestrian flows and wayfinding.

B.11.4 CONSTRUCTABILITY

The following issues are highlighted as key issues, which would need to be addressed in greater detail if this alternative were to be pursued. The methods suggested are based on concept-level data, and further detailed investigation into existing geotechnical profiles, building construction and foundations, utilities and track bed support, among others, needs to be performed before construction methods can be investigated fully.

The construction of the Dey Street Passageway poses several issues relating to utilities, building vaults extending below the sidewalk and a requirement to maintain uninterrupted vehicular access to the Century 21 Department Store loading dock on the south side of the street near Church Street. Due to the proposed depth of the tunnel and existing sub-soil materials, it is proposed to construct the tunnel using a cut-and-cover method. This would require special attention to the maintenance of the utilities, which would need to be supported on bridges across open excavations.

One of the most critical aspects of the construction process would be the construction of the passageway below the 45 track bed to connect the two (2) sides of the station. This would be done by treating the ground with a grout mixture then mining below the existing track bed while supporting the existing beam as the mined face advances. The tunneling operation would progress in two (2)- to three (3)-foot lengths within the treated ground to minimize any effect on the track bed. A permanent structure would be built inside the mined opening. The temporary supports would be incorporated into the permanent structure to avoid the possibility of voids and subsequent settlement of the track bed.

The widening of the existing RW Cortlandt Street underpass is also a key construction issue for this alternative. The construction techniques used for this element would be similar in nature to those employed on the 45 underpass discussed above. The ground behind the walls of the existing passageway would be treated with a grout mixture to increase strength and stability.

The inclusion of the circulation area under this alternative allows the western end of the AC mezzanine to be modified and widened. To widen this section of the existing mezzanine, the adjacent buildings would first need to be underpinned and, at the same time, the existing utilities would be moved outside of the proposed footprint. Secant pile walls would be installed on either side of the existing structure. Great care would be needed to ensure that the base of secant piles does not damage or excessively load the tunnel lining. The secant pile walls are intended to serve as initial support for the excavation only, and would not form the walls of the completed structure. This is because it would be difficult to install reinforcement in the secant pile wall so that it lines up with the locations of existing beams and columns that are to be retained at the platform level. As the piles would be located directly over the AC tunnel liners, which should not be excessively loaded, the secant pile walls would not be used to facilitate top-down construction. The area could then be excavated and braced, including the necessary pedestrian protection. The new mezzanine floor slab would then be constructed over the top of the existing floor slab. Construction should be performed sequentially to allow for pedestrian flow.

To construct this alternative, the property at 189 Broadway (on the southwest corner of Dey Street at Broadway) would need to be acquired for the main vertical circulation building. This element would contain escalators, stairways and elevators from the concourse level to both the southbound 45 platform and the street. The excavation for this element could be enabled by the installation of either a slurry wall or a bored pile wall extending down past the required depth. Excavation would then begin from ground level, and the walls would be temporarily braced internally as the depth increased. In the permanent
construction, the floor plates would supply this lateral restraint. Though potentially a slow operation, neither method is uncommon (specific ground conditions notwithstanding) and should pose little in the way of technical problems that cannot be addressed adequately by employing industry standard solutions.

To construct this aspect of the project, the adjacent buildings may need to be underpinned to prevent differential settlement within their foundations. As with the wall construction discussed above, this may prove to be a potentially slow operation but, in concept, is a common construction technique.

Broadway, Fulton and John Streets bound the Entry Facility. The existing buildings (including the Corbin Building) are to be demolished, leaving a large site area to begin construction. A containment wall constructed of either bored piles or a slurry wall would bound the area of the new street-level building. This would be used as a support for the surrounding buildings and roadways and, while the excavation for the circulation area is progressed, would also form the permanent retaining/external wall for the structure. It is likely that the adjacent building foundations would require underpinning for assured stability. Once excavation is completed, the foundations for the subsurface circulation area and above ground structure would be constructed and the columns, floors and cover slab would follow. The above ground building would be completed on top of the circulation area substructure. Because this alternative would require removal of the Corbin Building and cause related cultural resource impacts judged unavoidable, it is no longer considered reasonable.

B.11.5 PRELIMINARY ENVIRONMENTAL CONSIDERATIONS

Preliminary environmental screening indicates that the Corbin Building would be demolished in this alternative. Alternative 5 would also cause substantial impacts on the John Street-Maiden Lane Historic District as a result of the removal of the Corbin Building.

This alternative would require major property acquisitions. The use of existing and new easements would also be required. There would be a net loss of approximately 36,000 square feet of retail space associated with the acquisition and removal of properties, as the Entry Facility would provide for some limited replacement retail. This alternative would reduce the amount of retail by approximately 50 percent, similar to Alternatives 9 and 10 below. There would be some temporary impacts on businesses and residencies on Dey and Fulton Streets during construction of the Dey Street Passageway and AC modifications, respectively.

B.12 ALTERNATIVE 9 – DEY STREET PASSAGEWAY WITH CENTRAL STATION CONCOURSE AND ENTRY FACILITY (ISOLATION OF THE CORBIN BUILDING)

B.12.1 DESCRIPTION

This alternative includes an underground pedestrian tunnel running directly under Dey Street, which connects the WTC complex with the Fulton Street 4 5 station and other points within the Existing Complex (see Figure B-11). The tunnel’s western portal resides two (2) levels below Dey Street at the intersection of Dey and Church Streets. The tunnel continues eastward under the existing 4 5 subway tracks and terminates on the east side of Broadway where access to the 4 5 northbound platform is provided. An Entrance Facility would be located on the southwest corner of Dey Street at Broadway, providing access to the 4 5 southbound platform one (1) level down and to the Dey Street Passageway two (2) levels down.
Figure B-11

Isolation of Corbin Building

Alternative 9

V/C up = 0.30
V/C down = 0.14
Escalators between SB Lex platform and new concourse-level underpass

V/C up = 0.46
V/C down = 1.03
Escalators between Dey St concourse and platform

V/C up = 0.85
Escalators between platform and Dey St headhouse

Los A
Existing stair to Fulton/Bway NE corner

Platform level connection to NB Lex

Los A
Fulton Street Transit Center
In addition, a new building would occupy an area bordered by Fulton Street, Broadway and the north wall of the Corbin Building. The facility would extend two (2) levels below the street. The building is conceived as a central node within the downtown Manhattan transit system. The Dey Street Passageway would connect the plaza with the WTC complex and unify all Existing Complex services, facilitating horizontal and vertical circulation. The facility would contain system wayfinding assets, as well as public amenities such as retail space. This alternative would also include an entrance at 195 Broadway with a descent underneath the 4 5 tracks.

Project elements would include:

- Subsurface circulation mezzanine bounded by Fulton Street, Broadway and the north wall of the Corbin Building, with vertical access to transit center building above (Corbin Building isolated);
- A C mezzanine widening between Broadway and Nassau Street;
- Second 4 5 underpass connecting to vertical circulation element in 195 Broadway leading to the 4 5 southbound platform;
- A free-zone passageway to the WTC complex (Dey Street Passageway Connector);
- New entrance at Millenium Hotel to provide R W Street Access Stairs;
- New entrance structure at the southwest corner of Broadway and Dey Street;
- New entrances on the west side of Fulton Street and Broadway;
- New stairs on the southeast and southwest corner of Broadway and Cortlandt Street;
- Entrances on the south side of John Street between Nassau and William Streets;
- Entrances on the north side of Fulton Street to the east of William Street;
- Entrance on the west side of Nassau Street to the south of Fulton Street;
- New stairs connecting the east end of the A C platform to the 2 3;
- 2 3 Rehabilitation;
- 4 5 Rehabilitation;
- A C Rehabilitation;
- R W - E Connector;
- J M Z Nassau Street – ADA connectivity;
- ADA elevator on John Street for the 2 3 Fulton Street Station; and,
- ADA Access at R W - E stairs.

**B.12.2 OPERATIONAL CONDITIONS**

**LOS**

This alternative is comprised of three (3) major elements – the Dey Street Passageway, the Dey Street Access Building and the FSTC. The major difference between this alternative and other alternatives that include the FSTC is that this alternative does not impact the Corbin Building and does not provide a direct connection from the FSTC to John Street. Key LOS and v/c locations of this alternative are presented on Figure B-11.

The Dey Street Passageway begins two (2) levels below the WTC site and runs under Dey Street to a new concourse two (2) levels below the street east of Broadway. Free zone movement is possible through the concourse and up a set of vertical circulation elements one (1) level below the FSTC, which provides stair and escalator routes to Fulton Street and the east side of Broadway. Passengers coming from the WTC can also enter the FSTC through a fare control two (2) levels below the street, and reach the A C concourse without changing levels.

The Dey Street Access Building is a vertical core on the southwest corner of Dey Street and Broadway. It contains free zone escalators that connect the Dey Street Passageway with the southbound 4 5 platforms one (1) level below the street, and a street entrance onto Broadway.
The FSTC, in this alternative, consists of a new building that covers most of the block south of Fulton Street, but has no impact on the Corbin Building. The FSTC contains a paid zone concourse two (2) levels below the street that joins the Dey Street Passageway with the AC mezzanine and contains stairs and escalators up to the northbound and (via a new corridor beneath the 45 tracks and partially beneath 195 Broadway) southbound 45 platforms. It also contains paid zone stairs and escalators to one (1) level below the street, where passengers can exit the paid zone and proceed through another set of stairs and escalators to reach the street-level.

This alternative provides wider connections between the AC and 45 platforms and improves sightlines and wayfinding between the two (2) subsurface levels for transferring passengers. The new underpass connecting to the southbound 45 platform improves the safety and convenience of this transfer movement in peak hours. The alternative gives two (2) options to subway and Dey Street Passageway passengers for reaching the street-level from the FSTC. Because it does not include a direct connection from the FSTC to John Street, it requires an additional street stair to be built connecting the Dey Street Passageway to John Street.

Key LOS and v/c locations of this alternative are identified on Figure B-11 and in Table B-2. The key operational issues of this alternative are as follows.

**IMPROVEMENTS**

- The open space at the north end of the northbound 45 platform would be LOS A under this alternative, improving from LOS C in the No Action Alternative;
- The new central underpass from the Central Station Concourse to the southbound 45 platform would operate at LOS A;
- The stairs to the street in the northeast corner of Entry Facility would improve from LOS C under Alternative 5 to LOS A under Alternative 9; and,
- All exits from the Central Station Concourse would operate at LOS A.

**LIMITATIONS**

- The AC platform stairs to the mezzanine would remain at LOS C, and would not improve over the No Action Alternative;
- The new stair from Dey St Passageway to north side of John Street would operate at LOS D;
- There would not be any escalators up to the street on the south side of FSTC; and,
- The new from the Dey Street Passageway to the north side of John would operate at LOS D.

**B.12.3 ACHIEVEMENT OF PROJECT GOALS**

The construction of Alternative 9 would achieve the project goals. Substantial improvements to existing street-level entrances would be provided to improve street-level wayfinding. The presence of a dedicated passenger circulation space within the Entry Facility would substantially improve circulation and clarity. At street-level, the prominent visual presence of the Entry Facility, with clear vistas from Church, Fulton and Dey Streets, and Broadway, would improve passenger flows and wayfinding, but this would be limited to an extent by the presence of the Corbin Building. The Entry Facility would be set back to allow a wider sidewalk along the east side of Broadway in front of the Entry Facility while the Corbin Building would extend to the building line. The Corbin Building would thus block views to the Entry Facility from the southern part of Broadway.

Preserving the Corbin Building would have an impact on the operational performance of the Entry Facility. Entry Facility customers desiring to travel to the areas south of John Street and east of Broadway would have a longer travel path as they would have to walk around the perimeter of the Corbin Building to access the Entry Facility from the Broadway frontage or use the existing easement on John Street. Alternatively, Dey Street Passageway users may choose to complete this travel path by exiting on
the west side of Broadway, then crossing east along the streets, thereby lowering the opportunities to promote pedestrian safety by reducing street crosswalk conflicts. The preservation of the Corbin Building as is would also reduce the amount of interior circulation space available for the Entry Facility, adversely affecting internal circulation.

Below street-level, wayfinding, circulation and clarity would be substantially improved by avoiding congestion at the northern end of the 45 platform and the creation of an intuitive, visually reinforced circulation pattern between the center of the 45 platform and the Dey Street Passageway and the center of the AC platform to the northeast. The Entry Facility would provide a centrally organized space to accommodate a broad range of pedestrian flows in different directions. Because of the openness of the space inside the Entry Facility, destinations such as platforms would be visible to passengers, improving the sense of orientation.

Many of the existing difficulties and inefficiencies of subsurface connections within the Existing Complex would be alleviated. The existing circuitous passenger flows would be alleviated as this alternative decreases passenger flow at the congested northern end of the 45 platforms and the western end of the AC station by allowing for free passenger flow between the AC and 45, and improves sightlines and wayfinding at a subsurface level. The existing AC to 45 transfer is expected to experience an improved LOS under this alternative (see Table B-1). With the provision of a large subsurface open space, passengers would have ample room to circulate and the additional passenger flow utilizing the Dey Street Passageway and entering this space could be more than adequately accommodated. Visual clarity would also reduce circuitous circulation patterns by visitors.

This alternative provides for connectivity from the WTC to the subway complex east of Church Street, and does so while also reducing the passenger volumes at the intersection of 45 and AC platform ends. Passengers coming from Dey Street are distributed away from the congested southbound 45 platform when using the existing 45 sub-passage at the northern end of the southbound platform. This would reduce the existing congestion along this platform.

As previously noted, preservation of the Corbin Building would block pedestrian access to the Entry Facility from the south.

**B.12.4 CONSTRUCTABILITY**

The following issues are highlighted as key issues, which would need to be addressed in greater detail if the alternative were to be pursued. The methods suggested are based on concept-level data, and further detailed investigation into existing geotechnical profiles, building construction and foundations, utilities and track bed support, among others, needs to be performed before construction methods can be investigated fully.

The construction of the Dey Street Passageway poses several issues relating to utilities, building vaults extending below the sidewalk, and a requirement to maintain uninterrupted vehicular access to the Century 21 Department Store loading dock on the south side of the street, near Church Street. Due to the proposed depth of the tunnel and existing sub-soil materials, it is proposed to construct the tunnel using a cut-and-cover method. This would require special attention to the maintenance and protection of the existing utilities that would need to be supported on bridges across open excavations.

One of the most critical aspects of the construction process would be the construction of the passageway below the 45 track bed to connect the two (2) sides of the station. This would be done by treating the ground with a grout mixture and then mining below the existing track bed while supporting the existing beam as the mined face advances. The tunneling operation would progress in two (2)- to three (3)-foot lengths within the treated ground to minimize any effect on the track bed. A permanent structure would be built inside the mined opening. The temporary supports would be incorporated into the permanent structure to avoid the possibility of voids and subsequent settlement of the track bed.
The widening of the existing RW Cortlandt Street Station underpass is also a key construction issue for this alternative. The construction techniques used for this element would be similar in nature to those employed on the 45 underpass discussed above. The ground behind the walls of the existing passageway would be treated with a grout mixture to increase strength and stability.

The inclusion of the circulation area under this alternative allows the western end of the AC mezzanine to be modified and widened. To widen this section of the existing mezzanine, the adjacent buildings would first need to be underpinned and, at the same time, the existing utilities moved outside of the proposed footprint. Secant pile walls would be installed on either side of the existing structure. Great care would be needed to ensure the base of secant piles does not damage or excessively load the tunnel lining. The secant pile walls are intended to serve as initial support for the excavation only, and would not form the walls of the completed structure. This is because it would be difficult to install reinforcement in the secant pile wall so that it lines up with the locations of existing beams and columns that are to be retained at platform level. As the piles would be located directly over the AC tunnel liners, which should not be excessively loaded, the secant pile walls would not be used to facilitate top-down construction. The area could then be excavated and braced including the necessary pedestrian protection. The new mezzanine floor slab would then be constructed over the top of the existing floor slab. Construction would be performed sequentially to allow for pedestrian flow.

To construct this alternative, the property at 189 Broadway (on the southwest corner of Dey Street at Broadway) would need to be acquired for the main vertical circulation building. This element would contain escalators, stairways and elevators from the concourse level to both the southbound 45 line platform and the street. The excavation for this element could be enabled by the installation of either a slurry wall or a bored pile wall extending down past the required depth. Excavation would then begin from ground level and the walls would be temporarily braced internally as the depth increases. In the permanent construction, the floor plates would supply this lateral restraint. Though potentially a slow operation, neither method is an uncommon technique (specific ground conditions notwithstanding) and should pose little in the way of technical problems that could not be addressed adequately by employing industry standard solutions.

To construct this aspect of the project, the adjacent buildings may need to be underpinned to prevent differential settlement within their foundations. As with the wall construction discussed above, this may prove to be a potentially a slow operation but, in concept, is a common construction technique.

The Entry Facility is bounded by Fulton Street, Broadway and the northern wall of the Corbin Building. The existing buildings (excluding the Corbin Building) are to be demolished, leaving a large site area to begin construction. A containment wall constructed of either bored piles or a slurry wall would bind the area of the Entry Facility. This would be used as a support for the surrounding buildings (including the Corbin Building) and roadways while the excavation for the subsurface circulation area is progressed, and would also form the permanent retaining/external wall for the street-level structure. It is likely that the adjacent building foundations would require underpinning for assured stability. Once excavation is completed, the foundations for the subsurface circulation area and street-level structure would be constructed, and the columns, floors and cover slab would follow. The street-level building would be completed on top of the circulation area substructure.

B.12.5 PRELIMINARY ENVIRONMENTAL CONSIDERATIONS

Preliminary environmental screening suggests that this alternative would not result in any substantial impacts on historic resources, as the Corbin Building would not be substantially affected, and there would not be any impacts on the John Street-Maiden Lane Historic District. The Corbin Building would remain as existing. The long-term preservation commitment associated with public ownership would not be guaranteed. This alternative would require major property acquisitions. The use of existing and new easements would also be required. There would be a net loss of approximately 30,000 square feet of retail space associated with the acquisition and removal of properties. This alternative would reduce the
amount of retail by approximately 50 percent, similar to Alternatives 8 and 10. The Entry Facility would allow for the replacement of some of the lost retail space, and there would be some temporary impacts on businesses and residencies on Dey and Fulton Streets during construction of the Dey Street Passageway and A C modifications, respectively.

B.13 ALTERNATIVE 10 – DEY STREET PASSAGEWAY WITH CENTRAL STATION CONCOURSE AND ENTRY FACILITY (ADAPTIVE REUSE OF CORBIN BUILDING)

B.13.1 DESCRIPTION

This alternative includes a subsurface pedestrian tunnel, running directly under Dey Street, which connects the WTC complex with the Fulton Street 4 5 station and other points within the Existing Complex (see Figure B-12). The tunnel’s western portal resides two (2) levels below Dey Street at the intersection of Dey and Church Streets. The tunnel continues eastward under the existing 4 5 subway tracks and terminates on the east side of Broadway, where access to the 4 5 northbound platform is provided, along with street access to the north and south sides of John Street. An Entrance Facility would be located on the southwest corner of Broadway and Dey Street, providing access to the 4 5 southbound platform one (1) level down, and to the Dey Street tunnel two (2) levels down.

In addition, a new building would occupy the area bordered by Broadway, Fulton Street and the north side of the Corbin Building, and be linked to it. The facility would incorporate the historic elements of the Corbin Building. The facility would extend two (2) levels below the street. The building is conceived as a central node within the downtown Manhattan transit system. The Dey Street Pedestrian Passageway would connect the complex with the WTC complex and unify all Existing Complex services, facilitating horizontal and vertical circulation. The facility would contain system wayfinding assets, as well as potential public amenities. This alternative would also include an entrance at 195 Broadway with a descent underneath the 4 5 tracks and subsequent access to the Entry Facility.

Project elements would include:

- Street mezzanine bounded by John Street, Broadway and Fulton Streets with vertical access to transit center building above (Corbin Building integrated into new building at all levels);
- A C mezzanine widening between Broadway and Nassau Street;
- Second 4 5 underpass connecting to vertical circulation element in 195 Broadway leading to the 4 5 southbound platform;
- A free-zone passageway to the WTC complex (Dey Street Passageway Connector);
- New entrance at Millenium Hotel to provide R W Street Access Stairs;
- New entrance structure at the southwest corner of Broadway and Dey Street;
- New entrances on the west side of Fulton Street and Broadway;
- New stairs on the southeast and southwest corner of Broadway and Cortlandt Street;
- Entrances on the south side of John Street between Nassau and William Streets;
- Entrances on the north side of Fulton Street to the east of William Street;
- Entrance on the west side of Nassau Street to the south of Fulton Street;
- New stairs connecting the east end of the A C platform to the 2 3 ;
- 2 3 Rehabilitation;
- 4 5 Rehabilitation;
- A C Rehabilitation;
- R W - E Connector;
- J M Z Nassau Street – ADA connectivity;
• ADA elevator on John Street for the 23 Fulton Street Station; and,
• ADA Access at R W - E stairs.

B.13.2 OPERATIONAL CONDITIONS

LOS

This alternative is comprised of three (3) major elements – the Dey Street Passageway, the Dey Street Access Building and the FSTC. Key LOS and v/c locations of this alternative are presented on Figure B-12.

The Dey Street Passageway begins two (2) levels below the WTC site and runs under Dey Street to a new concourse two (2) levels below the street east of Broadway. Free zone movement is possible through the concourse and up a set of vertical circulation elements to one (1) level below the FSTC, which provides stair and escalator routes to Fulton and John Streets, and the east side of Broadway. Passengers coming from the WTC can also enter the FSTC through a fare control two (2) levels below the street, and reach the AC concourse without changing levels.

The Dey Street Access Building is a vertical core on the southwest corner of Dey Street and Broadway. It contains free zone escalators that connect the Dey Street Passageway with the southbound 4 5 platforms one (1) level below the street, and a street entrance onto Broadway.

The FSTC, in this alternative, consists of a superstructure that covers the northern four (4) parcels of the Broadway frontage from Fulton to John Streets, with the historic elements of the Corbin Building incorporated into the design of the street-level structure. The FSTC contains a paid zone concourse two (2) levels below the street that joins the Dey Street Passageway with the AC mezzanine and contains stairs and escalators up to the northbound and (via a new corridor beneath the 4 5 tracks and partially beneath 195 Broadway) southbound 4 5 platforms. It also contains paid zone stairs and escalators to one (1) level below the street, where passengers can exit the paid zone and proceed through another set of stairs and escalators to reach the street-level.

This alternative provides wider connections between the AC and 4 5 platforms and improves sightlines and wayfinding between the two (2) subsurface levels for transferring passengers. The new underpass connecting to the southbound 4 5 platform improves the safety and convenience of this transfer movement in peak hours. This alternative maximizes the options subway and Dey Street Passageway passengers have for reaching the street-level from the FSTC – taking pressure off existing street stairs – and allows the Dey Street Passageway and Access Building to operate without congestion.

Key LOS and v/c locations of this alternative are identified on Figure B-12 and in Table B-2. The key operational issues of this alternative are as follows.

IMPROVEMENTS

• The open space at the north end of the northbound 4 5 platform would be LOS A under this alternative, improving from LOS C in the No Action Alternative;
• The new central underpass from the Central Station Concourse to the southbound 4 5 platform would operate at LOS A;
• All FSTC stairs to street in the northeast corner of Entry Facility would improve from LOS C under Alternative 5 to LOS A under Alternative 6; and,
• All exits from the Central Station Concourse would operate at LOS A.
LIMITATIONS

- The A C platform stairs to the mezzanine would remain at LOS C, and would not improve over the No Action Alternative;
- The new stair from Dey St Passageway to north side of John Street would operate at LOS D; and,
- There would not be any escalators up to the street on the south side of FSTC.

B.13.3 ACHIEVEMENT OF PROJECT GOALS

The construction of Alternative 10 would achieve the project goals. Substantial improvements to existing street-level entrances would be provided to improve street-level wayfinding. The presence of a dedicated passenger circulation space within the Entry Facility would substantially improve circulation and clarity. At street-level, the prominent visual presence of the Entry Facility, with clear vistas from Church, Fulton and Dey Streets, and Broadway, would improve passenger flows and wayfinding. The visual presence of the Entry Facility would be reduced due to the blockage of views from the retention of the Corbin Building. However, this can be partially offset by the visual association of the Corbin Building with the Entry Facility through visual cues compatible with the potential historic character of the Corbin Building, including the use of the Corbin Building arches as entryways into the Entry Facility.

Below street-level, wayfinding, circulation and clarity would be substantially improved by avoiding congestion at the northern end of the 4 5 platforms and the creation of an intuitive, visually reinforced circulation pattern between the center of the 4 5 platform and the Dey Street Passageway and the center of the A C platform to the northeast. The Entry Facility would provide a centrally organized space to accommodate a broad range of pedestrian flows in different directions. Because of the openness of the space inside the Entry Facility, destinations such as platforms would be visible to the passenger, thus improving the sense of orientation.

The existing difficulties and inefficiencies of subsurface connections within the Existing Complex would be alleviated. The existing circuitous passenger flows would be alleviated, as this alternative decreases passenger flow at the congested northern end of the 4 5 platforms and the western end of the A C station by allowing for free passenger flow between the A C and 4 5, and improves sightlines and wayfinding at a subsurface level. The existing A C to 4 5 transfer is expected to experience an improved LOS under this alternative (see Table B-1). With the provision of a large subsurface open space, passengers would have ample room to circulate and the additional passenger flow utilizing the Dey Street Passageway and entering this space could be more than adequately accommodated. Visual clarity would also reduce circuitous circulation patterns by visitors.

This alternative provides for connectivity from the WTC to the subway complex east of Church Street, and does so while also reducing the passenger volumes at the intersection of 4 5 and A C platform ends. Passengers coming from Dey Street are distributed away from the congested southbound 4 5 platform when using the existing 4 5 sub-passage at the northern end of the southbound platform. This would reduce the existing congestion along this platform.

B.13.4 CONSTRUCTABILITY

The following issues are highlighted as key issues, which would need to be addressed in great detail if this alternative were to be pursued. The methods suggested are based on concept-level data, and further detailed investigation into existing geotechnical profiles, building construction and foundations, utilities and track bed support, among others, needs to be performed before construction methods can be investigated fully.

The construction of the Dey Street Passageway poses several issues relating to utilities, building vaults extending below the sidewalk and a requirement to maintain uninterrupted vehicular access to the Century 21 Department Store loading dock on the south side of the street, near Church Street. Due to the
proposed depth of the tunnel and existing sub-soil materials, it is proposed to construct the tunnel using a cut-and-cover method. This would require special attention to the maintenance of the utilities, which would need to be supported on bridges across open excavations.

One of the most critical aspects of the construction process would be the construction of the passageway below the 45 track bed to connect the two (2) sides of the station. This would be done by treating the ground with a grout mixture and then mining below the existing track bed while supporting the existing beam as the mined face advances. The tunneling operation would progress in two (2)- to three (3)-foot lengths within the treated ground to minimize any effect on the track bed. A permanent structure would be built inside the mined opening. The temporary supports would be incorporated into the permanent structure to avoid the possibility of voids and subsequent settlement of the track bed.

The widening of the existing RW Cortlandt Street Station underpass is also a key construction issue for this alternative. The construction techniques used for this element would be similar in nature to those employed on the 45 underpass above. The ground behind the walls of the existing passageway would be treated with a grout mixture to increase strength and stability.

The inclusion of the circulation area under this alternative allows the western end of the AC mezzanine to be modified and widened. To widen this section of the existing mezzanine, the adjacent buildings would first need to be underpinned and, at the same time, the existing utilities moved outside of the proposed footprint. Secant pile walls would be installed on either side of the existing structure. Great care would be needed to ensure that the base of secant piles does not damage or excessively load the tunnel lining. The secant pile walls are intended to serve as initial support for the excavation only, and would not form the walls of the completed structure. This is because it would be difficult to install reinforcement in the secant pile wall so that it lines up with the locations of existing beams and columns that are to be retained at platform level. As the piles would be located directly over the AC tunnel liners, which should not be excessively loaded, the secant pile walls would not be used to facilitate top-down construction. The area could then be excavated and braced, including the necessary pedestrian protection. The new mezzanine floor slab would then be constructed over the top of the existing floor slab. Construction should be performed sequentially to allow for pedestrian flow.

To construct this alternative, the property at 189 Broadway (on the southwest corner of Dey Street at Broadway) would need to be acquired for the main vertical circulation building. This element would contain escalators, stairways and elevators from the concourse level to both the southbound 45 platform and the street. The excavation for this element could be enabled by the installation of either a slurry wall or a bored pile wall extending down past the required depth. Excavation would then begin from ground level and the walls would be temporarily braced internally as the depth increases. In the permanent construction, the floor plates would supply this lateral restraint. Though potentially a slow operation, neither method is uncommon (specific ground conditions notwithstanding) and should pose little in the way of technical problems that cannot be addressed adequately by employing industry standard solutions.

To construct this aspect of the project, the adjacent buildings may need to be underpinned to prevent differential settlement within their foundations. As with the wall construction above, this may prove to be a potentially slow operation but, in concept, is a common construction technique.

Fulton Street, Broadway and the northern wall of the Corbin Building would bind the new portion of the Entry Facility building; the historic elements of the Corbin Building would be adaptively reused and integrated into the Entry Facility, as well. The existing buildings (excluding the Corbin Building) are to be demolished, leaving a large site area to begin construction. A containment wall constructed of either bored piles or a slurry wall would bind the area of the complex. This would be used as a support for the surrounding buildings (including the Corbin Building) and roadways while the excavation for the circulation area is progressed, and would also form the permanent retaining/external wall for the structure. It is likely that the adjacent building foundations, including the Corbin Building, would require
underpinning for assured stability. Once excavation is completed, the foundations for the subsurface circulation area and street-level structure would be constructed and the columns, floors and cover slab would follow. The street-level building is completed on top of the circulation area substructure. To achieve the integration of the Corbin Building, portions of the north-facing wall of the Corbin Building could be removed. The load bearing columns would be left in place and stiffened to counteract the necessary penetrations, based on the results of structural analysis.

B.13.5 PRELIMINARY ENVIRONMENTAL CONSIDERATIONS

Preliminary environmental screening suggests that this alternative would not be anticipated to result in substantial environmental impacts. It would not result in substantial impacts on historic resources, as the Adaptive Reuse of the Corbin Building would be developed in close coordination with the SHPO to ensure that it would not be adversely affected by the alternative. There would not be any subsequent impacts on the John Street-Maiden Lane Historic District. This alternative would require major property acquisitions. The use of existing and new easements would also be required. There would be a net loss of approximately 36,000 square feet of retail space associated with the acquisition and removal of properties. The Entry Facility would provide for some limited replacement retail. This Alternative would reduce the amount of retail by approximately 50 percent, similar to Alternatives 8 and 9. There would be some temporary impacts on businesses and residences on Dey and Fulton Streets during construction of the Dey Street Passageway and A C modifications respectively.

B.14 COMPARATIVE PROJECT COSTS

In order to distinguish the economic features among the reasonable alternatives that result from the foregoing analysis, order-of-magnitude conceptual project cost estimates were prepared and are given below (see Table B-3). As the engineering process continues through preliminary to final engineering, costs for those alternatives that continue to remain under consideration would be appropriately refined. The following costs are not to be used for investment or procurement purposes; these costs are meant for comparative screening purposes only and reflect an estimated conceptual cost within ±25 percent. These costs are inclusive of escalation purposes only and reflect an estimated conceptual cost within ±25 percent. These costs are not presented for:

- Alternatives 1 and 2 because they do not meet LOS requirements, and are not, therefore, reasonable and would not be implemented; and,
- Alternatives 5 and 8 because they would entail demolition of the Corbin Building, which is currently under nomination for listing in the National Register of Historic Places. These alternatives, are not, therefore, judged to be reasonable and would not be implemented.

Although Alternatives 3 and 4 are not judged reasonable because they do not provide adequate LOS, their costs are, however, given as a baseline to allow for comparison among the alternatives. These are:

- Alternatives 3 and 4 – Partial Build, with no buildings removed east of Broadway;
- Alternatives 6 and 7 – Partial Build, with buildings removed east of Broadway, except for the Corbin Building, and with an open plaza rather than an Entry Facility; and,
- Alternatives 9 and 10 – Full Build, with buildings removed east of Broadway, except for the Corbin Building, and with an Entry Facility.
### Table B-3
Concept Level Cost Comparison of Alternatives

<table>
<thead>
<tr>
<th>ALTERNATIVE</th>
<th>ORDER OF MAGNITUDE CONCEPTUAL LEVEL PROJECT COST (Rounded in $Millions ±25%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Action</td>
<td>Routine Maintenance</td>
</tr>
<tr>
<td>Fulton Street Passageway</td>
<td>---- (Fails LOS “F”)</td>
</tr>
<tr>
<td>Dey Street Passageway</td>
<td>---- (Fails LOS “F”)</td>
</tr>
<tr>
<td>Dey Street Passageway with Longitudinal Tunnel Under 4 5</td>
<td>$565 (Baseline Cost)</td>
</tr>
<tr>
<td>Dey Street Passageway with Diagonal Tunnel to A C</td>
<td>$565 (Baseline Cost)</td>
</tr>
<tr>
<td>Dey Street Passageway with Central Station Concourse and Plaza (Corbin Building Removed)</td>
<td>---- (Requires demolition of historic resource)</td>
</tr>
<tr>
<td>Dey Street Passageway with Central Station Concourse and Plaza (Isolation of Corbin Building)</td>
<td>$625</td>
</tr>
<tr>
<td>Dey Street Passageway with Central Station Concourse and Plaza (Adaptive Reuse of Corbin Building)</td>
<td>$640</td>
</tr>
<tr>
<td>Dey Street Passageway with Central Station Concourse and Entry Facility (Removal of Corbin Building)</td>
<td>---- (Requires demolition of historic resource)</td>
</tr>
<tr>
<td>Dey Street Passageway with Central Station Concourse and Entry Facility (Isolation of Corbin Building)</td>
<td>$700</td>
</tr>
<tr>
<td>Dey Street Passageway with Central Station Concourse and Entry Facility (Adaptive Reuse of Corbin Building)</td>
<td>$750</td>
</tr>
</tbody>
</table>

Inspection of the data on Table B-3 indicates:

- The Baseline Cost related to Alternatives 3 and 4 is approximately $565 million ±25 percent;
- The Project Costs for Alternatives 6 and 7 are, respectively, 11 percent and 13 percent above the Baseline Cost; the difference between these two alternatives is approximately two (2) percent; and,
- The Project Costs for Alternatives 9 and 10 are, respectively, approximately 24 percent and 33 percent above the Baseline Cost; the difference between the two alternatives is approximately seven (7) percent.

Alternative 9 would incur costs associated with protection and isolation of the Corbin Building during construction, as well as costs associated with the need to bypass the Corbin Building with an angled Dey Street Passageway under the 4 5 tracks. Alternative 10 would incur costs associated with construction to provide access from the street into the Entry Facility via the ground floor of the Corbin Building. It would also involve costs associated with construction in the basement of the Corbin Building to connect the Dey Street Passageway into the Entry Facility and an exit from the Dey Street Passageway to John Street.

The Partial Build Alternatives 6 and 7 that do not include an Entry Facility, but are limited to a subsurface Central Station Concourse with a plaza above, would require less funding than the Full Build Alternatives that include an Entry Facility. The reason for this is that much of the project costs is associated with the subsurface construction of the Central Station Concourse and construction of a plaza at street-level.

Alternatives that do not include a Central Station Concourse, but instead provide a connection between the Dey Street Passageway and the A C mezzanine with a long tunnel, would still require significant funding.
B.15 SUMMARY EVALUATION

The following presents a summary of the evaluation of preliminary alternatives and identifies those alternatives judged appropriate for detailed analysis in the DEIS. As described below, tables included in this Appendix present a summary overview of key characteristics of each preliminary alternative.

Table B-2 provides an overview of the LOS of the alternatives. Table B-3 provides an overview of the comparative cost of the alternatives. In order to capture the essence of all alternatives considered, Table B-4 was prepared to demonstrate how they address the Achievement of Project Goals, encounter issues of constructability, compare on cost relative to other alternatives, and their economic (retail) and environmental (historic) implications. This table is meant as a summary tool to facilitate review of alternatives and is not a substitute for the details given throughout this report.

Alternatives 1 and 2 provide a pedestrian connection between the Existing Complex and the WTC, doing so with minimal demolition and displacement of commercial and retail activities or impacts to cultural resources. However, the operational analysis indicates that both alternatives would exacerbate existing congestion problems at the north end of the 45 platforms, as travelers from the WTC site would interfere with existing flows of transferring AC and 45 passengers at this location. In addition, Alternative 1 (Fulton Street Passageway) would create congestion as it would add additional pedestrians to the future confluence of the RW and E. Alternative 2 (Dey Street Passageway) would result in additional congestion and potentially unsafe conditions at the 45 northbound platform, as this would be the only way for passengers using the Dey Street Passageway to connect to the western end of the AC mezzanine. The congestion referenced above was reflected in the projection of unacceptable pedestrian LOS varying from D to F at these locations (NYCT’s LOS standard is the boundary between C and D, indicated as C/D). These alternatives would add another tunnel to the maze of tunnels already existing and would not substantially improve wayfinding. Because of the operational issues associated with Alternatives 1 and 2, these alternatives are not recommended for further consideration.

Alternatives 3 and 4 essentially fail at LOS E, but are included in the analysis for comparative purposes as a Baseline between this “level” of Partial Build and the other Partial and Full Build Alternatives. They partially avoid the issues that Alternatives 1 and 2 encounter, including exacerbated congestion at the north end of the 45 platforms and the 45 northbound platform, by providing a separate passageway for passengers between the Dey Street Passageway and the AC mezzanine. While this reduces interference between conflicting flows, both alternatives add another tunnel structure to an already confusing maze of pedestrian tunnels and concourses, exacerbating existing wayfinding problems. The LOS projections for both alternatives indicate that operational efficiency improvements would not be substantial compared to existing conditions.

Furthermore, both Alternatives 3 and 4 would encounter the construction challenges related to the underpinning of various structures such as the 45 line (Alternative 3), resulting in potential disruptions during construction and the underpinning of potentially fragile buildings (Alternative 4) to construct a diagonal tunnel beneath the block facing Broadway. This alternative does minimize displacement of retail and commercial uses, as none of the structures on the block facing the east side of Broadway would have to be demolished and the historic Corbin Building would also remain in its current state. Because Alternatives 3 and 4 would not substantially improve operational conditions and would further exacerbate wayfinding issues, they were not considered to address the project Purpose and Need. These alternatives are therefore not recommended for further consideration; nevertheless their costs are given to provide a baseline for comparison.
# Table B-4
Summary of Alternatives Evaluation
Alternatives Matrix

<table>
<thead>
<tr>
<th>ALTERNATIVES</th>
<th>BUILD EXTENT</th>
<th>MEETING PROJECT GOALS</th>
<th>Feasibility / Cost Effectiveness</th>
<th>Environmental (Historic/Socioeconomic) Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1 2 3 4 5 6 7</td>
<td>Feasibility</td>
<td>Cost Effectiveness</td>
</tr>
<tr>
<td>WTC CONNECTION ONLY</td>
<td>PARTIAL</td>
<td>- 0 - 0 - - - -</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1 Fulton Street Passageway</td>
<td>PARTIAL</td>
<td>- 0 - 0 - - - -</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2 Dey Street Passageway</td>
<td>PARTIAL</td>
<td>0 0 0 0 0 0 0 -</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3 Det Street Passageway with Longitudinal Tunnel Under 45</td>
<td>PARTIAL</td>
<td>- 0 0 0 0 0 0 0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4 Dey Street Passageway with Diagonal Tunnel to AC</td>
<td>PARTIAL</td>
<td>0 0 0 0 0 0 0 0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>CENTRAL STATION CONCOURSE WITH PLAZA ABOVE</td>
<td>PARTIAL</td>
<td>0 0 0 0 0 0 0 -</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5 Dey Street Passageway with Central Station Concourse and Plaza (Removal of Corbin Building)</td>
<td>PARTIAL</td>
<td>0 0 0 0 0 0 0 -</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6 Dey Street Passageway with Central Station Concourse and Plaza (No Integration of Corbin Building)</td>
<td>PARTIAL</td>
<td>0 0 0 0 0 0 0 -</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>7 Dey Street Passageway with Central Station Concourse and Plaza (Corbin Building Integrated with Entry Facility)</td>
<td>PARTIAL</td>
<td>0 0 0 0 0 0 0 -</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>CENTRAL STATION CONCOURSE WITH ENTRY FACILITY ABOVE</td>
<td>FULL</td>
<td>+ + + + + + + +</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>8 Dey Street Passageway with Central Station Concourse and Entry Facility (Removal of Corbin Building)</td>
<td>FULL</td>
<td>+ + + + + + + +</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>9 Dey Street Passageway with Central Station Concourse and Entry Facility (No Integration of Corbin Building)</td>
<td>FULL</td>
<td>+ + + + + + + +</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>10 Dey Street Passageway with Central Station Concourse and Entry Facility (Corbin Building Integrated with Entry Facility)</td>
<td>FULL</td>
<td>+ + + + + + + +</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Legend:

+ Supports the goal/criterion
0 Limited or Marginal achievement of goal/criterion
- Detracts from the goal/criterion

Project Goals:
1. Facilitate Access, Improve Wayfinding, Streamline Transfers.
2. Allow for Intermodal Connectivity.
3. Promote System Flexibility in the event of service disruption.
4. Improve East-West Pedestrian Connectivity across Lower Manhattan.
5. Promote Safety and Reduce Congestion at heavily trafficked street crossings.
7. Improve Travelers’ Experience and Overall Attractiveness.
Alternative 5 would provide a pedestrian connection to the WTC site and would substantially improve operational conditions at the Existing Complex, as indicated by the LOS analysis. However, this alternative would require demolition of the structures on all five (5) parcels to construct the subsurface Central Station Concourse on Broadway with a plaza at street-level. As it includes demolition of the historic Corbin Building, this is not considered a reasonable alternative. Alternative 5 is not recommended for further consideration.

Alternatives 6 and 7 avoid the issues associated with the Corbin Building by reducing the footprint of the subsurface Central Station Concourse (Alternative 6) through avoidance of the Corbin Building, or by maintaining the full size footprint of the subsurface Central Station Concourse through integration of the basement of the Corbin Building into the Central Station Concourse (Alternative 7). While providing operational improvements below street-level, Alternatives 6 and 7 would only include a plaza at street-level and would thus not substantially improve street-level wayfinding. Alternatives 6 and 7 would also eliminate retail activity at street-level without replacing it as part of a new Entry Facility and disrupt “streetwalls” that define the block. Given the above, these alternatives are not recommended for further consideration. Costs for Alternatives 6 and 7 are similar and about 11 percent and 13 percent, respectively, above the Baseline Cost of Alternatives 3 and 4.

Alternative 8 is similar to Alternative 5 in that it involves demolition of the structures on all five (5) parcels of the block along the east side of Broadway between Fulton and John Streets. This alternative includes an Entry Facility encompassing the entire frontage of the block on Broadway and provides the best wayfinding of all alternatives evaluated. It also provides the greatest improvements in operational efficiency. Displacement of retail activity can be partially addressed by this alternative through incorporation of some replacement retail inside the Entry Facility, which is adequately sized to accommodate such retail uses. As it includes demolition of the historic Corbin Building, this is not considered further.

Alternatives 9 and 10 both address the project goals and the Purpose and Need while avoiding or minimizing impacts to the Corbin Building and the displacement of retail activities resulting from demolition of the buildings on four (4) of the five (5) parcels of the block facing Broadway. Alternatives 9 or 10 would require the demolition of several structures containing Broadway retail frontage. The Entry Facility could potentially replace such lost retail with approximately 61 percent (Alternative 9) and 57 percent (Alternative 10) of the retail currently present, thereby reducing any permanent impacts. Although Alternatives 9 and 10, including the Entry Facility are more costly (their cost is, respectively, 24 percent to 33 percent higher than the Baseline Cost) they provide substantially improved wayfinding and street-level access and thus make a substantially greater contribution to the achievement of the project goals, particularly as they relate to potential economic recovery in Lower Manhattan.

Based on conceptual level engineering analysis, both alternatives are considered technically feasible. Their costs are within seven (7) percent of each other at the order-of-magnitude conceptual level. Alternatives 9 and 10 are therefore recommended for further consideration during the environmental review process.