FOI #15532

Torres Rojas, Genara

From: abaumann@downtownny.com
Sent: Wednesday, December 03, 2014 1:34 PM
To: Duffy, Daniel
Cc: Torres Rojas, Genara; Van Duyne, Sheree
Subject: Freedom of Information Online Request Form

Information:

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Required copies of the records: Yes

List of specific record(s):
Seeking the Final EIS - Environmental Impact Statement and associated documents for the World Trade Center Transportation Hub. Could you please send ASAP? In addition, any information on projected ridership and built passenger capacity for the WTC Hub would also be greatly appreciated.

THE PORT AUTHORITY OF NY & NJ

FOI Administrator

March 13, 2015

Ms. Alison Baumann
Alliance for Downtown New York
120 Broadway, Suite 3340
New York, NY 10271

Re: Freedom of Information Reference No. 15532

Dear Ms. Baumann:

This is in response to your December 3, 2014 request, which has been processed under the Port Authority's Freedom of Information Code (the "Code", copy enclosed) for a copy of the EIS - Environmental Impact Statement and associated documents for the World Trade Center Transportation Hub. In addition, any information on projected ridership and built passenger capacity for the WTC Hub.

Material responsive to your request and available under the Code can be found on the Port Authority's website at http://www.panynj.gov/corporate-information/foi/15532-WTC-1.pdf, http://www.panynj.gov/corporate-information/foi/15532-WTC-2.pdf, http://www.panynj.gov/corporate-information/foi/15532-WTC-3.pdf, http://www.panynj.gov/corporate-information/foi/15532-WTC-4.pdf, http://www.panynj.gov/corporate-information/foi/15532-WTC-5.pdf, http://www.panynj.gov/corporate-information/foi/15532-WTC-6.pdf, http://www.panynj.gov/corporate-information/foi/15532-WTC-7.pdf, and http://www.panynj.gov/corporate-information/foi/15532-WTC-8.pdf. Paper copies of the available records are available upon request.

Please refer to the above FOI reference number in any future correspondence relating to your request.

Very truly yours,

Daniel D. Duffy
FOI Administrator

Enclosure

4 World Trade Center, 18th Floor
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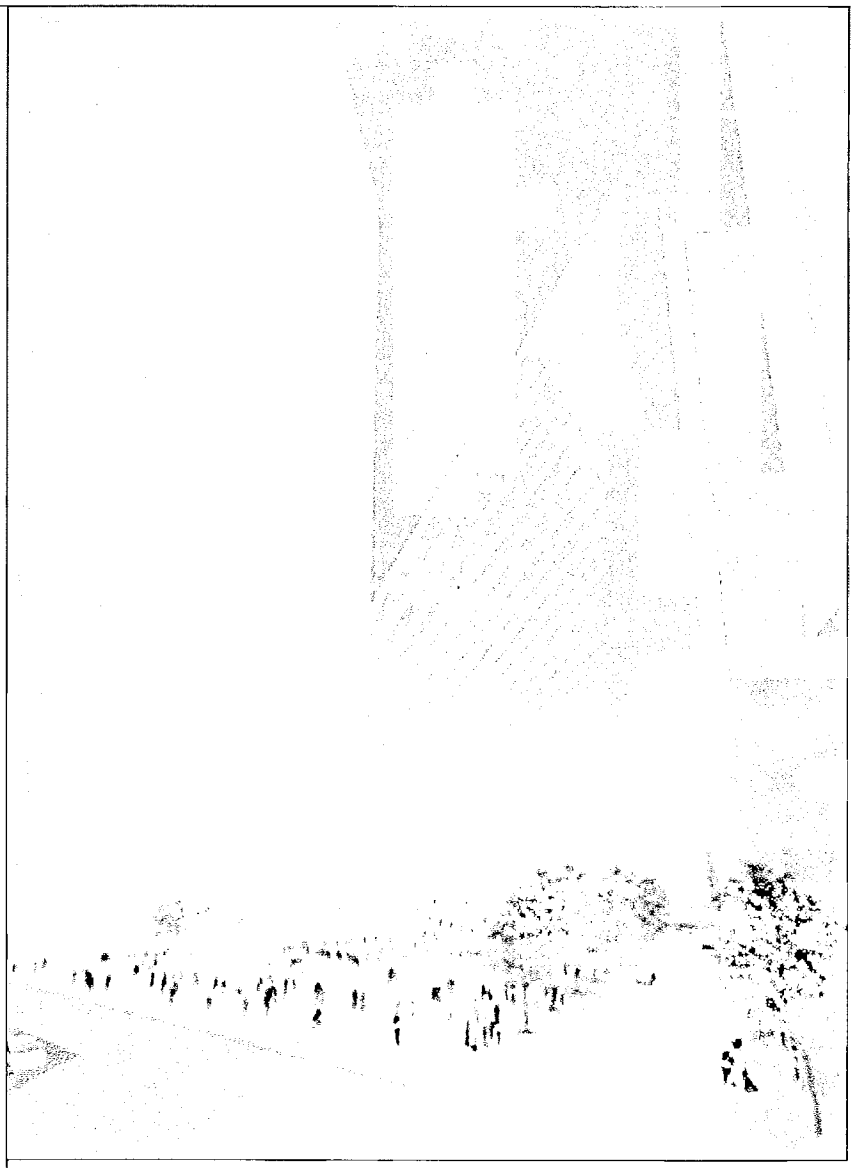
T: 212 435 3642 F: 212 435 7555

PERMANENT WTC PATH TERMINAL

FINAL ENVIRONMENTAL IMPACT STATEMENT



VOLUME I

FINAL ENVIRONMENTAL IMPACT STATEMENT AND SECTION 4(F) EVALUATION

United States Department of Transportation
Federal Transit Administration

THE PORT AUTHORITY OF NY & NJ

PATH

MAY 2005

PERMANENT WTC PATH TERMINAL

IN THE

BOROUGH OF MANHATTAN
NEW YORK COUNTY, NEW YORK

FINAL ENVIRONMENTAL IMPACT STATEMENT

PREPARED PURSUANT TO:

National Environmental Policy Act of 1969, §102 (42 U.S.C. §4332); Federal Transit Law (49 U.S.C. §5301(e), §5323(b) and §5324(b)); 49 U.S.C. §303 (formerly Department of Transportation Act of 1966, §4(f)); National Historic Preservation Act of 1966, §106 (16 U.S.C. §470f); Executive Order 11990 (Protection of Wetlands); Executive Order 11988 (Floodplain Management); Executive Order 12898 (Environmental Justice); and all applicable laws, regulations, orders, and guidelines.

by the

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL TRANSIT ADMINISTRATION

and the

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

Bernard Cohen
Director, Lower Manhattan Recovery Office
Federal Transit Administration

5/2/05
Date of Approval

Anthony G. Cracchiolo
Director, Priority Capital Programs
The Port Authority of New York and New Jersey

5/2/05
Date of Approval

ABSTRACT

The Federal Transit Administration (FTA) and The Port Authority of New York and New Jersey (PANYNJ), have completed a Final Environmental Impact Statement (FEIS) and Section 4(f) Evaluation for the Permanent World Trade Center (WTC) PATH Terminal, a project involving the reconstruction of a permanent terminal at the WTC site in Lower Manhattan for the Port Authority Trans-Hudson (PATH) system. The Permanent WTC PATH Terminal is proposed to be a full service, regional transportation hub that would be coordinated with the existing and future transportation infrastructure, WTC site development, and the surrounding area. The project is needed to re-establish and enhance transportation facilities and infrastructure that existed at the WTC complex prior to September 11, 2001 and to ensure the long-term accessibility and economic vitality of Lower Manhattan.

The FEIS has been prepared pursuant to the National Environmental Policy Act (NEPA). The alternatives considered in the FEIS include a No Action Alternative, and a Preferred Alternative. The Preferred Alternative is carried forward for detailed evaluation in this FEIS after careful consideration of a range of alternatives as part of the planning for a Permanent WTC PATH Terminal and following public comments during the scoping process and public comment period for the DEIS. The analyses and impact assessments in the FEIS consider potential effects on transit service and transportation, land use and local planning, social and economic conditions, historic and archaeological resources, urban design and visual resources, air quality, noise and vibration, infrastructure and energy, contaminated materials, natural and water resources, coastal zone management, safety and security, and cumulative effects. Environmental Performance Commitments, preliminary sustainable design guidelines, and mitigation measures to reduce impacts, including stipulations set forth in the Project's Memorandum of Agreement pursuant to Section 106 of the National Historic Preservation Act are described in the document.

For additional information concerning this document, contact:

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Information concerning this document can be obtained from the project website: www.panynj.gov/pathrestoration. ✳

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A. INTRODUCTION

The Port Authority of New York and New Jersey (PANYNJ), a municipal corporate instrumentality and political subdivision of the States of New York and New Jersey, is proposing to undertake, in cooperation with the United States Department of Transportation (USDOT), through the Federal Transit Administration (FTA), a project involving the reconstruction of a permanent terminal at the World Trade Center (WTC) site in Lower Manhattan for the Port Authority Trans-Hudson (PATH) system. The Permanent WTC PATH Terminal is proposed to be a full service, regional transportation hub that would be coordinated with the existing and future transportation infrastructure, WTC site development, and the surrounding area. The project is needed to re-establish and enhance transportation facilities and infrastructure that existed at the WTC complex prior to September 11, 2001 and to ensure the long-term accessibility and economic vitality of Lower Manhattan.

The Project would be funded as part of the Federal government's $4.55 billion Lower Manhattan Transportation Recovery Effort, which was committed to New York City following the terrorist attacks of September 11, 2001. The FTA will be the federal lead agency for the environmental review of this project to be undertaken in cooperation with PANYNJ. As such, this Environmental Impact Statement (EIS) is being prepared in accordance with the National Environmental Policy Act (NEPA; 42 USC §§4321 et seq.) of 1969 and the applicable regulations implementing NEPA as set forth in 23 CFR Part 771, 40 CFR Parts 1500-1508, and 49 CFR Part 622. This EIS is also being prepared in accordance with Section 106 of the National Historic Preservation Act (NHPA; 16 USC §470(a)) of 1966 and Section 4(f) of the USDOT Act of 1966 (49 USC §303) and other environmental laws and regulations.

B. PURPOSE AND NEED

Trans-Hudson transit service between New Jersey and New York has long been an integral part of the Lower Manhattan transportation system. Prior to the terrorist attacks of September 11, 2001, the WTC PATH Terminal served some 67,000 daily boardings and was the gateway to Lower Manhattan for most commuters from west of the Hudson River. However, the attacks resulted in extensive damage to the PATH system including the destruction of its WTC Terminal. As a result, the system lost a significant portion of its capacity to serve commuters throughout the New York and New Jersey region and mass transit access to Lower Manhattan was severely hindered.

PATH is an electrified, heavy-rail transit system with a total of 13 stations in New York and New Jersey. It is a wholly-owned subsidiary corporation of PANYNJ and is recognized as a commuter rail system under the oversight of the U.S. Department of Transportation, Federal Railroad Administration (FRA).

The WTC PATH Terminal, which opened in 1971, was located beneath the WTC's office and retail space, in the portion of the site referred to as the "bathtub." Its platform level contained three 10-car platforms and five tracks. Trains entered the station from New Jersey via the south Hudson River tunnel (Tunnel F) and exited to New Jersey via the north tunnel (Tunnel E). Thus, the platform level formed the loop in the PATH system allowing trains to enter and leave Manhattan without changing the location of the train's engineer or conductor. As a result, trains could have a short dwell time at the Terminal.

A mezzanine was located above the platforms, housing vertical circulation, fare equipment, and accessory retail and food stalls. The retail concourse, known as PATH Square, provided for all-weather connections between PATH, the office buildings on the WTC site, the World Financial Center, New York City Transit (MTA/NYCT) subways, and street level.

The WTC PATH Terminal and a seven-car PATH train were destroyed as a result of the terrorist attacks of September 11, 2001. Tunnels E and F under the Hudson River were flooded, and PATH's Exchange Place Station in Jersey City, New Jersey, was damaged and rendered inoperable because the track configuration would not allow trains to turn around before entering the Hudson River tunnels.

PANYNJ began construction of a temporary PATH station at the WTC site in July 2002, shortly after control of the site was returned by the City to PANYNJ. The station opened on November 23, 2003. It is located in the WTC "bathtub" and has five tracks and three 8-car platforms. Street level access is through a single entry/exit at the intersection of Fulton and Church Streets. There are also direct connections to two MTA/NYCT subway stations.

Although the temporary WTC PATH station allows for service to Lower Manhattan, it does not fully restore the pedestrian connections or the capacity that existed before September 11, 2001.

PROBLEM IDENTIFICATION

ECONOMIC RECOVERY

Transportation links have been critical to the commercial development of Lower Manhattan. Service between New Jersey and New York has been integral to the movement of employees to and from their Lower Manhattan offices. More recently, employment centers have emerged in Jersey City and Newark. These businesses depend on PATH to deliver workers from New York City and other points east of the Hudson River. Furthermore, several major businesses have located facilities in both Lower Manhattan and Jersey City, allowing for office expansion while maintaining a close connection between company functions on both sides of the River.

A successful economic redevelopment of Lower Manhattan requires the replacement and enhancement of transportation facilities that were lost or damaged on September 11, 2001. Some 15 percent of Lower Manhattan's workforce lived in New Jersey prior to September 11, 2001 and the WTC PATH Terminal was the busiest of downtown's transit stations. Although other currently planned transportation projects would improve access to and from Lower Manhattan for those commuting to and from New Jersey, none offers the direct and high-capacity linkage that can be served by PATH and the proposed Permanent WTC PATH Terminal.

In a survey of 25 executives of major employers located in Lower Manhattan, a Permanent WTC PATH Terminal was identified as "extremely" important to the future economic health of Lower Manhattan (Alliance for Downtown New York, Inc., April 2003). If such a facility were not provided, the full potential of Lower Manhattan's revitalization may never be realized.

RIDERSHIP GROWTH

Lower Manhattan is a vital component of the New York economy. It is second only to Midtown Manhattan in terms of gross floor area of office space, and it is a growing residential neighborhood and retail destination.

Prior to September 11, 2001, businesses in the area south of Canal Street employed more than 388,000 workers. Approximately 15 percent of Lower Manhattan's workforce commuted from west of the Hudson River and transit was their predominant mode of travel. The physical loss of office and commercial space on September 11, 2001, coupled with a general economic downturn, resulted in a reduction of 80,000 jobs in Lower Manhattan. Most of the office space damaged or destroyed on September 11, 2001 will be replaced by 2015. In addition, a memorial, cultural facilities, and retail space will be constructed on the WTC site that will attract visitors in addition to the anticipated return of office workers.

It is estimated that PATH's daily ridership at the WTC would be 175,000 by 2025, which would exceed the capacity of the temporary station. Therefore, without a permanent terminal, the PATH system cannot adequately support the planned redevelopment of the WTC and the overall revitalization of Lower Manhattan.

COMMUTING TO LOWER MANHATTAN WITHOUT PATH

Immediately following September 11, 2001, commuters formerly using the PATH WTC lines were forced to seek other routes or modes of travel to reach destinations in Lower Manhattan. As a result, there were significant ridership increases on Trans-Hudson ferries, uptown PATH lines, and NJ Transit commuter rail. Although these modes have enabled commuters to reach Lower Manhattan, they do not have the capacity or the flexibility to serve as a long-term alternative to a Permanent WTC PATH Terminal.

Although ferries have served as an important interim mode of travel for Lower Manhattan's commuters, they would not serve long-term travel needs between New Jersey and Lower Manhattan. Ferries have a much lower capacity than heavy-rail. While the location of ferry terminals may be convenient for those who work along Water Street and at the World Financial Center, others must walk much farther to reach interior destinations than was required with PATH service. Furthermore, most ferry passengers must transfer to one or more additional modes within New Jersey during their commute. During heavy rain storms or when the waters of the Hudson are icy, the ability to maintain ferry service is constrained.

Following the destruction of the WTC PATH Terminal on September 11, 2001, ridership at PATH's Christopher and 9th Street Stations doubled during peak periods. Both the Christopher and 9th Street Stations have a limited capacity. To immediately address these problems, PANYNJ had to limit station access during certain hours. Although upgrades are planned for these stations, they will not have adequate capacity to support general PATH system growth if a Permanent WTC PATH Terminal is not constructed.

Following the terrorist attacks, ridership on NJ Transit commuter rail increased by approximately 30 percent, requiring additional trains on its routes serving New York's Pennsylvania (Penn) Station, precluding certain service enhancements planned for that system. For example, the full opening of the Secaucus Transfer, which provides a link between the Northeast Corridor line serving Penn Station, and the Main and Bergen County lines that serve Hoboken, was delayed until temporary PATH service was restored. Furthermore, NJ Transit and Amtrak share the rail lines that traverse the Hudson River between New Jersey and Lower

Manhattan and service is limited by the capacity of the single rail tunnel. Thus, if permanent PATH service is not restored to Lower Manhattan, there may not be additional capacity to support passengers that would be diverted to commuter rail, thereby reducing the utility of the Secaucus Transfer and potentially limiting options for future system improvements.

LIMITATIONS OF TEMPORARY PATH SERVICE

To expedite the restoration of PATH service to Lower Manhattan, PANYNJ designed and built, on a fast-track basis, a temporary station. The temporary station was a commitment to restore the facilities damaged by the terrorist attacks and it was determined to be a catalyst to restore and redevelop Lower Manhattan by providing commuter service from west of the Hudson River. To ensure the speedy restoration of PATH service, the temporary station was constructed in essentially the same location as the pre-September 11, 2001 Terminal. This allowed PANYNJ to reuse certain infrastructure elements including the 1 and 9 underpass, portions of the retail concourse, and the MTA/NYCT subway station connections that remained on the WTC site. Furthermore, design documents could be advanced more quickly since track and platform configurations and other station elements could be constructed based on pre-September 11, 2001 plans. However, to achieve this commitment within two years after the attacks, PANYNJ compromised certain elements of the pre-September 11, 2001 Terminal with regard to operational capacity, service amenities, and pedestrian connections.

Because PANYNJ could use as-built plans from the pre-September 11, 2001 Terminal to design and construct the temporary station, extensive survey work was not needed. Designers could lock in the station and track configuration both horizontally and vertically. As such, steel detailing could be expedited and steel sizing accelerated. Since it was intended as a temporary station, platforms were designed to be removed and not integral to the platform walls; interior drainage was less than desired since only the outer bay of the station has interior drains; and, roof insulation was minimal since it is an outdoor facility open to the elements.

The temporary station has 8-car platforms as compared to the 10-car platforms that were part of the pre-September 11, 2001 Terminal, resulting in 20 percent less operational capacity. Prior to September 11, 2001, PANYNJ was studying the extension of stations along its Newark-WTC route to provide for 10-car train service. These improvements were in response to ridership levels that were reaching maximum capacity on this route during peak periods.

Some of the infrastructure elements within the station have a limited service life. The vertical elements, while ADA-compliant, do not provide a sufficient level of service to accommodate future demand. Escalators from the platform to the mezzanine level and from mezzanine level to the MTA/NYCT 1 and 9 subway line underpass were not provided. The station's design does not allow for new construction above, as planned for the WTC redevelopment, nor can it easily support connections to future buildings on the WTC site or other off-site destinations.

To expedite service restoration, the temporary station's tracks and platforms are located outdoors in the WTC "bathtub." Weather protection is provided, but the station is not fully enclosed and is not climate-controlled. Local radiant heating is provided in waiting areas, but many portions of the station complex are not heated during winter months or cooled during summer months.

The temporary station includes security and fire protection equipment, but advanced passenger amenities are not provided. The station is ADA-compliant, but its configuration requires four separate elevator rides to reach street level. Emergency exits are provided, but they lead

passengers either to Church Street or to the WTC bathtub area with access to the street via the temporary access ramp and a temporary stairway to West Street.

Because construction of the WTC site is ongoing, pedestrian access to the temporary station is limited as compared to the pre-September 11, 2001 Terminal. All patrons enter and exit at street level near the intersection of Church and Fulton Streets at the eastern boundary of the WTC site. Thus, patrons traveling to the World Financial Center must double-back along Vesey or Liberty Street. The temporary station has connections to MTA/NYCT's E, R, and W lines, but access to 1 and 9 subway line is not available because MTA/NYCT's Cortlandt Street Station has not yet reopened. As such, two fewer subways are served compared to pre-September 11, 2001 conditions.

CURRENT PLANNING CONTEXT

Since September 11, 2001, several projects have been planned that are independent of the Permanent WTC PATH Terminal but that also aim to redevelop and revitalize Lower Manhattan. Presently, four environmental reviews have been prepared under NEPA independent of this EIS as follows:

- World Trade Center Memorial and Redevelopment Plan: The U.S. Department of Housing and Urban Development (HUD) and the Lower Manhattan Development Corporation (LMDC) have prepared an EIS for the redevelopment of the WTC site, which includes a memorial and memorial-related improvements, commercial, retail, and hotel space; museum and cultural facilities; new open space; new street configurations; and certain infrastructure improvements at the WTC site and adjacent parcels. HUD and LMDC published a Final Generic Environmental Impact Statement for the World Trade Center Memorial and Redevelopment Plan in April 2004, and a Record of Decision was issued in May 2004.
- Fulton Street Transit Center (FSTC): FTA and the Metropolitan Transportation Authority (MTA) have prepared an EIS for the Fulton Street Transit Center project, which would rehabilitate, reconfigure, and enhance the multilevel complex of subway stations serving nine different lines in the area of Fulton Street and Broadway. The facility's proposed Dey Street concourse would connect with the MTA/NYCT subway station at Cortlandt Street (R and W lines), the WTC site, and the Permanent WTC PATH Terminal. FTA and MTA published a Final Environmental Impact Statement for the FSTC in October 2004 and a ROD was issued in November 2004.
- Route 9A Project: The U.S. Department of Transportation, Federal Highway Administration (FHWA) and the New York State Department of Transportation (NYSDOT) are considering alternatives for the reconstruction of Route 9A south of Chambers Street. This project would include at-grade improvements or a below-grade bypass for vehicular through traffic. A supplemental EIS is currently being prepared for this project. FHWA and NYSDOT published a Draft Supplemental Environmental Impact Statement for the Route 9A Project in May 2004. FHWA has not yet formally determined a Preferred Alternative for the Route 9A project. The State of New York has recently indicated a preference for the Route 9A At-Grade Alternative. A FEIS on this project is expected to be published in late spring or summer 2005 and select a preferred alternative. This FEIS addresses environmental impacts of the range of alternatives identified in the Route 9A DEIS.
- South Ferry Terminal: FTA and MTA are preparing an Environmental Assessment for the reconstruction of the South Ferry Terminal on the 1 and 9 line. This project would increase

both the capacity of the Terminal and the 1 and 9 line during peak periods. FTA and MTA published an Environmental Assessment for the South Ferry Terminal in May 2004 and a Finding of No Significant Impact was issued in August 2004.

Before September 11, 2001, several projects were planned downtown that are still under study. These include residential development projects and commercial buildings at Battery Park City and within the Washington Street Urban Renewal Area, open space and cultural institutions, and modest commercial development. Following September 11, 2001, federal, state, and local initiatives have been implemented to encourage private development in Lower Manhattan. These programs provide funds for commercial and residential and encourage the construction of community facilities, open space, and infrastructure in support of the area's redevelopment and recovery.

Although these projects would rehabilitate transportation facilities and would support an economic recovery for the area, none of them offers a high-capacity link between New Jersey and Lower Manhattan.

PROJECT GOALS

The Permanent WTC PATH Terminal would be a full-service, regional transportation hub that would be coordinated with existing and future transportation infrastructure, WTC site development, and the surrounding area. The project is needed to re-establish and enhance transportation facilities and infrastructure that existed at the WTC complex prior to September 11, 2001 and to ensure the long-term accessibility and economic vitality of Lower Manhattan. To that end, the selected project alternative must successfully address four goals.

- Effectively restore long-term PATH service between New Jersey and Lower Manhattan;
- Establish an intermodal transportation facility in Lower Manhattan;
- Plan and construct a Terminal that would support the redevelopment of Lower Manhattan; and
- Minimize adverse impacts to the environment.

C. PROJECT ALTERNATIVES

Project Alternatives for a Permanent WTC PATH Terminal were identified as part of early planning studies conducted by the PANYNJ following the terrorist attacks and through the public scoping process for this EIS. After careful consideration of these options, three alternatives were carried forward for further study in the Draft EIS (DEIS) as follows:

- No Action Alternative;
- Terminal with Liberty Plaza Connection Alternative; and
- Terminal without Liberty Plaza Connection Alternative.

The planning and design of a Permanent WTC PATH Terminal is being closely coordinated with the other Lower Manhattan recovery efforts described above. In order to plan for potential changes in these independent projects that may require alterations to the construction and/or operation of the Permanent WTC PATH Terminal, the DEIS identified design options for the Terminal. These design options and their potential environmental effects were described in the DEIS.

Furthermore, under the guidance of various federal agencies, the sponsors of the Lower Manhattan recovery efforts have coordinated to develop Environmental Performance

Commitments (EPCs) and Green Design and Sustainability Guidelines to be incorporated as part of their individual projects. These measures aim at proactively addressing potential adverse effects to the environment in order to reduce the impacts to the local community and the region as a whole.

Following the public comment period on the DEIS, FTA and PANYNJ selected a Preferred Alternative for the Permanent WTC PATH Terminal. The selected alternative was the "Terminal without a Liberty Plaza Connection" with some modifications to reflect current planning for the WTC site as well as the design options that would be part of the Project.

ALTERNATIVES DEVELOPMENT PROCESS

LOCATIONS FEASIBILITY ANALYSIS

While planning for the restoration of temporary PATH service to Lower Manhattan, PANYNJ was concurrently planning for a permanent facility, including tracks, platforms, mezzanines, pedestrian concourses, and a terminal building on or near the WTC site. Not only did PANYNJ intend to restore the capacity and connectivity that existed within the pre-September 11, 2001 WTC PATH Terminal but also wished to enhance pedestrian connections through the site and adjacent properties and to create a world-class transportation hub for Lower Manhattan. To that end, PANYNJ conducted an analysis of alternatives for transit service between New Jersey and Lower Manhattan.

Although the WTC Terminal was destroyed and the Hudson River tunnels were damaged as a result of the terrorist attacks, much of the PATH system remained intact. Thus, PANYNJ made the early decision to preserve as much of the PATH system as possible as part of their long-term planning for service to Lower Manhattan. It was decided that future service to Lower Manhattan should use the existing Hudson River tunnels and their projections within the WTC site. Because an alternate mode of transit would not be compatible with the remainder of the system, it was also decided that future service should be heavy-rail with PATH's specifications. Furthermore, PANYNJ considered constraints on PATH's alignment from other infrastructure within Lower Manhattan. Given these constraints, the only reasonable alternatives would be alternate locations for a Lower Manhattan PATH terminal.

Once PANYNJ identified that restoration of PATH was the only reasonable alternative for transit service between New Jersey and Lower Manhattan, they began planning for a location for the facility. To facilitate this process, planning guidelines were developed to further refine the Project's goals and objectives that were identified above. These planning guidelines allowed location options to be closely compared in order to weigh the benefits and potential shortcomings. Ultimately, a successful terminal location would not only restore service but would provide for enhancements as compared to the pre-September 11, 2001 facility. These planning guidelines were as follows:

- Create a World-Class, Transportation Facility;
- Support the Redevelopment of Lower Manhattan;
- Provide for Improved Pedestrian Connections;
- Provide for Advanced Security;
- Enhance Pre-September 11, 2001 PATH Operations;
- Support 10-Car PATH Trains, in order to support ridership growth;
- Minimize Impacts to Temporary PATH Service during Construction;

- Minimize Impacts to the Local Environment during Construction; and
- Minimize Construction Cost and Duration.

PANYNJ initially identified four sites of an appropriate size and configuration for a permanent PATH terminal. These locations are shown in Figure S-1 and are described below.

- Location 1, WTC "Bathtub" would restore service in the location of the pre-September 11, 2001 station by overbuilding the tracks, platforms, and mezzanines atop the temporary PATH station.
- Location 2, Church Street, would be a new facility in the approximate location of the former H&M Terminal.
- Location 3, Broadway-Nassau would be a new facility located east of the WTC site under Dey Street and beneath the FSTC.
- Location 4, Vesey Street, would be a new facility located on the northern portion of the WTC "Bathtub" along Vesey Street.

After careful consideration of these sites, it was determined that the construction at Locations 3 and 4 would result in long-term disruption of temporary PATH service. Furthermore, Location 3 would reduce the operating capacity of the PATH system and may require acquisition and/or demolition of existing buildings. Because these locations would not meet the Project's goals and objectives, they were considered seriously flawed and were not carried forward.

Location 1 (WTC "Bathtub") and Location 2 (Church Street) were evaluated more closely to determine their comparative benefits and faults. It was determined that Location 1 would be less expensive with a shorter construction duration than Location 2, and it would allow for more flexibility in the redevelopment of the WTC site. However, Location 2 would have closer proximity to many of Lower Manhattan's major destinations and transportation facilities and would have superior operations as compared to Location 1.

In recognition of the respective benefits of both Locations 1 and 2, PANYNJ worked to develop a plan that would combine the flexibility for overall site redevelopment with superior pedestrian connections and operations. As the master plan for the WTC site was advanced, the Permanent WTC PATH Terminal plan was revised to combine elements of both Locations 1 and 2. Under the "hybrid" option, the PATH tracks, platforms, mezzanine, and portions of its pedestrian concourses would be located in the WTC "Bathtub". The remaining portions of the pedestrian concourses and the terminal building would be located on the eastern portion of the WTC site along Church Street. Because this option balanced goals of the WTC site redevelopment with superior PATH operations, it was carried forward for further consideration in this EIS.

ALTERNATIVES CONSIDERED AND ELIMINATED

PATH-6 Train Connection

During the scoping process, public interest groups and local elected officials suggested an alternative that would connect the PATH system with MTA/NYCT's 6 line. PANYNJ considered their proposal and determined that a number of critical engineering and design issues would need to be resolved to make this alternative feasible which would likely delay the completion of this project, result in substantial alterations to existing and planned transportation infrastructure in Lower Manhattan, and have potential short- and long-term adverse impacts on

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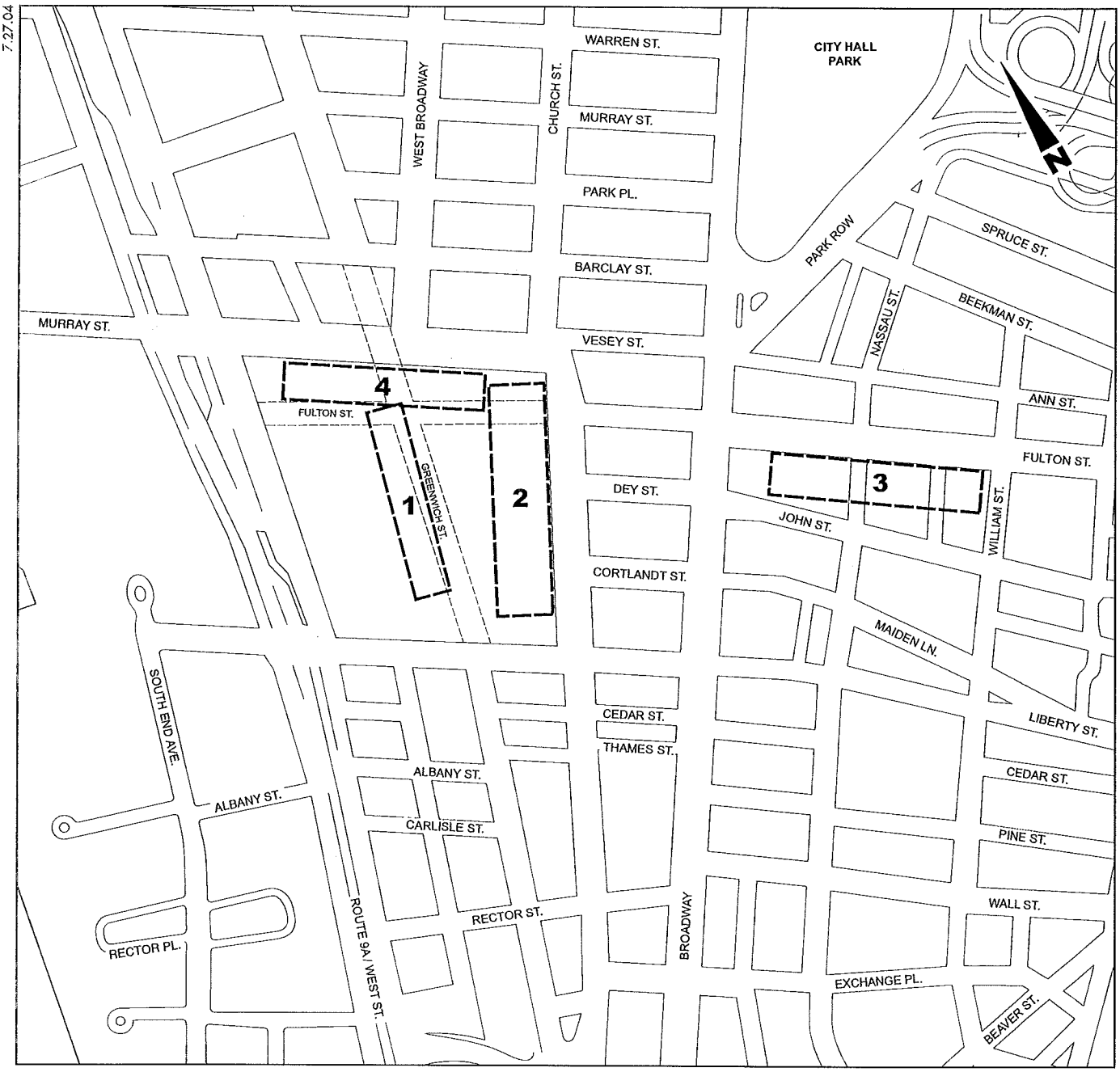


1 Alternative Location and Reference Number

Proposed New Street (To be Constructed by Others)

0 500 FEET
SCALE

PERMANENT WTC PATH TERMINAL
Final Environmental Impact Statement

Figure S -1
Alternative Locations

historic resources. Due to these constraints, this alternative was not considered to reasonably meet the goals and objectives and was, therefore, not carried forward for further consideration.

Terminal with Liberty Plaza Connection Alternative

The DEIS considered a Terminal with a Liberty Plaza Connection Alternative. Generally, the Terminal with a Liberty Plaza Connection Alternative would result in the same facility as described below for the Preferred Alternative. However, it would include an additional pedestrian connection under Church Street between the WTC site and Liberty Plaza Park. The analysis presented in the DEIS showed that the Terminal with a Liberty Plaza Connection Alternative would result in vibration impacts on a greater number of historic structures, would result in temporary lane closures and pedestrian diversions on Church Street, and would have increased emissions and noise levels during construction as compared to the Preferred Alternative. In the long term, the Terminal with a Liberty Plaza Connection would divert pedestrians from street-level to a sub-grade concourse, which could detract from local businesses, and it would reduce the availability of open space within Liberty Plaza Park.

During the public review process for the DEIS, public officials and concerned citizens stated that the Liberty Plaza Connection would adversely impact community character. A public goal for the rebuilding of Lower Manhattan has been to revive its retail and to ensure its longevity as a 24-hour community. Citizens and agency officials believed that the diversion of pedestrians from street-level to the underpass would detract from this goal. Upon further consideration, PANYNJ decided to eliminate the Liberty Plaza Connection as part of the Preferred Alternative.

DESIGN OPTIONS CONSIDERED AND ELIMINATED

The DEIS presented options for the design of certain components of the Permanent WTC PATH Terminal. As planning has advanced, certain components of the project have been finalized such that design options could be dropped from further consideration. The following describes the options previously presented and the outcome of the design process that has occurred since publication of the DEIS.

Stand-Alone Terminal

The construction of the Preferred Alternative would be closely coordinated with the construction of elements of the WTC Memorial and Redevelopment Plan. However, a Stand-Alone Terminal option was developed to determine the design and cost implications absent elements of the WTC Memorial and Redevelopment Plan. However, a Record of Decision was issued for the *WTC Memorial and Redevelopment Plan, Generic Environmental Impact Statement*, in May 2004 and LMDC has been developing plans for the Memorial and uses on the eastern portion of the WTC site. PANYNJ has been working closely with LMDC to coordinate the subgrade infrastructure to ensure that the construction of the Preferred Alternative would not preclude future uses on the WTC site. As such, the Permanent WTC PATH Terminal would be coordinated with elements of the WTC Memorial and Redevelopment Plan. However, given that WTC site development plans may be delayed or may change over time, PANYNJ may advance certain components of the Terminal as integrated and others as stand-alone. This Final EIS (FEIS) generally considers the benefits and impacts of an integrated Terminal; however, where Permanent WTC PATH Terminal elements may be stand-alone to advance its design and construction, the potential environmental effects are noted.

Route 9A Pedestrian Bridge

The design of the Permanent WTC PATH Terminal's connection to the World Financial Center must be coordinated with the selected alternative for the Route 9A Project. As described in the DEIS for the Permanent WTC PATH Terminal, PANYNJ considered a pedestrian bridge over Route 9A as an alternative to a subgrade concourse in the event that the relocation of utilities beneath Route 9A would not be undertaken by NYSDOT. However, since publication of the DEIS, PANYNJ has determined that a subgrade concourse could be constructed at a lower elevation, which would avoid utility relocation regardless of the selected alternative for the Route 9A Project. As such, the Route 9A pedestrian bridge has been eliminated from further consideration as part of this FEIS.

South Ventilation Structure

The DEIS identified two options for the location of the Terminal's south ventilation structure—Route 9A median and Deutsche Bank. Under the Deutsche Bank option, PANYNJ would construct the ventilation system within the new office tower planned for the former location of Deutsche Bank. The vent would be at a minimum height of 40-feet above ground and would likely be constructed within a mechanical level of the future building. Because of the proposed building's distance from the PATH tunnels, a vent structure at this location would not be collocated with emergency egress. Therefore, PANYNJ would need to provide for an emergency stairway with access from the planned plaza adjacent to the office tower or within the north or south sidewalk along Liberty Street. As such, this option would result in additional PATH structures and may increase the overall project cost. Subsequent to the publication of the DEIS, PANYNJ has selected the Route 9A option for the south vent as the Preferred Alternative.

NO ACTION ALTERNATIVE

Under the No Action Alternative, PANYNJ would retain temporary PATH service between New Jersey and Lower Manhattan until either 1) elements of the WTC Memorial and Redevelopment Plan would preclude operations, 2) the station would not safely accommodate passenger demand, or 3) the major elements of the station would exceed their useful service life. It is assumed that as redevelopment efforts occur in and around the WTC site, modifications to the physical characteristics and operation of the station would be required to maintain temporary PATH service to the extent possible. These modifications, which would not involve federal funding, may include the construction of additional egress locations, new ventilation structures, and minor modifications to passenger areas.

As future increases in ridership place demand beyond the temporary station's design capacity, PANYNJ would need to implement operational adjustments to safely accommodate passengers. Two options would be considered to extend temporary service beyond its design capacity—reduced service and peak hour restrictions. Reduced service would reduce congestion and allow the platforms to be cleared of passengers before the next train arrives. Restricted access would prohibit customers wishing to travel from Lower Manhattan to New Jersey in the morning peak period from using the system in order to accommodate a greater number of passengers traveling from New Jersey. These options may result in the diversion of PATH customers to other modes of travel to and from Lower Manhattan.

Under the No Action Alternative, construction activities associated with the WTC Memorial and Redevelopment Plan, the Fulton Street Transit Center, South Ferry Terminal, the Route 9A Project, and certain private developments would occur on or near the WTC site. As such, certain

modifications may be required to maintain temporary PATH service and to ensure the safety of PATH riders as construction occurs around and above the station complex. Further modifications may also be necessary to extend the station's service life, but such activities would be comparable to the ongoing station maintain that occurs throughout the PATH system. Thus, the potential impacts of the No Action Alternative during the construction period would be far fewer and much lesser in magnitude that would be associated with the other project alternatives.

For purposes of analysis, it is considered that the temporary WTC PATH station would continue to operate in 2009 under the No Action Alternative. However, given the constraints identified above, it is not considered feasible to operate the temporary station through 2025. Thus, at some point between 2009 and 2025, the temporary WTC PATH station would be closed and PATH service between New Jersey and Lower Manhattan would cease to exist.

PREFERRED ALTERNATIVE

A coordinated effort between PANYNJ and LMDC was undertaken to develop a master plan for the WTC site to program uses for above and sub-grade levels. This effort was necessary to identify and assess the multiple interfaces and coordination required to fully redevelop the site. The elements of the future WTC site, including the Permanent WTC PATH Terminal and the WTC Memorial and Redevelopment Plan, would be fully coordinated both in terms of their function and their construction. Close coordination between the individual parties responsible for site components would be essential to effectively construct and operate the site. In many cases, construction activities would be planned to support two or more elements of the overall master plan. Although these projects are being pursued independently, they will continue to be closely coordinated.

The Preferred Alternative would result in a new Permanent PATH Terminal on the WTC site. This alternative was developed through an evaluation of the benefits and constraints of two Terminal locations, WTC "Bathtub" and Church Street, and it combines an above-grade terminal building and sub-level pedestrian concourses on the eastern portion of the WTC site with additional pedestrian concourses, tracks, platforms, and a mezzanine on the western portion of the site (see Figure S-2).

PRELIMINARY DESIGN

The Preferred Alternative would have five levels—platform, mezzanine, concourse (main), concourse (balcony), and street-level.

The platform level would be located immediately west of MTA/NYCT's 1 and 9 train line and atop the concrete slab at the base of the WTC "Bathtub." The platforms and tracks would have a north-south orientation to complete a loop with the Hudson River tunnels, similar to the configuration of the temporary WTC PATH station. The Preferred Alternative would have four platforms (Platforms A through D) and 5 tracks (Tracks 1 through 5). The four platforms would be long enough to accommodate 10-car trains in accordance with PATH's long-range goal to increase the operational capacity of its system.

The mezzanine level would have a north-south orientation and would be located directly above the platform level. This level would house fare equipment, vertical circulation to the platforms and concourse level, and up to approximately 5,000 square feet of retail services, such as newsstands and food stalls. The mezzanine level would have two entrances/exits to the above concourse level. An east entrance/exit would direct passengers beneath MTA/NYCT's 1 and 9

line to the eastern portion of the WTC site. A west entrance/exit would direct passengers beneath Route 9A toward BPC and the World Financial Center.

The concourse consists of a main level and a balcony. The concourse's main level would connect to the mezzanine's east and west entrances/exits via escalators and elevators and would provide connections to offices and retail on the WTC site, FSTC's Dey Street Underpass, and the World Financial Center via a new underpass beneath Route 9A. The balcony level would provide connections to MTA/NYCT's Cortlandt Street (1 and 9), Cortlandt Street (R and W), and WTC (E) subway stations.

The street-level, terminal building, would be constructed on the eastern portion of the WTC site along Church Street near its intersections with Dey and Fulton Streets. It would provide access from Church Street and proposed elements of the WTC Memorial and Redevelopment Plan, including Greenwich Street and a public plaza. The building would also provide for natural light to the concourse level.

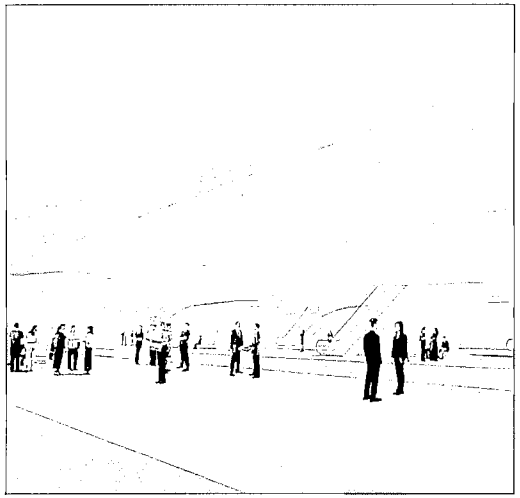
Prior to September 11, 2001, PATH had two ventilation structures within the median of Route 9A, which were used for both smoke evacuation and piston relief. These vent structures were located immediately above the PATH tunnels and contained evacuation stairs for emergency egress. As part of their program to enhance security within and around the WTC site, PANYNJ plans to reconstruct the ventilation structures to be 40 feet tall. Ideally, the future vents would serve the combined purpose of piston relief, smoke evacuation, and emergency egress. PANYNJ would construct the new ventilation structure in nearly the same location as before September 11, 2001.

NYSDOT is currently evaluating its plans for the reconstruction of Route 9A. Although PANYNJ prefers to locate the PATH vents in the future Route 9A median, it may be necessary to seek other locations (i.e., within the future Memorial Center or west of Route 9A) if NYSDOT cannot accommodate the vents as part of the ultimate design of the roadway. This FEIS identifies the Route 9A median as the Preferred Alternative for the ventilation structures. However, if the future plans for the Route 9A Project mandate an alternative location for the vents, FTA and PANYNJ would assess the alternative location through the appropriate NEPA process.

In addition to the emergency egress that would be provided via the vent structures, PANYNJ would construct emergency egress from the Terminal's track/platform and mezzanine levels. Egress stairways would be located near the north and south ends of the Terminal and would provide emergency access to Greenwich Street. The Permanent WTC PATH Terminal would share its emergency egress with the other facilities on the WTC site. PANYNJ plans to collocate one of these stairways within the proposed Performing Arts Center in the site's northwest quadrant and the other in the southwest quadrant within a museum or building that would be part of the WTC Memorial.

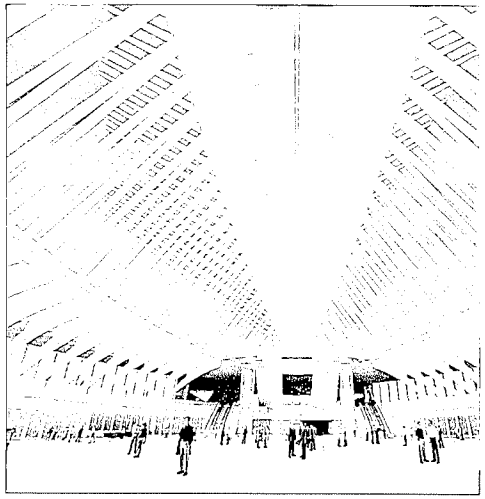
PANYNJ would reinforce the roof of the Terminal's east-west pedestrian concourse. The roof of the Terminal's east-west concourse would also serve as the road bed for the future extension of Fulton Street between Route 9A and Greenwich Street. The reinforced roof would consist of hardened, reinforced concrete to enhance the security of the east-west concourse below. The actual paving, landscaping, and opening of Fulton Street would be undertaken as a separate action.

The Preferred Alternative includes funds for the reinforcement of the basement walls, which form the "bathtub" within the WTC site. This work is necessary to ensure the structural integrity

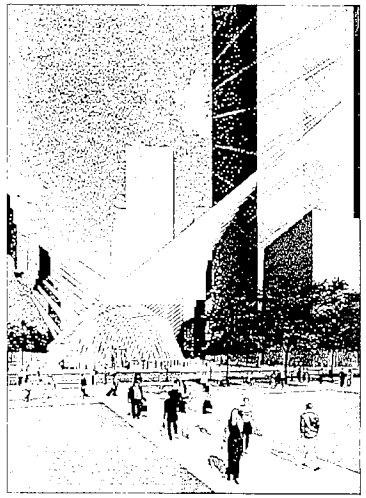


Platform Level

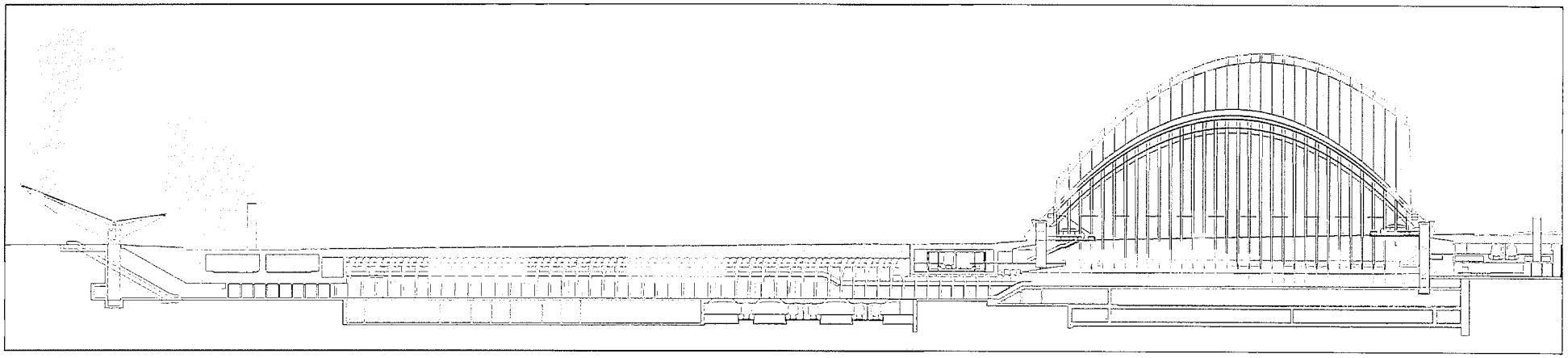
Mezzanine Level



Concourse Level



Street Level



Elevation

Figure S-2
Proposed Terminal Plan

of the walls and to support future redevelopment of the WTC site, including the Permanent WTC PATH Terminal. As part of the Permanent WTC PATH Terminal's construction, PANYNJ could reinforce the entire west bathtub wall except for portions that would remain visible as part of the WTC Memorial. PANYNJ would also reinforce portions of the east bathtub wall abutting MTA/NYCT's 1 and 9 line that were not previously reinforced. If other development on the WTC site does not move forward according to current schedules or plans, it may also be necessary to reinforce portions of the north bathtub wall east of Freedom Tower and portions of the south bathtub wall above the existing PATH substation.

Construction of the Terminal may also require the demolition and excavation of remaining structures within the eastern portion of the WTC site between MTA/NYCT's 1 and 9 line and Church Street, which includes all portions of the former H&M Terminal. This work would also support the future development of the site by others.

The DEIS noted that the removal of portions of the northwest remnant sub-grade structures on the WTC site may be undertaken as part of the Terminal's construction. However, subsequent to the publication of the DEIS, the removal of the northwest remnant sub-grade structures have been undertaken as an independent action pursuant to the stipulations of the Programmatic Agreement prepared for the WTC Memorial and Redevelopment Plan.

SUSTAINABLE DESIGN COMMITMENTS

As part of the construction and design of the Permanent WTC PATH Terminal, PANYNJ would implement Environmental Performance Commitments (EPCs). These EPCs were developed through a cooperative effort of the various project sponsors of the Lower Manhattan recovery effort. Divided into six resource areas, the EPCs are intended to reduce both short-term (construction) and long-term (operational) impacts to the environment. PANYNJ would implement the EPCs through specific actions identified in its public involvement and governmental entities coordination plan, construction environmental protection plan, design documents, and contracts. The specific EPCs and strategies for their implementation are described in Table S-5 and Section E below.

Per the guidance of the EPCs, the Terminal's design would incorporate sustainable/"green" design guidelines. PANYNJ is studying measures for the Terminal's initial design which are organized into six component areas: urban considerations, site, water, energy, materials, and indoor environment. These guidelines, which are consistent with industry standards, promote the use of techniques to reduce the demand for resources while promoting the capture and reuse of energy and materials, whenever possible. These measures would include the use of natural lighting, energy-efficient design, and renewable energy sources for heating and cooling.

One of the major sustainable/"green" design guidelines developed for the Permanent WTC PATH Terminal is the ability to use river water for cooling the Terminal's heating, ventilation, and air conditioning (HVAC) system. River water cooling was used prior to September 11, 2001 and its reuse is an economical and energy-efficient method to provide cooling for the components of the Permanent WTC PATH Terminal. The system's intakes, pumps, outfalls, and associated pipelines remain largely intact; river water provides lower supply temperature than other alternatives, resulting in greater energy efficiency; and river water cooling reduces the demand on the city's infrastructure. PANYNJ has filed an application with the New York State Department of Environmental Conservation to renew the State Pollution Discharge Elimination System (SPDES) permit for the WTC's river water cooling system. This application is being reviewed under an independent action.

CONSTRUCTION METHODS, SCHEDULE, AND COST

As shown in Figure S-3, the construction would begin in 2005. The Terminal would be completed in phases with an initial opening in 2009 and full completion in 2010.

The construction of the Permanent WTC PATH Terminal is comprised of five major elements as described below.

- North/South Temporary Access: Beginning in late 2005, PANYNJ would construct temporary access to the temporary WTC PATH station. Temporary access would be located on Vesey and/or Liberty Streets and would allow for the continued use of the temporary station as construction of the Permanent Terminal proceeds. The temporary access points would be maintained until the Terminal Hall and other street-level access can be provided. The duration for the construction of this element is 15 months.

- East-West Concourse: During this phase, PANYNJ would construct the east-west pedestrian connection through the WTC site and beneath Route 9A as well as the headhouse adjacent to the World Financial Center. If NYSDOT pursues a short-bypass alternative for the Route 9A Project, then they would construct the east-west concourse in tandem with their construction of the roadway tunnels. If NYSDOT pursues an at-grade alternative for Route 9A, then the east-west concourse would be constructed at nearly the same elevation by PANYNJ; however, the concourse would be mined with spoils removed from within the WTC site or from a shaft near the World Financial Center that would eventually provide the vertical connection between the concourse and the street-level headhouse. Following the completion of the east-west concourse through the WTC site, PANYNJ would harden its roof, which would eventually become the road bed of Fulton Street between Route 9A and Greenwich Street. The hardening of roof would involve the laying and reinforcement of high density concrete. Upon completion, the hardened road bed would serve as staging for the construction of Freedom Tower, which is being undertaken independent of the Preferred Alternative. The full duration for the east-west concourse construction is 36 months.

- Platform D, Arch Columns, and Temporary Underpinning: This element of construction involves the preparation work needed to maintain PATH operations as components of the Permanent Terminal are construction. It includes the laying of a temporary Track 6 and the permanent Platform D within the WTC "bathtub." The temporary track is needed to allow for continuous PATH operations as other tracks are reconfigured for use in the Permanent Terminal. Platform D provides access to trains using Track 6 and is, therefore, the first permanent platform to be constructed. Track 6 would be removed once PATH service can be fully restored on Tracks 1 through 5. During this phase of construction, the column supports for the Terminal's arches would be placed. Also, temporary underpinning of the 1 and 9 Line would be undertaken to support the later widening of the passageway between the mezzanine level and the concourse level. The total duration of this element is 20 months.

- Permanent Platforms, Tracks, and Mezzanine: This component of construction includes the major structural and finishing work for the platform and mezzanine levels of the Terminal. It includes placement of the structural arches, mezzanine construction, the underpinning of the 1 and 9 Line and construction of the passageway between the mezzanine and concourse levels, the lengthening and upgrade of Platforms A, B, and C, the completion of Platform D, and the construction of PATH's ventilation structures in the median of Route 9A. Grouting beneath the existing 1 and 9 subway tunnel would be performed from within this tunnel to protect the existing subway tunnel from the subsequent excavation work. Grouting is used in

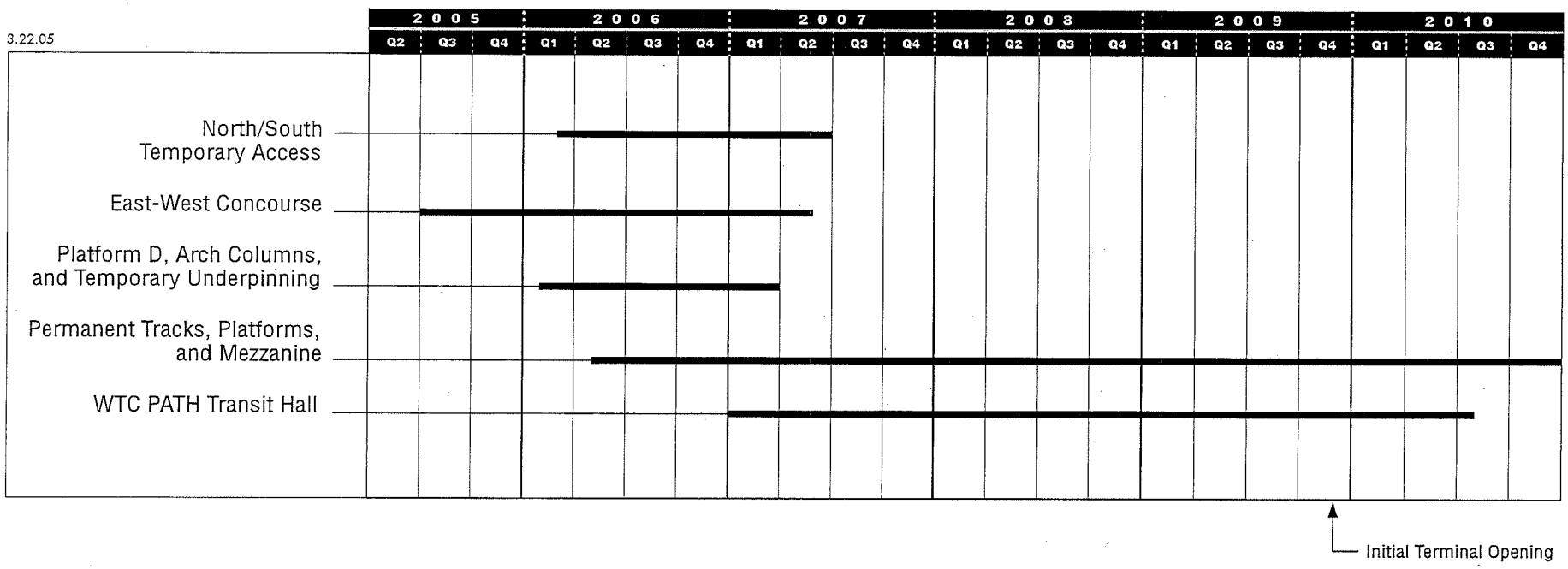


Figure S-3
Construction Schedule

soft soil to stabilize surrounding soils as a tunnel is excavated. In this case, a machine would be used to stabilize the surrounding soils by injecting cement or a similar material to form a hard tunnel shell. It would involve the use of compressed air operated drill rigs and grout pumps. Excavation and tunneling beneath the subway would occur from the west bathtub and proceed east. Tunneling would be accomplished via conventional mining techniques (e.g., shield with hand or mechanical excavation) and would require removal of existing piling supporting the subway tunnel and replacement with new piles/foundations. Spoils would be removed via the existing ramp to Liberty Street or by lifting to the surface with a crane and skip box. Demolition of temporary and construction of the permanent tracks, platforms, and mezzanine would occur alternating between northern and southern portions of track, platform, and mezzanines. To maintain train service and passenger safety and access, only one half (either the northern or southern half) of the platform would be demolished and converted, then the second half would follow. This stage of activity would continue until all tracks and platforms are converted. All work would occur within the west bathtub of the WTC site with access from the existing ramp from Liberty Street. No street closings are anticipated for this work to take place. The Terminal's two ventilation structures with emergency egress would be constructed within the median of Route 9A, and would also involve the installation of fans. The total duration for this phase of construction is 45 months.

- WTC PATH Transit Hall: This element consists of construction of the PATH terminal building, which includes the construction of all sub-grade and above-grade levels, the north-south pedestrian concourse, and the Terminal's mechanical and support systems. A preliminary estimate for the duration for the construction of the building area is 42 months, from late 2006 through early 2010. Lane closings on Church Street may be required for materials delivery and for the erection of pre-fabricated trusses and for the structural steel framing.

Construction workers and supervisors would arrive on site in personal vehicles or via mass transit. Limited parking would be available on-site and would primarily be used by supervisors arriving in light trucks. Heavy and light trucks would be present during demolition and construction stages throughout all elements; however, the number and type of trucks would vary between elements.

Generally, the hours of construction would be Monday through Saturday from 7 AM to 6 PM in one 10-hour shift. A 10-hour work shift was assumed not only for the construction of the Permanent WTC PATH Terminal but was also assumed for the analyses being prepared for the other Lower Manhattan recovery efforts. The proposed hours of construction are consistent with New York City construction guidelines and allow for a consistent basis to assess cumulative effects for the Lower Manhattan recovery efforts. However, in some cases, it may be necessary to conduct construction activities at night, particularly when temporary lane closures would be needed or to coordinate and stage activities for the daytime shift. These nighttime activities would be limited throughout the construction period and would have fewer staff than the daytime shift. These nighttime activities would be required to meet the New York City Noise Control Code (NYC Administrative Code Title 24 §201 et seq.), which does not allow for activities and equipment that would exceed specific noise criteria.

The vehicles, primarily trucks, needed to deliver materials for construction activities and remove demolition debris would be required to adhere to established site ingress and egress truck routes.

For access to the site, trucks arriving and departing would use Route 9A, Broadway, Liberty Street, Church Street, and Barclay Street.

The Preferred Alternative would cost $2.138 billion. A total of $1.750 billion would be funded by the FTA through the Lower Manhattan Transportation Recovery Effort. The remaining $388 million would be funded by PANYNJ through their capital improvements budget.

D. ANALYSIS FRAMEWORK

To assess the potential impacts of the Project Alternatives, this EIS considers three analysis years—construction period, opening year (2009), and design year (2025). Given the unique circumstances leading to the need for and implementation of the Project Alternatives, this EIS considers potential environmental impacts as they relate to two baseline conditions—pre-September 11, 2001 and post-September 11, 2001. Furthermore, a more detailed evaluation of potential cumulative effects was prepared than is typically undertaken.

BASELINE CONDITIONS

To fully investigate the potential impacts, this EIS considers two baseline conditions to formulate future scenarios for the Project Alternatives.

Pre-September 11, 2001 Baseline

The pre-September 11, 2001 baseline condition reflects the built environment in Lower Manhattan prior to the terrorist attacks. The pre-September 11, 2001 baseline is used for the evaluation of potential future long-term environmental impacts and for the preparation of appropriate mitigation measures.

Because the terrorist attacks resulted in drastic differences in the physical and social characteristics of Lower Manhattan, the current environment in Lower Manhattan does not reflect the level of activity that existed prior to September 11, 2001. The planned redevelopment of Lower Manhattan would result in the replacement of much of the real estate and infrastructure that was lost, resulting in increased trips to the area. However, it is anticipated that the environment in the vicinity of the Permanent WTC PATH Terminal could continue to support the level of activity that existed before September 11, 2001. Therefore, the quantified analysis of future impacts and mitigation is based on a theoretical comparison that assumes the terrorist attacks had not occurred, in order to evaluate the future condition when Lower Manhattan has truly recovered and continues to grow.

The pre-September 11, 2001 baseline condition precludes the federally sponsored redevelopment and recovery projects in Lower Manhattan since it is assumed that the terrorist attacks had not occurred. Therefore, the future conditions developed based on the pre-September 11, 2001 baseline does not include the following projects: WTC Memorial and Redevelopment Plan; Route 9A; Fulton Street Transit Center; and South Ferry Terminal.

However, other real estate development is assumed to have been constructed whether or not the terrorist attacks had occurred. These projects, therefore, are accounted for in the future conditions based on the pre-September 11, 2001 baseline.

Post-September 11, 2001 Baseline

The post-September 11, 2001 baseline condition reflects the current environment in Lower Manhattan. This scenario considers the loss of the WTC and transportation infrastructure as well as changes in employment and land use resulting from the terrorist attacks.

Because the revitalization of Lower Manhattan would take more than a decade, the post-September 11, 2001 baseline condition is used to project future conditions in the interim (construction period and opening year) analysis years presented in this EIS. It also considers the numerous projects planned for the redevelopment of Lower Manhattan, including the $4.55 billion transportation recovery projects. In addition, this scenario is applied to the design year conditions without PATH service under the No Action Alternative, since the other recovery efforts would be pursued independently.

CONSTRUCTION ANALYSIS FRAMEWORK

The DEIS presented a construction schedule and phasing plan developed in October 2003. This plan was prepared in a coordinated effort to support the assessment of cumulative effects for the Lower Manhattan recovery projects. The phasing plan presented in the DEIS consisted of 6 Elements as follows:

- Element 1: Permanent Tracks, Platform Conversion, Mezzanine, and Concourse Construction;
- Element 2: Tunnels under 1 and 9 Line;
- Element 3: Route 9A Connection;
- Element 4: Liberty Plaza Connection;
- Element 5: Excavation/Deconstruction of the temporary PATH station; and
- Element 6: PATH Terminal Building.

Since the Liberty Plaza Connection is not being proposed as part of the Preferred Alternative, Element 4 of the DEIS phasing plan has been eliminated in this FEIS. Furthermore, since publication of the DEIS, project engineering and design have progressed allowing for a more refined assessment of the construction schedule and phasing.

The analysis in the DEIS assumed construction would begin in the first quarter of 2005, but it is now anticipated to start in the third quarter of 2005. Furthermore, the DEIS analysis of construction impacts assumed a more fast-tracked approach with the majority of activities occurring in 2006. Based on current engineering data, design considerations, and coordination issues with other separate undertakings on the WTC site, the construction activities would be more evenly distributed through 2006, 2007, and 2008. Since the analysis in the DEIS was based on a higher level of activity than is currently proposed, the corresponding construction-related impacts are higher than what is now expected. Assumptions in the DEIS regarding construction scheduling and phasing have not been revised for the FEIS, as they represent the maximum predicted truck trip generation, noise levels, and pollutant concentrations that could possibly occur under the most aggressive construction schedule. Mitigation measures developed with respect to these maximum predicted levels would be even more effective under the currently proposed, less aggressive construction schedule.

This construction analysis framework in the DEIS considered the peak period of activity when four elements of the Terminal would be in simultaneous construction, including the Liberty

Plaza Connection. Elements 1, 2, and 3 of this framework were not changed for the quantified construction-period analysis presented in this FEIS; however, Element 4, the Liberty Plaza Connection, was dropped since it is no longer considered as part of the Preferred Alternative.

The following briefly describes the activities included in Elements 1, 2, and 3 of the construction analysis framework.

- Element 1, Permanent Tracks, Platform Conversion, Mezzanine and Concourse Construction, consists of three seven-month stages over a total duration of 21 months. In each stage, one existing platform/track section of the temporary WTC PATH station would be demolished and reconstructed with new mezzanine/concourse connections. All work would occur within the west bathtub of the WTC site with access from the existing ramp from Liberty Street. No street closings were anticipated for this work to take place.
- Element 2, Tunnels under 1 and 9 line, would involve the driving of the mezzanine and concourse tunnels under MTA/NYCT's 1 and 9 subway line beneath Greenwich Street. The work would take place from within the existing subway tunnel and from within the existing west bathtub. The work would involve underpinning the subway tunnel followed by the excavation and construction of the underpasses. Estimated duration of tunnel driving and construction is 20 months. Tunneling would be accomplished via conventional mining techniques (e.g., shield with hand or mechanical excavation). Over the 20-month period, construction activities including spoil removal, grout injection, underpinning, concrete pouring, and steel installation would occur. During this period, it may be necessary to occasionally suspend 1 and 9 train service through the construction zone during off-peak periods. This work would be coordinated with MTA/NYCT to minimize potential disruption to commuters.
- Element 3, Route 9A Connection, would include construction of the concourse under Route 9A, which would be constructed near the northwest corner of the site. Slurry wall construction and cut and cover excavation would be employed to cross Route 9A. The estimated duration was approximately 15 months. This work would be coordinated with NYSDOT's proposed reconstruction of Route 9A.

Table S-1 shows the on-site equipment requirements in the peak construction year for Elements 1, 2, and 3. Table S-2 presents the daily delivery trips for each of these elements.

The Preferred Alternative would generate 294 daily vehicle trips during construction. Of these, 236 trips would be delivery and service trucks traveling to and from the site, and a total of 58 daily trips would be construction workers arriving in their personal automobiles.

APPROACH TO CUMULATIVE EFFECTS

The Permanent WTC PATH Terminal is part of a larger redevelopment plan for Lower Manhattan that includes transportation and development projects being sponsored by both public and private groups. Although funded and planned separately, these projects would have a cumulative effect on the character and quality of Lower Manhattan and the region as a whole both during and after construction. To guide the Lower Manhattan project sponsors in their analysis of cumulative effects under NEPA, FTA prepared its *Approach to Cumulative Effects Analysis for the Lower Manhattan Recovery Effort* (July 2003). The approach described in FTA's guidance ensures consistency between the federally-sponsored projects through a coordinated set of analysis assumptions and methodologies for all of the transportation recovery

Table S-1
Construction Analysis Framework – Summary of On-Site Construction Equipment in the Critical Analysis Year

Equipment	Element 1	Element 2	Element 3	Total
Air Compressor for Impact Wrenches	2	0	0	2
Air Compressor for Pavement Breakers	1	0	0	1
Air Operated Grout Drills	0	2	3	5
Backhoe	0	0	1	1
Crawler Crane	1	1	1	3
Hi-Lift (forklift)	2	2	2	6
Hydraulic All-terrain Crane	1	0	0	1
Hydraulic Excavator with Hoe Ram	1	0	0	1
Hydraulic Excavator with Thumb	1	0	0	1
Impact Wrenches	20	0	0	20
Pavement Breakers	4	0	1	5
Welding Machines	2	1	2	5

Table S-2
Construction Analysis Framework – Summary of Peak Daily Off-Site Vehicle Trips in the Critical Analysis Year

Type	Element 1	Element 2	Element 3	Total
Heavy Trucks	132	22	20	174
Light Trucks	42	10	10	62
Private Vehicles	34	12	12	58
Total	208	44	42	294

projects. As individual projects advance through the NEPA process, the analysis and any identified impacts are incorporated into the documentation of later projects to ensure a consistent, up-to-date, and comprehensive evaluation of potential cumulative effects.

The study of cumulative impacts focuses on subject areas most prone to potential cumulative adverse effects. The federal partners and local project sponsors identified five areas with the highest potential for cumulative effects—access and circulation; air quality; noise and vibration; cultural and historic resources; and economic factors. The local project sponsors have coordinated amongst themselves and with federal agencies to develop consistent methodologies, assumptions, data sources, and impact criteria for the evaluation of impacts for the five cumulative effects subject areas. Furthermore, the project sponsors agreed to a consistent set of EPCs for these resource areas to be implemented as part of their projects in order to minimize or avert adverse impacts.

The cumulative effects analysis considers both the potential short-term (construction period) and long-term (operational period) beneficial and adverse impacts. For short-term, construction period assessment, the analysis explicitly considers the cumulative effects of the five federally-funded Lower Manhattan Recovery Projects—Permanent WTC PATH Terminal, WTC

Memorial and Redevelopment Plan, Fulton Street Transit Center, South Ferry Terminal, and the Route 9A Project (see Figure S-4). Other privately-funded initiatives were considered but were not explicitly modeled. These projects were either too small to influence the outcome or were considered as part of the baseline from which cumulative effects were projected.

Since publication of the DEIS, the construction schedules for the WTC Memorial and Redevelopment Plan and the Route 9A Project have been delayed by approximately one year, and as described above, the schedule for the Permanent WTC PATH Terminal is also changed. Although, the peak activity levels for these three projects is expected to be similar to the analysis presented in the DEIS, the actual peak period is more likely to occur in 2007 and/or 2008 rather than in 2006. The construction schedules for the South Ferry Terminal and the Fulton Street Transit Center are similar to those presented in the DEIS, meaning that activities for these projects would peak in 2006. Although the Fulton Street Transit Center and South Ferry Terminal projects would have less overlap with construction of the Permanent WTC PATH Terminal, the peak daily equipment and truck activities for these projects were not changed in this FEIS. Thus, the cumulative effects analysis presented herewith is a conservative baseline for the development of mitigation measures since a lower level of activity is more likely to occur in the peak construction year for the Permanent WTC PATH Terminal.

E. PROBABLE IMPACTS OF THE PROJECT ALTERNATIVES

ANALYSIS RESULTS

Summarized in this section are the findings of the environmental analyses performed for this FEIS. Analyses were performed to determine the potential for adverse and/or beneficial impacts in the following categories: land use, neighborhood character, and social conditions; economic conditions; visual and aesthetic considerations; historic resources; archeological resources; transportation; air quality; noise and vibration; energy; contaminated materials; water resources; wetland and terrestrial resources; and coastal zone management. Table S-3 provides a summary of the potential impacts during the construction period, while Table S-4 provides a summary of design year impacts. Where the potential for adverse impacts have been identified and mitigation measures are feasible, such measures are discussed below.

As described above, this EIS considers a 2009 opening year. The opening year analysis accounts for the continued operation of a temporary WTC PATH station, which is assumed to be closed by 2025. Furthermore, the redevelopment of the WTC site and the construction of several other private development projects in Lower Manhattan would not be fully completed in 2009 but would be achieved before 2025; therefore, there would be fewer trips to Lower Manhattan in the opening year than in the design year. Given these differences in the opening year and design year conditions, the 2009 analysis shows less pronounced benefits of a Permanent WTC PATH Terminal over the No Action condition than is reflected in 2025. However, in terms of the Terminal's potential impacts to cultural resources, noise and vibration, natural resources, and pedestrian circulation, the impacts in both 2009 and 2025 are nearly identical. Thus, the mitigation measures described below for the 2025 design year would also apply to the 2009 opening year.

MITIGATION

As described in Table S-3, the Preferred Alternative would result in impacts to cultural resources, vehicular traffic, air quality, noise and vibration, and contaminated materials during

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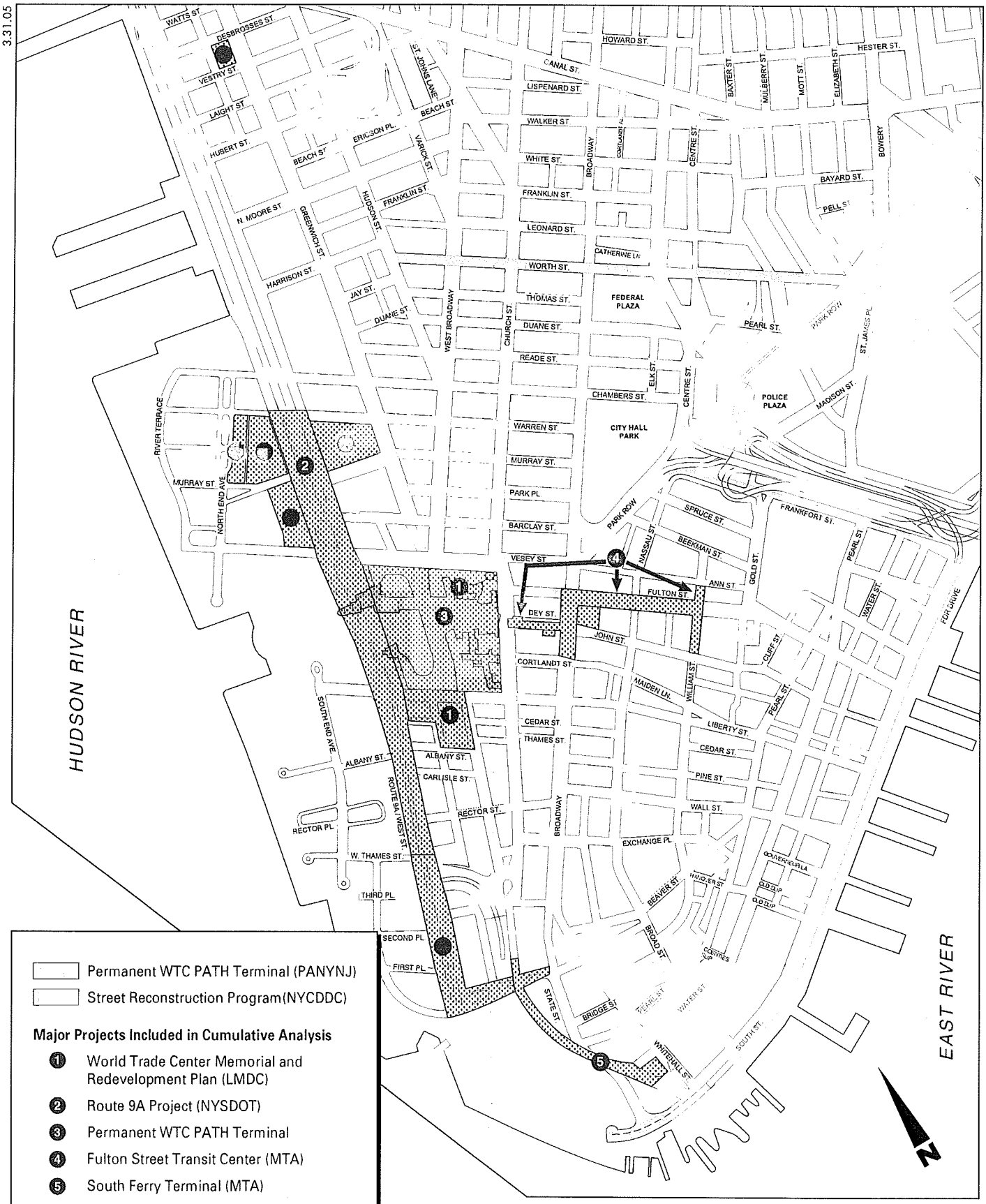

Figure S-4

Lower Manhattan Projects Planned for Construction in the Critical Analysis Year

the construction period. PANYNJ would implement Environmental Performance Commitments (EPCs) as part of the project to minimize or avoid adverse impacts during construction (see Appendix I). Although the EPCs would avert many of the adverse impacts identified in the FEIS, additional mitigation would be necessary. Table S-5 describes the EPCs and plans for their implementation, while the additional project-specific mitigation commitments are shown in Table S-6.

Generally, the Preferred Alternative would have greater environmental benefits than the No Action Alternative over the long-term, operational period. However, the analysis showed that the Preferred Alternative would result in adverse effects to cultural resources, on-street pedestrian circulation, noise and vibration, and natural resources (see Table S-4). Mitigation measures have been recommended to minimize these adverse impacts as shown in Table S-7.

The EPCs described in Table S-5 were developed through a coordinated effort of the Lower Manhattan project sponsors and are contained in a letter signed in September 2003 (see Appendix I). Throughout the DEIS and FEIS phases for the Permanent WTC PATH Terminal, the project sponsors developed and implemented a framework for construction coordination, which included several working groups to address issues that have been identified in the individual environmental documents and to further refine the EPCs. The sponsors established a Schedule Working Group, a Logistics Working Group, a Traffic Working Group, and a Standards Working Group. Through this coordinated approach to the evaluation of individual projects, the project sponsors strove to meet or exceed the EPCs and to investigate and remediate issues and concerns that could arise during the construction process.

Since the publication of the DEIS, Governor Pataki established, by way of an Executive Order, the Lower Manhattan Construction Command Center (see Appendix I). This entity will coordinate the construction of the Lower Manhattan Recovery Projects as well as any other construction projects in Lower Manhattan with a value in excess of $25 million through 2010. The Command Center will have an Executive Committee consisting of representatives from the various sponsoring agencies and other key state and local agencies. The Command Center and its Executive Committee will be managed by an Executive Director, who was appointed in February 2005.

As stated in the Executive Order, the functions of the Command Center will be:

- "Coordinating the work of the participants in the rebuilding process and ensuring that the construction in Lower Manhattan proceeds as scheduled by mediating conflicts in schedules and street and site access between construction projects, agencies, and the Lower Manhattan Community;"
- "Coordinating protocols, contract requirements and activities outside of individual project limits through planning on a daily basis throughout construction for government agencies, developers, construction managers, general contractors, and contractors;"

"Coordinating construction projects to minimize inconvenience for residents, workers, pedestrians, vehicles, and commuters;"

- "Ensuring that the Lower Manhattan area remains neat, clean and orderly throughout construction;"
- "Communicating with residents, businesses, and the general public through a communications director working with each agency's communications and public outreach

personnel; providing a central focus on issues critical to the local community and the construction industry, by coordinating initiatives, public outreach, and information;" and

- "Utilizing technology to facilitate coordination of projects."

Although the Command Center and the Lower Manhattan Construction Coordination Group will work to implement and enhance the EPCs for all of the Lower Manhattan Recovery Projects, PANYNJ will independently ensure that its EPCs are met. Coordination and circulation plans will accompany the Project's design documents, and the project's contract documents and construction specifications will include the EPCs and specific measures to monitor these commitments as construction moves forward.

Also, subsequent to publication of the DEIS, FTA and PANYNJ executed a Memorandum of Agreement (MOA) pursuant to Section 106 of the National Historic Preservation Act (see Appendix B). The MOA includes measures to avoid, minimize, or mitigate the Project's adverse impacts to historic properties both during and after construction. The MOA was developed through an extensive Section 106 consultation process that included the New York State Department of Parks, Recreation, and Historic Preservation; the U.S. Advisory Council on Historic Preservation; the New York City Landmarks Preservation Commission; and historic preservation, community, and public interest groups. The MOA establishes a process, which PANYNJ must follow as the Terminal's design moves forward. This process commits PANYNJ to incorporate certain remnants and structures on the WTC site into the Terminal's design to mitigate its adverse impacts and also includes stipulations to ensure ongoing coordination with the Section 106 consulting parties.

FTA will issue a ROD for the Permanent WTC PATH Terminal. The ROD will summarize the impacts of the Preferred Alternative and will include the mitigation commitments that would minimize or avoid these impacts. This would include the EPCs, the commitments set forth in the Project's Section 106 MOA, and all other mitigation measures identified in this FEIS.

SECTION 4(F) EVALUATION

Since the project is being funded by the FTA, an administration of the USDOT, it must comply with Section 4(f) of the USDOT Act of 1966. Under Section 4(f), the Secretary of Transportation is prohibited from approving any program or project that requires the "use" of 1) any publicly owned land in a public park, recreation area, or wildlife and waterfowl refuge of national state, or local significance, or 2) any land from a historic site of national, state, or local significance (collectively "Section 4(f) resources"), unless there is no feasible and prudent alternative to the use of such land and the project includes all possible planning to minimize harm to the resource.

With respect to the term "use", Section 4(f) considers three possible ways in which a project could involve a "use" of a resource:

- When land is permanently incorporated into a transportation facility;
- When there is a temporary occupancy of land that is adverse in terms of the statute's preservationist purpose; or,
- When there is a constructive use of land.

Constructive use occurs when the project does not directly incorporate land from a Section 4(f) resource, but the project's impacts are so severe that the protected activities, features, or attributes that qualify a resource for protection under Section 4(f) are substantially impaired.

Table S-3

Probable Impacts of the Project Alternatives—Construction Period

Resource Area		No Action Alternative	Preferred Alternative
Land Use, Neighborhood Character, and Public Policy		Under the No Action Alternative, any changes in land use and neighborhood character would be attributed to other independent actions. Because this alternative would not result in the coordinated construction of the Lower Manhattan Recovery Projects, it would be inconsistent with public policy initiatives.	Lane closures, trucking activities, and noise associated with construction may affect the quality of life for Lower Manhattan's employees, residents, and visitors; however, these disruptions would be temporary and no long-term effects to land use or neighborhood character would result.
Socioeconomic Conditions		The simultaneous construction of other independent transportation and development projects in Lower Manhattan, independent of the Project Alternatives, may have impacts to local residents and businesses. Temporary road closures, trucking activities, and construction noise may temporarily affect the quality of life for employees and residents in the vicinity of the WTC site. However, these construction activities are necessary to ensure the long-term vitality of Lower Manhattan; thus, this temporary adverse impact lends to long-term positive benefits for adjacent populations.	Construction of the Preferred Alternative would not result in residential or businesses displacement. The Maintenance and Protection of Traffic (MPT) plan would ensure that residents, employees, and visitors can access existing residences and businesses as well as the temporary WTC PATH station during the Preferred Alternative's construction. The Preferred Alternative's construction would yield a total of 19,965 person-years of employment and $3.86 billion in direct and indirect expenditures. The project would also generate nearly $50 million in tax revenues.
Cultural Resources	Historic Resources	The No Action Alternative would not directly alter or disturb historic resources within the area of potential affect. Thus, any changes to historic resources would be attributed to construction associated with other independent undertakings.	Construction of the Terminal would directly disturb or alter the Hudson River Bulkhead and remaining remnants on the WTC site. Vibrations created by project construction may adversely impact 5 historic buildings in the area of potential effect.
	Archaeological Resources	The No Action Alternative would not disturb known or suspected archaeological resources. Therefore, any potential impacts to archaeological resources would result from other independent undertakings.	Construction beneath Route 9A would have an adverse impact to the Hudson River Bulkhead, which is located beneath Route 9A. The project may also disturb as yet determined archaeological resources on the eastern portion of the WTC site; however, additional testing of these sites is recommended to determine their archaeological sensitivity.
Urban Design and Visual Resources		The temporary WTC PATH station would appear as is does today. Construction activities associated with the WTC Memorial and Redevelopment Plan would be occurring on the WTC site.	Above-grade construction of the Terminal Hall may temporarily impact streetscape features. However, the Preferred Alternative would not adversely impact visual resources and view corridors during the construction period.
Transportation	PATH	The No Action Alternative would not result in adverse impacts to PATH operations during construction. However, activities associated with other projects on the WTC site may result in off-peak and weekend service disruptions.	Construction of the Preferred Alternative would be staged to fully maintain peak period PATH service. Off-peak service disruption may be necessary for certain construction activities and in order to move equipment around the site.
	Vehicular Traffic and Parking	Because the project itself would not generate construction period vehicles, there would be no associated traffic impacts during the construction period.	Project-generated, construction period vehicle trips would result in an adverse impact at the intersection of Route 9A and Liberty Street during the PM peak hour.
	Transit	The construction of other projects (i.e. Fulton Street Transit Center, South Ferry Terminal, Route 9A, and World Trade Center Memorial and Redevelopment Plan) may result in temporary disruptions to subway and bus services during off-peak periods. However, the No Action Alternative, itself, would not adversely impact transit service during the construction period.	Construction of the Preferred Alternative would not impact access to other modes of transit in the vicinity of the WTC site. Where underpinning of MTA/NYCT's 1/9 and R/W subway lines would be required, construction would be limited to off-peak hours and would be coordinated with MTA/NYCT to minimize any potential service disruptions.
	Pedestrians	The construction of other projects (i.e. Fulton Street Transit Center, South Ferry Terminal, Route 9A, and World Trade Center Memorial and Redevelopment Plan) may result in temporary disruptions to on-street, pedestrian circulation in the vicinity of the WTC site. However, the No Action Alternative, itself, would not have adverse impacts to pedestrians during the construction period.	Pedestrian circulation in the vicinity of the project site would not change substantially as compared to the No Action Alternative since most diversions would be required for construction of other independent undertakings. The current access to the temporary WTC PATH station would be maintained until replaced by new access/egress points constructed as part of the Preferred Alternative. Sidewalks along Route 9A may be closed temporarily during construction; however, north-south pedestrian access would be maintained along the Route 9A alignment.
Air Quality		Under the No Action Alternative, emissions in the area would be highly influenced by the construction activity for the WTC Memorial and Redevelopment Plan, Route 9A Project, Fulton Street Transit Center, and other public and private development projects.	The Preferred Alternative's construction would result in increased emissions of carbon monoxide (CO), particulate matter ($PM_{2.5}$, PM_{10}), and nitrogen dioxide (NO_2) at receptor sites in close proximity to the construction zone. However, the increases in CO, PM_{10}, and NO_2 would not exceed National Ambient Air Quality Standards and, therefore, would not result in adverse impacts. However, the maximum increase in 24-hour $PM_{2.5}$ concentrations of 47.8 $\mu g/m^2$ would be substantial. These increased emissions would generally be highest in the vicinity of the Route 9A connection, but at distances in excess of a few hundred feet from the construction zone increases in project-generated emissions would not be substantial.
Noise and Vibration		Under the No Action Alternative, noise levels in the area would be highly influenced by the construction activity for the WTC Memorial and Redevelopment Plan, Route 9A Project, Fulton Street Transit Center, and other public and private development projects.	Construction noise levels would exceed FTA's recommended 8-hour threshold for residential uses at the Hilton Millennium Hotel and 114 Liberty Street and would exceed FTA's 8-hour and 30-day commercial land use thresholds at the World Financial Center. Vibrations created by project construction may adversely impact 5 historic buildings within 90 feet of the construction zone. Farther than approximately one to two blocks from the construction zone, noise and vibration increases from the Preferred Alternative's construction are not expected to be substantial.
Infrastructure and Energy		Under the No Action Alternative, any potential impacts to infrastructure or energy during the construction period would be attributed to other independent actions.	Energy needed to construct the Preferred Alternative would be supplied by the City's power grid or on-site generators. However, this energy demand is not anticipated to adversely impact the supply of utilities to Lower Manhattan. The Terminal's construction has the potential for conflicts with existing utility lines along Church Street. Where utility lines would interfere with permanent elements of the Terminal, they would be permanently relocated. Where construction activities have a high potential to disrupt utility lines, shoring or temporary relocation may be undertaken.
Contaminated Materials		Under the No Action Alternative, any potential impacts from contaminated materials during the construction period would be attributed to other independent actions.	The Terminal's platform, mezzanine, and portions of its concourse would be within the portion of the WTC site that was fully cleared of contaminants as part of the post-September 11, 2001 recovery efforts. Although some soils remain near PATH's tunnel projections, the top 18 inches were previously removed and replaced with clean fill. Portions of the WTC site east of the 1 and 9 line have the potential for residual contamination since debris and structures remain in this area. Excavation and tunneling activities beneath Route 9A has the potential to encounter fill materials with elevated levels of polycyclic aromatic hydrocarbons (PAHs) and metals, which is typical of fill soils in New York City. During the Preferred Alternative's construction, PANYNJ and LMDC would repair damaged portions of the WTC basement wall, which would essentially eliminate the invasion of overburden ground water through the wall into the WTC site.
Natural and Water Resources		Under the No Action Alternative, any potential impacts to natural resources and water quality during the construction period would be attributed to other independent actions.	The Terminal's construction is not expected to result in adverse impacts to terrestrial or aquatic species. Furthermore, floodplain control and stormwater management techniques that would be implemented as part of the project would avert any adverse impacts to water quality during construction.

Table S-4
Probable Impacts of the Project Alternatives—Design Year

Resource Area		No Action Alternative	Preferred Alternative
Land Use, Neighborhood Character, and Public Policy		The existing temporary WTC PATH station was constructed for use on an interim basis and would not support long-term development of the WTC site or Lower Manhattan, as a whole. The absence of a Permanent WTC PATH Terminal may reduce the desirability and marketability of those independent developments that are planned throughout the study area, including those at the WTC site itself. Existing Lower Manhattan businesses may relocate to other areas of Manhattan or leave New York City altogether. As a result, the revitalization of Lower Manhattan may not be as robust as would otherwise be expected and any benefits to neighborhood character would not be realized.	The Permanent WTC PATH Terminal is part of a major public policy initiative by federal, state, and city agencies to restore the Project Site as a functioning use and to reestablish a focal point of civic space and amenities for Lower Manhattan. PATH commuters would benefit area businesses, particularly restaurants and shops, well beyond the Project Site, improving neighborhood character. The Terminal is consistent with efforts to enhance Lower Manhattan to retain existing uses and to attract new businesses in the long term. Thus, this alternative would have beneficial effects on surrounding areas, and no adverse impacts to land use, neighborhood character, or public policy would result from this alternative.
Socioeconomic Conditions		The absence of a Permanent Terminal and possible disruption of or limitations to temporary WTC PATH service may reduce the desirability and marketability of Lower Manhattan and could lead existing Lower Manhattan businesses to relocate. Access between New Jersey and Lower Manhattan could be achieved by other modes, but these options are more time consuming, less convenient, and sometimes more expensive than direct PATH service. Thus, the No Action Alternative may have adverse effects on residents and employees and could have a lasting negative effect on its economic vitality.	The Preferred Alternative would not include residential or office uses nor would this alternative have adverse direct or indirect effects to residents or businesses. While PATH ridership would increase over time, this change would have positive impacts to businesses within the vicinity of the WTC site. It is expected that any effects of the Terminal would be a positive and that there would be no adverse impacts to social or economic conditions.
Cultural Resources	Historic Resources	Since the No Action Alternative would not directly result in changes to the WTC site or adjacent properties, any contextual impacts to historic resources would be the result of other independent actions.	The area of potential effect is composed of historic structures near more modern structures, such that many older buildings are immediately adjacent to contemporary glass and metal structures. Thus, the modern design of the terminal, including its ventilation structures and World Financial Center entrance, is not expected to result in adverse contextual effects to historic resources within the area of potential effect. FTA and PANYNJ have executed a Memorandum of Agreement (MOA) pursuant to Section 106 of the National Historic Preservation Act. Per the stipulations of the MOA, the Terminal would incorporate architectural treatments and other measures to minimize and/or mitigate the Project's long-term use of remaining remnants and structures on the WTC site.
	Archaeological Resources	Since the No Action Alternative would not have resulted in construction in areas with known or potential archaeological sensitivity, there would be no adverse impacts to archaeological resources.	Adverse effects to the Hudson River Bulkhead beneath Route 9A and potential adverse effects to potentially sensitive areas on the WTC site would be resolved during the construction period in consultation with SHPO. Thus, this alternative would not have adverse impacts to archaeological resources during the operation of the Permanent WTC PATH Terminal.
Urban Design and Visual Resources		It is assumed that infrastructure associated with the temporary WTC PATH station would be retained on the WTC site although certain alterations may be required to maintain PATH service to the extent possible. It is not expected that the No Action Alternative would have adverse effects to visual resources.	The Terminal's modern design would complement the structures planned for the WTC site. The terminal would likely become an important visual resource for Lower Manhattan, and would create a grand point of entry for the new transportation center. Similarly, the above-ground entrance to the Terminal from the World Financial Center would not have adverse impacts on the urban design or visual resources since it would be a modern design that complements the Winter Garden. The vent structures in the median of Route 9A would not block views or view corridors. They would be clad in reflective material that would blend them with their surroundings and would be in keeping with modern buildings in the immediate area. Thus, the vent structures would not have an adverse impact on view corridors or visual resources.
Transportation	PATH	Passenger volumes would surpass the safe and efficient design capacity of the temporary WTC PATH station before 2025. To continue service, PANYNJ would implement restrictive measures to ensure safety and reliable PATH operations, such as restricted peak hour access, reduced WTC train service, or, in the worst case, full closure. These measures would fail to serve passenger demand and would have operational repercussions throughout the PATH system. Absent WTC service, some passengers would divert to PATH's Christopher Street or 9th Street stations. The estimated addition of 2,300 AM peak hour passengers at each of these stations by 2025 would adversely impact their safe and efficient operation.	The Permanent WTC PATH terminal would provide added passenger capacity that would be required given the redevelopment of the WTC site. The Permanent WTC PATH Terminal would accommodate elements that the temporary WTC PATH station could not, including pedestrian linkages to surrounding buildings, all area NYCT subways lines, and more convenient access to trans-Hudson ferries. Multiple entrances and exits would reduce walking times to access and egress the new terminal, which would lead to shorter walking distances and commute times for many users. Thus, any potential impacts of the Permanent WTC PATH Terminal to its users and to PATH operations would be beneficial.
	Vehicular Traffic and Parking	The No Action Alternative may preclude PATH service to Lower Manhattan, resulting in upwards of 1,200 peak hour vehicle trips by 2025. These additional vehicle trips would result in possible adverse impacts at key locations, such as the Holland Tunnel and Route 9A. Furthermore, increased travel delays would be expected at key Lower Manhattan locations.	The Permanent WTC PATH Terminal would reduce traffic demand as compared to the No Action Alternative. Thus, the Preferred Alternative is not anticipated to result in adverse impacts to traffic operations.
	Transit	The No Action Alternative may preclude or impede PATH service to Lower Manhattan, resulting in the diversion of up to 158,000 daily trips to other modes of transit by the 2025 design year. These diverted PATH riders would increase congestion and hinder operations for these other transit modes. Added capacity could be provided on ferry and bus routes, but these additional boats and vehicles may result in additional adverse environmental impacts. New Jersey Transit commuter trains and PATH's uptown lines would experience extreme overcrowding and may not be able to provide for adequate capacity to meet ridership demand. Thus, the No Action Alternative would have long-term adverse impacts to transit service.	The Permanent WTC PATH Terminal would provide greater passenger capacity than the temporary WTC PATH station, which would serve to alleviate crowding on complementary transit services such as trans-Hudson ferry and bus service and downtown-bound subway service from Penn Station-New York. The Permanent Terminal would provide enhanced pedestrian connections between trans-Hudson ferries, NYCT subways, and PATH, which would improve transit access to, from, and within Lower Manhattan. Thus, the impacts of this alternative are expected to be beneficial.
	Pedestrians	Under the No Action Alternative, PATH customers may be diverted to other modes, which would change patterns of on-street circulation within the vicinity of the WTC site. Furthermore, absent the sub grade transit and building connections that are proposed as part of the Terminal, substantial volumes of commuters, office workers, and others would be diverted to street level, resulting in congestion on sidewalks and at street corners and crosswalks leading to and from the WTC site. It is anticipated that the No Action Alternative would result in pedestrian levels of service that would be worse than those in the area prior to September 11, 2001.	At the intersection of Church and Liberty Streets, the Preferred Alternative would add approximately 4,490 and 2,010 new pedestrian trips in the AM and PM peak hours, respectively. These trips would be added to a pre-September 11, 2001 baseline of 8,420 and 7,050 trips in the AM and PM peak hours, respectively, and would represent more than a 50 percent increase in volumes. This increase in trips would result in level of service (LOS) F conditions for the north and west crosswalks, which may cause pedestrians to spill into the opposing traffic travel lanes during the pedestrian signal. The loss in area per person would range from 1 to 10 SFP in the crosswalks, and from 1.3 to 12.4 in the northwest corner reservoir. The northwest corner reservoir LOS F in the AM peak hour would congest pedestrian flows when pedestrians are queued to cross away from the WTC/PATH site in the west and north crosswalks, and block pedestrians crossing inbound from the northeast and southwest corners of the intersection. Pedestrians normally crossing at Church and Liberty Street may divert to the Cortlandt or Cedar Street intersections, or illegally cross Church Street between Liberty and Cortlandt Streets. Pedestrians circulating through the northwest corner reservoir during surge conditions require more physical space than could be afforded in that area, which could force pedestrians to wait on the street in Liberty or Church Street vehicular travel lanes.

Table S-4 (Continued)
Probable Impacts of the Project Alternatives—Design Year

Resource Area	No Action Alternative	Preferred Alternative
Air Quality	Air quality in Lower Manhattan would improve upon the completion of construction of the Lower Manhattan recovery efforts. However, absent a Permanent PATH Terminal, there would be an increase in air pollutant emissions from the diversion of PATH customers to vehicular modes. By 2025, upwards of 15.7 tons of VOCs, 18.0 tons of NOx, 1.5 tons of PM10, and 236.0 tons of CO would be emitted by motor vehicles destined from New Jersey to Lower Manhattan if a Permanent WTC PATH Terminal were not built and temporary service was suspended..	The Preferred Alternative would reduce motor vehicle emissions as compared to the No Action Alternative. Therefore, the Preferred Alternative would have the beneficial impacts on air quality in the New York Metropolitan Area.
Noise and Vibration	In the design year, under the No Action Alternative, noise levels in the study area would be slightly higher than with the other Project Alternatives, due to the increase in vehicular traffic (autos and buses) expected to result from a reduction in, or the elimination of, PATH service. However, this expected increase in vehicular traffic would not likely increase noise levels substantially above current conditions.	The Preferred Alternative would not result in any operational transit noise or vibration impacts for uses that currently exist on the project site. However, this alternative would exceed the FTA criteria for ground-borne noise, for the most sensitive uses defined by FTA—concert halls, TV studios, recording studios, auditoriums and theaters. These uses were conservatively used to assess potential impacts at the WTC Memorial site. However, the WTC Memorial and the Preferred Alternative are being planned and designed cooperatively to ensure that transit noise from PATH operations would not adversely impact the WTC Memorial
Infrastructure and Energy	Because the No Action Alternative may generate new vehicle trips to Lower Manhattan, there would be additional fuel consumption and energy use.	Although the Preferred Alternative would be larger than the PATH facility that existed prior to September 11, 2001, advances in building materials and systems as well as the implementation of sustainable design measures are expected to result in energy demand that would be similar to or lesser than the pre-September 11, 2001 levels of consumption.
Contaminated Materials	It is unlikely that further development efforts in surrounding areas including the WTC site would cause any contaminated materials issues at the Project Site. Any soil contamination remaining on the WTC site would have been addressed independent of this alternative. Thus, the No Action Alternative would not have adverse impacts from the generation of or exposure to contaminated materials	Any contaminated materials encountered during construction would be removed from the WTC site. PATH uses limited quantities of hazardous materials and petroleum products, but such materials would not be stored on the WTC site. PANYNJ has established standard operating procedures, which include protocols for a hazardous material or petroleum spill. Thus, this alternative would not result in adverse impacts from the exposure to or generation of contaminated materials.
Natural and Water Resources	Any adverse impacts to natural and water resources under the No Action Alternative would result from the construction or operation of independent projects on or near the WTC site. The No Action Alternative itself would not result in adverse impacts to natural and water resources.	The use of glass as the primary material for the street-level terminal has the potential to result in day-time bird strikes. However, other above-grade elements of the Terminal are not expected to result in adverse impacts to terrestrial species. Stormwater generated on-site would be pretreated and would be discharged to the City's combined sewer system. Although elements of the Terminal would be located within the floodplain, its design and operation would incorporate floodplain control devices and would comply with a New York State Department of Environmental Conservation approved State Pollution Discharge Elimination Permit. The river water cooling system includes two existing intakes located on the eastern shore of the Hudson River near the World Financial Center. The New York State Department of Environmental Conservation is currently reviewing PANYNJ's application to renew their State Pollutant Discharge Elimination System (SPDES) permit for the river water cooling system. As part of this application, PANYNJ has prepared a Best Technologies Available (BTA) study that specifies measures to protect fish eggs and larve from entrainment and entrapment associated with the systems intake grates as follows: using 3 gallons per minute (gpm)/ton chillers; variable speed pumps; and modifying the intake structure with 2 millimeter (mm) wedgewire screens to reduce the approach velocity to 0.5 feet per second (fps) with a corresponding river water flow of 120,000 gallons per minute (gpm). While some level of impact to aquatic organisms due to entrainment of fish eggs (and much smaller numbers of larvae) is unavoidable utilizing the selected design, overall aquatic impacts are materially reduced from pre-September 11, 2001 conditions. The proposed system would eliminate the potential for impingement and would reduce entrainment of yolk-sac and post-yolk sac ichthyoplankton from pre-September 11, 2001 levels by an estimated 93 percent and 97 percent, respectively. In fact, virtually all (approximately 98 percent) of the entrained organisms are eggs, which are subject to high rates of natural mortality and fecundity. By excluding life stages of entrainable organisms with higher natural survival rates, the selected design minimizes the adverse environmental impact of the cooling water intake structures. The river water cooling system would be closed-circuit such that water extracted from the Hudson River would not be mixed with potable water or stormwater as it travels through the system. Therefore, the system would not alter the composition of Hudson River water. The BTA study specifies that the maximum designed change in temperature (ΔT) of the proposed river water cooling system is 10°F. Therefore, cooling water flow discharges would not result in temperatures in excess of the 90°F criterion, since the maximum ambient surface water temperature is 80°F, which is consistent with regulations set forth in 6 NYCRR Part 704. Therefore, the cooling water discharges would have no potential impacts to water temperature and water quality within the Hudson River.
Coastal Zone Management	Because the No Action Alternative would be inconsistent with long range development plans for Lower Manhattan and because it would not improve access between the WTC site and the waterfront, it would not fully support the policies of New York City's Local Waterfront Revitalization Program.	The Preferred Alternative would comply with a New York State Department of Environmental Conservation approved State Pollution Discharge Elimination Permit as well as agreements with the State Historic Preservation Officer to minimize or avert adverse impacts to water quality; cultural resources; and visual resources within the coastal zone. Therefore, this alternative would be consistent with the policies set forth in the New York City Local Waterfront Revitalization Program.

Table S-5
Environmental Performance Commitments

Commitment	Implementation Plan
Access and Circulation	
Establish a project-specific pedestrian and vehicular maintenance and protection plan.	PANYNJ will develop a Maintenance and Protection of Traffic Plan (MPT) as part of their contract documents for the Preferred Alternative. A Construction Traffic Management Plan (TMP) will also be developed for the Lower Manhattan Recovery Projects to address these issues in a broader sense. The TMP will be coordinated by PANYNJ, LMDC, MTA, NYSDOT, NYCDOT, the Lower Manhattan Construction Command Center, and others, as appropriate, based on updated construction scheduling and staging as the designs of individual projects are advanced.
Promote public awareness through mechanisms such as: a) signage; b) telephone hotline; and c) website updates.	The TMP will have a public outreach component to communicate traffic information, lane closures, access changes, and travel advisories for the duration of project construction.
Ensure sufficient alternate street, building, and station access during construction period.	For the Preferred Alternative, the MPT Plan included in the contract documents will be used to implement this EPC. The TMP will address the access issues for the Lower Manhattan Recovery Projects by coordinating the individual MPTs required and times for specific land uses and infrastructure (i.e. bus stops, transit stations, etc.).
Regular communication with New York City Department of Transportation and participation in its construction efforts.	PANYNJ will consult with NYCDOT to develop the MPT Plan for the Preferred Alternative. NYCDOT will be active in the development, update, and implementation of the TMP for the Lower Manhattan Recovery Projects.
Air Quality	
Use ultra low sulfur diesel fuel in non–road construction equipment with engine horsepower (HP) rating of 60 HP and above.	PANYNJ has developed specifications for non–road vehicles. The Authority would collect monthly samples of the ULSD fuel to verify compliance.
Where practicable, use diesel engine retrofit technology in non–road equipment to further reduce emissions. Such technology may include Diesel Oxidation Catalyst / Diesel Particulate Filters, engine upgrades, engine replacements, or combinations of these strategies.	In its contract documents, PANYNJ will require the use of DPFs or other measures with equivalent PM removal efficiency for all non-road diesel engines of 50 horsepower or greater wherever the implementation of such a device is technically feasible. In cases where such technology is not available, the use of DOCs will be required. (In the DEIS, the EPCs previously mandated controls only for engines of 60 horsepower or greater, and did not specify DPFs.) In cases where neither technology can be used effectively and the operation cannot be performed by another engine or other means, the use of diesel engines greater than 50 horsepower would be allowed without tailpipe reduction measures. In such cases, the constructor would submit a request for an exception for review and approval by PANYNJ prior to implementation.
Limit unnecessary idling times on diesel powered engines to 3 minutes	As part of the contract specifications, the contractor would provide a Diesel Emission Mitigation (DEM) Plan for review and prior approval by the Resident Engineer (RE). The DEM Plan shall address the control of emissions from all engines and vehicles including those that are not equipped with emission control devices.
Locate diesel powered exhausts away from fresh air intakes.	As part of the DEM, the contractor, as determined by the RE will be required to ensure diesel powered engines vehicles are located away from fresh air intakes.
Control dust related to construction site through a Soil Erosion Sediment Control Plan that includes, among other things: a) spraying of a suppressing agent on dust pile (non–hazardous, biodegradable); b) containment of fugitive dust; c) adjustment for meteorological conditions as appropriate.	PANYNJ has developed specifications for dust suspension, materials handing, and wheel washing. The specifications require the contractor to submit a Dust Control Plan which would be implemented 24 hours per day 7 days per week.
Noise and Vibration	
Where practicable, schedule individual project construction activities to avoid or minimize adverse impacts.	In accordance with Governor Pataki's November 22, 2004 Executive Order, PANYNJ will coordinate the scheduling and staging of construction activities through the Lower Manhattan Construction Command Center. The Command Center will review PANYNJ's plans in conjunction with other planned activities and will recommend schedule adjustments, as appropriate.
Coordinate construction activities with projects under construction in adjacent and nearby locations to avoid or minimize impacts.	Through the ongoing coordination efforts of the LMCCG and the Command Center, adverse noise and vibration effects on sensitive receptors will be minimized through scheduling and routing of deliveries, as well as coordination of street closures and placement of truck/equipment staging areas.
Consider condition of surrounding buildings, structures, infrastructures, and utilities where appropriate.	In accordance with the Project's executed Memorandum of Agreement, PANYNJ will perform pre-construction building conditions surveys of the potentially affected historic buildings within 90 feet of the Preferred Alternative's construction zone. These efforts would be coordinated with the other appropriate Lower Manhattan project sponsors for sites that may be affected by cumulative vibration.
Prepare contingency measures in the event established limits are exceeded.	The Permanent WTC PATH Terminal construction contractor will procure the services of a qualified acoustical firm (INCE certified or licensed Professional Engineer) to assist in the implementation of a Noise Control and Abatement Plan, which will include on-site noise monitoring during construction, and implementation of mitigation measures to ensure compliance with applicable noise exposure thresholds. Vibration monitoring specifications, and corrective actions in the event threshold levels are exceeded, will be included in the Construction Protection Plan pursuant to the Stipulations of the Project's executed MOA.
Cultural and Historic Resources	
Establish coordination among projects to avoid or minimize interruption in access to cultural and historic sites.	Access to cultural sites within the APE for the Preferred Alternative will be maintained, to the maximum extent feasible given public safety considerations, as part of the Preferred Alternative's Maintenance and Protection of Traffic (MPT) Plan. The TMP for all of the Lower Manhattan Recovery Projects will also coordinate access to cultural sites.
Initiate public information and involvement outreach with sensitivity to local cultural resources.	PANYNJ has coordinated with the Section 106 consulting parties to develop and execute a Memorandum of Agreement pursuant to Section 106 of the National Historic Preservation Act. The executed Memorandum of Agreement includes stipulations for ongoing coordination and consultation as the Preferred Alternative's design and construction moves forward. Materials pertaining to the Project's effects on cultural resources will made available on the project's website in accordance with the stipulations of the executed Memorandum of Agreement.
Identify public information outlets that will receive and provide current information about access during construction.	This EPC will be implemented through the Lower Manhattan Construction Command Center pursuant to Governor Pataki's Executive Order.
Consult with SHPO and LPC regarding potentially impacted, culturally significant sites. Monitor noise and vibration during construction at such sites as appropriate.	PANYNJ has and will continue to coordinate with the ACHP, SHPO, LPC, and the Section 106 consulting parties pursuant to the stipulations of the executed Memorandum of Agreement. As specified in the executed Memorandum of Agreement, PANYNJ will consult with SHPO and LPC to develop construction protection plans to monitor fragile buildings within the Preferred Alternative's APE and to stipulate measures to avert impacts to these structures. As described in the executed Memorandum of Agreement, PANYNJ will coordinate its CPPs with LMDC, MTA/NYCT, and/or NYSDOT, as appropriate, for those structures that may be cumulatively affected by construction vibrations.
Economic Conditions	
Coordinate with LMDC, Downtown Alliance or other entities to minimize residential and retail impacts as required through: a) relocation assistance, as applicable, to persons to businesses physically displaced by the project; and b) focus on essential business and amenities to remain in Lower Manhattan.	This would be implemented as part of the project's MPT Plan and the coordinated TMP. All businesses in the affected area would be mapped, in conjunction with the MPT and construction staging plans, to determine conflicts on business access. The MPT and TMP would then identify solutions to these conflicts.
Add appropriate signage for affected businesses and amenities.	This would be implemented as part of the project's MPT Plan.

Table S-6
Mitigation Measures—Construction Period

Resource Area	Mitigation Measures
Cultural Resources	The Project's executed Memorandum of Agreement (MOA) under Section 106 of the National Historic Preservation Act stipulates measures to avoid, minimize, or mitigate the Preferred Alternative's adverse impacts during and after construction. This section presents the stipulations pertinent to the construction period for effects to the WTC site, the Hudson River Bulkhead, and potential archaeology on the eastern portion of the WTC site. Measures to avoid or mitigate potential construction vibration impacts are described below under "Noise and Vibration," the measures to mitigate long-term impacts are described in Table S-7. HISTORIC RESOURCES WTC Site Documentation: PANYNJ will document the WTC site and its historic features to Level II standards of the Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER) prior to the removal or alteration of any historic features from the WTC site in connection with the undertaking of the Permanent WTC PATH Terminal. This documentation will consist of large-format, black-and-white photography of the site and its historic features as they currently exist; large-format photographic reproduction of selected existing drawings of current conditions and of pre-September 11, 2001 conditions; and a written history and description of the site and its historic features using information previously generated for the Coordinated DOE for the WTC site as well as the Permanent WTC PATH Terminal's DEIS and FEIS. PANYNJ will coordinate the photographic effort with the photographic efforts related to LMDC's fulfillment of Stipulation 1 as set forth in the April 22, 2004 Programmatic Agreement among the ACHP, LMDC, and SHPO for the WTC Memorial and Redevelopment Plan. PANYNJ will consult with SHPO and HABS/HAER to determine whether particular features warrant measured drawings, and any such drawings will be prepared by an individual with demonstrated experience in the preparation of measured drawings to HABS/HAER standards. The completed documentation will be submitted to SHPO and HABS/HAER for consideration. The large-format photographs prepared to HABS/HAER standards will consist of the views itemized in Exhibit H, "Schedule of Photographs" of the Project's MOA (see Appendix B). Tower Perimeter Column Bases: Up to 4 column bases in the North Tower could be temporarily removed by work to install other Project structures and infrastructure. Of the 4 column bases that could be affected by the Project foundation, those column bases that remain in situ undisturbed or are temporarily removed and returned to their original locations will be accessible following the completion of these foundations. Removing column bases, on either a temporary or permanent basis, will be considered only after practical engineering design options pursuant to Stipulations I., 2a and 2b, to preserve column bases in place have been exhausted. Column bases that are removed will be returned to their original locations if practical engineering design permits. Permanent removal of column bases will only take place as a last resort, and these column bases will be removed and stored in accordance with the stipulations of the MOA. The temporary PATH track (in addition to the existing 5 tracks) and associated ballast that will be installed on a temporary basis during construction of the Project tracks and platforms will be removed upon completion of the permanent tracks and platforms to re-expose the North and South Tower perimeter column remnants and portions of the North and South Tower footprints that may be covered by the temporary track and ballast. The construction fill currently on the footprints has been temporarily removed for the purposes of documentation of the footprints pursuant to Stipulation I.A. of the MOA, and will be replaced with clean rounded gravel as required after the documentation in order to protect the footprints and column remnants from ongoing construction. Further treatments may be specified in the Project's Resource Protection Plan. Steel Beams in Cross Form: PANYNJ will relocate the steel column and crossbeam mounted on a concrete pedestal and currently situated within the WTC site near Church Street in accordance with Stipulation VI of the MOA. The object will remain in the custody and control of PANYNJ pending final disposition of these artifacts in accordance with the rights of the respective owners. Resource Protection Plan for the WTC Site: PANYNJ, in consultation with SHPO and in coordination with LMDC and MTA/NYCT, as appropriate, shall develop a WTC Resource Protection Plan for the Permanent WTC PATH Terminal. The plan will be prepared to protect elements of the WTC site that are to remain in situ from inadvertent damage during the Terminal's construction. It will detail the Project's construction procedures and other construction plans for the site. It will provide for an inspection and reporting of the existing condition of elements, establish protection procedures, establish a monitoring program, and establish methods and materials to be used for any repairs. A historic architect, who meets the Secretary of the Interior's professional qualifications standards (48 FR 44716) in historic preservation, will be part of the design/construction team and will have the opportunity to review design drawing and specifications prior to construction. The plan will empower the Project's historic architect in consultation with the Chief Engineer of PANYNJ to issue "stop work" orders to prevent any unanticipated damage to historic properties. Recommencement of work will only be permitted once the Chief Engineer of PANYNJ and the historic architect are assured that appropriate modifications have been made to construction techniques to assure that no further damage will occur. PANYNJ will furnish copies of the Plan to SHPO, ACHP, and the Section 106 consulting parties for review and comment prior to its implementation. ARCHAEOLOGICAL RESOURCES In consultation with SHPO and NYSDOT, PANYNJ will develop and implement a plan to locate and identify intact portions of the Hudson River Bulkhead that will be affected by construction of the Permanent WTC PATH Terminal's east-west pedestrian connection. In the event that the intact portions of the Hudson River Bulkhead are identified, PANYNJ will, in consultation with the SHPO and NYSDOT, prepare an Archaeological Resource Treatment Plan for those portions of the Hudson River Bulkhead to be affected by the Project. The Archaeological Resource Treatment Plan will be submitted to SHPO and Section 106 consulting parties for their review and comment prior to implementation Prior to any Project-related subsurface disturbance at any of the locations that have been determined to be sensitive for historic archaeological resources, PANYNJ will, in consultation with the SHPO, and LMDC as appropriate, locate, identify, and evaluate the National Register eligibility of any archaeological resources at these locations in accordance with 36 CFR 800.4. In the event that FTA, in consultation with SHPO, determines that National Register-eligible archaeological resources will be adversely affected by construction of the Preferred Alternative, PANYNJ would, in consultation with FTA, SHPO, and LMDC as appropriate, and the Section 106 consulting parties, develop and implement an Archaeological Resource Treatment Plan for the Project. The Archaeological Resource Treatment Plan and documentation will adhere to the standards established by the Secretary of the Interior's Standards and Guidelines for Archaeology (48 FR 44716),including the standards therein for professional qualifications The plan will be submitted to SHPO and Section 106 consulting parties for their review and comment prior to implementation.
Vehicular Traffic and Parking	Project-generated vehicle trips will result in one construction period impact during the PM peak hour at the intersection of Route 9A and Liberty Street. A modest transfer of 5 seconds of green signal time from the Liberty Street approach to Route 9A will mitigate this adverse impact. NYSDOT has committed to prepare a construction-period traffic circulation plan. PANYNJ will incorporate this mitigation into the Preferred Alternative's Maintenance and Protection of Traffic (MPT) Plan and will coordinate this project-specific mitigation with NYSDOT as part of the Transportation Management Plan for the Lower Manhattan Recovery Projects.

Table S-6 (Continued)
Mitigation Measures—Construction Period

Resource Area	Mitigation Measures
Air Quality	In addition to measures identified in the original EPCs, PANYNJ would implement the following mitigation to further reduce project-generated emissions during the construction period. • Ultra Low Sulfur Diesel Fuel (ULSD): As described in the EPCs, PANYNJ would require that contractors use ULSD for all non-road vehicles that operate with diesel engines. • Electrification: PANYNJ or its contractor would develop a plan, in consultation with Con Ed, as appropriate, to disperse grid power throughout the contraction zone for the Preferred Alternative. In its contract documents, PANYNJ would require all contractors and subcontractors to use electrically powered equipment for air compressors, pumps, mixing, desanding and grout plants, welding machines, and any other diesel powered equipment that can be replaced with an electrically powered version. However, this does not apply to the east-west pedestrian concourse beneath Route 9A if the concourse is built by NYSDOT, since NYSDOT has not yet finalized what level of electrification would be possible for its projects. Given current conditions, it is expected that at lest 50 percent of the air compressors, pumps, mixing, desanding and grout plants, welding machines, and other diesel powered equipment that can be replaced with an electrically powered version would operate on electric power sources. • Advanced Reduction Technologies: In its contract documents, PANYNJ would require the use of Diesel Particle Filters (DPFs) or other measures with equivalent PM removal efficiency for all nonroad diesel engines of 50 horsepower or greater wherever the implementation of such a device is feasible. However, there may be cases where DPFs would not be feasible for safety considerations, mechanical reasons, or where the technology would not function properly. In such cases, the constructor would submit a request for an exception for review and approval by PANYNJ prior to implementation, and in these cases, DOCs may be used. Only in cases where, for technical reasons, neither DPFs or DOCs can be used effectively, and where the operation cannot be performed by another engine or other means, would the use of diesel engines greater than 50 horsepower be allowed without tailpipe reduction measures, subject to the above described approval process. • Newer Engines: In its contract documents, PANYNJ would require the use of post-1995 fuel injection engines, which meet the Tier II engine emissions standards, as defined in Title 40, Part 89.112. Exceptions will be made only for specific engines that are not yet commercially available as Tier II, and where the task cannot be reasonably accomplished using alternative engines or means which do comply with these demands. In such cases, the contractor would submit a request for an exception for review and approval by PANYNJ prior to implementation. • Diesel Emission Mitigation (DEM) Plan: PANYNJ would require contractors to prepare a DEM Plan that shall address the control of emissions from all engines and vehicles including those that are not equipped with emission control devices. As described in the EPCs, the DEM Plan would limit idling times on diesel powered engines to 3 minutes and would require that contractors locate diesel powered engines away from fresh air intakes. • Dust Control Plan: As described in the EPCs, PANYNJ would require contractors to submit a Dust Control Plan. Among other things, the plan would contain protocols and procedures for the spraying of dust piles, containment of fugitive dust, and appropriate adjustment measures to accommodate changes in meteorological conditions. • Verification: The effectiveness of measures to reduce construction period emissions depends on compliance. To that end, verification procedures would be implemented through construction specifications and contract documents. PANYNJ would verify mitigation and would identify opportunities to expand its implementation as part of its ongoing oversight and auditing of the Project's construction. Furthermore, verification procedures would be implemented in accordance with decisions of the Lower Manhattan Construction Command Center, including procedures for reporting updates to the public. • Other Emissions Reduction Technologies: PANYNJ is and will continue to investigate additional means (e.g., fuel emulsions) to reduce NOx (NO and NO2) emissions, but it is not yet known whether these measures would reduce the effectiveness of the above described mitigation. Therefore, specific means to further reduce NOx have not been identified in the mitigation plan for the Preferred Alternative at this time. If this investigation results in additional means to reduce NOx without jeopardizing the PM reduction measures and if other constraints such as technological availability are resolved, then PANYNJ would implement these additional mitigation techniques, as appropriate.
Noise and Vibration	NOISE PANYNJ will require contracts to use specific equipment during phases of construction to reduce noise levels below the FTA impact criteria. During the permanent track, platform, and mezzanine construction contractors will be required to use Impact wrenches with noise emission level of 82 dBA at 50 ft^2 and mufflers on pavement breakers. During the construction of the east-west concourse, contractors will be required to place air operated grout drills inside acoustical enclosure. VIBRATION PANYNJ, in consultation with SHPO and Section 106 consulting parties, and in coordination with LMDC, NYSDOT, and MTA/NYCT, where appropriate, shall develop a Construction Protection Plan (CPP) for the Preferred Alternative. The CPP will set forth measures for the protection and avoidance of structural and architectural damage to the 5 historic properties within 90 feet of the construction zone. The CPP will be based on requirements in the "New York City Department of Buildings Technical Policy and Procedure Notice (PPN) #10/88" regarding procedures for the avoidance of damage to historic structures resulting from adjacent construction. The PPN defines adjacent historic structures as being contiguous or within a lateral disturbance of 90 feet from a lot under development or alteration. The CPP will describe in detail the construction procedures of the Preferred Alternative, as well as the construction procedures associated with other projects under construction in the vicinity of each of these historic properties. It will also provide for the inspecting and reporting of existing conditions at these properties, establish protection procedures, establish a monitoring program to measure vertical and lateral movement and vibration, establish and monitor construction methods to limit vibration; and establish methods and materials to be used for any repairs. The plan shall also specify the implementation of special vibration protection measures to protect these historic properties from increased vibration levels associated with construction activities. The CPP will provide for a historical architect meeting the Secretary of Interior's Standards to supervise implementation of the CPP. The CPP will empower the historical architect, in consultation with the Chief Engineer of PANYNJ to issue "stop work" orders to prevent any damage to historic properties, and any recommencement of work shall only be permitted at such time that the Chief Engineer and historical architect have assurance that the appropriate modifications have been made to the construction technique to assure that no damage will occur to historic properties.
Contaminated Materials	PANYNJ will require contractors to prepare a Health and Safety Plan (HASP) as part of contract documents and will be in conformance with the above described goals/objectives and will include elements outlined in the following framework: • Identification of potential contaminants and, as necessary, development of a soil or ground water sampling plan to determine contaminant concentrations in environmental media; • Identification of thresholds or action levels for contaminants and development of procedures for modification or cessation of work activities based on field screening result; • Worker health and safety training including the identification of a project health and safety officer who will be responsible for overall oversight and will maintain all appropriate documentation of safe working conditions and permits/approvals for the management of construction related wastes and residuals; • Development and implementation of field screening for contaminant detection and worker health and safety; • Identification of PPE to be used (worn) during specified phases of construction; • •Development and implementation of a Soil Management Plan identifying the methods to be used in handling, staging, disposal, transportation, and decontamination of equipment and personnel in accordance with local, state, and federal regulations; • Development and implementation of a Ground Water Management Plan to address dewatering actions from ground water infiltration and overland stormwater and the methods to be used in handling, staging, disposal, transportation, and decontamination of equipment and personnel in accordance with local, state, and federal regulations; • Development and implementation of a Dust Management Plan to address dust generated through excavation or general construction activities; • Development and implementation of management plans to address PCBs and asbestos; and, • Identification of proposed licensed waste haulers and disposal/recycling facilities, for the transportation and disposal/recycling of waste materials generated from the project. The project specific HASP will be in accordance with all applicable local, state, and federal regulations and will document that safe conditions relative to onsite workers and the public are maintained throughout the project.

Table S-7
Mitigation Measures—Design Year

Resource Area	Mitigation Measures
Cultural Resources	As noted in Table S-6, the Project's executed MOA includes stipulations to avoid, minimize, or mitigate the Project's long-term use of the National Register-eligible WTC site. As such, the Terminal will incorporate certain design elements to preserve or acknowledge remaining remnants and structures as follows. Tower Perimeter Column Bases: Up to a total of 5 column bases in the North Tower and up to a total of 3 column bases in the South Tower may be temporarily or permanently removed to construct PATH Platform D. Where Platform D will intersect the northeast corner of the North Tower footprint, the platform will be clear of vertical obstructions and architectural treatments will be used to symbolically represent the location of the footprint. A minimum of 5 to a maximum of 7 column bases of the east column line of the North Tower will be visible from Platform D. The viewing area will consist of a glass wall tilted inward from the platform combined with a mirrored wall to the west to provide a view of the column bases from this area of the platform. Appropriate signage, graphics, and lighting will complete the viewing area. The locations of column remnants of the South Tower that may be removed or permanently obscured by PATH platforms B, C, and D will be symbolically represented on these platforms through architectural treatments that define and differentiate the portions of the infrastructure that are within the Tower footprint areas. These treatments may include color differentiation, texture differentiation, symbolic representation of Tower perimeter column remnants, and/or an emblematic marker designating the location of the historic resource. East-West Slurry Wall: The design for the Preferred Alternative will provide visibility from within the Terminal to a portion of the east or west slurry wall if the following criteria are met: the condition of the slurry wall evokes the image now understood to represent the historic nature of the wall (e.g. tiebacks are part of the area to be exposed, tiebacks project beyond the re-stabilized slurry wall); the exposure provided will enable a view of the slurry wall that is clear, recognizable, and respectful of the slurry wall; and the exposure will not pose a safety hazard to the public from exposed finishes of the wall or its components. The design for the east-west pedestrian concourse shall include a location from which the members of the public may view a plaque and photograph of the west slurry wall. Passageway to the NYCT Subway Station (E Train): The new pedestrian connection between the Permanent WTC PATH Terminal and the MTA/NYCT WTC E Subway Station will incorporate the existing E subway entrance, in its current location, in a manner that retains existing materials and features of this entrance, including, but not limited to, the handrails, the travertine flooring, the steps and doors separating the E train from the pedestrian connection, and overhead signage, to the extent possible and in accordance with current building codes and Americans with Disabilities Act requirements. The design will include, at a minimum, a plaque identifying the historic features of the E subway entrance.
Pedestrians	At the intersection of Liberty and Church Streets, LOS F conditions will result on the northwest corner reservoir, and in the north and west crosswalks in the AM peak hour. More aggressive mitigation will be required at this location, consisting of widening crosswalks by 11 feet and sidewalks by six feet. PANYNJ will coordinate these improvements along with other crosswalk widenings in the vicinity of the WTC site with LMDC and the New York City Department of Transportation.
Noise and Vibration	PANYNJ will incorporate acoustical and vibration treatments as part of the Terminal to reduce sound levels and prevent reverberation with the WTC Memorial. Examples of acoustical treatments include absorptive acoustical panels and enclosures, acoustical louvers, dampers, silencers, absorptive duct linings and plenums, and mufflers. Examples of vibration reduction treatments being considered for the PATH tracks include use of resilient fasteners, ballast mats, resiliently supported ties, and floating slabs.
Natural and Water Resources	TERRESTRIAL RESOURCES The preliminary design of the terminal building poses some concern for fatal strikes by migratory birds both during the day and at night. Measures that have the potential to reduce daytime bird strikes include: • Place attractants (such as feeders or vegetation) either within 1 foot of the glass surface so that birds that have been attracted to them do not build up enough momentum to sustain serious injury if they hit the glass upon departure, or more than 33 feet from the glass surface; • Transform glass into a recognizable obstacle by uniformly covering glass surfaces with a decorative grid with 2- to 4-inch intervals; • Angle windows such that the panes reflect the ground instead of surrounding vegetation and sky; • Minimize use of reflective glass; and • Minimize the illumination of interiors behind clear glass and the visibility of indoor plants from outside (Klem 1990b, Klem 1991 in Ogden 1996). Measures that have the potential to decrease bird strikes of nocturnal migrants include: • Minimize amount of light emanating upward during the migratory season; and • Minimize exterior floodlighting during the migratory season. Measures to reduce potential impacts to birds from striking the surface of the street-level terminal, such as those presented above, and to minimize the potential for birds to enter the building through an opening in the top of the structure, will be explored during final design. PANYNJ will explore all feasible, cost effective, and practical measures for reducing bird strikes that are in keeping with the Terminal's design concept. FLOODPLAINS Existing and rehabilitated flood protection measures will be implemented as part of the Preferred Alternative. As such, flood control will meet or exceed pre-September 11, 2001 conditions. Stormwater discharges will be managed with an approved Stormwater Pollution Prevention Plans (SWPPPs) and established regulatory programs to minimize potential impacts to floodplains, groundwater, water quality, and aquatic resources.

Substantial impairment occurs only when the protected activities, features, or attributes of the resource are substantially diminished.

For the Permanent WTC PATH Terminal, a Section 4(f) evaluation has been prepared for the following reasons:

- The Permanent WTC PATH Terminal would be constructed within the boundaries of the approximately 16-acre WTC site (National Register-eligible) and would have an effect on this historic resource;
- The project would an adverse effect on the Hudson River Bulkhead (State and National Register-eligible);
- The project may require alteration or removal of potential archaeological resources within the eastern portion of the WTC site; and
- The project's construction may result in vibration impacts to known historic buildings within 90 feet of the project's construction zone. These resources are as follows: Barclay-Vesey Building, Former East River Savings Bank; St. Paul's Chapel and Graveyard; Beard Building; and 114-118 Liberty Street.

Both of the Project Alternatives—No Action and the Preferred Alternatives—was evaluated for their potential use with respect to Section 4(f) rules and regulations, and it was determined that each would have adverse effects to one or more of the Section 4(f) resources identified above. Alternatives were explored to determine if the Project's goals and objectives could be met without the use of the Section 4(f) resources. Two alternatives, No PATH Service to Lower Manhattan and Relocate PATH Projections could avoid one or more of the Section 4(f) resources. Although the Draft Section 4(f) statement concluded that these alternatives were feasible, they were not prudent. The U.S. Department of the Interior concurred with this finding in a letter dated July 30, 2004.

Since it has been determined that no prudent and feasible alternative would avoid the use of all of the Section 4(f) resources, PANYNJ and FTA implemented measures to minimize harm through the medium of the project's MOA pursuant to Section 106 of the National Historic Preservation Act. As described above, the MOA stipulates measures to avoid, minimize, and mitigate the Project's effects to the WTC site and the Hudson River Bulkhead.

F. CUMULATIVE EFFECTS

Generally, the long-term cumulative effects of projects currently planned for Lower Manhattan are beneficial while some of the short-term effects are adverse. Because the Lower Manhattan Recovery Projects are either improvements to existing infrastructure or replacements of facilities destroyed on September 11, 2001, they have been planned with the specific purpose of economic recovery coupled with improvements to the environment of Lower Manhattan. This is particularly true with respect to transportation, since all five of the federal Lower Manhattan Recovery Projects include elements that would improve access to, from, and within Lower Manhattan as compared to pre-September 11, 2001 conditions. However, to attain these goals, the area would experience an intense level of construction over the next several years. Therefore, this cumulative analysis gives a greater focus to minimizing and mitigating of the potential adverse effects during construction of these projects.

As described above in "Approach to Cumulative Effects," construction schedules for the World Trade Center Memorial and Redevelopment Plan, Route 9A Project, and Permanent WTC PATH Terminal have been delayed such that there would be less overlap of the peak construction activities for the five Lower Manhattan Recovery Projects. The effects of the construction schedule changes was studied, and it was determined that the impacts would not change substantially as compared to the analysis presented in the DEIS. Furthermore, the mitigation measures that are proposed would continue to be sufficient.

CONSTRUCTION PERIOD

ACCESS AND CIRCULATION

Vehicular Traffic

The *WTC Memorial and Redevelopment Plan FGEIS* contains a comprehensive examination of expected traffic conditions in the peak construction year for Lower Manhattan Recovery Projects. The analysis of cumulative traffic effects considered a total of 24 intersections. Overall, future conditions with the construction activities for the Lower Manhattan Recovery Projects would result in adverse traffic impacts at 6 intersections as follows:

- Route 9A and Vesey Street (AM peak hour)
- Church Street and Chambers Street (AM and PM peak hours)
- Church Street and Barclay Street (AM peak hour)
- Church Street and Cortlandt Street (midday peak hour)
- Broadway and Canal Street (PM peak hour)
- Broadway and Worth Street (AM, midday, and PM peak hours)

The mitigation of cumulative traffic effects of the various Lower Manhattan construction activities would also be a coordinated effort under the auspices of NYSDOT and NYCDOT, since both agencies have jurisdiction over the affected roadways. As described in the Route 9A Project SDEIS, NYSDOT would prepare a Maintenance and Protection of Traffic (MPT) Plan on behalf of the Lower Manhattan project sponsors through the either the Command Center or the Lower Manhattan Construction Coordination Group, as appropriate. The MPT Plan would include input from PANYNJ, MTA/NYCT, LMDC, and NYCDOT and would specify measures to stage construction areas (e.g., lane and sidewalk closures) while ensuring the proper circulation of traffic through Lower Manhattan (e.g., traffic diversions, parking restrictions, signal timing adjustments).

Pedestrians

Generally, crosswalks in the vicinity of the WTC site would operate at level of service D (LOS) or better during the critical construction year, and there would be no change in LOS as compared to baseline conditions. However, there would be deterioration to LOS E conditions at the intersections of Church Street and Dey Street and at Church Street and Cortlandt Street in the AM and PM peak hours. As describe above, a MPT Plan will be prepared for the Lower Manhattan Recovery Projects. This plan will include measures to ensure that safe and efficient pedestrian access and circulation is maintained throughout the construction period. Such measures may include signal timing adjustments; protected pedestrian walkways, and crossing guards. It is anticipated that the MPT Plan would be administered by the Command Center in coordination with NYSDOT, NYCDOT, PANYNJ, LMDC, and MTA/NYCT.

AIR QUALITY

The analysis of the potential cumulative impact of activities related to the construction of the Permanent WTC PATH Terminal and the other Lower Manhattan Recovery Projects on air quality consider both stationary (e.g., on-site equipment) and mobile (e.g., trucks) sources. Since almost all stationary construction equipment and trucks use diesel engines, the main pollutants of concern for local analysis are particulate matter, and nitrogen dioxide, emitted both as engine exhaust and fugitive dust, and analyzed as $PM_{2.5}$ and PM_{10}, and NO_2. An analysis of the effects of truck traffic on carbon monoxide (CO) concentrations was also conducted.

The cumulative air quality assessment was modified since publication of the DEIS to reflect changes in the project commitments for the WTC Memorial and Redevelopment Plan as well as to describe both alternatives for the Route 9A Project. LMDC incorporated additional mitigation measures (e.g., electrification and diesel particle filters) in their ROD for the WTC Memorial and Redevelopment Plan. These measures were included in this cumulative effects analysis. Furthermore, analysis was prepared for both the at-grade and short bypass alternatives for Route 9A since construction methods for both Route 9A and PATH's east-west concourse would vary.

All diesel construction engines, excluding on-road trucks, would use ultra-low sulfur diesel (ULSD) fuel. Furthermore, per the guidance of the original EPCs, engines larger than 60 horsepower (HP) would include emissions reduction measures to reduce emissions of PM and volatile organic compounds (VOCs). For the purpose of the base case analysis (i.e. without additional mitigation beyond the original EPCs), it was assumed that PM emissions from all such engines would be reduced by 40 percent—the reduction achieved by using diesel oxidation catalysts (DOC).

Maximum predicted CO concentrations in the critical analysis year were predicted at two intersections along Route 9A. These locations are of concern because of the high level of traffic currently using the roadway and the potential for construction vehicles to adversely affect traffic flow and thereby increase CO emissions at critical intersections. The analysis includes all construction vehicles from the five major Lower Manhattan Recovery Projects, which totals approximately 2,000 per day. Approximately, a third of the construction vehicles would use Route 9A to access the WTC, PATH, and Route 9A construction work areas. Maximum predicted 8-hour average CO concentrations would increase by 0.6 parts per million (ppm) over the condition without any activity from the five major projects. With that increase, total CO concentrations would still be well below the National Ambient Air Quality Standards (NAAQS).

Under the Route 9A at-grade alternative, the maximum increase in PM_{10} concentrations would be 117.9 $\mu g/m^3$ on a 24-hour basis and 4.0 $\mu g/m^3$ on an annual basis in close proximity to the site. These potential maximums would occur at the temporary bikeway along Route 9A or at the intersection of Vesey and Route 9A. The incremental increase in the 24-hour PM_{10} concentrations would exceed the NAAQS; however, with the enhanced mitigation measures described below this exceedance would not occur. Increases in PM_{10} at other locations would be significantly lower, with a maximum increase at residential locations of 26.5 $\mu g/m^3$ and 2.5 $\mu g/m^3$ on a 24-hour and annual basis, respectively.

Under the Route 9A at-grade alternative, the predicted increase in maximum $PM_{2.5}$ concentrations in the immediate vicinity of the sites would be a maximum of 82.5 $\mu g/m^3$ and 2.4 $\mu g/m^3$ on a local 24-hour average and annual average basis, respectively. The annual average increase in neighborhood scale $PM_{2.5}$ concentrations would be 0.42 $\mu g/m^3$. The maximum predicted increase in $PM_{2.5}$ concentrations would exceed the interim guidance threshold values

established by the New York State Department of Environmental Conservation. Concentrations decrease rapidly with distance from the construction sites and exceedances would not be expected at approximately 1,300 feet from the sources. However, exceedances could occur at residential receptors in closer proximity if enhanced mitigation measures were not implemented. With mitigation, increases in $PM_{2.5}$ would be reduced by approximately 66 percent, and the potential exceedance of the interim guidance thresholds would be limited to a small area adjacent to Route 9A.

The NO_2 concentrations were predicted to increase substantially under the Route 9A at-grade scenario with a maximum increment of 21.5 $\mu g/m^3$ in the immediate vicinity of the site, with the total concentration, including background levels, potentially reaching 93.5 $\mu g/m^3$. Although exceedances of the NO_2 standard are not predicted, the U.S. Environmental Protection Agency expressed concern about NO_2 as it is a precursor to ozone. The mitigation proposed to reduce particulate matter (e.g. electrification) would also reduce NO_2 emissions.

Under the Route 9A short-bypass alternative the maximum 24-hour increase in PM_{10} concentrations of 86.5 $\mu g/m^3$ an annual increase of in PM_{10} 17.1 $\mu g/m^3$, and the annual 24.3 $\mu g/m^3$ increase in NO_2 would not exceed the NAAQS. However, the maximum annual increase in $PM_{2.5}$ of 2.4 $\mu g/m^3$ and maximum 24-hour increase of 68.4 $\mu g/m^3$ would exceed the interim guidance threshold values. Similar to the at-grade alternative for Route 9A, concentrations under the short bypass scenario decrease substantially with distance from the construction sites; however, without additional mitigation there would continue would be an exceedance of the $PM_{2.5}$ interim guidance thresholds at residential receptors.

Since publication of the DEIS, the Lower Manhattan project sponsors have committed to additional mitigation that was not originally contemplated with the EPCs. The following describes these commitments.

- Electrification: Certain construction engines that operate in a fixed or temporarily fixed position, such as welding machines and compressors, could potentially be connected to the City's power grid if available by Con Edison at the start of construction. The electrification of this equipment would eliminate the on–site diesel exhaust from these sources. However, in some cases, electrification may not prove effective due to the need for mobility, and some local power generation may be needed where connection points are not available. MTA/NYCT and PANYNJ would require all contractors and subcontractors to use electric power for all diesel powered equipment that can be replaced with an electrically powered version unless access to grid power is not available. However, this does not apply to PATH's pedestrian concourse beneath Route 9A if it is constructed by NYSDOT since NYSDOT has not finalized what level of electrification is possible for its project.

- Diesel Particle Filters (DPFs): Technologies are available that can achieve greater reductions in particulate matter emissions as compared to DOCs. DPFs, for example, can reduce particulate matter emission by at least 85 percent and as high as 98 percent. However, DPFs are not effective for every type of engine operation, and there may be technical difficulties in applying DPFs to some engines. The Lower Manhattan project sponsors would require the use of DPFs or other measures with equivalent PM removal efficiency for all nonroad diesel engines of 50 horsepower or greater wherever the implementation of such a device is commercially available. At this time, it is assumed that DPFs can be used on 75 percent of nonroad diesel engines and that the remaining 25 percent could employ DOCs.

- Newer Engines: The use of new construction engines would ensure that older, higher polluting engines are not operating on–site and would make the operation of added control technologies easier and more efficient. The Lower Manhattan project sponsors would require the use of post-1995 fuel injection engines, which meet the Tier II engine emissions standards, as defined in Title 40, Part 89.112. Exceptions will be made only for specific engines that are not yet available as Tier II, where the task cannot be reasonably accomplished using alternative engines or means to comply with these demands. However, given current technology, it is assumed that all engines would be Tier II compliant.
- The Lower Manhattan project sponsors are investigating the use of other methods to reduce NO_2 emissions. However, given the current uncertainty, additional NO_2 reduction techniques were not assumed as part of the cumulative mitigation analysis.

With these enhanced mitigation measures, the potential exceedance of the PM_{10} 24–hour, NAAQS would be eliminated. Furthermore, the cumulative $PM_{2.5}$ increment would be reduced by approximately 66 percent and the potential for exceedance of 24-hour, interim guidance thresholds for $PM_{2.5}$ would be reduced to a single location, the temporary Route 9A bikeway. As described above, the NO_2 NAAQS would not be exceeded during construction. However, the proposed electrification of motors would significantly reduce NO_2 emissions, and levels of NO_2 would be further reduced if NYSDOT commits to some level of electrification for the Route 9A Project.

NOISE AND VIBRATION

The analysis of cumulative construction noise considered twelve receptor sites in Lower Manhattan. Without mitigation, the predicted cumulative levels would exceed the recommended 8-hour L_{eq} and 30-day L_{dn}/L_{eq} thresholds at the Hilton Millennium Hotel, the World Financial Center, and 114 Liberty Street, and 4 Albany Street. Cumulative levels would also exceed the recommended 8-hour L_{eq} threshold at St. Peter's Church. The Preferred Alternative, itself, would result in significant adverse noise impacts at the Hilton Millennium Hotel, the World Financial Center, and 114 Liberty Street, but these project-generated impacts would be mitigated as identified above (see Table S-5). Although the Preferred Alternative would not contribute substantially to the cumulative noise levels at 4 Albany Street and St. Peter's Church, PANYNJ, in coordination with the other Lower Manhattan project sponsors, is investigating additional measures to reduce construction period noise as described below.

PANYNJ and the other major Lower Manhattan Recovery Projects are developing construction noise mitigation measures, examples of which are provided below. Implementation of these mitigation measures is expected to minimize or eliminate construction-related individual and cumulative noise impacts. The sponsors are coordinating their efforts through the Lower Manhattan Construction Coordination Group.

- The use of acoustic barriers and walled enclosures around certain construction activities. For example, noise tents/enclosures could be used around workers using jackhammers. A temporary noise barrier of 20 feet in height could be installed along the fence line/property line of the construction zone to reduce the noise levels. In addition, temporary barriers (e.g., wood panels on top of Jersey barriers) could also be positioned adjacent to and moved along slurry walls and other construction operations, etc.;
- The placement of construction equipment in shielded locations, such as below grade in the Project Site;

- The installation of silencers on jackhammers, air compressors, generators, light plants, and cranes to reduce noise levels at specific locations (i.e., adjacent to existing residential);
- The use of electrically operated equipment, rather than combustion equipment;
- The use of soil beds, timber planking and/or exterior rubber lining on truck body and aluminum carrying case to reduce rock impact noise during truck load/unloading operations;
- The use of drive-through street-level truck enclosures for truck loading and unloading;
- The use of sheds/enclosures at concrete pump sites during concrete truck unloading; and
- The placement of most loading/unloading inside the bathtub and away from areas at street level.
- The designation of central areas within projects for noisy activities, such as cutting steel or wood or use of noisy equipment such as impact wrenches. Use of pre-cut, pre-fabricated, or modular construction materials that minimize need for on-site fabrication or cutting methods.

Programmatic measures to control construction noise levels would be undertaken throughout the construction period. These programmatic measures would be administered through either the Command Center and/or the Lower Manhattan Construction Coordination Group and may include:

- Enforcement of designated truck routes during construction;
- Adherence to construction equipment noise performance standards specified by EPA and possible development of additional standards by the LMCCG;
- Noise monitoring before construction begins, to establish baseline noise levels, and ongoing monitoring during the various construction phases; and
- Evaluation of the noise reduction potential, and cost effectiveness, of alternative construction methods and/or changes to the sequencing of construction activities.

Cumulative construction of the Lower Manhattan Recovery Projects would result in varying degrees of vibration, depending on the stage of construction, the equipment and construction methods employed, and the distance from the construction to buildings and vibration sensitive structures. Construction equipment such as pile drivers can produce levels that exceed the 0.12 and 0.20 inches per second vibration damage threshold criterion for fragile buildings at distances of 50 feet. At distances closer to the construction zone (20 feet or less), additional equipment such as clam shovel drop, caisson drilling, and large bulldozers can produce levels exceeding the vibration threshold criterion for fragile and some extremely fragile buildings. Predicted vibration levels would be 0.23 or greater at the historic/fragile buildings within 50 feet from the construction area, during activities such as pile driving. The structures most prone to potential cumulative vibration impacts are located along Fulton and Dey Streets between Church Street and Broadway, on Liberty Street west of Church Street, and on West Street near Vesey Street.

As described in the executed MOA for the Permanent WTC PATH Terminal, PANYNJ, in consultation with the State Historic Preservation Officer (SHPO) and in coordination with other Lower Manhattan project sponsors, as appropriate, would develop a Construction Protection Plan (CPP) based on the requirements laid out in the "New York City Department of Buildings Technical Policy and Procedure Notice #10/88." The CPP would avoid or minimize vibration for historic resources within 90 feet of the Terminal's construction zone.

CULTURAL AND HISTORIC RESOURCES

The Permanent WTC PATH Terminal's Area of Potential Effect (APE) contains 21 resources that are listed or are eligible for listing on the National and New York State Registers of Historic Places and/or as a New York City Landmark. The assessments of potential impacts identified 9 sites within the APE that may be impacted by the Permanent WTC PATH Terminal's construction. Because construction of the South Ferry Terminal would occur outside the APE for the Permanent WTC PATH Terminal, there is no potential for cumulative construction-period impacts from the combination of these projects. However, construction of the WTC Memorial and Redevelopment Plan, Fulton Street Transit Center, and the Route 9A Project would have cumulative construction-period effects to seven resources within the APE that may also be impacted by the Permanent WTC PATH Terminal as follows:

- Hudson River Bulkhead, Battery to 59th Street;
- Barclay-Vesey Building, 140 West Street;
- St. Paul's Chapel and Graveyard;
- Former East River Savings Bank Building, 26 Corlandt Street;
- 114-118 Liberty Street;
- Beard Building, 125 Cedar Street; and
- The WTC site.

The cumulative construction of the Permanent WTC PATH Terminal, Fulton Street Transit Center, Route 9A Project, and World Trade Center Memorial and Redevelopment Plan may generate ground-borne vibration impacts at the Barclay-Vesey Building, St. Paul's Chapel and Graveyard, Former East River Savings Bank Building, 114-118 Liberty Street, and the Beard Building. Per the stipulations of the executed MOA for the Permanent WTC PATH Terminal, these potential impacts would be resolved through a coordinated CPP, which would establish the sensitivity of fragile structures and provide stipulations to protect them during construction of the Lower Manhattan Recovery Projects. As per the guidance of the EPCs, PANYNJ would coordinate with the SHPO, the New York City Landmarks Preservation Commission, the appropriate Lower Manhattan Project Sponsors, and Section 106 consulting parties to develop and implement these plans.

The Hudson River Bulkhead may be cumulatively affected by the construction of PATH's east-west concourse and Route 9A. As described in the executed MOA for the Permanent WTC PATH Terminal, PANYNJ would develop and implement a plan to locate and identify intact portions that would be affected by the concourse's construction. This plan would be developed in consultation with SHPO and in coordination with NYSDOT. In the event that intact portions of the Bulkhead are identified within the vicinity of the east-west pedestrian concourse, PANYNJ, in consultation with SHPO and in coordination with NYSDOT, would prepare an Archaeological Resource Treatment Plan for these portions of the Bulkhead.

The executed MOA also provides for stipulations to address potential cumulative effects from construction on the WTC site. As described in the MOA, PANYNJ would request that all agencies constructing projects within the WTC site submit preliminary and pre-final documents to PANYNJ. PANYNJ and its designated historic preservation consultant would consult with SHPO and the Lower Manhattan Emergency Preservation Fund to asses whether there would be potential for a cumulative adverse effect from the Permanent WTC PATH Terminal and other WTC site projects based on the preliminary and pre-final plans. If SHPO and PANYNJ, agree that planned or completed activities would result in cumulative adverse effects on the WC site,

then PANYNJ would consider measures with respect to the Permanent WTC PATH Terminal to mitigate or minimize these effects, including technical or financial measures for the protection, stabilization, or repair of resources and/or modifications to the Preferred Alternative's design. PANYNJ would make its documentation of potential cumulative effects and accompanying mitigation plans available for review by the National Park Service, the Advisory Council on Historic Preservation, the Lower Manhattan project sponsors, and the Section 106 consulting parties. PANYNJ's plans to minimize or mitigate adverse cumulative effects would also consider the stipulations within the Programmatic Agreements for the World Trade Center Memorial and Redevelopment Plan, the Route 9A Project, and the Fulton Street Transit Center.

ECONOMIC CONDITIONS

The Lower Manhattan Recovery Projects would create thousands of construction jobs. Not only would these projects spur employment in Lower Manhattan, but they would provide jobs for the region, as a whole. These projects would also directly enhance the local economy with the expenditure of dollars for labor and materials, the generation of tax revenues, and induced benefits to local businesses in the vicinity of construction sites.

Construction activities in general have the potential to disrupt business and retail operations as a result of restricted access for pedestrians (customers) and vehicles (deliveries). The Permanent WTC PATH Terminal is unlikely to directly restrict business access for extended periods of time during construction since most activities would be contained within the WTC site. However, some access restrictions may occur on streets surrounding the WTC site with construction of the PATH's Route 9A connection as well as periods of construction for the WTC Memorial and Redevelopment Plan.

The Fulton Street Transit Center would include cut-and-cover construction with potential restrictions to access on Dey Street, Church Street, and Fulton Streets. However, a detailed staging plan is being prepared to ensure that street and sidewalk traffic can be maintained in these areas, to the extent possible.

As currently planned, NYSDOT would maintain four lanes of traffic through their construction zone during most periods of the day. In addition, NYSDOT has completed a pedestrian bridge across Route 9A at Vesey Street that connects to an at-grade, protected pedestrian walkway along Vesey Street. Together these temporary measures would maintain access between Church Street and Battery Park City for businesses, workers, commuters, and residents.

The sponsors of the Lower Manhattan Recovery Projects are working with NYSDOT and NYCDOT to develop a Construction Management Plan (CMP) for Lower Manhattan that would coordinate the MPT plans of the individual projects. The CMP would ensure access is maintained through the area as individual projects proceed into their construction phases. This coordinated plan would help to minimize the potential adverse economic effects to businesses during the construction period.

The sponsors of the Lower Manhattan Recovery Projects would also provide for temporary signage to direct vehicles and pedestrians to businesses within the construction zone. These efforts would be coordinated between the sponsors and with the effected businesses to ensure that the maximum visibility for these businesses would be achieved.

DESIGN YEAR EFFECTS

NO ACTION ALTERNATIVE

The No Action Alternative could generate up to 1,200 new vehicle trips into Manhattan in the AM peak hour by 2025. These new vehicle trips would congest area roadways and would limit access to businesses for customers and deliveries. The No Action Alternative would also increase on-street pedestrian congestion since it would not provide for sub-grade concourses through the WTC site. Thus, there would be significant crowding of crosswalks and sidewalks on and near the WTC site, resulting in reduced traffic flow. Furthermore, the larger volume of pedestrians that would cross Route 9A would limit the future roadway's ability to process vehicular traffic and may necessitate the construction of a pedestrian bridge.

Because the No Action Alternative would increase vehicular traffic in Lower Manhattan, it would increase emissions and noise levels. The cumulative effect of a No Action Alternative for the Permanent WTC PATH Terminal may degrade air quality and noise levels as compared to pre-September 11, 2001 conditions. Over the long-term, increased traffic congestion, reduced air quality, and higher noise levels would degrade the quality of life for Lower Manhattan's residents and workers.

Increased congestion associated with the No Action Alternative would limit access to, from, and within Lower Manhattan. This would degrade the ability of visitors to access the areas many cultural sites and would reduce the capabilities of local businesses to process customers and deliveries. Because the No Action Alternative may limit or fully disrupt direct transit service between Lower Manhattan and New Jersey, it may force residents, commuters, and visitors to use more costly or more time consuming modes of travel. By reducing access to and from Lower Manhattan, the No Action Alternative has the potential to stagnate the overall recovery of Lower Manhattan, including the full redevelopment of the WTC site.

PREFERRED ALTERNATIVE

The Preferred Alternative has been planned and designed in cooperation with the Lower Manhattan Recovery Projects in its vicinity including the Fulton Street Transit Center, Route 9A Project, and the WTC Memorial and Redevelopment Plan. In the long-term, these projects would collectively provide for the integration of land use and transportation in the vicinity of the WTC site and would be an enhancement over pre-September 11, 2001 conditions.

The Preferred Alternative would form a critical sub-grade pedestrian link between Battery Park City and Church Street via the WTC site. The proposed connection between the Permanent WTC PATH Terminal and Fulton Street Transit Center's Dey Street Underpass would provide all-weather access between Tran-Hudson Ferries and the World Financial Center and the majority of the subway lines that serve Lower Manhattan. Furthermore, the Route 9A connection would reduce at-grade pedestrian trips during peak commuter periods. As a result, traffic circulation would be improved in the vicinity of the WTC site, which has resultant economic, traffic, air quality, and noise benefits.

The collection of transit services that would be offered by a Permanent WTC PATH Terminal in concert with a new trans-Hudson ferry terminal; a Fulton Street Transit Center; and other potential transportation projects, such as JFK airport access, would strengthen Lower Manhattan's role as a regional transit hub. As such, the area would attract scores of daily commuters and visitors who would frequent local retail establishments such as shops and restaurants. Further-

more, the integration of numerous transit services with the ability to serve residents throughout the region would increase the attractiveness of Lower Manhattan as a center of commerce.

G. PUBLIC PARTICIPATION AND AGENCY INVOLVEMENT

PUBLIC AND AGENCY INVOLVEMENT ACTIVITIES TO DATE

A comprehensive public involvement program was implemented for this project. The public involvement effort was designed to help provide complete information, to be early, timely in public notice, to be broad in public outreach, and to be responsive. The process requires extensive and intensive outreach to private citizens, local businesses and associations, development authorities, elected officials, affected government agencies and others in New Jersey and New York.

A project mailing list was developed for the distribution of outreach materials related to the environmental review process for the Permanent WTC PATH Terminal. The list currently contains approximately 500 addressees representing elected officials; federal, state, and local agencies; Technical Advisory Committee (TAC) members; Section 106 consulting parties; community and interest groups; local property owners and managers; and any members of the public who have requested mailings, including those who attended the public scoping meetings and the public hearings on the DEIS. Public outreach materials have been and will continue to be distributed throughout the environmental review process for this EIS. These activities and mailers include: flyers; mobile public information centers; newsletters; and postings to the project's website.

In addition, FTA and PANYNJ have organized formal and informal public meetings to inform elected officials, public agencies, community and interest groups, local stakeholders, and the general public of the progress of this environmental review process. These forums include:

- Federal Inter-Agency Review Team Meetings;
- Technical Advisory Committee Meetings;
- Section 106 Consulting Party Meetings;
- Congressional Briefings;
- Stakeholder Briefings;
- Community Board Briefings;
- Presentations to Community, Advisory, and Technical Interest Groups;
- Public Scoping Meetings; and
- DEIS Public Hearings.

As described previously, the Permanent WTC PATH Terminal is part of the larger, ongoing redevelopment effort in Lower Manhattan. Thus, the planning and construction of a project alternative for a Permanent WTC PATH Terminal must be coordinated with other current planning efforts in Lower Manhattan. To that end, FTA and PANYNJ have been active participants in a number of forums working with the other federal, state, and local agencies and groups having a role or interest in the overall redevelopment efforts. These forums have included:

- Coordinated Section 106 Consulting Party meetings for the WTC site;
- Federal Inter-Agency Review Team;
- Lower Manhattan Construction Coordination Group; and
- The Technical Advisory Committee to the Permanent WTC PATH Terminal.

Agency coordination efforts will continue throughout the further planning, design, and construction of the Permanent WTC PATH Terminal. As the Lower Manhattan Recovery Projects move from their early planning phases to design and construction, coordination efforts will focus both independently and through the Lower Manhattan Construction Command Center on the implementation of the EPCs, construction logistics, contract specifications, and ongoing public outreach. The goal of these efforts is to achieve the greatest long-term benefits for Lower Manhattan and the region as a whole while minimizing the short-term, adverse construction period impacts.

FTA AND PANYNJ CONTACTS

If you would like to request further information regarding this document, please visit the project's website at www.panynj.gov/pathrestoration, or you may contact one of the following:

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*

A. INTRODUCTION

Trans-Hudson transit service between New Jersey and New York has long been an integral part of the Lower Manhattan transportation system. Prior to the terrorist attacks of September 11, 2001, the World Trade Center's (WTC) Port Authority Trans-Hudson (PATH) Terminal served some 67,000 daily boardings and was the gateway to Lower Manhattan for most commuters from west of the Hudson River. However, the attacks resulted in extensive damage to the PATH system including the destruction of its WTC Terminal. As a result, the system lost a substantial portion of its capacity to serve commuters throughout the New York and New Jersey region and mass transit access to Lower Manhattan was severely hindered.

Since September 11, 2001, those commuting between Lower Manhattan and communities west of the Hudson River have resorted to often less convenient, more time-consuming, and more expensive modes of travel. Although a temporary PATH station has been constructed on the WTC site, it will not support the future development planned for the area nor does it meet the long-term needs of commuters.

A Downtown Transportation Hub, herein referred to as the Permanent WTC PATH Terminal, is proposed to be a full service, regional transportation facility that would be integrated with the existing and future transportation infrastructure on and near the WTC site, future WTC site development, and the surrounding area. This Project is needed to reestablish and enhance transportation facilities that existed at the WTC complex before September 11, 2001 and to ensure the long-term accessibility and economic vitality of Lower Manhattan.

The U.S. Congress has committed $21 billion to New York City since September 11, 2001 to support a variety of programs including clean up and recovery efforts, economic aid to residents and businesses, survivorship benefits, human services and crisis counseling, health programs, and infrastructure (Public Laws 107-38, 107-117, and 107-206). This federal relief package contains four elements: FEMA assistance, Community Development Block Grants, Liberty Zone Economic Stimulus Package, and appropriations to specific agencies to fund programs for Lower Manhattan. The $4.55-billion transportation recovery effort, which includes funds for this Project, is being administered through FEMA and the FTA. Although the grant package would be jointly funded, FTA is serving as the lead agency as agreed to in a Memorandum of Understanding (August, 2002) and subsequent correspondence between the agencies (November 18, 2002).

This chapter provides background information on the PATH system, its WTC Terminal, and Lower Manhattan in general; characterizes PATH's ridership; defines the need for this Project; and outlines the goals and objectives that it would achieve.

B. HISTORICAL OVERVIEW

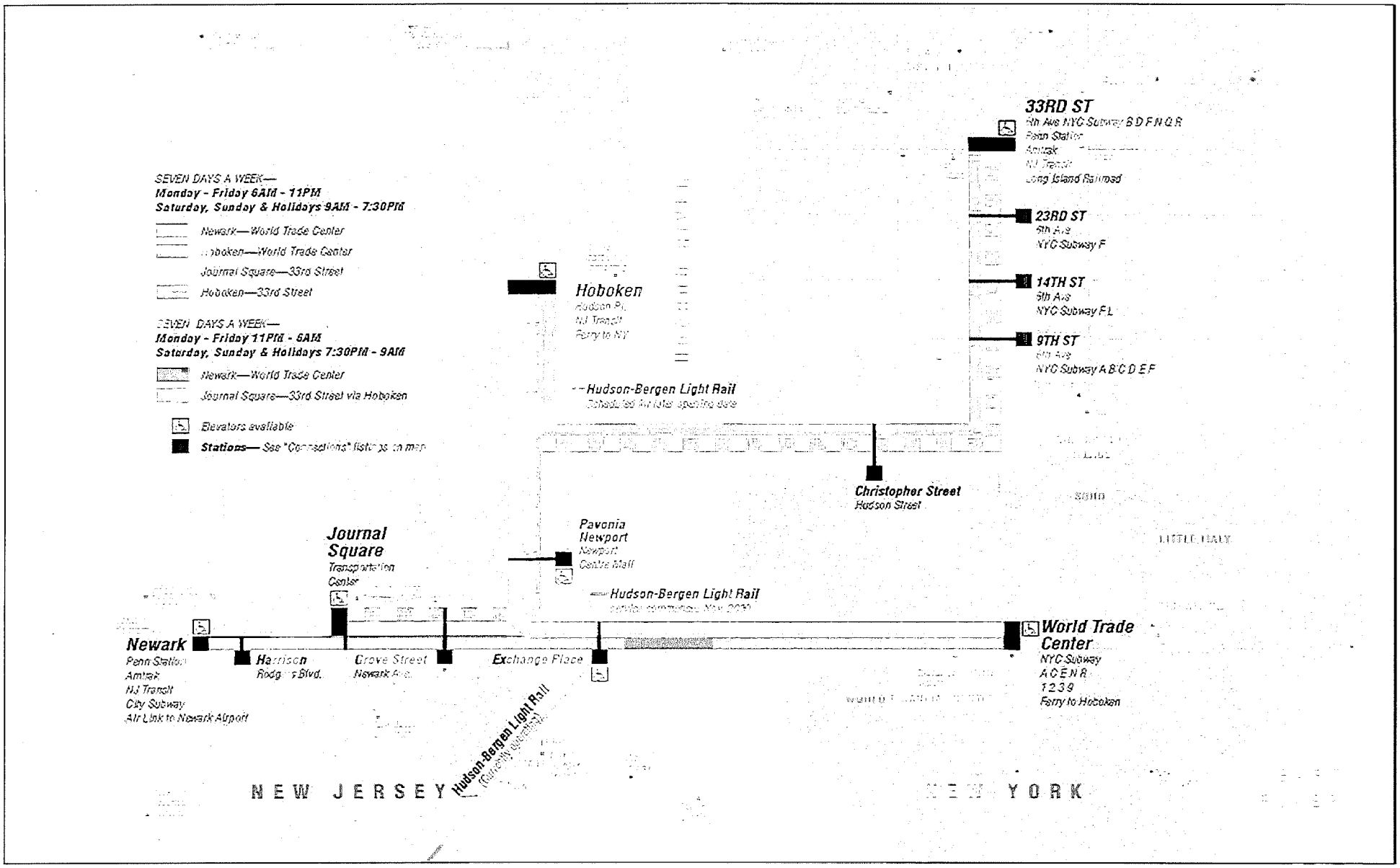
THE PATH SYSTEM

PATH is an electrified heavy-rail transit system with a total of 13 stations (see Figure 1-1 and Table 1-1). It is a fully owned subsidiary corporation of PANYNJ, which acquired the system as the Hudson & Manhattan (H&M) Railroad in 1962. PATH is recognized by the federal oversight agencies as a commuter rail system. Therefore, it operates according to policies and procedures set forth by the USDOT Federal Railroad Administration (FRA).

Table 1-1
PATH Stations and Connecting Transit Services

Station	Location	Connecting Service
9th Street	Sixth Ave. at 9th St., New York, NY	NYCT Subway, NYCT bus service
14th Street	Sixth Ave. at 14th St., New York, NY	NYCT Subway, NYCT bus service
23rd Street	Sixth Ave. at 23rd St., New York, NY	NYCT Subway, NYCT bus service
33rd Street	Sixth Ave. between 30th and 33rd Streets, New York, NY	Amtrak, NJ Transit and LIRR commuter rail, NYCT Subway; NYCT, and private bus service
Christopher Street	Christopher St. between Greenwich and Hudson Streets, New York, NY	NYCT Subway, NYCT bus service
Exchange Place	Montgomery St. at Hudson River, Jersey City, NJ	Hudson-Bergen Light Rail, NY Waterway ferry, NJ Transit, and local bus service
Grove Street	Newark Ave. between Grove St. and Luis Munez Marin Blvd., Jersey City, NJ	Coach, NJ Transit, and local bus service
Harrison	Frank E. Rodgers Blvd. between Somerset and Cape May Streets, Harrison, NJ	NJ Transit bus service
Hoboken	Hudson Place at River Street, Hoboken, NJ	NJ Transit and Metro-North commuter rail, Hudson-Bergen Light Rail, NY Waterway ferry, NJ Transit, and local bus service
Journal Square	Kennedy Blvd. between Pavonia and Sip Avenues, Jersey City, NJ	A&C, Bergen Avenue, Central Avenue, Community Lines Hudson, County Executive Express, Carefree, Red & Tan, Lafayette-Greenville, NJ Transit, and local bus service
Newark	1 Penn Plaza West, Newark, NJ	Amtrak and NJ Transit commuter rail, Newark City Subway, Greyhound, NJ Transit, and private bus service
Pavonia/Newport	Washington Blvd. at Pavonia Ave., Jersey City, NJ	Hudson-Bergen Light Rail, NY Waterway ferry, NJ Transit, and local bus service
World Trade Center	Fulton St. at Church St. New York, NY	NYCT Subway, NY Waterway and Water Taxi ferries, NYCT, and private bus service

Note: Information for the World Trade Center station reflects temporary PATH service.
Source: www.panynj.gov/path; www.mta.info.



PERMANENT WTC PATH TERMINAL
Final Environmental Impact Statement

Figure 1-1
PATH System

PATH has four routes: Newark-WTC, Hoboken-WTC, Journal Square-33rd Street, and Hoboken-33rd Street. Trains operate 24 hours a day, seven days a week, although routes are modified somewhat during late night and weekend hours.

PATH directly serves communities in Jersey City, Newark, Hoboken, and Manhattan but also provides connections for other west-of-Hudson residents. At Newark-Pennsylvania Station, PATH customers can access Amtrak, New Jersey Transit's (NJ Transit) Northeast Corridor, Raritan Valley, and North Jersey Coast commuter rail lines; the Newark City Subway; and bus and rail service to Newark Liberty International Airport. In Hoboken, PATH connects with Metro-North Railroad's Port Jervis line; NJ Transit Boonton, Morris & Essex, Main/Bergen County, Pascack Valley, and North Jersey Coast commuter rail lines; numerous NJ Transit bus routes; ferry service; and the Hudson-Bergen Light Rail. In New York, PATH stations are located in close proximity to New York City Transit (NYCT) subway stations serving a total of 20 subway lines. There are also connections to NYCT and privately operated bus routes, ferries, and commuter rail service.

HISTORY OF PATH SERVICE TO LOWER MANHATTAN

THE HUDSON & MANHATTAN TERMINAL

The Hudson & Manhattan (H&M) Railroad began operation of the Hudson Tubes to Lower Manhattan in 1909. The Hudson Tubes provided transit service between Hudson and Essex Counties in New Jersey and the Hudson Terminal in Lower Manhattan. The Hudson Tubes served both as a commuter service and as a connection to Manhattan for short- and long-distance rail customers arriving at Newark Pennsylvania Station, Hoboken Terminal, and Exchange Place.

The Hudson Terminal was located between Greenwich, Cortlandt, Church, and Fulton Streets parallel to the two subway lines. Above street level, the H&M constructed what was then the world's largest office building, consisting of two towers. Beneath the towers was the station itself, which occupied two city blocks. The station contained three levels: a pedestrian concourse with stores, restaurants, and services; a train level with five tracks; and a powerhouse level. The H&M Terminal formed a loop with the tunnels to and from New Jersey. Eastbound trains would enter the station from the south river tunnel and exit westbound through the north river tunnel.

When the H&M Railroad began to experience major financial difficulties, the States of New York and New Jersey looked to PANYNJ to assume control of the system. In 1962, the States enacted legislation authorizing PANYNJ to undertake a port development project consisting of 1) a World Trade Center; 2) the Hudson Tubes; and 3) certain extensions of the Hudson Tubes. PANYNJ was authorized to cooperate with other government agencies in the rehabilitation and redevelopment of the WTC, its environs, and the Hudson Tubes, for the purpose of renewal and improvement of these areas as part of the port development project.

The legislation of 1962 mandated that PANYNJ acquire, rehabilitate, and operate the rail transit property associated with the H&M Railroad and the Hudson Tubes, either directly or through a wholly owned subsidiary corporation. Accordingly, PANYNJ established the Port Authority Trans-Hudson (PATH) Corporation, which acquired, by condemnation, the railroad, its equipment, and its assets, including the Hudson Terminal building.

As mandated by the legislation of 1962, PANYNJ planned and constructed a WTC on an approximately 16-acre site that included the area bounded by Church Street, Liberty Street,

Route 9A, and Vesey Street, with an extension to the north to include the block that would become 7 World Trade Center (7 WTC). In connection with the construction of the WTC, PANYNJ razed the Hudson Terminal and replaced it with a new facility, which was located beneath the office towers of the WTC.

THE WTC PATH TERMINAL

The WTC PATH Terminal opened in 1971. It was constructed west of the original H&M Terminal in the portion of the WTC site referred to as the "bathtub" and was located beneath the office and retail space. The Terminal was fully compliant with the Americans with Disabilities Act (ADA; 24 USC §§12101 et seq.; 49 CFR Parts 27, 30, and 38), and it was the first station in the world to be fully climate controlled.

The platform level contained three 10-car platforms and five tracks. The orientation of the platforms and the track configuration was similar to the H&M Terminal such that trains entered the station from New Jersey via the south Hudson River tunnel (Tunnel F) and exited to New Jersey via the north tunnel (Tunnel E). Thus, the platform level formed the loop in the PATH system allowing trains to enter and leave Manhattan without changing the location of the train's engineer or conductor. As a result, trains could have a relatively short dwell time at the Terminal.

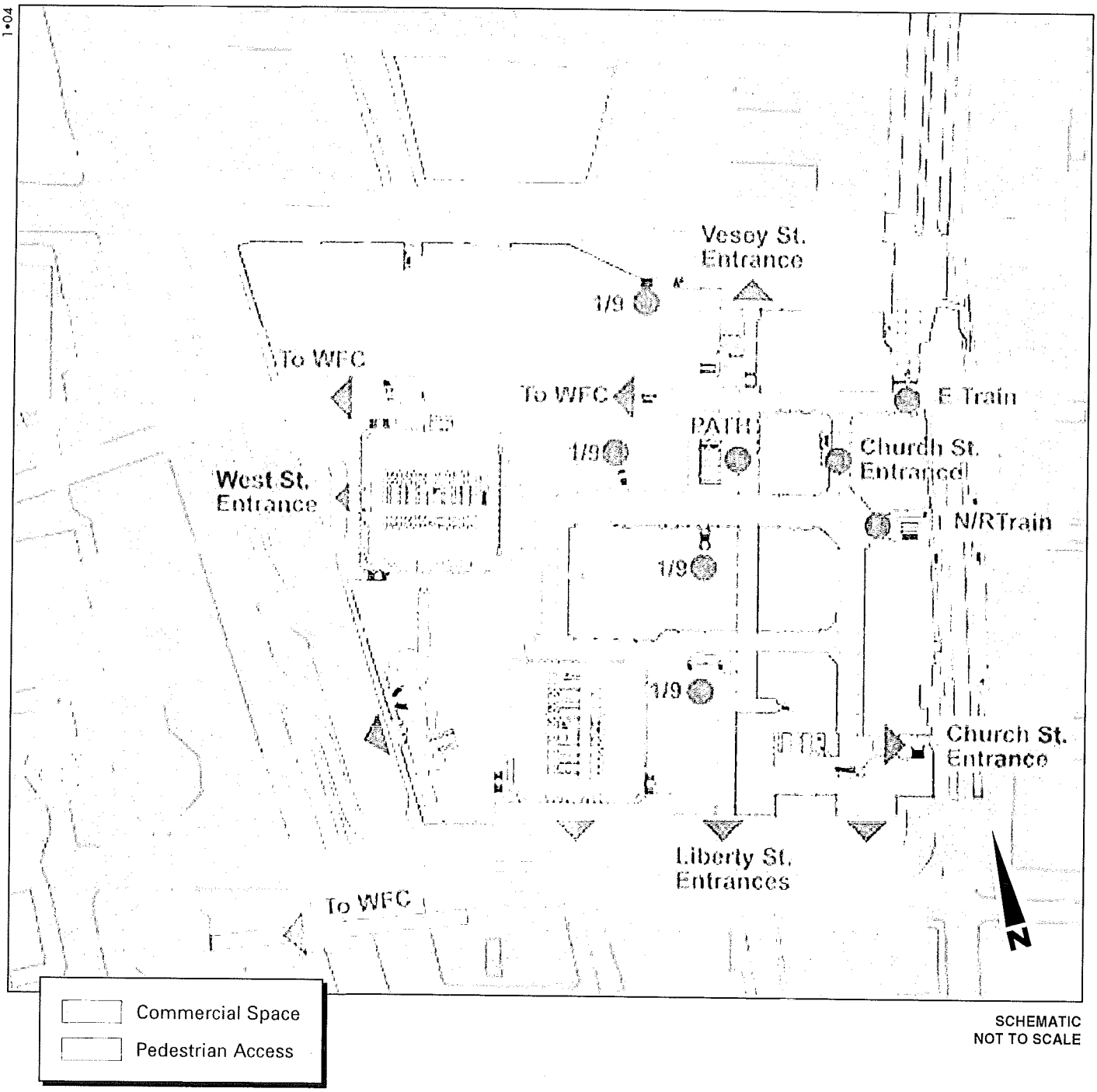
A mezzanine was located above the platforms, housing vertical circulation between the platforms and levels above, fare equipment, and accessory retail and food stalls. The principal access between the mezzanine and the WTC retail concourse was a bank of escalators that traveled upward under NYCT's 1 and 9 line. The escalators terminated in a portion of the retail concourse known as PATH Square.

As shown in Figure 1-2, PATH Square was located in the northeast portion of the WTC retail concourse. The retail concourse provided for all-weather connections between PATH, the office buildings on the WTC site, the World Financial Center, NYCT subways, and street level. From PATH Square, passengers could access three NYCT subway stations with connections to five NYCT subway routes (1, 9, E, N, and R) via the corridors of the WTC retail concourse. (The World Trade Center Station provided direct access to the E route, but connected with the Chambers Street Station on the A and C routes and the Park Place Station on the 2 and 3 routes.) The retail concourse had street-level access from Church, Vesey, Route 9A, and Liberty Streets. A second-level pedestrian bridge over Route 9A provided a connection between the retail concourse via 1 WTC and the World Financial Center.

On September 11, 2001, the WTC PATH Terminal and a seven-car PATH train were destroyed. Subsequently, Tunnels E and F under the Hudson River were flooded, and PATH's Exchange Place Station in Jersey City, New Jersey, was damaged and rendered inoperable because the track configuration would not allow trains to turn around before entering the Hudson River tunnels. As a result, the PATH system lost a substantial portion of its capacity to serve commuters throughout the New York and New Jersey region, and mass transit access to Lower Manhattan was severely hindered.

CURRENT PATH SERVICE TO LOWER MANHATTAN

Rescue and recovery operations began in and around the WTC site immediately following September 11, 2001. Work on the WTC site continued 24 hours a day, seven days a week, for approximately nine months. During this period, the New York City Department of Design and



SCHEMATIC
NOT TO SCALE

Figure 1-2
Pre-September 11, 2001
WTC PATH Terminal

Construction (NYCDDC) controlled the WTC site and was responsible for material removal, including contracting with private entities to provide such services in coordination with various federal and state entities. Control of the portion of the site that contained 7 WTC was returned to PANYNJ on May 7, 2002. The balance of the site was returned on June 30, 2002.

In February 2002, PANYNJ commenced work on the expansion of PATH's Exchange Place Station as well as repairs to the tunnels under the Hudson River. This work included electrical and signal replacements for components destroyed by water damage and excavation for new track crossovers and other improvements required to bring the station back in service. The Exchange Place Station was reopened to passengers on June 29, 2003.

PANYNJ began construction on a temporary WTC PATH station in July 2002, which was opened on November 23, 2003. The temporary station is located in the WTC "bathtub." It has five tracks and three eight-car platforms and provides street-level access through a single entry/exit at the intersection of Fulton and Church Streets. There are also direct connections to stations on NYCT's E, R, and W routes. (In February 2004, NYCT implemented long-term service adjustments that route N trains over the Manhattan Bridge and W trains over the local line to Whitehall Street. Thus, N trains no longer serve the Cortlandt Street Station.)

PATH RIDERSHIP

PRE-SEPTEMBER 11, 2001 REGIONAL TRAVEL TO MANHATTAN

The New York Metropolitan Transportation Council (NYMTC) periodically collects data to characterize daily trips to and from Manhattan's Central Business District (CBD). Referred to as hub bound counts, these data reflect regional travel to areas of Manhattan south of 60th Street. NYMTC classifies the data by cordon, which is the point where a person enters the Manhattan CBD. Five cordons have been defined: 60th Street, Brooklyn, Queens, New Jersey, and other (Roosevelt Island Tram and Staten Island Ferry).

The hub bound data reflects all trips into and out of the CBD, including work trips, non-work trips, and commercial vehicle trips. The New Jersey cordon includes all vehicular and transit trips into Manhattan for the modes and crossings south of 60th Street, including the Lincoln and Holland Tunnels, NJ Transit and Amtrak tunnels, PATH tunnels, and ferries. However, those entering the CBD via the George Washington Bridge are counted as part of the 60th Street cordon.

In the year 2000, the New Jersey cordon accounted for 14 percent of the approximately 3.9 million daily trips into the Manhattan CBD (see Table 1-2). During the AM peak period (7AM to 10AM), some 17 percent of trips crossed the New Jersey cordon, and in the AM peak hour, nearly 1 in 5 entered via the New Jersey cordon.

As shown in Table 1-3, transit riders comprised the majority of trips into Manhattan via the New Jersey cordon. The combined ridership of PATH, NJ Transit and Amtrak rail, commuter buses, and private ferries represented 62 percent of the total daily trips. The transit share was even higher at 75 percent and 81 percent during the AM peak period and AM peak hour, respectively.

PATH riders represented 30 percent of the total AM peak hour trips, 26 percent of the total AM peak period trips, and 23 percent of the total daily trips into Manhattan from the New Jersey cordon. As shown in Table 1-4, between 60 and 70 percent of these PATH trips used the downtown lines between Exchange Place and the WTC.

Table 1-2
2000 Weekday Hub Bound Trips by Sector

Sector	Peak Hour (8AM – 9AM)		Peak Period (7AM – 10AM)		24 Hour	
	Number	Percent	Number	Percent	Number	Percent
60th Street	155,130	25%	380,142	25%	1,482,768	38%
Brooklyn	199,938	32%	486,783	32%	1,044,744	27%
Queens	151,516	24%	376,383	25%	795,838	20%
New Jersey	111,955	18%	255,486	17%	536,952	14%
Other	1,992	1%	8,844	1%	31,687	1%
Total	620,531	100%	1,508,065	100%	3,891,989	100%

Note: Other includes the Staten Island Ferry and the Roosevelt Island Tram.
Sources: New York Metropolitan Transportation Council, *2000 Hub Bound Travel Report, Transportation to the Manhattan Central Business District* (May 2003).

Table 1-3
2000 Weekday Hub Bound Trips by Mode of Travel for the New Jersey Sector

Mode	Peak Hour (8AM – 9AM)		Peak Period (7AM – 10AM)		24 Hour	
	Number	Percent	Number	Percent	Number	Percent
Auto, Taxi, Van, and Truck	21,361	19%	63,546	25%	202,169	38%
NJTransit / Amtrak	18,224	16%	35,518	14%	62,098	11%
Commuter Bus	33,747	30%	78,350	31%	134,377	25%
Private Ferry	5,216	5%	11,029	4%	15,924	3%
PATH	33,407	30%	67,043	26%	122,384	23%
Total	111,955	100%	255,486	100%	536,952	100%

Sources: New York Metropolitan Transportation Council, *2000 Hub Bound Travel Report, Transportation to the Manhattan Central Business District* (May 2003).

Table 1-4
2000 Weekday Hub Bound Trips by PATH

Mode	Peak Hour (8AM – 9AM)		Peak Period (7AM – 10AM)		24 Hour	
	Number	Percent	Number	Percent	Number	Percent
Uptown Tubes	11,094	33%	20,219	30%	47,986	39%
Downtown Tubes	22,313	67%	46,824	70%	74,398	61%
Total	33,407	100%	67,043	100%	122,384	100%

Sources: New York Metropolitan Transportation Council, *2000 Hub Bound Travel Report, Transportation to the Manhattan Central Business District* (May 2003).

PRE-SEPTEMBER 11, 2001 PATH RIDERSHIP

Prior to September 11, 2001, the PATH system had approximately 257,000 boardings on an average weekday (see Figure 1-3). The WTC was the busiest of the 13 PATH stations with approximately 67,000 average weekday boardings. The WTC Terminal supported an average weekday two-way patronage of approximately 140,000 riders.

Volumes at the WTC Terminal were heaviest during the AM and PM peak hours. During these periods, the principal direction of travel was inbound to Manhattan in the AM and outbound to New Jersey in the PM; however, approximately 15 percent of riders commuted in the reverse direction. In the morning peak (8AM to 9AM), a total of approximately 26,000 riders used the station with 22,000 alighting and 4,000 boarding. In the evening peak (5PM to 6PM), the terminal accommodated 20,000 riders with 16,000 boardings and 4,000 alightings.

Table 1-5 shows the origins and destinations of PATH riders within Lower Manhattan during the AM and PM peak hours based on surveys conducted by PANYNJ in 1996. For those commuting to Lower Manhattan from New Jersey in the AM peak hour, the majority (61 percent) were destined to off-site buildings; 24 percent remained on the WTC site; and the remaining 15 percent connected to NYCT subways. For those leaving Lower Manhattan via PATH in the AM peak hour, some 65 percent accessed the system from NYCT subways; 3 percent from the WTC site itself; and another 32 percent from off-site buildings. Similar origins and destinations were observed for the PM peak hour.

Table 1-5
Pre-September 11, 2001 Origins and Destinations of Riders at the WTC PATH Terminal

	Commuters to Lower Manhattan		Commuters from Lower Manhattan	
Origin/Destination	AM Peak (Exit PATH)	PM Peak (Enter PATH)	AM Peak (Enter PATH)	PM Peak (Exit PATH)
NYCT Subways	15%	19%	65%	65%
WTC Site	24%	25%	3%	4%
Off-Site	61%	56%	32%	31%

Sources: Port Authority of New York and New Jersey

Table 1-6 shows the origins/destinations for those traveling between the WTC PATH Terminal and off-site developments. For those commuting to Lower Manhattan from New Jersey in the AM peak hour, the primary off-site destination was southeast from the WTC site toward the Financial District, representing about 40 percent of the total off-site trips. Trips to the north (Tribeca), northeast (Civic Center), and west (World Financial Center and Battery Park City) were fairly evenly distributed, each representing about 16 to 20 percent of the total off-site trips.

In the PM peak hour, there was a lower percentage of trips entering PATH from off-site; however, the distribution of these trips was similar to the AM peak hour.

Table 1-6
Pre-September 11, 2001 Off-Site Origins and Destinations of Riders at the WTC PATH Terminal

To/From	Commuters to Lower Manhattan		Commuters from Lower Manhattan	
	AM Peak (Exit PATH)	PM Peak (Enter PATH)	AM Peak (Enter PATH)	PM Peak (Exit PATH)
West (World Financial Center and Battery Park City)	20%	17%	5%	6%
North (Tribeca)	16%	21%	19%	28%
Northeast (Civic Center)	16%	22%	62%	53%
Southeast (Financial District)	40%	32%	13%	13%
South: Greenwich South	8%	6%	1%	1%
Sources: Port Authority of New York and New Jersey				

For those commuting from Lower Manhattan to New Jersey during the AM peak hour, the majority (62 percent of the total off-site trips) entered PATH from the northeast. Another 19 percent entered from the north (Tribeca); 13 percent from the southeast (Financial District); 5 percent from the west (World Financial Center and Battery Park City); and 1 percent from the south. A similar pattern of off-site trips was observed during the PM peak hour.

Approximately 5,900 and 5,700 commuters transferred between PATH and NYCT's subways during the AM and PM peak hours, respectively. The transfer to/from NYCT's WTC Station (E) was the most heavily used, representing approximately 55 percent of the transfer volume. One-third of the transfers were between PATH and NYCT's N and R trains, and the remaining 12 percent transferred to or from NYCT's 1 and 9 trains.

THE WTC CONCOURSE

The WTC retail concourse was an important, all-weather link to destinations within and around Lower Manhattan. Although PATH riders comprised the largest portion of pedestrians using the concourse during peak hours, thousands of other commuters traversed the facility en route to or from work. In both the AM and PM peak hours, some 19,000 non-PATH commuters entered or exited the concourse transferring between NYCT subways, buildings on the WTC site, and off-site developments.

CURRENT PLANNING CONTEXT

LOWER MANHATTAN RECOVERY PROJECTS

Since September 11, 2001, several projects have been planned to redevelop and revitalize Lower Manhattan. Replacement and enhancement of transportation facilities, office, retail and hotel spaces, museum and cultural facilities, and open space are essential to the economic success of Lower Manhattan. Presently, four environmental reviews are being or have been prepared under NEPA independent of this Project, as described below.

World Trade Center Memorial and Redevelopment Plan

New York Governor George Pataki and New York City's then-Mayor Rudolph Giuliani formed the Lower Manhattan Development Corporation (LMDC) in November 2001, as a subsidiary of

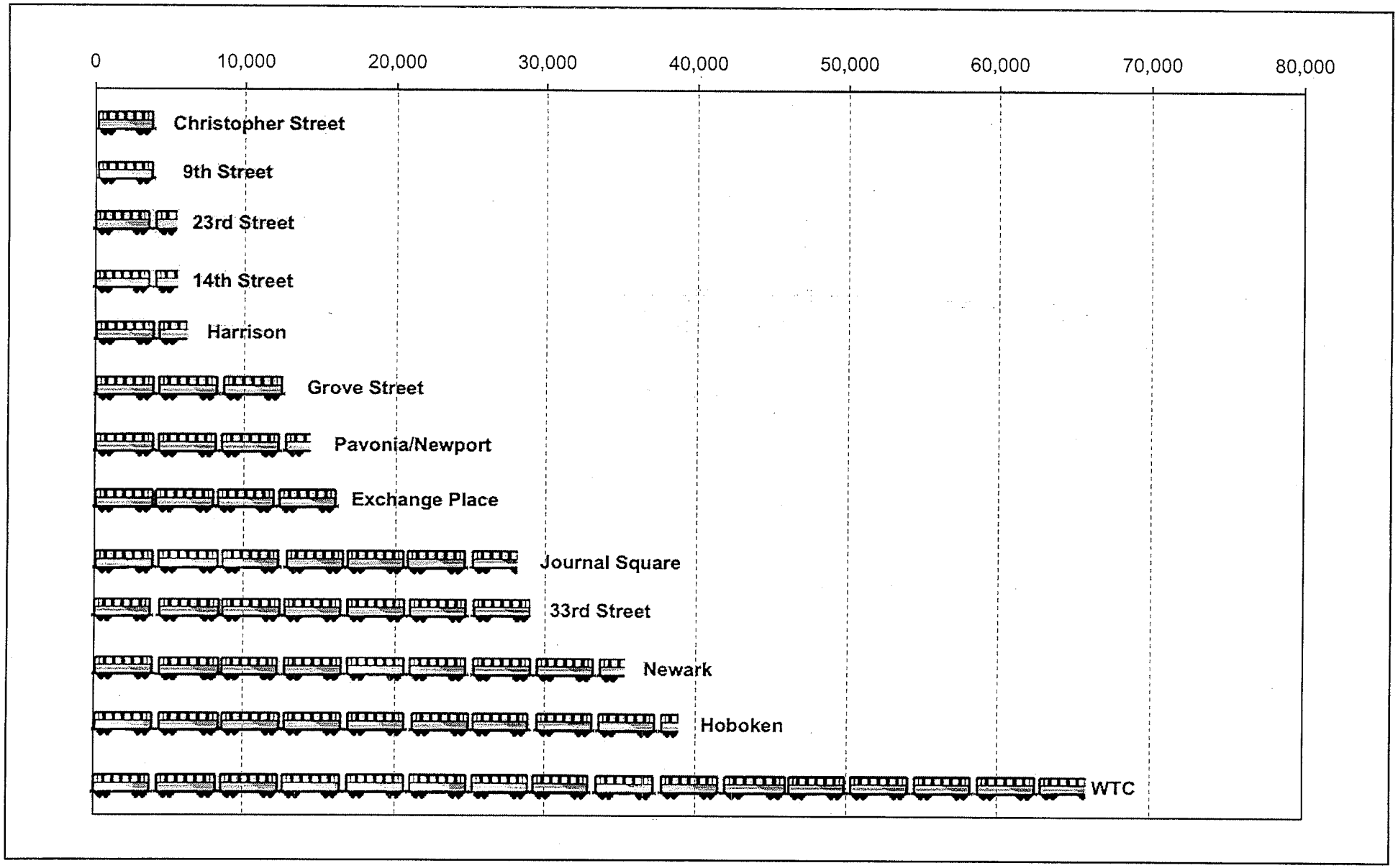


Figure 1-3
Pre-September 11, 2001 Daily Boardings

the New York State Urban Development Corporation (UDC) which does business as the Empire State Development Corporation (ESDC), a political subdivision and public benefit corporation of the State of New York. LMDC will oversee the revitalization and rebuilding of Lower Manhattan, defined as the areas south of Houston Street.

LMDC is undertaking, in cooperation with the United States Department of Housing and Urban Development (HUD) and PANYNJ, a World Trade Center Memorial and Redevelopment Plan. The plan includes the construction of a WTC Memorial and memorial-related improvements, as well as commercial, retail, and hotel space; museum and cultural facilities; open space; new street configurations; and infrastructure improvements at the WTC site and adjacent parcels.

The World Trade Center Memorial and Redevelopment Plan is independent of this Project and is undergoing a separate environmental review. LMDC is conducting a coordinated environmental review of their proposed action, pursuant to federal statute, as the recipient of HUD Community Development Block Grant program funds (42 USC 5304(g)), and as lead agency under NEPA and the New York State Environmental Quality Review Act (SEQRA) and its implementing regulations (6 NYCRR Part 617). LMDC published a Generic Environmental Impact Statement for this project and a Record of Decision was issued in June 2004. Consult the project's website (www.renewnyc.com) for current information about the WTC Memorial and Redevelopment Plan.

Fulton Street Transit Center

The Fulton Street Transit Center is a project being proposed by the Metropolitan Transportation Authority (MTA). The Fulton Street Transit Center (FSTC) will rehabilitate, reconfigure, and enhance the multilevel complex of subway stations serving nine different lines in the area of Fulton Street and Broadway. The project will improve platforms, mezzanines, and connecting corridors, and will provide a new central concourse with an above-grade presence. The facility has a proposed Dey Street concourse to NYCT's Cortlandt Street Station (R and W) and the Permanent WTC PATH Terminal. The FSTC is projected for completion in 2008.

The FSTC project is independent of this Project and is undergoing a separate environmental review by the FTA and MTA. A Draft Environmental Impact Statement for the FSTC was published in May 2004 and a Final Environmental Impact Statement was published in October 2004. FTA issued a Record of Decision on the project in November 2004. Consult the project's website (www.mta.info) for current information about the FSTC project.

Route 9A Project

The New York State Department of Transportation (NYSDOT) is currently considering the reconstruction of Route 9A south of Chambers Street with either at-grade improvements or a below-grade bypass for vehicular through traffic. The reconstruction of Route 9A is independent of this Project and is undergoing a separate environmental review by the USDOT, Federal Highway Administration (FHWA), and NYSDOT. A Draft Supplemental Environmental Impact Statement was published in May 2004 and a Final Environmental Impact Statement will be published in spring or summer of 2005. Consult the project's website (www.route9A.com) for current information about the Route 9A Project.

South Ferry Terminal

MTA, in cooperation with FTA, proposes to reconstruct the South Ferry Terminal on the 1 and 9 line. Presently, South Ferry is a loop station with a single platform that can only accommodate

five-car trains. MTA proposes to replace the loop station with a stub-end terminal having two tracks and one platform able to accommodate 10-car trains. This project would increase both the capacity of the South Ferry Terminal and the 1 and 9 line during peak periods. This project is independent of the Permanent WTC PATH Terminal and is undergoing a separate environmental review by the FTA and MTA. A Environmental Assessment was published in May 2004, and a Finding of No Significant Impact was issued in August 2004. Consult the project's website (www.mta.info) for current information about the South Ferry Terminal.

OTHER DOWNTOWN PROJECTS

Before September 11, 2001, several projects were planned downtown that are still under study. These include commercial and residential buildings at Battery Park City and within the Washington Street Urban Renewal Area as well as offices, open space, cultural institutions, and modest commercial development throughout Lower Manhattan.

Federal, state, and local initiatives have been implemented to encourage private development in Lower Manhattan. The Liberty Bonds program provides federal funds for commercial and residential development in Lower Manhattan, which has resulted in the conversion or construction of several new apartment and condominium buildings. LMDC is overseeing Governor Pataki's short-term capital projects, which include temporary pedestrian connections across Route 9A, streetscape improvements, security improvements at the New York Stock Exchange, the reopening of Millennium High School, and public open space and art.

C. PROBLEM DEFINITION

ECONOMIC RECOVERY

Transportation links have long been critical to the commercial development of Lower Manhattan. In its early days, Lower Manhattan was the center of the region's sea commerce with its numerous riverfront ports. As its economy shifted to office-sectors, Lower Manhattan depended on modes of transportation that would deliver workers to and from the area. Formerly the Hudson Tubes and now PATH, the transit link between New Jersey and New York was and is integral to the movement of employees to and from their Lower Manhattan offices. More recently, employment centers have emerged in Jersey City and Newark. These businesses depend on PATH to deliver workers from New York City and other points east of the Hudson River. Furthermore, several major businesses have located facilities in both Lower Manhattan and Jersey City to allow for office expansion while maintaining a close connection between company functions on both sides of the River.

A successful economic redevelopment of Lower Manhattan requires the replacement and enhancement of transportation facilities that were lost or damaged on September 11, 2001. As described above, current plans, which are independent of this Project, call for the rehabilitation of vehicular and transit facilities throughout Lower Manhattan. Although these projects would improve access to and from the area for those commuting to and from New Jersey, none offers the direct and high-capacity linkage that can be served by PATH and the Permanent WTC PATH Terminal.

In a survey of 25 executives of major employers located in Lower Manhattan, a Permanent WTC PATH Terminal was identified as "extremely" important to the future economic health of Lower Manhattan (Alliance for Downtown New York, Inc., April 2003). As described below, 15

percent of Lower Manhattan's workforce lived in New Jersey prior to September 11, 2001 and the WTC PATH Terminal was the busiest of downtown's transit stations. It is expected that as the WTC and other sites are developed with future commercial workers, a similar pool of new employees would be drawn from New Jersey. Thus, a restored and enhanced WTC PATH facility would be needed to accommodate newly generated demand for employees and their commute to and from Lower Manhattan offices. If such a facility were not provided, the full potential of Lower Manhattan's revitalization may never be realized.

RIDERSHIP GROWTH

Lower Manhattan is a vital component of the New York economy. It is second only to Midtown Manhattan in terms of gross floor area of office space, and it is a growing residential neighborhood and retail destination.

Prior to September 11, 2001, businesses in the area south of Canal Street employed more than 388,000 workers. Based on 1990 reverse journey-to-work data prepared by the U.S. Bureau of the Census, approximately 15 percent of Lower Manhattan's workforce commuted from west of the Hudson River and, as with the majority of workers in Lower Manhattan, transit was their predominant mode of travel.

The terrorist attacks resulted in the loss of 12 million square feet of office space and 500,000 square feet of retail space south of Canal Street. This physical loss of space coupled with a general economic downturn resulted in a reduction of 80,000 jobs in Lower Manhattan. As described above, LMDC and PANYNJ are planning for the redevelopment of the WTC site, meaning that most of the office space damaged or destroyed on September 11, 2001 will be replaced by 2015. In addition, a memorial, cultural facilities, and retail space will be constructed on the WTC site that will attract visitors in addition to the anticipated return of office workers.

Prior to September 11, 2001, proposals had been made for the continued development of vacant or underutilized sites in Lower Manhattan with various office, retail, and residential projects. These projects combined with the anticipated return of workers to the area would increase the future demand for transportation infrastructure.

It is estimated that PATH's daily ridership at the WTC would be 175,000 by 2025, which would exceed the capacity of the temporary station. Therefore, without this project, the PATH system cannot adequately support the planned redevelopment of the WTC and the overall revitalization of Lower Manhattan.

COMMUTING TO LOWER MANHATTAN WITHOUT PATH

As described above, the WTC PATH Terminal was the gateway to Lower Manhattan for some 67,000 daily commuters. It was among the most heavily used transit facilities in the area, and it offered critical connections to destinations within downtown as well as NYCT subway service for access to other parts of New York City.

Immediately following September 11, 2001, commuters formerly using PATH's WTC lines were forced to seek other routes or modes of travel to reach destinations in Lower Manhattan. As a result, there were substantial ridership increases on Trans-Hudson ferries, uptown PATH lines, and NJ Transit commuter rail. Although these modes enable commuters to reach Lower Manhattan, they do not have the capacity or the flexibility to serve as a long-term alternative to a Permanent WTC PATH Terminal.

TRANS-HUDSON FERRIES

Following the terrorist attacks, demand for ferry service between New Jersey and Lower Manhattan increased by more than 100 percent. Ferry operators rushed to respond by implementing increased peak hour service and new routes. Although ferries served as an important interim mode of travel for Lower Manhattan's commuters, they would not serve long-term travel needs between New Jersey and Lower Manhattan:

- Ferries have a much lower capacity than heavy-rail. Thus, numerous additional boats and services would be required to accommodate the anticipated future transit demand to and from Lower Manhattan.
- Ferries to Lower Manhattan must dock along the Hudson or East Rivers. While the location of ferry terminals may be convenient for those who work along Water Street and at the World Financial Center, others must walk much farther to reach interior destinations than was required with PATH service. Furthermore, most ferry passengers must transfer to one or more additional modes within New Jersey during their commute. Additional transfers and longer walks within Lower Manhattan increase the overall commute time and, thereby, decrease the attractiveness of this mode of travel.
- Ferry service is limited during inclement weather. During heavy rain storms or when the waters of the Hudson are icy, the ability to maintain ferry service is constrained.

UPTOWN PATH LINES

Following the destruction of the WTC PATH Terminal on September 11, 2001, many commuters diverted to PATH's Midtown routes. Once in Manhattan, these passengers would connect to NYCT subways to reach destinations in Lower Manhattan. As a result, ridership at PATH's Christopher and 9th Street Stations doubled during peak periods.

Both the Christopher and 9th Street Stations have a limited capacity. Platforms are narrow, there is only one point of access/egress, and fare zones are too small to serve large numbers of commuters. To immediately address these problems, PANYNJ had to limit station access during certain hours. Although upgrades are planned for these stations (see Chapter 8, Section A, "PATH"), they will not have adequate capacity to support general PATH system growth if a Permanent WTC PATH Terminal is not constructed.

NEW JERSEY TRANSIT COMMUTER RAIL

Following the terrorist attacks, ridership on NJ Transit commuter rail increased by approximately 30 percent, requiring additional trains on its routes serving New York's Pennsylvania Station. Although this additional capacity could accommodate the demand generated by the absence of PATH service to Lower Manhattan, it precluded certain service enhancements planned for this system.

For example, NJ Transit recently completed construction of the Secaucus Transfer, which provides a link between the Northeast Corridor line serving Pennsylvania Station, and the Main and Bergen County lines that serve Hoboken. Prior to its opening, passengers on several NJ Transit commuter rail lines would travel to Hoboken and then connect to PATH trains or ferries to access Midtown Manhattan. With the Secaucus Transfer, these passengers can now connect to Penn Station-bound commuter trains, resulting in a shorter commute time. Although the project was completed in summer of 2003, its full opening was delayed until temporary PATH service

was restored. NJ Transit could not support the increased ridership associated both with diverted PATH passengers and the Secaucus Transfer. If PATH service is not permanently restored to Lower Manhattan, it is expected that capacity constraints would exist on NJ Transit, thereby reducing the utility of the Secaucus Transfer and potentially limiting options for future system improvements.

Furthermore, NJ Transit and Amtrak share the rail lines that traverse the Hudson River between New Jersey and Lower Manhattan. Although a second Hudson River Tunnel is currently being studied, the interim expansion of the NJ Transit system is limited by the capacity of the single rail tunnel. Thus, if permanent PATH service is not restored to Lower Manhattan, there may not be additional capacity to support passengers that would be diverted to commuter rail.

LIMITATIONS OF TEMPORARY PATH SERVICE

To expedite the restoration of PATH service to Lower Manhattan, PANYNJ designed and built, on a fast-track basis, a temporary station. The temporary station was a commitment to restore the facilities damaged by the terrorist attacks and it was determined to be a catalyst to restore and redevelop Lower Manhattan by providing commuter service from west of the Hudson River. To ensure the speedy restoration of PATH service, the temporary station was constructed in essentially the same location as the pre-September 11, 2001 Terminal. This allowed PANYNJ to reuse certain infrastructure elements including the 1 and 9 underpass, portions of the retail concourse, and the NYCT subway station connections that remained on the WTC site. Furthermore, design documents could be advanced more quickly since track and platform configurations and other station elements could be constructed based on pre-September 11, 2001 plans. However, to achieve this commitment within two years after the attacks, PANYNJ compromised certain elements of the pre-September 11, 2001 Terminal with regard to operational capacity, service amenities, and pedestrian connections.

Because PANYNJ could use as-built plans from the pre-September 11, 2001 Terminal to design and construct the temporary station, extensive survey work was not needed. Designers could lock in the station and track configuration both horizontally and vertically. As such, steel detailing could be expedited and steel sizing accelerated. Since it was intended as a temporary station, platforms were designed to be removed and not integral to the platform walls; interior drainage was less than desired since only the outer bay of the station has interior drains; and, roof insulation was minimal since it was an outdoor facility.

The temporary station has 8-car platforms as compared to the 10-car platforms that were part of the pre-September 11, 2001 Terminal, resulting in 20 percent less operational capacity. Prior to September 11, 2001, PANYNJ was studying the extension of stations along its Newark-WTC route to provide for 10-car train service. These improvements were in response to ridership levels that were reaching maximum capacity on this route during peak periods.

Some of the infrastructure elements within the station have a limited service life. The vertical elements, while ADA-compliant, do not provide a sufficient level of service to accommodate future demand. Escalators from the platform to the mezzanine level and from mezzanine level to the NYCT 1 and 9 subway line underpass were not provided. The station's design does not allow for new construction above, as planned for the WTC redevelopment, nor can it easily support connections to future buildings on the WTC site or other off-site destinations.

To expedite service restoration, the temporary station's tracks and platforms are located outdoors in the WTC "bathtub." Weather protection is provided, but the station is not fully enclosed and

is not climate-controlled. Local radiant heating is provided in waiting areas, but many portions of the station complex are not heated during winter months or cooled during summer months. As noted previously, the pre-September 11, 2001 Terminal was fully climate-controlled.

The temporary station includes security and fire protection equipment, but advanced passenger amenities are not provided. The station is ADA-compliant, but its configuration requires four separate elevator rides to reach street level. Emergency exits are provided, but they lead passengers either to Church Street or to the WTC bathtub area with access to the street via the temporary access ramp and a temporary stairway to West Street.

Because construction of the WTC site is ongoing, pedestrian access to the temporary station is limited as compared to the pre-September 11, 2001 Terminal. All patrons enter and exit at street level near the intersection of Church and Fulton Streets at the eastern boundary of the WTC site. Thus, patrons traveling to the World Financial Center must double-back along Vesey or Liberty Street. The temporary station has connections to NYCT's E, R, and W lines, but access to 1 and 9 trains is not available because NYCT has not yet reopened its Cortlandt Street Station. As such, two fewer subways are served compared to pre-September 11, 2001 conditions.

D. GOALS AND OBJECTIVES

The Permanent WTC PATH Terminal would be a full-service, regional transportation hub that would be coordinated with existing and future transportation infrastructure, WTC site development, and the surrounding area. The Project is needed to reestablish and enhance transportation facilities and infrastructure that existed at the WTC complex prior to September 11, 2001 and to ensure the long-term accessibility and economic vitality of Lower Manhattan.

EFFECTIVELY RESTORE LONG-TERM PATH SERVICE BETWEEN NEW JERSEY AND LOWER MANHATTAN

The Project should provide for a facility that maintains a direct transit connection between New Jersey and Lower Manhattan. It should serve as a long-term, high-capacity facility with enhanced amenities as compared to the pre-September 11, 2001 WTC PATH Terminal. To successfully address this goal, the Project must meet the following objectives:

- Accommodate pre-September 11, 2001 PATH ridership;
- Provide for additional capacity at the Terminal to support ridership growth;
- Provide for modern station design with ADA-accessibility, climate control, and station security; and
- Minimize disruption to temporary PATH service during construction.

ESTABLISH AN INTERMODAL TRANSPORTATION FACILITY IN LOWER MANHATTAN

The Project should enhance transportation connections to, from, and within Lower Manhattan as compared to pre-September 11, 2001 conditions. The opportunity to rebuild a PATH facility should take advantage of connections to existing and future transit infrastructure and should allow for improved at-grade and below-grade pedestrian connections as compared to the pre-September 11, 2001 and temporary PATH facilities. To successfully address this goal, the Project must meet the following objectives:

- Improve street-level visibility and access;
- Provide for adequate and state-of-the-art pedestrian circulation within the facility; and
- Provide for connections to NYCT subways and other major origination and destination points.

PLAN AND CONSTRUCT A TERMINAL THAT WOULD SUPPORT THE REDEVELOPMENT OF LOWER MANHATTAN

The Project should support the physical and economic recovery of Lower Manhattan, including proposals for the reconstruction or rehabilitation of other transportation infrastructure, redevelopment of the WTC site, and construction and occupation of other off-site projects, all of which are undergoing separate environmental reviews, as detailed above. To successfully address this goal, the Project must meet the following objectives:

- Construct a facility that is coordinated with the master plan for the WTC site;
- Provide for future connections to WTC buildings and functions, including the proposed memorial;
- Coordinate PATH facilities with other sub-grade uses at the WTC site; and
- Plan and coordinate PATH elements with proposals for the reconstruction of Route 9A, the Fulton Street Transit Center, and other off-site development.

MINIMIZE ADVERSE IMPACTS TO THE ENVIRONMENT

The construction and operation of the Project should not, to the extent possible, adversely effect the local and regional environment in the short-term or long-term. The desired alternative would not only minimize adverse effects but would also provide for the greatest positive benefits to both the build and natural environment. To successfully address this goal, the Project must meet the following objectives:

- Reuse existing infrastructure to the extent possible;
- Provide for efficient and environmentally friendly construction techniques;
- Minimize disruption to PATH and NYCT subway service during construction; and
- Provide for "green" and sustainable design. ✷

A. INTRODUCTION

As described in Chapter 1, "Purpose and Need," the Permanent World Trade Center (WTC) PATH Terminal is one of four projects proposed for funding under the $4.55-billion Lower Manhattan Transportation Recovery Effort. The federal government is also proposing to fund the Fulton Street Transit Center (FSTC), South Ferry Terminal, and Route 9A Project in addition to the Permanent WTC PATH Terminal. These other transportation projects are being sponsored and evaluated independent of the Permanent WTC PATH Terminal. The federal government, through the U.S. Department of Housing and Urban Development (HUD), is also proposing to fund the Lower Manhattan Development Corporation's (LMDC) WTC Memorial and Redevelopment Plan. Although the WTC Memorial and Redevelopment Plan and the Permanent WTC PATH Terminal would both occupy spaces on the WTC site, these projects are considered independent actions under the National Environmental Policy Act (NEPA) process and are therefore being evaluated and assessed in separate Environmental Impact Statements (EISs).

Project Alternatives for a Permanent World Trade Center (WTC) PATH Terminal were identified as part of early planning studies conducted by the Port Authority of New York and New Jersey (PANYNJ) following the terrorist attacks of September 11, 2001, and throughout this environmental review process. This chapter describes the process for developing Project Alternatives, including a discussion of the overall alternatives development process, a description of the Preferred Alternative, and a review of alternatives considered and eliminated from further study.

Three Project Alternatives were advanced through the alternatives development process for detailed study in the Draft EIS (DEIS), as follows:

- No Action Alternative
- Terminal without Liberty Plaza Connection Alternative
- Terminal with Liberty Plaza Connection Alternative

Since publication of the DEIS, PANYNJ and FTA have selected the Terminal without a Liberty Plaza Connection as the Preferred Alternative for a Permanent WTC PATH Terminal. This alternative was selected after careful consideration of the public comments received during the public review process for the DEIS. Not only would the Preferred Alternative meet the goals and objectives of the project, but it would also provide for substantial improvements over the pre-September 11, 2001 WTC PATH Terminal and the temporary WTC PATH station.

As described in the DEIS, the design of the Permanent WTC PATH Terminal is being closely coordinated with the other Lower Manhattan recovery efforts described above. To anticipate potential modifications to this Project that may be necessary to coordinate with these independent actions, the DEIS identified design options for components of the Terminal. Specifically, the DEIS described options for the coordination of the Terminal's construction with other uses on the WTC site, the location of ventilation structures, the cooling system to be

employed, and the pedestrian connection across Route 9A. Since publication of the DEIS, PANYNJ has advanced the Terminal's design and has determined that these design options are no longer needed. As such, this Final EIS (FEIS) identifies the options selected as part of the Preferred Alternative and describes the options eliminated from further consideration.

This chapter in conjunction with Chapter 3, "Construction Methods and Materials," also describes the framework for the assessments of environmental effects presented in the technical chapters that follow. This discussion includes the development of baseline conditions for analysis, assumptions applied in the analysis of the No Action and Preferred Alternatives, and the approach to studying cumulative effects. This framework also presents the Environmental Performance Commitments (EPCs) and environmentally friendly "green" measures that would be incorporated into the design and construction of the Preferred Alternative to avoid or minimize potential adverse impacts to the environment.

B. ALTERNATIVES DEVELOPMENT PROCESS

LOCATIONS FEASIBILITY ANALYSIS

While restoring temporary PATH service to Lower Manhattan as described in Chapter 1, "Purpose and Need," PANYNJ began planning for a permanent facility, including tracks, platforms, mezzanines, pedestrian concourses, and a terminal building on or near the WTC site. Not only did PANYNJ intend to restore the capacity and connectivity that existed within the pre-September 11, 2001 WTC PATH Terminal but also wished to enhance pedestrian connections through the site and adjacent properties and to create a world-class transportation hub for Lower Manhattan. To that end, PANYNJ conducted a detailed analysis of alternatives for transit service between New Jersey and Lower Manhattan. The process that was undertaken is described below.

LOCATIONS FEASIBILITY ANALYSIS FRAMEWORK

Planning Constraints

The PATH system operated between New Jersey and Lower Manhattan for almost 100 years prior to the September 11, 2001 terrorist attacks. Thus, a substantial infrastructure had been built to support this high-capacity, heavy-rail service. Although the attacks and their resultant damage severely hindered operations, PATH was able to maintain service at all but two of its stations (Exchange Place and WTC). Furthermore, PATH's Hudson River tunnels between Exchange Place and Lower Manhattan were damaged by flooding but were determined to be structurally sound. New York City Transit's (NYCT) 1 and 9 line, which traverses the WTC site, was also damaged but was reconstructed on an expedited schedule to restore service within one year of the attacks. In planning for long-term transit service between New Jersey and Lower Manhattan, PANYNJ made an early decision not to preclude operations on portions of the PATH and NYCT systems that remained intact. To that end, PANYNJ's planning was constrained by four important considerations as described in Table 2-1.

Given these constraints, the only reasonable alternatives would be alternate locations for a Lower Manhattan PATH terminal.

Table 2-1
Locations Feasibility Planning Constraints

Planning Constraint	Description
Re-use Hudson River tunnels	Construction of new Hudson River tunnels would be time-consuming and expensive and may have potential adverse effects on the environment. New tunnels would also require right-of-way that may be outside current PANYNJ jurisdiction. Thus, it was determined that future Trans-Hudson service should use the existing tunnels between Exchange Place and the WTC site.
Maintain a heavy-rail system	Use of the Hudson River tunnels limits the type of service that can be provided because PATH's infrastructure, fleet, and support systems would not be easily adapted to other types of service. The introduction of alternative modes would severely disrupt the remainder of the PATH system.
Connect to existing tunnel projections	Use of the Hudson River tunnels requires connections to the PATH projections at the WTC site, which constrains the alignment within Lower Manhattan. New links to these projections must comply with PATH's systemwide grade and curvature specifications.
Maintain NYCT's 1 and 9 train alignment	Any PATH infrastructure that penetrates through NYCT's 1 and 9 line must be below the subway tracks. Such plans would need to consider the height, depth, and width of these protrusions and their potential effects on subway service.

Planning Guidelines

In planning for a permanent terminal, PANYNJ not only desired to restore the facility that existed before September 11, 2001 but also strived to improve and enhance service to Lower Manhattan. Chapter 1, "Purpose and Need", outlined the goals and objectives for the Project. In order to fully assess location options for a Terminal, these goals and objectives were refined into more specific planning guidelines so as to weigh various benefits and potential shortfalls of the locations being considered. These planning guidelines are described in Table 2-2.

Location Options

Given the planning constraints described above, PANYNJ identified four sites of an appropriate size and configuration for a permanent PATH terminal. These locations are shown in Figure 2-1 and are described below.

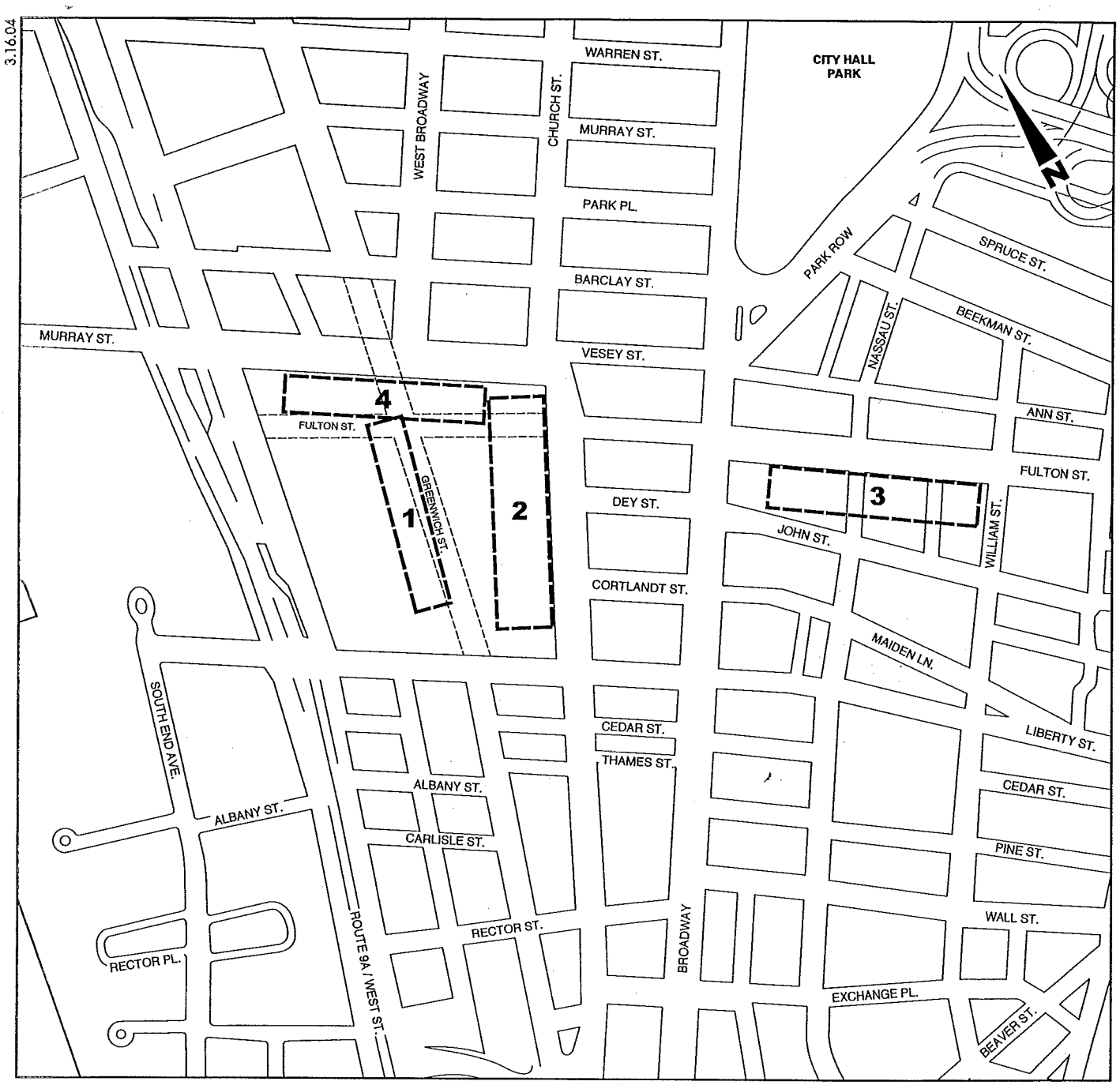
- Location 1, WTC "Bathtub": The WTC "Bathtub" option would restore service in the location of the pre-September 11, 2001 WTC Terminal by building the tracks, platforms, and mezzanines in the same location as the temporary PATH station. The platform level would have a north-south configuration with a loop track arrangement. There would be five tracks and three 10-car platforms. A terminal building would be constructed at street level, directly above the platforms and mezzanine, with access from Greenwich Street, and pedestrian concourses would allow for all-weather access to the World Financial Center, future buildings on the WTC site, NYCT's Fulton Street Transit Center, and NYCT's WTC and Cortlandt Street subway stations.

  Location 2, Church Street: The Church Street option would be a new facility in the approximate location of the original Hudson and Manhattan (H&M) Terminal, along the west side of Church Street between approximately Fulton and Cortland Streets. It would be a loop station and would have a north-south orientation on the eastern portion of the WTC site between Church and Greenwich Streets. The proposed plan would be for five tracks and five 10-car platforms. Four of the five platforms would accommodate separate boarding and alighting operations. A terminal building would be constructed above the platforms and mezzanine and would have street-level access from Church Street. This location would also provide for pedestrian concourses with all-weather access to the World Financial Center, future buildings on the WTC site, NYCT's Fulton Street Transit Center, and NYCT's WTC and Cortlandt Street subway stations.

Table 2-2
Locations Feasibility Planning Guidelines

Planning Objective	Description
Create a world-class, transportation facility in Lower Manhattan	The new PATH facility should be integrated with existing and proposed transportation infrastructure and other uses but should also have a significant presence in Lower Manhattan. A desirable location would allow for integration of sub-grade pedestrian connections with other facilities and for an above-grade terminal building that enhances the overall experience of PATH customers.
Support the redevelopment of Lower Manhattan	The permanent terminal should support the redevelopment of Lower Manhattan and its economic recovery. Although PATH is critical to Lower Manhattan's transportation infrastructure, a permanent terminal should not preclude other development on or off the WTC site. A desirable location would allow for the restoration and enhancement of PATH service but would not hinder other redevelopment efforts. The objective is to maximize space on the WTC site for redevelopment.
Provide for improved pedestrian connections	The permanent terminal should provide pedestrian connections to the facilities previously served by PATH, including NYCT's WTC (E) and Cortlandt Street (1 and 9; R and W) subway stations, Battery Park City, World Financial Center, and future buildings on the WTC site. The terminal should also connect to NYCT"s Fulton Street Transit Center (2, 3, 4, 5, A, C, J, M, and Z subway lines) and provide for concourses to serve other destinations based on pedestrian demand in Lower Manhattan.
Minimize impacts to temporary PATH service during construction	To avoid the commutation problems that existed immediately following September 11, 2001, PANYNJ desires not to disrupt weekday, peak-period service at the temporary WTC PATH station during construction of a permanent terminal.
Minimize impacts to the local environment during and after construction	The blocks immediately adjacent to the WTC site contain some of the area's largest office buildings as well as historic structures, which would be sensitive to disruption, displacement, underpinning, or other construction activities associated with a permanent terminal. Thus, any option that would directly displace businesses would not be desired.
Enhance pre-September 11, 2001 PATH operations	The permanent terminal should maintain the maximum operation of the pre-September 11, 2001 Terminal of 30 trains per hour. The terminal should also reduce the cross-flow conflicts that existed previously. Although 5 platforms and 5 tracks would virtually eliminate cross-flow, it was determined that 4 platforms would greatly improve conditions as compared to pre-September 11, 2001.
Support 10-car PATH trains	PANYNJ plans to widen platforms on PATH's Newark-WTC route to support 10-car trains. Thus, a future terminal should not preclude this long-term operating plan.
Provide for advanced security	To prevent future incidents at the WTC site, including the PATH terminal, PANYNJ, LMDC, Metropolitan Transportation Authority (MTA), and New York State Department of Transportation (NYSDOT) would provide for integrated, enhanced, and state-of-the-art security measures within the design of the individual projects. As such, the physical design of a permanent terminal and the WTC site must provide for adequate facilities to support security measures such as surveillance, structural hardening, and truck checkpoints for the protection of Lower Manhattan.
Re-use existing PATH right-of-ways	A location outside the WTC site would require property acquisition and potential demolition of existing structures, which may increase the cost of the project, increase the duration of construction, and may have potential adverse impacts on the local environment. PANYNJ would be less inclined to pursue a location needing additional right-of-way.
Minimize construction cost and duration	While working to pursue the other planning goals, PANYNJ would desire a location that provides the greatest benefits at a reasonable cost and within a reasonable construction timeframe.

- Location 3, Broadway-Nassau: The Broadway-Nassau option would be a new facility located east of the WTC site under Dey Street and beneath NYCT's Fulton Street Transit Center. It would be a stub-end station, meaning that conductors and engineers would need to change positions within the train to continue service in the reverse direction. The station would have five tracks and five 10-car platforms. It would be integrated with the Fulton Street Transit Center and would have street-level access from Broadway, Fulton Street, and John Street. Convenient, below-grade access to NYCT's 2, 3, 4, 5, A, C, J, M, and Z trains



1 Alternative Location and Reference Number

Proposed New Street (To be Constructed by Others)

0 500 FEET
SCALE

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Figure 2-1
Alternative Locations

would be provided. Connections to NYCT's R and W trains would be via a newly constructed concourse under Dey Street. There may also be all-weather connections to the World Financial Center or the future buildings on the WTC site.

- Location 4, Vesey Street: The Vesey Street option would be located in the WTC "Bathtub" along Vesey Street. It would have an east-west orientation and would form a loop with the Hudson River tunnels. It would have five tracks and five 10-car platforms. A terminal building would be constructed immediately above the platforms and mezzanines at street level with pedestrian access from Vesey and Fulton Streets. Pedestrian concourses would allow for all-weather access to the World Financial Center, future buildings on the WTC site, and NYCT's 1, 2, 3, 9, A, C, E, R and W subway lines with a possible connection to the Fulton Street Transit Center.

LOCATIONS EVALUATION

Fatal Flaws Analysis

Before advancing any design options, PANYNJ conducted an initial screening of the four sites to determine if any were seriously flawed. It was determined that any location, which 1) would not provide for adequate PATH operations, 2) would fully disrupt temporary PATH service, or 3) require major property acquisition and/or demolition of active buildings, would not be consistent with the overall goals and objectives for the Project identified in Chapter 1, "Purpose and Need". Using the planning guidelines described above, PANYNJ established that two locations would not satisfy the current and future needs of PATH customers as described below.

- Location 1, WTC "Bathtub": Location 1 would allow for a maximum operating capacity of 30 trains per hour. It would require some disruption to temporary PATH operations when portions of the station are upgraded during construction. However, careful staging would maintain service during peak periods. Since the terminal would be located on the WTC site, property acquisition and demolition of buildings would not be required. Furthermore, potential business disruption would be minimal since most construction activities would occur off-street. Thus, Location 1 was carried forward for further study.

- Location 2, Church Street, would allow for a maximum operating capacity of 30 trains per hour. It would require minor disruption to temporary PATH operations when its tracks are connected to the Hudson River tunnels, but service could be maintained during peak periods. Since the terminal would be located on the WTC site, property acquisition and demolition of active buildings would not be required. Furthermore, potential business disruption would be minimal since most construction activities would occur off-street. Thus, Location 2 was carried forward for further study.

- Location 3, Broadway-Nassau, would allow for a maximum operating capacity of 20 trains per hour, which is below the goal of 30 trains per hour. It would require full closure of the temporary PATH station for several months during construction as the tracks leading to the terminal would cross those of the temporary station such that the temporary tracks would need to be removed. The terminal's construction would require the acquisition of property and certain buildings would need to be demolished. Furthermore, above- and below-ground construction activities would likely require street closures. This could result in direct displacement of businesses in the vicinity of the proposed terminal. Because Location 3 failed to meet the operational requirements of PATH, it was considered fatally flawed.

- Location 4, Vesey Street, would have a maximum operating capacity of 30 trains per hour. However, it would require full closure of the temporary PATH station during construction because the tracks and platforms of the terminal would require the removal of infrastructure from the temporary station. Since the terminal would be located on the WTC site, property acquisition and demolition of buildings would not be required, and potential business disruption would be minimal. Because Location 4 would preclude temporary PATH service during construction, it was considered fatally flawed.

Detailed Screening Analysis

PANYNJ conducted further analysis for Location 1 (WTC "Bathtub") and Location 2 (Church Street) to evaluate their consistency with the long-range planning guidelines described above. Since these locations were similar in terms of many general goals, the detailed screening focused on specific differences in terms of their construction, long-term operations, and compatibility with redevelopment efforts for the WTC site.

Construction

PANYNJ prepared cost estimates and construction schedules for the development of a permanent terminal at Locations 1 and 2 based on preliminary engineering. This analysis showed that the Church Street option would cost 20 to 25 percent more and would require 7 to 10 percent more time to construct than the WTC "Bathtub" option.

The differences in construction cost and duration were mainly attributed to the site preparation and structural underpinning required for the Church Street option. Because the WTC "Bathtub" option is located in the area of the site that was fully cleared during recovery efforts, little site preparation would be necessary. The Church Street option is located on a portion of the site that retains five sub-grade levels (two basement levels of the former WTC complex and the three levels of the old H&M Terminal). These structures would need to be demolished and debris removed. Furthermore, a new slurry wall would need to be constructed east of the NYCT 1 and 9 subway line to excavate new PATH right-of-way between Church, Greenwich, Vesey, and Liberty Streets. Thus, front-end construction activities for the Church Street option would be longer and more costly than for the WTC "Bathtub" location.

The WTC "Bathtub" location would be constructed within and above the temporary station, requiring a complex staging plan to maintain PATH service. Thus, certain activities that could normally be implemented in a single phase would be spread over multiple stages of construction. Because the majority of the Church Street option would not directly affect temporary PATH operations, a less complicated construction phasing plan could be implemented, resulting in a more efficient construction process than with the WTC "Bathtub" option.

The Church Street option requires new track and tunnels beneath the 1 and 9 line; therefore, extensive underpinning of NYCT's infrastructure would be necessary. These activities would add to the project cost, require extensive staging and coordination to minimize disruption to subway service, and prolong the construction schedule. The WTC "Bathtub" option would require underpinning of NYCT's 1 and 9 subway line for platform and concourse construction, but such activities would be far less intensive than with the Church Street option.

Operations

Both locations would provide for improved operations as compared to the pre-September 11, 2001 Terminal. However, each would offer certain operating advantages.

The Church Street option would have two additional platforms as compared to the WTC "Bathtub" location, which would facilitate dedicated loading and unloading activities during peak periods and an extremely efficient platform circulation. The three-platform configuration of the WTC "Bathtub" location could not support dedicated loading and unloading. Although the Church Street location would have superior circulation as compared to the WTC "Bathtub" option, the maximum throughput of both stations would be 30 trains per hour.

The configuration of the WTC "Bathtub" location allows for better vertical circulation than the Church Street option. Because vertical elements could be arranged to allow for a diagonal ascension to street level, the WTC "Bathtub" location would facilitate passenger movements from platform level to concourse/street level in the desired direction of travel. Since space for the Church Street option is more constrained, vertical elements would be stacked and arranged in a scissor-style such that some passengers would double-back within the station complex to maneuver between platform and concourse/street level. Thus, the vertical circulation of the WTC "Bathtub" option would be more efficient than the Church Street location.

Each location offers relative proximity to certain destinations in Lower Manhattan. The Church Street option would be approximately 300 feet east of the WTC "Bathtub" location; thus, it would be one block closer to the Financial District, the Civic Center, the Fulton Street Transit Center, and NYCT's Cortlandt Street (R and W) and WTC (E) subway stations. The WTC "Bathtub" location would be closer to Battery Park City and the World Financial Center. Each location, therefore, offers advantages for certain riders.

Compatibility with WTC Redevelopment Efforts

The Church Street or WTC "Bathtub" PATH terminal would be one component of the redevelopment on the WTC site. Any future terminal must not preclude redevelopment efforts, and the most desirable location would allow planners to achieve the maximum programming of other uses. Furthermore, the terminal must allow for the enhanced security measures that would need to be incorporated into the site's design so as to not limit the ability of site developers to provide for enhancements as compared to pre-September 11, 2001 conditions.

Because infrastructure is required throughout the site to support all of the redevelopment components, it was determined that the first four levels of the WTC from the bathtub floor would be dedicated to transportation, utilities, internal circulation elements, and building support. These levels would also contain the tracks, platforms, and mezzanines for PATH. Areas above the fourth level would follow a master plan for the site with programmed spaces for a memorial, cultural facilities, open space, and commercial uses.

All infrastructure associated with the WTC "Bathtub" option would be on the western portion of the site, freeing the eastern portion of PATH elements. This would allow maximum flexibility for commercial development and the incorporation of mechanical, security, and building servicing infrastructure required for such development. Furthermore, secured loading and servicing as well as large retail spaces could be made available in the below-grade spaces on the eastern portion of the WTC site. With the ability to provide multi-level retail spaces on the eastern portion of the site, major anchor tenants could be sought such as "big-box" retailers or department stores, which would restore and enhance the overall retail composition of Lower Manhattan. Because much of the rest of Lower Manhattan is fully developed, it would be difficult to provide adequate spaces for such retailers off-site. The above-grade portions of the WTC "Bathtub" option would be within the area of a proposed memorial, including its headhouse.

The Church Street option would have PATH elements throughout the WTC site. While the western portion would only contain the tracks and ancillary facilities, the platforms, mezzanines, concourses, and terminal building would be located wholly within the eastern portion. Given the "scissor-style" configuration of a Church Street terminal, safe passenger egress would require that the level of the terminal's tracks and platforms be higher than for the WTC "Bathtub" location. These below-grade spaces dedicated to PATH either would preclude or would require that retail, security and other support services are located elsewhere. Thus, loading areas and parking facilities would be located above grade or eliminated. If above-grade loading areas were needed, it is likely that they would be accessed from Greenwich Street because New York City guidelines typically disallow such activities from wide avenues such as Church Street. These trucking activities would not be sensitive to the memórial zone, which would be located opposite Greenwich Street. Furthermore, since above-grade loading would likely require that individual areas be provided in each of the offices towers, ground-level space would be lost and centralized security could not be provided. Based on preliminary programming for the WTC site, it is estimated that a total of approximately 15 to 25 percent of the potential on-site retail spaces would be lost under the Church Street location as compared to the WTC "Bathtub" option.

Construction of commercial towers above a PATH terminal at the Church Street location would require advanced engineering and a longer schedule to complete. Certain structural elements within the PATH terminal would be required to support a commercial overbuild, which would reduce the flexibility of the station's design and the flexibility of the above-grade development. Furthermore, other site uses within the eastern portion of the site could not be constructed until PATH elements are completed; thus, the Church Street location may result in an extended timeframe for the overall redevelopment of the WTC site.

Analysis Results

Table 2-3 compares the results of the detailed screening analysis. Location 1 was determined to be more desirable in terms of construction because it would be less expensive with slightly shorter duration. Although intensive coordination would be needed to maintain temporary PATH service, the WTC "Bathtub" location would allow for simultaneous construction of other projects on the WTC site. Thus, the schedule for the overall site redevelopment may be reduced.

The Church Street option would allow for superior platform circulation as compared to the WTC "Bathtub" option; however, vertical circulation would be more difficult. Both locations would have all-weather connections to NYCT subways, but the Church Street option would be closer to most of the existing stations. It would also be one block closer to developments within the Civic Center and the Financial District. However, the WTC "Bathtub" location would have better proximity to the World Financial Center and Battery Park City.

Generally, the WTC "Bathtub" option would be more compatible with proposed uses on the WTC site. Certain above-grade portions would need to be integrated with the future memorial. However, this location would allow for the maximum development potential of other uses, which would enhance the economic recovery of Lower Manhattan. The Church Street option would not require above-grade structures within the area of the memorial, but it would hinder sub-grade and above-grade commercial development on other portions of the site. Furthermore, the Church Street option would have contextual impacts to the memorial since building servicing, such as truck loading and security would likely be at street level, and it is probable that spaces beneath the memorial would be needed to support other buildings on the site.

Table 2-3
Locations Feasibility Detailed Screening Analysis Results

Criteria	Location 1 WTC "Bathtub"	Location 2 Church Street
Construction		
Cost	30% to 35% less expensive	30% to 35% more expensive
Duration	7% to 10% shorter	7% to 10% longer
Constructability	Requires complex staging plan to avoid disruption to temporary PATH service	Requires extensive site preparation and underpinning of NYCT infrastructure
Operations		
Tracks	5	5
Platforms	3	5
Platform Cross-flow	Cross-flow conflicts on all platforms	Cross-flow conflicts on 1 platform
Vertical Circulation	Easily navigable	More complex with double-back movements to reach street level
Proximity to Civic Center	One block farther	One block closer
Proximity to Financial District	One block farther	One block closer
Proximity to World Financial Center and Battery Park City	One block closer	One block farther
Proximity to NYCT Cortlandt Street Station (1 and 9)	No difference	No difference
Proximity to NYCT Cortlandt Street Station (R and W)	One block farther	One block closer
Proximity to NYCT World Trade Center Station (E)	One block farther	One block closer
Proximity to Fulton Street Transit Center (2, 3, 4, 5, A, C, J, M, and Z)	One block farther	One block closer
Proximity to World Financial Center Ferry Terminal	One block closer	One block farther
Compatibility with WTC Redevelopment		
Compatibility with Memorial	Certain above-grade elements would be within the memorial zone; these facilities could be integrated into the memorial's design	Contextual effect if building servicing is moved to street level. Certain site elements may be located beneath the memorial.
Compatibility with Other Site Development	Allows for more flexibility in above-grade development and approximately 15% to 25% more on-site retail.	Requires spaces that could be programmed for commercial uses and reduces the flexibility of site planning and construction. Could result in a 15% to 25% reduction in retail space.
Compatibility with site infrastructure and security	Allows for sub-grade security checkpoints, building servicing, and goods delivery.	Requires at-grade building servicing and goods delivery; may preclude centralized security checkpoint.

The "Hybrid" Option

PANYNJ reviewed the results of the detailed screening analysis to determine locations for the permanent terminal to be evaluated further. Because PANYNJ recognized certain benefits of both options, a plan that would accommodate the advantages of both locations was developed. As the conceptual planning of the WTC site was advanced, it was determined that spaces between Greenwich and Church Streets could be made available for a PATH terminal, but there would not be sufficient below-grade space to accommodate new tracks and platforms along Church Street. Thus, PANYNJ proceeded with a plan that would maintain the tracks and platforms within the WTC "Bathtub" but would locate the major pedestrian connections and terminal building in the vicinity of Church Street. Table 2-4 compares the evaluation of this "hybrid" option to the WTC "Bathtub" and Church Street locations.

Table 2-4
Comparison of the WTC "Bathtub", Church Street, and "Hybrid" Locations

Criteria	Location 1 WTC "Bathtub"	Location 2 Church Street	"Hybrid" Location
Construction			
Cost	Lowest Cost	Medium Cost	Highest Cost
Duration	Shortest Duration	Longest Duration	Medium Duration
Constructability	Requires complex staging plan to avoid disruption to temporary PATH service	Requires extensive site preparation and underpinning of NYCT infrastructure	Requires site preparation on eastern portion and extensive coordination with temporary PATH
Operations			
Tracks	5	5	5
Platforms	3	5	4
Platform Loading and Unloading	Cross-flow conflicts could not be eliminated	Cross-flow conflicts could be eliminated on 4 of 5 platforms	Cross-flow conflicts could be eliminated on 1 of 4 platforms
Vertical Circulation	Easily navigable	More complex with some double-back movements to reach street level	Allows for improved vertical circulation over Location 2
Proximity to Civic Center	One block farther	One block closer	Same as Location 2
Proximity to Financial District	One block farther	One block closer	Same as Location 2
Proximity to World Financial Center and Battery Park City	One block closer	One block farther	Same as Location 1
Proximity to NYCT Cortlandt Street Station (1 and 9)	No difference	No difference	No difference
Proximity to NYCT Cortlandt Street Station (R and W)	One block farther	One block closer	Same as Location 2
Proximity to NYCT World Trade Center Station (E)	One block farther	One block closer	Same as Location 2
Proximity to Fulton Street Transit Center	One block farther	One block closer	Same as Location 2
Proximity to World Financial Center Ferry Terminal	One block closer	One block farther	Same as Location 1
Compatibility with WTC Redevelopment			
Compatibility with Memorial	Certain above-grade elements would be within the memorial zone; these facilities could be integrated into the memorial's design	Contextual effect if building servicing is moved to street level. Certain site elements may have to be located on the western portion of the site beneath the memorial	Limited effect but would have more below-grade infrastructure in WTC "Bathtub" than would Location 2
Compatibility with Other Site Development	Allows for more commercial development with greater flexibility	Requires spaces that could be programmed for commercial uses and reduces the flexibility of site security and planning	Allows use of below-grade levels for commercial uses, building servicing, and security but terminal building would occupy above-grade space

The "hybrid" option would be more costly and more difficult to construct than either the WTC "Bathtub" or the Church Street options. Because the construction of PATH elements would require site excavation on some of the eastern portion of the WTC site, the "hybrid" location would carry some of the construction costs that would be required for the Church Street location. However, construction of the PATH elements in both the eastern and western portions of the WTC site could be undertaken simultaneously; thus, the "hybrid" option would have shorter construction duration than the Church Street. Although the "hybrid" option does not have advantages over the WTC "Bathtub" or Church

Street locations in terms of construction, the long-term benefits were determined to outweigh these short-term construction issues.

The "hybrid" option would have the same number of tracks but one additional platform as compared to the WTC "Bathtub" location and therefore would be an improvement over PATH's pre-September 11, 2001 operations. Upon review and refinement with PATH's operations staff, it was determined that a four-platform configuration would be acceptable to accommodate long-term ridership demand. The "hybrid" option would be oriented similar to the pre-September 11, 2001 WTC PATH Terminal such that patrons would enter the station at platform level west of Greenwich Street but would travel eastward toward Church Street as they ascend through the complex. However, an additional egress in the westward direction would be provided to allow better connections to Battery Park City and the World Financial Center. Thus, in terms of its pedestrian connections, the "hybrid" location would combine the advantages of both the Church Street and the WTC "Bathtub" options.

The "hybrid" option gives greater flexibility for WTC site redevelopment than does the Church Street location but allows for the memorial zone to be freed of most, if not all, above-grade PATH structures. Above-grade and below-grade elements of the PATH terminal could be fully integrated with commercial development to provide benefits to both uses. Truck loading and unloading could be accommodated below grade; thereby reducing the adverse street-level effects of the Church Street location. Furthermore, a terminal building could be located on Church Street to provide greater visibility for PATH. The hall would be oriented to accommodate the predominant pedestrian movements to and from PATH.

Since the "hybrid" option combined many of the advantages of both the Church Street and the WTC "Bathtub" locations, it was determined to be favorable for further study. This option was advanced into preliminary design and is evaluated as the "Preferred Alternative" in this FEIS, as described below.

ALTERNATIVES FOR FURTHER STUDY

NO ACTION ALTERNATIVE

Under the No Action Alternative, a Permanent WTC PATH Terminal would not be constructed, and the temporary station would remain in service to the extent possible. However, as described in Chapter 1, "Purpose and Need," the temporary station was constructed with the principal goal of restoring PATH service to Lower Manhattan as quickly as possible following the terrorist attacks of September 11, 2001. As such, certain components of the station may require replacement or upgrade to extend its service life beyond the anticipated 2009 opening year of a Permanent WTC PATH Terminal.

Under the No Action Alternative, PANYNJ would retain temporary PATH service between New Jersey and Lower Manhattan until either 1) elements of the WTC Memorial and Redevelopment Plan would preclude operations, 2) the station would not safely accommodate passenger demand, or 3) the major elements of the station would exceed their useful service life.

As described in Chapter 5, "Socioeconomic Conditions," the residential and employee population of Lower Manhattan will increase as the redevelopment of the WTC site and other projects are completed. These populations will generate new demand for PATH service as compared to today. As ridership nears the temporary station's design capacity, PANYNJ would need to implement operational adjustments to safely accommodate passengers. Two options

would be considered to extend temporary PATH service beyond its design capacity—reduced service and restricted access.

Reduced train service would result in fewer trains entering and leaving the station during the AM and PM commuter periods. As a result, there would be longer headways between trains, which allow the platforms to be cleared of passengers before the next train arrives. Reduced operations also help the throughput of vertical elements, such as escalators and stairways, by decreasing congestion. As will be described in Chapter 8, Section A, "PATH," reduced operations may result in the diversion of PATH customers to other modes of travel to and from Lower Manhattan.

Restricted access would result in the suspension of entering PATH customers at the temporary WTC station during the AM peak period. A similar operating plan was enacted at PATH's Christopher Street Station in the months following September 11, 2001. Restricted access would prohibit customers wishing to travel from Lower Manhattan to New Jersey in the morning peak period from using the system. Thus, these riders would need to seek alternative modes of travel to reach their destinations. It should be noted that a similar operation could be implemented, albeit in the reverse direction, during the PM peak period.

Restricted access eliminates cross-flow traffic within the station complex and results in more efficient platform operations. Furthermore, vertical elements can operate with a single flow of traffic in a uniform direction. This increases the throughput of these elements and allows for the processing of a larger number of passengers.

Although PANYNJ could implement measures to extend the design capacity of the temporary station, it is anticipated that vital systems within the station would exceed their service life over the next 20 years. Therefore, without a major infusion of capital, it would be necessary to cease operations at the temporary WTC PATH station sometime between 2009 and 2025.

PREFERRED ALTERNATIVE

The Preferred Alternative would result in a new Permanent PATH Terminal on the WTC site. As described above, this alternative was developed through an evaluation of the benefits and constraints of two Terminal locations (WTC "Bathtub" and Church Street) on the WTC site, which was previously described as the "hybrid" location. This alternative combines an above-grade terminal building and sub-level pedestrian concourses on the eastern portion of the site with additional pedestrian concourses, tracks, platforms, and a mezzanine on the western portion of the site. Under this alternative, the Permanent WTC PATH Terminal would have four levels—platform, mezzanine, concourse, and a street-level terminal building.

Proposed Design

Figure 2-2 shows the platform level, which would be located immediately west of NYCT's 1 and 9 train line and atop the concrete slab at the base of the WTC "Bathtub." The platforms and tracks would have a north-south orientation to complete a loop with the Hudson River tunnels. Trains would enter the station from the south Hudson River tunnel (Tunnel F) and would exit via the north tunnel (Tunnel E). With this configuration, PATH trains would enter and leave Manhattan without changing the location of the train's engineer or conductor. Thus, trains could have a short dwell time at the Terminal.

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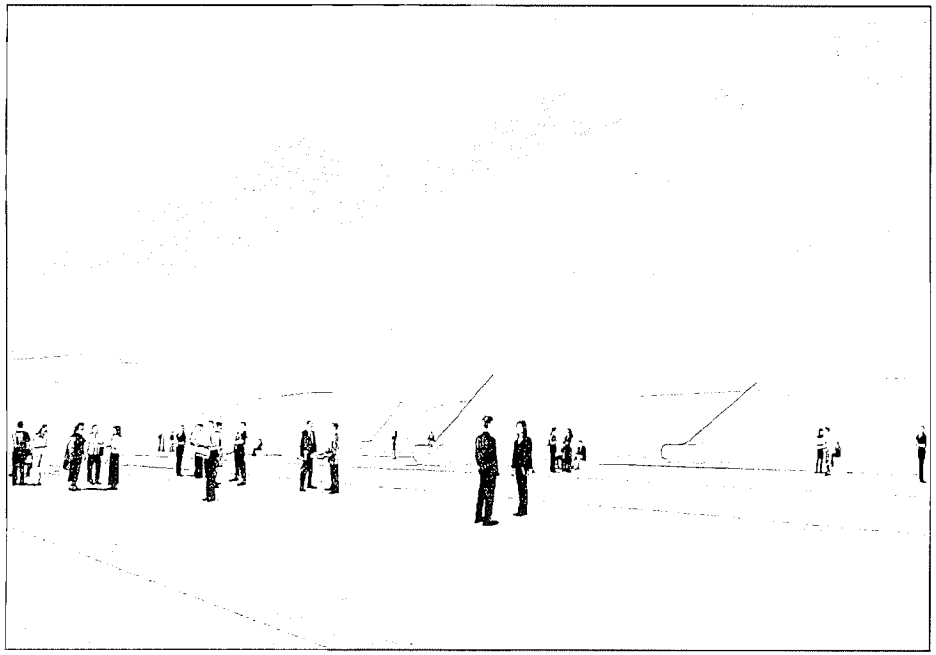

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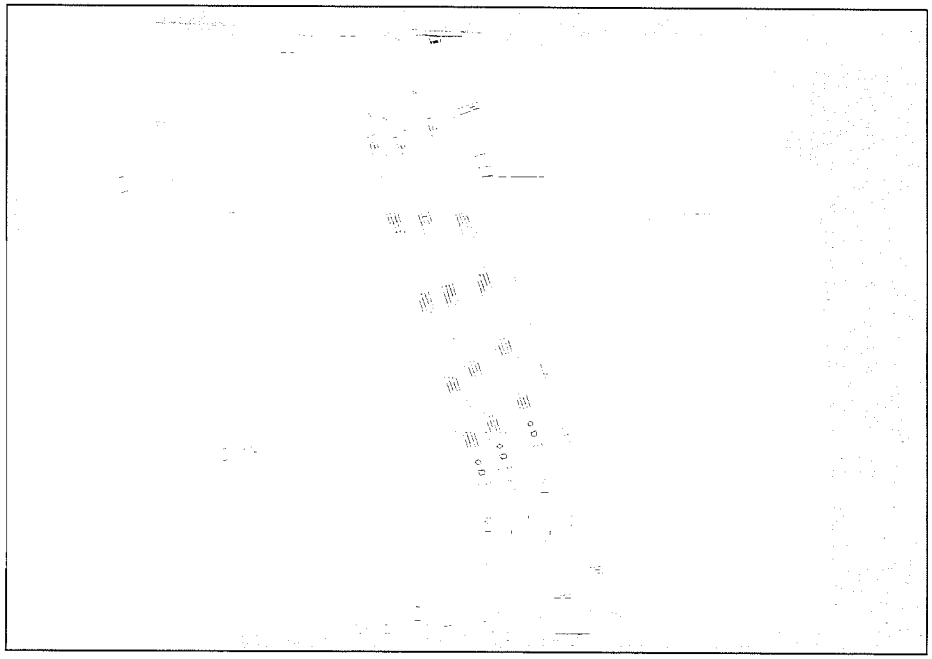
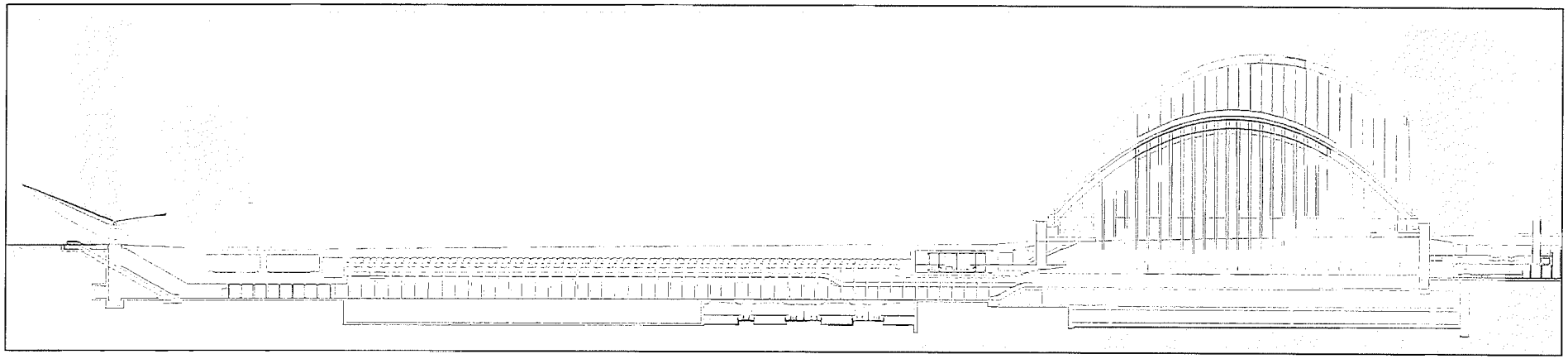


Plan



Elevation

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Figure 2-2
Platform Level

The Preferred Alternative would have four platforms (Platforms A through D) and 5 tracks (Tracks 1 through 5). The four platforms would be long enough to accommodate 10-car trains in accordance with PATH's long-range goal to increase the operational capacity of its system.

Platform A would effectively be a lengthening and rehabilitation of the temporary WTC PATH station platform that is adjacent to the east slurry wall. It is constrained to its east by the slurry wall and to its west by Track 1. Due to the narrowness of Platform A, it would not provide sufficient capacity to board and alight trains during peak hours. However, it is being retained as part of the Preferred Alternative to serve five functions: 1) as a failure management egress platform; 2) for access to trains stored on Track 1 during overnight hours; 3) as a service platform; 4) for use to alight trains that would end revenue service at the WTC Terminal; and 5) for staging the movement of trains to Harrison and Journal Square for inspection and repair.

Platform B would effectively be a rehabilitation of the temporary WTC PATH Station platform. It is constrained to the east by Track 2 and to the west by Track 3. It would serve Hoboken-WTC trains on Tracks 2 and 3. Platforms C and D would serve Newark-WTC trains on Tracks 4 and 5. Platform C would effectively be a rehabilitation of the temporary WTC PATH Station platform. It is constrained to the east by Track 4 and to the west by Track 5. PATH would allow both boarding and alighting to Track 4 from Platform C and dedicated boarding to Track 5. Alighting from Track 5 would be to Platform D.

Platform A would range in width from 13 to 23 feet. Platform B would be 30 feet wide, Platform C would be 31 feet, and Platform D would be 30 feet. As described in Chapter 6, "Cultural Resources" the PATH platforms would have architectural treatments to identify the areas at which they overlap with the footprint of the former South Tower. Furthermore, Platform D would contain a glass viewing area atop the portion of the former North Tower that it would cover.

Each of the four platforms would have multiple vertical circulation elements to move passengers between the platform and mezzanine levels. As planned, all platforms would contain elevators in accordance with the Americans with Disabilities Act. Platforms would also contain a combination of stairways and escalators.

The number and location of stairways and escalators is still being planned for Platform A. Platforms B and C would have a total of ten stairways and escalators and Platform D would have a total of 12. Certain structural elements that support the levels above would touch down within Platforms B and C. As planned, these elements would intersect the center of the platform between two stairways, two escalators, or a combination of stairways and escalators. Because these structural elements would not intersect Platform D, two additional stairways and/or escalators would be constructed.

As shown in Figure 2-3, the mezzanine level would have a north-south orientation and would be located directly above the platform level. This level would house fare equipment, vertical circulation to the platforms and concourse level, and up to approximately 5,000 square feet of retail services, such as newsstands and food stalls. The mezzanine level would have two entrances/exits to the above concourse level. An east entrance/exit would direct passengers beneath NYCT's 1 and 9 line to the eastern portion of the WTC site. A west entrance/exit would direct passengers beneath Route 9A toward Battery Park City and the World Financial Center.

Figures 2-4a and 2-4b show the concourse, which consists of a main level and a balcony. The concourse's main level would connect to the mezzanine's east and west entrances/exits via escalators and elevators and would provide connections to offices and retail on the WTC site and

FSTC's Dey Street Underpass, and a corridor beneath Route 9A would allow for access to the World Financial Center. The concourse's balcony level would provide connections to NYCT's Cortlandt Street (1 and 9), Cortlandt Street (R and W), and WTC (E) subway stations.

Figure 2-5 shows the terminal building, which would be constructed on the eastern portion of the WTC site along Church Street near its intersections with Dey and Fulton Streets. It would provide access from Church Street and proposed elements of the WTC Memorial and Redevelopment Plan, including Greenwich Street and a public plaza. The building would also provide for natural light to the concourse level.

Ancillary Facilities

The Terminal would include ancillary facilities and systems, such as mechanical rooms, ventilation, communications, emergency egress, and security. Some of the major elements of this ancillary work are described in the next few paragraphs.

Prior to September 11, 2001, PATH had two ventilation structures within the median of Route 9A. These vent structures were used for both smoke evacuation and piston relief. Piston relief is necessary because when trains operate within a fully enclosed structure, they create air pressure as they move. The structures within the Route 9A median vented this air, thereby reducing the pressure it would otherwise create with the PATH tunnels and Terminal. These vent structures also contained evacuation stairs for emergency egress. The vents were 12 feet tall and were located immediately above the PATH tunnels.

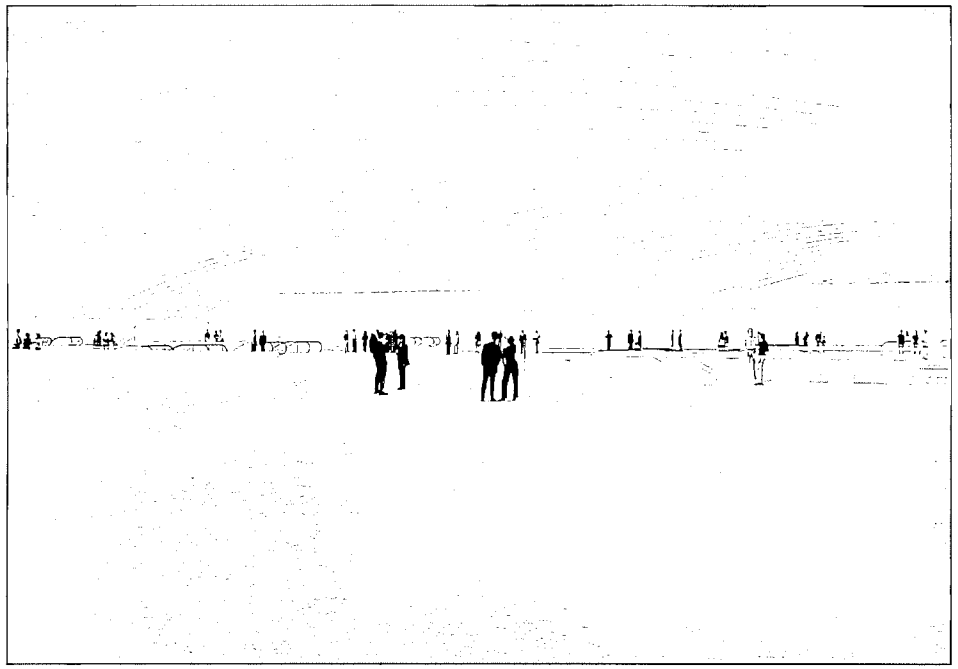
As part of their program to enhance security within and around the WTC site, PANYNJ plans to reconstruct the ventilation structures to be 40 feet tall. Ideally, the future vents would serve the combined purpose of piston relief, smoke evacuation, and emergency egress, as they did prior to September 11, 2001. PANYNJ would construct a north ventilation structure within the Route 9A median above PATH's Tunnel E. The south ventilation structure would also be located within the median of Route 9A above Tunnel F.

NYSDOT is currently evaluating its plans for the reconstruction of Route 9A. Although PANYNJ prefers to locate the PATH vents in the future Route 9A median, it may be necessary to seek other locations (i.e., within the future Memorial Center) if NYSDOT cannot accommodate the vents as port of the ultimate design of the roadway. This FEIS identifies the Route 9A median as the Preferred Alternative for the ventilation structures. If the future plans for the Route 9A Project mandate an alternative location for the vents, FTA and PANYNJ would assess the alternative location through the appropriate NEPA process.

In addition to the emergency egress that would be provided via the vent structures, PANYNJ would construct emergency egress from the Terminal's track/platform and mezzanine levels. Egress stairways would be located near the north and south ends of the Terminal and would provide emergency access to Greenwich Street. The Permanent WTC PATH Terminal would share its emergency egress with the emergency egress for other facilities on the WTC site. PANYNJ plans to collocate one of these stairways within the proposed Performing Arts Center on the site's northwest quadrant and the other on the southwest quadrant within a museum or building that would be part of the WTC Memorial.

PANYNJ would reinforce the roof of the Terminal's east-west pedestrian concourse. The roof of the Terminal's east-west concourse would also serve as the road bed for the future extension of Fulton Street between Route 9A and Greenwich Street. The reinforced roof would consist of hardened, reinforced concrete to enhance the security of the east-west concourse below. The

3.18.05



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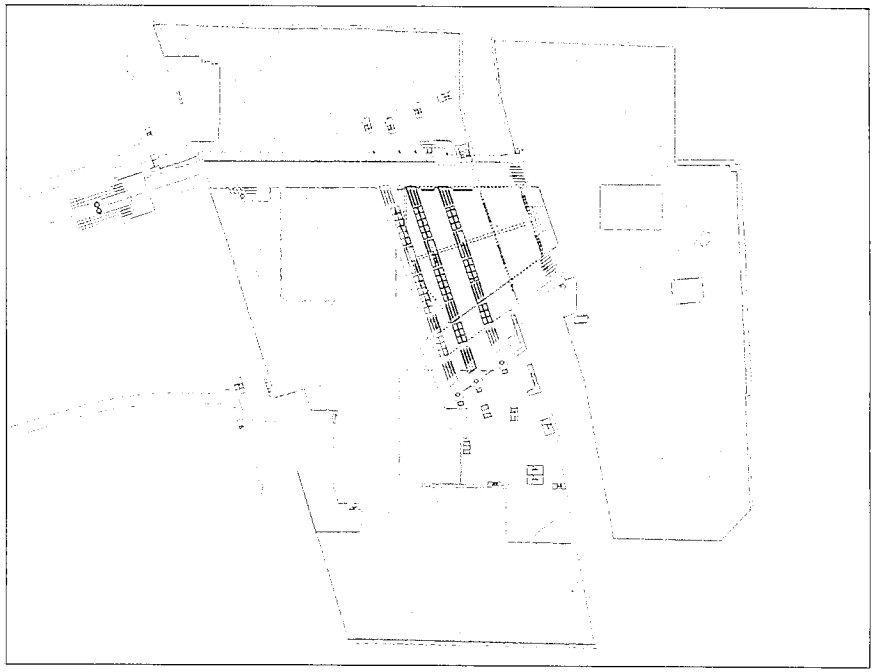

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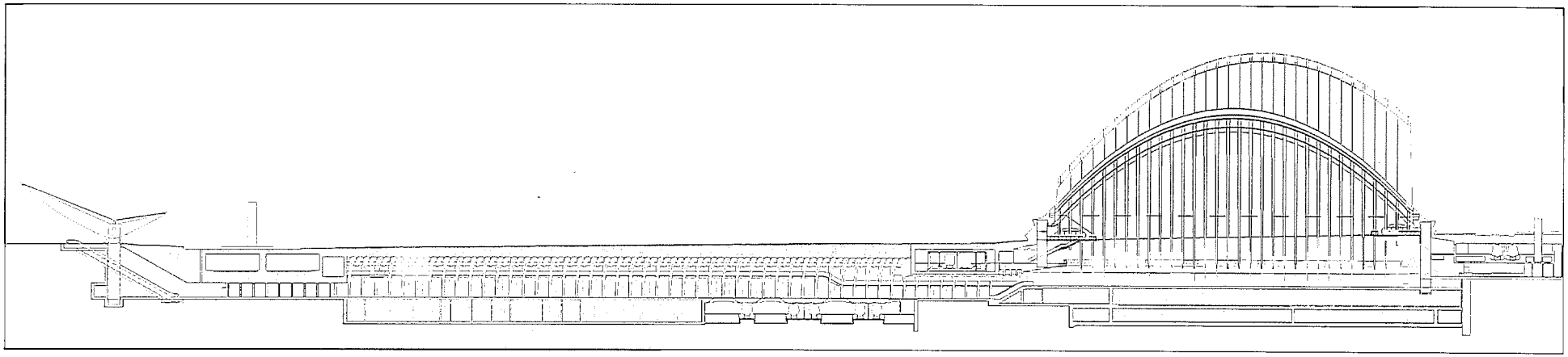
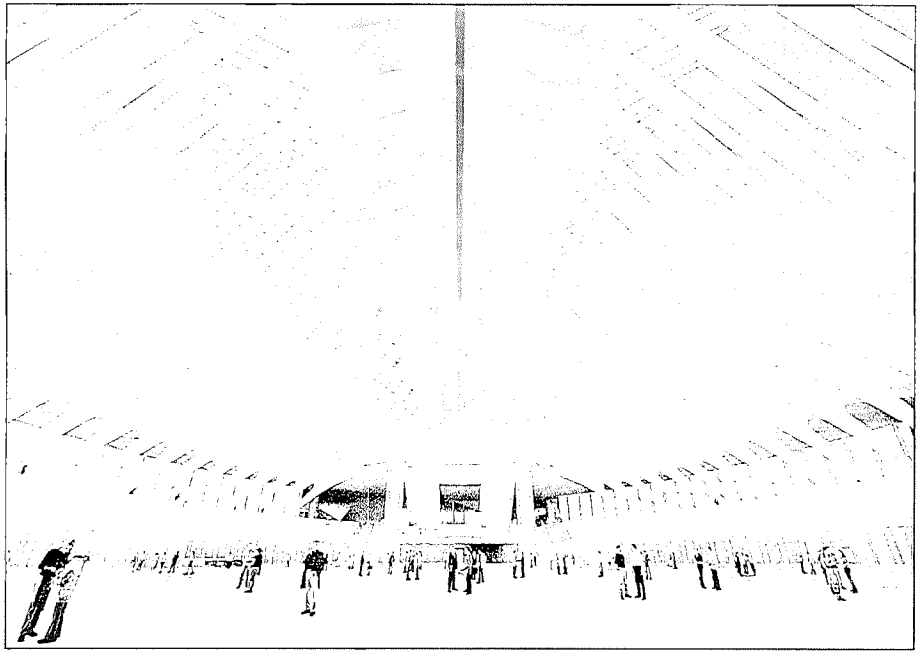


Elevation

PERMANENT WTC PATH TERMINAL
Final Environmental Impact Statement

Figure 2-3
Mezzanine Level

2.24.05



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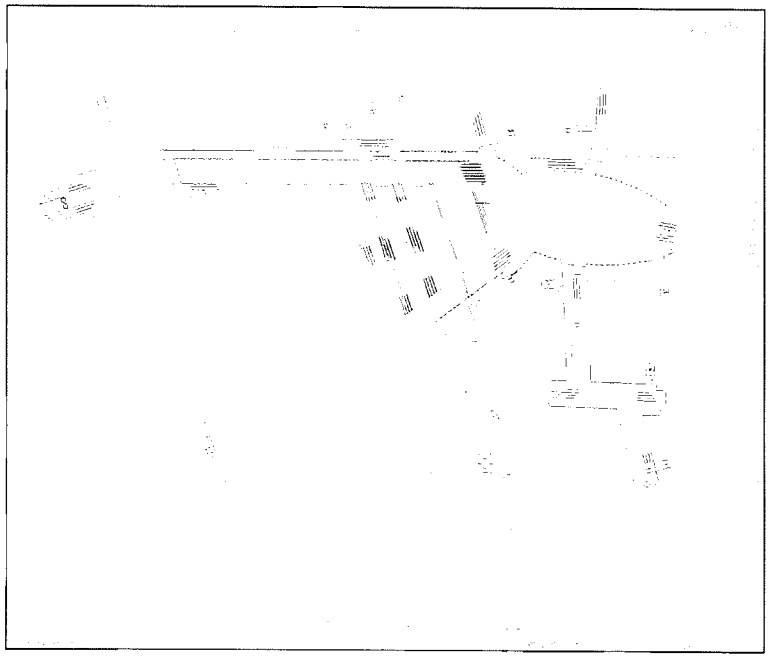

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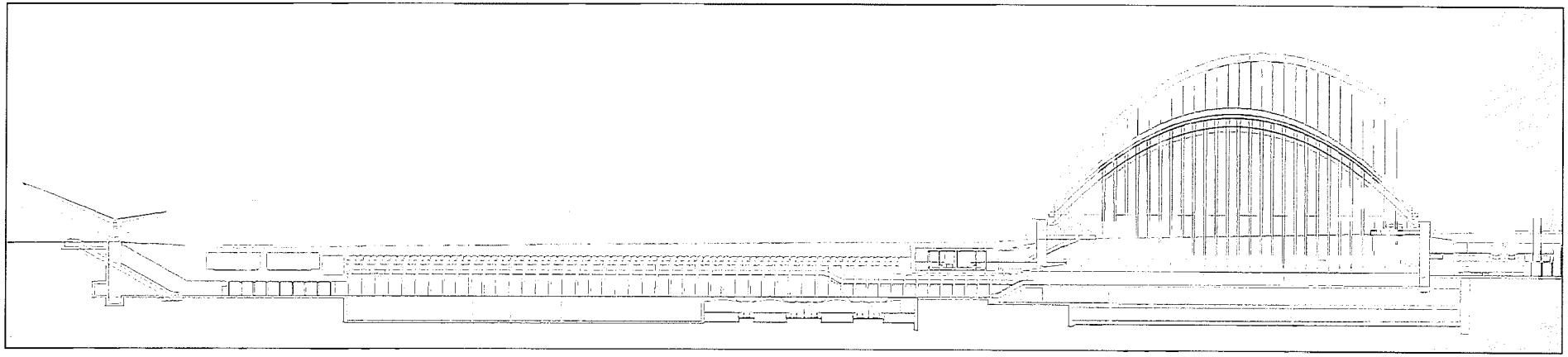


Elevation

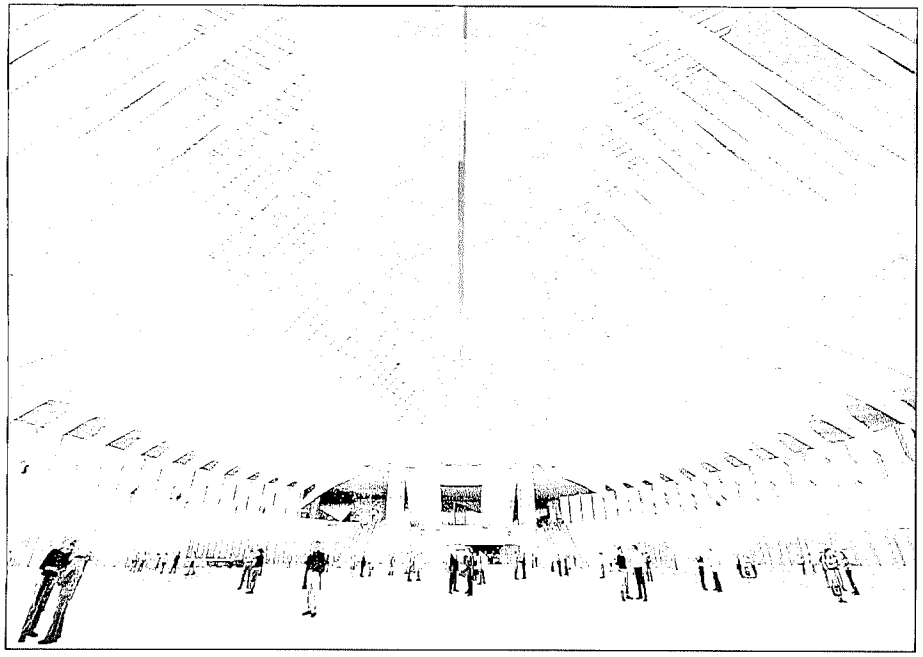
Permanent WTC Path Terminal

Portions of the WTC site to be constructed by others

PERMANENT WTC PATH TERMINAL
Final Environmental Impact Statement

Figure 2-4a
Concourse Level (Main)

2.24.05



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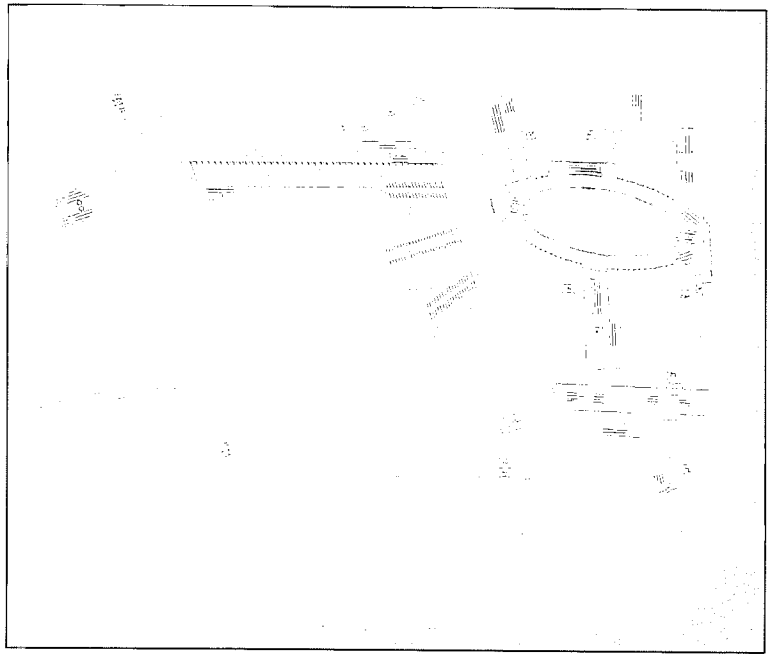

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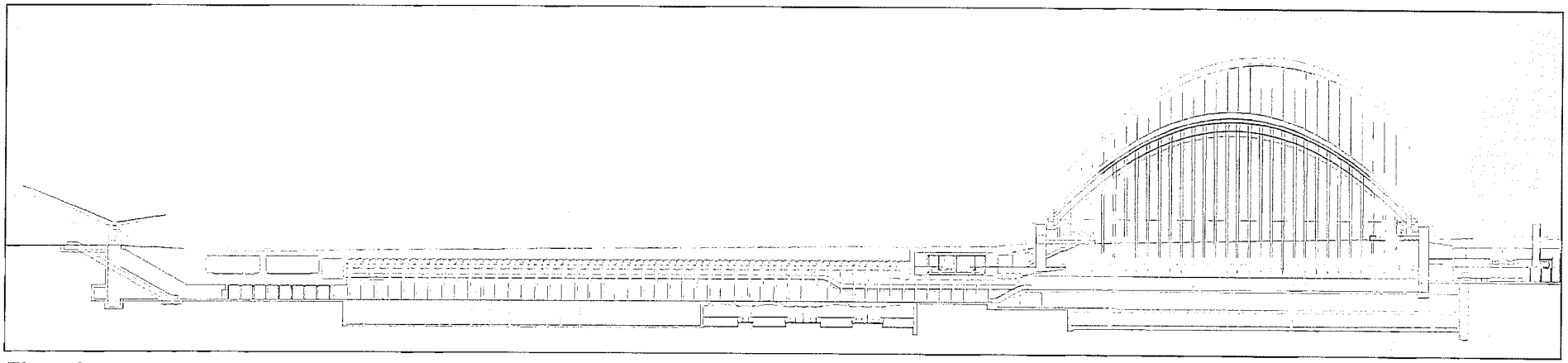

Elevation

PERMANENT WTC PATH TERMINAL
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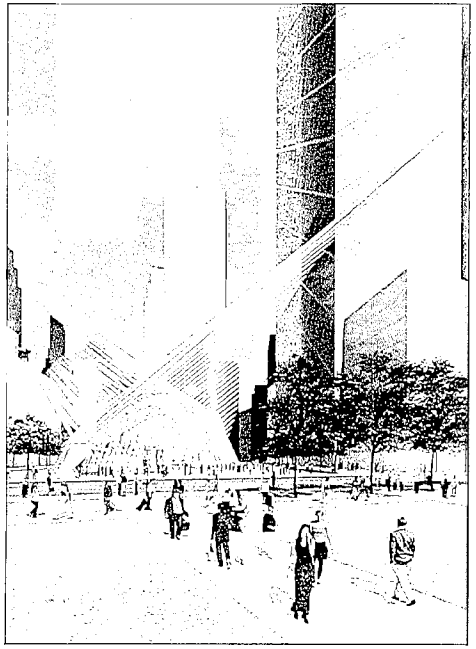
Figure 2-4b
Concourse Level (Balcony)

3.17.05



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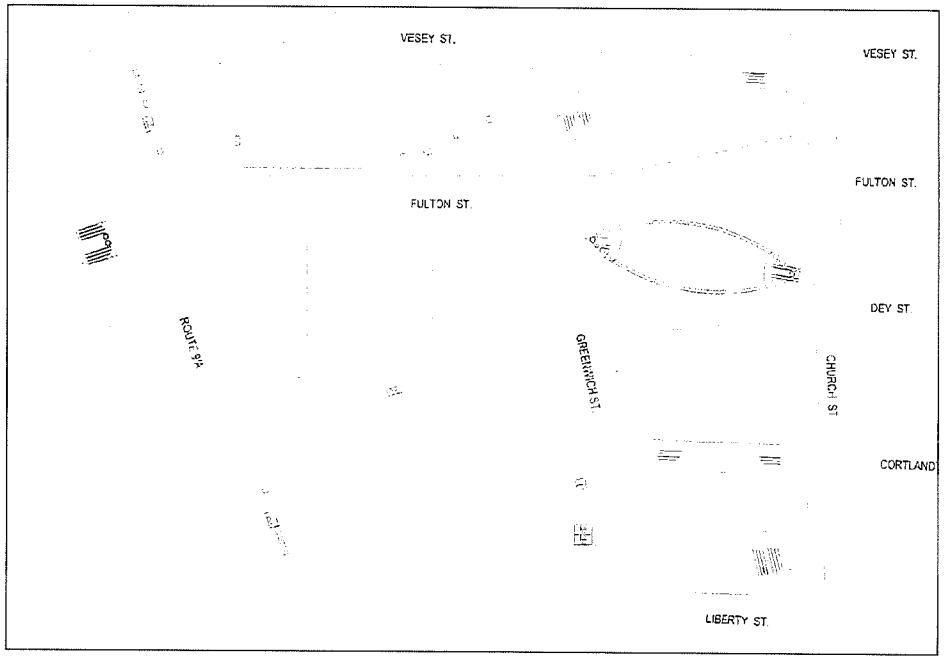
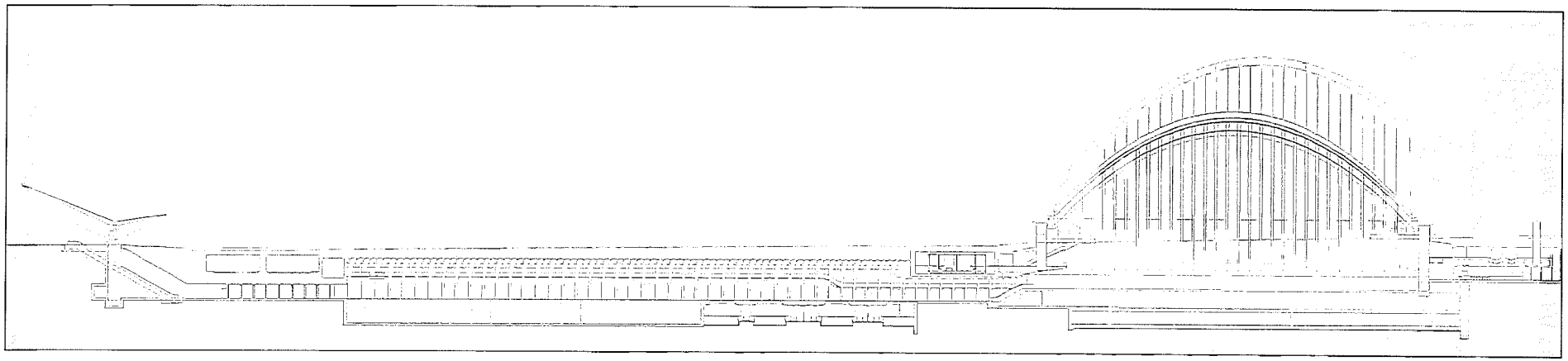


Plan



Elevation

PERMANENT WTC PATH TERMINAL
Final Environmental Impact Statement

Figure 2-5
Street Level

actual paving, landscaping, and opening of Fulton Street would be undertaken as part of the WTC Memorial and Redevelopment Plan.

The Preferred Alternative includes funds for the reinforcement of the basement walls, which form the "bathtub" within the WTC site. This work is necessary to ensure the structural integrity of the walls and to support future redevelopment of the WTC site, including the Permanent WTC PATH Terminal. As part of the Permanent WTC PATH Terminal's construction, PANYNJ could reinforce the entire west bathtub wall except for portions that would remain visible as part of the WTC Memorial. PANYNJ would also reinforce portions of the east bathtub wall abutting NYCT's 1 and 9 line that were not previously reinforced. If other development on the WTC site does not move forward according to current schedules or plans, it may also be necessary to reinforce portions of the north bathtub wall east of Freedom Tower and portions of the south bathtub wall above the existing PATH substation. It is currently estimated that approximately 30 percent of the required slurry wall repairs would be undertaken as part of the Preferred Alternative.

Construction of the Terminal may also require the demolition and excavation of remaining structures within the eastern portion of the WTC site between NYCT's 1 and 9 line and Church Street, which includes all portions of the former H&M Terminal. This work would also support the future development of the site by others.

The DEIS noted that the removal of portions of the northwest remnant sub-grade structures on the WTC site may be undertaken as part of the Terminal's construction. However, subsequent to the publication of the DEIS, the removal of the northwest remnant sub-grade structures have been undertaken as an independent action pursuant to the stipulations of the Programmatic Agreement prepared for the WTC Memorial and Redevelopment Plan.

Sustainable Design Elements

The Terminal would incorporate the sustainable/"green" design guidelines being developed by the agencies participating in the Lower Manhattan recovery projects. As described below, these measures would include the use of natural lighting, construction materials specifications, energy-efficient design, and renewable energy sources for heating and cooling.

One of the major sustainable/"green" design guidelines developed for the Permanent WTC PATH Terminal is the ability to use a river water system for cooling the Terminal's heating, ventilation, and air conditioning (HVAC) system. River water cooling was also at the WTC site prior to September 11, 2001. The river water cooling system circulates water from the Hudson River through a central refrigeration plant. The river water would withdraw heat from the HVAC system and then would be returned to the River.

The reuse of the existing Hudson River water intakes and outfalls is an economical and energy-efficient method to provide cooling for the components of the Permanent WTC PATH Terminal. The intakes, pumps, outfalls, and associated pipelines that existed prior to September 11, 2001, remain largely intact. Furthermore, since river water, on average, provides lower supply temperature than other alternatives, greater energy efficiency during the heat transfer process would be achieved. Finally, river water cooling reduces the Terminal's demand on the city's infrastructure.

The river water cooling system is being reestablished as part of the overall redevelopment of the WTC site. However, it may not be fully operational before components of the Permanent WTC

PATH Terminal are opened. Therefore, PANYNJ would employ open air-cooling of the Terminal's HVAC systems in the interim.

PANYNJ has filed an application with the New York State Department of Environmental Conservation to renew the State Pollution Discharge Elimination System (SPDES) permit for the WTC's river water cooling system. This application is being reviewed under an independent action. In the event that the permit's renewal is substantially delayed, PANYNJ would maintain the Terminal's temporary cooling system.

Project Cost

The Preferred Alternative for a Permanent WTC PATH Terminal would cost $2.138 billion, which is $186 million more than identified in the DEIS. Since publication of the DEIS, PANYNJ has advanced the design of the Preferred Alternative and has determined that certain components would be more costly than originally estimated. As a result, the Preferred Alternative would have a higher cost than the "Terminal with Liberty Plaza Connection Alternative" presented in the DEIS.

A total of $1.75 billion would be funded by the FTA through the Lower Manhattan Transportation Recovery Effort (see Chapter 1, "Purpose and Need"). The remaining $388 million would be funded by PANYNJ through their capital improvements budget. Table 2-5 shows a breakdown of the project cost by its various components.

Table 2-5
Project Cost

Project Component	Cost (in millions)
PATH Station Elements	$807
East-West Concourse	$208
North-South Concourse	$318
Terminal Hall and Plaza	$805
Total	$2,138

Note: "Other Project Elements" includes costs for security systems and infrastructure; construction staging for temporary PATH service; utility relocation; and other miscellaneous project costs.

Construction of the Terminal is estimated to begin in 2005. Components of the station, including platforms, mezzanine, and certain pedestrian connections, would be completed by the end of 2009. The remaining portions would be completed in 2010.

ALTERNATIVES CONSIDERED AND ELIMINATED

PATH-6 TRAIN CONNECTION

During the scoping process, public interest groups and local elected officials suggested an alternative that would connect the PATH system with NYCT's 6 subway line. Their proposal would extend the PATH tracks through the WTC site to a new station beneath Fulton Street between Greenwich Street and Broadway. Beyond Broadway, a new track would be constructed beneath Park Place to merge with the 6 line, which currently terminates at NYCT's Brooklyn Bridge-City Hall Station.

PANYNJ considered their proposal, including subsequent iterations, and determined that a number of critical construction and operational issues would need to be resolved to make this

alternative feasible. These considerations would likely delay the completion of this Project and may also result in substantial alterations to existing and planned transportation infrastructure.

The general engineering feasibility of this alternative was considered, referring to the NYCT's *MW-1 Track Standards and Reference Manual* (2002). The criteria considered from this manual included a 3 percent maximum grade, minimum 530-foot long stations on a tangent alignment, and the use of spiral transition curves. In order to achieve clearance of existing subway infrastructure in Lower Manhattan, the 3 percent grade would be exceeded within certain portions of the alignment. Furthermore, to achieve a 530-foot station beneath Fulton Street, certain structures may need to be demolished or underpinned. Finally, the alignment of the connection between PATH and NYCT's 6 line may preclude both a temporary and permanent PATH facility on the WTC site. To align tracks between the Hudson River tunnel portals and the proposed Fulton Street station, a complicated curving scheme would be needed, which would forgo NYCT's requirement for spiral transition curves.

The construction of a new station and tracks beneath Fulton Street would require underpinning of existing NYCT subway infrastructure beneath the streets of Lower Manhattan as well as buildings in the vicinity of Fulton Street, Park Row, and Broadway. Underpinning of NYCT's 1 and 9, N and W, A and C, 2 and 3, and 4 and 5 lines would be required. In addition, structural support for station platforms under Greenwich Street, Church Street, Fulton Street, Nassau Street, and Broadway may also be required.

The connection between PATH and NYCT's 6 train would require the reconfiguration of the 4 and 5 line between the Fulton Street and Brooklyn Bridge-City Hall Stations. The proposal would likely require the reconstruction of the Brooklyn Bridge-City Hall Station to allow for increased passenger loads and operational changes on the 6 line. Construction may also require full disruption of 4, 5, and 6 train service to and from Lower Manhattan for an extended period.

NYCT operates the 6 train through a loop formed by an unused station immediately south of the Brooklyn Bridge-City Hall Station. Similar to the arrangement proposed for the Permanent WTC PATH Terminal, this loop operation allows the 6 train to reverse direction without repositioning the train's engineer or conductor. Thus, trains enter and leave their terminal at the Brooklyn Bridge-City Hall Station with relatively short dwell times, which increases the throughput and capacity of the 6 line. The unused station, which provides for this loop arrangement, was part of the original 1904 subway system. Because of its historical and architectural significance, this station is designated a New York City landmark and is considered eligible for listing on the State and National Registers. In order to connect PATH and the 6 line, this station would have to be physically altered, which may adversely affect its historic integrity.

The train cars that operate on PATH and NYCT's 6 line are similar but are not fully compatible. NYCT recently completed procurement of a new fleet of cars for the 6 train. PATH would need to upgrade to these same cars to fully integrate the systems.

NYCT operates 10-car trains on the 6 line, and PATH plans to implement 10-car service on its Newark-WTC line. However, an upgrade to 10-car operations on the Hoboken-WTC line is not planned at this time. Thus, the integration of PATH and NYCT's Lexington Avenue Local line may preclude direct service between Hoboken and Lower Manhattan.

The 6 line operates under the oversight of the Federal Transit Administration (FTA), and must comply with FTA specifications for station and train operations. As described in Chapter 1, "Purpose and Need," PATH operates under the oversight of the Federal Railroad

Administration. In order to integrate these systems, PANYNJ and NYCT would need to consolidate their operating plans under a single federal oversight agency.

Given the above-described constraints of integrating the PATH and NYCT 6 line, this alternative was not considered to be reasonable and was not carried forward for further consideration.

TERMINAL WITH LIBERTY PLAZA CONNECTION ALTERNATIVE

The DEIS considered a Terminal with a Liberty Plaza Connection Alternative. Generally, the Terminal with a Liberty Plaza Connection Alternative would result in the same facility as described above for the Preferred Alternative. However, it would include an additional pedestrian connection under Church Street between the WTC site and Liberty Plaza Park. As such, the lower concourse corridor shown in Figure 2-4a would be extended beyond the WTC site to serve the subgrade tunnel beneath Church Street. Patrons would ascend to street level within the western portion of Liberty Plaza. This alternative would not have altered the design of the platform, mezzanine, and terminal levels, including the connections to subways, buildings on the WTC site, and the FSTC.

The Liberty Plaza connection was estimated to cost $81 million. Thus the total project cost for this alternative would be approximately $81 million more than the estimate presented for the Preferred Alternative.

The analysis presented in the DEIS showed that the Terminal with a Liberty Plaza Connection Alternative would have more intense and/or a greater number of adverse impacts than the Preferred Alternative during construction. As compared to the Preferred Alternative, the Terminal with a Liberty Plaza Connection would result in vibration impacts on a greater number of historic structures, would result in temporary lane closures and pedestrian diversions on Church Street, and would have increased emissions and noise levels. In the long term, the Terminal with a Liberty Plaza Connection would divert pedestrians from street-level to a sub-grade concourse, which could detract from local businesses, and it would reduce the availability of open space within Liberty Plaza Park.

During the public review process for the DEIS, public officials and concerned citizens stated that the Liberty Plaza Connection would adversely impact community character. A public goal for the rebuilding of Lower Manhattan has been to revive its retail and to ensure its longevity as a 24-hour community. Citizens and agency officials believed that the diversion of pedestrians from street-level to the underpass would detract from this goal. Upon further consideration, PANYNJ decided to eliminate the Liberty Plaza Connection as part of the Preferred Alternative.

DESIGN OPTIONS CONSIDERED AND ELIMINATED

The DEIS presented options for the design of certain components of the Permanent WTC PATH Terminal. As planning has advanced, certain components of the project have been finalized such that design options could be dropped from further consideration. The following describes the options previously presented and the outcome of the design process that has occurred since publication of the DEIS.

STAND-ALONE TERMINAL

The construction of the Preferred Alternative would be closely coordinated with the construction of elements of the WTC Memorial and Redevelopment Plan. However, a Stand-Alone Terminal

option was developed to determine the design and cost implications absent elements of the WTC Memorial and Redevelopment Plan. The assumption was that the Permanent WTC PATH Terminal would be constructed without the adjacent commercial and retail facilities on the eastern portion of the WTC site. The only elements of the WTC Memorial and Redevelopment Plan that would advance simultaneously would be the Memorial substructure and Freedom Tower on the western portion of the WTC site. This assumption resulted in three major adjustments to the Preferred Alternative as described below.

- The interface walls with the retail would be replaced with blast resistant glass above street level. Below street level, stand alone walls would be constructed and would be comparable to the walls of an integrated Terminal.
- The terminal building and pedestrian concourses east of the 1 and 9 line would be supported on anchor slab and piles rather than on the foundations of the future WTC office towers.
- Construction and operational costs for mechanicals, electrical systems, and plumbing would be higher with a stand-alone Terminal since these functions could be integrated with the retail and commercial uses of the WTC Memorial and Redevelopment Plan if constructed simultaneously.

It would be feasible to construct a stand-alone Terminal, and its cost would be approximately 5 to 10 percent greater than a facility that is coordinated with other construction on the WTC site. However, the ability to develop retail and commercial facilities subsequent to the Terminal would be much more difficult with potentially large increases in the time and cost required over the coordinated approach.

A Record of Decision was issued for the *WTC Memorial and Redevelopment Plan, Generic Environmental Impact Statement*, in May 2004 and LMDC has been developing plans for the Memorial and uses on the eastern portion of the WTC site. PANYNJ has been working closely with LMDC to coordinate the subgrade infrastructure to ensure that the construction of the Preferred Alternative would not preclude future uses on the WTC site. As such, the Permanent WTC PATH Terminal would be coordinated with elements of the WTC Memorial and Redevelopment Plan. However, given that WTC site development plans may be delayed or may change over time, PANYNJ may advance certain components of the Terminal as integrated and others as stand-alone. The FEIS generally considers the benefits and impacts of an integrated Terminal; however, where Permanent WTC PATH Terminal elements may be stand-alone to advance its design and construction, the potential environmental effects are noted.

ROUTE 9A PEDESTRIAN BRIDGE

NYSDOT is currently undertaking an environmental review for the reconstruction of Route 9A from Barclay to Albany Streets. At present, NYSDOT is considering three alternatives for the roadway: No Action, At-grade, and Short Bypass. Under the No Action Alternative, NYSDOT would rehabilitate the existing "interim" roadway, which was reconstructed following September 11, 2001 to upgrade its pavement and landscaping. The At-grade Alternative would restore the roadway to its eight-lane, pre-September 11, 2001 condition with modifications to accommodate future uses on the WTC site. The third, "Short Bypass," alternative would reroute approximately 75 percent of vehicular traffic through a four-lane, sub-grade bypass. A four-lane, at-grade boulevard would also be constructed to accommodate local traffic and to improve the pedestrian links between the WTC site, the World Financial Center, and Battery Park City.

The design of the Permanent WTC PATH Terminal's connection to the World Financial Center must be coordinated with the outcome of the Route 9A Project. As will be described in Chapter 11, "Infrastructure and Energy," numerous utility lines, including a 66-inch water line, a 78-inch sewer main, a 48-inch water main, and an 84-duct telephone utility, lie beneath the roadbed of Route 9A. If a short bypass is constructed, NYSDOT would relocate these utilities to facilitate their proposed traffic tunnel. This utility relocation would also allow for construction of PATH's sub-grade concourse. In the event that the No Action or At-grade Alternative for the Route 9A Project is selected, NYSDOT may not undertake this utility relocation.

As described in the DEIS, PANYNJ considered a pedestrian bridge over Route 9A as an alternative to the subgrade concourse in the event that utility relocation would not be undertaken by NYSDOT. However, since publication of the DEIS, PANYNJ has determined that the subgrade concourse could be constructed at a lower elevation, which would avoid these utility lines regardless of the selected alternative for the Route 9A Project. As such, the Route 9A pedestrian bridge has been eliminated from further consideration as part of this FEIS.

SOUTH VENTILATION STRUCTURE

The DEIS identified two options for the location of the Terminal's south ventilation structure—Route 9A median and Deutsche Bank.

Under the Route 9A option, the south ventilation structure would be identical to the north ventilation structure described above, but it would be located atop PATH's Tunnel F. Like the north structure, it would serve for piston relief, smoke evacuation, and emergency egress. However, the New York State Department of Transportation raised concerns regarding the location of this building given their planned reconstruction of Route 9A, As such, PANYNJ considered a second option to locate the vent outside the Route 9A right-of-way within the former site of Deutsche Bank.

Under the Deutsche Bank option, PANYNJ would construct the ventilation system within the new office tower planned for the former location of Deutsche Bank. The vent would be at a minimum height of 40-feet above ground and would likely be constructed within a mechanical level of the future building. Because of the proposed building's distance from the PATH tunnels, a vent structure at this location would not be collocated with emergency egress. Therefore, PANYNJ would need to provide for an emergency stairway with access from the planned plaza adjacent to the office tower or within the north or south sidewalk along Liberty Street. As such, this option would result in additional PATH structures and may increase the overall project cost.

Subsequent to the publication of the DEIS, PANYNJ has selected the Route 9A option for the south vent as the Preferred Alternative and will coordinate its design with the selected alternative for the Route 9A Project.

C. ANALYSIS FRAMEWORK

ASSESSMENT OF PROBABLE IMPACTS OF THE PROJECT ALTERNATIVES

BASELINE CONDITIONS

The terrorist attacks of September 11, 2001 have resulted in unique conditions under which to evaluate the potential environmental effects of planned projects as prescribed by NEPA. In a typical setting, an EIS considers the effects of a new or expanded project in comparison to a

future condition absent the proposal. The Permanent WTC PATH Terminal, however, would essentially be a replacement of a facility that existed prior to the attacks.

As described in Chapter 5, "Socioeconomic Conditions," the terrorist attacks resulted in the loss of more than 12 million square feet of office space and the relocation of some 80,000 jobs to other parts of the metropolitan area. As a result, today's demand for certain infrastructure and services in Lower Manhattan is much reduced from pre-September 11, 2001 levels. However, other sensitive uses may be more vulnerable to adverse environmental affects following the terrorist attacks than would have been the case prior to September 11, 2001. To fully investigate the potential for future impacts, the technical analyses that follow consider two baseline conditions to formulate future scenarios for the Project Alternatives.

Pre-September 11, 2001 Baseline

The pre-September 11, 2001 baseline condition reflects the built environment in Lower Manhattan prior to the terrorist attacks. The pre-September 11, 2001 baseline is used for the evaluation of potential future long-term environmental impacts and for the preparation of appropriate mitigation measures.

Because the terrorist attacks resulted in drastic differences in the physical and social characteristics of Lower Manhattan, the current environment in Lower Manhattan does not reflect the level of activity that existed prior to September 11, 2001. The planned redevelopment of Lower Manhattan would result in the replacement of much of the real estate and infrastructure that was lost, resulting in increased trips to the area. However, it is anticipated that the environment in the vicinity of the Permanent WTC PATH Terminal could continue to support the level of activity that existed before September 11, 2001. Therefore, the quantified analysis of future impacts and mitigation is based on a theoretical comparison that assumes the terrorist attacks had not occurred, in order to evaluate the future condition when Lower Manhattan has truly recovered and continues to grow.

The pre-September 11, 2001 baseline condition precludes the federally sponsored redevelopment and recovery projects in Lower Manhattan since it is assumed that the terrorist attacks had not occurred. Therefore, the future conditions developed based on the pre-September 11, 2001 baseline does not include the following projects:

- WTC Memorial and Redevelopment Plan;
- Route 9A;
- Fulton Street Transit Center; and
- South Ferry Terminal.

However, other real estate development is assumed to have been constructed whether or not the terrorist attacks had occurred. These projects, therefore, are accounted for in the future conditions based on the pre-September 11, 2001 baseline.

Post-September 11, 2001 Baseline

The post-September 11, 2001 baseline condition reflects the current environment in Lower Manhattan. This scenario considers the loss of the WTC and transportation infrastructure as well as changes in employment and land use resulting from the terrorist attacks.

Because the revitalization of Lower Manhattan would take more than a decade to complete, the post-September 11, 2001 baseline condition is used to project future conditions in the interim (construction period and opening year) analysis years presented in this EIS. It also considers the

numerous projects planned for the redevelopment of Lower Manhattan, including the $4.55 billion transportation recovery projects. In addition to its use in projecting construction and design year conditions, this scenario is applied to the design year conditions without PATH service under the No Action Alternative, since the other recovery efforts would be pursued independently.

ANALYSIS YEARS

To assess the potential impacts of the Project Alternatives, this EIS considers three analysis years—construction period, opening year, and design year. The basic framework for these analysis years is described below.

Construction Period

PANYNJ estimates that construction of the Permanent WTC PATH Terminal would begin in summer 2005, concurrent with other sub-grade work for the redevelopment of the WTC site. The platform and mezzanine levels and portions of the pedestrian connections could be completed in 2006, while remaining portions of the complex would be done in phases between 2007 and 2009. The EIS considers the potential environmental effects throughout the 2005 to 2009 construction period. However, to estimate peak construction period conditions, a critical analysis year of 2006 has been selected. Chapter 3, "Construction Method and Materials," presents the methodology for selecting this critical analysis year.

Opening Year

Construction activity at other sites in Lower Manhattan would continue after the Permanent WTC PATH Terminal is fully operational in early 2009. Due to concerns about cumulative effects and potential changes in pedestrian travel associated with the Project Alternatives, an analysis of the 2009 opening-year conditions is included.

Design Year

Typically, the analysis of impacts associated with a transit facility also anticipates future conditions approximately 20 years hence, also known as the design year. The design year varies from the initial year of operation because it anticipates future development that might increase transit demand and behavioral changes that may result in varied patterns of travel. For consistency with analyses being conducted for other downtown transportation projects and regional forecasts prepared by the New York Metropolitan Transportation Council (NYMTC), this EIS considers a 2025 design year for the Permanent WTC PATH Terminal.

THE FUTURE COMMON TO ALL ALTERNATIVES

A "Future Common to All Alternatives" has been developed for each of the analysis years described above. The Future Common to All Alternatives projects conditions in these various analysis years independent of the Permanent WTC PATH Terminal and provides a base to analyze, assess, and mitigate potential adverse impacts of the No Action, and Preferred Alternatives. The Future Common to All Alternatives considers planned or proposed initiatives that will have direct or substantial indirect effects on development patterns and transportation access to, from, and within Lower Manhattan. The Future Common to All Alternatives also considers known changes in local, state, and federal regulations that may affect this Project's potential to generate impacts as compared to today.

PROJECT ALTERNATIVES

No Action Alternative

As described above, the No Action Alternative would require that PANYNJ continue the use of the temporary WTC PATH station beyond 2009, but because of certain limitations, it is anticipated that the PATH operations between New Jersey and Lower Manhattan would need to be suspended at some point before 2025. To assess the potential impacts of this alternative, this EIS considers that the temporary station would continue operations in 2009 (opening year) but that there would be no PATH service to Lower Manhattan in 2025 (design year).

Preferred Alternative

A detailed analysis of the potential impacts of the Preferred Alternative is presented in all of the technical chapters of this EIS.

ASSESSMENT OF CUMULATIVE EFFECTS

The Preferred Alternative for the WTC PATH Terminal would be part of the larger redevelopment of Lower Manhattan that includes transportation and development projects being sponsored by both public and private groups. Although funded and planned separately, these projects would have a cumulative effect on the character and quality of Lower Manhattan and the region as a whole both during and after construction. Recognizing the potential impacts of such large-scale development in a relatively small geographic area, the FTA developed a framework for the analysis of cumulative effects for their Lower Manhattan recovery projects being reviewed under NEPA.

This framework ensures that findings presented within the individual environmental documents for the federally sponsored projects in Lower Manhattan are based on a consistent baseline condition and analysis approach. Therefore, the analysis of both the potential impacts attributed directly to the Permanent WTC PATH Terminal and those that may result cumulatively are based on guidance developed by the FTA and the sponsors of the Lower Manhattan Recovery Projects. The following describes the framework that was developed and its application to the evaluation of the Permanent WTC PATH Terminal.

FEDERAL GUIDANCE

A Memorandum of Understanding (MOU) was prepared jointly by the Federal Emergency Management Agency, the FTA, the Federal Highway Administration, HUD, the New York State Urban Development Corporation (Empire State Development Corporation) and its subsidiary LMDC, the U.S. Coast Guard, EPA, the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, and the National Marine Fisheries Service in August 2002. This MOU formalized the commitment among the listed Federal agencies to coordinate and accelerate the review of projects under NEPA. The MOU applied to projects developed and/or funded as a result of the September 11, 2001 terrorist attacks. The MOU specified the role of the participating government entities and defined procedures and commitments to ensure a comprehensive yet expeditious environmental review process under NEPA.

To further the federal coordination established by the MOU, the FTA Lower Manhattan Recovery Office published its *Approach to Cumulative Effects Analysis for the Lower Manhattan Recovery Effort* in July 2003. This document provides guidance for the sponsoring agencies being funded from the $4.55-billion Lower Manhattan Transportation Recovery Projects. The principal features of the coordinated analysis are:

- Promoting efficient project delivery and environmental stewardship,
- Advancing each project independently, but in a coordinated manner, and
- Focusing attention on critical environmental factors.

The approach promotes environmental stewardship through the proactive evaluation of environmental factors and includes measures to streamline the review and project delivery. The coordinated approach will ensure consistency between projects through a consistent set of analysis assumptions and methodologies for all of the transportation recovery projects. As a project advances through the NEPA process, its analysis and any identified impacts will be incorporated into the documentation of later projects to ensure a consistent, up-to-date, and comprehensive evaluation of potential cumulative effects.

To expedite the environmental review process, the study of cumulative effects will focus on subject areas that are prone to potential adverse effects. The federal partners and local project sponsors have coordinated to identify five key areas with the highest potential for adverse cumulative effects: access and circulation, air quality, noise and vibration, cultural and historic resources, and economic factors. The local project sponsors coordinated with the FTA and EPA to develop consistent methodologies, assumptions, data sources, and impact criteria for the evaluation of impacts under each of the five cumulative effects subject areas.

The temporary waiver of most transportation air quality conformity requirements provided by Public Law 107-230 allows for these projects to proceed without a full conformity determination. To meet obligations set forth with the conformity waiver, the framework recognizes the need and value of interagency consultation and is consistent with the enhanced interagency consultation procedures set forth during the transportation conformity waiver period.

ENVIRONMENTAL ANALYSIS FRAMEWORK

In response to the federal guidance provided by the FTA, the governmental entities involved with the recovery efforts in Lower Manhattan have developed an environmental analysis framework (see Appendix I). This framework was prepared by LMDC, MTA, NYSDOT, and PANYNJ, in cooperation with the FTA and interested Federal agencies. The framework was used by LMDC, MTA, NYSDOT, and PANYNJ for the preparation of environmental documentation for each of their recovery projects. Local Project Sponsors will be introduced to this framework, as appropriate, when additional federally sponsored recovery projects are identified and prioritized.

The framework considers the regulations set forth by the Council on Environmental Quality (CEQ) and accounts for the guidance of the State Environmental Quality Review Act (SEQRA) regulations, the *New York City Environmental Quality Review (CEQR) Technical Manual*, industry best practices, and public input.

The framework consists of the following components:

- Green Design, Green Construction, and Sustainable Design Principles;
- Construction Environmental Protection Plan;
- Public Involvement and Governmental Entities Coordination Plan; and
- Baseline Assessment of Resources and Coordinated Cumulative Effects Analysis Approach

Green Design, Green Construction, and Sustainability Principles

The Project Sponsors for the Lower Manhattan Recovery Projects have developed a common set of Environmental Performance Commitments (EPCs) that they will each undertake such as design

elements, construction techniques, and operating procedures that will lower the potential for adverse environmental impacts.

Unlike a typical NEPA process, which responds to potential impacts with appropriate mitigation, the EPCs provide specific measures for the avoidance and reduction of potential impacts in advance of the environmental review process (see Appendix I). These EPCs incorporate design features and construction practices to preserve the capacity of the local environment and successfully allow for the development of all of the Lower Manhattan recovery projects. Table 2-6 shows the EPCs that were formalized by LMDC, MTA, NYSDOT, and PANYNJ in September 2003.

Each project sponsor would implement the EPCs through specific actions identified in its public involvement and governmental entities coordination plan, construction environmental protection plan, design documents, and contracts.

The EPCs established a general guidance for developing green design and sustainability principals to reduce the demand for and use of resources during construction and once projects would be operational. Subsequently, PANYNJ has outlined preliminary sustainable design guidelines for the Preferred Alternative, which will continue to be formalized as the Project's design advances.

Principals and actions were organized into six component areas: urban considerations, site, water, energy, materials, and indoor environment. These guidelines are consistent with criteria contained in the NYCT Environmental Guidelines, the U.S. Green Building Council, Leadership in Energy Efficiency (LEED) Guidelines 2.1, and requirements of New York State (NYS) Executive Order 111, "Green And Clean State Buildings And Vehicles," which direct State agencies to be more energy-efficient and environmentally aware, and the NYS Green Building Tax Credit (Chapter 63 of the NYS Laws of 2000), which promotes environmentally sound building practices through a package of tax incentives.

Urban Considerations

For urban considerations, the design guidelines support development in existing urban areas, the development of public transportation by linking inter-modal systems, promote regional mass transit, increase bicycle access, facilitate pedestrian pathways, and improve neighborhood air quality by reducing back-up of traffic into neighborhood streets. To implement these guidelines, PANYNJ would support the existing infrastructure by exceeding a minimum development density, integrate the use of public transportation by providing access to NYCT subway and buses, and provide the services and support to facilitate pedestrian movements.

Site

PANYNJ would integrate water, material, and energy resources to optimize the utilization of all resources on site. The project would implement a storm water management plan to collect storm water from site surfaces and implement a filtration structure in conjunction with the Water Management Plan. Pollution prevention would also be in place to control site erosion. PANYNJ would integrate existing slurry walls, bathtub excavation, elements of the temporary PATH station, and utilities for re-use in the new site development. PANYNJ would also study opportunities for "waste to reuse" for food, paper, metal, and construction waste. To reduce the effect of the urban heat islands phenomena, PANYNJ would provide green infrastructure, along with albedo surfaces to mitigate thermal loading of site surfaces and building roofs. Light pollution would be minimized by reducing sky glow, glare, and light trespass.

Table 2-6
Environmental Performance Commitments

Technical Area	Proposed Commitments
Air Quality	Use ultra low sulfur diesel fuel in off-road construction equipment with engine horsepower (HP) rating of 60 HP and above.
	Where practicable, use diesel engine retrofit technology in off-road equipment to further reduce emissions. Such technology may include Diesel Oxidation Catalyst or Diesel Particulate Filters, engine upgrades, engine replacements, or combinations of these strategies.
	Limit unnecessary idling times on diesel powered engines to 3 minutes
	Locate diesel powered exhausts away from fresh air intakes.
	Control dust related to construction site through a Soil Erosion Sediment Control Plan that includes, among other things: a) Spraying of a suppressing agent on dust pile (non-hazardous, biodegradable); b) Containment of fugitive dust; c) Adjustment for meteorological conditions as appropriate.
Noise and Vibration	Where practicable, schedule individual project construction activities to avoid or minimize adverse impacts.
	Coordinate construction activities with projects under construction in adjacent and nearby locations to avoid or minimize impacts.
	Consider condition of surrounding buildings, structures, infrastructures, and utilities where appropriate.
	Prepare contingency measures in the event established limits are exceeded.
Cultural and Historic Resources	Establish coordination among projects to avoid or minimize interruption in access to cultural and historic sites.
	Initiate public information and involvement outreach with sensitivity to local cultural resources.
	Identify public information outlets that will receive and provide current information about access during construction.
	Consult with the New York State Office of Parks, Recreation, and Historic Preservation and the New York City Landmarks Preservation Commission regarding potentially impacted, culturally significant sites. Monitor noise and vibration during construction at such sites, as appropriate.
Access and Circulation	Establish a project-specific pedestrian and vehicular maintenance and protection plan.
	Promote public awareness through mechanisms such as: a) signage; b) telephone hotline; and c) Web site updates.
	Ensure sufficient alternate street, building, and station access during construction period.
	Regular communication with New York City Department of Transportation and participation in its coordinated construction efforts.
Economic Effects	Coordinate with LMDC, Downtown Alliance or other entities to minimize residential and retail impacts as required through: a) relocation assistance, as applicable, to persons to businesses physically displaced by the project; and b) focus on essential business and amenities to remain in Lower Manhattan.
	Add appropriate signage for affected businesses and amenities.
Design for the Environment	Energy Efficiency/Renewable Energy
	Enhanced Indoor Environmental Quality
	Conserving Material and Resources
	Environmentally-friendly Operations & Maintenance
	Water Conservation and Site Management
	Waste Management and Recycling (including during construction)

Water

PANYNJ would incorporate sustainable water principals by providing on-site collection of storm water and treatment of waste water. Where practicable, the project would use reclaimed water for toilet flushing, cooling tower makeup, and landscape irrigation. PANYNJ's measures to improve water use to reduce the burden on municipal water supply include efficient water fixtures, automatic controls, and waterless urinals.

Energy

Energy conservation is another component to sustainable development that PANYNJ would implement. Optimizing of energy use would consist of premium efficiency motors, superior insulations, and sensors on light fixtures. Another "green" principal PANYNJ would incorporate is to utilize site-generated and/or purchased renewable energy for a portion of total energy use. PANYNJ would reduce emission of ozone-depleting chemicals by specifying that building systems have zero levels of chlorofluorocarbon refrigerants and use only insulation materials that do not contain chlorine-based gases. PANYNJ would also institute an independent authority to execute a commissioning plan, which would comprise design phase reviews, contractor submittal reviews, functional testing, training, operations and maintenance reviews.

Materials

A key component to sustainable development is material management in construction. The "green" design principals for material management include a comprehensive materials management plan, construction waste management, material reuse, recycled content of the material, proximity of manufactured material to project site, wood certification, and agricultural materials. PANYNJ would develop a comprehensive materials management plan to optimize the use of materials and to reduce waste generation to landfill. This plan would reduce the travel distance for building products and systems. PANYNJ would coordinate with other uses on the site to maximize recycling and to provide a centralized recycling facility.

Indoor Environment

Indoor environmental quality would be enhanced with the following sustainability principals: indoor air quality performances and monitoring, daylight and outdoor views, reduction of contaminants from materials, chemicals and particulates, acoustics, and thermal comfort. PANYNJ would implement an Indoor Air Quality Management Plan that includes architectural and HVAC design strategies to establish high indoor air quality and provide a plan for a permanent monitoring system with centralized controls to supply feedback on ventilation performance and the resultant concentrations of carbon monoxide, carbon dioxide, and volatile organic compounds (VOCs) in accordance with the NYS Executive Order 111, Article 19.638.7(d)(1). PANYNJ would also implement a Materials Management Plan to minimize use of materials with high levels of VOCs and other toxic characteristics. PANYNJ would implement a facility for system default to 100 percent outside air, where practicable, and in balance with energy conservation. PANYNJ would incorporate natural lighting into the terminal building and concourses to reduce demand for artificial illumination. An ambient lighting system would be coordinated with day lighting strategy for flexible illumination.

PANYNJ would provide a plan to reduce potential noise and vibration from mechanical equipment in conformance with the recommendations of the American Society of Heating, Refrigerating, and Air-Conditioning Engineers Applications Chapter 46 Design Guidelines. PANYNJ would provide a plan to manage air flow, moisture, and thermal energy and use an integrated system to monitor and control air temperature in each zone.

Construction Environmental Protection Plan

As the design and environmental review of the Permanent WTC PATH Terminal is advanced, the PANYNJ will provide a detailed outline of the EPCs and any other procedures to be implemented to protect sensitive resources that may be affected by the project's construction. This plan will describe how the initial condition of the resources will be assessed, how the

construction work will be implemented to avoid or minimize impacts, and how the project will be monitored during construction. The plan will use the best available information from the ongoing construction coordination process for projects in Lower Manhattan and a shared projects inventory being developed by LMDC. The plan will also provide for an effective means of disseminating current information to the public and other developers.

Public Involvement and Governmental Entities Coordination Plan

As per the framework, PANYNJ will maintain on going communication with the community at-large (including environmental groups, interested governmental entities, and the general public) and they will be involved as the Project is advanced through the design and construction process.

PANYNJ has developed a public involvement plan that has and will continue to guide the outreach for the Permanent WTC PATH Terminal EIS (see Chapter 18, "Agency Coordination, Process, and Public Participation"). A key goal of this plan is to communicate potential impacts during construction and to coordinate with other projects in the vicinity to avoid, or at least minimize, adverse effects on the environment. As the process continues, this plan will be updated to identify a protocol for 1) addressing comments received during the construction phase; 2) communicating appropriate current information to the public, including implementation schedules; and 3) means and measures of on-going coordination with other projects. The process will build on an existing construction coordination protocol among parties already involved in rebuilding Lower Manhattan.

Baseline Assessment and Coordinated Cumulative Effects Analysis Approach

The framework establishes the components of the baseline assessment and coordinated cumulative effects analysis to be used for the Federal Transportation Recovery Projects. These parameters have been applied not only to the study of cumulative effects but also to the analysis of potential impacts resulting directly from the construction and operation of the Permanent WTC PATH Terminal. The guidelines specifically addressed in the framework are as follows:

- Each Project Sponsor will address cumulative effects, as applicable, as part of its independent project-specific environmental review process.
- The baseline to be used for the No Build comparison required under NEPA will be pre-September 11, 2001 conditions.
- The baseline used for assessment of construction-related impacts for each project will be adjusted, where appropriate, to reflect anticipated conditions at the time of construction.
- Project Sponsors will share appropriate information, databases, and documentation of the baseline and forecasted conditions.
- Each Project Sponsor will apply a consistent approach for the evaluation of cumulative effects focused on the five following resources: Air Quality (including the Enhanced Procedures during the Transportation Conformity Waiver Period); Pedestrian and Vehicular Access and Circulation; Historic and Cultural Resources; Noise and Vibration; and Business/Economic Interests
- The geographic area for analysis will be the area of Lower Manhattan south of Canal Street but, where appropriate, the geographic area may be adjusted for specific resources.

- Each Project Sponsor will adhere, at a minimum, to the set of common EPCs to lower the potential for adverse environmental impacts, thereby lessening the potential for each project to contribute to overall adverse cumulative effects.
- As each project matures through the NEPA process, the findings of the project will be incorporated into the cumulative effects analysis for the projects that follow it. As such, the project on which findings have been issued will constitute an existing condition for the cumulative effects analysis of the next project.

The "Methodology" sections of Chapters 4 through 14 of this FEIS detail the specific data sources, study areas, and criteria applied to the assessment of potential impacts associated with the Preferred Alternative. The approach to the evaluation of cumulative effects is further described in Chapter 15, "Cumulative Effects."

Since publication of the DEIS, PANYNJ has coordinated with NYSDOT and MTA to refine the EPCs and other mitigation commitments identified in the environmental documents for the Lower Manhattan Recovery Projects. As such, PANYNJ and MTA have agreed to additional measures to minimize or mitigate air quality emissions, noise, and vibration during the construction of their projects. These measures are described in more detail in Chapter 9, "Air Quality" and Chapter 10, "Noise and Vibration."

Furthermore, on November 22, 2004, New York State Governor George E. Pataki signed an Executive Order creating the Lower Manhattan Construction Command Center (see Appendix I). The Command Center will administer the construction of project's within Lower Manhattan that either 1) have a construction value of more than $25 million; 2) require governmental actions or permits or; 3) require work within a City or State street or highway.

The Command Center will coordinate community information, construction logistics, utility coordination, environmental compliance and safety, and diversity and equal opportunities in employment. The Command Center will be managed by an Executive Director to be appointed by the Governor and the Mayor of the City of New York. The Mayor will also appoint a Director of City Operations to act as a liaison between the Command Center and City officials. An Executive Committee, to be chaired by the Executive Director, will be appointed to facilitate communications between the Command Center, the Lower Manhattan Project Sponsors, and other key city and state departments and agencies. Chapter 3, "Construction Methods and Materials" provides a more detailed description of the roles and functions of the Lower Manhattan Construction Command Center.

As described in Chapter 18, "Process, Agency Coordination, and Public Participation," the Lower Manhattan Construction Command Center is only one of the several forums in which PANYNJ will coordinate with other agencies and the general public as the planning and construction of the Permanent WTC PATH Terminal moves forward. As the owners of the WTC site, PANYNJ will maintain close contact with LMDC, MTA, and NYSDOT as their efforts move forward. In addition, PANYNJ will continue to coordinate with the project's Section 106 consulting parties on issues relating to archaeological and historic resources, and they will continue their outreach with project stakeholders and community groups to report on the project's progress. ✳

A. INTRODUCTION

This chapter describes the activities required for construction of the Preferred Alternative for a Permanent World Trade Center (WTC) PATH Terminal. The potential environmental impacts that may result from construction and any required mitigation measures are detailed in Chapters 4 through 14 of this Environmental Impact Statement (EIS).

The purpose of this chapter is to develop a framework for the analysis of potential impacts from the construction of the Preferred Alternative. At this time, design of the project is still ongoing, and will continue to evolve. Similarly, planning for construction of the project will also evolve. Therefore, while the actual construction process may differ somewhat from the scenario discussed below, the analysis methods have been conservatively developed to maximize the potential for construction-related impacts. Specifically, it has been assumed for concurrent construction activities that the peaks will overlap and cumulatively affect air quality, noise, and traffic conditions to a higher degree than what is likely to occur. Therefore, any measures required to mitigate these impacts would then be sufficient for any number of possible future construction scenarios.

B. NO ACTION ALTERNATIVE

Under the No Action Alternative, it is assumed that construction activities associated with the WTC Memorial and Redevelopment Plan, the Fulton Street Transit Center, South Ferry Terminal, the Route 9A Project, and certain private developments would occur on or near the WTC site as described in Chapter 15, "Cumulative Effects." As such, certain modifications may be required to maintain temporary WTC PATH service and to ensure the safety of PATH riders as construction occurs around and above the station complex. Furthermore, it is assumed that specific plans to maintain and protect temporary PATH service and any required modifications to the station in support of other area developments would be undertaken by the respective project sponsors.

As described in Chapter 2, "Project Alternatives", minor construction may be required within and adjacent to the temporary station to extend its service life through the opening year, but such activities would be similar to station maintenance that occurs on a regular basis throughout the PATH system. Generally, the effects of this maintenance are anticipated to be far less than those with the construction of a Permanent WTC PATH Terminal since the activities described below for the Preferred Alternative would be far more intense.

C. PREFERRED ALTERNATIVE

The DEIS presented a construction schedule and phasing plan developed in October 2003. This plan was prepared as part of the coordinated efforts for the cumulative effects analysis

framework for the Lower Manhattan recovery projects. The phasing plan presented in the DEIS consisted of 6 Elements as follows:

- Element 1: Permanent Tracks, Platform Conversion, Mezzanine, and Concourse Construction;
- Element 2: Tunnels under 1 and 9 Line;
- Element 3: Route 9A Connection;
- Element 4: Liberty Plaza Connection;
- Element 5: Excavation/Deconstruction of the temporary PATH station; and
- Element 6: PATH Terminal Building.

As noted in Chapter 2, "Project Alternatives," the Liberty Plaza Connection is not being proposed as part of the Preferred Alternative. Therefore, Element 4 of the phasing plan described in the DEIS has been eliminated in this FEIS. Furthermore, since publication of the DEIS, project engineering and design have progressed allowing for a more refined assessment of the construction schedule and phasing. The analysis in the DEIS assumed construction would begin in the first quarter of 2005, but it is now anticipated to start in the third quarter of 2005. Furthermore, the DEIS analysis of construction impacts assumed a more fast-tracked approach with the majority of construction activities occurring in 2006. Based on current engineering data, design considerations, and coordination issues with other separate undertakings on the WTC site, the construction activities would be more evenly distributed through 2006, 2007, and 2008. Since the analysis in the DEIS was based on a higher level of activity than is currently proposed, the corresponding construction-related impacts are higher than what is now expected. Assumptions in the DEIS regarding construction scheduling and phasing have not been revised for the FEIS, as they represent the maximum predicted noise levels and pollutant concentrations that could possibly occur under the most aggressive construction schedule. Mitigation measures developed with respect to these maximum predicted levels would be even more effective under a less aggressive construction schedule.

This section presents the construction schedule and phasing for the Preferred Alternative as currently proposed. Section D, "Construction Analysis Framework" describes the construction scenario that was originally developed for the DEIS and is used in this FEIS to assess potential impacts and to recommend mitigation.

SCHEDULE

Construction of the Preferred Alternative is comprised of five major elements, within which there are stages to be performed concurrently or sequentially. As shown in Figure 3-1, these five construction elements would occur from approximately July 2005 through early 2010. However, the major components of the Terminal are expected to be operational in 2009.

During all elements of the project, construction workers and supervisors would arrive on site either in personal vehicles or via mass transit. A limited amount of parking would be available on-site and would primarily be used by supervisors arriving in light trucks. Other workers arriving by private vehicle would park off-site. Heavy and light trucks would be present during demolition and construction stages throughout all elements; however, the number and type of trucks would vary between elements.

Generally, the hours of construction would be Monday through Saturday from 7 AM to 6 PM in one 10-hour shift. A 10-hour work shift was assumed not only for the construction of the Preferred Alternative but was also assumed for analyses prepared for the World Trade Center

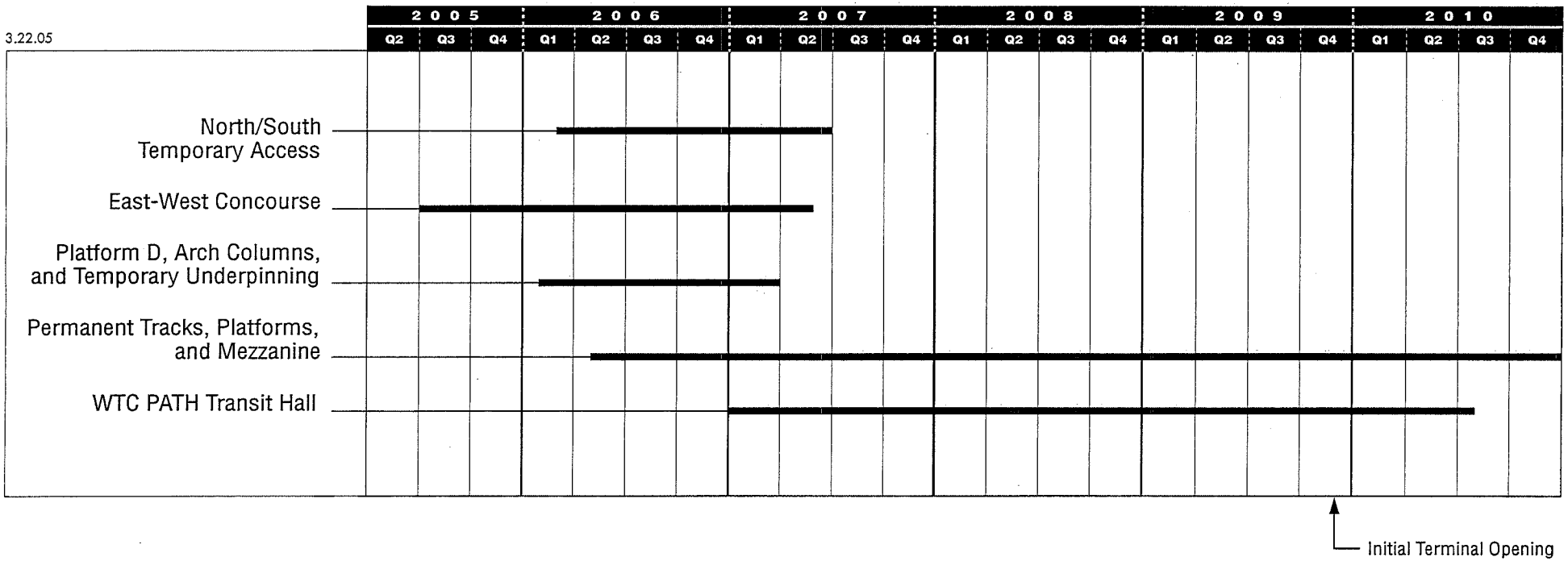


Figure 3-1
Construction Schedule

Memorial and Redevelopment Plan. The proposed hours of construction are consistent with New York City construction guidelines.

In some cases, it may be necessary to conduct construction activities at night, particularly when temporary lane closures would be needed or to coordinate and stage activities for the daytime shift. These nighttime activities would be limited throughout the construction period and would have fewer staff than the daytime shift. These nighttime activities would be required to meet the New York City Noise Control Code (NYC Administrative Code Title 24 §201 et seq.), which does not allow for activities that would exceed specific noise criteria.

CONSTRUCTION ELEMENTS

For descriptive purposes, the construction process for the Preferred Alternative is divided into five elements. Prior to or during construction of the Preferred Alternative, the bathtub walls surrounding the western portion of the WTC site will require permanent reinforcement and stabilization to protect the Preferred Alternative from extensive infiltration of water from the Hudson River and potential flooding. All or part of this bathtub reinforcement and stabilization work may be done as part of the Permanent WTC PATH Terminal project. Following is a brief description of each of these project components.

NORTH/SOUTH TEMPORARY ACCESS

Beginning in late 2005, PANYNJ would construct temporary access to the temporary WTC PATH station. As currently planned, the temporary access would be located on Vesey or Liberty Street or both and would allow for the continued use of the temporary station as construction of the Permanent Terminal proceeds. The temporary access would be maintained until the Terminal Hall and other permanent street-level entrances can be provided. The duration for the construction of this element is 15 months.

EAST-WEST CONCOURSE

During this phase, PANYNJ would construct the east-west pedestrian connection through the WTC site. This phase also includes the construction of the east-west connection beneath Route 9A and of the headhouse adjacent to the World Financial Center. The portion of the connection beneath Route 9A may be constructed by NYSDOT using cut-and-cover methods or by PANYNJ with mining. If NYSDOT pursues a short-bypass alternative for the Route 9A Project, then they would construct the east-west concourse in tandem with their construction of the roadway tunnels. If NYSDOT pursues an at-grade alternative for Route 9A, then the east-west concourse would be constructed at nearly the same elevation by PANYNJ; however, the tunnel would be mined with spoils removed from within the WTC site or from a shaft near the World Financial Center that would eventually provide the vertical connection between the concourse and the street-level headhouse. The full duration for the east-west concourse construction is 36 months.

The hardening of the roof of the east-west concourse, which would eventually become the road bed of Fulton Street between Route 9A and Greenwich Street would occur during this element. The hardening of roof would involve the laying and reinforcement of high density concrete. Upon completion, the hardened road bed would serve as staging for the construction of Freedom Tower, which is being undertaken independent of the Preferred Alternative for the Permanent WTC PATH Terminal. The road bed would be prepared for street traffic as part of a separate undertaking.

PLATFORM D, ARCH COLUMNS, AND TEMPORARY UNDERPINNING

This element of construction involves the preparation work needed to maintain PATH operations as components of the Permanent Terminal are construction. It includes the laying of a temporary Track 6 and the permanent Platform D within the WTC "bathtub." The temporary track is needed to allow for continuous PATH operations as other tracks are reconfigured for use in the Permanent Terminal. Platform D provides access to trains using Track 6 and is, therefore, the first permanent platform to be constructed. Track 6 would be removed once PATH service can be fully restored on Tracks 1 through 5. During this phase of construction, the column supports for the Terminal's arches would be placed. Also, temporary underpinning of the 1 and 9 Line would be undertaken to support the later widening of the passageway between the mezzanine level and the concourse level. The total duration of this element is 20 months.

PERMANENT PLATFORMS, TRACKS, AND MEZZANINE

This component of construction includes the major structural and finishing work for the platform and mezzanine levels of the Permanent Terminal. It includes placement of the structural arches, mezzanine construction, the underpinning of the 1 and 9 Line and construction of the passageway between the mezzanine and concourse levels, the lengthening and upgrade of Platforms A, B, and C, the completion of Platform D, and the construction of PATH's ventilation structures in the median of Route 9A. The total duration for this phase of construction is 45 months.

Grouting beneath the existing NYCT 1 and 9 subway tunnel would be performed from within this tunnel to protect the existing subway tunnel from the subsequent excavation work. Grouting is used in soft soil to stabilize surrounding soils as a tunnel is excavated. In this case, a machine would be used to stabilize the surrounding soils by injecting cement or a similar material to form a hard tunnel shell. It would involve the use of compressed air operated drill rigs and grout pumps.

Excavation and tunneling beneath the subway would occur from the west bathtub and proceed east. Tunneling would be accomplished via conventional mining techniques (e.g., shield with hand or mechanical excavation) and would require removal of existing piling supporting the subway tunnel and replacement with new piles/foundations. Spoils would be removed via the existing ramp to Liberty Street or by lifting to the surface with a crane and skip box.

Demolition of temporary and construction of the permanent tracks, platforms, and mezzanine would occur alternating between northern and southern portions of track, platform, and mezzanines. To maintain train service and passenger safety and access, only one half (either the northern or southern half) of the platform would be demolished and converted, then the second half would follow. This stage of activity would continue until all tracks and platforms are converted. All work would occur within the west bathtub of the WTC site with access from the existing ramp from Liberty Street. No street closings are anticipated for this work to take place.

Two ventilation structures with emergency egress would be constructed as part of the Preferred Alternative. The north ventilation structure would be below and within the median of Route 9A near the projection of PATH Tunnel E. Similarly, the south ventilation structure would be within Route 9A above Tunnel F. This construction would also involve the installation of fans. Estimated duration for construction of the ventilation shafts is approximately 6 months. The vent structure construction would be undertaken in coordination with NYSDOT.

WTC PATH TRANSIT HALL

This element consists of construction of the PATH terminal building, which includes the construction of all sub-grade and above-grade levels, the north-south pedestrian concourse, and the Terminal's mechanical and support systems. A preliminary estimate for the duration for the construction of the building area is 42 months, from late 2006 through early 2010. Lane closings on Church Street may be required for materials delivery and for the erection of pre-fabricated trusses and for the structural steel framing.

MATERIALS DELIVERY AND SPOILS REMOVAL

The vehicles, primarily trucks, needed to deliver materials for construction activities and remove demolition debris would be required to adhere to established site ingress and egress truck routes. For access to the site, trucks arriving and departing would use Route 9A, Broadway, Liberty Street, Church Street, and Barclay Street (see Figure 3-2).

The staging of materials would generally occur within the WTC site or along Vesey and Liberty Streets, which would remain closed to vehicle access during the construction period. At limited times during the Project's construction, it may be necessary to stage materials on Church Street, which would require temporary lane closures. PANYNJ and its contractors would coordinate such activities with the New York City Department of Transportation.

Excavation and demolition of existing site infrastructure and remaining soil would result in the removal of spoils throughout the construction period. As described in Chapter 12, "Contaminated Materials," these spoils would be removed from the site by licensed handlers and would be tested prior to disposal in accordance with U.S. Environmental Protection Agency, New York State Department of Environmental Conservation, and New York City Department of Environmental Protections guidelines and policies. Spoils would be deposited in a licensed facility.

ENVIRONMENTAL PERFORMANCE COMMITMENTS

As discussed in Chapter 2, "Project Alternatives," PANYNJ has committed to a series of common Environmental Performance Commitments (EPCs) as part of the Environmental Analysis Framework for Federal Transportation Recovery Projects in Lower Manhattan. Actual requirements and specifications implementing the commitments will be set forth in PANYNJ's design and contract document.

As described in the DEIS, the project sponsors developed a framework for construction coordination, which included several working groups to address issues that have been identified in the individual environmental documents for the Lower Manhattan recovery projects and to implement the EPCs. The sponsors established a Schedule Working Group, a Logistics Working Group, a Traffic Working Group, and a Standards Working Group. Through this coordinated approach to the construction of individual projects, the project sponsors strove to meet or exceed the EPCs and to investigate and remediate issues and concerns that could arise during the construction process.

Since the publication of the DEIS, Governor Pataki established, by way of an Executive Order, the Lower Manhattan Construction Command Center (see Appendix I). This entity will coordinate the construction of the Lower Manhattan Recovery Projects but will also coordinate any other construction projects in Lower Manhattan with a value in excess of $25 million through 2010. The Command Center will have an Executive Committee consisting of representatives from the various project sponsors and other key state and local agencies. The

Command Center and its Executive Committee will be managed by an Executive Director, who was appointed in February 2005.

As stated in the Executive Order, the functions of the Command Center will be:

- "Coordinating the work of the participants in the rebuilding process and ensuring that the construction in Lower Manhattan proceeds as scheduled by mediating conflicts in schedules and street and site access between construction projects, agencies, and the Lower Manhattan Community;"
- "Coordinating protocols, contract requirements and activities outside of individual project limits through planning on a daily basis throughout construction for government agencies, developers, construction managers, general contractors, and contractors;"
- "Coordinating construction projects to minimize inconvenience for residents, workers, pedestrians, vehicles, and commuters;"
- "Ensuring that the Lower Manhattan area remains neat, clean and orderly throughout construction;"
- "Communicating with residents, businesses, and the general public through a communications director working with each agency's communications and public outreach personnel; providing a central focus on issues critical to the local community and the construction industry, by coordinating initiatives, public outreach, and information;" and
- "Utilizing technology to facilitate coordination of projects."

Although the Command Center and the Lower Manhattan Project Sponsors may further refine the EPCs as construction moves forward, PANYNJ has already committed to specific measures to mitigate potential impacts resulting from the project's construction. As noted in Chapter 2, "Project Alternatives," the EPCs address five categories as follows:

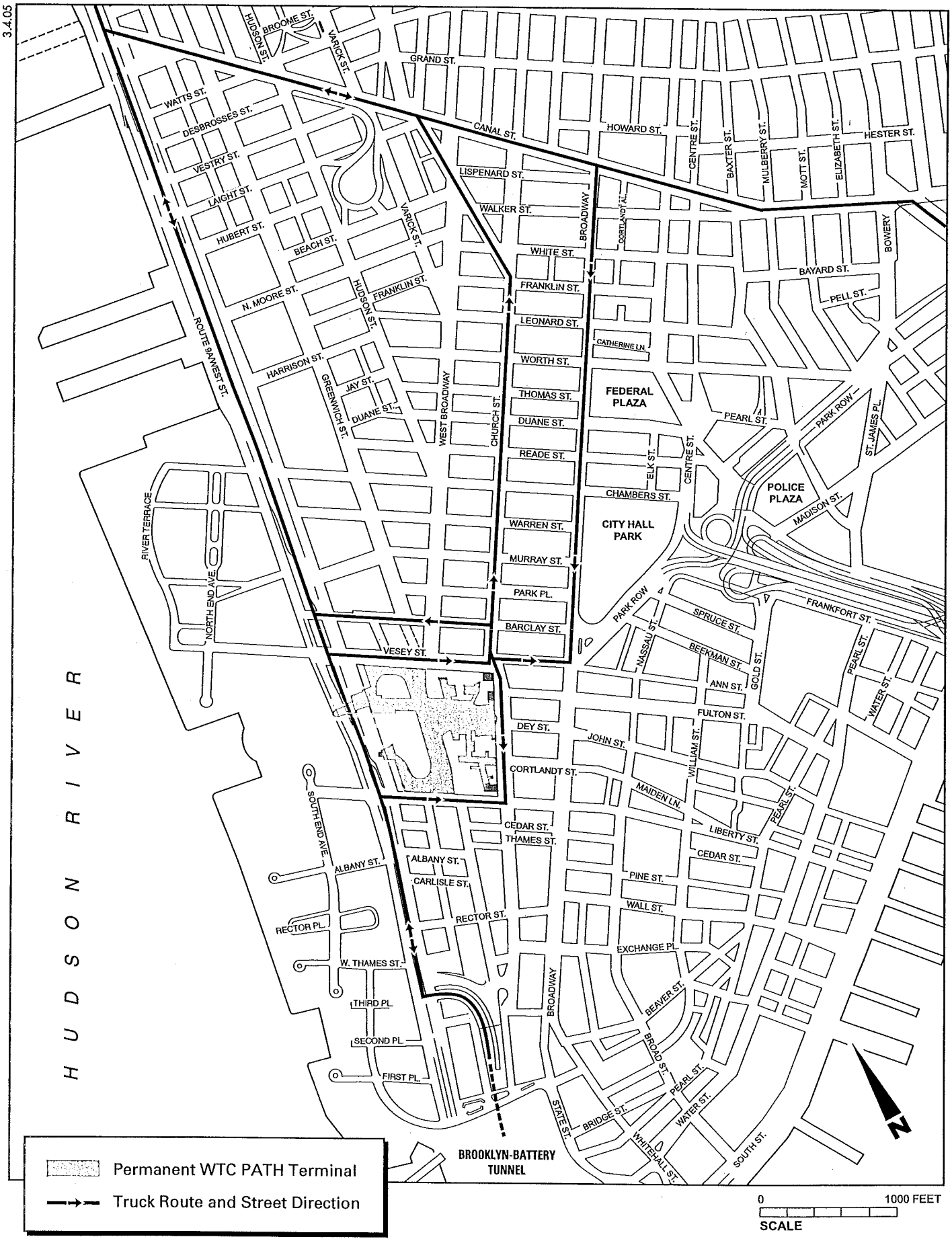
- Economic Conditions;
- Cultural Resources;
- Access and Circulation;
- Air Quality; and
- Noise and Vibration.

Chapter 5, "Socioeconomic Conditions," Chapter 6, "Cultural Resources," Chapter 8, Section B, "Vehicular Traffic and Parking," Chapter 9, "Air Quality," and Chapter 10, "Noise and Vibration," describe these commitments, plans for their implementation, and their anticipated benefits to local conditions during the construction period.

PANYNJ will also ensure that its EPCs are met independent of the Lower Manhattan Construction Command Center. Coordination and circulation plans will accompany the Project's design documents, and the project's contract documents and construction specifications will include the EPC requirements for contractors and specific measures to monitor these commitments as construction moves forward.

D. CONSTRUCTION ANALYSIS FRAMEWORK

As described above, the DEIS presented a construction analysis framework developed through a coordinated effort with the sponsors of the Lower Manhattan recovery projects in October 2003.



PERMANENT WTC PATH TERMINAL
Draft Environmental Impact Statement

Figure 3-2
Truck Routes

This framework considered the peak period of activity (2006) when four elements of the Terminal would be in simultaneous construction. The Liberty Plaza Connection was one of the four elements assessed for the peak construction year in the DEIS. Since the Preferred Alternative does not include the Liberty Plaza Connection, this element is dropped from the construction analysis framework for this FEIS. Furthermore, although the current phasing and schedule of the Preferred Alternative varies somewhat, the analysis framework presented in the DEIS reflects a more aggressive schedule and is considered a reasonable yet conservative framework to evaluate potential impacts and mitigation.

The assessment of potential impacts due to project construction requires the development of a framework that reasonably simulates, both temporally and spatially, those activities that may adversely affect the adjacent environment. To develop this framework, a critical analysis year is first selected. For construction projects that extend over multiple years, a critical year is identified to isolate the greatest potential for adverse effects. In the case of the Preferred Alternative, the peak period of construction activity would occur in 2006. Generally, the assessment of impacts in the critical or peak construction year results in an analysis and mitigation that would also alleviate adverse effects in other years of the construction period since activities on and near the Preferred Alternative would be less intense than in the critical analysis year. For each stage of construction, a peak condition is developed that replicates the daily activities that may be encountered for each stage. These activities include the type and location of construction occurring, a roster of construction equipment on site, the hours of operation for each equipment type, and a quantification of the numbers of trucks providing material or demolition transport. It is also necessary to develop estimates of construction worker vehicle trips even though these are not expected to occur in the peak analysis hours but may be substantial over a 24-hour period. Once these activities are detailed over the individual construction stages, an analysis scenario can be developed that is used as input to the traffic, air quality, and noise impact assessments.

CRITICAL ANALYSIS YEAR (2006)

For the Preferred Alternative, 2006 has been selected as the critical analysis year. During most of that year major work on three elements (Elements 1 through 3) would be occurring simultaneously. While work on Element 5 would be beginning at the end of 2006, construction activities on Elements 1 and 2 would be nearly complete. Therefore, the peak activities associated with Element 5 would not overlap with those of the first three elements. A detailed description of the work for Elements 1 through 3 follows.

Some construction activities may occur sequentially and some may occur simultaneously to increase efficiency and progress. The movement of heavy and light trucks would be a daily recurring activity throughout the duration of each stage of each element (i.e.., trucks to and from the site). On the other hand, some construction activities specific to each element (i.e., spoils removal, concrete pouring, and underpinning) would occur in stages and would not overlap, as it may be necessary to complete one activity before proceeding to the next. Additionally, one process or section of an element (e.g., reinforced steel installation) may be finishing while another is beginning in another area of the same work zone (e.g., pouring concrete). The analysis takes this into consideration by developing a reasonable number of concurrent activities for the impact assessment.

The average daily truck traffic numbers represent each vehicle counted once. It is assumed that the vehicles (i.e., numbers shown) would make one trip in and one trip out of the site (i.e.,

round-trip). Truck trips have been assumed to be evenly distributed throughout the day because the major truck generators, like demolition and concrete pouring, would require staging throughout the day at a more or less even pace as work proceeds.

As stated above, the work week would be six days, and a work day would be one 10-hour shift between the hours of 7 AM and 6 PM. However, the construction equipment is assumed to be operating a maximum of nine hours per day. Additionally, the total number of employees arriving at the site includes those arriving in personal vehicles as well as employees traveling via mass transit to the site. Although some activity may occur outside the assumed 10-hour shift during certain times of the construction period, these activities would employ far fewer workers and implements of equipment than the daytime shift. Thus, the daytime, 10-hour shift is considered a conservative scenario for the evaluation of potential construction-period impacts.

It is assumed that each material delivery truck (e.g., concrete, steel) would idle for approximately one-half hour per day (i.e., 5 percent of the 10-hour day).

DESCRIPTION OF CONSTRUCTION ELEMENTS

The following section describes in greater detail the construction activities in Elements 1 through 3. Figure 3-3 shows the areas in which the elements would take place and generally where the construction equipment would operate on site.

Element 1 – Permanent Tracks, Platform Conversion, Mezzanine and Concourse Construction

Element 1 would take place in the central portion of the site (see Figure 3-3). This element consists of constructing a temporary track to add to the existing five tracks, then demolishing temporary platforms and mezzanines and installing structural steel and reinforcing steel/concrete for new platforms and mezzanines. Demolition activities would take place for one-half month (i.e., 10 days) to prepare half a platform section for construction. The construction of the new platforms/mezzanines would involve the installation of reinforcing steel, concrete, and structural steel. The time required to complete one-half of a platform would be approximately three months. While each activity (e.g., placement of reinforcing steel) may only take a total of 30 working days, it may be spread out over the entire three-month cycle. Including demolition, the entire stage would last approximately 3.5 months. There would be two periods, each 3.5 months in duration, per stage and three stages for a total of six periods and 21 months.

While the exact pattern of construction is not known at this time, it has been assumed for the environmental analysis that all construction activities could be occurring simultaneously. Table 3-1 presents the number of trucks for each stage of this element. The table shows both the number of daily trucks required for an activity and the assumed number for the environmental impact assessment (i.e., the peak trips). As shown, it has been conservatively assumed that both demolition and construction are occurring on the same day. Only the trucks related to mobilization are not included in the peak trips, since it is not possible for mobilization to occur concurrently with the other activities. The maximum number of concurrent daily truck trips during demolition in Element 1 is estimated at 16 trips while construction would require an estimated 71 trucks. As shown in the table, the majority of the heavy-duty trucks coming to the site are related to the demolition and concrete pouring. Since demolition activities only occur for 10 days over the 3.5-month cycle, a total of 87 trucks (light- and heavy-duty) could only be reached on a small number of days, if at all.

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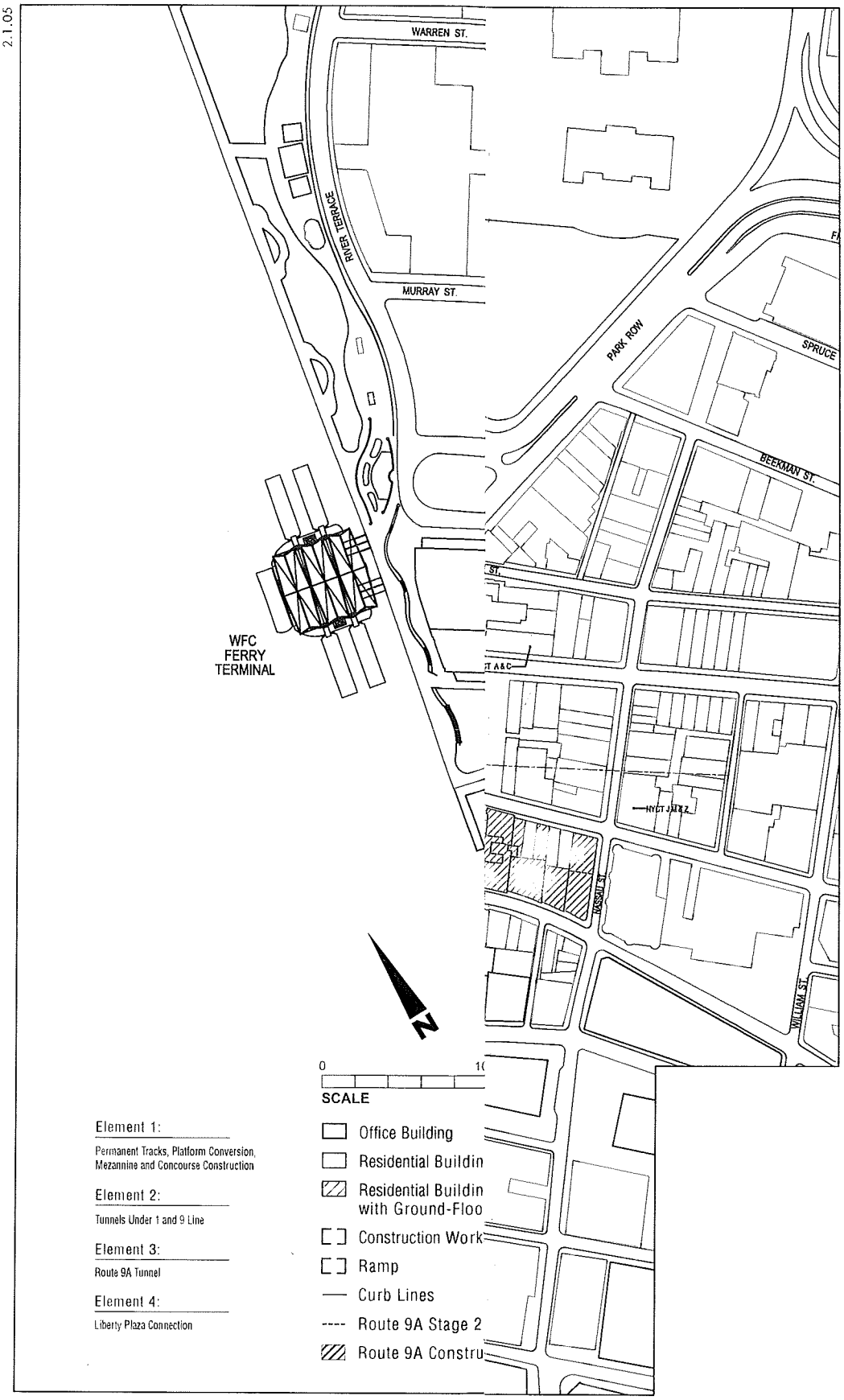

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Figure 3-3
Elements 1-3

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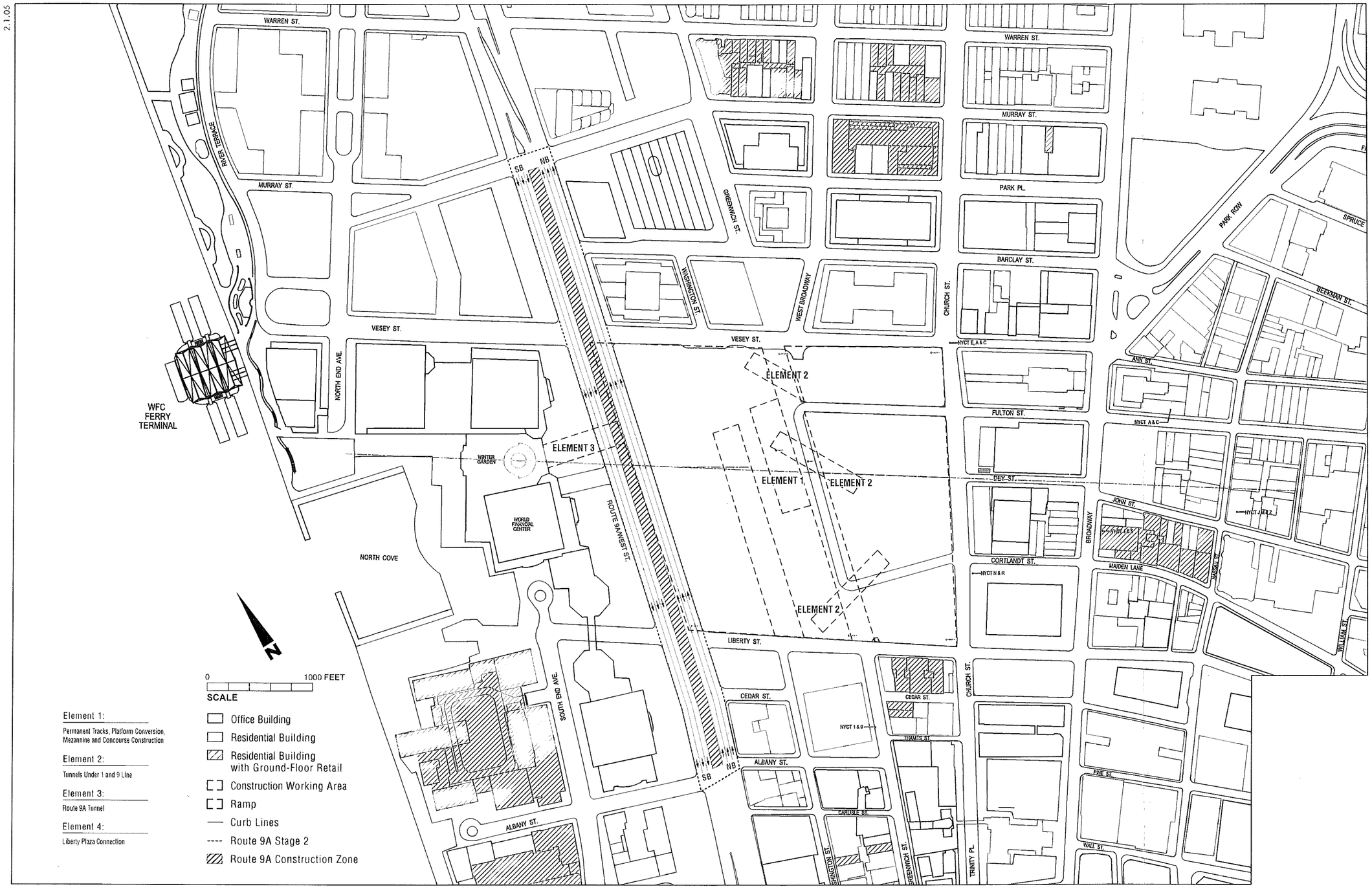

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Figure 3-3
Elements 1-3

Table 3-1
Element 1 – Summary of Off-Site Construction Activity

Activity	Peak Daily Trucks	Average Daily Trucks
Demolition		
Debris Removal*	5/day	3/day
Service Trucks	3/day	2/day
Light Trucks	8/day	6/day
Construction		
Concrete*	50/day	2/day
Reinforcing Steel*	1/day	1/day
Structural Steel*	4/day	1/day
Service Trucks	3/day	2/day
Light Trucks	13/day	11/day
Total	87/day	28/day

Note:
* Heavy trucks would be used for these activities.

The equipment usage for the demolition and construction activities has also been conservatively estimated. Table 3-2 presents a roster of equipment that would be used for the demolition and construction activities. These tables also show the number and types of equipment in use for peak days and the number of days in a year that each piece would be operating. It is important to distinguish between the peak days and the annual usage since some air pollutants, notably particulates and nitrogen dioxide, have an average annual standard that will be assessed in the impact analysis. The peak days will be used for the short-term (i.e., 8- and 24-hour averages) air quality and noise assessments, while the annual numbers will be used for the long-term standards (30-day and annual average). The maximum number of days that a piece of equipment would be used in a year is 288, which represents a six-day work week. A 48-week work year has been assumed to account for holidays and inclement weather conditions.

All of the equipment needed for the demolition, placement of reinforcing steel, pouring of concrete and erection of structural steel is included in these tables. As shown, a wide range of equipment would be employed for the various construction elements. Some equipment types (e.g., crane) are used in most activities while others are specific to an individual activity (e.g., concrete pump).

Element 2 – Tunnels under 1 and 9 Line

Element 2 consists of tunneling and underpinning of the 1 and 9 subway line at three locations, each labeled in Figure 3-3. Activities in this element include underpinning of the subway tunnel (six months), excavation and removal of spoil material (six months), and placement of steel and concrete within the excavated tunnel (eight months). The total duration of this element is 20 months. Underpinning would occur slightly ahead of excavation and spoil removal followed by the placement of concrete and steel to complete the activity. Since all three types of work occurring in this element could be performed in multiple locations, and given that this work could be performed together, all three activities could occur simultaneously during a typical work day.

Table 3-2
Element 1 – Summary of On-Site Construction Activity

Equipment	Quantity
Air Compressor for Impact Wrenches	2
Air Compressor for Pavement Breakers	1
Concrete Pump	1
Crawler Crane	1
Hi-Lift (forklift)	2
Hydraulic All-terrain Crane	1
Hydraulic Excavator with Hoe Ram	1
Hydraulic Excavator with Thumb	1
Impact Wrenches	20
Pavement Breakers	4
Welding Machines	2
Workers in Private Vehicles during Demolition	6/day
Workers in Private Vehicles during Construction	11/day

Table 3-3 presents the number of trucks needed for each stage of Element 2. The maximum number of peak daily truck trips during construction is estimated at 16.

Table 3-3
Element 2 – Summary of Off-Site Construction Activity

Activity	Peak Daily Trucks	Average Daily Trucks
Spoil Removal*	6/day	2/day
Underpinning*	1/day	1/day
Concrete/Steel*	2/day	1/day
Service Trucks*	2/day	1/day
Light Trucks	5/day	3/day
Total	16/day	8/day

Note:
* Heavy trucks would be used for these activities.

As previously discussed, the grouting operations for the underpinning would occur from within the subway tunnel. This activity would occur during late-night or weekend periods to minimize the effects to subway operations. The grouting is used to control the flow of soil and/or groundwater during the subsequent excavation stages. Concurrent with grouting, the internal framing for the subway structure would be reconstructed and socketed into bedrock with caissons. Temporary sheet piling would also be installed before excavation begins.

The staging for the tunneling work and placement of the concrete/steel structural elements would occur in the west bathtub. Tunneling would proceed east in a step-wise fashion. After grouting, underpinning and dewatering are completed for a section, the tunneling would proceed and material would be excavated and removed. As the tunneling progresses, the structural elements (i.e., concrete and steel) would be installed in the previously excavated tunnel space. Once the tunneling is complete, finishes would be installed.

Table 3-4 shows the types and quantity of equipment that would be used for this element.

Table 3-4
Element 2 – Summary of
On-Site Construction Activity

Equipment	Quantity
Air Operated Grout Drills	2
Concrete Pump	3
Crawler Crane	1
Hi-Lift (forklift)	2
Backhoe or Boom Cutter for Tunneling	2
Welding Machines	1
Workers in Personal Vehicles	6/day

Element 3 – Route 9A Connection

Element 3 would take place in the northwestern portion of the site (see Figure 3-3). This element consists of tunneling under Route 9A for the pedestrian concourse under this roadway. Under the short-bypass alternative for Route 9A, excavation would employ cut and cover construction methods beneath the existing roadway.

As described previously, the methods employed to construct the Route 9A connection depend upon the alternative selected for the Route 9A Project. Under the short-bypass alternative, NYSDOT would construct PATH's connection on behalf of PANYNJ. NYSDOT would use cut-and-cover methods and would incorporate the excavation of PATH's connection with their construction efforts for the roadway tunnels. If the at-grade alternative is selected for Route 9A, then PANYNJ would construct the concourse beneath Route 9A by mining.

The cut-and-cover method of construction would result in the maximum predicted impacts on traffic circulation and noise as compared to mining; thus, these chapters consider the cut-and-cover method for the evaluation of impacts. The potential impacts on air quality vary depending upon the construction method; therefore, the analysis presented in Chapter 9, "Air Quality," considers both methods of construction.

Furthermore, the short-bypass alternative for the Route 9A Project requires relocation of utilities in the vicinity of the roadway; however, these utilities would not be relocated if the at-grade alternative is pursued. Although utility relocation is not required in the proposed location of PATH's Route 9A connection, it is described below as part of the coordinated cut-and-cover method.

It is anticipated that the structure would be completed in two halves. If the Route 9A short bypass is selected as the alternative in this location, the cut-and-cover excavation would be integrated for the two projects. Basically, the ceiling of the concourse would become the floor of the short bypass.

Due to the amount of existing deep utilities, piles, timber cribbing and other obstructions in the eastern portion of the planned concourse area, a slurry wall would be used to create the temporary excavation. For the remaining portions of the concourse the excavations would be created with interlocking piles that can be grouted to form a watertight seal.

The construction of the concourse under Route 9A would be staged to minimize the disruption to the World Financial Center and the existing roadway. Shallow utilities would be temporarily

relocated and/or protected in-place until construction is complete in that area. Once the utilities have been relocated, the excavation work would begin. As the work progresses, the walls of the excavation (i.e., either slurry or interlocking piles) would be laterally supported by internal bracing. The concourse would be constructed as a separate box within the temporary excavation. Each portion of the concourse would have to be bulk-headed until the next portion is constructed and the two can be connected. Once completed, the excavation would be backfilled and work on the other half (e.g., eastern or western depending upon sequencing) of the roadway could begin.

Table 3-5 presents the number of trucks for each stage of Element 3. As shown, the peak daily trucks would be 15 since it is assumed that all operations could occur simultaneously. Table 3-6 summarizes the types and quantities of equipment that would be used during this phase of construction.

Table 3-5
Element 3 – Summary of Off-Site Construction Activity

Activity	Peak Daily Trucks	Average Daily Trucks
Spoil Removal*	5/day	2/day
Underpinning*	1/day	1/day
Concrete/Steel*	2/day	1/day
Service Trucks*	2/day	1/day
Light Trucks	5/day	4/day
Total	15/day	9/day

Note:
* Heavy trucks would be used for these activities.

Over the 15-month duration for this element, each activity (underpinning, excavating and placement of concrete/steel) would occur for approximately one-third of the time. Therefore, while the assumptions for the peak day include all equipment operating simultaneously, the annual usage reflects that equipment such as the welding machines or concrete pump would be in use for only one-third of the year.

Table 3-6
Element 3 – Summary of On-Site Construction Activity

Equipment	Quantity
Air Operated Grout Drills	3
Concrete Pump	1
Crawler Crane	1
Hi-Lift (forklift)	2
Pavement Breakers	1
Backhoe	1
Welding Machines	2
Workers in Private Vehicles	6/day

Summary

A summary of the peak trucking activity (i.e., total number of light and heavy trucks that would be on site during construction) in Elements 1 through 3 is presented in Table 3-7. As discussed above, since activities in all elements could potentially overlap, it is conservatively assumed that a total of 118 trucks could arrive on site per day during project construction. Since each truck would travel both to and from the project site, this would represent 236 daily truck trips.

Table 3-7
Summary of Total Peak Daily Trucks (Elements 1 through 3)

Table 3-5	Light Trucks (Per Day)	Heavy Trucks (Per Day)	Total Trucks (Per Day)
Element 1	21	66	87
Element 2	5	11	16
Element 3	5	10	15
Total for All Elements	31	87	118

Of these 118 trucks, 87 would be heavy-duty trucks while 31 would consist of light-duty or subcontractor pick-up trucks. In addition to the delivery and service vehicles generated by the Preferred Alternative's construction, it is estimated that a small number of construction workers would arrive at and depart the area by car. The subsequent traffic, air quality and noise assessment reflect the different characteristics of each of these vehicles. ✳

A. INTRODUCTION

This chapter examines the effects of the Preferred Alternative within the context of existing and future land use and development trends, neighborhood character, and public policy. The analysis assesses the Preferred Alternative's ability to support the economic recovery of Lower Manhattan as the third largest central business district in the United States. This chapter describes the anticipated changes in land use, neighborhood character, and public policy that are independent of the Preferred Alternative in each of the analysis years and assesses its potential impacts.

B. METHODOLOGY

Three analysis years—2006 (construction year and critical analysis year), 2009 (opening year), and 2025 (design year)—are considered. While the analysis is primarily based upon conditions that exist today at the Project Site and in the surrounding study area (defined below), a discussion of the environment prior to the events of September 11, 2001 is included in this chapter to provide an overall context for the analysis which follows. Anticipated changes in land use, neighborhood character, and public policy that are expected to occur independently of the Preferred Alternative by each analysis year are identified, and its potential impacts to land use, neighborhood character, and public policy are assessed.

Projections of potential future baseline conditions were developed based on the New York Metropolitan Transportation Council's regional modeling for its Regional Transportation Plan. However, these projects were adjusted to local levels based on current knowledge of existing and proposed Lower Manhattan land use. As described in Chapter 2, "Project Alternatives" and Chapter 15, "Cumulative Effects," PANYNJ has coordinated with the other sponsors of the Lower Manhattan Recovery Efforts (Lower Manhattan Development Corporation, Metropolitan Transportation Authority, and New York State Department of Transportation) to develop a consistent approach to the evaluation of potential environmental effects for their respective projects. The methodology for this land use and neighborhood character analysis follows this guidance, and the development of baseline and future conditions has been closely coordinated between the project sponsors.

STUDY AREA AND SUBAREAS

The Preferred Alternative would be constructed almost entirely within the bounds of the approximately 16-acre WTC site, bounded by Vesey Street to the north, Church Street to the east, Liberty Street to the south, and Route 9A to the west (see Figure 4-1). Street level access points and below-grade connections would extend farther, from the World Financial Center (WFC) on the west side of Route 9A in Battery Park City (BPC) to Liberty Park Plaza located east of Church Street between Liberty and Cedar Streets. These areas are referred to collectively as the Project Site.

For the purposes of assessing existing and future land use, public policy, and neighborhood character, the land use study area surrounding the Project Site has been divided into nine subareas established based on geographic boundaries as well as commonly accepted neighborhood boundaries.

While the Project Site, as defined below, is largely contained within the boundaries of the former WTC site, the areas to be used specifically to construct the Preferred Alternative are analyzed separately from the rest of the developments expected to occur at the WTC Redevelopment Sites, as defined below. The Project Site and the five subareas immediately surrounding the Project Site represent the primary catchment area for PATH riders and the areas where impacts from the Preferred Alternative are most likely to occur. They are also the areas that experienced the greatest impacts from September 11, 2001 and its aftermath. The remaining four subareas are located further away from the Project Site and therefore are less likely to be affected by the Preferred Alternative. However, these areas capture almost all additional PATH riders who travel to Lower Manhattan, and are included to be consistent with the study areas established for other major projects in the area, including the Lower Manhattan Development Corporation's (LMDC) WTC Memorial and Redevelopment Plan.

To assess potential off-site impacts, a Lower Manhattan study area was defined which includes all uses south of Canal Street. For discussion purposes, this study area is divided into nine subareas as shown in Figure 4-1 and described below.

- *WTC Redevelopment Sites:* (1) the WTC site, bounded by Vesey, Church, and Liberty Streets, and Route 9A; and (2) the two city blocks south of the WTC site, one bounded by Liberty, Greenwich, Albany, and Washington Streets, and the other bounded by Liberty, Washington, and Cedar Streets and Route 9A, plus portions of Liberty and Washington Streets.
- *North of WTC site*, bounded by Chambers Street to the north, Vesey Street to the south, Route 9A to the west, and the eastern boundary of City Hall Park to the east.
- *Broadway Corridor*, extending from Vesey Street and Pace Plaza in the north to Beaver Street between Trinity Place/Church Street and Nassau/Broad Streets in the south.
- *Greenwich South Corridor*, bounded generally by Liberty Street to the north, Trinity Place to the east, Battery Place to the south, and Route 9A to the west.
- *Battery Park City*, encompassing the area between Route 9A and the Hudson River, from approximately Chambers Street to Battery Place.
- *Tribeca*, bounded by Chambers Street to the north, Broadway to the east, Canal Street to the south, and the Hudson River to the west.
- *Chinatown below Canal Street*, bounded by Canal Street to the north, Pike Street and the East River to the east, the Brooklyn Bridge to the south, and Pearl Street to the west, in addition to the blocks between Broadway and Pearl Street from Canal Street in the north to Worth Street/Clavin Place in the south.
- *Civic Center*, bounded by Pearl Street to the east, the Brooklyn Bridge to the south, and Broadway to the west, and extending north to Worth Street/Clavin Place between Lafayette and Pearl Streets.

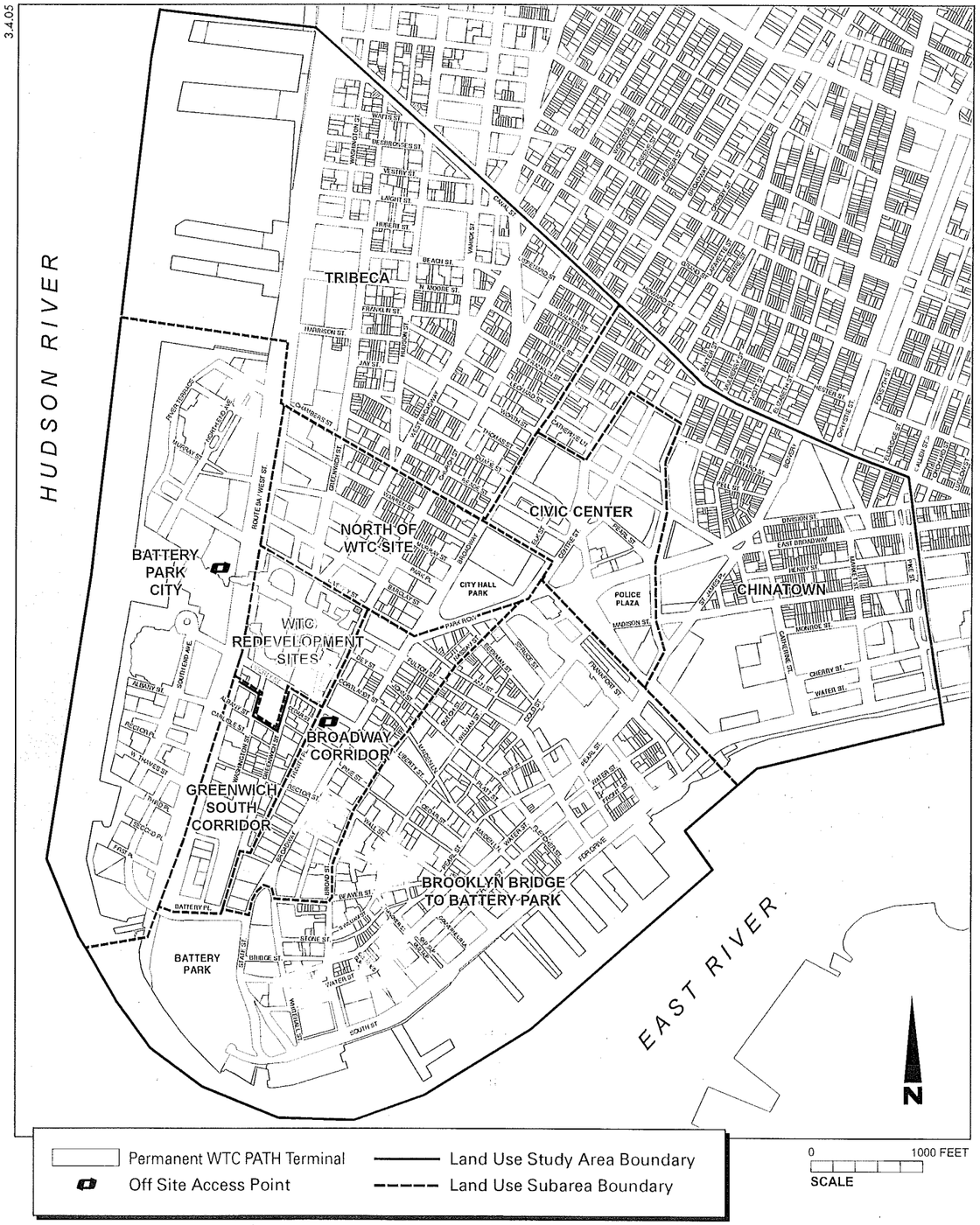

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Figure 4-1
Land Use Study Area

- *Brooklyn Bridge to Battery Park*, bounded by the bridge to the north, Centre/Nassau/Broad Streets to the west, the East River to the east, and south of Beaver Street/Battery Place in the southwest corner.

C. DESCRIPTION OF THE AFFECTED ENVIRONMENT

PRE-SEPTEMBER 11, 2001 BASELINE CONDITIONS

Prior to the September 11, 2001 attacks on the WTC, the Project Site was occupied by the WTC PATH Terminal located in the WTC complex. As the Preferred Alternative would effectively result in the Terminal's replacement, an understanding of the conditions that existed on the Project Site and in the surrounding area when the original Terminal was active will help to provide the context for the analysis which follows. Those land uses, public policies, and neighborhood characteristics that existed prior to September 11, 2001 are discussed in this section.

LAND USE AND NEIGHBORHOOD CHARACTER

Project Site

Before September 11, 2001, the Project Site was occupied by the WTC PATH Terminal, which included a track and platform level, an associated mezzanine/fare-zone level, and sub-grade pedestrian connections to adjacent streets, New York City Transit (NYCT) subways, and WTC site developments. The terminal was the busiest of the 13 PATH stations with approximately 67,000 average weekday boardings. Access to the mezzanine and platforms was located on the eastern portion of the Project Site within the WTC Concourse. The track and platform and mezzanine levels were located on the western half of the site, below the WTC Towers 1 and 2. The tracks connected to the Hudson Tubes beneath Route 9A and extended west under the Hudson River to New Jersey. Below ground, remnants of the former Hudson & Manhattan (H&M) Terminal existed in an altered state and were used for parking, truck access, and storage for the other facilities on the WTC site.

The WTC Concourse that housed the WTC PATH Terminal also contained retail stores and a transportation hub providing pedestrian connections to seven subway lines operated by the Metropolitan Transportation Authority (MTA) as well as the PATH trains. Although not particularly successful initially and deserted on weekends for years, the shopping area had been improved and by 2001 had become an extremely lucrative retail hub. Austin J. Tobin Plaza (Tobin Plaza) and the additional outdoor public areas along the east side of Church Street housed the popular Greenmarket and several outdoor cafes, and served as a regular performance venue for free concerts.

Liberty Plaza contained benches, planters, and lighting, providing respite for area workers and visitors. The WFC was connected to the Project Site and the WTC complex by a pedestrian bridge over Route 9A.

Study Area

The project study area was generally characterized by a mixed land use pattern which prevails today. Dominated by the scale of the WTC buildings and their populations, there was a strong and growing residential community in Tribeca and the Financial District, and a number of

institutional uses in addition to offices. The blocks immediately surrounding the Project Site were extremely active and a vital part of the dense commercial core of Lower Manhattan.

WTC Redevelopment Sites. Prior to September 11, 2001, the WTC site contained over 10 million square feet (msf) of office space in five buildings, approximately 500,000 square feet of retail space, a 22-story hotel, and a public plaza. The site was best known for the Twin Towers: One and Two WTC, two 110-story buildings that rose over 1,350 feet. Each tower contained more than 4.1 msf of rentable Class A office space. Between the Towers at the southwest corner of the WTC site was Three WTC, a 22-story Marriott Hotel with 820 rooms and meeting spaces. Along the north and west edges of the WTC site were two nine-story buildings (Four and Five WTC) and the eight-story U.S. Custom House (Six WTC).

The five office buildings and the hotel surrounded Tobin Plaza where concerts and other public events were held. Along Church Street was more plaza area expanded by the southbound lanes of the street that were closed to traffic and improved with benches and planters with trees.

The Twin Towers dominated the Project Site and the surrounding blocks. Area streets and sidewalks bustled with traffic and with pedestrians going to work, shop, sightsee, and travel to other areas. Approximately 48,000 workers were employed at the WTC Redevelopment Sites with 34,000 employees in the Twin Towers alone (see Chapter 5, "Socioeconomic Conditions"). Over 200,000 workers and commuters poured through the WTC each weekday and into the evening hours.

Although weekends were less active, the Twin Towers and retail stores attracted a steady flow of tourists and shoppers. Tourists from around the world came to see and photograph the Twin Towers, to visit the observation deck, and to dine at Windows on the World. Although it was a busy nexus of transportation, which included the WTC PATH Terminal, and an important destination itself, the WTC superblock blocked view corridors and was often a barrier for residents, workers, and visitors of the three distinct neighborhoods surrounding it—Tribeca to the north, BPC to the west, and the Financial District to the east and south.

To the south, the building at 130 Liberty Street was a fully occupied office tower with ground-floor retail. It had a plaza with a fountain in the summer that was replaced by shrubs in the winter. Above this was an additional plaza level originally intended to connect to the plaza level at the WTC. To its west, the block at the corner of Liberty Street and Route 9A was an active parking lot and the site of the St. Nicholas Greek Orthodox Church.

North of WTC site. The area north of the WTC site contained a variety of land uses, including office, residential, institutional, light industrial/utilities, and open space, as well as vacant land. It was a transition zone between the mainly commercial office buildings to the south and the more residential and institutional development in Tribeca to the north. Prior to September 11, 2001, Vesey Street carried substantial vehicular and pedestrian traffic volumes. With the approximately two million-square-foot 7 WTC, the Federal Office Building/U.S. Post Office (90 Church Street), and the Barclay-Vesey Building (Verizon Building), used for housing telephone equipment and offices, lining the north side of Vesey Street between Route 9A and Church Street, these blocks were a vital part of the dense commercial core of Lower Manhattan. A number of additional office buildings, many with ground floor retail uses, were located along Park Place and Murray Street to the north and between Church Street and Broadway to the east.

The renovation of the Borough of Manhattan Community College's (BMCC) Fiterman Hall, located immediately north of Seven World Trade Center (7 WTC), was near completion and actively used.[1] Other institutional uses included P.S. 234 and St. John's University School of Risk Management, Insurance and Actuarial Science, both between Greenwich Street and Route 9A. Located among these educational institutions were two large, vacant parcels known as Site 5B and Site 5C under the Washington Street Urban Renewal Area (WSURA) Plan (see "Pre-September 11, 2001 Baseline Conditions—Public Policy").

The blocks east of Greenwich Street and north of Murray Street had a greater mix of uses more typical of the Tribeca community. They were characterized by smaller commercial and residential buildings with a variety of ground-floor retail uses, including banks, restaurants, dry cleaners, and convenience-goods stores. The retail uses were more heavily concentrated along the north-south streets and Chambers Street, with smaller businesses along the east-west streets. Residential uses were concentrated on Greenwich Street between Murray and Chambers Street, on Murray Street east from Greenwich Street, and on Park Place from West Broadway to the east. In the easternmost portion of the subarea was City Hall Park and City Hall which housed the Mayor's offices and chambers of the New York City Council.

Broadway Corridor. Several buildings with a range of uses were located directly across Church Street from the Project Site. A church (St. Paul's Chapel), a hotel (the Millennium Hotel), a department store (Century 21), and a massive office building (1 Liberty Plaza) covering almost its entire block lined Church Street from Vesey to Liberty Streets. Across Liberty Street to the south was Liberty Park Plaza, part of the Project Site.

Office and other commercial uses generally dominated the Broadway Corridor before September 11, 2001. It was part of the historic financial district, the traditional home of financial institutions and corporate headquarters and the smaller businesses and industries which serve them. Class A and B office buildings lined Broadway as well as Church Street/Trinity Place and Nassau/Broad Streets. Such notable buildings as 140 Broadway, the Bank of New York Building, and the New York Stock Exchange were located here. Residential buildings with retail use at street level were concentrated in the northern portion of the corridor east of Broadway. Heavy vehicular and pedestrian traffic, especially along Church Street and Broadway, were typical throughout the weekday and into the evening hours.

Greenwich South Corridor. The area south of the WTC site contained a mix of land uses on blocks of varying sizes, including residential, office, educational, and public parking as well as the entrance and exit ramps for the Brooklyn Battery Tunnel. The area was densely developed with buildings generally occupying their entire lots and public plazas non-existent.

The New York City Fire Department (FDNY) firehouse for Ladder Company 10 and Engine Company 10 stood at the corner of Liberty and Greenwich Streets. To its east were residential uses in converted commercial buildings with active ground-floor retail uses, and a fast-food restaurant building. West of Greenwich Street, the 39-story office tower at 130 Liberty Street dominated the block. A public parking lot and St. Nicholas Greek Orthodox Church occupied the block to the west along Route 9A. Farther south, the buildings at 90 West Street and 130 Cedar Street were used as commercial office space. The building at 19 West Street was occupied by the Downtown Athletic Club, a private health club with hotel rooms and the home of the Heisman Trophy.

[1] BMCC's main campus is located four blocks to the north along Route 9A in the Tribeca subarea.

A number of commercial buildings both large and small south of Cedar Street between Route 9A and Greenwich Street had been or were in the process of being converted to residential use, following an ongoing trend in Lower Manhattan that began in the 1990s. Office uses were also located throughout the corridor with several buildings between Washington Street and Trinity Place, including the American Stock Exchange, the Trinity Building, and 40 Rector Street. Other commercial uses included restaurants, informal eating establishments, clothing stores, and small-scale retail businesses concentrated along Greenwich and Washington Streets, with limited retail along Route 9A.

Institutional uses included two schools and a religious organization. The High School for Leadership and Public Service and the High School of Economics and Finance were both on Trinity Place near Thames Street. Occupying the historic Downtown Community House on Washington Street north of Rector Street was the True Buddha Diamond Temple of New York. The corridor also contained several public parking structures, including the massive Battery Garage. Extending from Route 9A to Greenwich Street near the Brooklyn Battery Tunnel ramps, the garage could accommodate more than 2,000 vehicles.

Battery Park City. BPC, one of New York City's newest neighborhoods, is a "city within the city" that was still being completed before September 11, 2001. Built in part on landfill from the large volume of soil excavated for the WTC complex, BPC is a mixed-use community with a commercial center, two residential neighborhoods, schools, cultural facilities, hotels, and neighborhood amenities such as dry cleaners, grocery stores, shopping opportunities, movie theatres, and restaurants, as well as the most extensive open space network in Lower Manhattan.

BPC was generally divided into three sections: the North neighborhood (north of Vesey Street), the World Financial Center (WFC), and the South neighborhood (south of Liberty/Albany Streets). All three sections were bound together by a common scale and style and by the extensive waterfront parks and public esplanade, which began at Battery Park in the south and extended along the Hudson River to just north of Chambers Street at the north end. BPC was physically divided from the WTC site and the other subareas by Route 9A. This eight-lane divided highway served as a major thoroughfare along Manhattan's west side and provided access to the Brooklyn-Battery Tunnel. The highway also contained a separate Class I bikeway and walkway, part of the Hudson River Park, for bicycles, pedestrians, and recreational users.

Buildings in the North neighborhood were generally newer and taller, with several vacant parcels between Vesey and Warren Streets. The residential buildings at 20 and 22 River Terrace were under construction. Street-level activity was light in this area. However, the presence of Stuyvesant High School and P.S./I.S. 89 increased the level of activity during daytime hours.

The WFC consisted of four large office towers with retail shops and restaurants, and the Winter Garden, a large, glass-enclosed public atrium. These buildings were strategically positioned to tie into the WTC complex which stood directly across Route 9A. Two pedestrian bridges connected the WFC with the WTC complex to the east.

The South neighborhood contained mostly low- and mid-rise residential buildings in addition to cultural and hotel uses. With the exception of two large vacant parcels along Route 9A, the South neighborhood was fully developed. The Ritz-Carlton Hotel was approaching its scheduled opening, and construction of the Jewish Museum Expansion was underway.

Tribeca. Residential and commercial uses dominated the Tribeca neighborhood, with institutional, industrial, and open space uses also present throughout the subarea. Late 19th and early 20th century corniced loft buildings were interspersed with new mid-rise apartment

buildings with terraces and bay windows that seek to evoke the style of the older buildings. High-rise buildings were primarily located along the wider north-south streets with smaller buildings occupying the midblocks. Many of the smaller commercial buildings were converted to residential use with loft-style apartments and a variety of ground-floor retail uses. These included basic neighborhood amenities, such as banks, dry cleaners, and convenience goods stores, as well as large concentrations of art galleries, boutique shops, bars, and restaurants.

Notable institutional uses included the main campus of BMCC (also home to the Tribeca Performing Arts Center), New York Law School, and the Tribeca Film Center. Office buildings were concentrated along Broadway and Worth Street, with a large office complex situated on the block bound by Route 9A and North Moore, Hubert, and Greenwich Streets. Some of the industrial uses that characterized the neighborhood before the residential conversions began were still present in the northwestern portion of the study area, mainly in the area bounded by West, Greenwich, Laight, and Canal Streets. Open spaces included Washington Market Park at Chambers and Greenwich Streets, a 1.65-acre public landscaped park with active recreation areas for children. The Hudson River Park included a permanent bicycle and pedestrian greenway running up the west side of Manhattan, with interim uses on the piers and waterfront offering volleyball, minigolf, basketball courts, batting cages, concessions, a boathouse, and fishing and passive use areas.

The subarea had a slightly irregular street pattern, with heavy north-south traffic, particularly along Route 9A and all around St. John's Rotary which provided access to the Holland Tunnel. With such a diversity of uses, pedestrian activity was steady during the day and evening throughout much of the subarea.

Chinatown below Canal Street. The Chinatown below Canal Street subarea included mainly commercial and residential uses in small, older buildings, and large residential towers. High concentrations of commercial and mixed-use buildings existed throughout the subarea, concentrated along Canal Street, between Broadway and Pearl Street, and along the north-south streets throughout the subarea. Restaurants, fresh food markets, tea and rice shops, and garment factories are the main businesses in Chinatown, and the area's distinct character and mix of businesses made it a popular tourist destination. The largest Asian community in North America could be found among the narrow streets of Chinatown, a neighborhood which extends north of Canal Street beyond the study area.

The eastern and southern sections of the subarea included large-scale residential developments, such as Chatham Towers, the Governor Alfred E. Smith Houses along the East River, Knickerbocker Village, and Confucius Plaza, a large, middle-income residential building at the Bowery and Division Street.

Additional uses in the subarea included institutional, transportation, office, and open space. Three elementary schools and numerous religious institutions were scattered throughout the area. Cultural institutions included the Museum for Chinese in the Americas at Mulberry and Bayard Streets, and the Eldridge Street Project between Canal and Division Streets, which undertook a massive restoration of the Eldridge Street Synagogue, a National Historic and New York City Landmark. Columbus Park between Baxter and Mulberry Streets and a number of ballfields near the Manhattan Bridge at the East River were all well-utilized open spaces.

Civic Center. The Civic Center subarea was characterized by a high concentration of government and government-related uses, including several courthouses, city and state government office buildings, and the New York Police Department headquarters as well as their

office uses. Several small parks were located near the courthouses as well as a small portion of the African burial ground, located along Duane Street east of Broadway. The historic courthouse buildings lined Center Street, the area's main thoroughfare, which passed through Foley Square. The ramps to the Brooklyn Bridge created a physical and visual barrier to the neighborhoods to the south.

Brooklyn Bridge to Battery Park. This subarea comprises the eastern section of the Financial District and was largely commercial, with pockets of residential, institutional, entertainment, and open space uses. The area between Wall, Pearl, and Whitehall Streets is where New York City began and where Lower Manhattan's reputation as a major international economic hub was born. Huge skyscrapers housing financial service institutions, law firms, and insurance companies tower over narrow, winding streets in the Wall Street area. Large commercial buildings dating from the early 1930s include 70 Pine Street, 40 Wall Street, and 20 Exchange Place. More modern office buildings include One Chase Manhattan Plaza, 55 Water Street, One New York Plaza, and Financial Square.

The area's historic significance combined with a large presence of cultural institutions, including Federal Hall, the South Street Seaport Museum, and Castle Clinton National Monument, which provided ferry connections to the Statue of Liberty and Ellis Island Immigration Museum, made this area a major tourist destination. A greater mix of uses was present in the northern portion of the subarea, including several residential buildings and institutional uses. The largest residential use in the area was Southbridge Towers, located on the superblock bounded by Gold, Fulton, and Water Streets, and the Brooklyn Bridge. The area surrounding these towers contained small concentrations of residential buildings, most with ground-floor commercial uses. Major institutional uses included Pace University and NYU Downtown Hospital, located just south of the Brooklyn Bridge.

The South Street Seaport was a dominant use along the East River waterfront, attracting large numbers of visitors to shop, restaurants, boat rides, and boardwalk entertainment. At the southern tip of Manhattan, the Whitehall Ferry Terminal provided access to the Staten Island Ferry. Adjacent to it and encompassing 23 acres along the waterfront was Battery Park. The park contained expansive lawns and landscaping, a waterfront promenade, playgrounds, several monuments and memorials, and cultural programs.

The eastern edge of the study area included Franklin D. Roosevelt Drive (FDR Drive) and Water Street, two roadways that carried heavy volumes of local and through traffic. Streets were crowded during the workday with large numbers of office workers, as well as tourists and a growing number of residents. The area was substantially less active during evening hours and on weekends.

PUBLIC POLICY

Since office vacancy rates began to increase in Lower Manhattan in the early part of the 1990s, public policy has been used to influence land use and has begun to bring about the transformation of the Financial District into a more diverse, 24-hour community. Policy initiatives were developed beginning in 1995 to offer economic and financial incentives intended to increase office occupancy as well as promote reinvestment and adaptive reuse of the more obsolete buildings in Lower Manhattan. The policies were designed to lower the area's commercial vacancy rates, convert targeted commercial office buildings into residential space, help build a 24-hour, mixed-use neighborhood, invest in and upgrade Class B office space, and attract new retailers to the area.

Many of the public policies in effect today to support Lower Manhattan as a vibrant, attractive residential community as well as a center of business and tourism were in place prior to September 11, 2001. The only policy in effect prior to September 11, 2001, that is not in effect today is the Washington Street Urban Renewal Area (WSURA). Each of these policies is described below. Those policies specifically created in response to the terrorist attacks are discussed in the following section (see "Changes in the Affected Environment Since September 11, 2001—Public Policy").

Zoning

While zoning regulations do not apply to a large portion of the Project Site itself, they are applicable to the land use study area generally. Therefore, a brief discussion of zoning is included to further establish the context of the Preferred Alternative.

The Project Site is located in an area zoned C6-4 and C5-3 and falls within the boundary of the Special Lower Manhattan District (see Figure 4-2 and Table 4-1). The surrounding area located in Liberty Park Plaza is zoned C5-5, a high-density restricted central commercial district intended for retail and large offices, as well as high-density residential and community facilities. The open plaza was constructed as part of the development of 1 Liberty Plaza, a large office building to the immediate north. The surrounding area located at the WFC is zoned under the Special BPC District, described below.

The entire approximately 16-acre WTC site is owned by PANYNJ. The 1962 legislation authorizing the development of the WTC provides that so long as the WTC is owned by PANYNJ, no agency, commission, or municipality shall have jurisdiction over the WTC. The New York City Zoning Resolution, Building Code, and Fire Code do not therefore apply to the WTC site, including the Project Site. However, it is PANYNJ policy to voluntarily conform to the maximum extent practicable to local building and fire codes. This policy is evidenced by the various Memoranda of Understanding (MOUs) that PANYNJ has entered into with the City's Department of Buildings and Fire Department. These MOUs establish the policy of PANYNJ to ensure that its facilities meet code requirements to the maximum extent practicable and, where appropriate, exceed them.

Table 4-2 summarizes the existing zoning districts located throughout the larger study area. The North of WTC Site, Broadway Corridor, and Greenwich South Corridor subareas are largely zoned for medium- and high-density commercial office development. The Project Site is surrounded by General Central Commercial (C6) districts to the north and south, as well as Restricted Central Commercial (C5) districts to the north and east. The C6 districts are zoned for a wide range of retail, office, amusement, service, custom manufacturing, and related uses normally found in the central business district. These districts typically contain corporate headquarters, large hotels, entertainment facilities, and some residential development, with ground-floor retail uses in some buildings. The C5 districts, found in the Broadway Corridor and portions of the Greenwich South Corridor and North of WTC site subareas, are designed to provide for office buildings and a great variety of retail stores.

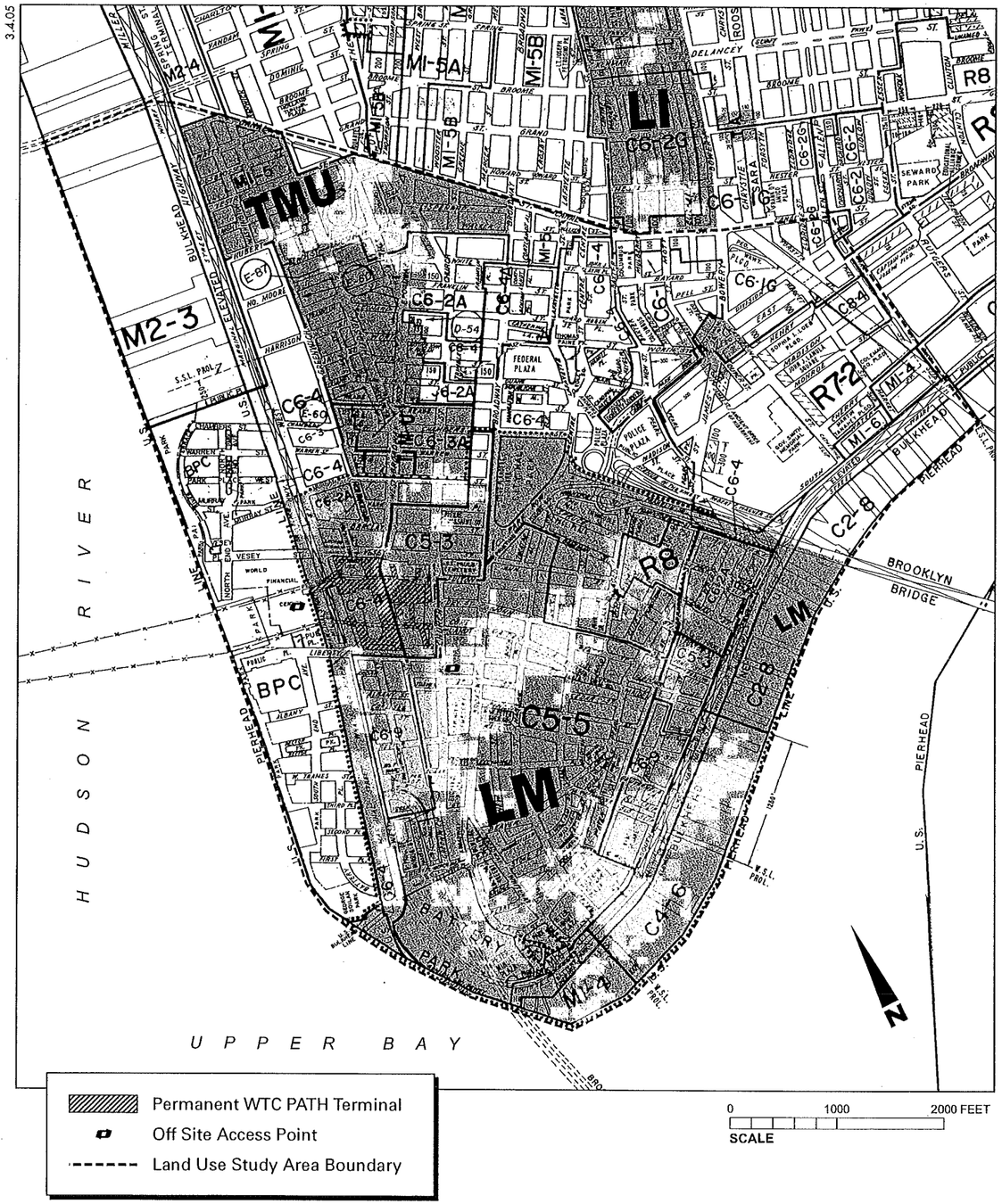
Table 4-1
Study Area Zoning

Zoning District	Permitted Uses/Bulk
Commercial Districts	
C2-8	Low-density neighborhood shopping/services. High-density residential and community facility use.
C4-6	Medium-density general commercial (such as department stores and theaters). High-density residential and community facility.
C5-3, C5-5	High-density restricted central commercial district intended for retail and large offices. High-density residential, community facility.
C6-1, C6-2, C6-3	Medium-density general central commercial outside CBD. Low- to medium-density residential and community facility.
C6-1G	Medium-density general central commercial district. Allow residential conversion of non-residential floor area only by special permit.
C6-2A, C6-3A	Contextual* medium-density general central commercial district outside CBD. Low- to medium-density residential and community facility.
C6-4, C6-9	High-density general central commercial intended for CBD, allowing medium- to high-bulk offices. High-density residential, community facility.
C6-4A	Contextual high-density general central commercial intended for CBD, allowing medium- to high-bulk offices. High-density residential, community facility.
C8-4	General service district intended to provide for necessary service establishments often involving objectionable influences (noise from operations or truck traffic). Incompatible with residential and retail uses.
Residential Districts	
R7-2	Medium-density residential, community facility.
R8	General residence district. High-density residential, community facility.
Manufacturing Districts	
M1-4	Low-density light industrial uses (high performance) and certain community facilities.
M1-5, M1-6	Medium-density light industrial uses (high performance) and certain community facilities (for loft areas).
M2-3	Low-density general industrial uses (medium performance), most commercial uses.
Special Purpose Districts	
LM	Special Lower Manhattan District
TMU	Special Tribeca Mixed-Use District
BPC	Special Battery Park City District
TA	Special Transit Land Use District

Note: * Contextual districts mandate street wall heights, lot coverage and density requirements, which produce lower, bulkier buildings that maintain the scale and street space of the existing neighborhoods.
Source: Zoning Resolution of the City of New York.

Table 4-2
Zoning Districts by Subarea

Subarea	Zoning Districts
WTC Redevelopment Sites (Adjacent Sites only)	C6-9, Special Lower Manhattan District, Special BPC District
North of WTC site	C5-3, C6-2A, C6-3, C6-3A, C6-4, Special Tribeca Mixed-Use District, Special Lower Manhattan District
Broadway Corridor	C5-3, C5-5, Special Lower Manhattan District
Greenwich South Corridor	C5-5, C6-9, Special Lower Manhattan District
Battery Park City	Special BPC District
Tribeca	C6-2A, C6-3A, C6-4, C6-4A, M1-5, M1-6, M2-3, Special Tribeca Mixed-Use District
Chinatown below Canal Street	C2-8, C6-1, C6-1G, C6-4, C6-4A, C8-4, R7-2, M1-4, M1-5, M1-6, Special Transit Land Use District
Civic Center	C6-1, C6-4
Brooklyn Bridge to Battery Park	C2-8, C4-6, C5-3, C5-5, C6-9, R8, M1-4, Special Lower Manhattan District



PERMANENT WTC PATH TERMINAL
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Figure 4-2
Zoning Map

Tribeca is primarily zoned with medium-density commercial districts (C6), with manufacturing districts (M1 and M2) mapped in the north and west sections of the subarea near Canal Street and along the Hudson River waterfront. The Chinatown below Canal Street subarea contains commercial (C6 and C8), manufacturing (M1), and residential (R7) zoning districts. The C6-4 zoning district encompasses nearly the entire Civic Center subarea allowing for medium- to high-bulk office buildings. The Brooklyn Bridge to Battery Park subarea is primarily zoned with medium- and high-density commercial districts (C5 and C6), with low- to medium-density districts (C2-8 and C4-6) mapped along the East River waterfront. In addition, the R8 residential district is mapped specifically for the Southbridge Towers residential development just south of the Brooklyn Bridge. With the exception of the manufacturing districts along the waterfront, zoning districts throughout the study area permit residential uses.

In addition to the underlying zoning, three special districts cover portions of the study area: the Special Lower Manhattan District, the Special BPC District, and the Special Tribeca Mixed-Use District.

Special Lower Manhattan (LM) District. The Project Site and a large portion of the surrounding study area lie within the Special LM District. Established in 1998, it covers the country's third-largest central business district including all of Lower Manhattan generally south of Murray Street and the Brooklyn Bridge. It was created to simplify and consolidate the overlapping complex regulations previously governing Lower Manhattan, to allow the area to grow while reinforcing its historic character and built fabric, and to facilitate the change to a mixed-use community. The zoning change relaxed strict use controls that had inhibited the retail, entertainment, and service establishments generally needed to support a 24-hour community. New height and setback controls also allow considerable design flexibility and, at the same time, are intended to encourage new development that would be consistent with the historic character of Lower Manhattan.

Special Battery Park City District. That portion of the Project Site located at the WFC and BPC as a whole are governed by the Special BPC District. The Special BPC District was established by the city and the BPCA in 1973 to guide development in accordance with the BPC Master Plan. Elements of the Master Plan include a central office complex flanked by residential neighborhoods to the north and south, and a continuous, publicly accessible esplanade along the Hudson River waterfront. The district contains special design controls with respect to floor area ratio (FAR), required building walls, and permissible building height.

Zoning text modifications for the special district occurred in 1981, 1987, and 2001. The BPC District is divided into three subdivisions: Zone A, Zone B, and Zone C. Zone A provides for residential development with ancillary retail and service uses and hotels. Zone B, which encompasses the WFC and the New York Mercantile Exchange Building, provides for commercial and mixed-use development with ancillary retail and service uses. Zone C provides for commercial and mixed-use development, parking, and ancillary retail and service uses.

Special Tribeca Mixed-Use (TMU) District. The Special TMU District covers the area from Greenwich Street to the west of West Broadway and from north of Harrison Street to Murray Street, and includes portions of the Tribeca and North of WTC site subareas. It is intended to retain stable industries within the Tribeca neighborhood that provide jobs and adequate wages and to encourage stability and growth by permitting controlled residential uses and light manufacturing to coexist. In addition, the district aims to facilitate the change to a mixed-use community and permit the area to grow while protecting its historic character.

World Trade Center Act of 1962

In 1962, the States of New York and New Jersey enacted legislation which authorized PANYNJ to undertake a port development project consisting of 1) the WTC, 2) the Hudson Tubes, and 3) certain extensions of the Hudson Tubes. PANYNJ was authorized to cooperate with other government agencies in the rehabilitation and redevelopment of the WTC and Hudson Tubes for the purpose of renewal and improvement of these areas as part of the port development project. The legislation provided for PANYNJ to acquire, rehabilitate, and operate the rail transit property associated with the Hudson Tubes either directly or through a wholly owned subsidiary corporation. Accordingly, PANYNJ established the Port Authority Trans-Hudson (PATH) Corporation, which acquired, by condemnation, the railroad and equipment owned by the H&M Railroad Company, including the Hudson Terminal Building in Lower Manhattan.

Lower Manhattan Economic Revitalization Plan

The Lower Manhattan Economic Revitalization Plan was the center of public policy initiatives that generated new economic activity in Lower Manhattan. This plan was enacted into law in 1995 and has been extended until June 30, 2007. The plan includes benefits for both commercial tenants and residential conversions, as well as other cost-savings programs. Commercial tenant benefits include a five-year real estate tax abatement and a commercial rent tax special reduction. Both programs are applicable for pre-1975 commercial buildings with leases executed prior to March 31, 2001. The program benefits are required to pass through to commercial tenants. A residential conversion program is also available for a 100 percent exemption of the increased assessed value due to residential conversion for 8 years (9 years for landmarked buildings) and phased in at 20 percent every year for 4 years thereafter, for a total of 12 years. In addition to tax incentive benefits, the plan includes a 12-year energy program consisting of a reduction of electricity costs. The plan attracted traditional Lower Manhattan commercial tenants and multi-media, entertainment, and technology entrepreneurs, creating a new Information Technology District in the area.

The Alliance for Downtown New York

The Alliance for Downtown New York (Downtown Alliance), the city's largest Business Improvement District (BID), was established in 1995. Generally, a BID delivers supplemental services such as sanitation and maintenance, public safety and visitor services, marketing and promotional programs, capital improvements and beautification in a designated area. BIDs are funded by a special assessment paid by property owners within the district. The Downtown Alliance's mission is to transform Downtown into a 24-hour neighborhood and to create a safe, clean, live-work, wired community for the 21st century. The BID covers the area from City Hall to the Battery and from the East River to Route 9A, and includes approximately 100 msf of office space and over 100 city blocks.

Battery Park City Authority

The BPCA is a public benefit corporation created in 1968 by Governor Nelson Rockefeller and the New York State Legislature to develop and operate the 92-acre landfill at the southwestern tip of Manhattan known as BPC. Parcels of land are leased to private developers who build in accordance with BPCA guidelines, as described above (see "Special BPC District").

Hudson River Park Trust

In 1998, the Hudson River Park Act created the Hudson River Park Trust (HRPT) and established the boundaries for the Hudson River Park. HRPT is a public benefit corporation under the jurisdiction of both the City and the State that is responsible for developing and operating the Hudson River Park, which extends from Battery Park to West 59th Street, where it connects with Riverside Park. The 5-mile, 550-acre park, much of which is in construction, will be built in six segments. When complete, Hudson River Park will consist of 13 park piers, a continuous waterfront esplanade, active and passive recreation space, boating, and three commercial development nodes.

The portion of the park opposite the Project Site and as far north as Chambers Street is Segment 2. Segment 3, located in the Tribeca subarea, runs from Chambers Street to north of Canal Street and includes Piers 25, 26, 32, and 34.

Local Waterfront Revitalization Program

The Project Site is located within the boundaries of the coastal zone. Pursuant to federal legislation, in 1999 and 2002, New York City and State, respectively, adopted policies aimed at protecting resources in the coastal zone. New York City's Waterfront Revitalization Program (WRP) contains 10 major policies, each with several objectives focused on improving public access to the waterfront; reducing damage from flooding and other water-related disasters; protecting water quality, sensitive habitats, such as wetlands, and the aquatic ecosystem; reusing abandoned waterfront structures; and promoting development with appropriate land uses. The principles of the WRP formed the basis for a NYCDCP study and the resulting adoption of new waterfront zoning. For City actions, the New York City Planning Commission (CPC) certifies whether a proposed action is in compliance with the City's WRP. The New York State Department of State (NYSDOS) or the applicable state agency has this responsibility on the state level. Chapter 14, "Coastal Zone Management," provides a detailed analysis of the compatibility of the Preferred Alternative with the 10 WRP policies.

421-g Program

The 421-g program provides a real estate tax exemption and abatement incentive for developers to convert commercial buildings, generally south of Murray and Frankfort Streets, into residential dwellings. Up to 25 percent of the converted building may contain commercial, community facility or accessory use space, with the tax exemption reduced proportionally if the total nonresidential space exceeds 12 percent of the aggregate floor area. The program generally provides for a 14-year exemption from the increase in real estate taxes resulting from the work and abatement of substantially all existing real estate taxes on the site. Since 1998, more than 50 buildings in the study area have been converted from office to residential use under the 421-g program.

Washington Street Urban Renewal Area

The city established WSURA in 1961; it expired on January 25, 2002. The WSURA Plan's stated objective was to promote diversified and economically sound development in the area from Barclay to Hubert Streets, between Greenwich Street and Route 9A. Originally, the plan called for development of commercial, light manufacturing, or warehouse uses, but after being amended nine times, the plan called for community space and residential or office development. Today, Sites 5B and 5C between Chambers, Greenwich, and Murray Streets and Route 9A are the only two WSURA sites that remain undeveloped.

CHANGES IN THE AFFECTED ENVIRONMENT SINCE SEPTEMBER 11, 2001

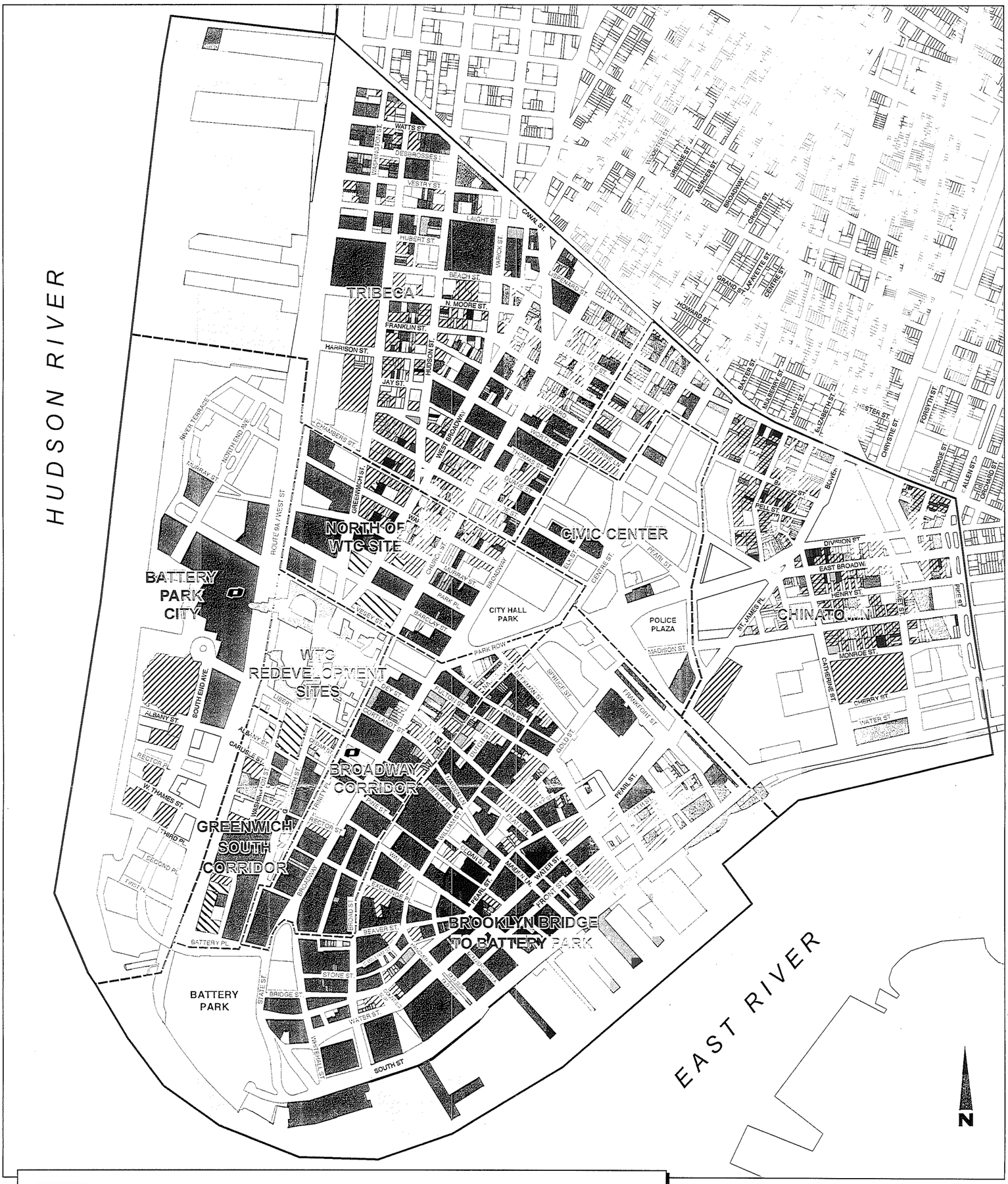
This section provides a detailed description of those land uses and public policies in the land use study area which have changed since September 11, 2001. These differences are largely concentrated on the Project Site, the WTC site, and the subareas immediately surrounding these sites. The land uses and public policies which characterize the Project Site and surrounding study area today form the basis for future land use projections and public policy as well as the basis for the impact analysis which follows. This section highlights those land uses which have changed as a direct result of the terrorist attacks along with any other changes which have occurred, including new construction, conversions, and vacancies, and the effect of such changes on neighborhood character and public policy. Figure 4-3 shows a land use map for the study area as it exists today.

LAND USE AND NEIGHBORHOOD CHARACTER

Loss of the WTC complex left Lower Manhattan without PATH train service to New Jersey due to the destruction of the WTC PATH Terminal and reduced the amount of commercial office space by approximately 13.3 msf, including over 10 msf on the WTC site itself. A substantial number of residents and businesses were displaced by the attacks, and the events resulted in the loss or relocation of hundreds of corporations, small businesses, and retail and office establishments. Except for the Project Site, the WTC Redevelopment Sites, and the immediately surrounding blocks, land use and neighborhood character remain much the same today as they were prior to September 11, 2001. Those buildings which were destroyed or severely damaged as a result of the attacks of September 11, 2001, and its aftermath are listed in Table 4-3. Figure 4-4 shows those parcels with changes to land use since September 11, 2001.

Table 4-3
Affected Buildings

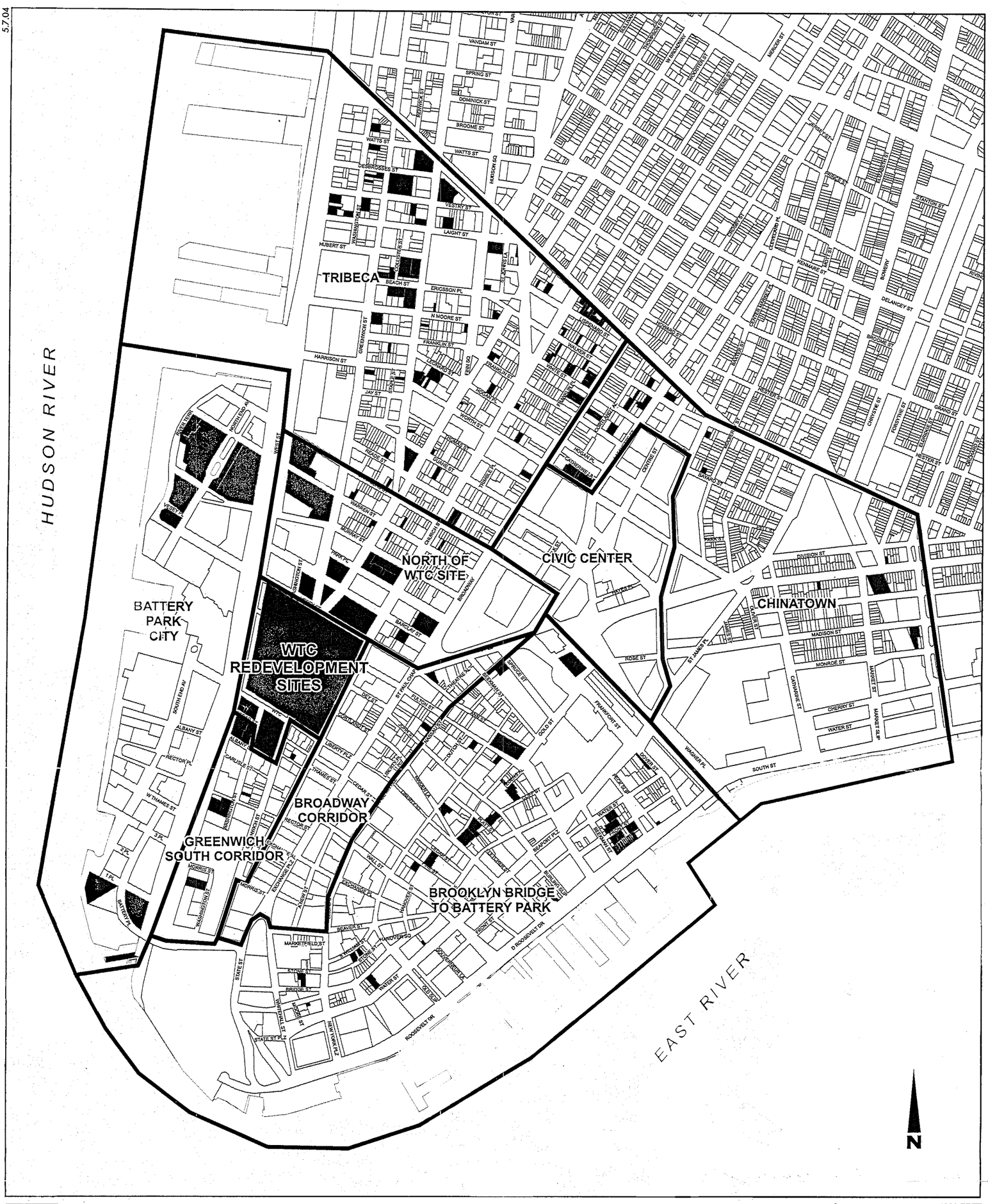
Building/Address	Pre-September 11 Use	Current Status
WTC PATH Terminal	Transportation	Destroyed
1-6 WTC	Office-Retail-Hotel	Destroyed
WFC 1-3	Office-Retail	Repaired and Reopened
WFC Winter Garden	Public Atrium	Rebuilt and reopened
Barclay-Vesey Building (140 West Street)	Utilities-Office	Partially reopened; undergoing renovations
7 WTC	Office	Destroyed; new building under construction
Federal Office Building/U.S. Post Office (90 Church Street)	Office-Institutional	Closed for renovations
Fiterman Hall (30 West Broadway)	Educational	Closed; planned for demolition and rebuilding
Millennium Hotel	Hotel	Renovated and reopened
Century 21	Retail	Renovated and reopened
1 Liberty Plaza/Brooks Brothers	Office-Retail	Renovated and reopened
106 Liberty Street	Restaurant	Renovated and reopened
110 Liberty Street	Residential	Renovated and reoccupied
114 Liberty Street	Residential	Vacant; undergoing renovation
125 Cedar Street	Residential	Renovated and reoccupied
FDNY Liberty Street Firehouse	Institutional	Rebuilt and opened
130 Liberty Street	Office	Vacant; planned for demolition
St. Nicholas Greek Orthodox Church	Institutional	Destroyed
130 Cedar Street	Office	Vacant
90 West Street	Office	Vacant; planned for conversion to residential use



0 1000 FEET
SCALE

- Permanent WTC PATH Terminal
- Off Site Access Point
- Land Use Study Area Boundary
- Land Use Sub-Area Boundary
- Residential
- Residential (with Ground-Floor Retail)
- Residential/Office
- Residential/Hotel/Cultural
- Commercial
- Office
- Hotel
- Entertainment
- Institutional
- Industrial, Utilities, Transportation, Public Parking
- Open Space
- Vacant Parcels
- Vacant Building
- Under Construction

Figure 4-3
Existing Land Use (January 2004)



Study Areas

Affected Parcels

Coastal

0 1000 FEET

SCALE

Figure 4-4

Parcels with Changes in Land Use Since September 11, 2001

In addition to the buildings damaged or destroyed as a result of the terrorist attacks, notable changes to land use in the study area since September 11, 2001 include:

- Construction of temporary WTC PATH station.
- Reconstruction of IRT No. 1/9 subway lines through the WTC site.
- Residential conversions continued throughout the study area, concentrated in the North of WTC Site, Tribeca, and Brooklyn Bridge to Battery Park subareas.
- New residential construction in the Battery Park City North neighborhood and the Brooklyn Bridge to Battery Park subarea. Construction has begun on several additional buildings.
- Completion of several cultural institutions in Battery Park City (Skyscraper Museum, Jewish Museum Expansion, and Irish Hunger Memorial), and the opening of Millennium High School at 75 Broad Street in the Brooklyn Bridge to Battery Park subarea.

Project Site

The attacks of September 11, 2001 destroyed the WTC PATH Terminal along with the Twin Towers and the rest of the WTC complex. Today, the temporary WTC PATH station, which opened in November 2003, occupies a large portion of the Project Site. The station entry plaza and canopy occupy the west side of Church Street at Fulton Street on the eastern portion of the Project Site. The rebuilt IRT No. 1/9 subway lines also cross through the eastern portion of the site. The temporary WTC PATH station's mezzanine level, station platforms, and rail tracks are located on the western portion of the site. The rest of the Project Site remains vacant or under construction, and is not accessible to the public.

Liberty Park Plaza is generally open to the public for passive recreational use after being closed for many months after September 11, 2001. The plaza is now the site of the Greenmarket that used to operate across Church Street at the WTC. The Winter Garden at the WFC was reconstructed after suffering severe damage on September 11, 2001.

Study Area

WTC Redevelopment Sites. Each of the Twin Towers was struck on September 11, 2001, by a terrorist hijacked airline jet. Within hours, the Twin Towers collapsed onto the WTC and surrounding areas, causing massive death and devastation. Today, the WTC site is vacant except for the temporary WTC PATH station, the IRT No. 1/9 subway lines crossing the site, and ongoing construction activity. Except for the temporary WTC PATH station and a newly constructed sidewalk/viewing area on the west side of Church Street at the edge of the WTC site, the site is fenced off and not accessible to the public.

The north façade of the office tower at 130 Liberty Street was severely damaged in the attacks of September 11, 2001, and its two-level plaza was completely destroyed. The building stands shrouded in protective black netting and is slated for demolition. To its west, the St. Nicholas Greek Orthodox Church was destroyed and the block on which it stood remains vacant and part of the staging area for ongoing construction activities at the WTC site.

North of WTC Site. Directly across Vesey Street from the WTC site, office buildings were damaged or destroyed on September 11, 2001. In the center, 7 WTC is being rebuilt on the block bounded by Vesey, Barclay, and Washington Streets and West Broadway. It will replace the two Consolidated Edison Company of New York, Inc. (Con Edison) electrical substations and most of the Class A office space that formerly occupied the site. The new building is being

constructed on the west end of its former footprint to preserve the Greenwich Street corridor for pedestrians and possibly vehicles.

West of the 7 WTC site, the Verizon Building's south side was damaged by the collapse of WTC Tower 1 and its east side was damaged by the subsequent collapse of 7 WTC. Portions of the Verizon Building were recently reopened as the building continues to undergo extensive repairs. To the east, although there is little or no visible damage to the exterior of the massive Federal Office Building/U.S. Post Office, it is undergoing extensive interior cleaning and reconstruction. Vesey Street remains closed between Route 9A and Church Street. A narrow pedestrian walkway runs adjacent to the Federal Office Building/U.S. Post Office (90 Church Street); west of Washington Street the walkway is actually in the bed of Vesey Street. BMCC's Fiterman Hall also sustained extensive damage due to the collapse of 7 WTC and remains closed. These blocks are less populated and therefore noticeably quieter than before September 11, 2001.

The rest of the subarea has seen a number of changes in land use. The Woolworth Building on Broadway between Barclay Street and Park Place is being converted in phases to a mixed-use building to house the New York University (NYU) School of Continuing and Professional Studies (which recently occupied several of the lower floors) and luxury condominiums. Sites 5B and 5C are now used for public and private parking uses and planned for mixed-use residential developments in the future. The area has also seen several residential conversions, the largest of which is 50 Murray Street.

Broadway Corridor. Land use and neighborhood character in the Broadway Corridor are substantially the same today as they were prior to September 11, 2001. The wrought iron fence surrounding St. Paul's grounds has been the location of many informal memorials. The buildings on Church Street immediately east of the WTC site that suffered damage on September 11, 2001, have since reopened with the same uses after undergoing repairs and renovations. Without the WTC buildings across Church Street, these large buildings are now more visible from the north, west, and south.

Although not as busy as before September 11, 2001, the area attracts large numbers of workers and visitors throughout the day and evening traveling to and from work, shopping, or viewing the WTC Site across the street. Traffic along Broadway and Church Street is lighter. More blocks are closed to traffic in the vicinity of the New York Stock Exchange, hindering traffic flow along the east-west streets. While the area is quieter, it is not so different as to indicate any substantial change in neighborhood character.

Greenwich South Corridor. A number of buildings in the Greenwich South Corridor were severely damaged or destroyed as a result of the terrorist attacks. All but one (114 Liberty Street) of the buildings along Liberty Street have been cleaned, renovated, and reoccupied. The reopening of the redesigned FDNY firehouse and the active ground floor businesses along Liberty Street facing the WTC site have brought back activity and with it some sense of normalcy to these blocks which remained inactive for many months, and in some cases years, after September 11, 2001. Immediately south of the WTC site, Liberty Street remains closed to vehicular traffic. Part of Liberty Street is closed off for WTC site reconstruction and part of it is open for pedestrian circulation and access to the Liberty Street bridge across Route 9A to BPC. 90 West Street, planned for residential conversion, is also vacant.

The former office building at 90 Washington Street was converted to residential use, having been partially financed through the Liberty Bond program (see "Changes in the Affected

Environment Since September 11, 2001—Public Policy"). The Downtown Athletic Club has closed since September 11, 2001, and the building remains vacant.

Except for the buildings identified above, land use in the remainder of the Greenwich South Corridor has generally been the same since September 11, 2001. This subarea remains less active than the other subareas surrounding the Project Site, with increased retail and building vacancies and some interior streets closed to traffic.

Battery Park City. The Winter Garden was severely damaged in the aftermath of September 11, 2001, and has since been rebuilt and opened to the public, along with the rest of the shops and offices at the WFC. In the northern part of BPC, the residential buildings at 20 and 22 River Terrace have since opened, and two more residential buildings are under construction nearby. Teardrop Park, a new open space adjacent to 22 River Terrace, is also currently under construction.

The portion of the Route 9A roadway adjacent to the WTC site suffered extensive damage on September 11, 2001, its aftermath, and during the recovery period. Today, a six-lane temporary roadway runs between Liberty and Vesey Streets. One permanent pedestrian bridge across Route 9A at Liberty Street, damaged on September 11, 2001, and two temporary pedestrian bridges at Rector and Vesey Streets help connect BPC to the rest of Lower Manhattan.

The overall neighborhood character remains the same in BPC, with a slightly more active North neighborhood due to the addition of several hundred dwelling units. The buildings of the WFC are more visible from the east but feel more isolated from the Lower Manhattan business core, having been designed to harmonize with the size and design of the Twin Towers. In addition, the ballfields along Route 9A between Warren and Murray Streets were opened for use in the summer of 2003. Teardrop Park between River Terrace and North End Avenue is under construction and expected to be complete in 2004. Across the street from the recently expanded Jewish Museum, the Skyscraper Museum recently opened its doors at the base of the Ritz-Carlton building.

Tribeca. The major change in Tribeca is the continued increase in residential conversions which have appeared throughout the subarea, particularly along Broadway, Hudson Street, and in the northwest corner of the subarea.

Chinatown below Canal Street. Other than a few residential conversions in the western portion of the study area, there is little new development in Chinatown. An increased number of commercial vacancies and dilapidated buildings can be found throughout the subarea with a decrease in street activity since September 11, 2001.

Civic Center. No changes to land use or neighborhood character have occurred in the Civic Center subarea since September 11, 2001.

Brooklyn Bridge to Battery Park. A number of residential conversions and new construction are occurring throughout the subarea. Construction of two new residential buildings is near completion at 2 Gold Street and 10 Liberty Street, both of which are funded in part through the New York Liberty Bond Program (see "Changed to the Affected Environment Since September 11, 2001—Public Policy" below).

At the southern tip of Manhattan, the Whitehall Ferry Terminal is currently undergoing renovations. The Fritz Koenig *Sphere*, a sculpture that originally stood in Tobin Plaza on the WTC site and was damaged on September 11, 2001, stands in Battery Park as an interim memorial.

PUBLIC POLICY

Since September 11, 2001, a number of public policy initiatives have been implemented to assist in the recovery efforts and continued revitalization of Lower Manhattan. These are in addition to policies that continue to be in effect since before the terrorist attacks (see "Pre-September 11, 2001 Baseline Conditions—Public Policy"). The major policies and plans addressing the Project Site and surrounding study area are discussed below.

Lower Manhattan Development Corporation

LMDC was created in November 2001 as a subsidiary of the Empire State Development Corporation (ESDC) to help plan and coordinate the rebuilding and revitalization of Lower Manhattan south of Houston Street so that it will re-emerge as a stronger and more vibrant community. LMDC is charged with assisting New York City to recover from the terrorist attacks on the Twin Towers. Through consultation with its many advisory councils representing a cross-section of affected communities and direct communication with government officials, elected representatives, community organizations, affected individuals, and members of the public, LMDC has gathered information on issues critical to the city's recovery, including transportation and infrastructure, residential and commuter concerns, economic development, education, and tourism and the arts. LMDC has also sponsored several initiatives and studies relating to short-term and long-term solutions to the challenges facing Lower Manhattan neighborhoods in the wake of September 11, 2001. Among these efforts are open space and streetscape improvements and studies of affordable housing, Chinatown traffic and transportation, the Fulton Street corridor, and Greenwich Street south of the WTC site. LMDC receives federal funding through two Community Development Block Grants totaling $2.783 billion from the U.S. Department of Housing and Urban Development (HUD).

New York City's Vision for a 21st Century Lower Manhattan

On December 12, 2002, Mayor Michael Bloomberg released a *Vision for a 21st Century Lower Manhattan* (New York City's *Vision*) with the stated purpose to connect Lower Manhattan to the world around it, build new neighborhoods, and create public places that make Lower Manhattan one of the most appealing places in the world. It was released in conjunction with LMDC's announcement of seven design proposals for the Project Site. The plan describes various recommendations to help revitalize and improve Lower Manhattan as a global center of business by creating new regional transportation links. To attract new investment in the neighborhoods south and east of the Project Site, the city calls for the creation of Fulton Market Square and Greenwich Square. Other goals include improvements to streetscapes, the expansion and creation of public plazas and parks, and the continued revitalization of the waterfront. The *Vision* aims to spark private market reactions from these public investments to increase the number of businesses and residents in Lower Manhattan.

New York Liberty Bond Program

As part of the efforts toward rebuilding and revitalizing New York City in the wake of September 11, 2001, the New York Liberty Bond Program was introduced as a cooperative program between New York Liberty Development Corporation, New York City Industrial Development Agency, New York State Housing Finance Agency, and New York City Housing Development Corporation. These agencies offer tax-exempt financing for the construction and renovation of commercial and residential properties that lie primarily within the Liberty Zone, which is the area of Manhattan south of Canal Street, East Broadway, and Grand Street. The

goal of the program is to create a seven-day-a-week, 24-hour mixed-use, diversified community in Lower Manhattan by repairing and replacing damaged and destroyed commercial space; creating additional multifamily residential and neighborhood retail development; providing modern office space for displaced and decentralized businesses; attracting new residents and employers to New York City; and encouraging environmentally responsible design and construction.

Federal Policies

In recognition of the disastrous impact of the terrorist attacks, President George W. Bush declared Lower Manhattan a national disaster area and $21 billion in aid was approved by the United States Congress for the repair, restoration, and recovery efforts. These funds were allocated to the Federal Emergency Management Agency (FEMA), the Federal Transit Administration (FTA), and HUD for specific objectives and grants to be separately administered by each of the agencies and local project sponsors under Defense Appropriations Act of 2002 (Public Law 107-117), and Supplemental Appropriations Act of 2002 for Further Recovery From and Response to Terrorist Attacks on the United States (Public Law 107-206). The U.S. Small Business Administration (SBA) offered low-interest loans to eligible individuals to repair or replace damaged property and personal belongings not covered by insurance. In addition to emergency response efforts, FEMA's Disaster Housing Program also made funds and services available to individuals whose homes were uninhabitable and also provided cash grants to those who did not qualify for the SBA loans.

D. PROBABLE IMPACTS OF THE PROJECT ALTERNATIVES

CONSTRUCTION PERIOD (2006)

FUTURE COMMON TO ALL ALTERNATIVES

Land Use and Neighborhood Character

A number of major projects will be completed during the construction period resulting in increased land use densities throughout the study area. Overall, an additional 1.7 msf of new office space, 1.8 msf of restored office space, 53,000 square feet of additional commercial space, over 700,000 square feet of institutional space, and over 5,400 new residential units are expected for completion by 2006. The major projects are discussed briefly below. A complete list of projects expected to be complete by 2006 in the study area can be found in Appendix A, Table A-1.

While these developments may result in some changes to the character of the area in the immediate vicinity of the development sites, most of the neighborhoods throughout the study area are expected to retain their most prominent characteristics, and overall neighborhood character will be minimally affected. Lower Manhattan will continue to possess a diversity of uses including commercial office, retail, residential, government, cultural, educational, and open space. Residential use will increase as a result of new construction and conversions throughout the study area. Most of the buildings damaged on September 11, 2001 will be repaired and restored to their former use, increasing activity on now underutilized blocks. All new projects are being developed within the boundaries of existing blocks and would not result in the removal of any architecturally distinguished buildings located throughout the study area.

Although additional employees are expected in the area by 2006, the worker population will be substantially less than pre-September 11 densities while the WTC Redevelopment Sites remain largely vacant. Any increase in worker and residential populations is not likely to result in

changes to the character of the neighborhoods beyond the area immediately surrounding the specific developments.

WTC Redevelopment Sites. In 2006, major construction will be in progress at the WTC site on the Memorial, related cultural uses, the retail bases of the four planned office towers, and below-grade concourse levels for retail use and pedestrian connections. The two blocks south of Liberty Street, planned for office and open space uses, will be vacant and possibly used as construction staging areas. The construction of a new St. Nicholas Church is planned and may be underway in 2006.

North of WTC Site. The Verizon Building and the Federal Office Building/U.S. Post Office directly north of the WTC site on Vesey Street will be restored, repaired, renovated, and reopened with the same land uses as existed prior to September 11, 2001. Between these buildings, the new 1.6 msf 7 WTC office tower (and two Con Edison substations) will be completed and occupied. In addition, several residential and mixed-use developments are expected to be built. The largest of these will be on the former WSURA Site 5C at the corner of Chambers Street and Route 9A. NYU's School of Continuing Education and Professional Studies will have expanded its presence at the Woolworth Building (233 Broadway), and 150 new residential units will occupy the upper floors of this landmark building.

Broadway Corridor. No development projects have been identified for completion by 2006 in the Broadway Corridor.

Greenwich South Corridor. Restoration and conversion of 90 West Street will have provided over 400 residences with street-level retail space and accessory parking.

Battery Park City. Most of the vacant parcels remaining in BPC are expected to be complete by 2006. Four primarily residential buildings will have produced almost 1,500 new dwelling units. Some of these buildings will include street-level retail or institutional space to be used by the BPC Parks Conservancy. The planned development at BPC Site 16/17, the large parcel bounded by Murray Street, North End Avenue, Vesey Place, and River Terrace, will contain over 500 housing units, a New York Public Library branch, not-for-profit space, a café, and new public open space. Redevelopment of Pier A between BPC and Battery Park for retail and tourism uses is also expected to be complete before 2006. Lastly, Route 9A south of West Thames Street will have a new esplanade and open space.

Tribeca. Consistent with existing trends, small- to medium-sized buildings throughout Tribeca are expected to continue to be converted from office or industrial to residential use and new residential buildings will be constructed by 2006. These buildings would each contain between 4 and 120 units of various sizes. An expansion is also planned for the New York Law School on Church Street between Leonard and Worth Streets.

Chinatown below Canal Street. No planned or proposed land use development projects in the Chinatown below Canal Street subarea that will be completed by 2006 have been identified.

Civic Center. No development projects have been identified for completion by 2006 in the Civic Center subarea.

Brooklyn Bridge to Battery Park. A number of developments are planned for the Brooklyn Bridge to Battery Park subarea. Several sites will be developed with mixed-use residential buildings, which will include a combination of residential and institutional, office, retail, and/or parking uses. These include the NYU Downtown Hospital parking lot on Gold and Beckman Streets, 15 William Street, also a parking lot, and 2 Gold Street. In total, over 2,700 residential

units will be added to the Brooklyn Bridge to Battery Park subarea by 2009. Millennium High School will have expanded to its full capacity at 75 Broad Street. The reconstructed Whitehall Ferry Terminal will be opened at the southern tip of Manhattan.

Public Policy

The implementation of the projects described above by the 2006 construction year would be consistent with public policies for the area. The city and state policies that support the recovery and growth of Lower Manhattan as both a thriving central business district and an evolving 24-hour community are expected to continue. An increase in residential development through conversions and new construction would be consistent with existing trends for the area. Overall, infrastructure improvements and developments providing new and expanded uses would represent a demonstration of city, state, and federal policy, along with private investment, to rebuild Lower Manhattan.

NO ACTION ALTERNATIVE

In 2006 under the No Action Alternative, the temporary WTC PATH station would continue to operate as it does today with a single entry/exit at Fulton and Church Streets and no change in land use would occur. The temporary WTC PATH station would continue to provide a direct transportation connection between Lower Manhattan and New Jersey and accommodate expected commercial and residential growth throughout the study area (see Chapter 5, "Socioeconomic Conditions"). Construction activity associated with the WTC Memorial and Redevelopment Plan will continue on the remainder of the Project Site independent of this alternative. Land use at the Project Site, including the WFC and Liberty Park Plaza surrounding areas, would not change and no changes to neighborhood character would result.

PREFERRED ALTERNATIVE

Land Use and Neighborhood Character

In 2006, portions of the Preferred Alternative would be operational, with phased completion of other station components expected between 2007 and 2009. Construction on the remainder of the Preferred Alternative would be in progress at the Project Site in conjunction with ongoing construction at the WTC site. No changes in land use would occur. Much of the temporary WTC PATH station would continue to operate as it does today in conjunction with the completed portions of the permanent facility. Throughout the construction period, pedestrian access may be hindered due to sporadic closing, rerouting or narrowing of sidewalks used to access the sole entrance/exit of the temporary WTC PATH station at Fulton and Church Streets. While these construction activities may inconvenience pedestrians, these disruptions would be temporary and no long-term effects to land use or neighborhood character would result.

The construction of the proposed project would have temporary impacts on neighborhood character in the immediate vicinity of the project site. Temporary road closures, trucking activities, noise, and changes in air quality associated with construction activities may temporarily affect the quality of life for employees, residents, and visitors in the vicinity of the Project Site resulting in an adverse impact on neighborhood character in the immediate area. However, such activities are necessary to ensure the long-term vitality of Lower Manhattan and thus are likely to lead to a long-term positive benefit on the community and overall character of the area.

Public Policy

Construction of the Preferred Alternative would be consistent with the goals of PANYNJ, LMDC, and the city's *Vision* to revitalize Lower Manhattan as a competitive, thriving business district. No adverse impacts to public policy would result from the Preferred Alternative in the construction year.

OPENING YEAR (2009)

FUTURE COMMON TO ALL ALTERNATIVES

Land Use and Neighborhood Character

Project Site/WTC Redevelopment Sites. Development through 2009 would result in enormous changes to land use and neighborhood character at the WTC site, independent of the Preferred Alternative. The WTC site will change from a largely vacant site in 2006 to a mixed-use development with a Memorial and museum and office, cultural, retail, and open space uses. To the south, Washington Street will be closed, St. Nicholas Greek Orthodox Church will be reconstructed, and an open space will be created between Route 9A and Greenwich Street. These developments will strengthen and be a key element in the revitalization of Lower Manhattan by introducing a range of active and attractive uses (see Appendix A, Table A-2).

First, the initial development will include the Memorial and the related museum (Memorial Center). The extension of two streets, Greenwich and Fulton, through the WTC site, would recreate north-south and east-west linkages for pedestrians and vehicles that have not existed since before the creation of the WTC. The proposed performing arts center, a major new use for Lower Manhattan, will also face onto this intersection in the heart of the WTC site.

Freedom Tower, at the northwest corner of the WTC site, will also be completed by 2009. At a height of 1,776 feet this structure will be the tallest on the island of Manhattan and restore an element of the skyline lost on September 11, 2001. With 2.6 msf of office space, the tower will begin to replace the Class A office space lost on the WTC site. Its restaurants and observation decks will also be replacements for September 11, 2001 losses.

Retail bases of the three other towers on the WTC site will be complete by 2009 and together with the below-grade retail will provide up to 1 msf for stores. Major portions of this retail space will be at grade and open onto and enliven the sidewalks around and inside the WTC site.

A number of new open spaces will be created totaling approximately 5.6 acres. All of the open spaces, including the Memorial, will be at grade and immediately accessible from the sidewalks. Wedge of Light Plaza and PATH Plaza will be part of the east-west circulation system along with Fulton Street. Liberty Park South will stretch from Greenwich Street to Route 9A.

The potential bus garage for tour buses coming to the Memorial will be located below grade on the WTC site or, possibly, south of Liberty Street.

The Memorial and Memorial Center, along with the observation decks of Freedom Tower and its restaurants, will become major tourist attractions and attract visitors from all over the world to Lower Manhattan. The increase in visitors will benefit area businesses, particularly restaurants and shops well beyond the vicinity of the WTC site throughout the entire land use study area (see Chapter 5, "Socioeconomic Conditions"). Together, the diverse components of the WTC Memorial and Redevelopment Plan will contribute to the creation of a more active and attractive

WTC site. The overall character of the area will be improved from an essentially blighted state into a major destination for workers, tourists, and other visitors.

North of WTC Site. In keeping with the trend of increasing residential use in Lower Manhattan, a large residential project is expected to be complete at 270 Greenwich Street, formerly known as WSURA Site 5B, adding approximately 730 new residential units and 240,000 square feet of major retail uses to the area. This will serve to better connect the blocks to the east of Greenwich Street with BPC to the west by replacing a large, empty parcel with active residential and retail uses. BMCC's Fiterman Hall will be demolished and the site redeveloped for its former educational use.

Broadway Corridor. A major transportation project and several residential developments are expected to be complete in the Broadway Corridor by the 2009 opening year. The FTA in cooperation with MTA and NYCT is planning the Fulton Street Transit Center, scheduled for completion in late 2008/early 2009. The project's goal is to improve access to and from Lower Manhattan. It will consist of the construction and operation of a rehabilitated, reconfigured, enhanced multi-level underground transit hub that will incorporate four subway stations serving 12 subway lines. It will provide underground connections to WTC site developments and the Permanent WTC PATH Terminal, if built, at Dey and Church Streets. In addition, several residential conversions will be complete along Maiden Lane, Fulton, and John Streets.

Battery Park City. Another transportation project expected for completion by 2009 is the rehabilitation of Route 9A between Chambers and West Thames Streets. This section of highway, a portion of which is adjacent to the WTC Site, will either be restored at grade or placed in a short bypass beneath a wide median with an adjacent local roadway. Residential development will also continue in the North and South neighborhoods, adding over 850 residential units to BPC. The North neighborhood developments will include a new indoor community recreation center and additional space for the BPC Parks Conservancy. In the South neighborhood, the planned mixed-use development at 1st Place between Route 9A and Battery Place, will be home to the new Women's Museum. In addition, Site 26 will be developed with a 2.3 million-square foot commercial office tower with ground-floor retail and accessory parking uses.

Tribeca. Segment 3 of the Hudson River Park, which runs from Chambers Street to Houston Street north of the study area, will be complete. Currently in design development, this segment will feature two of the park's longest piers—25 and 26 near North Moore Street in Tribeca—and an "eco-pier" at Canal Street. A number of public use facilities, including a river education center, habitat planting area, boathouse, restaurant, park concessions, playgrounds, volleyball, practice field, boat docking, minigolf, skate park, and other passive and active recreation opportunities, will be operating by 2009. Residential conversions are also expected to continue throughout the subarea.

Brooklyn Bridge to Battery Park. The expanded South Ferry Subway Terminal will be opened at the southern tip of Manhattan. The completely redesigned subway station will accommodate the full length of a typical 10-car subway train (rather than the five cars it accommodates in 2004) and provide new connections to the Staten Island Ferry and to the Whitehall Street subway station. Also planned are several large residential developments through both new construction and conversion. Almost 3000 new dwelling units will be added there by 2009.

More generally, an aggressive street reconstruction program is being undertaken in Lower Manhattan both to relocate and strengthen infrastructure lost during the events of September 11, 2001, and to repair streets damaged by recovery vehicles in the months following. By 2007, the

New York City Department of Design and Construction will have reconstructed nearly all of the city's streets south of Canal Street from river to river.

Public Policy

The implementation of the development projects described above by 2009 will be consistent with public policy in the study area. The city and state policies that support the recovery and growth of Lower Manhattan as both a central business district and an evolving 24-hour community are expected to continue. Infrastructure improvements and developments providing new commercial, residential, and open space uses are being planned by the state and city and will represent a demonstration of city, state, and federal policy to rebuild Lower Manhattan. Several of these projects are federally sponsored, including the Fulton Street Transit Center, Route 9A, South Ferry Terminal, WTC Memorial and Redevelopment Plan, and the numerous commercial and residential developments subsidized through the New York Liberty Bond Program. Together, these projects demonstrate ongoing governmental interest in actively promoting infrastructure improvements and new developments throughout Lower Manhattan.

NO ACTION ALTERNATIVE

Land Use and Neighborhood Character

Under the No Action Alternative, the temporary WTC PATH station would continue to operate on the WTC site. As described above, considerable development is expected at the WTC site and in the surrounding neighborhoods, increasing the demand for PATH service and other modes of public transportation. However, without the increased capacity of the Preferred Alternative, transit service in the area may not meet the demand from other planned land use developments throughout Lower Manhattan. Furthermore, the temporary WTC PATH station is not consistent with the current master plan for the WTC site. In the event that it would need to continue operations through the opening year, components of the WTC master plan would need to be revised to accommodate PATH operations.

Although the absence of the Preferred Alternative may not preclude those developments planned throughout the study area, it may affect the desirability and marketability of Lower Manhattan's residential, office, and retail establishments. As described in Chapter 2, "Project Alternatives," as ridership nears the temporary station's design capacity, PANYNJ would need to implement operational adjustments to safely accommodate passengers, such as reduced service and/or restricted access. PATH service is vital to the movement of employees to and from their offices throughout the study area. In addition, businesses located in Jersey City and Newark depend on PATH to deliver workers from New York City and other points east of the Hudson River. More recently, PATH service has become critical to those businesses that have located facilities in both Lower Manhattan and Jersey City to allow for office expansion while maintaining a close connection between company functions on both sides of the Hudson River. Without full reliance on this critical inter-regional connection, the anticipated developments in Lower Manhattan, which would result in an increase in land use and density, may not come to fruition as quickly or intensely as would be expected under the Preferred Alternative.

Overall neighborhood character would not change substantially as a result of the No Action Alternative. Along with PATH commuters traveling to and from the temporary station, the newly opened Fulton Street Transit Center across Church Street from the Project Site and the existing and planned developments at the WTC site and on the blocks surrounding the Project

Site will generate substantial pedestrian and vehicular traffic throughout the area. The area would remain a bustling business district.

Public Policy

The No Action Alternative would not support the existing city, state, and federal policies that promote the recovery and growth of Lower Manhattan as both a central business district and an evolving 24-hour community. Those policies that support the revitalization of the Lower Manhattan central business district will undoubtedly continue well beyond 2009. The lack of the Preferred Alternative, which restores and improves upon the level of PATH train service that existed prior to September 11, 2001, would hinder the achievement of these policies' goals.

For example, as discussed above, LMDC was created to help plan and coordinate the rebuilding and revitalization of Lower Manhattan so that it will re-emerge as a stronger and more vibrant community. A comprehensive local and regional transportation infrastructure system is a vital part of meeting that objective. One of the stated purposes of New York City's *Vision* is to connect Lower Manhattan to the world around it. The policy includes recommendations to create new regional transportation links to help revitalize and improve Lower Manhattan. The continued operation of the temporary PATH station in 2009 may result in reduced service or restricted access, as discussed in Chapter 2, "Project Alternatives," making it difficult to meet the goals of these policies. Therefore, the No Action Alternative would have an adverse effect on public policy.

PREFERRED ALTERNATIVE

The Preferred Alternative would consist of a track and platform level, a mezzanine/fare-zone level, and a street-level terminal building incorporating sub-grade pedestrian connections to adjacent streets, NYCT subways, and on and off-site developments, including the WFC. The PATH tunnels, tracks, platforms, and mezzanine would be located within the WTC "bathtub" as they were prior to September 11, 2001.

The Preferred Alternative would provide added passenger capacity and pedestrian linkages to surrounding buildings and transit services that the temporary WTC PATH station could not accommodate, and would provide better service to its riders. The opening of the proposed Preferred Alternative would be compatible with the office, retail, cultural, and residential land uses in the surrounding area, benefiting area businesses, office workers, tourists, and residents, and improving the overall character of the Project Site and the surrounding blocks. The Preferred Alternative would be consistent with existing public policy aimed at reviving the Lower Manhattan office market to retain and attract both large corporations and small businesses in conjunction with the developments at the WTC site (see Chapter 5, "Socioeconomic Conditions"). These businesses would have access to the New Jersey workforce as they did before September 11, 2001, while businesses across the Hudson River in Jersey City could depend on a quick and direct commute to Lower Manhattan for the long-term. The new facility would also provide regional connections for potential visitors and patrons who wish to visit the Memorial or any of the new cultural uses developed at the WTC site and surrounding area.

The new facility would not conflict with other land uses or public policies in effect for the area, and would be compatible with the overall character of the neighborhood. No change to land use would result from the Preferred Alternative since it would replace the existing temporary WTC PATH station with the same use in a larger configuration. Overall, the Preferred Alternative would support other public policies that previously existed in Lower Manhattan with the

intention of creating a 24-hours-a-day, seven-days-a-week community. As a result, no adverse impacts to land use or public policy would result.

The new Terminal building, along with the surrounding WTC developments, would benefit overall neighborhood character since the Project Site would change from a blighted construction site to an area with built form and visual identity. PANYNJ owns the WTC site; therefore, the majority of the Terminal's components could be constructed without easements. However, PANYNJ would require easements from NYSDOT and Brookfield Properties for the construction of a Route 9A connection and its proposed entrance adjacent to the Winter Garden. PANYNJ has been coordinating with these property owners for their planning of the Route 9A connection, but the formal execution of these easements would likely not occur until final design of the connection is completed. Since the necessary easements would be negotiated directly with the property owners, their execution is not expected to result in adverse impacts to public policy.

DESIGN YEAR (2025)

FUTURE COMMON TO ALL ALTERNATIVES

Land Use and Neighborhood Character

The 2025 land uses described below assume all projects for the 2009 opening year have been completed. Additional developments, potential or proposed, that have no specific build year have been assumed to occur between 2010 and 2025 and are described below (see Appendix A, Table A-3). In addition, several developments have been identified that could potentially be developed in the future but do not have a defined program associated with a definite site at this time. Specifically, New York City's *Vision* may bring changes that are not yet programmed or approved.

Overall, land use in the study area is expected to follow existing trends toward increasing residential, cultural, and other uses while restoring the office space lost at the WTC and maintaining a strong commercial presence. The distribution of uses is expected to remain much the same as it is today, with commercial development clustered at the WTC site, the blocks immediately north of the WTC site, the Broadway Corridor, and the WFC in BPC, and residential development concentrated in the Greenwich South Corridor, BPC, and North of WTC site subareas. Development of soft sites (i.e., sites not built out to the maximum allowable FAR) may lead to a greater intensity of land uses, with higher-density office and residential uses in the future.

These developments will be in keeping with the traditional character of the Project Site and study area as a densely developed urban setting. The area surrounding the Project Site will continue to function as a bustling business district. In addition, it will contain a greater mix of uses with better transportation connections that will help to create a livelier environment, not only during the workday but during evening hours and on weekends. All of these uses will be compatible with those land uses that exist throughout the study area and will help to make Lower Manhattan a more attractive and welcoming place to live, work, and visit.

WTC Redevelopment Sites. By 2025, it is assumed that the developments for the WTC Memorial and Redevelopment Plan will be complete. In addition to the Memorial, Memorial Center, cultural facilities, retail uses, and open space, full development will bring the total office space to 10 msf and add a hotel with conference facilities. This office space will be in towers above the bases and below-grade areas with up to 1 msf of retail space. There will be five large, modern office towers ranging in area from 1.6 msf to 2.6 msf, each with between approximately

56 and 70 stories of office space. The hotel will provide up to approximately 800 rooms and up to 150,000 square feet of conference facilities. The additional office space, hotel, and their associated populations will support and benefit the retail and cultural uses developed in the initial phase of the plan.

North of WTC Site. No specific development projects have been identified for completion between 2010 and 2025 in the North of WTC Site subarea. It is likely that residential conversions will continue.

Broadway Corridor. New York City's *Vision* includes residential construction in the Broadway Corridor. Other potential future development in the Broadway Corridor includes three complete residential conversions and the conversion of the upper floors of a large office building on Broad Street to residential use.

Greenwich South Corridor. New York City's *Vision* will create a public open space, Greenwich Square, over the Brooklyn Battery Tunnel ramps with the intention of stimulating new residential development or residential conversions in the area.

Battery Park City. All of BPC is expected to be developed by 2009. No additional developments have been identified for completion between 2010 and 2025.

Remaining Subareas. Commercial and residential development is expected to continue in the remainder of the study area between 2010 and 2025 as a continuation of trends foreseen for 2009. Residential projects, both conversions and new construction, are proposed throughout the study area with the majority concentrated in the Tribeca and Brooklyn Bridge to Battery Park subareas.

In addition, two major transportation projects are also anticipated for completion before 2025. Under consideration for decades, the FTA recently issued a Record of Decision for the Second Avenue Subway. The project is proposed to provide much needed transit access to residents, workers, and visitors on the east side to reduce excess crowding on the Lexington Avenue subway and to improve overall mobility. The project consists of a new, two-track, 8.5-mile subway extending from Lexington Avenue at 125th Street in Harlem to Water Street at Hanover Square in the Brooklyn Bridge to Battery Park subarea.

Finally, the city proposes to provide direct, one-seat airport access to JFK and Newark International Airports. The project involves extending the JFK AirTrain system from the airport through a new tunnel to Lower Manhattan and by extending the PATH train from Newark's Penn Station to Newark Liberty Airport. The new tunnel between downtown and JFK would also connect the area to any Long Island Rail Road (LIRR) train at Jamaica Station. It is anticipated that the Lower Manhattan Terminal would be in the vicinity of the proposed Fulton Street Transit Center and the Permanent WTC PATH Terminal.

Public Policy

The developments described above that are expected to be completed between 2010 and 2025 will continue to be consistent with public policy for the area. These developments demonstrate the city and state's long-term interests in both rebuilding and promoting the continuous success of Lower Manhattan.

NO ACTION ALTERNATIVE

Land Use and Neighborhood Character

The existing temporary WTC PATH station was constructed for use on an interim basis, and therefore would be retired from service and no longer in operation long before the 2025 design year. At the same time, developments planned as part of the WTC Memorial Redevelopment Plan will be complete and fully occupied, as described above. Without the Preferred Alternative, the above- and below-grade portions of the Project Site may be incorporated into other WTC site developments. Land use on those portions of the Project Site located at Liberty Park Plaza and the WFC are not expected to change by 2025 under this alternative.

At this time it is unknown what, if anything, would occupy the former footprints of the temporary WTC PATH station after it ceases operations. In any event, the No Action Alternative would leave Lower Manhattan without an important regional transportation connection at a time when such a use will be critical. The WTC PATH Terminal served over 67,000 commuters a day prior to September 11, 2001, the events of which left the PATH system without a large portion of its capacity to serve commuters throughout the New York and New Jersey region. With a substantial increase in commercial office, retail, cultural, and residential uses expected by 2025 at the WTC Redevelopment Sites and in the surrounding neighborhoods, New Jersey residents will require convenient access to the Lower Manhattan business district, and without PATH no direct connection would exist. As discussed in Chapter 8A, "PATH," over 167,000 weekday passengers who would have used the Permanent WTC PATH Terminal in year 2025 would be required to divert to alternate modes of transportation to access Lower Manhattan.

The No Action Alternative would reduce the desirability and marketability of those independent developments planned for the study area, including those at the WTC site itself. Existing Lower Manhattan businesses may relocate to other areas of Manhattan or leave New York City altogether. As a result, the revitalization of Lower Manhattan may not be as robust as would otherwise be expected and any benefits to neighborhood character would not be realized.

Public Policy

The No Action Alternative would be inconsistent with public policies in place for Lower Manhattan, as discussed above for the 2009 opening year. No PATH train service would exist between New Jersey and the central business district. At the same time, the WTC Redevelopment Sites and the surrounding blocks would be fully developed and occupied. A major part of the infrastructure needed to support the Lower Manhattan office and retail markets would not exist. The lack of an important regional transportation connection—one that existed prior to September 11, 2001—would frustrate existing public policies that aim to better integrate and serve the Lower Manhattan business district with New Jersey, Long Island, Midtown Manhattan, and other boroughs, as well as nearby neighborhoods. Therefore, this alternative would result in an adverse impact on public policy.

PREFERRED ALTERNATIVE

Land Use and Neighborhood Character

In 2025, the Preferred Alternative would contribute to the creation of a more active Project Site and would benefit land use and neighborhood character. The Preferred Alternative would be compatible with and supportive of surrounding land uses. By 2025 PATH service into Lower Manhattan would be even more important than it is today, or is expected to be in 2009, due to

the increased intensity of land uses that are expected at the WTC Redevelopment Sites and throughout the land use study area, as described above. PATH service would again become an integral part of the Lower Manhattan central business district, as it was prior to September 11, 2001.

The Preferred Alternative would bring workers and visitors who, by purchasing goods and services, would support the existing businesses in the surrounding study areas, enlivening the surrounding study area. This alternative would support the increased office development and new cultural uses in the area. The influx of commuters associated with this alternative would benefit area businesses, particularly restaurants and shops, well beyond the Project Site, improving neighborhood character. Therefore, the Preferred Alternative would have beneficial effects on the surrounding areas, and no adverse impacts to land use or neighborhood character would result from this alternative. All other uses and their effects on land use and neighborhood character would be similar to conditions described in 2009.

Public Policy

This alternative is part of a major public policy initiative led by PANYNJ in cooperation with other federal, state, and city agencies to restore the Project Site as a functioning part of Lower Manhattan and maintain its place as a transportation hub for the Downtown area. The Preferred Alternative would be consistent with plans and efforts to maintain Lower Manhattan as a prosperous business district and to make the area more attractive to retain existing and attract new businesses in the long term. The project would be consistent with and help to meet the goals of public policies for Lower Manhattan, and no adverse impacts to public policy would result.

E. MITIGATION

During the construction period, activities associated with the Preferred Alternative may result in adverse impacts related to socioeconomic conditions, traffic, air quality, and noise and vibrations (see Chapter 5, "Socioeconomic Conditions," Chapter 8, "Transportation," Chapter 9, "Air Quality," and Chapter 10, "Noise and Vibration"). As a result, these activities would have an adverse effect on neighborhood character in the immediate vicinity of the Project Site. The mitigation measures proposed for each of the technical areas discussed above would also minimize the adverse effects to neighborhood character during the construction period.

Since the project would not have long-term (opening or design year) adverse impacts, as described above, mitigation would not be required once the Terminal is operational. ✳

A. INTRODUCTION

This chapter assesses the potential impacts of the Preferred Alternative on the socioeconomic characteristics of Lower Manhattan, including population and housing profiles, commercial office and retail activity, and employment trends.

B. METHODOLOGY

FRAMEWORK OF ANALYSES

A socioeconomic analysis describes whether and how a proposed action will impact the population, housing stock, or economic activities in a geographic area. Projects are examined for their potential to influence these socioeconomic characteristics (either directly or indirectly), and any anticipated changes are evaluated based on both their magnitude and character.

Typically, a proposed action should be examined for its potential to affect change through direct residential or business displacement, indirect residential or business displacement, and effects on a particular industry. The Preferred Alternative would not directly or indirectly displace businesses or residents nor would it adversely affect a specific industry. Thus, this assessment focuses on the Preferred Alternative's potential for social and economic impacts and benefits to Lower Manhattan.

As described in Chapter 2, "Project Alternatives" and Chapter 15, "Cumulative Effects," PANYNJ has coordinated with the other sponsors of the Lower Manhattan Recovery Efforts (Lower Manhattan Development Corporation, Metropolitan Transportation Authority, and New York State Department of Transportation) to develop a consistent approach to the evaluation of potential environmental effects for their respective projects. The methodology described below for the social and economic conditions analysis follows this guidance, and the development of baseline and future conditions has been closely coordinated between the project sponsors.

BASELINE CONDITIONS

As described in Chapter 2, "Project Alternatives," the Preferred Alternative is analyzed under current, and pre-September 11, 2001 conditions. This chapter presents two baselines. The first summarizes population, housing, employment, and commercial real estate characteristics as they existed prior to September 11, 2001, and the second presents those characteristics for the study areas today.

Following the baseline discussion is an assessment of future conditions in the study areas for three different analysis years: 2006 (which falls within the construction period), 2009 (the opening year) and 2025 (the design year). For each year, future socioeconomic conditions are described for the Future Common to All Alternatives as well as the No Action and Preferred Alternative.

STUDY AREA DEFINITIONS

The socioeconomic study area is Lower Manhattan, south of Canal Street. Study area subareas vary by subject matter, depending on the level of detail appropriate for the analyses and the types of data available. Subareas for each section of the socioeconomic analysis are defined below.

POPULATION AND HOUSING

There are nine Population and Housing subareas, including the World Trade Center (WTC) site. Those subareas immediately surrounding the WTC site include: North of WTC Site, Battery Park City, Greenwich South Corridor, and Broadway Corridor. Those on the periphery include: Tribeca, Civic Center, Chinatown, and Brooklyn Bridge to Battery Park (see Figure 5-1).

COMMERCIAL OFFICE MARKET

The study area for the Commercial Office Market analysis has been divided into five submarkets, which conform to data collected by the real estate services firm Cushman & Wakefield. These submarkets are mapped in Figure 5-2, and are further described below:

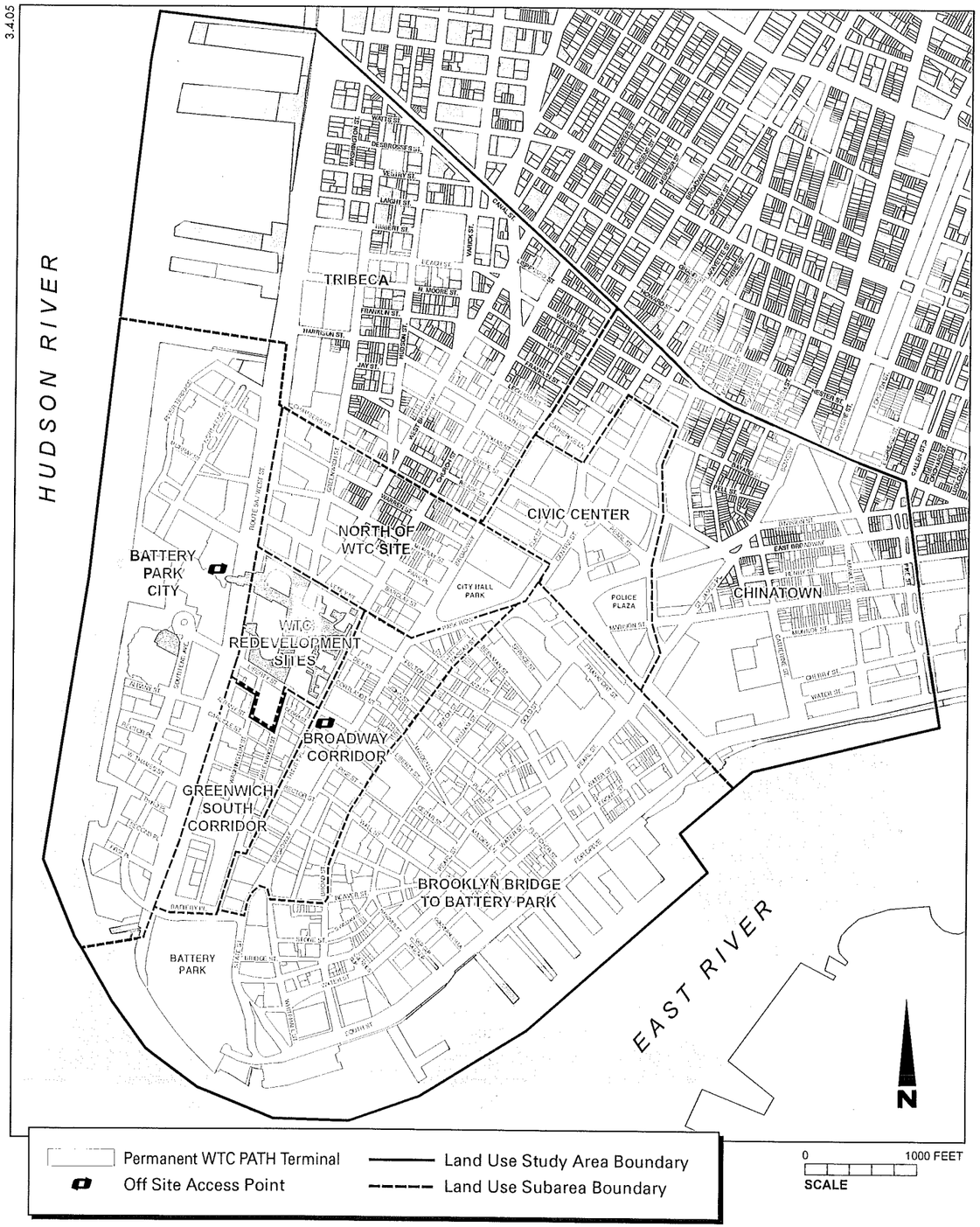
- City Hall: Bound by the Brooklyn Bridge, Park Row, Vesey Street, Chambers Street, Hudson River, Canal Street, and the East River.
- World Financial: Bound by Albany Street, Hudson River, Chambers Street, Church Street, Vesey Street, Broadway, Liberty Street, and Greenwich Street.
- Insurance: Bound by Pine Street, William Street, Liberty Street, Broadway, Park Row, and the Brooklyn Bridge.
- Financial West: Bound by Battery Park, Hudson River, Albany Street, Greenwich Street, Liberty Street, and Broadway.
- Financial East: Bound by Battery Park, Broadway, Liberty Street, William Street, Pine Street, and the East River.

In order to contextualize the Lower Manhattan office market data, it is compared to data describing other Manhattan submarkets, including Midtown South and Midtown. The three major Manhattan submarkets are mapped in Figure 5-3.

COMMERCIAL RETAIL MARKET

The Commercial Retail Market has not been divided into submarkets. However, because the Preferred Alternative could have an effect on retail establishments located on blocks immediately surrounding the proposed entrances to the Terminal, a smaller study area has been defined for the Retail analysis. This "Immediate Study Area" consists of the blocks immediately surrounding the WTC site, along with buildings lining the east side of Broadway from Pine Street to Ann Street (see Figure 5-2). More specifically, the Immediate Study Area includes:

- The World Financial Center on the west side of the WTC site;
- Blocks between Route 9A and Broadway, Vesey, and Barclay Streets;
- Blocks between Vesey and Thames Streets, Church Street, and Broadway;



PERMANENT WTC PATH TERMINAL
Final Environmental Impact Statement

Figure 5-1
Land Use Study Area

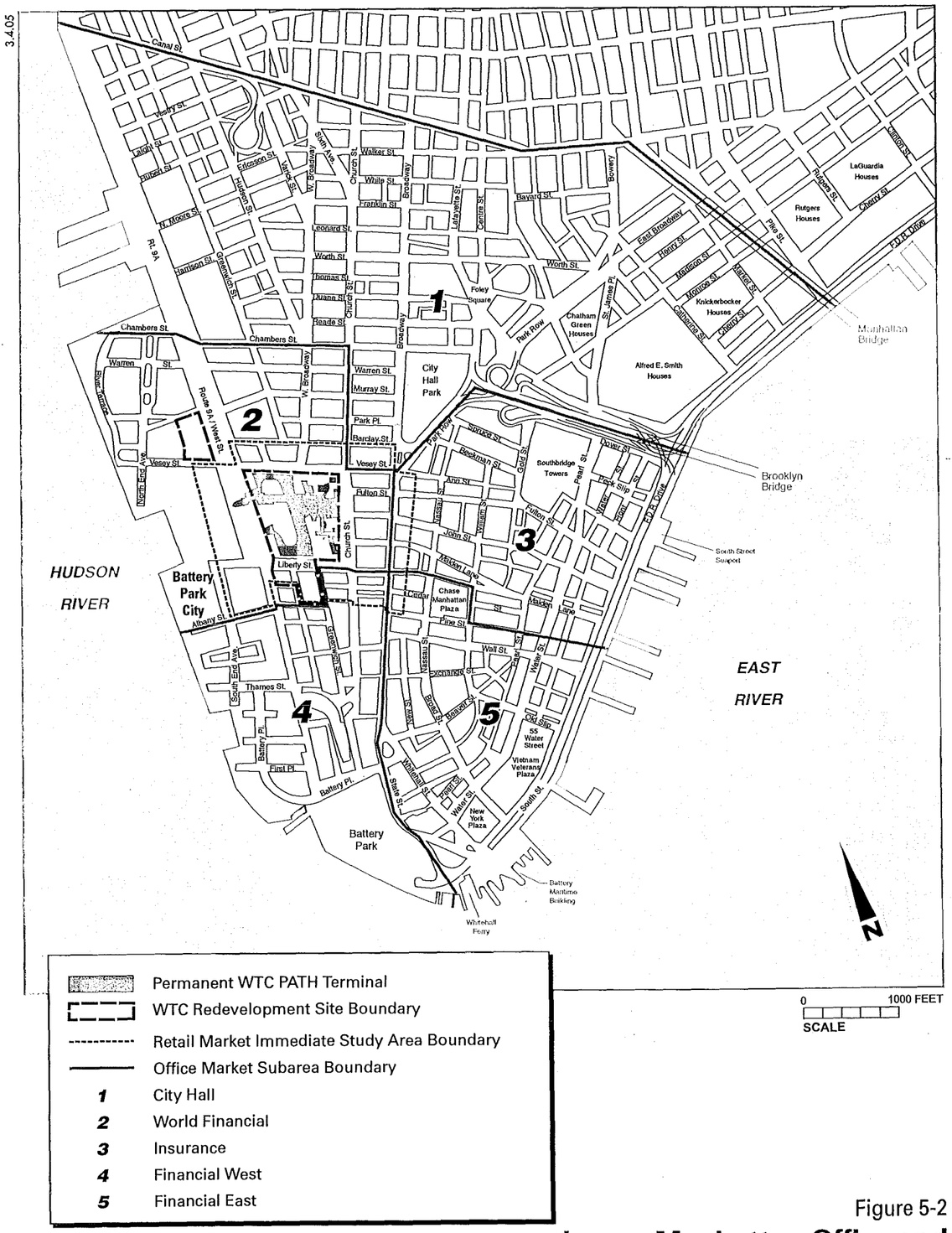


Figure 5-2

Lower Manhattan Office and Retail Market Subareas

3.5.05

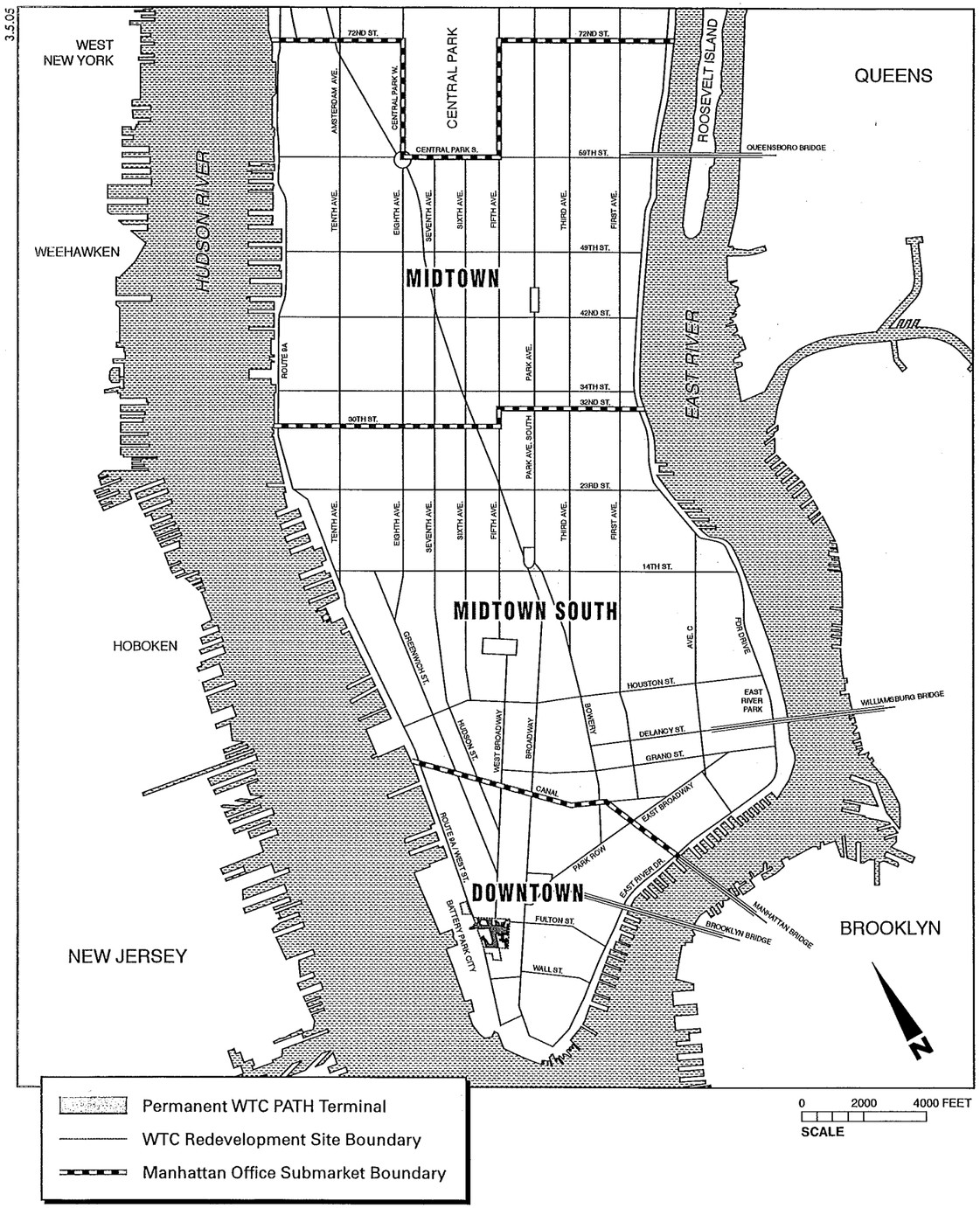


Figure 5-3
Manhattan Office Submarkets

- Buildings facing Broadway on the east side of Broadway, between Ann Street on the north and Pine Street on the south; and
- Blocks on the south side of Liberty Street, from West Street to Church Street.

EMPLOYMENT

The Employment study area, which includes all of Lower Manhattan south of Canal Street, has not been divided into submarkets.

DATA SOURCES

POPULATION AND HOUSING

The assessment of population and housing trends in the Primary and Secondary Study Areas is based on data from the 1990 and 2000 Census. The information was grouped into three content areas:

- Population characteristics, including total number, race, and median age;
- Housing characteristics, including number of units, vacancy and tenure (owner versus renter occupied), median contract rent, and median home value; and
- Household characteristics, including number of households, average size and income, and percent below poverty.

The data have been organized by subarea. However, because the subareas were defined according to land use patterns and commonly used neighborhood definitions, boundaries do not always conform to Census geography (Tract, Block Group, or Block). Where Census units overlap subarea boundaries, a judgment was made regarding the extents of the Census unit to include in the subarea based on land uses in the area and the potential for the characteristic being examined to cross the Census unit in question.

There is some discrepancy between the precision with which the 1990 and 2000 data conforms to subarea boundaries. Because much of the 1990 data is reported only by Tract and Block Group levels (not at the level of the Census Block, the smallest geographic unit), the 1990 data is not as precise as the 2000 data for some demographic and housing characteristics. However, every effort was made to ensure a consistent comparison between these data.

The pre-September 11, 2001 condition is based primarily on 2000 Census data. Because the Census is dicennial, it is impossible to obtain an accurate 2003 demographic and housing profile of the study areas. Thus, the current condition is based largely on 2000 data updated with information and survey data compiled from various agencies and organizations involved in the redevelopment of Lower Manhattan, such as the Alliance for Downtown New York (Downtown Alliance) and the Lower Manhattan Development Corporation (LMDC). Much of the 2003 housing and population data is based on an assessment of units built in the study areas between 2000 and 2003 and corresponding population estimates based on 2000 average household sizes by subarea. The list of recent housing development was compiled from a variety of sources including real estate firms, newspaper articles, Community Board 1, Downtown Alliance, and the New York City Department of City Planning (NYCDCP).

OFFICE

Office market trends and current conditions for Lower Manhattan and Manhattan, as a whole, are presented using data from Cushman & Wakefield. Four main indicators were used to depict market conditions: total inventory, average rent, vacancies, and absorption. Wherever possible, these indicators were reported separately by class of office space. Office class definitions are as follows:*

- *Class A*: Most prestigious buildings competing for premier office users with above average rents for the area. Buildings have high quality standard finishes, state-of-the-art systems, exceptional accessibility and suggest a definitive market presence.
- *Class B*: Buildings competing for a wide range of users with average rents for the area. Building finishes are fair to good for the area and systems are adequate, but the buildings do not compete with Class A at the same price.
- *Class C*: Buildings competing for tenants requiring functional space at below average rents for the area.

The post-September 11, 2001 condition is portrayed using data from the second quarter of 2003, and the pre-September 11, 2001 condition reflects data from the second quarter of 2001.

RETAIL

Data on the Manhattan and Lower Manhattan Retail markets was obtained primarily from the Retail Report series published by the Real Estate Board of New York and the Fulton Corridor study commissioned by LMDC.** In addition, a field survey was conducted in September 2003 to develop a comprehensive list of businesses in the "Immediate Study Area."

EMPLOYMENT

Employment data for Manhattan and New York City are from the New York State Department of Labor (NYSDOL). The discussion of employment trends is based on data from 1990, 1995, 2000, and 2002. Second quarter 2000 data were used for the pre-September 11, 2001 conditions and second quarter 2002 data (the most recent data available) were used for the post-September 11, 2001 conditions.

Employment data for Lower Manhattan is based on employment estimates from the New York Metropolitan Transportation Council (NYMTC) supplemented with industry-specific data from NYSDOL. It is difficult to accurately quantify employment in Lower Manhattan using NYSDOL data because it is available only by zip code, and zip code 10013 is bisected by Canal Street, the northern boundary of the Study Area. Although the NYMTC data in its original form is county-based, it has been adjusted to the Census Tract level and used for several transportation projects in Manhattan with the endorsement of a variety of City agencies. Thus, the NYMTC data was used to quantify employment in Lower Manhattan. (It should be noted

* Cushman and Wakefield. *Market Beat Series*. Individual reports from Cushman and Wakefield are referenced in text and tables presented later in this document.

** LMDC. *Fulton Corridor: Creating a Vision for Enhanced Retail+Arts+Cultural Activities in Lower Manhattan*, June 12, 2003

that overall, the NYMTC-based private sector employment estimate is approximately 6 percent higher than the NYSDOL-based estimate.)

To estimate employment by industry (or Standard Industrial Code—SIC) for Lower Manhattan, the NYSDOL employment distribution was applied to the NYMTC employment estimates for 2000 and 2002. For example: if, according to the NYSDOL, 35 percent of Lower Manhattan employment in 2000 was in the Services sector, then this distribution was applied to the NYMTC.

The NYMTC employment figures include both public and private sector employment, with subtotals by sector. While private sector employment is based on 2000 data, the public sector employment estimate is based on 1990 data—the most recent year for which data is available. However, government employment for New York City, as a whole, changed only modestly from 1990 to 2000 (decreasing by about 5 percent in magnitude).

ENVIRONMENTAL JUSTICE

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires that every federal agency identify and address disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations.

As discussed in the existing conditions portion of this chapter, the primary study area population is over 75 percent white, with a median household income that is over twice the median for New York City and a poverty level that is well below the citywide average. The secondary study area includes two subareas with populations that are over 50 percent minority: Chinatown (approximately 86 percent minority) and Civic Center (approximately 65 percent minority). These communities also have a relatively high proportion of persons living in poverty—37.5 percent in Civic Center and 33.4 percent in Chinatown, as compared to 20.8 percent in New York City. However, these communities are geographically further removed from the proposed project and would not suffer disproportionately high and adverse impacts from the proposed project. Therefore, a more detailed environmental justice analysis was deemed unnecessary. Nevertheless, as more fully discussed in Chapter 18, "Agency Coordination, Process, and Public Participation," FTA and PANYNJ reached out to low-income and minority populations in an effort to include them as part of the project's public participation program.

C. DESCRIPTION OF THE AFFECTED ENVIRONMENT

PRE-SEPTEMBER 11, 2001 BASELINE CONDITIONS

POPULATION AND HOUSING

Population

Table 5-1 presents characteristics of the Lower Manhattan population in 1990 and 2000. In 2000, there were approximately 58,620 people living in Lower Manhattan. About 44 percent of the total population lived in Chinatown. Approximately 48 percent of the study area population was White, almost 40 percent was Asian, and only 6.4 percent was Black. This contrasts with the racial profile of Manhattan as a whole, which was approximately 54 percent White,

Table 5-1
Pre-September 11, 2001 Population Characteristics in Lower Manhattan (1990 and 2000)

Primary Study Area	Total Population					Median Age[4]
	Total	Race and Ethnicity (Percent)[1,2]				
		White	Black	Asian	Other	
1990						
North of WTC Site[3]	1,218	84.1	4.2	9.9	1.8	N/A
Broadway Corridor[3]	497	70.9	10.1	16.2	2.8	N/A
Greenwich South Corridor	122	91.8	2.5	4.1	1.6	N/A
Battery Park City	5,574	80.6	3.5	14.9	0.9	N/A
Tribeca[3]	7,508	80.9	11.9	4.5	2.7	N/A
Civic Center	1,536	33.4	39.5	5.2	21.9	N/A
Chinatown[3]	23,939	17.3	6.6	69.2	6.9	N/A
Brooklyn Bridge to Battery Park[3]	5,635	73.3	10.2	13.7	2.4	N/A
Lower Manhattan Total	**46,030**	**46.0**	**8.5**	**40.4**	**5.1**	**N/A**
Manhattan	1,487,536	58.3	22.0	7.4	12.3	N/A
New York City	7,322,564	52.3	28.7	7.0	12.0	N/A
2000						
North of WTC Site	1,601	75.8	3.8	13.9	6.5	36.0
Broadway Corridor	1,385	75.7	3.1	16.2	5.0	32.2
Greenwich South Corridor	1,142	75.4	7.7	9.5	7.4	32.4
Battery Park City	7,951	75.0	3.0	18.0	4.1	35.4
Tribeca	8,797	83.5	5.1	6.9	4.5	39.8
Civic Center	2,051	34.9	45.4	8.4	11.3	33.1
Chinatown	25,691	14.0	4.9	74.2	6.9	39.6
Brooklyn Bridge to Battery Park	10,000	68.5	5.9	18.2	7.4	36.0
Lower Manhattan Total	**58,618**	**47.8**	**6.4**	**39.4**	**6.4**	**37.2**
Manhattan	1,537,195	54.4	17.4	9.4	18.9	35.7
New York City	8,008,278	44.7	26.6	9.8	18.9	34.2

Notes:

1 White, Black, Asian, and Other population may also be Hispanic.

2 Race categories were reported differently in the 1990 and 2000 Census. In order to draw comparisons, the 2000 Census categories of "Asian Alone" and "Native Hawaiian and Other Pacific Islander Alone" were combined into "Asian" and the categories of "American Indian and Alaska Native Alone," "Some Other race alone," and "Two or more races" were combined into "Other." For 1990 data, the "Other" category combines the categories of "American Indian, Eskimo, or Aleut" and "Other race."

3 Because the 1990 census data is not reported by block, and neighborhood boundaries do not conform with block group boundaries, it was not possible to calculate the exact population or population by race within neighborhood boundaries. The population was derived by calculating the percent of population in each block group living within the neighborhood boundaries in year 2000 and applying that same percent to the 1990 block group population figures. The race percentage is based on racial breakdown of entire block groups into which the neighborhood falls.

4 Median age is the weighted average of the median ages for each census tract, block group, or block falling within the subarea. Median age can not be calculated for 1990.

Source: U.S. Department of Commerce, Bureau of the Census, 2000 Census, Summary File 1 and 1990, Summary File 1.

17 percent Black, and 9 percent Asian. As illustrated in Table 5-1, the uncharacteristically high Asian representation in Lower Manhattan is due to the high number of people living in Chinatown, which is nearly 75 percent Asian.

Of all subareas in Lower Manhattan, Brooklyn Bridge to Battery Park experienced the greatest net increase in population between 1990 and 2000 (growing by approximately 4,365 people), and Greenwich South Corridor had the greatest percentage increase (growing from 122 to 1,142 residents). For all subareas, the Asian population constituted a larger percent of total population in 2000 than it did in 1990. At the same time, the White and Black populations in most subareas shrunk as a percent of total population.

The average median age in 2000 was eldest in Chinatown and Tribeca (almost 40 in both subareas) and youngest in the Broadway Corridor and Greenwich South Corridor subareas.

Housing

As illustrated in Table 5-2, there were approximately 27,143 housing units in Lower Manhattan in 2000. Overall, about 20 percent were owner-occupied and 80 percent were renter-occupied, which mirrors the overall Manhattan housing market. The study area's vacancy rate was only moderately higher than in Manhattan (9.4 as compared to 7.5) but the rate varied substantially across subareas. At 17.9 percent, Battery Park City had the highest vacancy rate, which may be attributable to the substantial number of newly constructed but not yet occupied units that were built late in the 1990s.

The 2000 median home value in Lower Manhattan was $411,040, approximately 14 percent higher than the median for Manhattan, and 86 percent higher than the median for New York City. The area's median contract rent (or weighted average of median contract rents for all subareas) of $1,130 per month was over 50 percent higher than the median rent for Manhattan. It is worth nothing that the median home value and median contract rent for Chinatown were substantially lower than in many other Lower Manhattan subareas; which deflates the overall averages for the study area.

Between 1990 and 2000, the housing stock in Lower Manhattan increased much faster than it did in Manhattan or New York City. While the number of units in the study area increased by 30 percent, the Manhattan housing market grew by only 1.6 percent and the New York City market by 6.9 percent. The majority of growth occurred in the Battery Park City, Tribeca, and Brooklyn Bridge to Battery Park subareas, having a total of 4,480 new units between 1990 and 2000.

While the number of units increased from 1990 to 2000, the overall ratio of owner- to renter-occupied housing units remained almost constant and the vacancy rate increased by only 1.7 percent. Median contract rent increased by approximately $434 between 1990 and 2000.

Households and Income

There were approximately 24,615 households in Lower Manhattan in 2000 with an average size of 2.2 people. The vast majority of households (22,464 in number) were located in four subareas: Chinatown, Brooklyn Bridge to Battery Park, Battery Park City, and Tribeca. The study area's median household income of approximately $65,090 was about 38 percent higher than for Manhattan and 70 percent higher than for New York City. The poverty rate, however, was roughly equal to that of Manhattan—primarily due to the high poverty rate in Chinatown (33.4 percent). The North of WTC site subarea had the highest median income and lowest poverty rate in the study area. Table 5-3 presents income characteristics for Lower Manhattan.

Table 5-2
Pre-September 11, 2001 Housing Characteristics in Lower Manhattan, (1990 and 2000)

Primary Study Area	Total Housing Units	Housing Vacancy (Percent)	Housing Tenure (Percent)		Median Contract Rent[1, 3]	Median House Value[1, 2, 3]
			Owner	Renter		
1990						
North of WTC Site	672	18.1	51.2	48.8	$1,199	N/A
Broadway Corridor	590	7.9	29.4	70.6	$1,237	N/A
Greenwich South Corridor	89	10.1	0.0	100.0	$670	N/A
Battery Park City	4,032	16.3	19.6	80.4	$1,319	N/A
Tribeca	3,479	7.3	27.6	72.4	$707	N/A
Civic Center	60	5.0	40.4	59.6	$750	N/A
Chinatown	8,723	3.8	7.4	92.6	$392	N/A
Brooklyn Bridge to Battery Park	3,255	5.7	35.7	64.3	$701	N/A
Lower Manhattan Total	**20,900**	**7.7**	**19.8**	**80.2**	**$696**	**N/A**
Manhattan	785,127	8.8	17.9	82.1	$630	N/A
New York City	2,992,169	5.8	26.6	71.4	$590	N/A
2000						
North of WTC Site	761	8.3	58.9	41.1	$1,510	$548,133
Broadway Corridor	841	11.8	16.7	83.3	$1,220	$478,080
Greenwich South Corridor	739	15.8	0.8	99.2	$2,000	$187,500
Battery Park City	5,382	17.9	17.7	82.3	$1,873	$318,600
Tribeca	4,786	8.3	32.7	67.3	$1,254	$782,455
Civic Center	91	2.2	1.1	98.9	$170	N/A
Chinatown	9,465	5.4	11.0	89.0	$449	$203,094
Brooklyn Bridge to Battery Park	5,078	8.0	25.0	75.0	$1,413	$548,058
Lower Manhattan Total	**27,143**	**9.4**	**20.5**	**79.5**	**$1,130**	**$411,040**
Manhattan	798,144	7.5	20.1	79.9	$740	$361,100
New York City	3,200,912	5.6	30.2	69.8	$646	$221,200

Notes:

1 Values were calculated by taking the weighted average of median number of rooms, median contract rent, and median house value of all the census block groups in a given study area. Because this data is available only at the block group level and block group boundaries do not always align with subarea boundaries, the medians are not exact. Block groups were included or excluded depending on how much of the block group lay within the subarea and whether the housing in the block group was consistent in character with housing in other parts of the subarea.

2 The 1990 median home value is not reported because the 1990 value was based on "specified owner-occupied housing units" only, while the 2000 median was based on all owner-occupied housing units. The two data sets are not comparable.

3 All 1990 values were converted to 2000 constant dollars using the U.S. Department of Labor's Consumer Price Index for the "New York-Northern New Jersey-Long Island" area.

Source: U.S. Department of Commerce, Bureau of Census, 1990 and 2000 Census, Summary File 1 and Summary File 3.

Table 5-3
Pre-September 11, 2001 Household and Income Characteristics in Lower Manhattan (1990 and 2000)

Primary Study Area	Housing Characteristics		Income Profile[3]	
	Total House-holds	Average Household Size	Median Household Income[1]	Persons Below Poverty (Percent)[2]
1990				
North of WTC Site	541	2.1	$94,505	5.3
Broadway Corridor	235	1.9	$67,101	11.3
Greenwich South Corridor	80	1.5	$33,175	0.0
Battery Park City	3,373	1.7	$94,828	3.9
Tribeca	3,479	2.0	$71,876	7.9
Civic Center	57	2.2	$60,943	12.5
Chinatown	8,392	2.8	$23,936	27.0
Brooklyn Bridge to Battery Park	2,885	1.7	$47,961	14.4
Lower Manhattan Total	**19,042**	**2.3**	**$51,580**	**18.2**
Manhattan	716,811	2.0	$42,511	20.5
New York City	2,816,274	2.5	$39,297	19.3
2000				
North of WTC Site	698	2.1	$127,262	3.7
Broadway Corridor	742	1.9	$88,949	9.6
Greenwich South Corridor	622	1.7	$94,809	15.2
Battery Park City	4,419	1.8	$107,611	5.5
Tribeca	4,420	2.0	$97,228	4.4
Civic Center	89	1.4	$8,833	37.5
Chinatown	8,955	2.7	$23,867	33.4
Brooklyn Bridge to Battery Park	4,670	1.7	$57,525	10.4
Lower Manhattan Total	**24,615**	**2.2**	**$65,090**	**19.8**
Manhattan	738,644	2.0	$47,030	19.4
New York City	3,021,588	2.6	$38,293	20.8

Notes:

1 The median income represents a weighted average of the median incomes of all the census blocks or block groups in the subarea.

2 The U.S. Census Bureau uses a set of money income thresholds that vary by family size and composition to detect who is poor. If the total income for a family or unrelated individual falls below the relevant poverty threshold, then the family or unrelated individual is classified as being "below the poverty level."

3 All 1990 values were converted to 2000 constant dollars using the US Department of Labor's Consumer Price Index for the "New York-Northern New Jersey-Long Island" area.

Source: U.S. Department of Commerce Bureau of the Census, 1990 and 2000 Census, Summary Files 1 and 3.

Table 5-4
Pre-September 11, 2001 Manhattan Office Market Characteristics (Year-End 2000)

Submarket	Total Inventory (sq. ft.)	Total Average Rent	Class A Average Rent	Total Vacancy Rate
Midtown	224,320,504	$54.65	$67.11	3.6 percent
Midtown South	60,614,279	$46.70	$50.23	3.6 percent
Lower Manhattan	107,512,756	$43.29	$52.37	3.6 percent
Total	392,447,539	$50.12	$64.51	3.7 percent

Source: Cushman & Wakefield, second quarter 2003.

Between 1990 and 2000, the study area gained a total of 5,573 households, an increase of 29.3 percent. Median household income increased by 26 percent, from $51,580 to $65,090. The most substantial increase in income occurred in the Greenwich South Corridor, the subarea, which also experienced the most dramatic growth in the number of households.

COMMERCIAL OFFICE MARKET

At year-end 2000, Manhattan's office inventory totaled 392,447,539 square feet. Approximately 57 percent was located in Midtown, 27 percent in Lower Manhattan, and 15 percent in Midtown South. As indicated in Table 5-4, vacancy rates were low, absorption was high, and total average rents ranged from $43.29 per square foot (psf) to $54.65 psf.

During the second quarter of 2001, Lower Manhattan contained approximately 107.8 million square feet (msf) of office space. Over half was considered Class A, which was generally distributed between two submarkets: World Financial and Financial East. Class B space was concentrated in the Financial East area, and the City Hall submarket contained 40 percent of all Class C space.

The WTC site itself contained over 10 msf of office space in five buildings. The Twin Towers, (One and Two World Trade Center) were 110 stories each and contained approximately 4.7 msf of Class A office space per building.

Table 5-5 shows inventory and average rents for each of the submarkets in Lower Manhattan in the months immediately preceding September 11, 2001. As shown, the average rent for Lower Manhattan office space in 2001 was $41.17 psf. Class A space rented at approximately $47.50 psf, Class B at $37.70 psf, and Class C at $37.08 psf.

Table 5-5
Pre-September 11, 2001 Lower Manhattan Office Inventory and Rents (2001)

Submarket	Class A		Class B		Class C		Total	
	Inventory (sq.ft.)	Total Avg. Rent	Inventory (sq.ft.)	Total Avg. Rent	Inventory (sq.ft.)	Total Avg. Rent	Inventory (sq.ft.)	Total Avg. Rent
World Financial	24,331,521	$51.20	3,144,677	$38.86	1,396,150	$0.00	28,872,348	$46.50
City Hall	5,181,465	$54.57	4,920,258	$35.97	5,823,613	$34.46	15,925,336	$39.63
Insurance	5,178,179	$42.03	7,170,386	$38.86	4,393,706	$38.32	16,742,271	$39.04
Financial West	663,315	$45.61	4,256,528	$33.96	1,569,242	$36.79	6,489,085	$34.82
Financial East	23,410,332	$45.86	14,836,586	$40.99	1,533,966	$39.75	39,780,884	$43.57
Total	58,764,812	$47.51	34,328,435	$37.70	14,716,677	$37.08	107,809,924	$41.17
Percent of Total Study Area	54.5%	115.4%	31.8%	91.6%	13.7%	90.1%	100.0%	

Source: Cushman & Wakefield, second quarter 2001.

The office vacancy rate in Lower Manhattan was fairly low immediately preceding the September 11, 2001 attacks. As indicated in Table 5-6, the vacancy rate was 6.5 percent, with vacancies in all submarkets except for Financial West ranging between 3.4 and 7.3 percent. The vacancy rate for the Financial West subarea was 21.5 percent.

Table 5-6
Pre-September 11, 2001 Lower Manhattan Office Vacancy (2001)

Submarket	Class A		Class B		Class C		Total Study Area	
	Total Available Space	Total Vacancy Rate	Total Available Space	Total Vacancy Rate	Total Available Space	Total Vacancy Rate	Total Available Space	Total Vacancy Rate
World Financial	663,549	2.7%	330,220	14.8%	0	0.0%	993,769	3.4%
City Hall	149,998	2.9%	218,869	4.4%	278,784	4.8%	647,651	4.1%
Insurance	146,682	2.8%	465,472	6.5%	495,076	11.3%	1,107,230	6.6%
Financial West	76,650	11.6%	1,087,106	25.5%	231,959	14.8%	1,395,715	21.5%
Financial East	1,549,005	6.6%	1,270,859	8.6%	70,738	46.0%	2,890,602	7.3%
Total	2,585,884	4.4%	3,372,526	9.8%	1,076,557	7.3%	7,034,967	6.5%
Percent of Total Study Area	36.8%	67.7%	47.9%	150.8%	15.3%	112.3%	112.3%	

Source: Cushman & Wakefield, second quarter 2001.

COMMERCIAL RETAIL MARKET

At the end of March 2001, Manhattan had a total of 10.6 million square feet (msf) of available retail space (or 1,850 stores) with an average rent of $98 psf. By the end of September 2001, Manhattan had 11.3 msf of available retail space (1,744 stores), with an average asking rent of $84 psf. Though some of this drop can be attributed to the attacks of September 11, 2001, much of the decrease was underway in the months prior to September 11, 2001, as regional and national economies began to slow.

In Lower Manhattan, a total of 1.6 msf of retail space was available as of March 2001, and the average asking rent was $60 psf. Like the overall Manhattan retail market, the Lower Manhattan market was showing signs of weakness prior to September 11, 2001, evidenced by the drop in average asking rents from $67 psf in September 2000 to $60 psf in March 2001.

EMPLOYMENT

New York City and Manhattan

Approximately 3.1 million people were employed in New York City's private sector in 2000, and almost two thirds (1.9 million) worked in Manhattan. In both Manhattan and New York City as a whole, the greatest concentration of employment was in the Services industry. The largest proportion of all Services employment was in the Business Services and Health Services subsectors. In Manhattan, 31 percent of all Services employment was in Business Services, and 14 percent was in Health Services. In New York City, 24 percent was in Business Services and 23 percent in Health Services. Public Sector employment in New York City totaled approximately 549,100 in 2000, comprising about 15 percent of all employment in the City. Of those employees, approximately 66,700 worked for the federal government, 42,100 for the state, and 440,300 for local government agencies.

In Manhattan, 418,236 employees (22 percent of the private labor force) worked in the Finance, Insurance and Real Estate (FIRE) sector, and another 18 percent worked in retail or wholesale

trade. By comparison, New York City's workers were less concentrated in the FIRE industries (16 percent of private sector employees) and somewhat more concentrated in the trade industries (20 percent of private sector employees).

Between 1990 and 2000, private sector employment in Manhattan grew by about 3.4 percent, or 64,400 workers. The largest absolute growth occurred in the Services sector, which gained 161,525 employees, growing by 22 percent. Retail Trade also experienced substantial growth, adding about 34.8 thousand employees to its 1990 base of 198,273. Employment in Wholesale Trade declined by 29,000 workers. Employment in the FIRE industries decreased by over 7 percent, from 451,400 to 418,200 employees.

Lower Manhattan

In 2000, there were approximately 426,008 employees in Lower Manhattan. As shown in Table 5-7, approximately 40 percent were working in the FIRE sector and another 36 percent worked in the Services sector. Within the Services sector, 36 percent worked in "Business Services," and within FIRE, 65 percent worked in the "Security and commodity brokers, dealers, exchanges, and services" subsector as a whole.

Table 5-7
Pre-September 11, 2001 Lower Manhattan Employment (2000)

Industry	Number	Percent
Private Sector Employment	331,841	100.0 %
Agriculture, Forestry, Fishing, and Hunting	164	0.0 %
Mining	2	0.0 %
Construction Industries	4,486	1.4 %
Manufacturing	16,826	5.1 %
Transportation, Communication, and Utilities	13,385	4.0 %
Wholesale Trade	9,633	2.9 %
Retail Trade	34,990	10.5 %
Financial, Insurance, Real Estate	130,370	39.3 %
Services Industries	120,887	36.4 %
Unclassified Establishments	1,097	0.3 %
Public Sector Employment	94,168	22.1 %
Total Employment	426,009	100.0 %

Notes:

1. Due to NYSDOL data suppression practices, the sum of employment by industry did not exactly match the total private sector employment figure. Employment that was unaccounted for in the industry breakdown was added to "Unclassified Establishments."
2. For private sector employment industry subcategories, "Percent" represents percent of private sector employment, not total employment. For main public and private Sector headings, "Percent" represents the relative contribution of private and public employment to total employment.

Sources: Number of firms was obtained from NYSDOL 2002 employment data. Employment was estimated using NYSDOL data to generate an employment estimate that is consistent with NYMTC employment estimates.

Compared to Manhattan, Lower Manhattan had a high concentration of FIRE sector employment. About 38 percent of all FIRE employment in Manhattan and 32 percent of all New York City FIRE employment was located within Lower Manhattan, making it more than twice

as concentrated in the FIRE industries as Manhattan and about three times more concentrated than the City as a whole.

CHANGES IN THE AFFECTED ENVIRONMENT SINCE SEPTEMBER 11, 2001

POPULATION AND HOUSING

Population

The Lower Manhattan population has gone through some dramatic changes since the 2000 Census. Following September 11, 2001, the population in Lower Manhattan (particularly in those subareas surrounding the WTC site) dropped, as people were forced to leave their homes during the beginning phases of the WTC site cleanup. While some of the area's residents returned when conditions permitted, others chose to relocate elsewhere, driving vacancy rates upward and keeping the population below its pre-September 11, 2001 level. However, residential grant programs were successful in convincing many to remain, return, or relocate to Lower Manhattan. Thus, vacancy rates have decreased and population has grown.

According to the Downtown Alliance, residential vacancy rates in Lower Manhattan have now returned to their pre-September 11, 2001 levels.* Assuming a) an overall vacancy rate of 5 percent in residential buildings that existed in 2000 as well as those built between 2000 and 2003 (see Housing sections below for more detail) and b) that the average housing size remains the same as in 2000, the population in Lower Manhattan has grown by approximately 10,077 (17 percent) since the 2000 Census, resulting in a total of approximately 68,695. The majority of this growth occurred in the Greenwich South Corridor and Brooklyn Bridge to Battery Park subareas, where populations increased by approximately 2,730 and 3,400 people respectively.

Information on the current racial composition of subarea populations is not available. Judging from the modest changes that occurred between 1990 and 2000, it is assumed that the racial composition has not changed markedly since the 2000 Census.

Housing

Lower Manhattan included approximately 27,140 housing units in 2000. Since then, the area has gained approximately 5,774 housing units, growing by 21 percent. Approximately 36 percent of the new units were built in the Brooklyn Bridge to Battery Park subarea; another 1,690 units were added to the Greenwich South Corridor subarea, and 835 units to Battery Park City. With the exception of Battery Park City, which has new construction, many new units in the Study Area are in buildings converted from commercial use. Most new units are upscale, with rents equal to or higher than the median for their respective subareas.

Households and Income

Current information on household and income characteristics is not available. However, judging from rental rates and general size of apartments constructed between 2000 and 2003, it is assumed that median income and average household size in Lower Manhattan have not changed greatly since 2000.

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* Downtown Alliance. *The Downtown Report.* Winter 2003.

COMMERCIAL OFFICE MARKET

Manhattan Office Market

Since the end of 2000, the Manhattan office market has lost approximately 3.2 msf of space, and average rental rates have decreased by approximately 18 percent. Vacancy rates have increased from 3.7 to 12.5 percent.

According to second quarter 2003 data, the Manhattan office market currently contains approximately 390 million square feet (msf) of office space. Of that space, 58 percent (approximately 227 msf) is considered Class A, and 27 percent (about 104 msf) is considered Class B. The vast majority (75 percent) of Class A space is located in Midtown. Class B and C space is more evenly dispersed across the submarkets, with Midtown containing the largest portion of Class B space, and Midtown South the greatest amount of Class C.

Table 5-8 presents the inventory and average rent by class of space for the Manhattan submarkets. The total average rent for Manhattan office space in 2003 is approximately $41 psf. Class A space commands an average rent of $48.50 psf and Class C, $26.75 psf. Class A rents are much higher in Midtown than in Downtown or Midtown South—about $10 psf higher than Downtown and $17 psf higher than Midtown South. The average rental rate for Downtown as a whole ($36.36 psf) is notably lower than the average rent for all of Manhattan ($41.12 psf).

Table 5-8
Post September 11, 2001 Midtown Office Inventory and Rents (2003)

Submarket	Class A		Class B		Class C		Total	
	Inventory (sq.ft.)	Total Avg. Rent	Inventory (sq.ft.)	Total Avg. Rent	Inventory (sq.ft.)	Total Avg. Rent	Inventory (sq.ft.)	Total Avg. Rent
Midtown	171,977,201	$51.50	41,780,038	$35.94	17,442,468	$24.49	231,199,707	$46.56
Midtown South	9,943,982	$34.37	30,241,234	$32.82	24,993,692	$27.37	65,178,908	$31.09
Downtown	45,375,476	$41.57	32,249,155	$30.58	15,266,018	$28.49	92,890,649	$36.36
Total	227,296,659	$48.48	104,270,427	$33.37	57,702,178	$36.75	389,269,264	$41.12
Percent of Total Study Area	58.4%	117.9%	26.8%	81.2%	14.8%	65.1%	100.0%	

Source: Cushman & Wakefield, second quarter 2003.

As indicated in Table 5-9, the vacancy rate for office space in Manhattan is currently 12.5 percent. Of the three submarkets, Midtown South has the highest vacancy rate (14.5 percent). Overall, Class B space has a slightly higher vacancy rate (13.1 percent) than Classes A (12.4 percent) or C (12.2 percent). The vacancy rate for Class A buildings is higher Downtown than in other submarkets.

Table 5-9
Post September 11, 2001 Manhattan Office Vacancy (2003)

Submarket	Class A		Class B		Class C		Total	
	Total Available Space	Total Vacancy Rate	Total Available Space	Total Vacancy Rate	Total Available Space	Total Vacancy Rate	Total Available Space	Total Vacancy Rate
Midtown	20,430,860	11.9%	5,104,073	12.2%	2,122,232	12.2%	27,657,165	12.0%
Midtown South	1,198,558	12.1%	4,897,171	16.2%	3,341,074	13.4%	9,436,803	14.5%
Downtown	6,473,383	14.3%	3,709,101	11.5%	1,559,526	10.2%	11,742,010	12.6%
Total	28,102,801	12.4%	13,710,345	13.1%	7,022,832	12.2%	48,835,978	12.5%
Percent of Total Study Area	57.5%	99.2%	28.1%	104.8%	14.4%	97.6%	100.0%	

Source: Cushman & Wakefield. Downtown New York Office Market Data, second quarter 2003.

Lower Manhattan Office Market

The Lower Manhattan office market has changed in many ways since 2001 (see Table 5-10). The total inventory in 2003 is about 14 percent less than it was in 2001—a difference of about 15 msf. The most dramatic change occurred in Class A inventory, which decreased by approximately 23 percent. The decrease in Class A space occurred primarily from the loss of the WTC and surrounding buildings. A small fraction of that loss was countered by an increase of 0.75 msf of Class A space in Financial West between 2001 and 2003.

Table 5-10
Post September 11, 2001 Lower Manhattan Office Inventory and Rents (2003)

	Class A		Class B		Class C		Total	
Submarket	Inventory (sq.ft.)	Total Avg. Rent	Inventory (sq.ft.)	Total Avg. Rent	Inventory (sq.ft.)	Total Avg. Rent	Inventory (sq.ft.)	Total Avg. Rent
World Financial	10,202,802	$44.13	2,447,114	$29.27	1,396,150	$32.00	14,046,066	$40.58
City Hall	5,181,465	$40.99	3,492,656	$29.23	5,904,094	$30.60	14,578,215	$33.02
Insurance	5,202,929	$33.25	7,170,386	$27.90	4,393,706	$26.95	16,767,021	$29.85
Financial West	1,438,315	$34.51	3,433,528	$32.56	1,569,242	$29.24	6,441,085	$33.72
Financial East	23,349,965	$42.42	15,705,471	$31.16	2,002,826	$23.87	41,058,262	$36.98
Total	45,375,476	$41.57	32,249,155	$30.58	15,266,018	$28.49	92,890,649	$36.36

Source: Cushman & Wakefield. Downtown New York Office Market Data, second quarter 2003.

Average rents in Lower Manhattan have decreased dramatically since 2000. Overall, rent dropped by 13.2 percent from $41.17 psf to $36.36 psf. Class C rents dropped by the greatest percentage (23 percent) and Class A the least (13 percent). Among Downtown submarkets, rents in the Insurance area experienced the most drastic decrease (dropping by 24 percent).

Data from the second quarter of 2003 indicates that Lower Manhattan now has a total inventory of approximately 93 msf of office space. Of that space, 49 percent is considered Class A. Over 50 percent of Class A space is located in the Financial East submarket. Class B space is also concentrated in Financial East, while the City Hall and Insurance submarkets contain the majority (a combined 67 percent) of Class C space.

As illustrated in Table 5-11, vacancy rates in Lower Manhattan vary across submarkets and class of space. The World Financial and Financial West submarkets have the highest vacancy rates (24.7 percent and 22.9 percent respectively). Vacancies are most common in Class A space at approximately 14.3 percent as compared to 11.5 percent of Class B space and 10.2 percent of Class C space.

Table 5-11
Post September 11, 2001 Lower Manhattan Office Vacancy (2003)

	Class A		Class B		Class C		Total	
Submarket	Total Available Space	Total Vacancy Rate	Total Available Space	Total Vacancy Rate	Total Available Space	Total Vacancy Rate	Total Available Space	Total Vacancy Rate
World Financial	2,616,297	25.6%	702,556	28.7%	156,153	11.2%	3,475,006	24.7%
City Hall	248,557	4.8%	205,936	5.9%	495,539	8.4%	950,032	6.5%
Insurance	567,267	10.9%	414,298	5.8%	387,080	8.8%	1,368,645	8.2%
Financial West	561,506	39.0%	655,240	19.1%	261,037	16.6%	1,477,783	22.9%
Financial East	2,479,756	10.6%	1,731,071	11.0%	259,717	13.0%	4,470,544	10.9%
Total	6,473,383	14.3%	3,709,101	11.5%	1,559,526	10.2%	11,742,010	12.6%

Source: Cushman & Wakefield. Downtown New York Office Market Data, second quarter 2003.

COMMERCIAL RETAIL MARKET

According to the New York City Department of Finance, Manhattan has a total of 108.6 msf of retail space. Approximately 41 percent (44.4 msf) is located in Midtown South, 31 percent (33.9 msf) in Midtown, and 6.5 percent Downtown.

The average asking rent varies considerably among submarkets. Average asking rents are highest in the East Side and are lowest in Upper Manhattan. The average asking rent dropped dramatically between Spring 2001 and Spring 2003, from $98 psf to $88 psf. The amount of available retail space increased only modestly over that same period from 10.6 msf to 11.3 msf. The amount of available space was 14.5 msf in Spring 2003.

Lower Manhattan contains approximately 7.1 msf of retail space and comprises approximately 6.5 percent of the retail space in Manhattan. According to the Real Estate Board of New York (REBNY), almost 2.3 msf of Lower Manhattan's retail space was available in Spring 2003. The average asking price is $58 psf, which is markedly lower than the $88 psf average asking rent for Manhattan as a whole.

September 11, 2001 had considerable negative impacts on the Lower Manhattan retail market. Approximately 325,000 sf of retail space was destroyed at the World Trade Center, and many retail establishments in the area were closed for several months following the attacks. Retailers reported a dramatic drop in sales after the attacks, resulting both from a decline in office and tourist populations and from the temporary decline in the residential population. The vacancy rate below Chambers Street increased from 10 percent in August 2001 to 17 percent in May 2002, and the average asking rent decreased from $60 psf to $58 psf.

Retail activity improved as people and businesses returned to Lower Manhattan. Major Downtown stores such as Century 21 and J&R Computer World have reopened, and new stores such as Ann Taylor Loft, Nine West, and Crunch Gym have appeared in Lower Manhattan. However, the average asking rent is still $2 psf lower than in Spring 2001 and $9 psf less than in Fall 2000.

The retail market in Lower Manhattan includes a broad range of services, but is heavily concentrated in the food industries. A survey conducted by Wall Street Rising in August 2002 indicated that approximately one third of the retail establishments south of Chambers Street were food-oriented, with 20 percent falling into the Deli/Fast Food/Take-Out category and 11 percent in the Restaurant category. Roughly another third of the retail base was in the GAFO (general merchandise, apparel and accessories, furniture and home furnishings, and other comparison goods) category, with approximately 11 percent of all retail stores selling apparel and accessories. Neighborhood services such as nail and hair salons, cleaners/tailors, and shoe repair shops constituted another 15 to 20 percent of the retail south of Chambers. *

Immediate Study Area Retail Market

The Immediate Study Area includes the blocks immediately surrounding the Project Site. The retail mix in the Immediate Study Area reflects the composition of the retail market in Lower Manhattan as a whole with a heavy concentration of food-oriented and GAFO businesses. (Refer to Figure 5-4, later in this chapter.)

* Wall Street Rising. *Downtown Retail Attraction Program*. March 2003. Section 3.

The World Financial Center currently contains a total of 33 retail establishments on two floors. Twelve are eating or drinking places, 10 are GAFO stores, 9 sell convenience goods, and 2 offer neighborhood services. As of March 2003, there were 19 available stores in the World Financial Center, ranging from 574 to 13,620 square feet.

The remainder of the study area contains 70 retail establishments. Most are street level. A few have street-level entrances with second floor space, and others are located slightly below street level. Of the 70 stores, 24 are GAFO, 21 are eating or drinking establishments, 14 sell convenience goods (with 4 focusing on food items), and 7 provide neighborhood services. At the time of this field inspection, the area included four vacant storefronts, one on the northeast corner of Church and Vesey Streets, two along Liberty between Greenwich and Trinity Streets, and one on the northeast corner of Broadway and Maiden Lane.

EMPLOYMENT

New York City and Manhattan

Between 2000 and 2002, employment in every private sector industry except for "Unclassified" decreased. The Services industry lost the greatest number of employees (about 51,000) while the Wholesale Trade and Manufacturing industries lost the greatest percent of employees (10 and 16 percent, respectively).

According to second quarter 2002 employment data from the NYSDOL, there were approximately 2.9 million individuals working in the private sector in New York City. Over 60 percent were employed in Manhattan. (See Table 5-12.) Service industries—which include a wide variety of jobs in hotel, educational services, legal services, automotive repair, and health services—employed the largest number of people and the greatest percentage of the total private sector workforce in both New York City and Manhattan. In Manhattan, employment in service industries was approximately 850,140, or 47 percent of the overall private sector market. In New York City, 46 percent of the private sector workforce was employed in Services. After Services, the industry employing the greatest number of Manhattan workers was FIRE. These workers comprised over 21 percent of Manhattan's private sector workforce. In New York City as a whole, however, FIRE constituted only 16 percent of total employment. Outside Manhattan, Trade, particularly Retail Trade, was the second-highest employer, comprising approximately 20 percent of the private sector workforce.

Public sector employment represented 16 percent of all employment in New York City in 2002. Of the 553,887 public sector employees, approximately 60,700 worked for the federal government, 42,600 for the State, and 450,600 for local government.

Lower Manhattan Employment

The September 11, 2001 attacks and the economic downturn that followed had a dramatic impact on employment in Lower Manhattan. The attack destroyed seven buildings and damaged approximately 23 others.* According to TenantWise.com, the buildings that were destroyed and damaged contained 608 tenants (450 tenants in destroyed buildings and 158 tenants in damaged buildings). Approximately 137,920 jobs were initially displaced.

* New York Metropolitan Transportation Council. *Demographic and Socioeconomic Forecasting Post September 11th Impacts.* Technical Memorandum Prepared by Urbanomics.

Table 5-12
Post-September 11, 2001 Manhattan and New York City Private Sector Insured Employment (2002)

Industry	Manhattan		NYC	
	Employment	Percent of Total	Employment	Percent of Total
Manufacturing	118,341	6.6%	201,982	7.0%
Agriculture and Mining	2,273	0.1%	4,756	0.2%
Construction	31,284	1.7%	111,575	3.9%
Transportation and Public Utilities	82,896	4.6%	182,542	6.3%
Trade	321,689	17.8%	570,515	19.7%
Wholesale Trade	99,117	5.5%	162,124	5.6%
Retail Trade	222,572	12.3%	408,391	14.1%
FIRE	386,348	21.4%	452,072	15.6%
Services	850,137	47.2%	1,330,701	46.0%
Unclassified	9,536	0.5%	36,987	1.3%
Total Private Sector Employment	1,802,510	100.0%	2,891,130	100.0%

Source: New York State Department of Labor, second quarter 2002.

As of March 2002, 55.3 percent of displaced jobs had returned to Lower Manhattan. Another 27 percent had relocated to Midtown, 11 percent to New Jersey, and 5 percent to other locations. TenantWise.com reports that as of September 2003, only 91 of the 186 large corporate tenants (those occupying over 10,000 sf of office space) forced to relocate following the attacks had returned to Lower Manhattan.

In light of these displacement and relocation estimates, it is not surprising that Lower Manhattan lost approximately 71,256 employees, representing 17 percent of its 2000 workforce. The greatest loss was in the FIRE sector, which decreased by approximately 25 percent. Retail was also hit hard, losing approximately 11 percent of its 2000 base.

In 2002, there were 354,753 private and public sector jobs in Lower Manhattan. As shown in Table 5-13, almost 40 percent of the private sector employees worked in service industries and another 35 percent worked in the FIRE sector. Within the FIRE industries, over 60 percent were in the "Security and commodity brokers, dealers, exchanges, and services" subsector and another 14 percent were at banks, in the "Depository institutions" subsector. The greatest percentage of employees in the Services Industry (31 percent) were in "Business Services."

Table 5-13
Post-September 11, 2001 Lower Manhattan Employment (2002)

Industry	Number	Percent
Private Sector Employment	276,336	77.9 %
Agriculture, Forestry, Fishing, and Hunting	174	0.1 %
Mining	2	0.0 %
Construction Industries	3,478	1.3 %
Manufacturing	12,012	4.3 %
Transportation, Communication, and Utilities	10,627	3.8 %
Wholesale Trade	7,658	2.8 %
Retail Trade	29,520	10.7 %
Financial, Insurance, Real Estate	96,004	34.7 %
Services Industries	107,444	38.9 %
Unclassified Establishments	9,395	3.4 %
Public Sector Employment	78,417	22.1 %
Total Employment	354,753	100.0 %

Notes:

1. Due to NYSDOL data suppression practices, the sum of employment by industry did not exactly match the total private sector employment figure. Employment that was unaccounted for in the industry breakdown was added to "Unclassified Establishments."
2. For private sector employment industry subcategories, "Percent" represents percent of private sector employment, not total employment. For main public and private sector headings, "Percent" represents the relative contribution of private and public employment to total employment.

Sources: Number of firms was obtained from NYSDOL 2002 employment data. Employment was estimated using NYSDOL data to generate an employment estimate that is consistent with NYMTC employment estimates.

D. PROBABLE IMPACTS OF THE PROJECT ALTERNATIVES

CONSTRUCTION PERIOD (2006)

FUTURE COMMON TO ALL ALTERNATIVES

By 2006, Lower Manhattan will gain an estimated 6,023 housing units, an increase of 18 percent over its 2000 base, and an estimated 10,856 residents (see Table 5-14). Accounting for these additional housing units and those known to have been constructed between 2000 and 2003, Lower Manhattan will have 38,581 housing units and approximately 78,929 residents by 2006.

Lower Manhattan will gain approximately 3.55 msf of office space. When added to the 92.9 msf of space in Lower Manhattan in 2003, the total space will be approximately 96.45 msf by 2006. Retail area will increase by 110,400 sf between 2003 and 2006, resulting in a total of approximately 7.21 msf of space. The projected retail employment, office employment, and other employment (from hotel and institutional uses) are added to the 2002 base of 354,753, it yields an estimated 2006 figure of approximately 369,966 jobs.

Table 5-14
Projected Housing, Population, and Employment in Lower Manhattan in the Construction Period (2006)

Estimate	Residential (DU)	Office (sf)	Retail (sf)	Population	
				Residential	Employee
Post-September 11, 2001	32,558	92,900,000	7,100,000	68,073	354,753
Incremental Growth	6,023	3,550,800	110,400	10,856	15,213
Total 2006	38,581	96,450,800	7,210,400	78,929	369,966

Notes: Population estimates were generated by multiplying the number of housing units (DU) by the 2000 average household size for each subarea. Employment estimates were generated by applying standard employee/square foot ratios to anticipated development.

In addition to the jobs that would be created by new development in Lower Manhattan, the major, federally-sponsored recovery efforts that are independent of the Preferred Alternative are anticipated to result in significant numbers of construction jobs in 2006. As will be described below for the Preferred Alternative, these workers will provide for substantial increases in spending and tax revenues within Lower Manhattan.

NO ACTION ALTERNATIVE

Under the No Action Alternative, the temporary WTC PATH station would continue to operate as it does today with a single entry/exit at the intersection of Fulton and Church Streets. There would be construction activity on the WTC site associated with the WTC Memorial and Redevelopment Plan. Although access to the temporary WTC PATH station would be retained at all times, certain routes to and from the Fulton Street entrance may be restricted to allow for construction staging and other activities. However, since there would be no active uses on the WTC site during the construction period, these restrictions would not have a direct economic effect.

As will be described in Chapter 15, "Cumulative Effects," the simultaneous construction of transportation and development projects in Lower Manhattan may have impacts to local residents and businesses. Temporary road closures, trucking activities, and construction noise may temporarily affect the quality of life for employees and residents in the vicinity of the WTC site.

PREFERRED ALTERNATIVE

Construction of the Preferred Alternative would not displace residents or businesses since no such uses are currently located on the WTC site. The plans for the Preferred Alternative have been closely coordinated into the WTC Memorial and Redevelopment Plan; thus, its construction would also not preclude future cultural, office, and retail projects on the WTC site. Off-site construction is limited to portions of Route 9A and the Winter Garden at the World Financial Center. In their planning for these off-site activities, PANYNJ has ensured that no commercial or residential spaces would be directly displaced.

The majority of the Preferred Alternative's construction would occur within the WTC site. Where off-site construction would be required, PANYNJ would prepare a Maintenance and Protection of Traffic (MPT) plan to ensure that residents, employees, and visitors to Lower Manhattan can access destinations throughout the study area (see Chapter 8, "Transportation").

Environmental Performance Commitments (EPCs) would be undertaken to communicate with local businesses regarding construction activities and to provide for signage and advertising to promote businesses directly impacted by construction activities. Thus, the Preferred Alternative would not eliminate access to existing residential, business, or retail establishments during the construction period.

Access to the temporary WTC PATH station would be retained throughout the construction period. However, as certain components are completed, additional entrances and exits would be provided. As described below, the anticipated changes in pedestrian flows associated with the Preferred Alternative would not result in adverse impacts to businesses in the Immediate Study Area.

The construction of the Preferred Alternative would be coordinated with the overall redevelopment of the WTC site. Although additional construction equipment and labor would be required for the Terminal's construction, the types of activities and their potential effects on local populations would occur with or without the Preferred Alternative since the WTC Memorial and Redevelopment Plan would occur independently. However, to minimize any potential adverse effects associated with the construction of the Preferred Alternative, PANYNJ would implement EPCs as described in Chapter 2, "Project Alternatives," and later in this chapter under Section E, "Mitigation."

As described in Chapter 2, "Project Alternatives," the Draft Environmental Impact Statement evaluated a Permanent WTC PATH Terminal both with and without a sub-grade connection beneath Church Street to Liberty Plaza. The alternative with the concourse was projected to cost $81 million more than the alternative without the concourse. However, since publication of the DEIS, PANYNJ has advanced the design of the Preferred Alternative, which does not include this sub-grade concourse, and has determined that certain components would be more costly than originally estimated. Thus, the Preferred Alternative would have a higher construction cost ($2.138 billion) than the "Terminal with Liberty Plaza Connection Alternative" presented in the DEIS.

The construction of the Preferred Alternative would generate new construction jobs and resultant economic benefits for Lower Manhattan. The principal model used to estimate the effect of constructing the Terminal on the city's economy is the Regional Input-Output Modeling System (RIMS II), developed by the U.S. Department of Commerce, Bureau of Economic Analysis. The model contains data for New York City on 490 economic sectors, showing how each sector affects every other sector as a result of a change in the quantity of its product or service. A similar RIMS II model for New York State, also developed by the U.S. Department of Commerce, has been used to trace the effects on the State economy. The models have been adjusted to reflect the most recent changes in the New York metropolitan area price level. Using these models and the specific characteristics of the project, the total effect has been projected for New York City and State.

The development of this alternative would be undertaken by the investment of funds into the area. Based on preliminary estimates, the capital investment for construction of the Preferred Alternative is estimated to equal about $2.138 billion. This amount includes site preparation and hard costs (actual construction), and design, legal, and related costs. The total estimated amount of $2.138 billion reflects the cost of physical improvements to the site, and therefore excludes other values (such as financing) that are not directly a part of the expenditures for construction.

The $2.138 billion represents the direct expenditures during the construction period. As a result of the direct expenditures, the direct employment is estimated at about 10,533 person-years of employment. (A person-year is the equivalent of one employee working full-time for a year.) In addition to direct employment, total employment resulting from construction expenditures would include jobs in business establishments providing goods and services to the contractors and resulting indirect and generated employment. Based on the model's economic multipliers for New York City industrial sectors, the Preferred Alternative would generate an additional 5,779 person-years of employment within New York City, bringing the total direct and generated jobs from the construction to 16,312 person-years (see Table 5-15). In the larger New York State economy, the model estimates that this alternative would generate 9,432 person-years of indirect employment, bringing the total direct and generated jobs from construction to 19,965 person-years of employment.

The direct wages and salaries during the construction period are estimated at $661.50 million (see Table 5-15). Total direct and generated wages and salaries resulting in New York City from construction are estimated at $988.94 million. In the broader New York State economy, total direct and generated wages and salaries from construction of the Preferred Alternative are estimated at $1.18 billion ($1,184.88 million).

Based on the RIMS II model for New York City and State, the total economic activity, including indirect expenditures (those generated by the direct expenditures), that would result from construction is estimated at $3.97 billion in New York State, of which $3.10 billion would occur in New York City (see Table 5-15).

The construction activity would have associated with it tax revenues for New York City, the Metropolitan Transportation Authority (MTA), and New York State. Based on aggregate data on economic activity and tax receipts for the New York City and State economies, it is estimated that, in total, the construction of the Terminal would generate approximately $146 million in tax revenues for New York City, MTA, and New York State. Of these tax revenues, the largest portion would come from personal income taxes, corporate and business taxes, sales tax on indirect expenditures, and related taxes on direct and induced economic activity. New York State would receive about $96.81 million from construction of the Preferred Alternative. The MTA (which collects a 0.25 percent sales tax and tax surcharges on business and utilities taxes within the city and the MTA 12-county region) would receive about $2.96 million. New York City would receive about $46.5 million.

OPENING YEAR (2009)

FUTURE COMMON TO ALL ALTERNATIVES

Table 5-16 summarizes the development and population growth anticipated in Lower Manhattan by 2009. The combined new construction of dwelling units, offices, and retail between 2003 and 2009 will increase both the residential and employee populations of Lower Manhattan. In total, the area is expected to gain 10,060 dwelling units, 6.15 msf of office space, and 1.38 msf of retail space between 2003 and 2009. This will result in a total of 42,618 dwelling units, 99.05 msf of office space, and 8.48 msf of retail space.

In total, the area's residential population will increase by 28 percent between 2003 and 2009 from 68,073 to 86,893. The combined development of offices, retail, hotels, and institutional uses in Lower Manhattan is expected to increase its employment by nearly 9 percent over the same six year period from 354,753 to 386,081.

Table 5-15
Employment and Fiscal Benefits from Construction of the Preferred Alternative

	Portion in New York City	Total New York City And State
Employment (Person-years)*		
Direct (Construction)	10,533	10,533
Indirect (Secondary and Induced)	5,779	9,432
Total	16,312	19,965
Wages and Salaries (Millions)		
Direct (Construction)	$661.50	$661.50
Indirect (Secondary and Induced)	$327.44	$523.38
Total	$988.94	$1,184.88
Total Economic Output or Demand** (Millions)		
Direct (Construction)	$2,138.0	$2,138.0
Indirect (Secondary and Induced)	$957.7	$1,832.6
Total	$3,095.7	$3,970.6
	Fiscal	
Tax Revenues*** (Constant 2003 dollars)		
New York City Taxes	$46,485,500	
MTA Taxes	$2,963,000	
New York State Taxes	$96,809,500	
Total	$146,258,000	

Notes:
* A person-year is the equivalent of one person working full-time for a year.
** The economic output or total effect on the local economy derived from the direct construction spending.
*** Includes personal income taxes, corporate and business taxes, sales tax on indirect expenditures, and numerous other taxes on construction and secondary expenditures.
Sources: The characteristics and construction cost of the Preferred Alternative; the Regional Input-Output Modeling System (RIMS II), U.S. Department of Commerce, Bureau of Economic Analysis; and the tax rates by applicable jurisdiction.

Table 5-16
Projected Housing, Population, and Employment in Lower Manhattan in the Opening Year (2009)

Estimate	Residential (DU)	Office (sf)	Retail (sf)	Population	
				Residential	Employee
Post-September 11, 2001	32,558	92,900,000	7,100,000	68,073	354,753
Incremental Growth	10,060	6,150,800	1,380,400	18,820	31,328
Total 2009	42,618	99,050,800	8,480,400	86,893	386,081

Notes: Population estimates were generated by multiplying the number of housing units by the 2000 average household size for each subarea. Employment estimates were generated by applying standard employee/square foot ratios to anticipated development.

NO ACTION ALTERNATIVE

Under the No Action Alternative, the temporary WTC PATH station would continue to operate in the opening year. As described in Chapter 8, Section A, "PATH," PANYNJ anticipates that the temporary station can fully accommodate the anticipated increase in workers and residents in Lower Manhattan in the 2009 opening year.

PREFERRED ALTERNATIVE

Upon its completion, the Preferred Alternative would have positive impacts to the residential and business populations of Lower Manhattan. As described in Chapter 8, Section A "PATH," the Preferred Alternative would serve approximately 67,000 passengers on an average weekday. The transportation link between New Jersey and Lower Manhattan would improve the marketability of office space in the study area and would support the growing residential population of Lower Manhattan.

The Preferred Alternative would include a small retail component (less than 5,000 sf), but there would be no residential or office uses within the project limits. Thus, the Preferred Alternative would not alter the 2009 projected employment or population characteristics described above.

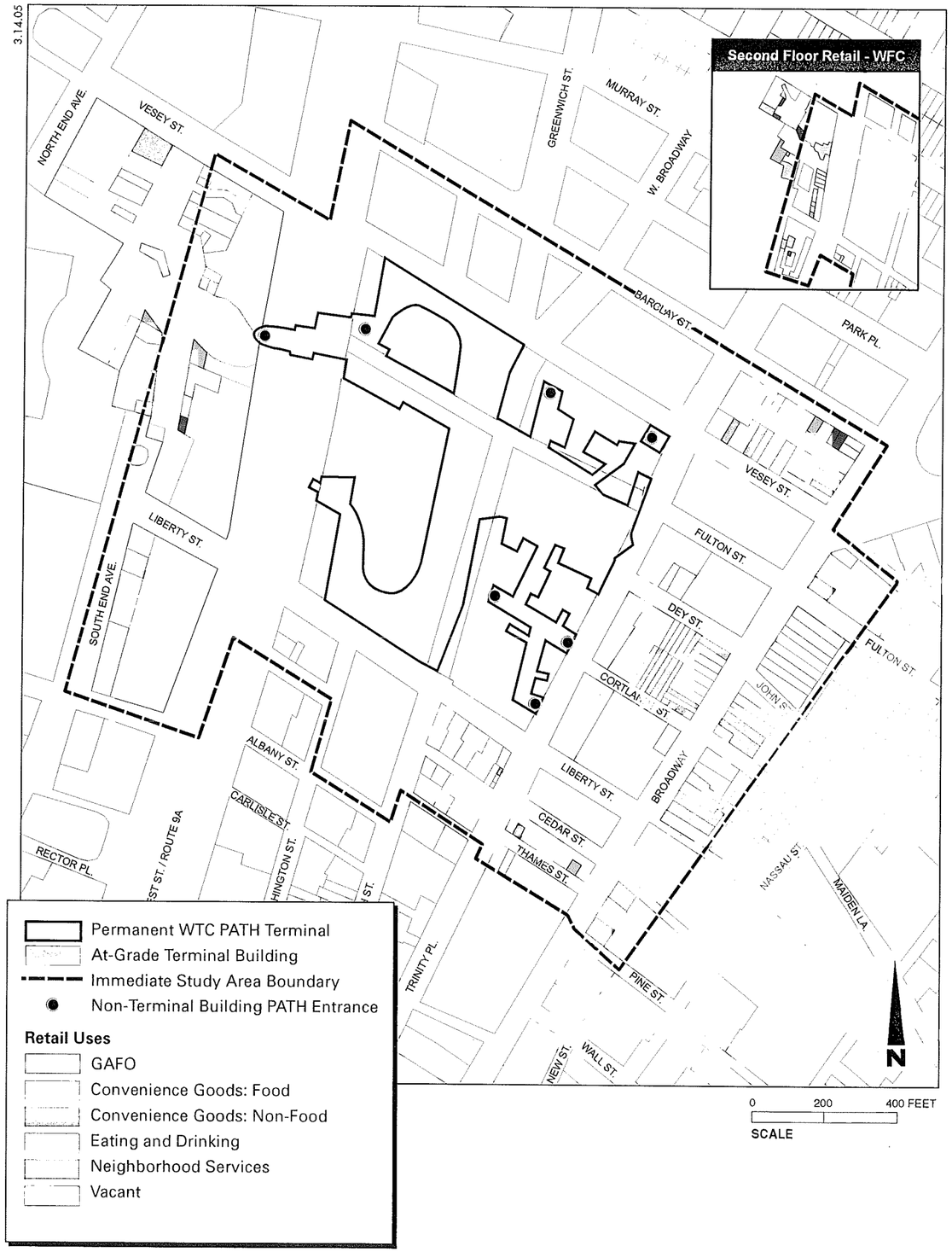
Although the Preferred Alternative may increase the desirability of Lower Manhattan's residential market, its effects would not be powerful enough to alter the existing demographic or housing profile nor would it alter existing trends. Over the past two decades, Lower Manhattan has experienced residential growth that is unmatched by most parts of the city. Between 1990 and 2000, the housing stock in the subareas immediately surrounding the WTC site increased by 44 percent as compared to 1.6 and 6.9 percent for Manhattan and the city as a whole, respectively. As described under the Future Common to All Alternatives, this trend is expected to continue. Based on current and anticipated statistics, the area would not contain a substantial population that would be vulnerable to indirect displacement. Thus, any upward pressures in real estate resulting from the development of the Preferred Alternative would not result in adverse impacts from the displacement of local residents.

The Preferred Alternative would not directly displace business or residents, would not introduce major new economic activities, and would not replace property that has a blighting effect on existing commercial development. Therefore, the Preferred Alternative would not result in indirect business displacement. If anything, it would have a positive indirect effect to the Lower Manhattan office market by providing improved access to existing and proposed developments.

Prior to September 11, 2001, approximately 140,000 people used the WTC PATH Terminal on a daily basis, generating a reliable stream of foot traffic for retail establishments in the Immediate Study Area. Figure 5-4 shows existing retail uses in the Immediate Study Area by category along with the proposed access points to the Terminal, which would be generally positioned in the same location as before September 11, 2001 with two exceptions: 1) a sub-grade connection to the Winter Garden at the World Financial Center, and 2) connection to Fulton Street Transit Center's Dey Street Concourse.

The proposed Winter Garden entrance would replace the second-level pedestrian bridge that existed before September 11, 2001. This entrance may alter pedestrian patterns within the World Financial Center as compared to the pre-September 11, 2001 condition, but any changes would be modest and would not substantially impact existing businesses in the World Financial Center. The new Dey Street concourse, which is being constructed independent of the Preferred Alternative, would allow a direct, sub-grade connection between subways located along

3.14.05



PERMANENT WTC PATH TERMINAL
Final Environmental Impact Statement

Figure 5-4
Retail Uses

Broadway, Fulton, Nassau, and William Streets and the WTC site and Permanent WTC PATH Terminal. This new transfer may attract some pedestrians from street-level; however, the businesses located en route would not be substantially impacted by these diversions. Thus, the Preferred Alternative would not have adverse indirect effects to retail establishments in the Immediate Study Area.

The Preferred Alternative would not directly alter the employment characteristics of the study area since it would not include an office component or substantial commercial development. The small amount of retail that is proposed would be comparable to that which existed prior to September 11, 2001. This retail would employ up to 15 people, representing a small addition to the more than 382,800 jobs that would be located south of Canal Street in 2009. Any potential impacts to employment would be positive since the Preferred Alternative would improve access to jobs for both residents of New Jersey and Lower Manhattan.

DESIGN YEAR (2025)

FUTURE COMMON TO ALL ALTERNATIVES

Table 5-17 summarizes the development and population growth anticipated in Lower Manhattan by 2025. In total from 2003 to 2025, Lower Manhattan is expected to gain 12,217 new housing units, nearly 15 msf of new and reoccupied office space, and nearly 1.5 msf of new and reoccupied retail space. In total the area will house 90,775 residents and will employ 421,873 in offices, retail, hotels, and cultural and institutional facilities.

Table 5-17
Projected Housing, Population, and Employment in Lower Manhattan in the Design Year (2025)

Estimate	Residential (DU)	Office (sf)	Retail (sf)	Population	
				Residential	Employee
Post-September 11, 2001	32,558	92,900,000	7,100,000	68,073	354,753
Incremental Growth	12,217	14,912,850	1,470,700	22,702	67,120
Total 2025	44,775	107,812,850	8,570,700	90,775	421,873
Pre-September 11, 2001	27,143	107,512,756	7,450,000	58,618	426,000

Notes: Population estimates were generated by multiplying the number of housing units by the 2000 average household size for each subarea. Employment estimates were generated by applying standard employee/square foot ratios to anticipated development.

The residential population of Lower Manhattan is expected to increase substantially as compared to before September 11, 2001. By 2025, the area will house 90,775 residents, representing a 79 percent increase over the 25 year period. Although the area will realize a net gain in retail and office spaces, the total employment in 2025 is expected to be quite similar to pre-September 11, 2001 conditions. By 2025, employment will be within 1 percent of its pre-September 11, 2001 levels. The estimates presented in Table 5-18 indicate that while the office and retail markets in Lower Manhattan will have recovered from the terrorist attacks by 2025, the area's drastic increase in its residential population exemplify Lower Manhattan's changing focus from a 9 to 5 business center to a 24-hour neighborhood.

NO ACTION ALTERNATIVE

By 2025, the temporary WTC PATH station would be retired from service since it would have reached the end of its useful service life. Absent the Preferred Alternative, PATH operations would be suspended between New Jersey and the WTC site. As described in Chapter 1, "Purpose and Need," Chapter 8, "Transportation," and previously in this chapter, the aftermath of September 11, 2001 had devastating affects to the economy of Lower Manhattan. Access to the area was limited by the loss of PATH service between New Jersey and the WTC. It is anticipated that if this connection was again lost, growth in population and employment would not be as robust as currently projected.

This assertion is supported by surveys and studies involving businesses currently located in Lower Manhattan. For example, the "Executive Survey" performed by the Downtown Alliance in April 2003 revealed that transportation access to Lower Manhattan is an issue of high importance to senior executives at leading Downtown companies. The survey indicates that for many leading businesses, the decision to remain in or relocate to Lower Manhattan is heavily based on the convenience and ease with which their employees and clients can reach their facilities. Thus, the absence of a WTC PATH Terminal under the No Action Alternative may contribute to an out-migration of some existing firms, and discourage other firms from locating in Lower Manhattan.

As discussed in Chapter 8, Section B ("Vehicular Traffic and Parking"), vehicular traffic during AM and PM peak hours is expected to increase by more than 1,200 trips under the No Action Alternative. This addition would represent a considerable increase in congestion and could have adverse impacts at key locations, especially near the major portals such as the Holland Tunnel and along the Route 9A corridor. These new vehicle trips could negatively impact businesses in Lower Manhattan, making it more difficult for trucks to deliver goods, for employees to reach their workplaces, and for customers to reach retailers.

Thus, the combination of increased vehicle traffic and decreased transportation access under the No Action Alternative could have a serious adverse impact on the long-term vitality of the Lower Manhattan economy.

PREFERRED ALTERNATIVE

As previously described, the Preferred Alternative would not include a residential or office component. The proposed retail component would be comparable to what existed prior to September 11, 2001 and would not have an effect on employment in Lower Manhattan. Thus, the Preferred Alternative would not alter the development, population, or employment characteristics described above for the Future Common to All Alternatives.

Furthermore, the Preferred Alternative would have no adverse direct or indirect effects on residents or businesses in the design year. While ridership would increase between 2009 and 2025, this change would have positive impacts to businesses within the Immediate Study Area. It is expected that any effects of the Preferred Alternative would be beneficial as compared to existing and No Action conditions and that there would be no adverse impacts to social or economic conditions in Lower Manhattan.

E. MITIGATION

During the construction period, activities associated with the Permanent WTC PATH Terminal may restrict access or limit the visibility of certain businesses in the immediate vicinity of the Project Site. To minimize adverse effects to these businesses, PANYNJ would undertake EPCs that both promote the business climate and Lower Manhattan and retain access to businesses, to the extent possible. These EPCs and the proposed implementation plans are described in Table 5-18.

Table 5-18
Environmental Performance Commitments

Proposed Commitment	Implementation Plan
Coordinate with LMDC, Downtown Alliance or other entities to minimize residential and retail impacts as required through: a) relocation assistance, as applicable, to persons to businesses physically displaced by the project; and b) focus on essential business and amenities to remain in Lower Manhattan.	This would be implemented as part of the Maintenance and Protection of Traffic (MPT) Plan and the coordinated Transportation Management Plan (TMP) among the Lower Manhattan Project sponsors. All businesses in the affected area would be mapped, in conjunction with the MPT and construction staging plans, to determine conflicts on business access. The MPT Plan and TMP would then identify solutions to these conflicts.
Add appropriate signage for affected businesses and amenities.	This would be implemented as part of the project's MPT Plan.

As described in Chapter 2, "Project Alternatives," PANYNJ has and continues to coordinate with the sponsors of the other Lower Manhattan recovery efforts to further refine the EPCs and protocols for their implementation. This includes public outreach planning to inform businesses and residents of issues during the construction period. This plan will employ a variety of methods to communicate with the public during construction of the Preferred Alternative including targeted outreach to residents and businesses adjacent to the Project Site as well as a wider campaign for Lower Manhattan through community and interest groups, media, and other public relations tools. Refer to Chapter 18, "Agency Coordination, Process, and Public Participation," for a description of outreach activities to date.

Since the Preferred Alternative would not have long-term (opening or design year) adverse impacts, as described above, mitigation would not be required once the Terminal is operational.✳

A. INTRODUCTION

Lower Manhattan is home to many of New York City's most important historic resources and some of its finest architecture. It is the oldest and one of the most culturally rich sections of the city. Thus, numerous buildings, street fixtures and other structures have been identified as historically significant. This chapter assesses the potential impacts of the Preferred Alternative on archaeological and historic resources.

B. METHODOLOGY

In general, potential effects on archaeological or historic resources can include both direct physical effects (e.g., demolition, alteration, or damage from construction on nearby sites) and indirect, contextual effects, such as the isolation of a property from its surrounding environment, or the introduction of visual, audible, or atmospheric elements that are out of character with a property or that alter its setting. To assess the potential effect of a project, an Area of Potential Effect (APE) is defined and an inventory of archaeological and historic resources located in the APE is compiled.

This section describes the delineation of the APE, the inventory, and the assessment of potential effects of the Preferred Alternative.

REGULATORY CONTEXT

The National Environmental Policy Act (NEPA) requires the consideration of potential impacts to historic resources. In addition, potential effects on historic resources are considered in conformance with Section 106 of the National Historic Preservation Act of 1966 (NHPA), Section 4(f) of the United States Department of Transportation Act of 1966 (Section 4[f]), and the New York State Historic Preservation Act of 1980 (SHPA). In addition, the New York City Landmarks Law and potential impacts to New York City Landmarks (NYCLs) and New York City Historic Districts (NYCHDs) have been considered.

NATIONAL HISTORIC PRESERVATION ACT (SECTION 106)

NHPA requires federal agencies to take into account the effects of their undertakings on historic properties. This process, commonly referred to as Section 106 process, provides for review of any federally licensed, financed, or assisted undertaking. Because funds from a federal agency (the United States Department of Transportation, Federal Transit Administration [FTA]) would be used to achieve the project, this assessment of cultural resources was prepared pursuant to Section 106 of NHPA.

Due to the WTC Site being within and near the project locations of their respective proposed undertakings, FTA, Federal Highway Administration (FHWA) and Lower Manhattan Development Corporation (LMDC) coordinated the Section 106 process in determining the

eligibility of the WTC Site for inclusion in the National Register of Historic Places. The coordinated process concluded on March 31, 2004 with the issuance of the Coordinated Determination of National Register Eligibility (Coordinated DOE) finding the WTC Site eligible for listing. As the State Register of Historic Places has the same criteria for evaluation as the National Register, the WTC Site is also eligible for inclusion in the State Register. Each project sponsor is performing its own assessment of its project's effects and identifying mitigation measures, as necessary.

Section 106, as implemented by federal regulations appearing at 36 CFR 800, mandates that federal agencies take into account the effect of their actions on any properties listed on or determined eligible for listing on the National Register of Historic Places (NR) and afford the federal Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on such undertakings. Federal agencies, in consultation with the State Historic Preservation Officer (SHPO), as well as other consulting parties where appropriate, must determine whether the Preferred Alternative would have any effects on the characteristics of a resource that qualify it for the National Register of Historic Places (NR) and seek ways to avoid, minimize, or mitigate any adverse effects. The Section 106 process includes the following:

- All properties within the APE that are included in or eligible for the National Register must be identified in consultation with SHPO. If properties are found that may be eligible for the National Register, but for which no determination has yet been made, the agency consults with SHPO to determine eligibility or ineligibility.
- If there are listed or eligible properties, the potential effect of the proposed project on each property must be evaluated, in consultation with SHPO, to determine if the project would have adverse effects on them by applying the criteria of adverse effect (36 CFR § 800.5(a)). In general, a proposed project is deemed to have an adverse effect if it would diminish the characteristics of the property that qualify it for inclusion in the National Register.
- If the analysis indicates that the proposed project would have an adverse effect, ACHP is notified, and SHPO and other consulting parties are consulted to seek concurrence on ways to avoid, minimize, or mitigate effects. This mitigation is typically implemented through either a Memorandum of Agreement (MOA) or Programmatic Agreement. ACHP may choose to participate in the consultation when there are substantial effects on important historic properties, when a case presents important questions of policy or interpretation, when there is a potential for procedural problems, or when there are issues of concern to Native Americans. ACHP must be invited to participate when the federal agency sponsoring the project requests ACHP's involvement, when the project would have an adverse effect on a National Historic Landmark (NHL), or when a Programmatic Agreement will be prepared. Programmatic Agreements may be used when effects on historic properties are similar and repetitive or are multi-state or regional in scope, when effects on historic properties cannot be fully determined prior to approval of an undertaking, or where other circumstances warrant a departure from the normal Section 106 process, among other reasons. In addition, the federal agency sponsoring the project may request an advisory opinion if it wishes.
- Execution of the MOA or Programmatic Agreement and implementation of the terms therein demonstrate that the federal agency has taken into account the effects of the action.

The review under Section 106 can be conducted in coordination with analyses conducted for NEPA, and where consistent with the procedures set forth in 36 CFR 800, information developed for the NEPA environmental review may be used to meet the requirements of Section

106. The views of the public are essential to inform federal decision-making in the Section 106 process and, therefore, the public should be made aware of, and given the opportunity to comment on, the project and its effects on historic properties. An agency may use its procedures for public involvement under NEPA to satisfy the requirements of Section 106, if those procedures provide adequate opportunities for public involvement consistent with 36 CFR 800. In the case of the Permanent WTC PATH Terminal, the FTA is coordinating its Section 106 process with the other federal agencies carrying out Lower Manhattan Recovery Projects and is using this NEPA review to provide additional opportunities for comment by the public, SHPO, ACHP, and a broad range of consulting parties. As described in Section E, "Mitigation," the Section 106 process is ongoing for this project.

In addition, Section 110 of NHPA addresses federal agencies' responsibility to preserve historic properties. Section 110(f) mandates additional protection for NHLs by requiring that federal agencies exercise a higher standard of care when considering undertakings that may directly and adversely affect NHLs.

SECTION 4(F) OF THE U.S. DEPARTMENT OF TRANSPORTATION ACT

Historic properties are also protected under Section 4(f) of the Department of Transportation Act of 1966.[1] Section 4(f) prohibits actions by the Secretary of Transportation that require "use" of a historic property that is listed on or eligible for inclusion on the National Register, unless a determination is made that there is no feasible and prudent alternative to the use of such land and all possible planning has been undertaken to minimize harm to the 4(f) property. For historic properties, "use" includes direct physical impacts, such as demolition or removal of part of a historic property. It also includes adverse contextual impacts (these can result in "constructive use," when changes caused by the project that are near the historic structure cause a substantial impairment in the historic resource's important qualities). Constructive use could occur from such changes as noise, visual intrusion, or other such elements that would significantly alter the setting of the historic resource. A Section 4(f) Evaluation has been prepared and is included in Volume I of this Environmental Impact Statement (EIS).

STATE HISTORIC PRESERVATION ACT

SHPA closely resembles NHPA, and requires that state agencies consider the effect of their actions on properties listed on or determined eligible for listing on the State Register of Historic Places. Compliance with Section 106 satisfies the requirements of SHPA, set forth in Section 14.09 of the New York State Parks, Recreation and Historic Preservation Law.

NEW YORK CITY LANDMARKS LAW

The New York City Landmarks Preservation Commission (LPC) designates historically significant properties in New York City as NYCLs and/or NYCHDs, following the criteria provided in the *Local Laws of the City of New York, New York City Charter, Administrative Code, Title 25, Chapter 3*. Properties designated as NYCLs or NYCHDs are protected under the New York City Landmarks Law, which requires LPC review and approval before any alterations or demolition can occur. Although the New York City Landmarks Law is not applicable to the

[1] Section 4(f) has been recodified as Section 303 of Title 49 of the United States Code as well Section 138 of Title 23, although it is commonly referred to as Section 4(f).

Permanent WTC PATH Terminal, potential impacts to NYCLs and NYCHDs have been considered.

AREA OF POTENTIAL EFFECT

SHPO has concurred with the APEs defined below for archaeological and historic resources (see Appendix B).

ARCHAEOLOGICAL RESOURCES

For archaeological resources, the APE is generally the area to be excavated by the Preferred Alternative, since this is the area where any artifacts or features could be disturbed (see Figure 6-1). For the Preferred Alternative, the APE for archaeological resources includes a portion of the eastern half of the WTC site (east of the 1 and 9 subway line). The western half of the WTC site (the bathtub), where the proposed tracks, platforms, and mezzanine would be located, was excavated down to bedrock during construction of the WTC, and again during the recent demolition and debris removal as part of the recovery from the attacks. As a result, the bathtub has no potential for archaeological resources.

The APE for archaeological resources also includes the location where a below-grade pedestrian concourse would extend beyond the boundary of the WTC site and cross beneath Route 9A to the World Financial Center (WFC) in Battery Park City (BPC). As described in Chapter 2, "Project Alternatives," the Draft EIS (DEIS) considered an alternative (since dismissed) that would have involved the construction of a below-grade pedestrian concourse beneath Church and Liberty Streets, terminating within Liberty Plaza. The APE for archaeological resources therefore was originally delineated to include portions of Church and Liberty Streets and Liberty Plaza.

Archaeological resources are evaluated through a three-step process. The first step, Phase 1, consisted of documentary research into the history of the site to determine the likelihood that archaeological resources may be present within the APE. This step was divided into two phases: Phase 1A, which required identifying areas that may contain archaeological resources, and Phase 1B, which would involve subsurface testing to try to determine whether any resources are actually present. Phase 1A documentary research has been complete, while Phase 1B subsurface testing has been recommended for certain areas of the Project Site. If the Phase 1B testing indicates that resources are present, then Phase 2 investigations would take place. Phase 2 would consist of more extensive subsurface investigations and additional research to establish the age, integrity and research potential of the resources, and whether they may be eligible for the Registers. A third step, Phase 3, would be considered the mitigation phase; mitigation may consist of either avoidance of the resource or data recovery in the form of a full-scale excavation and documentation.

HISTORIC RESOURCES

To account for contextual and visual effects, as well as possible construction-related structural damage, the APE for historic resources was defined as the Project Site and the adjacent area within approximately two blocks of the Project Site. Thus, the APE is generally bounded by Barclay Street to the north, Albany and Thames Streets to the south, the limits of the Route 9A right-of-way to the west and Broadway to the east (see Figure 6-1).

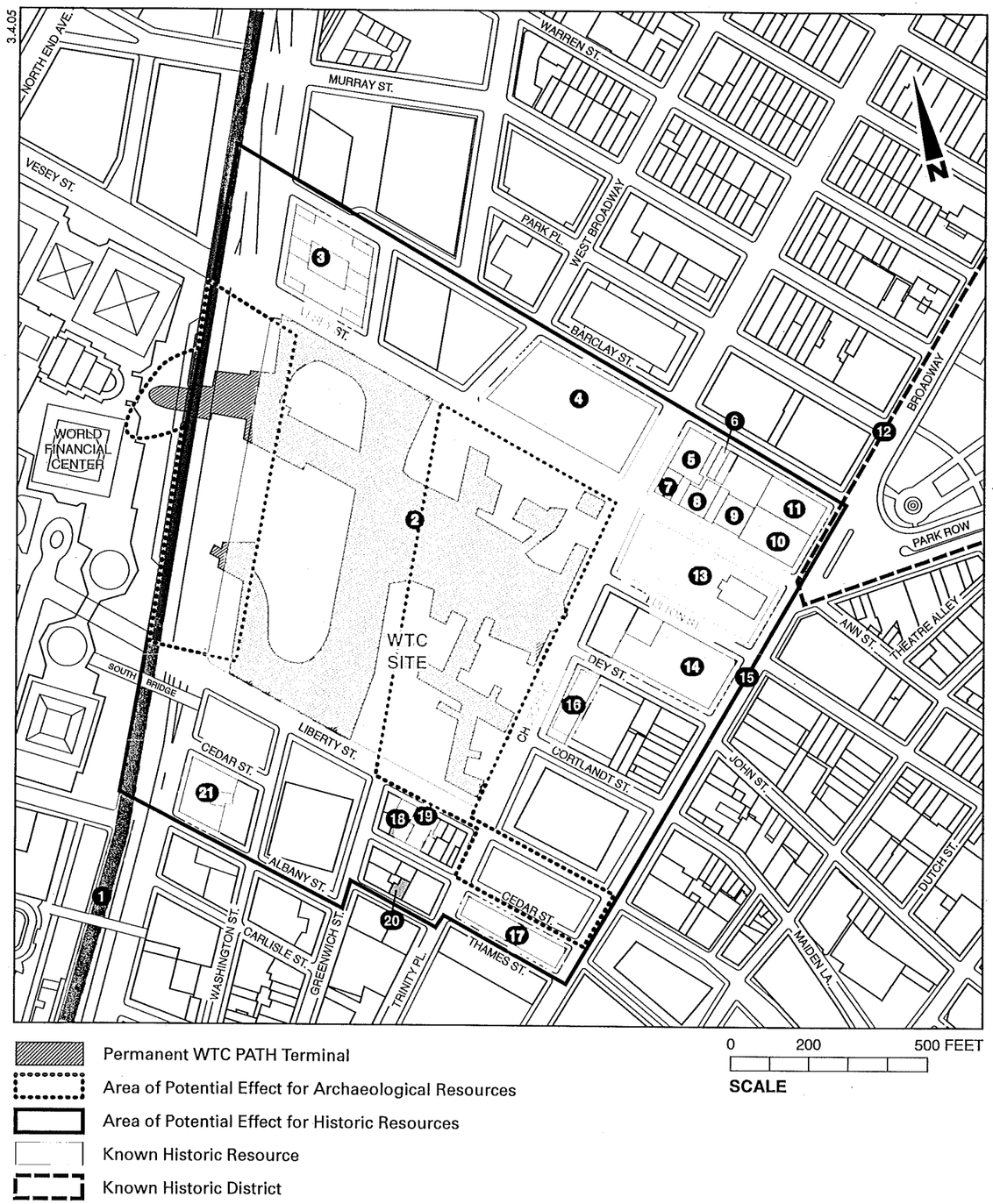


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Figure 6-1
Area of Potential Effect

Identification of Historic Resources

Once the APE was defined, a list of officially recognized historic resources within the APE was compiled. This included NHLs; other properties or districts listed on the State and National Registers of Historic Places (S/NR) or properties determined eligible for such listing; and New York City Landmarks (NYCL) or Historic Districts (NYCHD), or properties pending NYCL or NYCHD designation. A list of potential historic resources within the APE was also compiled. These were identified based on field surveys of the APE and, where available, information from historical societies or preservation organizations with knowledge of the area. Potential historic resources comprise properties that may be eligible for listing on the S/NR and/or designation as NYCLs.

The National Register Criteria for Evaluation are found in 36 CFR 60. Following these criteria, districts, sites, buildings, structures, and objects are eligible for the S/NR if they possess integrity of location, design, setting, materials workmanship, feeling, and association, and:

A. that are associated with events that have made a significant contribution to the broad patterns of our history; or

B. that are associated with the lives of significant persons in our past; or

C. that embody the distinctive characteristics of a type, period, or method of construction; that represent the work of a master; that possess high artistic values; that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. that have yielded, or may be likely to yield, information important in history or prehistory.

Properties that have been constructed within the last 50 years are ordinarily not eligible. Determinations of eligibility are made by SHPO. Generally, all properties that are listed on the National Register are listed on the State Register, which has the same criteria for evaluation as the National Register.

Buildings, properties, or objects are eligible for designation as a NYCL or NYCHD when a part is at least 30 years old. Landmarks have a special character or special historical or aesthetic interest or value as part of the development, heritage, or cultural characteristics of the city, state, or nation. There are four types of landmarks: individual, interior, historic district, and scenic.

The identification of historic resources for this project was unique due to the historic events of September 11, 2001. As described above, FTA, FHWA, and LMDC issued a Coordinated DOE regarding the WTC site's eligibility for inclusion in the National Register. SHPO concurred with this determination and found the WTC site eligible for listing in the National Register (see Appendix B). As the State and National Registers have the same criteria for evaluation, the WTC Site is also eligible for inclusion in the State Register.

In addition to the resources with official designation or status, a number of other potential historic resources have been identified by the Lower Manhattan Emergency Preservation Fund (LMEPF), a consortium of historic preservation organizations that was formed in response to the terrorist attacks of September 11, 2001. This consortium includes the Municipal Art Society, the National Trust for Historic Preservation, the New York Landmarks Conservancy, the Preservation League of New York State, and the World Monuments Fund. The LMEPF produced a map, entitled *Corridors of Concern*, which shows potential historic resources in addition to the officially recognized (or known) resources. Information obtained from this map was used to assist in the identification of potential historic resources. SHPO and LPC have

determined that some of these resources are S/NR-eligible and NYCL-eligible, and these resources have been included in Table 6-1.

ASSESSMENT OF EFFECTS ON HISTORIC RESOURCES

Once the historic resources in the APE are identified, the effects of the project on those resources are assessed. As described above, potential effects may include both direct physical effects and indirect contextual effects. Direct effects could include physical destruction, damage, or alteration of a historic resource. In addition, indirect effects, such as changes in the appearance of a historic resource or in its setting—including introduction of incompatible visual, audible, or atmospheric elements to a resource's setting—are considered.

FTA began its Section 106 process in September 2003, concurrent with scoping for the Permanent WTC PATH Terminal. In December 2003, FTA began its coordinated Section 106 process with FHWA (lead agency for the Route 9A Project and LMDC (lead agency for the WTC Memorial and Redevelopment Plan). In December 2003, the three federal agencies jointly notified the SHPO and ACHP concerning these three Lower Manhattan undertakings and identified potential consulting parties to the Section 106 process. In January and February 2004, FTA, FHWA and LMDC jointly hosted two meetings with consulting parties to discuss the projects and in particular the evaluation of the WTC Site for eligibility for inclusion in the National Register of Historic Places. Consulting parties were also offered opportunities to comment on draft versions of the Coordinated DOE, which was issued in final form on March 31, 2004. At this point, the coordinated process effectively ended, with each lead agency to meet the remainder of its Section 106 responsibilities separately as appropriate to its respective undertaking.

FTA identified the APE for the Permanent WTC PATH Terminal and by letter of February 25, 2004 requested SHPO concurrence with its proposed APE. The SHPO indicated its concurrence through its letter of March 19, 2004. FTA has identified 21 historic properties within the APE as described below, and as shown on Figure 6-1 and Table 6-1. Areas of potential archaeological sensitivity within the APE are shown on Figure 6-2.

As discussed in Section D, "Probable Impacts of the Project Alternatives," FTA finds that the Preferred Alternative will have adverse effects on historic properties. FTA has coordinated extensively with SHPO, ACHP, and consulting parties in the identification of measures to resolve these adverse effects (see Section E, "Mitigation," for more information). Results of this coordination and consultation form the basis for the MOA executed among FTA, SHPO, ACHP, and PANYNJ for the Permanent WTC PATH Terminal (see Appendix B).

C. DESCRIPTION OF THE AFFECTED ENVIRONMENT

PRE-SEPTEMBER 11, 2001 BASELINE CONDITIONS

ARCHAEOLOGICAL RESOURCES

It is assumed that the potential for archaeological resources would be the same in the pre-September 11, 2001 conditions analysis as described below in "Changes in the Affected Environment Since September 11, 2001." The potential for archaeological resources was limited due to construction activity that took place on the Project Site and surrounding area prior to September 11, 2001.

High Archaeological Sensitivity

8 Former Lot Numbers

Source: Sanborn Map Company, 1951

0 100 200 FEET
SCALE

Figure 6-2

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Areas of Potential Archaeological Sensitivity

HISTORIC RESOURCES

Project Site

Prior to September 11, 2001, the Project Site was occupied by a WTC PATH Terminal, which included a track and platform level, an associated mezzanine/fare-zone level, and sub-grade pedestrian connections to adjacent streets, subways, and the buildings of the WTC. Access to the mezzanine and platform levels was located on the eastern portion of the Project Site within the WTC concourse. The track and platform and mezzanine levels were located on the western half of the site (west of the 1 and 9 subway line), below the WTC Towers 1 and 2. The tracks connected to the Hudson River tunnels beneath Route 9A and extended west under the Hudson River to New Jersey. Below ground, remnants of the former Hudson and Manhattan (H&M) Terminal existed in an altered state. Used as truck ramps and for storage, they were not publicly accessible.

As of September 11, 2001, none of the PATH facilities or WTC buildings on the Project Site were listed on or determined eligible for listing on the S/NR or designated as a NYCL.

Area of Potential Effect

In the pre-September 11, 2001 conditions analysis, the approximately 16-acre WTC, built by the Port Authority of New York and New Jersey (PANYNJ) between 1966 and 1981, comprised six buildings, including the 110-story Twin Towers (1 and 2 WTC). These 1,350-foot-tall aluminum-clad towers (excluding the 345.1-foot antenna) were the tallest buildings in the world when completed in 1972 and 1973. Other buildings located on the WTC site included a 22-story hotel (3 WTC), two nine-story buildings (4 and 5 WTC), and an eight-story U.S. Customs House (6 WTC). These buildings were situated around the Austin J. Tobin Plaza, which was decorated with several sculptures by prominent artists. A concourse was located directly below the plaza and consisted of a retail mall and transportation hub. A pedestrian bridge over Route 9A connected the northern part of the WTC with the commercial core of BPC. As of September 11, 2001, there were no known historic resources located on the WTC Site.

Prior to September 11, 2001, the block at the corner of Liberty Street and Route 9A was an active parking lot and the site of the St. Nicholas Greek Orthodox Church, destroyed on September 11, 2001. This small Greek Orthodox church stood at 155 Cedar Street, south of the WTC. Established in 1916 by Greek immigrants, it was only 35 feet tall with a rooftop bell cote. The church was notable for its small scale and its icons, which were a gift from the last czar of Russia, Nicholas II. The block to the east was occupied by a 39-story office building at 130 Liberty Street. Located directly across Liberty Street from 2 WTC, it was a fully occupied office tower with ground-floor retail. It had a plaza with a fountain, above which was an additional plaza level that was originally intended to connect to the plaza level at the WTC.

It is assumed that all historic buildings that were damaged on September 11, 2001 would not have been damaged and would still be occupied as they were on September 11, 2001. The Federal Office Building/U.S. Post Office would be occupied with office tenants and the Church Street Station of the post office would be open and serving its customers. The Barclay-Vesey Building would be undamaged.

It is assumed that the identification of known and potential resources would be the same in the pre-September 11, 2001 conditions analysis as described below in "Changes in the Affected Environment Since September 11, 2001." Although several resources were listed on or determined eligible for listing on the National Register or designated as a NYCL or NYCHD after Septem-

ber 11, 2001, these resources would have been determined eligible or designated in any event because their characteristics that qualify them for listing were not altered.

CHANGES IN THE AFFECTED ENVIRONMENT SINCE SEPTEMBER 11, 2001

ARCHAEOLOGICAL RESOURCES

The following analysis regarding the potential for archaeological resources on the WTC site was based on data obtained from a Phase IA Archaeological Assessment of the WTC, prepared in October 2003 and a Topic Intensive Study of the WTC Site, prepared in March 2004. Information regarding the potential for archaeological resources in the Route 9A roadbed was obtained from prior documentation for the *Route 9A Reconstruction FEIS*. Copies of these reports, as well as relevant SHPO correspondence, are included in Appendix B.

Project Site

Prehistoric Resources. Prior to European contact in the early 17th century, Native Americans speaking a Munsee dialect of the Eastern Algonquin language inhabited Manhattan Island. Native Americans referred to the island of Manhattan as "Minna-atn" which meant "Island of Hills." The first contacts between Native Americans and Europeans occurred when early explorers began to trade with the native population. Dutch trading expeditions had been visiting the Hudson River for many years prior to the founding of New Amsterdam at the southern tip of Manhattan in 1626. These groups made contact with the native population; Robert Juet, who traveled with Henry Hudson on his 1609 voyage, provides in his journal a description of the native population and their trading practices. Dutch colonization in Manhattan began in earnest in 1625 when an expedition of farmers from the Dutch West India Company arrived at the southern tip of Manhattan with the purpose of building a fort and laying out nine Company farms.

Prior to landfilling activities in the 18th and early 19th centuries, the Hudson River shoreline originally ran approximately along the path of Greenwich Street. Research on the Paleo-shoreline indicates the possibility of a bay from Cedar Street to north of the WTC and an irregular shoreline forming a spit of land near Vesey Street at about 40 feet below current sea level.

There is little likelihood that precontact archaeological resources have survived within the Project Site. West of Greenwich Street, excavation for the bathtub extends about 70 feet below grade, below the lowest level that precontact deposits could have survived (about 40 feet below grade). East of Greenwich Street, it is likely that precontact resources would have been destroyed by basement construction in these areas as well as construction activities associated with the WTC.

Therefore, the Project Site is not considered sensitive for prehistoric archaeological resources.

Historic Period. Prior to 1700, a large portion of the Project Site was either under water or was undeveloped farmland. During the Dutch period, a wooden ship called the *Tyjger* burned and was abandoned along the shoreline in 1613.

The first known structures on the Project Site were a house and windmill belonging to Peter Mesier. Shown on the Miller Plan (1696), they were located in the area that is now west of Church Street between Liberty and Cortlandt Streets. Landfilling along the Hudson River shoreline began around the turn of the 18th century. Between 1699 and 1701 several entrepreneurs

built docks on the three blocks between Cedar and Cortlandt Streets and Greenwich Street and Washington Street.

Activity along the Hudson River waterfront accelerated in the 18th century and continued through the 19th century. Many streets were planned and developed during this period and the busy waterfront supported many successful business ventures. By 1852 all the streetfronts within the APE had been solidly filled with buildings.

The Project Site was disturbed by construction of the 1 and 9 subway lines and the Hudson & Manhattan (H&M) Railroad and its Terminal on the west side of Church Street between Cortlandt and Fulton Streets. During construction of the subway (1916), the remains of a wooden ship thought to be the *Tyjger* were found in the excavation of Greenwich Street at Dey Street.

During the 1960s, the Project Site was extensively disturbed by construction of the WTC. The entire area west of Greenwich Street and the 1 and 9 subway was excavated to bedrock, 70 feet below grade to create the so-called bathtub where the Twin Towers along with the hotel and 6 WTC stood. In 1967 during excavation for the WTC, archaeologists attempted to find the rest of the *Tyjger*, but their efforts were unsuccessful.

Areas of Potential Sensitivity. A Phase IA Archaeological Assessment for the Project Site (included in Appendix B) found the following areas to be sensitive and warrant further consideration:

- At the northeast corner of the Project Site: former Lots 8-17 on former Block 85 (south side of Vesey Street between Greenwich and Church Streets, see Figure 6-2).
- At the southeast corner of the Project Site: Former lots 5, 6, and 10 on former Block 60 (north side of Liberty Street between Greenwich and Church Streets, see Figure 6-2).

The Topic Intensive Study for the WTC Site (included in Appendix B) concluded that the three lots on Liberty Street and the 10 lots on Vesey Street appear to possess potential archaeological significance. Each of the lots was occupied by a household or business for an extended period of time spanning the 1750s through the 1850s. The lots were used for both residences, businesses, and a combination of residences and businesses, where the proprietor lived and worked at the same location. Archaeological resources associated with occupations on these 13 historic lots have the potential to answer a variety of research questions pertaining to use and occupation of home lots by different types of individuals and businesses in Lower Manhattan during the second half of the 18th and first half of the 19th century.

These areas were located outside the former WTC construction footprint and have the potential to contain shaft features (such as privies, cisterns, wells, and cesspools) predating the 1850s that may have survived under former basements. Lots with basements 20 feet or more below grade have a lesser likelihood of shaft feature preservation.

Route 9A Connection

There is one known archaeological resource in the area where the pedestrian concourse to the WFC would be located—the Hudson River Bulkhead (S/NR-eligible). The bulkhead and its associated structural systems were built between 1871 and 1936 by the New York City Department of Docks. The majority of the construction consisted of masonry walls on a variety of foundation systems, with quarry-faced ashlar granite block forming the visible face along most of the armored frontage. Design of the bulkhead was the responsibility of George B.

McClellan, a Civil War general, who became the first Engineer-in-Chief of the Department of Docks. McClellan's plans contemplated the creation of a 250-foot-wide marginal street, from which 60- to 100-foot-wide piers with cargo sheds would project 400 to 500 feet around 150- to 200-foot-wide slips. Initiated to respond to the deteriorated, congested, and silt-filled condition of the waterfront, the carefully built granite walls created a consistent monumental surface to the waterfront that reinforced an image of New York City's commercial prominence. As property was acquired and as commerce warranted, the city built the bulkheads, built or rebuilt pier substructures, and leased redeveloped areas to private companies, which were usually responsible for piershed and headhouse construction. The bulkhead runs from the Battery to West 59th Street. The portion of the bulkhead located within the study area is below-grade along the western edge of Route 9A.

In the area between Dey and Fulton Streets, where the pedestrian concourse to the WFC would be located, 16 potential historic-period archaeological sites were identified in documentation prepared for the *Route 9A Reconstruction FEIS* (see Appendix B). No potential prehistoric sites were identified in this area. (This number includes sites listed as Cortlandt-Dey on the south and Fulton-Vesey on the north.) Of these, 15 were piers, wharves and pier sheds; all of these were eliminated from further consideration due to lack of archaeological visibility and lack of research potential (SHPO letter 8/12/92). The other site was a crib bulkhead at Dey Street, which was eliminated due to lack of research potential (SHPO letter 8/12/92).

HISTORIC RESOURCES

Project Site

The Project Site is located within and near the limits of the approximately 16-acre WTC site, which has been found to be S/NR-eligible. A street level access point and a below-grade pedestrian concourse would extend beyond the Project Site, connecting to the Winter Garden at the WFC. The WFC is located in BPC, west of Route 9A, opposite the WTC site. The Winter Garden is a large glass-enclosed public atrium and is one of several modern structures included in the WFC. It was severely damaged on September 11, 2001 and has since been reconstructed.

The temporary WTC PATH station opened in November 2003. Its entrance is located at the northeast portion of the WTC site. At Fulton Street, the canopy of the temporary WTC PATH station has a sculptural form, with two wings rising from a central truss supported on two vertical trusses. The tracks of the temporary WTC PATH station curve around the south end of the bathtub, passing into the new structure of the temporary station. The temporary WTC PATH station's mezzanine level, station platforms, and rail tracks are located on the western portion of the site. The 1 and 9 subway line also bisects the Project Site. Additionally, a wide area along the east side of the Project Site is paved with concrete. Sidewalk viewing areas are located along Church Street south of the PATH entrance and on Liberty Street. Aside from the viewing areas and the temporary WTC PATH station, the remainder of the Project Site remains excavated or under construction and is not accessible to the public.

Limited portions of the former H&M Terminal still exist below grade on the WTC site. Designed by Clinton & Russell, and constructed in 1908–09, it consisted of two 19-story Renaissance Revival towers that were linked together below ground by a three-level rail terminal. It occupied a two-block-long site on Church Street between Cortlandt and Fulton Streets. The terminal was linked to the Hudson Tubes—two cast-iron ring tunnels built under the Hudson River. In connection with the construction of the WTC, a new PATH terminal was built west of the H&M Terminal. Although the H&M Terminal office towers were demolished, the Hudson

Tubes were still used, but were redirected to swing out farther apart from each other to accommodate the longer length of the new terminal. As the terminal was located west of the H&M Terminal and at a lower grade, the H&M Terminal was able to maintain normal service during construction of the new facility. The WTC PATH Terminal opened in 1971, at which time the H&M Terminal was closed. Unused remnants of the Hudson Tubes were converted to truck ramps, and portions of the former terminal were used for truck loading, parking, and storage.

The WTC PATH Terminal and the PATH tunnels were catastrophically destroyed as a result of the terrorist attacks on September 11, 2001. Some portions of the underground levels of the former H&M Terminal were damaged but remained intact. SHPO determined that the remaining portions of the former H&M Terminal and the cast-iron tubes leading from the station do not meet the criteria for listing on the National Register due to a loss of historic integrity (letter dated October 16, 2003).

Area of Potential Effect

Known Resources

There are several known historic resources located in the APE. These resources are described below. They are also listed in Table 6-1 and mapped on Figure 6-1.

WTC Site (S/NR-eligible)

The WTC Site is an approximately 16-acre parcel bounded by Vesey, Church and Liberty Streets and Route 9A. As detailed in the Coordinated DOE (see Appendix B), the WTC Site is significant as the locus of the events of September 11 and the significance of those events and their aftermath to American history makes the WTC Site eligible for listing on the State and National Registers, even at this early date. Some elements remaining on the site help convey the events of September 11 and their aftermath. The Coordinated DOE identifies the following elements in particular as contributing to the significance of the WTC Site: the truncated box-beam column bases that help define the perimeter or "footprints" of the former Twin Towers; the slurry walls that form the sides of the underground bathtub for the Twin Towers; the remnants of the parking garage, containing slabs and interior columns charred with smoke; the beams forming a cross erected by recovery workers; the portion of the concrete steps and escalator ramp from Vesey Street to the subway; and the remaining portion of the passageway to the E subway line.

Artifacts recovered from the WTC Site following the attacks currently exist at off-site locations, including the New York State Museum in Albany and Hangar 17 at John F. Kennedy International Airport. Because these off-site artifacts are not physically located on the WTC Site and do not convey the significance of the site, they are not included in the Coordinated DOE. However, the Keeper of the National Register of Historic Places has indicated in a letter to the ACHP (dated July 18, 2004), that artifacts returned to the WTC Site in the future could be considered contributing elements of this historic property if they are returned and found to convey significance (see the Coordinated DOE in Appendix B for a discussion of off-site artifacts).

Table 6-1
Known Resources in the Area of Potential Effect

Ref. No.	Name	Address	NHL	S/NR	S/NR-eligible	NYCL	NYCL-eligible
1.	Hudson River Bulkhead	Battery to West 59th Street			X		
2.	WTC Site	Bounded by Vesey, Church and Liberty Streets, and Route 9A			X		
3.	Barclay-Vesey Building	140 West Street			X	X	
4.	Federal Office Building/ U.S. Post Office	90 Church Street		X			
5.	St. Peter's Roman Catholic Church	22 Barclay Street		X		X	
6.	Former St. Peter's School	16 Barclay Street			X		
7.	30 Vesey Street	30 Vesey Street			X		
8.	Old New York Evening Post Building	20 Vesey Street		X		X	
9.	New York County Lawyer's Association	14 Vesey Street		X		X	
10.	Astor Building	217 Broadway			X		
11.	Transportation Building	225 Broadway			X		
12.	African Burial Ground and the Commons Historic District	Bounded by Duane Street, Park Row, Broadway and Centre Street	X	X		X	
13.	St. Paul's Chapel and Graveyard	Broadway and Fulton Street	X	X		X	
14	Former American Telephone & Telegraph (AT&T) Company Building	195 Broadway			X		X
15.	Fulton Street IRT Station	Fulton Street and Broadway			X	X	
16.	Former East River Savings Bank	26 Cortlandt Street			X		X
17.	United States Realty Building*	115 Broadway		X	X	X	
18.	Beard Building	125 Cedar Street			X		X
19.	114-118 Liberty Street	114-118 Liberty Street			X		
20.	21-23 Thames Street	21-23 Thames Street			X		
21.	90 West Street	90 West Street			X	X	

Notes: Corresponds to Figure 6-1.
NHL: National Historic Landmark.
SR: New York State Register of Historic Places.
NR: National Register of Historic Places.
S/NR-eligible: Site has been found eligible for listing on the New York State and National Registers of Historic Places.
NYCL: New York City Landmark.
NYCL-eligible: LPC has determined that the site appears eligible for NYCL designation.
* The United States Realty Building is listed on the SR only. It is eligible for listing on the NR.

In addition, the Coalition of 9/11 Families has requested that the National Park Service (NPS), which administers the NHL program, consider the WTC Site for NHL status. The NHL program was authorized by the Historic Sites Act of 1935 (Public Law 74-292). NHL criteria (36 CFR § 65.4[a] and [b]) differ from National Register criteria and establish a stringent test for national significance and high historical integrity. NPS has indicated that they will not consider this request until the Project's Section 106 review process and other Section 106 processes related to the WTC Site are completed.

Barclay-Vesey Building (S/NR-Eligible, NYCL)

Built between 1923 and 1927, the Art Deco Barclay-Vesey Building (140 West Street) occupies the full block bounded by Barclay Street, Washington Street, Vesey Sreet, and Route 9A, and overlooks the WTC Site. It is considered one of the most significant structures in the history of skyscraper design, since it was the first building in New York City to make the most of the requirements of the 1916 Zoning Resolution, leading to the tower's dramatic massing. Designed by Ralph Walker of McKenzie, Voorhees & Gmelin as an office building and switching center for the New York Telephone Company, this 32-story brick, limestone, and terra cotta structure consists of an 18-story parallelogram base and an 11-story square tower (see Figure 6-3). For 10 stories, the base rises flush with the lot lines. Above the 10th floor, there are setbacks on the north and south façades and light courts on the east and west façades. Above the base, the tower is oriented to the Manhattan grid street pattern. Multiple setbacks above the 10th floor serve to further relieve the building's bulk. Flat piers provide verticality and on the tower they create buttresses that cap the structure. There are limestone cornices on each setback, and on the first two floors there are terra cotta spandrel panels, and window and door enframements of intricately carved reliefs of people, animals, and vegetation. The ground floor of the Vesey Street façade is an arcade.

The Barclay-Vesey Building suffered façade and structural damage as a result of the collapse of 1 WTC and 7 WTC. Repair work is ongoing and it is partially reoccupied.

Federal Office Building/U.S. Post Office (S/NR)

This building, located at 90 Church Street, was designed by Cross & Cross and Pennington, Lewis & Mills and was constructed in 1934–38. The massive limestone building is 15 stories tall and combines Classical Revival and Art Deco details, as well as exterior sculptural reliefs by Carl Paul Jennewein (see Figure 6-3). It occupies the full block bounded by West Broadway and Barclay, Vesey, and Church Streets, and also overlooks the WTC Site across Vesey Street. The building has been closed for repair, cleaning, remediation of potentially hazardous materials, and interior reconstruction.

St. Peter's Roman Catholic Church (S/NR, NYCL)

Located at 22 Barclay Street, this Greek Revival granite church is home to the oldest Roman Catholic parish in New York City. It was designed by John R. Haggerty and Thomas Thomas in 1836-40, replacing an earlier building dating from 1785. It has a temple-like front with six Ionic columns (see Figure 6-4).

Former St. Peter's School (S/NR-eligible)

East of St. Peter's Church at 16 Barclay Street, a five-story brick Greek Revival school building was erected for St. Peter's School ca. 1838. It is three bays wide and is topped with a mansard roof with three pediment dormers (see Figure 6-4).

30 Vesey Street (S/NR-eligible)

The 18-story brick Renaissance Revival building at 30 Vesey Street has a tripartite design of base, shaft, and capital. Fluted pilasters embellish its two-story base, and additional ornamentation is found at the upper stories. It was constructed in 1914.

Old New York Evening Post Building (S/NR, NYCL)

Robert D. Kohn designed this 13-story limestone-faced building, located at 20 Vesey Street, in 1906–07. It was erected as the offices and printing plant of the *New York Evening Post*. It is a rare example of a New York City building inspired by the early 20th-century Central European artistic reform movement known as the Vienna Secession. Its refined classicism, rational expression of structure, and stylized ornament are suggestive of Viennese precedents. Notable features of the building include four statues on the 10th floor known as the *Four Periods of Publicity*—two are by Gutzon Borglum, the sculptor of Mount Rushmore, and two are by Estelle Rumbold Kohn, the architect's wife.

New York County Lawyer's Association (S/NR, NYCL)

An example of the 18th-century English Georgian Revival style, this four-story white limestone building is a late work of Cass Gilbert, having been designed in 1929–30. It is located at 14 Vesey Street and was commissioned by the New York County Lawyer's Association, an organization that had been founded in 1908 to serve the public interest and the legal profession.

Astor Building (S/NR-eligible)

The seven-story Renaissance Revival commercial building at 217 Broadway was designed by Charles Platt in 1915. It has a stone façade and lacks ornamentation. The building is crowned by a bracketed cornice.

Transportation Building (S/NR-eligible)

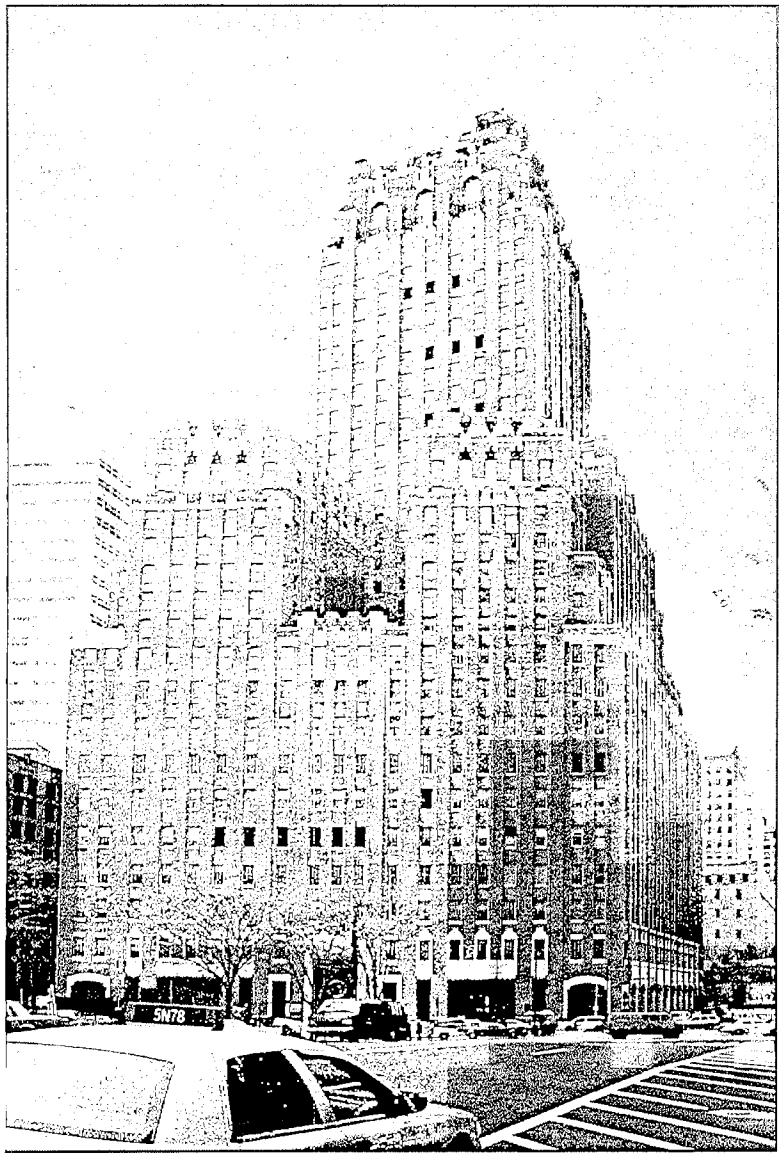
Designed by York & Sawyer in 1926–27, this 44-story skyscraper is located at 225 Broadway. It rises straight to the 23rd floor, continues eight stories with narrow setbacks, then a rectangular tower rises an additional 13 floors. It has a four-story stone base with tan brick upper stories and Lombardic details.

African Burial Ground and the Commons Historic District (NHL, S/NR, NYCHD)

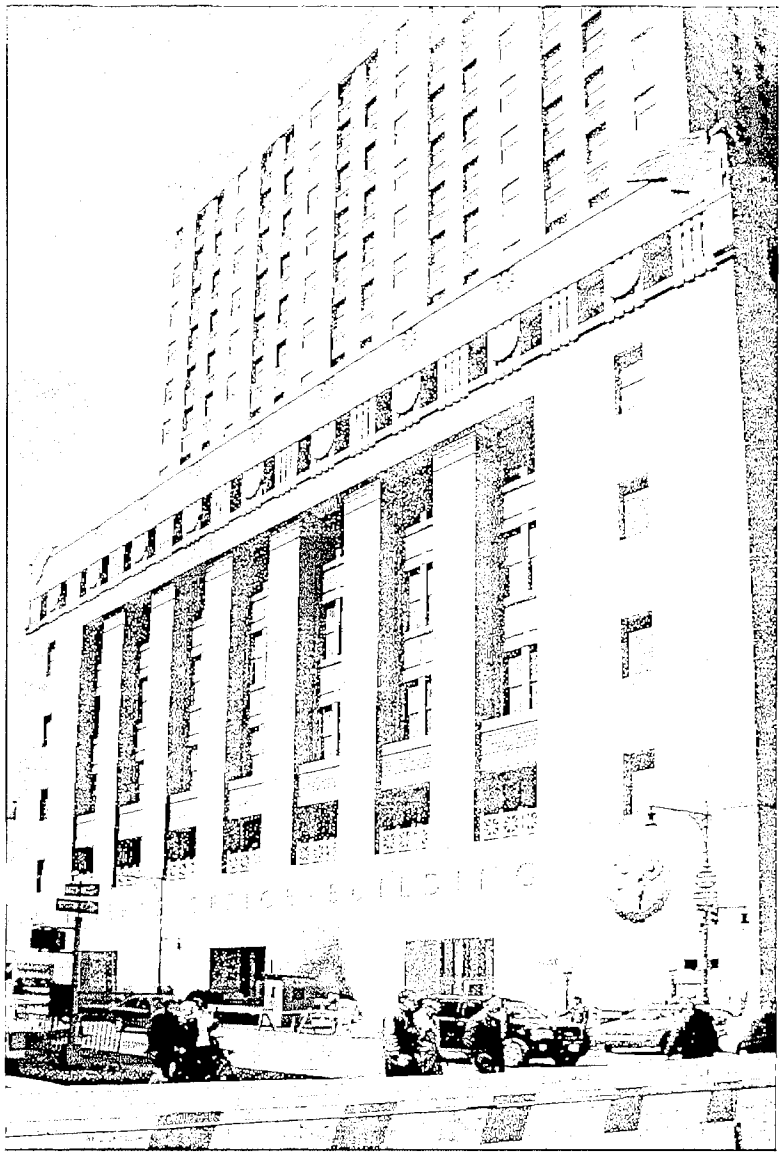
Bounded by Duane Street, Park Row, Broadway, and Centre Street, this district incorporates both the Commons—pastureland set aside by the Dutch government in colonial New Amsterdam—and the 18th-century African Burial Ground. The Commons later became a site for parading troops, public gatherings, celebrations, and executions. A portion of the Commons became a public park in the 1780s and was later incorporated into a park setting for City Hall. The section of the Commons between Chambers and Duane Streets became a burial ground for African slaves and freed men and women in the 18th century and possibly earlier. The cemetery was uncovered during investigations for the construction of a federal office building. Portions of the burial ground were completely excavated to construct the government building, but other sections were preserved in situ as a memorial to New York's earliest African residents.

St. Paul's Chapel and Graveyard (NHL, S/NR, NYCL)

St. Paul's Chapel, located at Broadway and Fulton Street, was erected between 1764 and 1766; its porch was built in 1767–68 and its tower was designed by James C. Lawrence in 1794. It is Manhattan's oldest surviving church and is also considered one of the finest Georgian buildings in the nation. It is a simplified version of James Gibbs's Saint Martin-in-the-Fields on Trafalgar Square in London. It was built of local stone with brownstone trim. It has a modest portico on its towered west façade, which faces the adjacent 18th-century graveyard. The Broadway elevation features an imposing brownstone Ionic porch, which was part of the original plan but was not built until 1767–68 (see Figure 6-4). Although the design of the church is often ascribed to

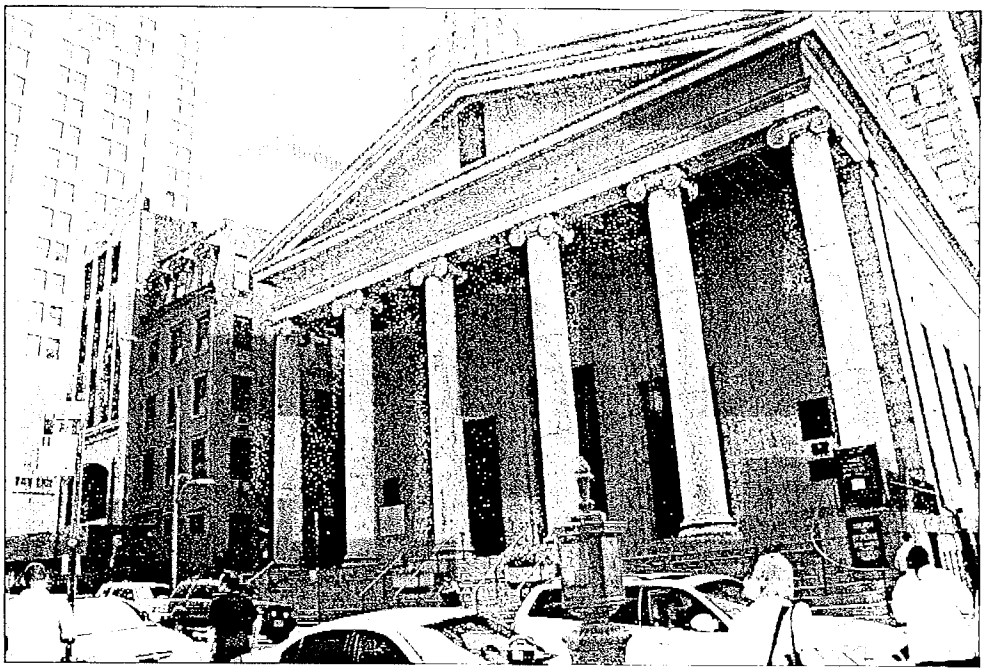


Barclay-Vesey Building, 140 West Street

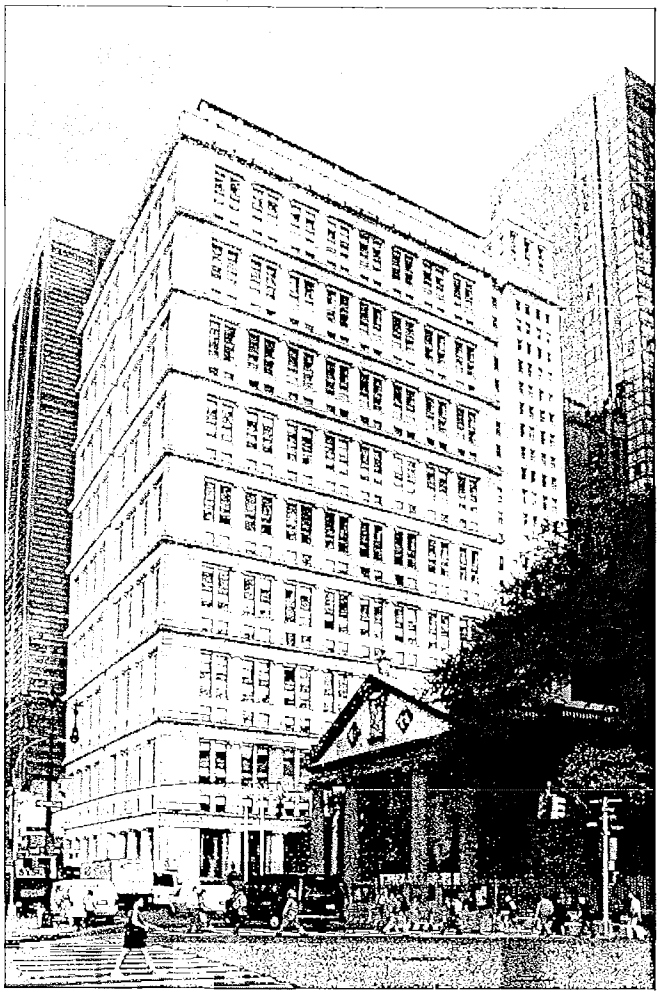


Federal Office Building/U.S. Post Office, 90 Church Street

Figure 6-3
Known Historic Resources



St. Peter's Roman Catholic Church and former school (left of church), 16-22 Barclay Street



St. Paul's Chapel (Broadway and Fulton)
and the former AT&T Company Building (195 Broadway)

Figure 6-4
Known Historic Resources

Thomas McBean, there is no evidence to support this theory. George Washington worshipped at the church during the brief period when New York was the nation's capital. During the recovery effort at the WTC Site, the chapel served as a refuge for rescue workers.

Former American Telephone & Telegraph (AT&T) Company Building (S/NR-eligible, NYCL-eligible)

Designed by William Welles Bosworth and built in three sections between 1912 and 1923, this 29-story neo-Classical Revival commercial office building is located at 195 Broadway. It has been described as a square-topped layer cake, as its façade consists of eight Ionic colonnades, with three stories located within each set (see Figure 6-4). It is clad with Vermont granite and has a Doric colonnade at the lower story. It is reported to have more classical columns than any other façade in the world. Its tower rises to a stepped crown modeled on the Mausoleum of Halicarnassus. Bronze panels above the Broadway entrances were designed by the sculptor Paul Manship. It has a notable lobby with Greek Temple-like rows of Doric columns.

Fulton Street Station (S/NR-eligible, NYCL)

The underground subway station at Fulton Street is one of several under- and above-ground stations built as part of Contract 1 of the Interborough Rapid Transit Company's first subway in Manhattan. This first section of the subway, which ran from City Hall to Grand Central Terminal and then ran west and along Broadway to the Bronx, was built between 1899 and 1904 under the direction of Chief Engineer William B. Parsons. The ornamentation of the stations, consisting primarily of white tile with light-colored brick and decorative mosaic sign panels and terra cotta and faience plaques, was designed by Heins & La Farge. The Fulton Street Station was restored in 1987 by Lee Harris Pomeroy & Associates. It features ceramic tile plaques of Robert Fulton's steamboat the *Clermont*.

Former East River Savings Bank (S/NR-eligible, NYCL-eligible)

Currently occupied by a department store, the five-story former bank building located at 26 Cortlandt Street was designed by Walker & Gillette in 1931–1934. It has Classical and Art Deco details with stainless-steel winged eagles over the entrances (see Figure 6-5).

United States Realty Building (SR, NR-eligible, NYCL)

Designed by Francis H. Kimball in 1904–07, this skyscraper at 115 Broadway, as well as the Trinity Building at 111 Broadway, were designed with Gothic details to harmonize with Trinity Church, located to the south. Both buildings are faced with limestone and feature towers, gables, and delicately carved ornament. Construction of both buildings was a major undertaking, causing the relocation of Thames Street as well as the construction of caissons 80 feet into the marshy subsoil.

Beard Building (S/NR-eligible, NYCL-eligible)

Oswald Wirz designed the 12-story Beard Building at 125 Cedar Street (a.k.a. 120 Liberty Street) as an office building. Constructed in 1895–97, it is a through-block, brick and stone building with Romanesque Revival-style façades (see Figure 6-5). It has a two-story stone base composed of pilasters and deeply recessed window bays; the north façade of the base is clad in limestone, while the south façade appears to be clad in sandstone. On the shaft, wide piers frame corner window bays and create a wide central bay broken up by thin, closely spaced mullions. An entablature caps the shaft. The two-story building capital contains pedimented windows. A

bracketed cornice crowns the building. Converted to residential use long before September 11, 2001, it has been restored and reoccupied except for the ground floor on Liberty Street.

114-118 Liberty Street (S/NR-eligible)

This 11-story Renaissance Revival-style building was constructed in 1900–01 and designed by John T. Williams (see Figure 6-5). Due to the irregular lot shape, the through-block loft building is three bays wide on Liberty Street and two bays wide on Cedar Street. The main façade fronts Liberty Street overlooking the WTC Site. It has a two-story rusticated stone base and a brick shaft crowned with a modillioned cornice. The base contains an entrance porch, arched show windows with keystones, and a frieze. Projecting cartouches and an entablature mark the mezzanine (third) story. The upper floors are articulated with brick pilasters, spandrels, and mullions. At the two-story capital, swags crown the double-height piers, and the top-floor windows are arched. The Cedar Street façade is divided into a rusticated base, a shaft composed of piers and window bays, and a cornice-crowned capital, but it is less ornate. Converted to residential use prior to September 11, 2001, it is currently being restored to residential use.

21-23 Thames Street (S/NR-eligible)

This five-story brick tenement was built in 1872 by John Lerscher. It features a galvanized iron cornice and was originally designed to house three families on each of its upper stories.

90 West Street (S/NR-eligible, NYCL)

Designed by Cass Gilbert and built in 1905–07, the 90 West Street Building is among the most important early 20th century skyscrapers in New York City, and the aesthetic precursor of Gilbert's Woolworth Building from 1910–13. The 23-story former commercial office building is also the earliest example of the use of Gothic detail on a skyscraper with distinctly vertical massing. It has a C-shaped plan with a light court facing east and its primary façade fronting on Route 9A. Its north elevation faces the WTC Site across Liberty Street. Above a two-story granite base, the façades of the shaft are clad in white terra cotta with modest marble and polychromed terra cotta trim. The shaft is articulated with recessed window bays and clustered columns that form piers. These piers, along with colonettes between the windows, rise uninterrupted for most of the building's height, creating vertical emphasis. The building's heavy three-story capital is ornately designed as an arcade with engaged columns. A mansard roof with dormers and pinnacles crowns the building. The building was covered in scaffolding for ongoing façade repair on September 11. It was heavily damaged due to burning debris from the WTC. It is being restored and renovated for residential use.

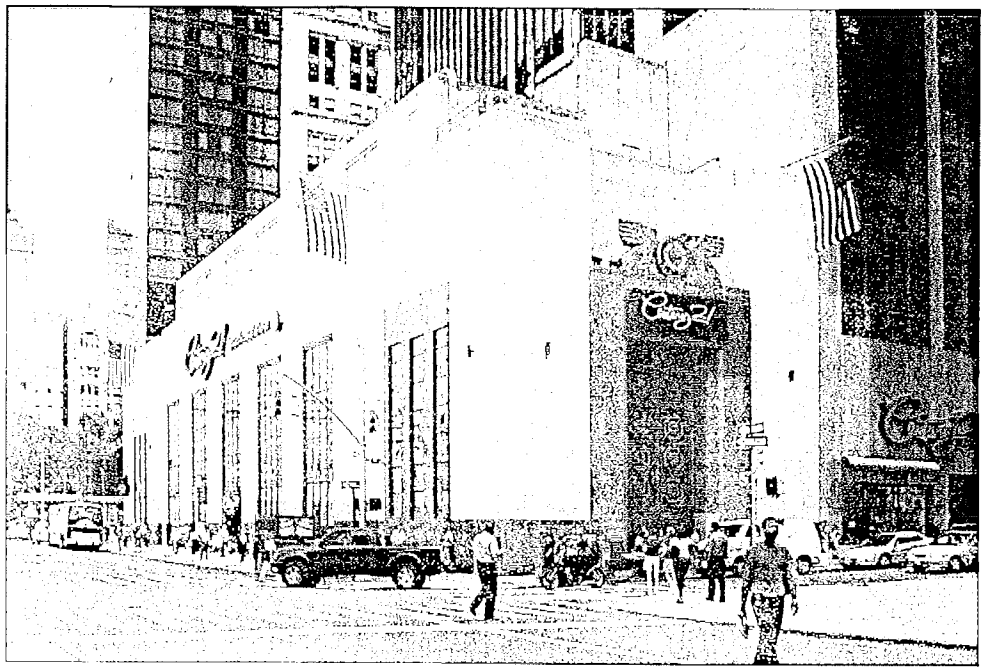
D. PROBABLE IMPACTS OF THE PROJECT ALTERNATIVES

This section describes conditions that are or would be expected to exist under the No Action and Preferred Alternatives for the three analysis scenarios (construction period, opening year and design year).

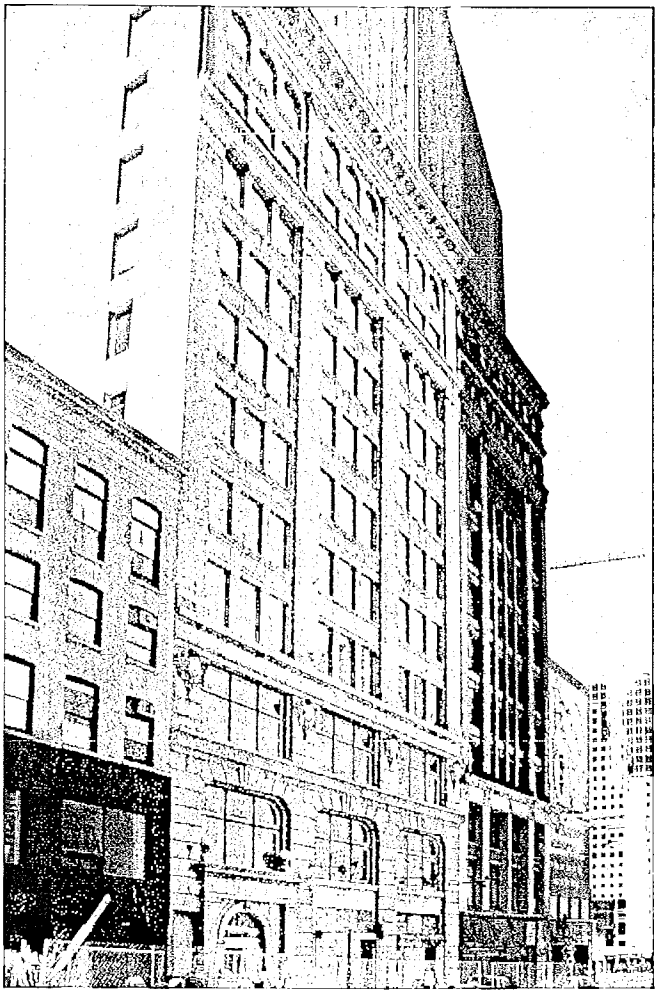
CONSTRUCTION PERIOD (2006)

FUTURE COMMON TO ALL ALTERNATIVES

Initial reconstruction activities associated with the WTC Memorial and Redevelopment Plan would be taking place. It is anticipated that St. Nicholas Church will be reconstructed on the



Former East River Savings Bank, 26 Cortlandt Street



114-118 Liberty Street (left) and the Beard Building at 125 Cedar Street

Figure 6-5

Known Historic Resources

block south of the WTC site. In addition, reconstruction of Route 9A between West Thames Street and Chambers Street will be underway.

As part of the Section 106 process for each of their respective projects, LMDC and NYSDOT have prepared and executed Programmatic Agreements that will continue to guide the design and construction of their projects with respect to potential impacts to historic resources. Furthermore, the Northwest Remnant Subgrade Structures, which were identified in the coordinated DOE for the WTC site, will be removed as part of Freedom Tower's construction. The removal of these structures is being undertaken in accordance with the Programmatic Agreement by LMDC, SHPO, and ACHP.

Both the Barclay-Vesey Building and the Federal Office Building/U.S. Post Office, north of the Project Site, will be repaired, renovated, and reopened. Between these two buildings, 7 WTC will be complete along with its triangular open space on the north side of Vesey Street. A residential building is expected to be complete along Barclay Street, between Broadway and Church Street. The proposed building is expected to be taller than the adjacent small-scale buildings.

NO ACTION ALTERNATIVE

Project Site

Under the No Action Alternative, the temporary WTC PATH station would remain in service. There would be no project-generated construction activities that would affect historic resources.

Area of Potential Effect

It is not expected that this alternative would have any adverse effects on historic resources.

PREFERRED ALTERNATIVE

Project Site

Construction of the Preferred Alternative would begin in 2005 concurrent with other sub-grade work for the proposed redevelopment of the WTC site. Components of the terminal, including the platforms, mezzanine, and certain pedestrian connections, would be completed by the end of 2009. A pedestrian concourse to the WFC would also be constructed.

Construction of the Preferred Alternative may affect potential archaeological resources located on the Project Site. In order to avoid, minimize, or mitigate any adverse effects to potential archaeological resources on the Project Site, PANYNJ would coordinate with LMDC and SHPO prior to the start of construction to determine whether any potentially sensitive areas have already been tested as part of the WTC Memorial and Redevelopment Plan. As described in the MOA executed for the Permanent WTC PATH Terminal, prior to any disturbance of potentially sensitive areas, PANYNJ would—in consultation with SHPO and LMDC, as appropriate—locate, identify, and evaluate the National Register eligibility of archaeological resources in these potentially sensitive areas. If National Register-eligible archaeological resources would be adversely affected by construction of the Preferred Alternative, PANYNJ, in consultation with FTA, SHPO, and LMDC, as appropriate, and the Section 106 consulting parties, would develop and implement an Archaeological Resource Treatment Plan

Construction of a below-grade pedestrian concourse to the WFC may require removal of short segments of the Hudson River Bulkhead between Fulton and Vesey Streets. At this time it is

anticipated that an approximately 40-foot wide segment of the bulkhead would be affected. As described in the executed MOA, PANYNJ would coordinate treatment of the bulkhead with NYSDOT, as appropriate. A plan would be developed to locate and identify intact portions of the bulkhead that would be affected by construction of the below-grade pedestrian concourse. If intact portions of the bulkhead are identified, PANYNJ would, in consultation with SHPO and NYSDOT, prepare a treatment plan for the portions of the Hudson River Bulkhead that would be affected by the Preferred Alternative. The plan would be submitted to SHPO and the Section 106 consulting parties for review and comment prior to its implementation.

Area of Potential Effect

WTC Site

Adverse effects to the WTC site are expected under this alternative, although the extent of these adverse effects has not yet been fully determined. Construction of the Preferred Alternative would not alter the location or setting of the WTC site. However, because it will result in the removal or alteration of remaining remnants and structures on the site, it could diminish the site's integrity of feeling, association, and materials. The following describes the specific impacts of the Preferred Alternative on the various elements of this historic resource. Each of these elements has been addressed in the MOA and specific stipulations regarding the documentation and treatment of the WTC site have been defined (see Appendix B).

- ***Tower Perimeter Column Bases with Other Column Bases and Infrastructure*** (constructed pre-September 11, 2001): There were 84 perimeter columns extending into the bedrock that would outline the North Tower façade, and 73 perimeter columns extending into bedrock that would outline the South Tower façade. The original subgrade column grid in the WTC bathtub was configured to span above the former Hudson & Manhattan tunnels traversing the bathtub, as well as then new PATH tracks (there were 84 perimeter columns for the South Tower appearing above grade). In addition, approximately 34 of the South Tower columns were within the PATH right-of-way area (interspersed with tracks, electrical equipment, and other infrastructure), and 39 were outside the PATH right-of-way area. During the post-September 11, 2001 emergency recovery operations conducted by the City of New York, all of these Tower perimeter columns were truncated such that only the bases remain. During subsequent construction of the temporary WTC PATH station, all of the column bases within the existing PATH right-of-way were either obscured to some extent or removed for installation of the temporary WTC PATH station's track sheds, utilities, duct banks, conduits, and other PATH infrastructure.

  As described in the project's Memorandum of Agreement (MOA), PANYNJ shall, to the maximum extent feasible, preserve in place 84 column base remnants in the North Tower and 39 column base remnants in the South Tower at the existing floor at elevation 242 (58 feet below Sea Level) that outline the footprints of the former Twin Towers at the WTC site and are not located in the PATH right-of-way. However, up to 16 column bases in the North Tower and 3 column bases in the South Tower would be temporarily or permanently removed.

  There would be various site infrastructure elements supporting the Preferred Alternative within the PATH right-of-way, including utility lines traversing the outline of the Tower perimeter column bases, and utility rooms and structures located within the area outlined by the perimeter column bases. Although these would not disturb the perimeter column bases themselves, these elements may somewhat impact visibility and accessibility to the Tower

perimeter column bases. The Preferred Alternative may also include utility lines that cross the footprints of the former North and South Towers at an elevation above the existing floor of the WTC site (Elevation 242 or 58 feet below Sea Level). Under current plans, these utilities would be at Elevation 264 (36 feet below Sea Level). These utility lines could serve the joint infrastructure needs of both the Permanent WTC PATH Terminal and the WTC Memorial and Redevelopment Plan.

The total extent of the North Tower footprint at the lowest level, at approximately elevation 242 (58 feet below sea level) to be permanently occupied by any portion of the Project will be approximately 1,600 square feet and will not exceed 4 percent of the North Tower footprint area. The total extent of the South Tower footprint at the lowest level, at approximately elevation 242 (58 feet below sea level) to be permanently occupied by any portion of the Project will be approximately 21,615 square feet currently occupied by the WTC PATH facility, plus an additional 2,000 square feet required by the Project, and will not exceed 53 percent of the South Tower footprint area.

During the construction of the Preferred Alternative, PANYNJ would construct a temporary track west of the existing Track 5. This temporary track would be used to maintain PATH operations while rehabilitation work is undertaken on other PATH tracks. The temporary track would cover column bases and footprint areas outside the existing PATH right-of-way during the construction period, but this track would be removed upon completion of the permanent tracks.

- ***Bathtub Walls*** (constructed pre-September 11) and Tiebacks (constructed post-September 11/temporary): All four of the slurry walls forming the "bathtub" would require some modification in order to ensure their continued structural function, which is to secure the "basement" of this portion of the WTC site from the high water table resulting from the site's proximity to the Hudson River.

  The Preferred Alternative includes the reinforcement of portions of the basement walls to ensure their structural integrity and to support future redevelopment of the WTC site, including the Permanent WTC PATH Terminal. A portion of the approximately 70 foot high west slurry wall, with tieback caps exposed, is proposed to remain visible and accessible to the public (a separate undertaking), and another portion of the west wall would be pierced (in a location away from the proposed exposed section) for the east-west pedestrian concourse below Route 9A. The remainder of the west wall would be protectively lined as part of the Preferred Alternative. PANYNJ would also reinforce portions of the east bathtub wall abutting NYCT's 1 and 9 line that were not previously reinforced. If other development on the WTC site does not move forward according to current schedules or plans, it may also be necessary to reinforce portions of the north bathtub wall east of Freedom Tower and portions of the south bathtub wall above the existing PATH substation. Where liners are installed, existing tieback caps would remain although their projections would be subsumed within the concrete of the liners.

- ***Recovery and Construction Ramp*** (constructed post-September 11/temporary): The support foundation for the ramp would be relocated to allow for construction of a temporary track. The ramp would remain during early construction of the Preferred Alternative and would then be removed.

- ***North and South Tunnel Projections from West Wall*** (constructed pre-September 11): Structural modifications would be made to the projections to accommodate the temporary Track 6.
- ***H&M Remnants*** (constructed pre-September 11): The cast-iron ring tubes in the east slurry wall of the bathtub would be removed for construction of the Preferred Alternative. On the eastern portion of the WTC site, all or portions of the remnants of the former H&M Terminal building and its powerhouse would be removed to construct a north-south concourse for the Preferred Alternative. Other remnants of these tubes (under the Hudson River) would still remain in service.
- ***Other Vehicular Ramps*** (constructed pre-September 11): Several of these ramps would be removed or sealed off, as they would have no function under the Preferred Alternative. This would also accommodate construction of new pedestrian concourses.
- ***PATH Tracks and Substation*** (reconstructed post-September 11): The PATH tracks that are part of the temporary WTC PATH station, would remain but would be further modified for permanent operation and to install a switch to the temporary Track 6. The wiring at the existing substation, also installed as part of the temporary PATH facility, would be modified for the permanent operation.
- ***Existing WTC PATH Station Main Entrance and Concourse, Sidewalks, Fencing, Existing PATH Platforms/Mezzanine*** (constructed post-September 11/temporary): Portions of these elements would be removed for construction of a permanent entry facility, main transit hall, concourses, PATH mezzanine, and platform levels.
- ***Passageway to the NYCT WTC Subway Station (E-Train)*** (constructed pre-September 11): The passageway between the Terminal and the MTA/NYCT E Subway would be designed to incorporate the existing E Subway entrance in its current location. Certain elements and materials of this passageway, which were retained as part of the construction of the temporary station, would be preserved as part of the Preferred Alternative. However, it may be necessary to remove the doors during construction for their protection. They would be stored until they could be returned to the reconstructed passageway.
- ***Steel Beams in Cross Form*** (post-September 11): The "steel cross" was moved from the area of 6 WTC to its current location in the eastern portion of the WTC site near the intersection of Church and Cortlandt Streets for public viewing. The cross structure would be removed from this location to accommodate the new north-south pedestrian concourse construction at-grade. The steel beam in cross form would remain in the custody of PANYNJ pending its disposition in accordance with the rights of its respective owners.
- ***Plaza and Subway Access from Vesey Street*** (constructed pre-September 11): The structural remnants of this access from Vesey Street are not permanently stable or functional. However, construction of the Preferred Alternative would not directly impact these elements. Furthermore, as described in the Project's MOA, a Resource Plan would be prepared to include these structures with measures to protect them from potential indirect effects during the Terminal's construction.
- ***Cooling Water Pipes*** (constructed pre-September 11): The Preferred Alternative would have no impact on the cooling water pipes. However, sections of the existing cooling water pipes may be reconstructed or rerouted under a separate undertaking.

Historic Resources Outside the WTC Site

Sub-grade work associated with construction of the Preferred Alternative could affect historic resources located within 90 feet of the Project Site. Based on the analysis described in Chapter 10, "Noise and Vibration," construction of the Terminal may cause damage to these buildings from ground-borne vibrations and dewatering. Specifically, historic buildings or sites located within 90 feet of the Project Site include the Barclay-Vesey Building at 140 West Street, St. Paul's Chapel and Graveyard, the former East River Savings Bank at 26 Cortlandt Street, the Beard Building at 125 Cedar Street, and 114-118 Liberty Street. (Other historic resources are more distant from the Project Site and are not within the area that is expected to be affected by construction.)

These potential adverse effects would be mitigated by Construction Protection Plan(s), the protocol and stipulations of which have been addressed in the MOA (see Appendix B).

OPENING YEAR (2009)

FUTURE COMMON TO ALL ALTERNATIVES

Portions of the WTC Memorial and Redevelopment plan would be complete while other construction activity would continue. The Greenwich Street view corridor and possibly the street itself will be open north into Tribeca. In addition, reconstruction of Route 9A between West Thames and Chambers Streets would be complete. As described earlier, the Programmatic Agreements executed by LMDC and NYSDOT for their respective undertakings will continue to guide the design and construction of those projects with respect to potential impacts to historic resources. In BPC, Site 26 is slated for commercial development and may be opened. The Fulton Street Transit Center would be open, east of the Permanent WTC PATH Terminal.

NO ACTION ALTERNATIVE

Project Site

In 2009 without the Preferred Alternative, the temporary WTC PATH station would remain in service. Some construction activities associated with the WTC Memorial and Redevelopment Plan would continue.

Area of Potential Effect

It is not expected that this alternative would have any adverse effects on historic resources.

PREFERRED ALTERNATIVE

Project Site

The tracks, platforms, mezzanine, concourses, and street-level terminal building would be located on the WTC site. The terminal building would provide street-level access to the WTC site and Greenwich and Church Streets. The terminal building would be designed by Santiago Calatrava, an award-winning architect, artist and engineer. His works include the Olympic Sports Complex (Athens, 2001), the Milwaukee Art Museum (1994), several railway stations (Liege, 1996; Lisbon, 1993; and Alameda, 1991), and several bridges (Buenos Aires, 1998; Orleans, 1996; Venice, 1996; Bilbao, 1994; and Merida, 1988). The terminal would be modern in design and would be lower in height than the WTC buildings adjacent to it on the south and to

the north of it across Fulton Street. Underground pedestrian concourses connecting to other transit systems would also be complete by 2009.

Two ventilation structures would be within the Route 9A median. As these locations have no potential for archaeological sensitivity, construction of the ventilation structures would have no adverse effect on archaeological resources.

Area of Potential Effect

In terms of contextual or visual effects, the APE is developed with a mix of historic and modern structures that range in height from one to 60 stories. The size and architectural styles of these buildings vary greatly, reflecting the architectural styles of the eras in which they were designed and constructed. The APE is composed of historic structures near more modern structures, where many streets contain a mixture of historic structures in immediate proximity to contemporary glass and metal structures. The historic context of the APE was dramatically changed during the 1960s with the construction of the WTC. Redevelopment of the WTC site, which will be under-way by 2009 independent of the Preferred Alternative, will again introduce modern skyscrapers to the immediate area. By 2009, Freedom Tower will be completed on the northwest quadrant of the WTC site and will be a tall, modern structure. In contrast, the Terminal planned under the Preferred Alternative would be of a lower height and scale than existing buildings in the immediate area, as well as adjacent structures completed and/or development on the WTC site.

It is anticipated that Calatrava's design for the proposed terminal building would be constructed of glass, steel and concrete, and would be similar to the materials used in Wedge of Light Plaza that would be constructed along Church Street as part of the WTC Memorial and Redevelopment Plan. It would also be in keeping with modern structures that exist in the study area, such as the Winter Garden and other buildings in the WFC and BPC. It would continue the tradition in the downtown area where technologically advanced modern buildings have been constructed near older, historic structures, thus continuing the existing trend of modern buildings juxtaposed against the historic fabric of Lower Manhattan. It is also anticipated that Calatrava's design would be modern and unique to the area, and that the new terminal may become an important architectural resource. It is expected that the proposed terminal building would be an improvement over current conditions and would introduce an important architectural resource to the APE.

The proposed development would not alter the historic context of the surrounding area, as this context was significantly altered with the completion of the WTC and subsequent modern office buildings that were (and will be) erected in the APE.

It is not anticipated that the street level access to the below-grade pedestrian concourse at the WFC would have any contextual or visual effects on historic resources. Several street level subway entrances already exist within the APE, in close proximity to historic resources. It is anticipated that this entrance would be similar to other subway entrances located throughout the APE.

It is not anticipated that the vent structures would have any contextual or visual effects on historic resources. The vent structures within the Route 9A median would be long and slender in massing and would stand 40 feet tall. It is anticipated that the vent structures would be clad in reflective material that would be in keeping with modern materials used on buildings in the immediate area. This reflective material would also help the vent structures to blend in with their natural surroundings. Surrounding each vent structure, trees would be planted in the median as part of greening improvements to Route 9A. It is anticipated that these trees would be 35 feet in

height within five years, thus obscuring views of the vent structures from historic resources located in the APE. Although the vent structures would be located west of the WTC site, it is not anticipated that these structures would affect the WTC site, as they would not block views towards the site and tall trees would obscure views of these structures from the WTC site. Overall, it is not anticipated that the vent structures would have any adverse contextual or visual effects on historic resources, as they would be consistent with modern buildings in the surrounding area and would be obscured by tall trees that would be planted in the Route 9A median.

DESIGN YEAR (2025)

FUTURE COMMON TO ALL ALTERNATIVES

By 2025, it is assumed that the full program for the WTC site would be developed, with the completion of the three towers on the east side of the WTC site and a fifth tower south of Liberty Street. A 65-story office building (Tower 2) and a 25-story hotel would be completed in the northeast quadrant. In the southeast quadrant, a 62-story office building (Tower 3) and a 58-story office building (Tower 4) would be completed. A 57-story office building (Tower 5) would be completed south of Liberty Street. Two office towers will also be developed at 130 and 140 Liberty Street.

NO ACTION ALTERNATIVE

Project Site

In 2025 absent the Preferred Alternative, it is assumed that PATH service would no longer operate at the Project Site. The temporary WTC PATH station would still be located on the Project Site, unless removed by a separate undertaking, but would not be operational. Construction activities associated with the WTC Memorial and Redevelopment Plan would be complete, and it is anticipated that there would be increased pedestrian traffic on the Project Site.

Area of Potential Effect

It is not expected that this alternative would have any adverse effects on historic resources.

PREFERRED ALTERNATIVE

Project Site

All work associated with the Preferred Alternative would have been completed for a period of 16 years after its initial operation. It is anticipated that there would be increased pedestrian traffic on the Project Site as a result of the Preferred Alternative.

Area of Potential Effect

In 2025, it is anticipated that there would be increased pedestrian traffic in the area immediately surrounding the Project Site. However, this would not change the character of historic resources located in the APE as the context of the Project Site and surrounding area has historically been defined by transportation uses, first with the H&M Terminal, then with the pre-September 11, 2001 WTC PATH Terminal and currently with the temporary WTC PATH station. Thus, the APE has been characterized by transportation uses and pedestrian traffic and it is not anticipated that an increase in pedestrian traffic would have an adverse effect on historic resources.

E. MITIGATION

PROJECT-SPECIFIC COMMITMENTS

As described in Chapter 18, "Agency Coordination, Process, and Public Participation," FTA and PANYNJ have solicited and fully considered comments from consulting parties and other interested members of the public regarding measures to minimize or mitigate adverse effects of the construction and operation of the Permanent WTC PATH Terminal. The agreed upon measures are contained in an MOA that has been executed among FTA, SHPO, ACHP, and PANYNJ (see Appendix B). This MOA for the Permanent WTC PATH Terminal has been prepared pursuant to the finding that the Preferred Alternative would have adverse effects on the WTC site and the Hudson River Bulkhead. The MOA also addresses the potential effects of the Preferred Alternative on as yet undetermined archaeological resources on the WTC site and on off-site historic resources during construction.

WTC SITE

The executed MOA provides for specific measures to mitigate impacts on the remaining remnants and structures on the WTC site. Specifically, it includes measures pertaining to the tower perimeter column bases and footprint areas, the passageway to the NYCT E WTC subway station, the steel beam in cross form, and the east and west slurry walls. Furthermore, the MOA has general provisions for the documentation of the WTC site, and protection of remaining remnants and structures during construction. The MOA also provides stipulations for the treatment of cumulative effects, which is described in Chapter 15, "Cumulative Effects," of this FEIS.

WTC Site Documentation

As stated in the MOA, PANYNJ would document the WTC site and its historic features to Level II standards of the Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER) prior to the removal or alteration of any historic features from the WTC site in connection with the undertaking of the Permanent WTC PATH Terminal. This documentation would consist of large-format, black-and-white photography of the site and its historic features as they currently exist; large-format photographic reproduction of selected existing drawings of current conditions and of pre-September 11, 2001 conditions; and a written history and description of the site and its historic features using information previously generated for the Coordinated DOE for the WTC site as well as the Permanent WTC PATH Terminal's DEIS and FEIS. PANYNJ would coordinate the photographic effort with the photographic efforts related to LMDC's fulfillment of Stipulation 1 as set forth in the April 22, 2004 Programmatic Agreement among the ACHP, LMDC, and SHPO for the WTC Memorial and Redevelopment Plan.

PANYNJ would consult with SHPO and HABS/HAER to determine whether particular features warrant measured drawings, and any such drawings would be prepared by an individual with demonstrated experience in the preparation of measured drawings to HABS/HAER standards.

The completed documentation would be submitted to SHPO and HABS/HAER for consideration. The large-format photographs prepared to HABS/HAER standards would consist of the views itemized in Exhibit H, "Schedule of Photographs" of the Project's MOA (see Appendix B).

Tower Perimeter Column Bases

Up to a total of 5 column bases in the North Tower and up to a total of 3 column bases in the South Tower may be temporarily or permanently removed to construct PATH Platform D. Where Platform D would intersect the northeast corner of the North Tower footprint, the platform would be clear of vertical obstructions and architectural treatments would be used to symbolically represent the location of the footprint. A minimum of 5 to a maximum of 7 column bases of the east column line of the North Tower would be visible from Platform D. The viewing area would consist of a glass wall tilted inward from the platform combined with a mirrored wall to the west to provide a view of the column bases from this area of the platform. Appropriate signage, graphics, and lighting would complete the viewing area.

The locations of column remnants of the South Tower that may be removed or permanently obscured by PATH platforms B, C, and D would be symbolically represented on these platforms through architectural treatments that define and differentiate the portions of the infrastructure that are within the Tower footprint areas. These treatments may include color differentiation, texture differentiation, symbolic representation of Tower perimeter column remnants, and/or an emblematic marker designating the location of the historic resource.

In addition to the column bases described above, up to 4 column bases in the North Tower could be temporarily removed by work to install other Project structures and infrastructure. Of the 4 column bases that could be affected by the Project foundation, those column bases that remain in situ undisturbed or are temporarily removed and returned to their original locations would be accessible following the completion of these foundations.

Removing column bases, on either a temporary or permanent basis, would be considered only after practical engineering design options pursuant to Stipulations I.B., 2a and 2b, to preserve column bases in place have been exhausted. Column bases that are removed would be returned to their original locations if practical engineering design permits. Permanent removal of column bases would only take place as a last resort, and these column bases would be removed and stored in accordance with the stipulations of the MOA.

The east-west pedestrian concourse to the World Financial Center would be designed and built in a manner that avoids the column remnants projecting above the concrete slab that outline the north perimeter of the North Tower and places this corridor at least five (5) feet outside the North Tower footprint as measured from the center line of each projecting column base to the face of the nearest structural support wall.

The temporary PATH track (in addition to the existing 5 tracks) and associated ballast that would be installed on a temporary basis during construction of the Project tracks and platforms and would be removed upon completion of the permanent tracks and platforms to re-expose the North and South Tower perimeter column remnants and portions of the North and South Tower footprints that may be covered by the temporary track and ballast.

The construction fill currently on the footprints has been temporarily removed for the purposes of documentation of the footprints pursuant to Stipulation I.A. of the MOA, and would be replaced with clean rounded gravel as required after the documentation in order to protect the footprints and column remnants from ongoing construction. Further treatments may be specified in the Project's Resource Protection Plan.

Passageway to the NYCT Subway Station (E Train)

The new pedestrian connection between the Permanent WTC PATH Terminal and the MTA/NYCT WTC E Subway Station would incorporate the existing E subway entrance, in its current location, in a manner that retains existing materials and features of this entrance, including, but not limited to, the handrails, the travertine flooring, the steps and doors separating the E train from the pedestrian connection, and overhead signage, to the extent possible and in accordance with current building codes and Americans with Disabilities Act requirements. The design would include, at a minimum, a plaque identifying the historic features of the E subway entrance. During construction of the new pedestrian connection between the Permanent WTC PATH Terminal and the E Subway Entrance, doors may need to be carefully removed and stored until they can be reinstalled within the new connection.

East and West Slurry Walls

The design for the Preferred Alternative would provide visibility from within the Terminal to a portion of the east or west slurry wall if the following criteria are met: the condition of the slurry wall evokes the image now understood to represent the historic nature of the wall (e.g. tiebacks are part of the area to be exposed, tiebacks project beyond the re-stabilized slurry wall); the exposure provided would enable a view of the slurry wall that is clear, recognizable, and respectful of the slurry wall; and the exposure would not pose a safety hazard to the public from exposed finishes of the wall or its components. The design for the east-west pedestrian concourse shall include a location from which the members of the public may view a plaque and photograph of the west slurry wall.

Steel Beams in Cross Form

PANYNJ would relocate the steel column and crossbeam mounted on a concrete pedestal and currently situated within the WTC site near Church Street in accordance with Stipulation VI of the MOA (see Appendix B). The object would remain in the custody and control of PANYNJ pending final disposition of these artifacts in accordance with the rights of the respective owners.

Resource Protection Plan for the WTC Site

PANYNJ, in consultation with SHPO and in coordination with LMDC and MTA/NYCT, as appropriate, shall develop a WTC Resource Protection Plan for the Permanent WTC PATH Terminal. The plan would be prepared to protect elements of the WTC site that are to remain in situ from inadvertent damage during the Terminal's construction. It would detail the Project's construction procedures and other construction plans for the site. It would provide for an inspection and reporting of the existing condition of elements, establish protection procedures, establish a monitoring program, and establish methods and materials to be used for any repairs. A historic architect, who meets the Secretary of the Interior's professional qualifications standards (48 FR 44716) in historic preservation, would be part of the design/construction team and would have the opportunity to review design drawing and specifications prior to construction. The plan would empower the Project's historic architect in consultation with the Chief Engineer of PANYNJ to issue "stop work" orders to prevent any unanticipated damage to historic properties. Recommencement of work would only be permitted once the Chief Engineer of PANYNJ and the historic architect are assured that appropriate modifications have been made to construction techniques to assure that no further damage would occur.

PANYNJ will furnish copies of the Plan to SHPO, ACHP, NPS, and the Section 106 consulting parties for review and comment prior to its implementation.

ARCHAEOLOGICAL TREATMENT PLANS

The executed MOA includes the process to address the Preferred Alternative's impacts on the Hudson River Bulkhead and its potential impacts to as yet determined archaeological resources that may be located within the eastern potion of the WTC site. Because the Hudson River Bulkhead is also located within the APE for the Route 9A Project, PANYNJ would coordinate its treatment plan with NYSDOT. Similarly because the potential archaeological resources within the WTC site are also located within the APE for the WTC Memorial and Redevelopment Plan, PANYNJ would coordinate its treatment plan, if necessary, with LMDC.

In consultation with SHPO, and, as appropriate, NYSDOT, PANYNJ would develop and implement a plan to locate and identify intact portions of the Hudson River Bulkhead that would be affected by construction of the Permanent WTC PATH Terminal's east-west pedestrian connection. In the event that the intact portions of the Hudson River Bulkhead are identified, PANYNJ would, in consultation with the SHPO and NYSDOT, prepare a treatment plan for those portions of the Hudson River Bulkhead to be affected by the Project. The plan would be submitted to SHPO and Section 106 consulting parties for their review and comment prior to implementation.

Prior to any Project-related subsurface disturbance at any of the locations that have been determined to be sensitive for historic archaeological resources, PANYNJ will, in consultation with the SHPO, and LMDC as appropriate identify and evaluate the National Register eligibility of any archaeological resources at these locations in accordance with 36 CFR 800.4.

In the event that FTA, in consultation with SHPO, determines that National Register-eligible archaeological resources will be adversely affected by construction of the Preferred Alternative, PANYNJ would, in consultation with FTA, SHPO, and LMDC as appropriate, and the Section 106 consulting parties, develop and implement an Archaeological Resource Treatment Plan for the Project. The Archaeological Resource Treatment Plan and documentation will adhere to the standards established by the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44716), including the standards therein for professional qualifications. The plan will be submitted to SHPO and Section 106 consulting parties for their review and comment prior to implementation.

CONSTRUCTION PROTECTION PLANS

The MOA includes protocols for developing and implementing a CPP to avoid, minimize, or mitigate the project's potential construction-period vibration impacts on the Barcley-Vesey Building, Former East River Savings Bank, the Beard Building, 114-118 Liberty Street, and St. Paul's Chapel and Graveyard.

PANYNJ, in consultation with SHPO and Section 106 consulting parties, and in coordination with LMDC, NYSDOT, and MTA/NYCT, where appropriate, shall develop a Construction Protection Plan (CPP) for the Preferred Alternative. The CPP would set forth measures for the protection and avoidance of structural and architectural damage for these historic properties. The CPP would be based on requirements in the "New York City Department of Buildings Technical Policy and Procedure Notice (PPN) #10/88" regarding procedures for the avoidance of damage to historic structures resulting from adjacent construction. The PPN defines adjacent historic structures as being contiguous or within a lateral disturbance of 90 feet from a lot under development or alteration.

The CPP would describe in detail the construction procedures of the Preferred Alternative, as well as the construction procedures associated with other projects under construction in the vicinity of each of these historic properties. It would also provide for the inspecting and reporting of existing conditions at these properties, establish protection procedures, establish a monitoring program to measure vertical and lateral movement and vibration, establish and monitor construction methods to limit vibration; and establish methods and materials to be used for any repairs. The plan shall also specify the implementation of special vibration protection measures to protect these historic properties from increased vibration levels associated with construction activities. The CPP would provide for a historical architect meeting the Secretary of Interior's Standards to supervise implementation of the CPP.

The CPP would empower the historical architect, in consultation with the Chief Engineer of PANYNJ to issue "stop work" orders to prevent any damage to historic properties, and any recommencement of work shall only be permitted at such time that the Chief Engineer and historical architect have assurance that the appropriate modifications have been made to the construction technique to assure that no damage would occur to historic properties.

ENVIRONMENTAL PERFORMANCE COMMITTMENTS

As described in Chapter 2, "Project Alternatives," and Chapter 3, "Construction Methods and Materials," PANYNJ, in cooperation with the sponsors of the other Lower Manhattan recovery projects, has developed Environmental Performance Commitments (EPCs) to protect historic resources during construction of the Preferred Alternative. Table 6-2 describes the EPCs that pertain to historic resources as well as current plans for their implementation.

Table 6-2
Environmental Performance Commitments

Commitment	Implementation Plan
Establish coordination among projects to avoid or minimize interruption in access to cultural and historic sites.	Access to cultural sites within the APE for the Preferred Alternative will be maintained, to the maximum extent feasible given public safety considerations, as part of the Preferred Alternative's Maintenance and Protection of Traffic (MPT) Plan. The TMP for all of the Lower Manhattan Recovery Projects will also coordinate access to cultural sites.
Initiate public information and involvement outreach with sensitivity to local cultural resources.	PANYNJ has coordinated with the Project's Section 106 consulting parties to develop and execute a Memorandum of Agreement pursuant to Section 106 of the National Historic Preservation Act. The executed Memorandum of Agreement includes stipulations for ongoing coordination and consultation as the Preferred Alternative's design and construction moves forward. Materials pertaining to the Project's effects on cultural resources will made available on the project's website in accordance with the stipulations of the executed Memorandum of Agreement.
Identify public information outlets that will receive and provide current information about access during construction.	This EPC will be implemented through the Lower Manhattan Construction Command Center pursuant to Governor Pataki's Executive Order.
Consult with SHPO and LPC regarding potentially impacted, culturally significant sites. Monitor noise and vibration during construction at such sites as appropriate.	PANYNJ has and will continue to coordinate with the ACHP, SHPO, LPC, and the Section 106 consulting parties pursuant to the stipulations of the executed Memorandum of Agreement. As specified in the executed Memorandum of Agreement, PANYNJ will consult with SHPO and LPC to develop construction protection plans to monitor fragile buildings within the Preferred Alternative's APE and to stipulate measures to avert impacts to these structures. As described in the executed Memorandum of Agreement, PANYNJ will coordinate its CPPs with LMDC, MTA/NYCT, and/or NYSDOT, as appropriate, for those structures that may be cumulatively affected by construction vibrations.

*

A. INTRODUCTION

Lower Manhattan is developed with a dense concentration of historic and modern buildings that range in size from small-scale, low-rise structures to large-scale, high-rise structures. They reflect a variety of architectural styles that have been built over the years as commerce in Lower Manhattan has flourished and expressed its success in built form. The streets and open spaces surrounding this rich collection of buildings provide unique views that are distinguished from the views of other cities.

For 30 years, the World Trade Center's (WTC) Twin Towers were the tallest elements of those views and readily identifiable from miles around. Prior to September 11, 2001 the WTC complex occupied a superblock site and had a strong presence on the urban design of the area. A WTC PATH Terminal was located at the WTC and was an important transportation hub for the area. Following the events of September 11, 2001 and the subsequent recovery efforts, the WTC site had lost its transportation hub as well as the other aspects of the WTC. Construction activities have continued on the site as part of various phases of recovery and stabilization and included the construction of the temporary WTC PATH station, which opened for public use in November 2003.

The Preferred Alternative would introduce a visually important terminal building to the study area and would contribute to the larger redevelopment of Lower Manhattan. The modern design of the new terminal would create a new gateway to Lower Manhattan and would re-establish the site as an important transportation center.

This chapter considers the impact of the Preferred Alternative on the urban design character and visual resources of the study area from nearby locations from which the project would be visible. The study area has been delineated as the area generally bounded by Barclay Street to the north, Cedar and Thames Streets to the south, Battery Park City (BPC) to the west and Broadway to the east (see Figure 7-1). This study area was developed to be consistent with the study area defined for Cultural Resources (see Chapter 6).

Urban design characteristics and visual resources create the "look" of a neighborhood—its physical appearance, including the size and shape of buildings, their arrangement on blocks, the street pattern, and noteworthy views that may give an area a distinctive character and contribute to its unique sense of place. Urban design characteristics of a neighborhood are composed of the various components in the buildings and streets of the area and include building bulk, use and height, block forms and street patterns, streetscape elements, and natural features. An area's visual resources are its unique or important public view corridors, vistas, or natural or built features. They include views from public and publicly accessible locations only.*

* As defined in the *City Environmental Quality Review* (CEQR) *Technical Manual*, page 3G-1.

B. METHODOLOGY

Three analysis years—2006 (construction year), 2009 (opening year), and 2025 (design year)—are considered. While the analysis is primarily based upon conditions that exist today at the Project Site and in the surrounding study area, a discussion of the study area prior to the events of September 11, 2001 is included in this chapter to provide an overall context for the analysis which follows. Anticipated changes in the urban design and visual resources of the study area that are expected to occur independently of the Preferred Alternative by each analysis year are identified and potential impacts associated with each of the Preferred Alternatives are assessed.

The analysis of potential impacts to urban design and visual resources was conducted using the guidance set forth in the 2001 *City Environmental Quality Review* (CEQR) *Technical Manual.* Once the study area was established, the urban design characteristics and significant visual resources were described. Field visits were conducted to obtain information about the urban design and visual resources located within the study area. The information gathered in the field was supplemented with data obtained from Sanborn maps. Once this information was gathered, an assessment was prepared, focusing on urban design elements and visual resources that could be impacted.

C. DESCRIPTION OF THE AFFECTED ENVIRONMENT

PRE-SEPTEMBER 11, 2001 BASELINE CONDITIONS

PROJECT SITE

Urban Design

Prior to September 11, 2001, the Project Site was occupied by a WTC PATH Terminal, which included a track and platform level, an associated mezzanine/fare-zone level, and sub-grade pedestrian connections to adjacent streets, subways, and the WTC. There were no above-ground features of the terminal, as it was accessed through the WTC buildings (see Figure 7-2).

Visual Resources and View Corridors

Prior to September 11, 2001, the Twin Towers were important visual resources. Buildings associated with the WTC blocked views across the Project Site from other portions of the study area.

STUDY AREA

Comprising important parts of Lower Manhattan, the study area prior to September 11, 2001, was densely developed with office buildings, a number of which have been converted to residential use in recent years. The discussion below focuses first on the study area's urban design—its basic layout and structures—and then describes its visual resources.

Urban Design

Natural Features, Street Patterns, and Block Shapes. The topography of the study area sloped slightly to the south and west. Street patterns were slightly irregular. Route 9A and Greenwich Street generally traveled in a north-south direction, while West Broadway, Church Street, and Broadway traveled in a northeast-southwest direction. As a result, the blocks west of West

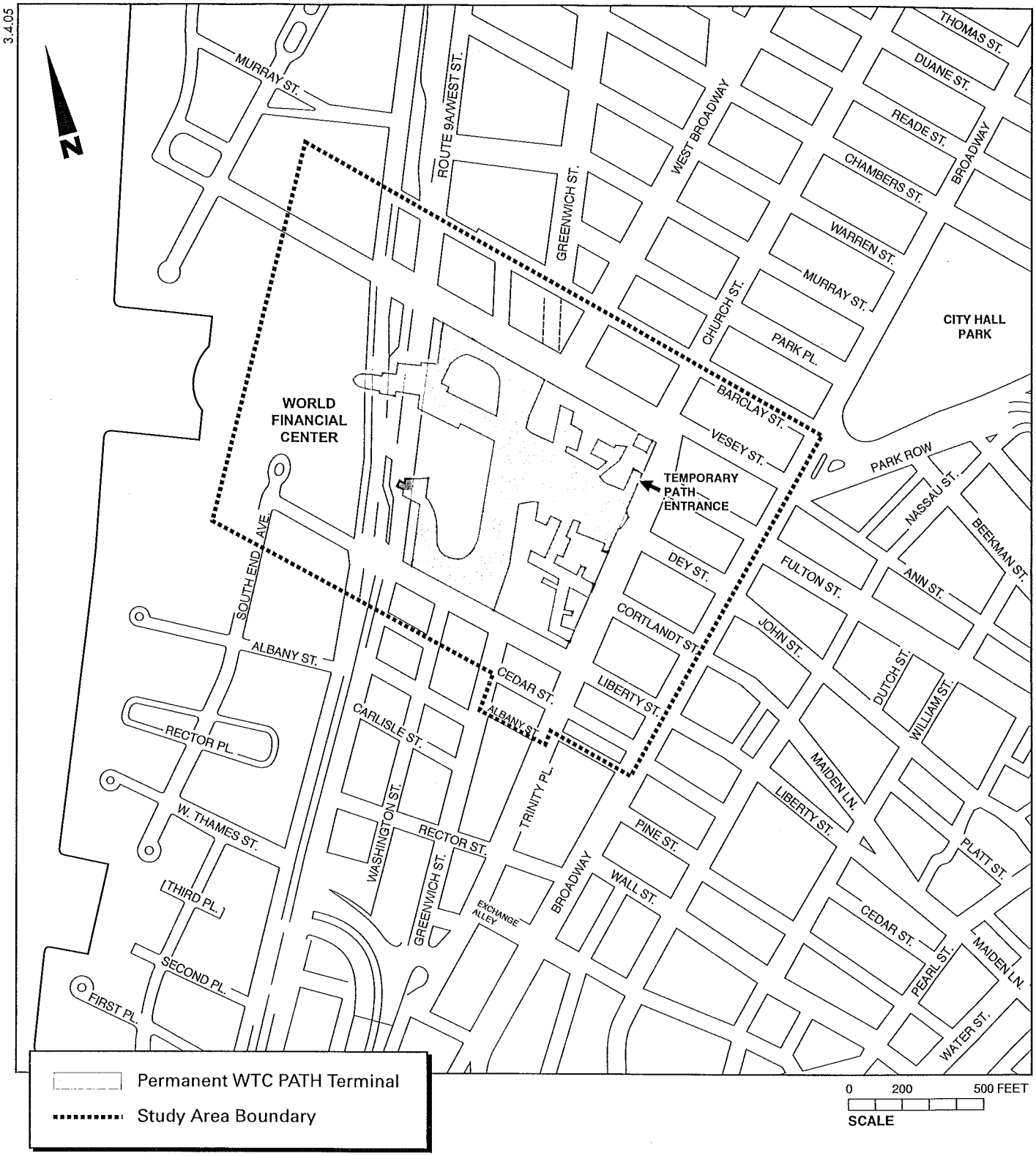


Figure 7-1

Urban Design and Visual Resources Study Area

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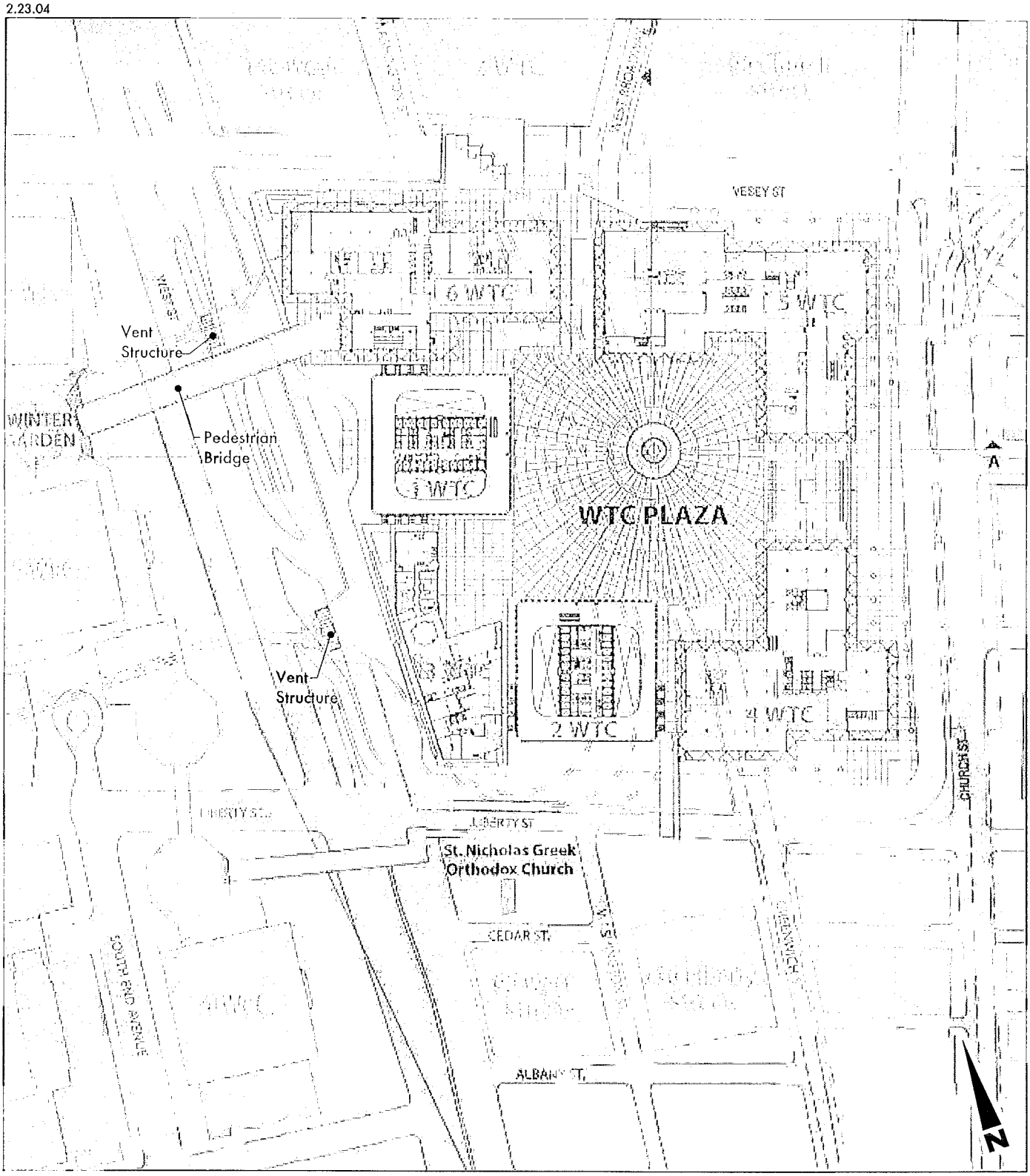

Source: PANYNJ

0 200 400 FEET
SCALE

Figure 7-2

Urban Design and Visual Resources Pre-September 11, 2001 Conditions

Broadway had irregular shapes. Route 9A, Broadway and Church Street were the primary roadways in the study area carrying multiple lanes of vehicular traffic.

Greenwich Street terminated at Barclay Street as Seven World Trade Center (7 WTC) occupied the entire area between Washington Street on the west and West Broadway on the east. West Broadway was open to Vesey Street where it ended at the WTC site. The WTC occupied a superblock site and had a strong impact on the street patterns and block shapes in the study area.

Large office buildings—including the Barclay-Vesey Building, the Federal Office Building/U.S. Post Office and One Liberty Plaza—occupied full blocks. St. Paul's Chapel, with its adjoining graveyard, also occupied a full block. Liberty Plaza occupied the full block bounded by Liberty and Cedar Street, Trinity Place and Broadway.

In BPC, there were no streets through the World Financial Center (WFC) between Liberty Street on the south and Vesey Street on the north. South End Avenue was the north-south roadway south of Liberty Street as was North End Avenue north of Vesey Street. Block shapes were not regular, and most structures were not built to the lot line.

Streetscape. The study area was urban in character, with streets flanked by concrete sidewalks. Most buildings extended to the lot line. Parked cars lined most streets. Various kinds of street furniture were found throughout study area, including fire hydrants, mailboxes, newsstands, lampposts and vendor carts. Most lampposts located along Route 9A were reproductions of historic lampposts, while others were of more modern design. Historic fire alarm call boxes were unique urban artifacts also found in the study area.

While still very urban in character, BPC was visually distinct from the rest of the study area. It was physically divided from the study area by Route 9A, the only multi-lane highway in the area. The WFC was set back from Route 9A's bikeway/walkway by a wide concrete sidewalk along the building front and a green lawn beyond that. Open space, both paved plazas and landscaped areas, was far more prevalent in BPC than elsewhere in the study area. BPC also had a great variety of attractive, well-designed street furniture, including benches, tables, and lampposts.

The streetscape on the north side of 7 WTC was the location of the wide truck ramp off Barclay Street that provided service access to the underground levels of the WTC. To reach this ramp, trucks were lined up on the west side of West Broadway for several blocks. The WTC as well as the wide and busy Route 9A roadway separated the WFC from the streets of Lower Manhattan. Two twelve-foot-tall vent structures for the WTC PATH Terminal were also located in the Route 9A median, opposite the WTC. Liberty and Vesey Streets were both open, providing vehicular access.

Building Uses, Shapes, and Forms. Prior to September 11, 2001, six buildings were located on the WTC superblock, most notably the 110-story Twin Towers (One and Two World Trade Center). These 1,350-foot-tall aluminum-clad skyscrapers (excluding the 345.1-foot antenna) were the tallest buildings in New York and had a dominating presence on the New York City skyline (see Figure 7-3). The Twin Towers were important visual resources due to their height and modern design. Other buildings on the site were more modest in scale. These included a 22-story hotel (Three World Trade Center), two nine-story buildings (Four and Five World Trade Center), and the eight-story U.S. Customs House (Six World Trade Center). These buildings were situated around the Austin J. Tobin Plaza, which was decorated with several sculptures. An enclosed pedestrian bridge over Route 9A connected the WTC with the Winter Garden in the WFC and was wider than the bridge that still crosses Route 9A at Liberty Street. Another shorter

pedestrian bridge crossed over Vesey Street from the WTC plaza to 7 WTC. The building at 7 WTC occupied the full block between Barclay, Vesey and Washington Streets and West Broadway.

A 39-story office building stood at 130 Liberty Street. Located directly across Liberty Street from 2 WTC, it had a plaza with a fountain.

The remainder of the study area was developed with a mix of historic and modern, low- and high-rise buildings. Almost all the buildings were originally constructed as office buildings, although several had been converted to residential use. Three churches were located in the study area—St. Paul's Chapel, St. Peter's Roman Catholic Church and St. Nicholas Greek Orthodox Church. Aside from the WTC, buildings in the study area ranged in height from two to 54 stories. Several tall office buildings were located in the study area and included the Barclay-Vesey Building with its dramatic setbacks, the Transportation Building at 225 Broadway, the former AT&T Company Building at 195 Broadway and One Liberty Plaza. Most buildings were built to the lot line, except for One Liberty Plaza, which was set back from its lot line and was surrounded by a plaza.

BPC was primarily developed with modern high-rise office and residential buildings. The WFC was a group of office towers clad in pink granite. They varied in height from 33 to 51 stories. Each structure was designed with a different geometric form at its roofline—mastaba, dome, pyramid, and stepped pyramid. The residential buildings west and south of the WFC varied in height from four to 28 stories.

Visual Resources and View Corridors

Prior to September 11, 2001, the Twin Towers were considered important visual features for the study area. The Austin J. Tobin Plaza and the plaza area along Church Street were visual and urban design amenities.

Despite its amenities, the WTC blocked view corridors. It cut off views north and south on Greenwich and Washington Streets, views south on West Broadway, and views west on Fulton, Dey, and Cortlandt Streets. The building at 130 Liberty Street blocked views east and west on Cedar Street.

7 WTC blocked views of the east side of the Art Deco Barclay-Vesey Building. Views from the south of the Barclay-Vesey Building were limited by 6 WTC and 1 WTC. 7 WTC blocked views south on Greenwich Street and views south on West Broadway ended at 5 WTC. A shorter structure and set back from the street, 5 WTC allowed more light up West Broadway than 7 WTC allowed up Greenwich Street.

Broadway, Church Street and Route 9A provided long north-south view corridors; however, the view corridor along Route 9A was partially blocked by the pedestrian bridges above the highway at Liberty and Vesey Streets. Views west on Barclay, Vesey, Liberty and Cedar Streets continued to BPC, while views east on these streets continued uninterrupted along narrow street corridors. The view corridors north along Washington and Greenwich Streets were blocked by 2 WTC and 4 WTC. In addition, the view east and west on Cedar Street was blocked by 130 Liberty Street—a building with dark glass windows that towered over the narrow streets to the east, south, and west of it.

In BPC, the buildings of the WFC were designed to harmonize with the size and design of the Twin Towers (see Figure 7-3). In views of Manhattan from the Hudson River or New Jersey, the WFC buildings stepped up the height of the built environment toward the WTC towers. On the

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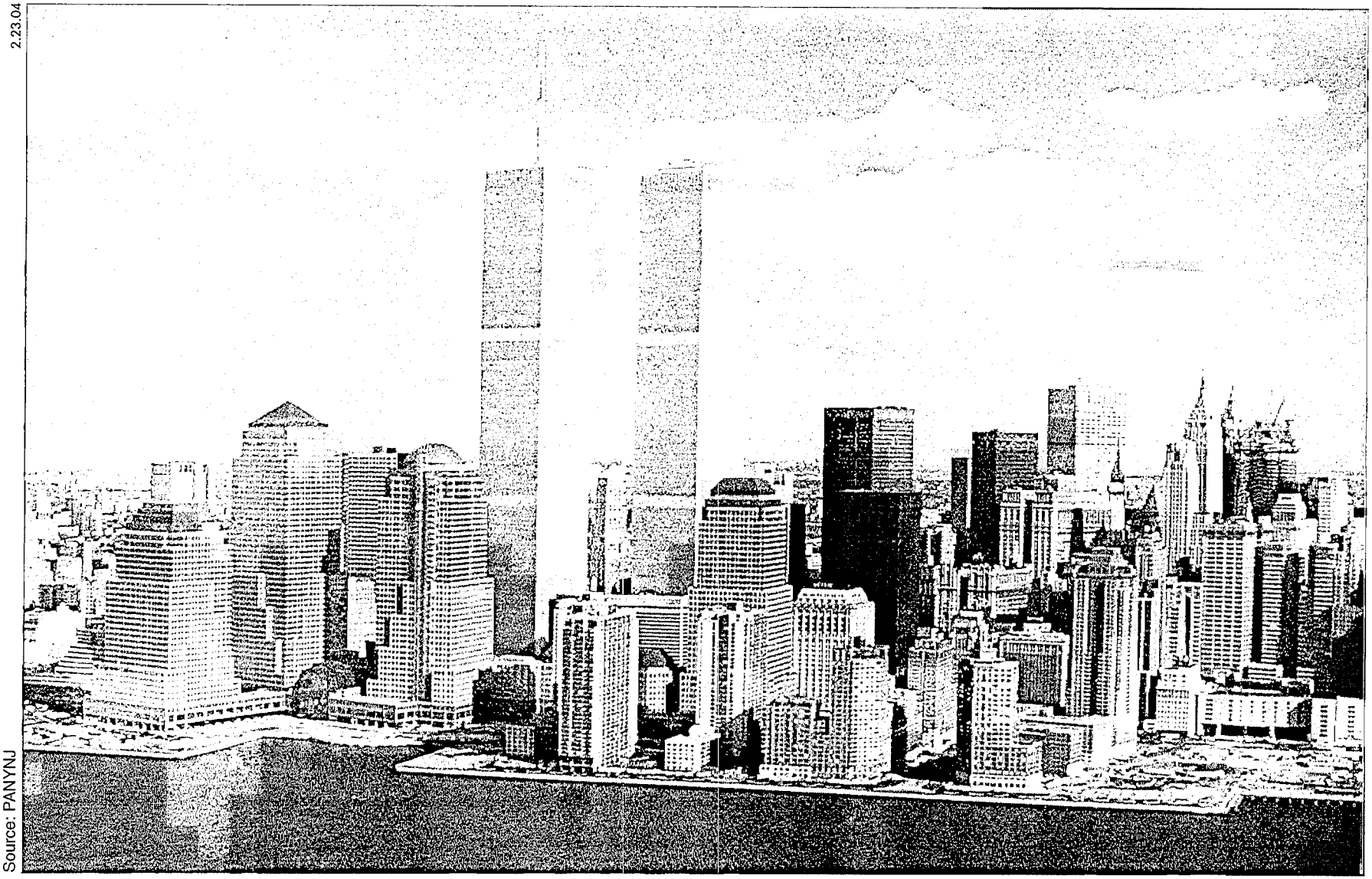


Source: PANYNJ

Pre-September 11, 2001 photo showing the Twin Towers in the New York City skyline

Figure 7-3

Urban Design and Visual Resources
Pre-September 11, 2001 Conditions

other hand, because of the WTC the whole façade of the WFC along Route 9A could only be seen at an oblique angle. It was also not possible to see St. Paul's Chapel and the East River Savings Bank from the WFC prior to September 11, 2001.

Historic office buildings are frequently among the important visual resources of Lower Manhattan (see Chapter 6, "Cultural Resources"). Due to their heights, distinctive forms and decorative features, the Art Deco Barclay-Vesey Building (140 West Street/Route 9A), the neo-Gothic Woolworth Building (233 Broadway), the neo-Gothic building at 90 West Street, the Beaux Arts Equitable Building (120 Broadway) and the Art Deco Irving Trust Company Building (1 Wall Street) were unique visual resources that could be seen from throughout the study area.

Trinity Church was an important visual resource that was visible from the southern portion of the study area. Set between its graveyard and a small yard area, it was a relatively small neo-Gothic structure located at the head of Wall Street. Similarly, St. Paul's Chapel, opposite the northeast corner of the Project Site, was a visual resource along with its graveyard and large trees. The steeples of both churches were visible from blocks away, and the juxtaposition of their steeples against high-rise buildings, both sleek modern and more ornate older ones, was a defining feature of Lower Manhattan.

Another visual resource was Liberty Plaza. It was a paved full block with eight metal benches; a life-sized sculpture of a man with a briefcase and umbrella sat on one. Across the plaza there were views of the WTC but not the WFC. On Cortlandt, Dey, and Fulton Streets, the structures of the WTC blocked views west. Looking west on Cortlandt Street, 4 WTC was in front of 2 WTC. The view west across Fulton Street was to 5 WTC.

The modern granite-clad structures of the WFC and the glass walls of the Winter Garden were visible from Route 9A and adjoining side streets. While very attractive, the most important visual resources of BPC were the Hudson River and the many varied open spaces of BPC.

CHANGES IN THE AFFECTED ENVIRONMENT SINCE SEPTEMBER 11, 2001

This section provides a detailed description of urban design characteristics and visual resources in the study area which have changed since September 11, 2001. These differences are largely concentrated on the Project Site, the WTC site and the immediate area. This section highlights changes in urban design and visual resources which occurred as a direct result of the terrorist attacks along with any other changes which have occurred.

PROJECT SITE

Urban Design

The attacks of September 11, 2001 destroyed the WTC PATH Terminal along with the Twin Towers and the rest of the WTC. Today, the temporary WTC PATH station, which opened in November 2003, is located at the northeast portion of the Project Site (see Figure 7-4). The tracks of the temporary WTC PATH station curve around the south end of the bathtub, passing into the new structure of the temporary station. The temporary WTC PATH station's mezzanine level, station platforms, and rail tracks are located on the western portion of the site. The New York City Transit (NYCT) 1 and 9 subway line also bisects the Project Site. Additionally, a wide area along the east side of the Project Site is paved with concrete. The entrance to the temporary WTC PATH station is located here opposite Fulton Street. Sidewalk viewing areas are located along Church Street south of the WTC PATH entrance and on Liberty Street.

Portions of the former Hudson & Manhattan (H&M) Terminal exist on site; however, these portions are below grade and are not visible from street level. Damaged portions of the tunnels that traveled under the Hudson River—known as the Hudson Tubes—are located in the east wall. Only the south tube is visible (see Figure 7-4). Aside from the viewing areas and the temporary WTC PATH station, the remainder of the Project Site remains undeveloped and is fenced off and not accessible to the public (see Figure 7-5).

Visual Resources and View Corridors

On the Project Site at Fulton Street, the canopy of the temporary WTC PATH station has a sculptural form, with two wings rising from a central truss supported on two vertical trusses (see Figure 7-4). The fence, which stands along the public viewing area, allows visitors to see through it to the WTC site. The Port Authority of New York and New Jersey (PANYNJ) has posted informational boards telling the history of the site and high-rise buildings in Lower Manhattan.

As no other structures exist on the Project Site, the site is open and more sunlight reaches the Project Site and surrounding streets. View corridors are open across the site to other portions of the study area.

STUDY AREA

Urban Design

Natural Features, Street Patterns, and Block Shapes. Following the events of September 11, 2001, street patterns and block shapes changed slightly in the study area. The area south of Barclay Street and west of Greenwich Street is now closed to traffic by fencing and construction activity at 7 WTC. Greenwich Street, at least as a view corridor, is being reopened to Vesey Street by the new configuration of 7 WTC. Aside from the temporary WTC PATH station, the superblock of the WTC remains an undeveloped lot.

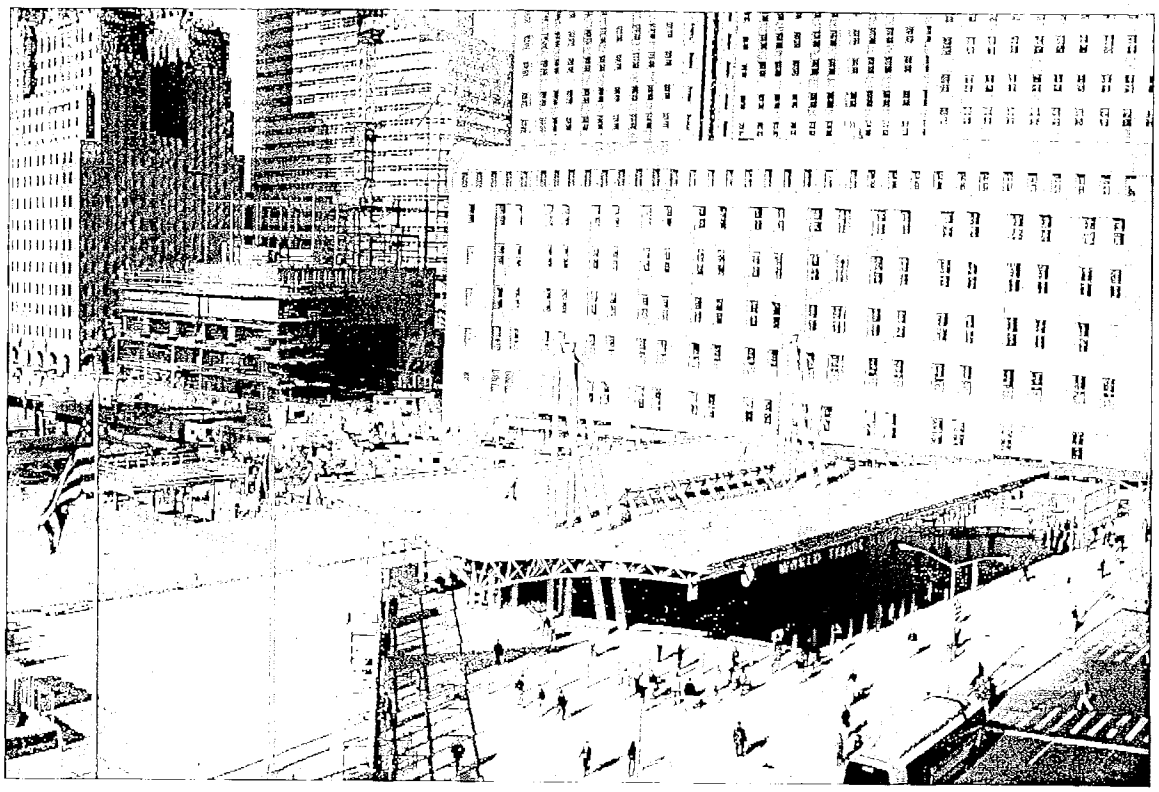
Many street segments were closed after the terrorist attacks and for the recovery activities. Closed streets include portions of Barclay, Vesey, Liberty and Cedar Streets, and the northern portions of Washington and Greenwich Streets.

Streetscape. Today, much of the streetscape surrounding the WTC site is dominated by construction. Otherwise, streetscape features in the study area are generally unchanged.

Building Uses, Shapes, and Forms. St. Nicholas Greek Orthodox Church, located south of the WTC site, was destroyed as a result of the events of September 11, 2001. The large block south of the WTC, bounded by Liberty, Greenwich, Albany, and Washington Streets, is occupied by a vacant office building at 130 Liberty Street. Its north façade (facing the WTC) was severely damaged in the attacks of September 11, 2001, and its two-level plaza was completely destroyed. The plaza area has been excavated, leaving a large hole in the ground surrounded mostly by a high construction wall. The large size of its lot, as well as the damaged and abandoned condition of the building, creates a strong presence on the adjoining streets.

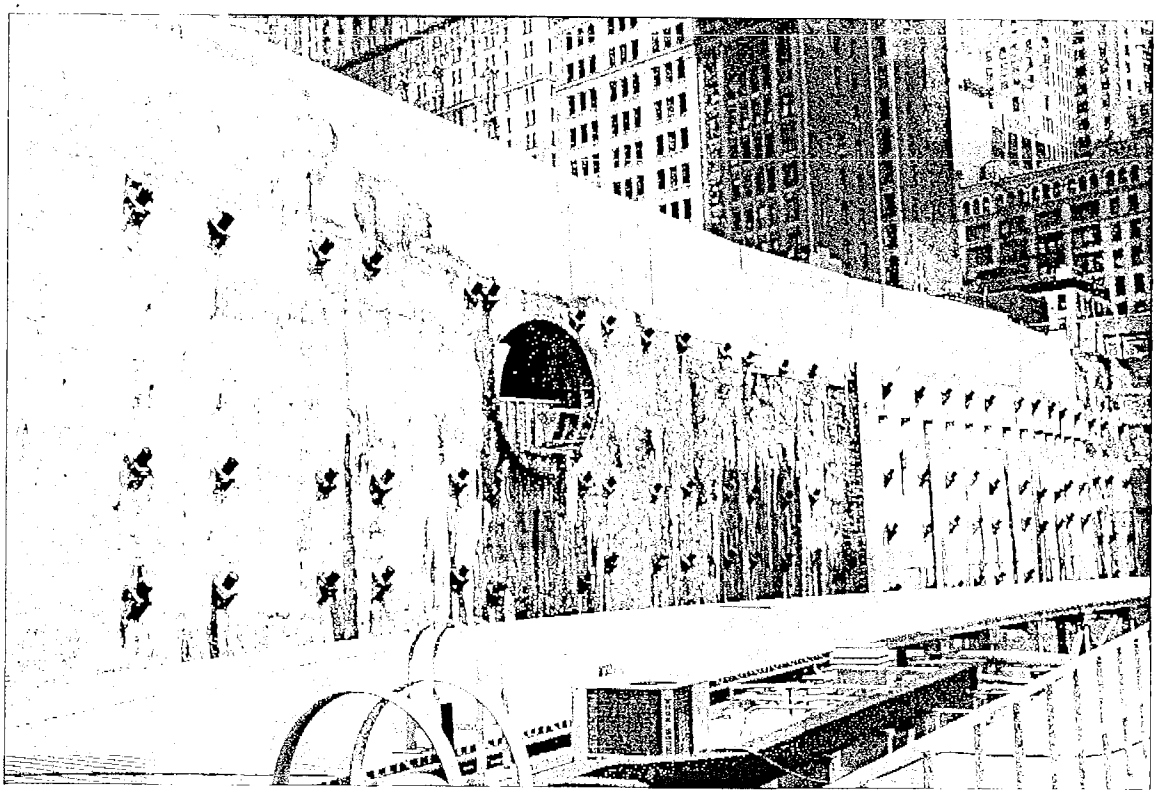
Visual Resources and View Corridors

The WTC site in its current condition has opened view corridors to the north, south, west, and east (see Figure 7-6). The openness allows visual resources located in the study area to be seen from and across the WTC site. The Barclay-Vesey Building and the Federal Office Building/U.S. Post Office are now visible in views north, from south of the site. From locations



Source: PANYNJ

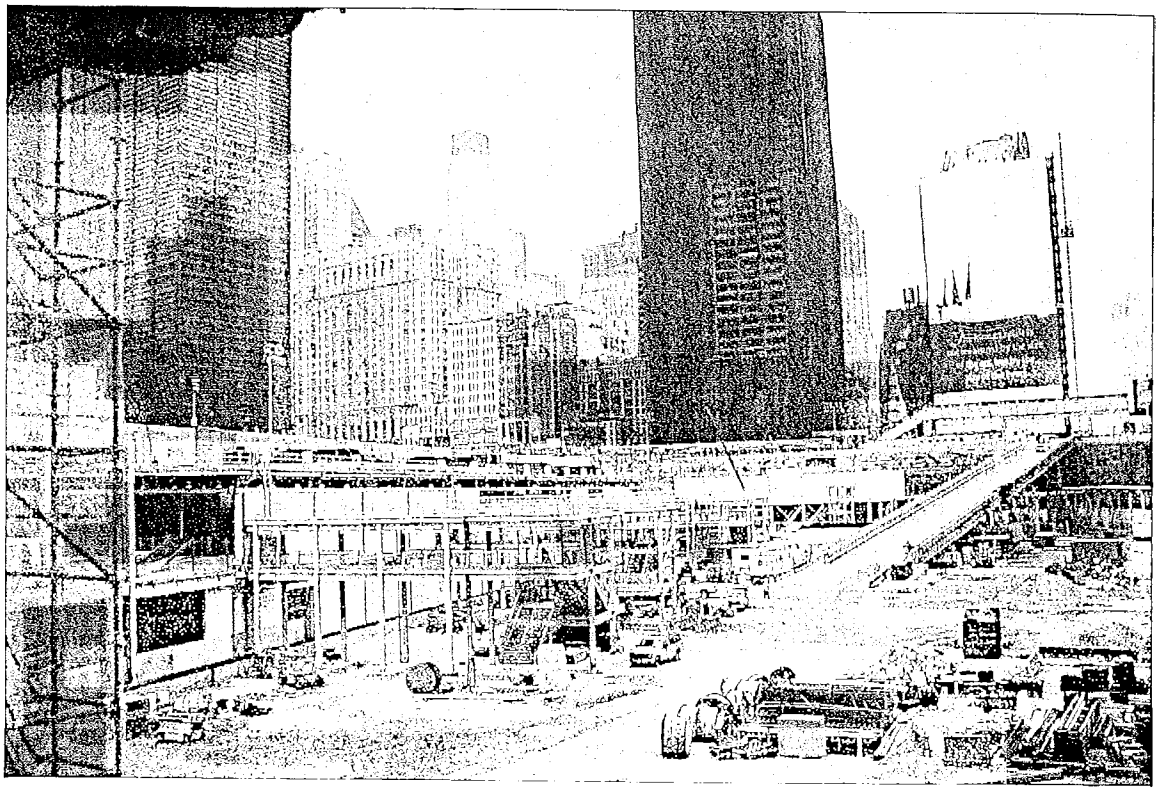
View northwest of the Project Site showing the temporary WTC PATH station.
7 WTC is under construction in the background



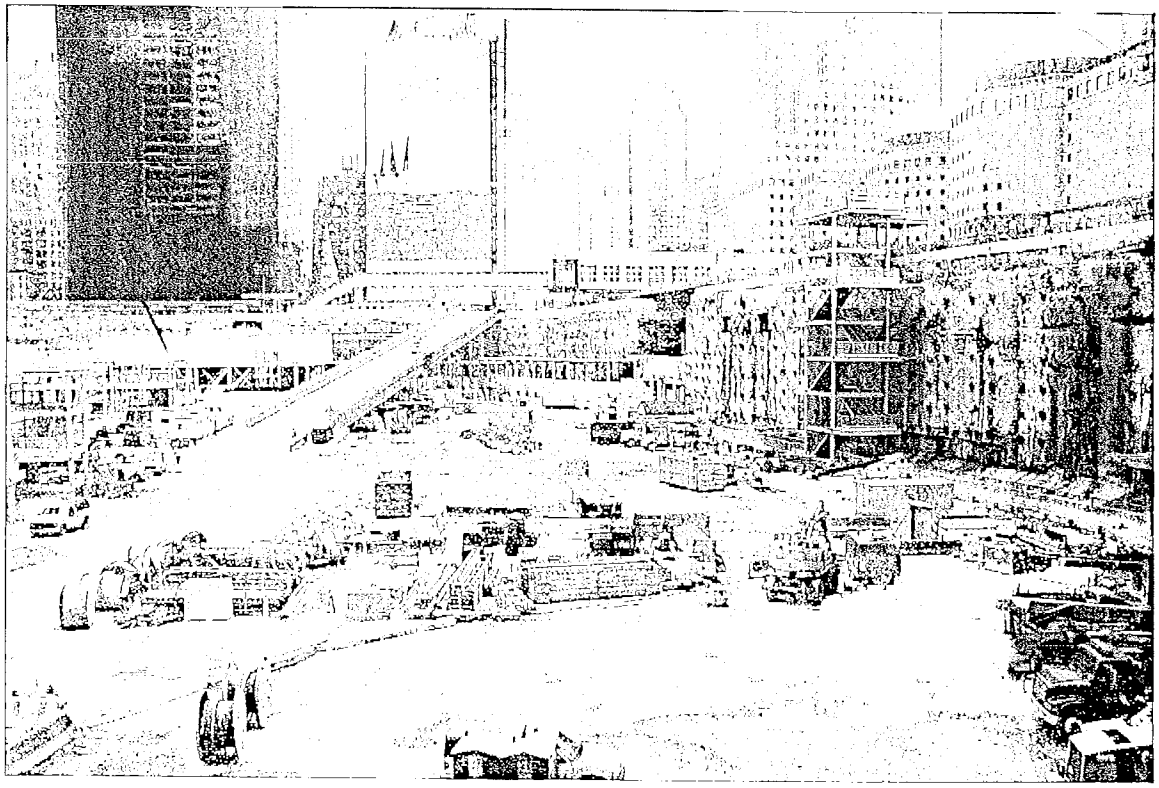
View showing one of the Hudson Tubes in the eastern slurry wall

Figure 7-4

Urban Design and Visual Resources
Post-September 11, 2001 (Current) Conditions



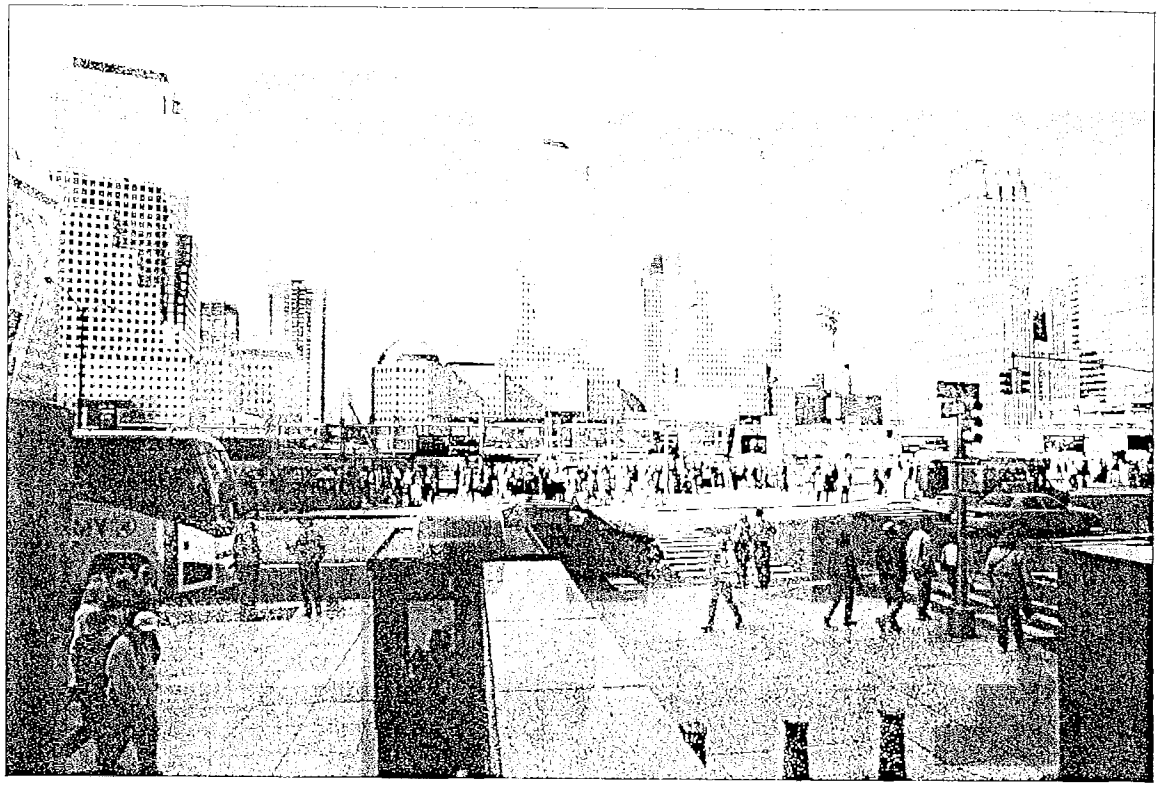
View southeast of the WTC site, showing the temporary WTC PATH station on the site



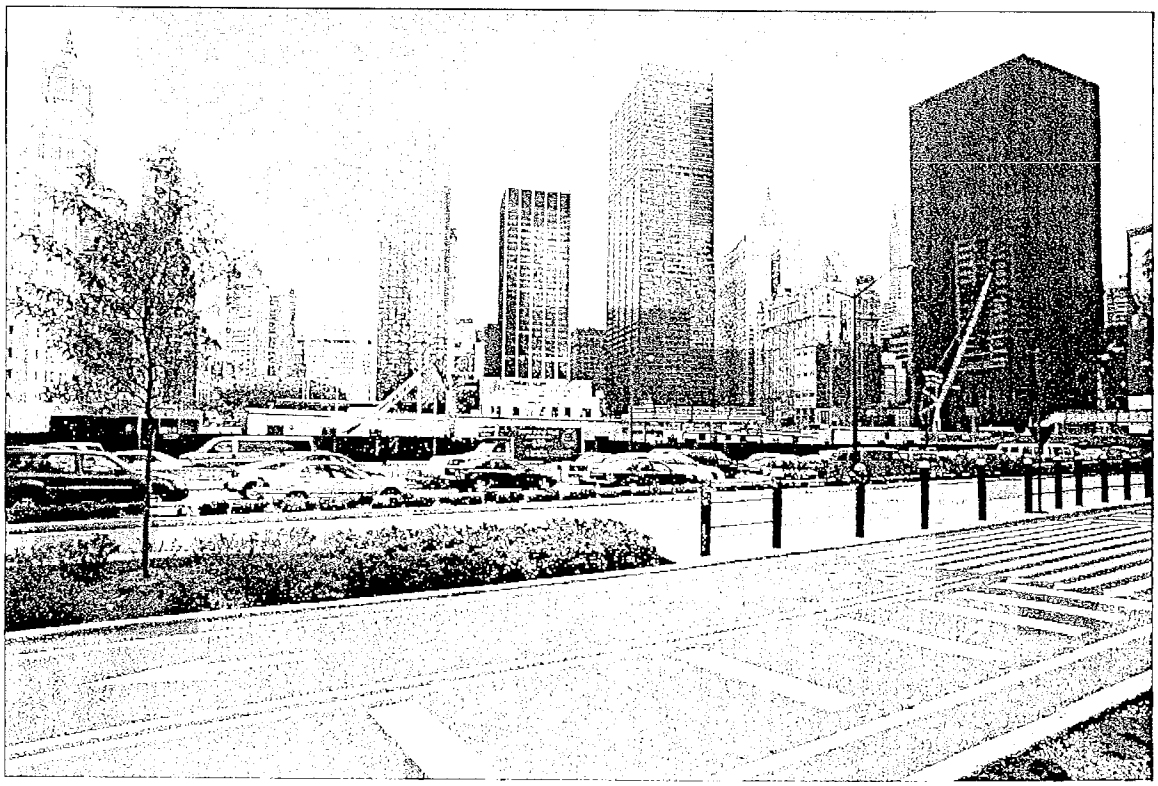
View southwest of the WTC site

Figure 7-5

Urban Design and Visual Resources
Post-September 11, 2001 (Current) Conditions



View west across the WTC site



View southeast across the WTC site

Figure 7-6

Urban Design and Visual Resources
Post-September 11, 2001 (Current) Conditions

west of the site, views of St. Paul's Chapel and the East River Savings Bank are available. From east of the site, views of the modern office towers of the WFC as well as views toward the Hudson River are available. Due to the undeveloped condition of the WTC site, the streets and buildings immediately surrounding it receive additional light.

Views west on Barclay, Vesey, Liberty and Cedar Streets are partially blocked by construction activity. Liberty Plaza was damaged on September 11, 2001 and has been partially restored. It remains a full-block open space with benches, planters, and lighting.

D. PROBABLE IMPACTS OF THE PROJECT ALTERNATIVES

This section describes conditions that are or would be expected to exist under the project alternatives for three analysis scenarios (construction period, opening year, and design year).

CONSTRUCTION PERIOD (2006)

FUTURE COMMON TO ALL ALTERNATIVES

Initial reconstruction activities associated with the WTC Memorial and Redevelopment Plan would be taking place. St. Nicholas Church is expected to be reconstructed south of the WTC site by 2006.

Both the Barclay-Vesey Building and the Federal Office Building/U.S. Post Office, north of the Project Site, will be repaired, renovated, and reopened. Between these two buildings, 7 WTC will be complete along with its triangular open space on the north side of Vesey Street. A residential building is expected to be complete along Barclay Street, between Broadway and Church Street. The proposed building is expected to be taller than the adjacent small-scale buildings. In addition, reconstruction of Route 9A between West Thames and Chambers Streets will be taking place.

NO ACTION ALTERNATIVE

Project Site

Under the No Action Alternative, the temporary WTC PATH station would remain in service. Construction activities associated with the WTC Memorial and Redevelopment Plan would be occurring on site.

Study Area

It is not expected that this alternative would have any adverse impact to urban design features or visual resources.

PREFERRED ALTERNATIVE

Project Site

Construction of the Preferred Alternative would begin in 2005 concurrent with other sub-grade work for the proposed redevelopment of the WTC site. Components of the terminal, including the platforms, mezzanine, and certain pedestrian connections, would be completed by the end of 2006.

Study Area

It is not anticipated that this alternative would have any impact on natural features, street patterns, or block shapes in the study area, as none of these features would be altered. Construction activities associated with this alternative may temporarily impact streetscape features. As all work would take place below grade and there would be no above-ground features of this alternative completed by 2006, there is no anticipated adverse impact to building uses, shapes, and forms in the study area. Although there would be some above-grade construction activities as well as potential staging areas associated with this alternative, these construction activities would be temporary. As these construction activities would be temporary and would not have a permanent visual impact on the study area, it is not anticipated that there would be an adverse impact to visual resources and view corridors in the study area.

OPENING YEAR (2009)

FUTURE COMMON TO ALL ALTERNATIVES

Portions of the WTC Memorial and Redevelopment Plan would be complete while other construction activity would continue. The Greenwich Street view corridor and possibly the street itself will be open north into Tribeca. In addition, reconstruction of Route 9A between West Thames and Chambers Streets would be complete. In BPC, Site 26 is slated for commercial development. The Fulton Street Transit Center would be open, east of the Project Site.

NO ACTION ALTERNATIVE

Project Site

In 2009 without the Preferred Alternative, it is assumed that the temporary WTC PATH station would remain in service. Some construction activities associated with the WTC Memorial and Redevelopment Plan would continue while some would be complete on site.

Study Area

It is not expected that this alternative would have any adverse impact to urban design features or visual resources.

PREFERRED ALTERNATIVE

Project Site

The remaining portions of the Preferred Alternative would be completed in phases from 2007 to 2009. The terminal building would be located on the WTC site south of Fulton Street between Greenwich and Church Streets.

The terminal building would provide street-level access to the WTC site and Greenwich and Church Streets. It would be modern in design and would be lower in height than the WTC buildings adjacent to it on the south and to the north of it across Fulton Street. The terminal building would be designed by Santiago Calatrava, an award-winning architect, artist, and engineer. His works include the Olympic Sports Complex (Athens, 2001), the Milwaukee Art Museum (1994), several railway stations (Liege, 1996; Lisbon, 1993; and Alameda, 1991), and several bridges (Buenos Aires, 1998; Orleans, 1996; Venice, 1996; Bilbao, 1994; and Merida, 1988).

Calatrava's modern design for the terminal would incorporate two wing-like canopies that would run the length of the glass and steel shell of the terminal concourse (see Figures 7-7 and 7-8). These wings would be approximately 100 feet high and could pivot aside to create an opening to the sky along the main axis of the terminal. The terminal's design would complement the modern structures planned for the WTC site, such as Freedom Tower and Wedge of Light Plaza. The terminal would likely become an important visual resource for Lower Manhattan, and would create a grand point of entry for the new transportation center.

Underground pedestrian concourses connecting to New York City subways would also be complete by 2009. An above-ground entrance to the concourse would be located next to the World Financial Center. The Terminal would also include certain ancillary facilities and systems, including mechanical, ventilation, communications, and security.

In addition, two vent structures would be located in the Route 9A median, west of the WTC site. Both the north vent and the south vent would be of a long and slender massing and would stand 40 feet tall. It is anticipated that the structures would be clad in reflective material, in keeping with modern material used on buildings in the immediate area.

Study Area

In 2009, it is not anticipated that this alternative would have any impact on natural features, street patterns, or block shapes in the study area, as none of these features would be altered. It is not anticipated that there would be an adverse impact on streetscape features since existing elements would not be altered by the proposed development. The Project Site is expected to be developed with streetscape elements that would be in keeping with those found throughout the study area. Although the entrance to the temporary WTC PATH station would be replaced by the new entrance to the Permanent WTC PATH Terminal, it is expected that the new entrance would be developed with streetscape elements that would be in keeping with those found in the study area and would be an improvement over current conditions.

It is anticipated that Calatrava's design for the proposed terminal building would be constructed of glass, steel and concrete, and would be similar to the materials used in Wedge of Light Plaza that would be constructed along Church Street as part of the WTC Memorial and Redevelopment Plan. It would also be in keeping with modern structures that exist in the study area, such as the Winter Garden and other buildings in the WFC and BPC. It would continue the tradition in the downtown area where technologically advanced modern buildings have been constructed near older, historic structures. It is also anticipated that Calatrava's design would be modern and unique to the area, and that the new terminal may become an important visual resource for the study area. In addition, its use would be consistent with the historic transportation uses associated with the Project Site. The terminal building would not block any unique views or view corridors, as views across the Project Site will be blocked by construction associated with redevelopment of the WTC site. As it is expected that the proposed terminal building would be an improvement over current conditions and would introduce an important architectural resource to the study area, it is not expected to have an adverse impact on the urban design or visual resources of the study area.

It is anticipated that the underground concourse to the WFC would be an improvement over existing conditions because its construction would allow for the removal of the temporary bridge over Route 9A at Vesey Street. The removal of this bridge would improve view corridors along Route 9A and surrounding streets in the study area. A new headhouse would be located in front of the Winter Garden. The headhouse would provide access to and from the Route 9A

connection. It would be a canopy of steel and glass and would be similar in scale to the temporary WTC PATH Station entrance. It is anticipated that the headhouse would complement the modern style of the Winter Garden. Figure 7-9 is a schematic of the proposed headhouse.

It is not anticipated that the vent structures would block any views or view corridors. The vent structures would be located in the Route 9A median, west of the WTC site. The location of the north vent structure would not block the Fulton Street view corridor, while the south vent structure would not block the Liberty Street view corridor. The vent structures would not block views north or south on Route 9A, as they would be slender in massing and would be located within the roadway median. Surrounding each vent structure, trees would be planted in the median as part of greening improvements to Route 9A. It is expected that this landscaping would occur concurrent with landscaping for the Route 9A Project in or around 2007.

It is anticipated that these trees would be 35 feet in height within five years of planting, thus obscuring views of the vent structures from pedestrians and vehicular traffic (see Figures 7-10 and 7-11). It is anticipated that the vent structures would be clad in reflective material that would be in keeping with modern materials used on buildings in the immediate area. This reflective material would also help the vent structures to blend in with their natural surroundings. Although the vent structures would be located west of the WTC site, it is not anticipated that these structures would impact the WTC site, as they would not block views towards the site and tall trees would obscure views of these structures from the WTC site. Likewise, it is not anticipated that these vent structures would have any impact on the WFC. Overall, it is not anticipated that the vent structures would have an adverse impact on view corridors or visual resources located within the study area, as they would not block any view corridors or views to visual resources and would be further obscured by tall trees that would be planted in the Route 9A median.

DESIGN YEAR (2025)

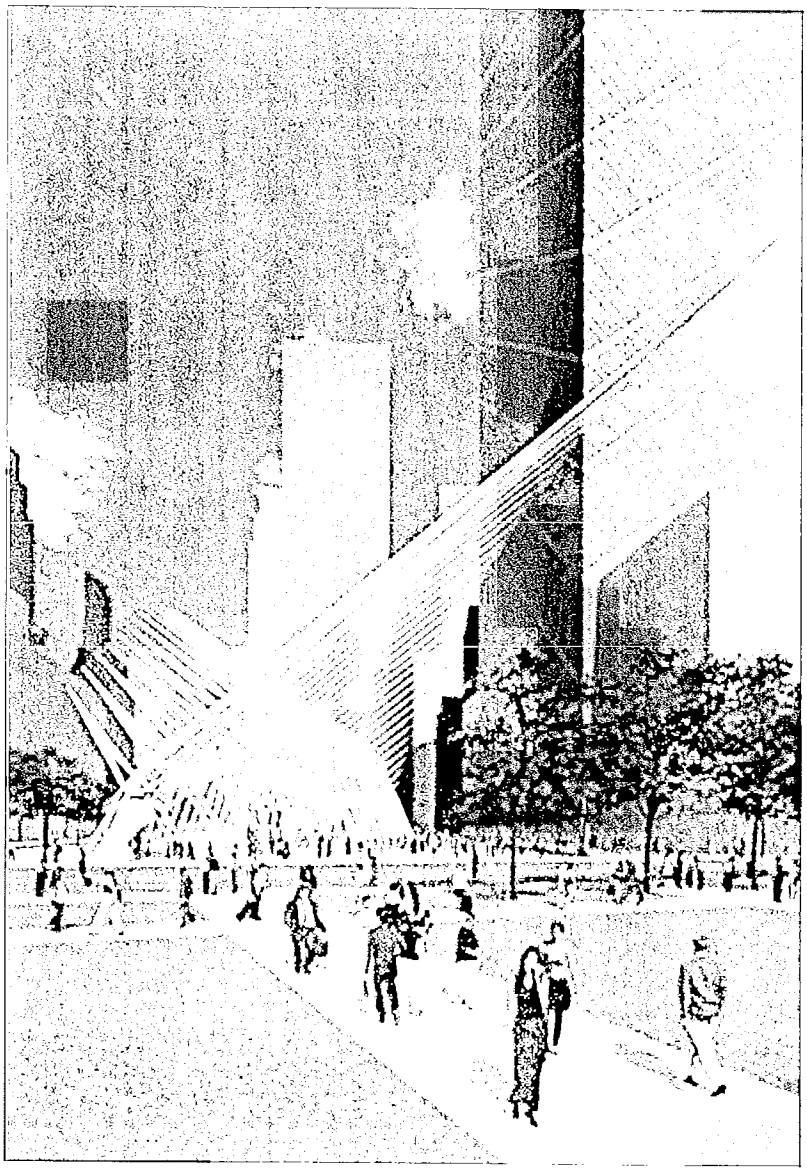
FUTURE COMMON TO ALL ALTERNATIVES

By 2015, it is assumed that the full program for the WTC site would be developed, with the completion of the three towers on the east side of the WTC site and a fifth tower south of Liberty Street. A 65-story office building (Tower 2) and a 25-story hotel would be completed in the northeast quadrant. In the southeast quadrant, a 62-story office building (Tower 3) and a 58-story office building (Tower 4) would be completed. A 57-story office building (Tower 5) would be completed south of Liberty Street. Two office towers would also be developed at 130 and 140 Liberty Street. The Fulton Street Transit Center would be complete, east of the Project Site. It is expected that these new developments would create shadows typical of the urban context of Lower Manhattan.

NO ACTION ALTERNATIVE

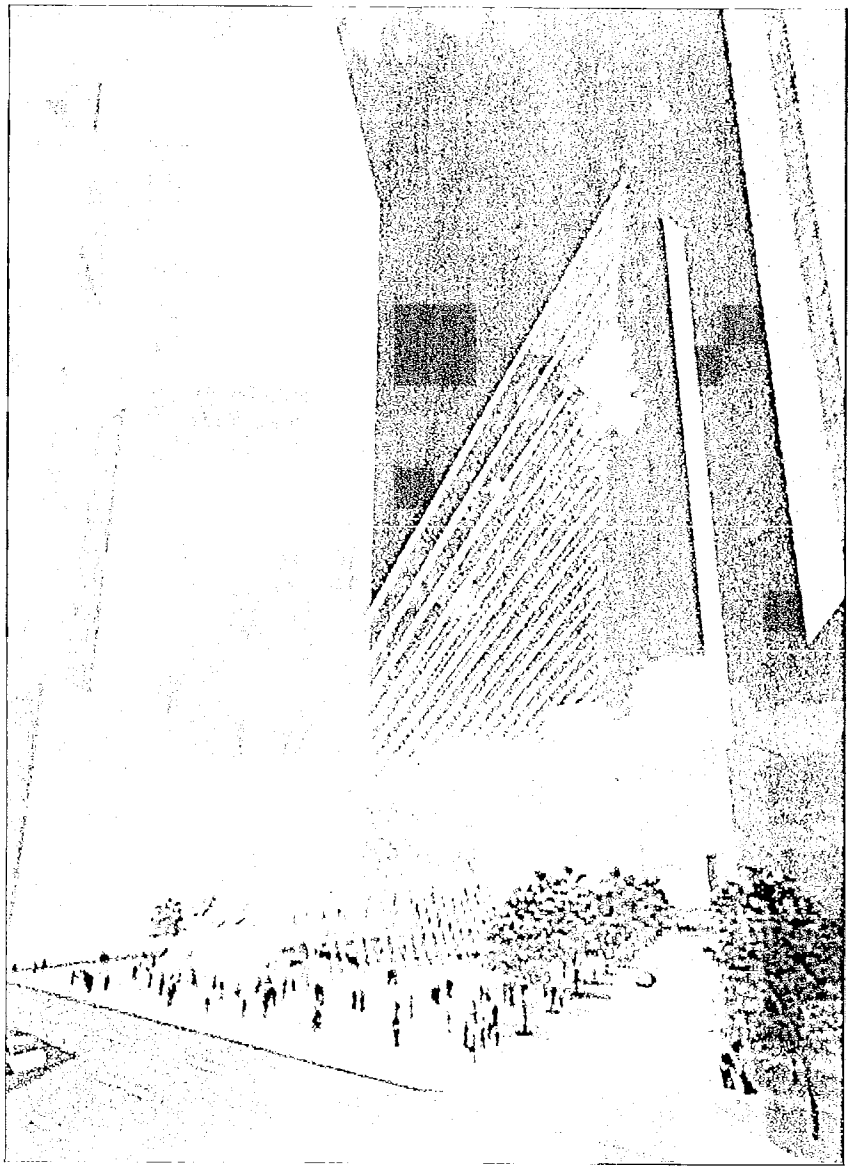
Project Site

In 2025 without the Preferred Alternative, it is assumed that the temporary WTC PATH station would still be located on the Project Site, unless removed by a separate undertaking and would not be operational. Construction activities associated with the WTC Memorial and Redevelopment Plan would be complete on site.



View southeast from WTC Memorial

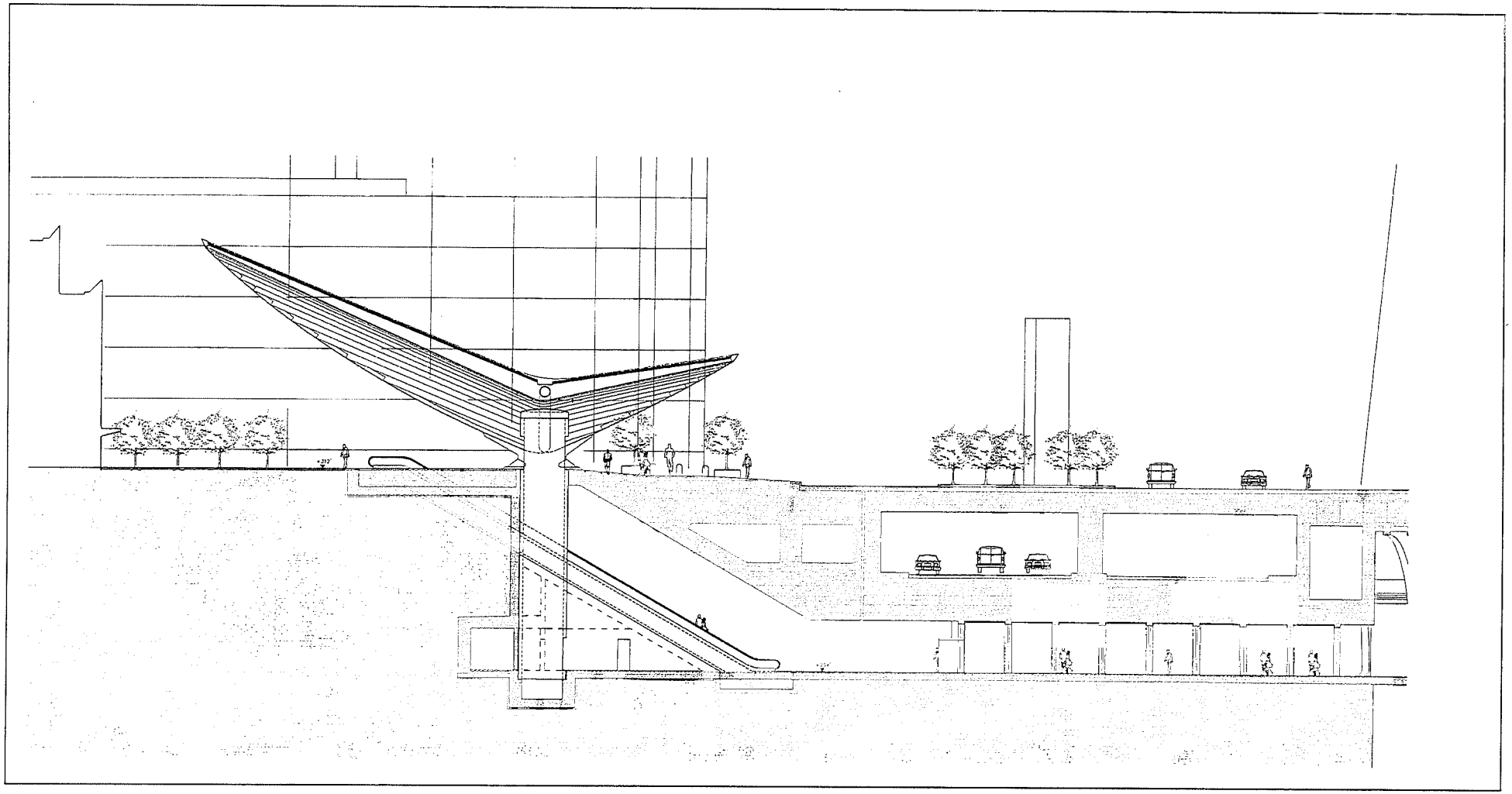
Figure 7-7
Proposed Terminal Design



View southwest from Church and Fulton Streets

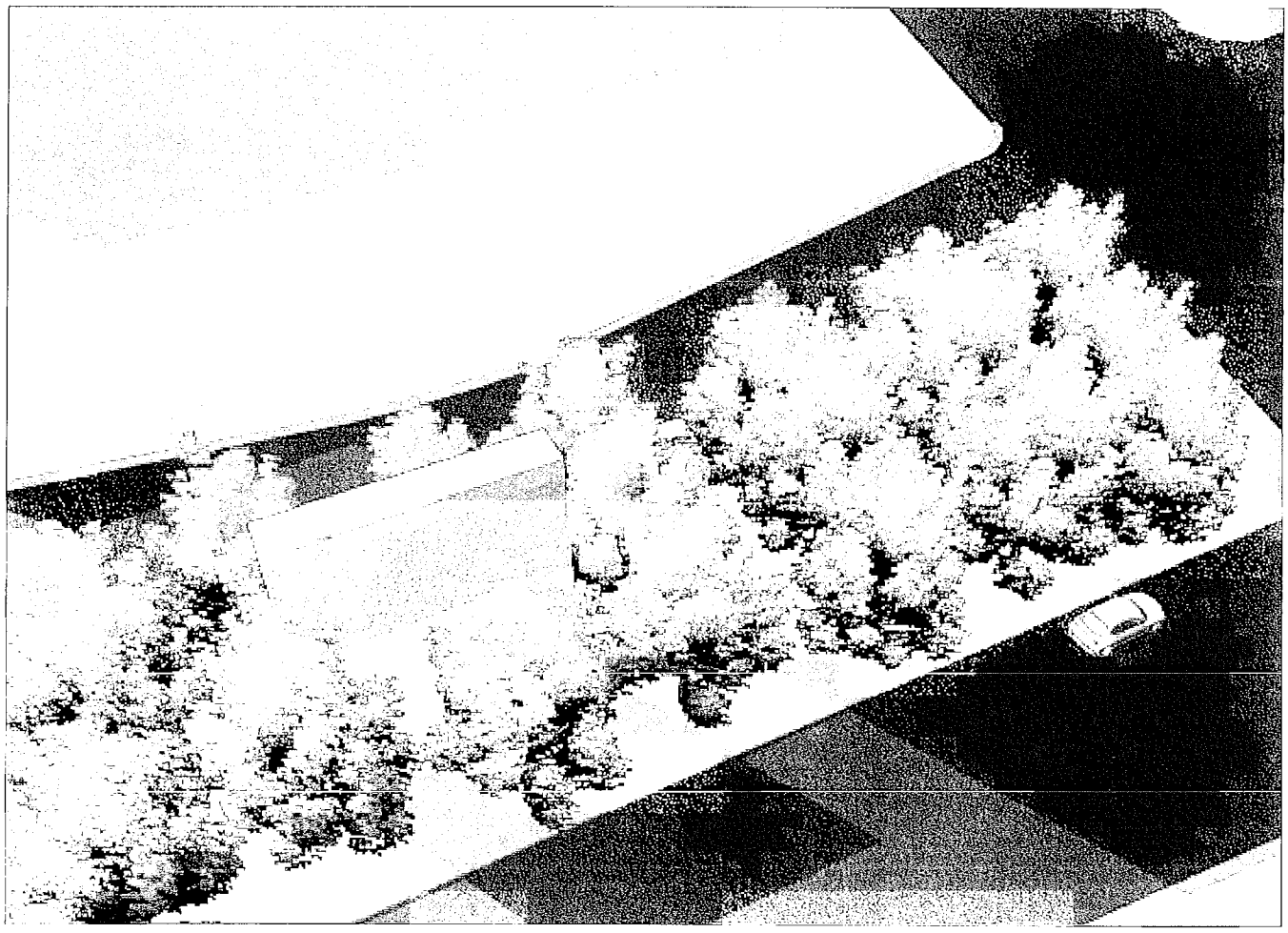
Figure 7-8
Proposed Terminal Design

2.24.05



PERMANENT WTC PATH TERMINAL
Final Environmental Impact Statement

Figure 7-9
Proposed Winter Garden Entrance



Aerial view showing proposed north vent structure
(facing northwest from WTC memorial)

Figure 7-10
Proposed Route 9A Vent

Pedestrian view showing proposed north vent structure
(facing east from the Winter Garden)

Figure 7-11
Proposed Route 9A Vent

Study Area

It is not expected that this alternative would have any adverse impact to urban design features or visual resources.

PREFERRED ALTERNATIVE

Project Site

All work associated with this alternative would have been completed for a period of 16 years after its initial operation. It is assumed that in 2025, the Preferred Alternative would be in operation and would continue to be compatible with and supportive of urban design features and visual resources on the WTC site. This alternative would bring workers and visitors who would enliven the Project Site and surrounding neighborhood by bringing increased pedestrian traffic. Therefore, it is not anticipated that this alternative would have an adverse impact on the urban design or visual resources of the Project Site.

Study Area

In the future, urban design characteristics of the study area may change. Changes to urban design features, visual resources, or to their settings may occur irrespective of this alternative.

In 2025, it is assumed that the Preferred Alternative would continue to be compatible with and supportive of urban design features and visual resources of the study area. It is anticipated that Calatrava's modern design for the Preferred Alternative would be unique to the study area and that the Terminal may become an important visual resource. It is expected that this alternative would be an improvement over current conditions and, therefore, would not result in any adverse impact to the urban design or visual resources of the study area.

E. MITIGATION

The Preferred Alternative would not result in adverse impacts to urban design or visual resources. Specific measures have been proposed that would minimize or avoid adverse impacts to the urban design and visual resources of the study area. The north and south vent structures would be slender in massing and trees would be planted around them. It is expected that this landscaping would occur concurrent with landscaping for the Route 9A Project. It is anticipated that these trees would be 35 feet in height within five years of planting and would thus obscure views of the vent structures from pedestrians and vehicular traffic. It is also anticipated that the vent structures would be clad in reflective material that would help them blend in with their natural surroundings. ✳

A. INTRODUCTION

The assessment of potential impacts to transportation facilities associated with the Preferred Alternative has been divided into four sections as follows:

- Chapter 8, Section A, "PATH";
- Chapter 8, Section B, "Vehicular Traffic and Parking";
- Chapter 8, Section C, "Transit," which includes non-PATH transit modes such as subway, bus, and ferry; and
- Chapter 8, Section D, "Pedestrians."

These sections describe transportation conditions in the vicinity of the Project Site and identify the potential for significant impacts of the Preferred Alternative. The analyses address conditions in the area once the Permanent World Trade Center (WTC) PATH Terminal is fully operational in 2009, further in the future in its 2025 design year, and when the Terminal is under construction. Chapter 15, "Cumulative Effects," includes an assessment of cumulative impacts when several proposed Lower Manhattan projects including the Permanent WTC PATH Terminal, the World Trade Center Memorial and Redevelopment Plan, Fulton Street Transit Center, Route 9A Project, and South Ferry Terminal, are in simultaneous construction and operation.

B. ANALYSIS FRAMEWORK FOR THE PROJECT ALTERNATIVES

NO ACTION ALTERNATIVE

As described in Chapter 2, "Project Alternatives," the No Action Alternative could result in the closure of the temporary station and full disruption of PATH service to Lower Manhattan at some point between the 2009 opening year and 2025 design year. The Port Authority of New York and New Jersey (PANYNJ) would work to maintain service to the extent possible, but as passenger volumes increase, the temporary station would have severe operating constraints that would limit its ability to safely and efficiently process riders. For analysis purposes, it has been assumed that absent the Preferred Alternative, those traveling between New Jersey and Lower Manhattan would be diverted to other modes of travel in the design year. In order to assess the probable impacts of this diversion to the regional and Lower Manhattan transportation networks, it was necessary to estimate the percentage of former PATH riders that would divert to each mode. To estimate this modal diversion from the temporary WTC PATH station, a number of assumptions were required, including:

- The WTC area would be redeveloped to accommodate the volume of workers similar to pre-September 11, 2001 levels, as current redevelopment plans indicate.
- All PATH stations would be fully operational, excluding the WTC PATH Terminal.

- Waterway ferry services between Lower Manhattan and west-of-Hudson locations would provide service, frequency, and passenger capacity levels similar to post-September 11, 2001 and prior to the opening of the temporary WTC PATH station.
- Some express bus service from west-of-Hudson locations would be implemented or would be diverted from the Port Authority Bus Terminal (PABT) to Lower Manhattan.

Based on these assumptions, west-of-Hudson travelers wishing to reach the Lower Manhattan area would have several mode options to cross the Hudson River including:

- Auto
- Bus to Lower Manhattan
- Bus to PABT, and then connect to Lower Manhattan-bound New York City Transit (NYCT) subway
- Commuter rail, and then connect to Lower Manhattan-bound NYCT subway
- Commuter van
- Ferry
- PATH to a Manhattan station other than WTC, such as Christopher Street or 9th Street, and then walk or connect to the NYCT subway to Lower Manhattan

Several resources were used to estimate the percentage of PATH riders that would divert to these modes, absent the Preferred Alternative. These sources included ridership data for both pre- and post- September 11, 2001, PATH passenger surveys conducted in June 2001, and the 2002 survey at PATH's Christopher and 9th Street stations.

The results of this modal diversion analysis are provided in Table 8-1. The estimates presented in Table 8-1 are integral components of the "Probable Impacts" portion in each of the four sections of this chapter, "PATH," "Traffic and Parking," "Transit," and "Pedestrians." Table 8-1 also provides an estimate of the number of former alighting and boarding WTC PATH passengers that would utilize each mode on an average weekday in 2025.

Table 8-1
No Action Alternative: Diversion of WTC PATH Riders

Mode	Percent	Year 2025 Diverted Weekday Passenger Trips
Auto	5	8,086
Bus to Lower Manhattan	21	33,961
Bus to PABT / NYCT Subway	5	8,086
Commuter Railroad / NYCT Subway	18	29,109
Commuter Van	1	1,617
Ferry	35	56,601
Uptown PATH / NYCT Subway	15	24,258
Total	100	161,718

Note: The "Diverted Weekday Passenger Trips" are a worst-case scenario as they were derived using the projected number of trips anticipated for the Permanent WTC PATH Terminal. Without this investment in public transportation infrastructure, the number of trips to Lower Manhattan from west-of-Hudson locations would be somewhat less.

PREFERRED ALTERNATIVE

The number of future trips to Lower Manhattan is expected to increase from today through the Permanent WTC PATH Terminal's 2025 design year. Some of these trips would be attributed to private development projects planned for the area. Others would be the direct result of newly constructed buildings and uses on the WTC site, including office towers, retail, cultural facilities, and a memorial.

The Preferred Alternative would be an enhancement to a travel mode that existed both prior to September 11, 2001 and in a temporary capacity today. However, the long-term operation of the Preferred Alternative is not expected to result in a shift in the modal distribution of trips to and from Lower Manhattan as compared to pre-September 11, 2001 conditions. Thus, the Terminal itself would not induce new ridership. Rather, it would provide for the additional capacity and enhanced passenger amenities needed to support the independent growth in trips to and from Lower Manhattan.

C. EVALUATION OF PROBABLE IMPACTS OF THE PROJECT ALTERNATIVES

Not all of the travel modes (PATH, vehicles, subway, bus, ferry, and pedestrians) are critical in terms of their potential for significant impacts. For example, the Preferred Alternative is not expected to create adverse vehicular traffic impacts in its operational phase since the Terminal that was destroyed on September 11, 2001 generated a minimal volume of auto and taxi trips. Based on surveys conducted by PANYNJ, 1 percent of connecting trips to or from the PATH were made by auto and less than ½ percent were made by taxi. Thus, the vehicular traffic analyses that follow focus principally on potential impacts during construction, identifying the volume of construction traffic generated by the project and the routes to be used by trucks accessing the site.

The Preferred Alternative would provide greater capacity than the Terminal that was destroyed on September 11, 2001, but its construction is not expected to induce new PATH ridership beyond levels that were forecasted prior to the terrorist attacks. Although PANYNJ projections show an increase in ridership through the project's design year, these new riders would be attributed to private development that was anticipated prior to September 11 2001 or from redevelopment efforts that are independent of the Permanent WTC PATH Terminal but are in response to the terrorist attacks. Since the Preferred Alternative is not expected to induce new riders, it would not increase subway patronage above that which would have occurred otherwise. It is possible that different access/egress points to the street network above could affect pedestrian crossing locations and create impacts or benefits to levels of service for on-street facilities, which is addressed in Chapter 8, Section D.

The analyses of each mode begin with a description of existing conditions both pre- and post-September 11, 2001 and proceed with an assessment of projected conditions during the construction period, design year, and opening year. ✳

A. INTRODUCTION

This section describes the pre- and post-September 11, 2001 PATH system, the original World Trade Center (WTC) PATH Terminal, the temporary WTC PATH station, and the Permanent WTC PATH Terminal. This section also identifies whether the No Action and Preferred Alternatives would create impacts to the PATH system in terms of operations and ridership. The analyses that follow provide an overview of existing conditions, pre- and post-September 11, 2001, in order to establish a baseline from which future conditions may be assessed. Additional information on PATH's ridership projections and planning and design requirements for a new terminal are presented in Appendix C.

The Port Authority of New York and New Jersey (PANYNJ) does not expect the Permanent WTC PATH Terminal itself to induce PATH ridership beyond growth that was projected prior to September 11, 2001. Rather, the Preferred Alternative seeks to serve customers who previously used the PATH system and the former WTC PATH Terminal, and to accommodate the growing ridership that PATH had experienced in the past and would have continued to occur in the future absent the events of September 11, 2001. Other land uses surrounding the Project Site, such as the WTC Memorial, will induce additional trips to Lower Manhattan which will need to be accommodated.

The Preferred Alternative would be designed to adequately serve projected ridership levels through its 2025 design year. Shortcomings of the original WTC PATH Terminal, such as its difficulty in accommodating reverse passenger flows, will be addressed in the design of the Preferred Alternative, thereby improving the level of service that existed previously.

The Preferred Alternative would also result in improved connections to subway service and Hudson River ferries as compared to the pre-September 11, 2001 and temporary PATH facilities at the WTC site. The potential effects of these improved connections are described later in this chapter as well as in Chapter 8, Section C, "Transit."

The Preferred Alternative is a functional replacement and improvement of the WTC PATH Terminal that previously existed on the WTC site. In time, as the WTC site is redeveloped, and other previously planned or anticipated development occurs in Lower Manhattan, a fully functioning PATH system would be a necessary component in the public transportation system and the overall transportation network for the region in terms of both capacity and redundancy. Due to the substantial capacity, pedestrian, and component service life limitations of the temporary WTC PATH station that is currently in service, the only means by which to return the PATH rail system to its former capacity and service capabilities, and to accommodate projected future ridership, is to implement the Preferred Alternative, for the Permanent WTC PATH Terminal.

B. METHODOLOGY

The analyses begin with a description of the WTC PATH Terminal and the operation of the PATH system both pre- and post-September 11, 2001. System operations were reviewed in terms of train frequencies and system capacity.

Historical ridership data was compared and analyzed. This analysis included a review of total PATH system demand and WTC PATH Terminal demand from year to year, and a comparison of average weekday ridership trends for the system as a whole and for the WTC PATH Terminal over time. Peak period demands were also assessed for the WTC PATH Terminal.

"Existing conditions" service and ridership information, which comprise both historical (pre-September 11) and current (post-September 11) data, was then compared to the expected system operations and ridership once the Preferred Alternative would open in 2009 and to the Terminal's 2025 design year. The analyses presented in this section were performed using available historical ridership data, ridership projections, and system operations information.

If the Preferred Alternative is not constructed, it is expected that the temporary WTC PATH station that is presently operating would continue to maintain service to the extent possible. This is the No Action Alternative, which was fully described in Chapter 2, "Project Alternatives." However, increasing passenger volumes over time would substantially surpass the safe and efficient design capacity of the temporary WTC PATH station prior to the 2025 design year. Once the design capacity of the temporary WTC PATH station is reached, PANYNJ would need to implement restrictive measures to ensure passenger safety and reliable PATH rail operations. One such measure may include restricting passengers from entering the WTC station during AM peak hours as was done at the Christopher Street station following September 11, 2001. Another measure may be to reduce the number of trains serving the WTC station so as to allow sufficient station egress prior to another train discharging passengers. Such measures would not only fail to serve passenger demand, but they would also have operational repercussions throughout the PATH rail system. Due to these impacts, for analysis purposes, it was assumed that absent the Preferred Alternative, those traveling between New Jersey and Lower Manhattan would be diverted to other modes of travel as described in the "Introduction" to this Transportation Chapter.

C. DESCRIPTION OF THE AFFECTED ENVIRONMENT

PRE-SEPTEMBER 11, 2001 BASELINE CONDITIONS

OPERATIONS

Prior to September 11, 2001, the PATH system operated 24 hours per day, seven days per week. Figure 8A-1 provides a map of the PATH system as it then operated. Service was provided along the following four lines:

- Newark-World Trade Center;
- Hoboken-World Trade Center;
- Journal Square-33rd Street; and
- Hoboken-33rd Street

During the late night hours and weekends, some of the routes were combined.

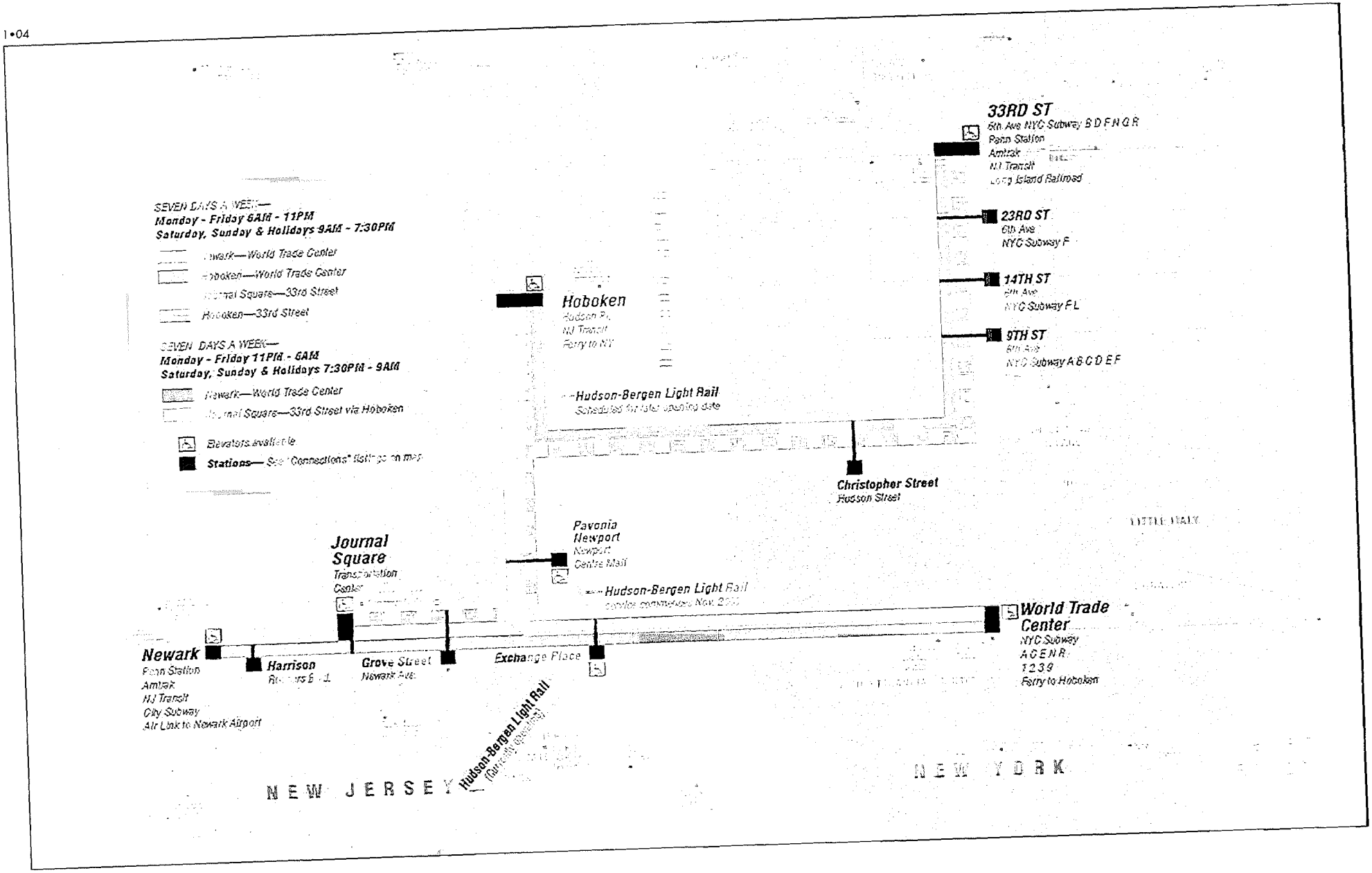


Figure 8A-1
PATH System

The PATH system encompassed a total of 13 stations, six of which were located within New York City and seven in New Jersey. Table 8A-1 provides the locations of each of these stations and the connecting transportation services that were available.

Table 8A-1
PATH Stations and Nearby Connecting Transit Services

Station	Location	Connecting Service
World Trade Center	Fulton Street at Church Street New York, NY	NYCT Subway; NY Waterway and Water Taxi ferries; NYCT and private bus service
Christopher Street	Christopher St. between Greenwich and Hudson Streets, New York, NY	NYCT Subway; NYCT bus service
9th Street	Sixth Ave. at 9th St., New York, NY	NYCT Subway; NYCT bus service
14th Street	Sixth Ave. at 14th St., New York, NY	NYCT Subway; NYCT bus service
23rd Street	Sixth Ave. at 23rd St., New York, NY	NYCT Subway; NYCT bus service
33rd Street	Sixth Ave. between 30th and 33rd Streets, New York, NY	Amtrak; NJ Transit and LIRR commuter rail; NYCT Subway; NYCT and private bus service
Exchange Place	Montgomery St. at Hudson River, Jersey City, NJ	Hudson-Bergen Light Rail; NY Waterway ferry; NJ Transit and local bus service
Grove Street	Newark Ave. between Grove St. and Luis Muniz Marin Boulevard, Jersey City, NJ	NJ Transit and local bus service
Harrison	Frank E. Rodgers Boulevard between Somerset and Cape May Streets, Harrison, NJ	NJ Transit bus service
Hoboken	Hudson Place at River Street, Hoboken, NJ	NJ Transit commuter rail; NY Waterway ferry; NJ Transit and local bus service
Journal Square	Kennedy Boulevard between Pavonia and Sip Avenues, Jersey City, NJ	NJ Transit and local bus service
Newark	1 Penn Plaza West, Newark, NJ	Amtrak and NJ Transit commuter rail; Newark City Subway; Greyhound and NJ Transit and local bus service
Pavonia/Newport	Washington Blvd. at Pavonia Ave., Jersey City, NJ	Hudson-Bergen Light Rail; NY Waterway ferry; NJ Transit and local bus service

PATH directly served communities in Manhattan, Jersey City, Newark, Harrison, Hoboken, and also provided connections for other west-of-Hudson residents. At Newark-Penn Station, PATH customers could access Amtrak; New Jersey Transit's (NJ Transit) Northeast Corridor, Raritan Valley, and North Jersey Coast commuter rail lines; the Newark City Subway; and bus and rail service to Newark Liberty International Airport. At Hoboken, PATH connected with NJ Transit Boonton, Morris & Essex, Main/Bergen County, Pascack Valley, North Jersey Coast and Port Jervis commuter rail lines; numerous NJ Transit bus routes; and NY Waterway ferry service. In New York, PATH stations were located in close proximity to New York City Transit (NYCT) subway stations on the Broadway, Sixth, Seventh, and Eighth Avenue lines. Connections to NYCT and privately operated bus routes, ferries, and commuter rail service were also available.

Prior to September 11, 2001, PATH maintained a fleet of 334 cars. A total of 288 cars would be required for AM peak period revenue operation. In addition, PATH maintained two 7-car gap trains—one, 7-car consist on the Newark-WTC Line and one, 7-car consist on the Journal Square-33rd Street Line. Thus, PATH's AM peak period operating fleet consisted of 302 cars. The remaining 32-cars were rotated with the operating fleet to facilitate car inspection and maintenance.

PATH would operate its peak schedules between 7:30AM to 9AM (AM peak period) and from 4:30PM to 6:00PM (PM peak period). Headways would fluctuate during this period with a maximum operation in the hours from 8AM to 9AM (AM peak hour) and 5PM to 6PM (PM peak hour). In the AM peak period, PATH was operating a total of 39 train consists through the system. Train consists ranged in length from 7-cars to 8-cars. Headways on the system ranged from 3 minutes on the Newark-WTC Line to 6 minutes on the Hoboken-33rd Street Line. Table 8A-2 summarizes the pre-September 11, 2001 operations for the PATH system.

Table 8A-2
Pre-September 11, 2001 PATH Train Operations

Route	Consists for Revenue Operation	Consist Length	Operating Headway
Newark-WTC	15 consists	8-cars	3 to 4 minutes
Hoboken-WTC	7 consists	7-cars	3 to 4 minutes
Journal Square-33rd Street	11 consists	7-cars	4 to 5 minutes
Hoboken-33rd Street	6 consists	7-cars	6 minutes

Notes: PATH maintained 1, 7-car gap train for use on the Newark-WTC Line and 1, 7-car gap train for use on the Journal Square-33rd Street Line.

When accounting for run times, the total of 22 consists operating on the Newark-WTC and Hoboken-WTC Lines translated to 31 runs through the WTC Terminal in the AM peak hour. There were 16 runs in each direction on the Newark-WTC Line and 15 runs in each direction on the Hoboken-WTC Line. At the peak commuter period within the peak hour, PATH would maintain 3 minute headways on both routes, as required to support ridership system-wide.

During midday and evening periods, PATH would operate all four with 10- to 15-minute headways, depending upon the route. During overnight hours, weekends, and holidays, PATH would suspend Hoboken-WTC service and would modify its Journal Square-33rd Street Line to stop at Hoboken-Terminal. The Newark-WTC Line would operate at all times. The headways during these periods ranged from 15-minutes to 60-minutes.

During non-peak periods, PATH would store trains at 4 locations: Journal Square Yard; Harrison Yard; Newark South Street Yard; and the World Trade Center Terminal. The later of these storage locations was used only for trains operating on the Hoboken-WTC Line. The other yards would store trains that operated on all four PATH routes. In addition, PATH would store one train at the 33rd Street station.

WTC PATH TERMINAL

The WTC PATH Terminal opened in 1971. It was constructed in the portion of the WTC site referred to as the "bathtub" and was located beneath the WTC's office and retail space. The Terminal was fully compliant with the Americans with Disabilities Act (ADA), and it was the first station in the world to be fully air-conditioned.

The platform level contained three 10-car platforms and five tracks. The tracks and platforms of the station formed a "loop" with the projections of the Hudson River tunnels. Trains entered the station from New Jersey via the south Hudson River tunnel (Tunnel F) and exited to New Jersey via the north Hudson River tunnel (Tunnel E). Thus, trains entered and left Manhattan without changing the location of the train's engineer or conductor, resulting in a short dwell time at the Terminal.

The easternmost platform (Platform A) served Track 1 and was used in the event of an equipment failure, for train storage, and for alighting trains that terminated revenue service at the WTC Terminal. Platform B and Tracks 2 and 3 and served the Hoboken-WTC Line. Platform C and Tracks 4 and 5 and was used for the Newark-WTC Line.

A mezzanine level was located above the platforms, which housed fare equipment, vertical circulation between the platform level and other levels above, and accessory retail and food stalls. The principle access between the mezzanine and the WTC retail concourse was a bank of escalators that traveled underneath NYCT's 1 and 9 line. The escalators terminated in an area of the WTC retail concourse known as PATH Square.

PATH Square was located in the northeast section of the WTC retail concourse. The retail concourse provided weather-protected connections between PATH, the office buildings on the WTC site, the World Financial Center, three NYCT subway stations, and the streets adjacent to the WTC. Within the retail concourse, PATH passengers could access the Cortlandt Street Station on NYCT's 1 and 9, and N and R lines, and the WTC Station on the E line. A circuitous connection was also available to both the Park Place Station for the 2 and 3 lines and the Chambers Street Station for the A and C lines. The retail concourse had street-level access from Church, Vesey, West, and Liberty Streets. Two pedestrian overpasses over Route 9A provided access between the World Financial Center and the WTC.

The WTC PATH Terminal, which served as the only station on the New York side of the Hudson for two of PATH's four routes, was destroyed during the terrorist attacks of September 11, 2001. As a result, the PATH system lost a substantial portion of its capacity to serve commuters throughout the region, and public transit access to Lower Manhattan was substantially impacted as other transit providers sought to serve former PATH customers.

RIDERSHIP

Prior to September 11, 2001, the PATH system had approximately 257,000 boardings on an average weekday. Table 8A-3 provides historical average weekday boardings for the PATH's major stations and for the PATH system as a whole for the years 1992 to 1999. As shown in the table, ridership for the PATH system increased over time, as did boardings at the former WTC PATH Terminal itself.

Table 8A-3
Average Weekday Ridership for Selected PATH Stations: 1992 to 1999

Station	1992	1993	1994	1995	1996	1997	1998	1999
WTC	54,160	52,771	55,053	51,319	52,980	55,893	58,110	60,385
Newark	25,639	25,580	26,570	25,660	27,143	28,725	29,910	31,065
Journal Sq.	21,508	21,336	21,630	21,271	22,204	23,279	23,821	25,237
Hoboken	30,337	30,962	32,952	32,389	30,126	30,583	31,223	33,323
33rd Street	20,502	21,633	22,731	24,430	22,979	22,176	23,149	22,604
System Total	195,682	197,923	206,887	206,304	207,990	215,170	223,164	232,351

The original WTC PATH Terminal was the busiest station in the PATH system with approximately 67,000 average weekday boardings, or an average two-way ridership of approximately 142,300 weekday riders.

Volumes at the former WTC PATH Terminal were heaviest during the AM and PM peak hours. During these periods, the principal direction of travel would be inbound to Manhattan in the morning and outbound to New Jersey in the evening; however, approximately 15 percent of the ridership would commute in the reverse direction. During the morning peak hour (8 AM to 9 AM), a total of approximately 26,600 riders used the terminal, with 22,500 alighting the system and 4,100 boarding. During the evening peak hour (5 PM to 6 PM), the terminal handled 20,400 riders, of which approximately 16,100 boarded PATH and 4,300 alighted.

Table 8A-4 shows the origins and destinations of PATH riders within Lower Manhattan during the AM and PM peak hours based on surveys conducted by the PANYNJ in 1996. For those commuting to Lower Manhattan from New Jersey in the AM peak hour, the majority (61 percent) were destined to buildings beyond the WTC site, 24 percent were destined to the WTC site itself, and the remaining 15 percent connected to NYCT subways. Figure 8A-2 illustrates the above and the associated passenger flow distribution in Lower Manhattan. For those leaving Lower Manhattan via PATH in the AM peak hour, 65 percent accessed the system from NYCT subways, 3 percent from the WTC site itself, and another 32 percent from other locations in Lower Manhattan. Similar origins and destinations were observed for the PM peak hour.

Table 8A-4
Pre-September 11, 2001 Origins and Destinations of Riders at the WTC PATH Terminal

	Commuters to Lower Manhattan		Commuters from Lower Manhattan	
Origin/Destination	AM Peak (Exit PATH)	PM Peak (Enter PATH)	AM Peak (Enter PATH)	PM Peak (Exit PATH)
NYCT Subways	15%	19%	65%	65%
WTC Site	24%	25%	3%	4%
Other Lower Manhattan	61%	56%	32%	31%

Table 8A-5 shows the origins/destinations for those traveling between the WTC PATH Terminal and off-site developments. For those commuting to Lower Manhattan from New Jersey in the AM peak hour, the primary off-site destination was southeast from the WTC site toward the Financial District, representing about 40 percent of the total off-site trips (see Figure 8A-2). Trips to the north (Tribeca), northeast (Civic Center), and west (World Financial Center and Battery Park City) were fairly evenly distributed, each representing about 16 to 20 percent of the total off site trips. In the PM peak hour, there were a lower percentage of trips entering PATH from off site; however, the distribution of these trips was similar to the AM peak hour.

For those commuting from Lower Manhattan to New Jersey in the AM peak hour, the majority (62 percent of the total off-site trips) entered the WTC PATH Terminal from the northeast. Another 19 percent entered from the north (Tribeca), 13 percent from the southeast (Financial District), 5 percent from the west (World Financial Center and Battery Park City), and 1 percent from the south. A similar pattern of off-site trips was observed during the PM peak hour.

Approximately 5,900 and 5,700 commuters transferred between PATH and NYCT's subways during the AM and PM peak hours, respectively. The transfer to/from NYCT's WTC Station (A,

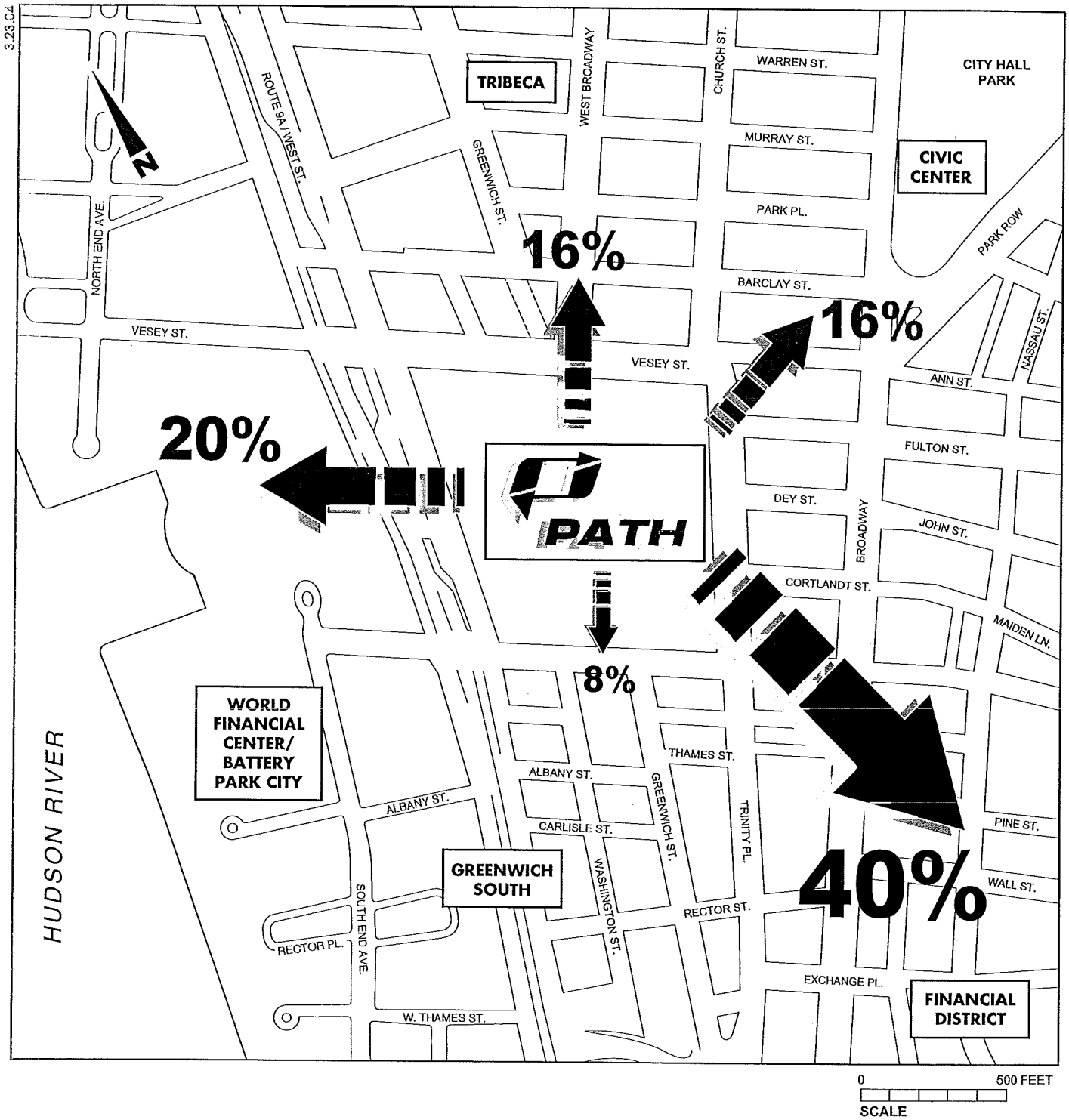


Figure 8A-2

Pre-September 11, 2001 Conditions Off-Site Destinations of AM Peak Hour PATH Riders

C, E, 2, and 3 trains) was the most heavily used, representing approximately 55 percent of the transfer volume. One-third of the transfers were between PATH and NYCT's N and R trains and the remaining 12 percent transferred to or from NYCT's 1 and 9 trains.

Table 8A-5
Pre-September 11, 2001 Off-Site Origins and Destinations of Riders at the WTC PATH Terminal

To/From	Commuters to Lower Manhattan		Commuters from Lower Manhattan	
	AM Peak (Exit PATH)	PM Peak (Enter PATH)	AM Peak (Enter PATH)	PM Peak (Exit PATH)
West (World Financial Center and Battery Park City)	20%	17%	5%	6%
North (Tribeca)	16%	21%	19%	28%
Northeast (Civic Center)	16%	22%	62%	53%
Southeast (Financial District)	40%	32%	13%	13%
South (Greenwich South)	8%	6%	1%	1%

CHANGES IN THE AFFECTED ENVIRONMENT SINCE SEPTEMBER 11, 2001

CHANGES IN THE PATH SYSTEM

The WTC PATH Terminal and a seven-car PATH train were destroyed during the terrorist attacks of September 11, 2001. Subsequently, Tunnels E and F were flooded, and PATH's Exchange Place Station in Jersey City, New Jersey, was damaged and rendered inoperable because the track configuration would not permit trains to reverse direction before entering the Hudson River tunnels. As a result, the PATH system lost a substantial portion of its capacity to serve commuters throughout the New York and New Jersey region, which substantially hindered public transit access to Lower Manhattan. All remaining PATH service following September 11, 2001 and prior to the opening of the temporary WTC PATH station was rerouted to terminate in New Jersey or at the 33rd Street PATH station.

CHANGES IN PATH RIDERSHIP

Before September 11, 2001, the PATH system served approximately 257,000 passengers each weekday. Prior to the reopening of the Exchange Place Station, which occurred on June 29, 2003, and the opening of the temporary WTC PATH station on November 23, 2003, approximately 160,000 passengers used the system each weekday, a reduction of about 97,000 passengers, or almost 38 percent.

Ridership fell precipitously on the Newark-WTC and Hoboken-WTC lines as access to Manhattan was no longer available on these routes. Some riders chose to divert to the Journal Square-33rd Street or Hoboken-33rd Street lines, thereby increasing ridership on these uptown-bound trains. PATH passengers destined for Lower Manhattan would exit at Christopher or 9th Street and transfer to nearby NYCT subway lines. Severe crowding occurred at both of these stations, which each have only one entry/exit location, At Christopher Street, passengers were barred from entering this station on weekdays from 7 AM to 9:45 AM. In addition, trains operating from Journal Square and Hoboken to 33rd Street would not stop at Christopher Street on weekdays from 4:30 PM to 7 PM.

EFFECTS ON OTHER TRANSIT SERVICES

Due to system capacity and service reductions caused by the events of September 11, 2001, many former PATH riders were required to divert to other transportation services in order to access destinations in Lower Manhattan. Most former PATH riders chose to divert to NJ Transit commuter rail (which increased ridership approximately 30 percent system-wide), NJ Transit buses, or to trans-Hudson ferries, which increased ridership by more than 100 percent. A more extensive discussion of impacts to these other transit providers is presented in Chapter 8, Section C, "Transit."

TEMPORARY WTC PATH SERVICE

Temporary WTC PATH Station

The temporary WTC PATH station opened on November 23, 2003. The temporary WTC PATH station was designed and constructed with the primary objective of restoring PATH service to Lower Manhattan as quickly as possible following September 11, 2001. It was designed to accommodate 80 percent of the users of the original WTC PATH Terminal in 2000. This reflects the fact that 20 percent of the original WTC PATH Terminal users were bound for the WTC buildings themselves, which were destroyed on September 11, 2001.

Although the temporary WTC PATH station has allowed service to be restored, its operating capacity and functionality are limited. For example, vertical circulation elements within the terminal have a limited service life. If this station were to remain in service, various elements may require replacement before 2010. The design of the station does not easily allow for new construction above, as planned for the WTC redevelopment. Thus, as the site is redeveloped, station elements will need to be rebuilt to accommodate its construction. The temporary WTC PATH station would also not easily support connections to future buildings on the WTC site.

The temporary WTC PATH station has substantially the same operating configuration as the terminal that existed on the WTC site prior to September 11, 2001. As before, trains enter the station from New Jersey via the south Hudson River tunnel and exit to New Jersey via the north tunnel thereby forming a loop in the PATH system that allows trains to enter and leave Manhattan without requiring the train operator to change positions. Also like the original terminal, the temporary station has five tracks and three platforms. The new platforms, however, accommodate eight-car PATH trains as compared to the 10-car platforms that existed before September 11, 2001, a 20 percent reduction in capacity.

The temporary WTC PATH station includes security and fire protection equipment, but advanced passenger amenities are not provided. It is accessible to people with disabilities in accordance with the ADA, but its configuration requires four separate elevator rides to reach street level.

The temporary WTC PATH station consists of five levels—platform, mezzanine, 1 and 9 underpass, concourse, and street level. Passengers must use a series of escalators and/or elevators to travel between the platform and the street- and concourse-level entrances. Pedestrian access to the temporary WTC PATH station is limited due to the anticipated continued construction at the WTC site. All patrons must enter and exit the station at street level near the intersection of Church and Fulton Streets at the eastern boundary of the WTC site or from NYCT's WTC (E) or Cortlandt Street (R and W) subway stations.

Operations

With the reopening of PATH's Exchange Place and WTC stations in 2003, the system is now operating much as it did prior to September 11, 2001. Service frequencies are similar to pre-September 11, 2001 levels with trains running every 4 to 6 minutes during peak periods, every 10 to 15 minutes throughout the day, and every half-hour overnight. On weekends and holidays, trains operate every 15 to 30 minutes depending on the route and time of day.

With the restoration of service to the World Trade Center, PATH has resumed operations similar to the pre-September 11, 2001 condition. However, physical damage endured by the terrorist attacks and changes in ridership have resulted in the following changes:

- PATH currently maintains a fleet of 327 cars because one, 7-car train was destroyed on September 11, 2001.
- PATH currently operates 7-car trains on both the Hoboken-WTC and Newark-WTC Lines. Thus, the AM peak hour car requirement for revenue service is 252. Additionally, PATH maintains two 7-car gap trains. Thus, PATH's AM peak period operating fleet consists of 266 cars. PATH anticipates the restoration of 8-car service on the Newark-WTC Line in 2006, which would increase its AM peak hour car requirement to 278.
- Because ridership is lower than before September 11, 2001, PATH operates fewer trains per hour between Hoboken and Newark and the World Trade Center. Currently, PATH runs 15 trains on the Newark-WTC Line and 5 on the Hoboken-WTC Line in the AM peak period.

During non-peak periods, PATH stores trains as it did prior to September 11, 2001 at Journal Square Yard, Harrison Yard, Newark South Street Yard, World Trade Center, and 33rd Street.

Ridership

With PATH operations essentially restored, ridership at the temporary WTC PATH station has reached approximately 80 percent of pre-September 11, 2001 levels. As shown in Appendix C-1, the temporary WTC PATH station serves approximately 52,500 daily two-way trips.

D. PROBABLE IMPACTS OF THE PROJECT ALTERNATIVES

CONSTRUCTION PERIOD (2006)

FUTURE COMMON TO ALL ALTERNATIVES

PANYNJ will continue or will begin upgrades to other portions of the PATH system, independent of the Preferred Alternative. Although these projects are planned independently, the outcome of this environmental review process and subsequent construction schedule for the Preferred Alternative may affect the implementation of the PATH system improvements described below.

- ***9th Street and Grove Street Station Rehabilitation.*** Due in part to substantial increases in station usage following September 11, 2001, the PANYNJ will renovate the 9th Street and Grove Street PATH Stations to include an additional entrance/exit. Currently, these stations operate with only one point of entry/exit. Other improvements such as station modernization and platform lengthening will also be performed. These projects will provide better customer convenience and safer operations at these stations.

- ***10-Car Operation.*** The PANYNJ will continue to prepare the PATH's Newark-WTC Line for 10-car operation, a program that pre-dates the terrorist attacks of September 11, 2001. PATH also eventually plans to lengthen its Hoboken-WTC train consists from 7 to 8 cars. Since September 11, 2001, PANYNJ lengthened the platforms at the Exchange Place station in tandem with the emergency repairs to the system that were required to restore service following the attacks. However, to fully implement 10-car operations, additional rolling stock must be acquired and the Harrison and Grove Street stations must be rehabilitated to lengthen platforms. It is anticipated that these improvements would be funded as part of the 2008 to 2013 Capital Plan with implementation by 2015.

- ***Signal System Upgrade.*** PANYNJ will continue a program to modernize its signals system-wide. Currently, PATH operates with a fixed-block signal system but plans to upgrade to a Communication Based Train Control (CBTC) system. The CBTC system is more flexible than the fixed-block system because it continuously updates train positions, distances, and travel speeds. This allows the system to recover more quickly from delays, because a train can follow a "delayed" train more closely without having to come to a complete stop. CBTC results in a more efficient operation that produces regular travel speed because it:

  - Allows for consistent trip times in closer conformance to the operating schedule;
  - Allows for a precise strategy for stopping accuracy;
  - Optimizes headways, which increases capacity by allowing the trains to closely follow the safe braking distance; and
  - Improves ride quality.

  Under both the fixed-block and CBTC signal systems, PATH's capacity is controlled by the track junction at Exchange Place and the throughput of the Hudson River tunnels. Prior to September 11, 2001, PATH operated 31 trains in each direction through the World Trade Center tunnels (Tunnels E and F) in the AM peak hour; thus, trains had approximately 116-second headways. PATH operated 16 trains on the Newark-WTC Line and 15 trains on the Hoboken-WTC Line. With the CBTC system, it is possible that headways could decrease to 90 seconds through the tunnels, resulting in up to 40 trains per hour. However, given projected ridership demand and other limitations within the system, PATH plans to operate fewer trains than 40 trains per hour.

  PATH will begin planning the implementation of CBTC concurrent with its contracts for fleet replacement. This arrangement will ensure consistency in the design of signal and train systems. It is anticipated that CBTC would be in place sometime between 2010 and 2015.

- ***Fleet Replacement.*** PATH currently maintains a fleet of 327 cars, much of which are more than 30 or more years old. In order to meet future ridership needs, PATH must maximize its peak hour service plan with a high degree of reliability. However, as the fleet ages, equipment failures increase; thereby, reducing PATH's ability to adhere to scheduled headways. Furthermore, PATH plans to implement 10-car train service cannot be realized without an expansion of its fleet.

  On June 17, 2004, PANYNJ announced a request for proposals to design and fabricate 246 new rail cars and to rehabilitate or replace an additional 94 cars. The new cars will have improved lighting, air conditioning and heating; cantilevered seats with room for passengers to store items under them; prerecorded station announcements; better signs; and three doors

on each side. This proposal allows PATH an option to purchase additional rolling stock to meet future demands.

- ***Fare Integration.*** When the temporary WTC PATH station opened on November 23, 2003, it was the first station in the PATH system to accept pay-per-ride MetroCards sold by the Metropolitan Transit Authority (MTA). The PANYNJ will continue to work with the MTA to integrate the PATH fare equipment throughout its rail system with the MetroCard system. The fare integration program will allow transit riders to transfer between NYCT subways and buses and PATH with a single fare card.

Furthermore, PATH will continue to increase service on its WTC Lines to meet ridership demand. In the very near future, the length of Newark-WTC trains will be increased from seven to eight cars. PATH will also increase the number of peak period runs on both routes as demand warrants.

It is assumed that some or all of these projects will be completed or will commence during the construction period for the Preferred Alternative.

NO ACTION ALTERNATIVE

The temporary WTC PATH station was designed to accommodate anticipated passenger volumes during the construction period. No impacts to PATH service are expected to either PATH passengers or to the operation of the PATH system during this period given the No Action Alternative.

PREFERRED ALTERNATIVE

It is anticipated that the Preferred Alternative can be constructed with minimal impacts to PATH's normal weekday train operations. PATH service to the temporary WTC PATH station may have to be suspended sporadically during the overnight hours on weekdays and all day on weekends to accommodate heavy construction activities.

Throughout the construction period, pedestrian access may be hindered due to sporadic closing, rerouting or narrowing of sidewalks used to access the sole entrance/exit of the temporary WTC PATH station. Pedestrian connections between PATH and the NYCT subway system may also be impacted due to rerouted or narrowed passageways. Otherwise, no construction-related impacts are anticipated for PATH riders or operations.

OPENING YEAR (2009)

FUTURE COMMON TO ALL ALTERNATIVES

In the opening year of the Preferred Alternative, it is assumed that the PANYNJ will have completed or will continue work on the system improvements described above for the construction period. These system enhancements will improve operations and will provide for enhanced customer convenience as compared to today.

As shown in Table 8A-6, projected opening year demand on an average weekday for trans-Hudson PATH service between New Jersey and the WTC site will be 125,286, approximately 12 percent less than the 142,300 daily boardings recorded in year 2000. The projected AM peak hour demand in 2009, both boardings and alightings, is approximately 23,423 passengers, or 12 percent less than in year 2000 (see Appendix C).

Table 8A-6
PATH Ridership Forecast for WTC Service in the Opening Year (2009)

Year	Average Weekday Trips			AM Peak Hour		
	Terminal Users	Weekday Boardings	Weekday Alightings	Terminal Users	Weekday Boardings	Weekday Alightings
2000	142,300	67,000	75,300	26,604	4,107	22,497
2009	125,286	58,989	66,297	23,423	3,749	19,674

NO ACTION ALTERNATIVE

If the Preferred Alternative is not constructed, then the temporary WTC PATH station that is currently in service would remain in service through the opening year. The temporary WTC PATH station was designed and constructed with the primary objective of restoring PATH service to Lower Manhattan as quickly as possible following September 11, 2001. Thus, its capacity, functionality, and equipment are limited over time, but its systems could support the anticipated opening year ridership.

PREFERRED ALTERNATIVE

The Preferred Alternative would consist of a track and platform level, a mezzanine/fare-zone level, and a street-level terminal building incorporating sub-grade pedestrian connections to adjacent streets, NYCT subways, and on- and off-site developments. The PATH tunnels, tracks, platforms, and mezzanine would be located within the WTC "bathtub" as they were prior to September 11, 2001.

The Preferred Alternative is being planned to support the PATH's system-wide improvements identified above, PATH's operating requirements, and future ridership demand. Each of these factors results in specific requirements for the design of the Terminal's platforms and tracks, and as such, it has been determined that a 5-track, 4-platform station is needed. Further details on the selection of 5-track, 4-platform configuration as well as alternative track and platform schemes evaluated in conjunction with project planning are provided in Appendix C.

System-Wide Improvements

PATH will implement improvements to increase capacity on trains operating between Newark and the WTC, by increasing their length from 8 to 10 cars. Not only will this improvement require that the WTC Terminal support 10-car operations but a consequence will be that more people will use the WTC PATH Terminal's platforms during peak travel periods.

All new PATH cars will have 3-doors per side allowing PATH to retire the portions of its current fleet with 2-doors per side. Three-door cars will decrease the boarding/alighting times of trains by 50 percent, which will improve dwell times at intermediate stations along the PATH route and could reduce the overall run time of trains. However, the new cars are not expected to improve the platform clearance time for passengers since they will not directly affect platform area or the provision or operation of stairways and escalators.

While PATH currently maintains 3-minute headways on its Newark-WTC Line and 4-minute headways on its Hoboken-WTC Line during portions of the peak hour, CBTC will facilitate such headways over a longer period with greater reliability and less potential for delays. CBTC in conjunction with the 10-car train program will have the ability to increase the throughput of the

PATH system, resulting in more passengers and a higher frequency of service at the WTC Terminal than before September 11, 2001. As such, platforms at the WTC Terminal will need to clear more swiftly in the future in order to maintain safe and efficient operations.

Operational Requirements

PATH must plan for failure management to maintain reliable, on-time peak period service. Because the WTC is a terminal station, trains dwell for short periods to maintain the operating schedule. Thus, to maintain the headway and allow for the arrival of a subsequent train, PATH requires two tracks for each the Hoboken-WTC and Newark-WTC Lines. In the event that a train becomes disabled, a fifth track is needed. The fifth track allows the disabled train to remain in the Terminal while the remaining four actives tracks can be used to continue service.

PATH has limited capacity for train storage at its Newark, Harrison, and Journal Square Yards. Therefore, PATH would use the WTC Terminal for the overnight storage of 6 Hoboken-WTC trains. Four tracks are required for this overnight storage and a 5th track is needed for revenue service on the Newark-WTC Line. The overnight storage of Hoboken-WTC trains at the WTC Terminal would allow for a more efficient ramp-up to AM peak period revenue service and decreases the potential for weather-related delays on the Hoboken-WTC Line.

Ridership Requirements

A principal consideration for the planning of the Terminal is the ability of platforms to safely accommodate peak period ridership. Because PATH is primarily a commuter system, the platform design must accommodate both AM and PM peak patterns of travel.

In the AM peak hour, trains unload passengers to the platform who must then ascend to mezzanine level. For this condition, the principal design criterion is the targeted time period within which all passengers exiting a train alight from the platform. As stairways and escalators become congested, passengers queue at the foot before they can ascend. Therefore, to avoid a lengthening of this back-up, it is important that all passengers clear the platform before arrival of the next train. The *Transit Capacity and Quality of Service Manual* states that a platform (and vertical circulation) should be planned to ensure full clearance of the platform before the next train arrives. However given that passengers may not use or may not be able to use all available exits, a safety factor of 20 to 30 percent is applied. Thus, a platform should clear fully within 70 to 80 percent of the scheduled headway.

The proposed frequency of Newark-WTC Line service requires that its platform clear within 126 to 144 seconds. However, based on projected ridership, a single Newark-WTC platform would require 213 seconds to clear. Thus, two Newark-WTC Line platforms are needed to meet platform clearance guidelines. A single Hoboken-WTC platform is sufficient to meet platform clearance criteria.

For the PM peak period, the planning of the platforms must also consider failure management in the event of a missed headway and subsequent delay in service. Thus, the platform must provide for adequate room to queue passengers waiting for the next arriving train.

Given ridership levels in 2025 and level of service standards, a minimum 15,264 square feet of platform area would be required for the Newark-WTC service in the event of a missed headway while 10,385 square feet would be required for the Hoboken-WTC service. However, accounting for the unusable areas of the platform (e.g., spaces occupied by escalators and elevators and the safety buffer along the platform edge), the Terminal's platforms would each provide for an

effective area of 10,416 square feet. Thus, a single platform would be adequate for the Hoboken-WTC Line but more than one platform would be needed for Newark-WTC Line.

In order to maintain temporary PATH service during construction of the Preferred Alternative, PANYNJ would not relocate the existing PATH tracks. As such, Platform A cannot be widened beyond its current configuration, which is not adequate for normal revenue service. Since three full-size platforms are needed for peak period service, the Preferred Alternative would include a total of 4 Platforms. The 5 tracks that are currently part of the temporary station would be retained in their current alignment, which is adequate to meet PATH's operating requirements.

The platform and mezzanine levels would have a north-south orientation and would be located immediately west of NYCT's 1 and 9 train tunnel and the proposed Greenwich Street extension. The four platforms would be long enough to accommodate 10-car trains in accordance with PATH's long-range goal to increase the operational capacity of the system, and five tracks will allow for increased queuing capacity during peak periods. Fare equipment would be located on the mezzanine level. The platforms and mezzanine would be fully enclosed with heating, air conditioning, and advanced communication and security systems.

The concourse and street-level terminal building would be located on the eastern section of the WTC site extending from Greenwich to Church Streets. The mezzanine and lower concourse levels would connect via a passage under the NYCT's 1 and 9 train tunnel and over to the western side of the site. The concourse would have pedestrian passageways to the north, south, and west. The west passageway would cross beneath Route 9A to the World Financial Center. These passageways would also provide access to the proposed towers on the WTC site.

As shown in Figure 8A-3, the concourse level would also provide access to NYCT's Cortlandt Street Station on the 1 and 9, and R and W lines; the WTC Station on the E line; the existing corridor to One Liberty Plaza; and street-level at the intersections of Fulton and Greenwich Streets and Vesey and Church Streets. The passageway to the R and W Cortlandt Street Station would also link with the proposed pedestrian connection to the Fulton Street Transit Center. All circulatory elements within the Permanent WTC PATH Terminal would be designed to fully accommodate the expected volumes of passengers through its 2025 design year, with passenger corridors varying in width between 10 and 30 feet, and to comply with ADA requirements.

The Preferred Alternative would provide the PATH system with greater operational flexibility in meeting growing passenger demand over time. The new terminal itself would be able to accommodate larger passenger flows and reverse passenger flows than the original terminal or the current temporary WTC PATH station. It would also provide more convenient passenger connections to surrounding buildings, nearby NYCT subway stations, and trans-Hudson ferries. The Preferred Alternative is not expected to induce additional PATH ridership beyond the levels that would have existed had the events of September 11, 2001 not occurred, but it would be designed to accommodate passengers induced by the WTC redevelopment itself.

No impacts to PATH riders or its operations are expected once the Preferred Alternative is fully opened in 2009. Rather, the terminal would provide added passenger capacity that would be required given the redevelopment of the WTC site. The Preferred Alternative would accommodate elements that the temporary WTC PATH station could not, including pedestrian linkages to surrounding buildings, all area NYCT subways lines, and more convenient access to trans-Hudson ferries. Multiple entrances and exits would reduce walking times to access and egress the new terminal, which would lead to shorter walking distances and commute times for

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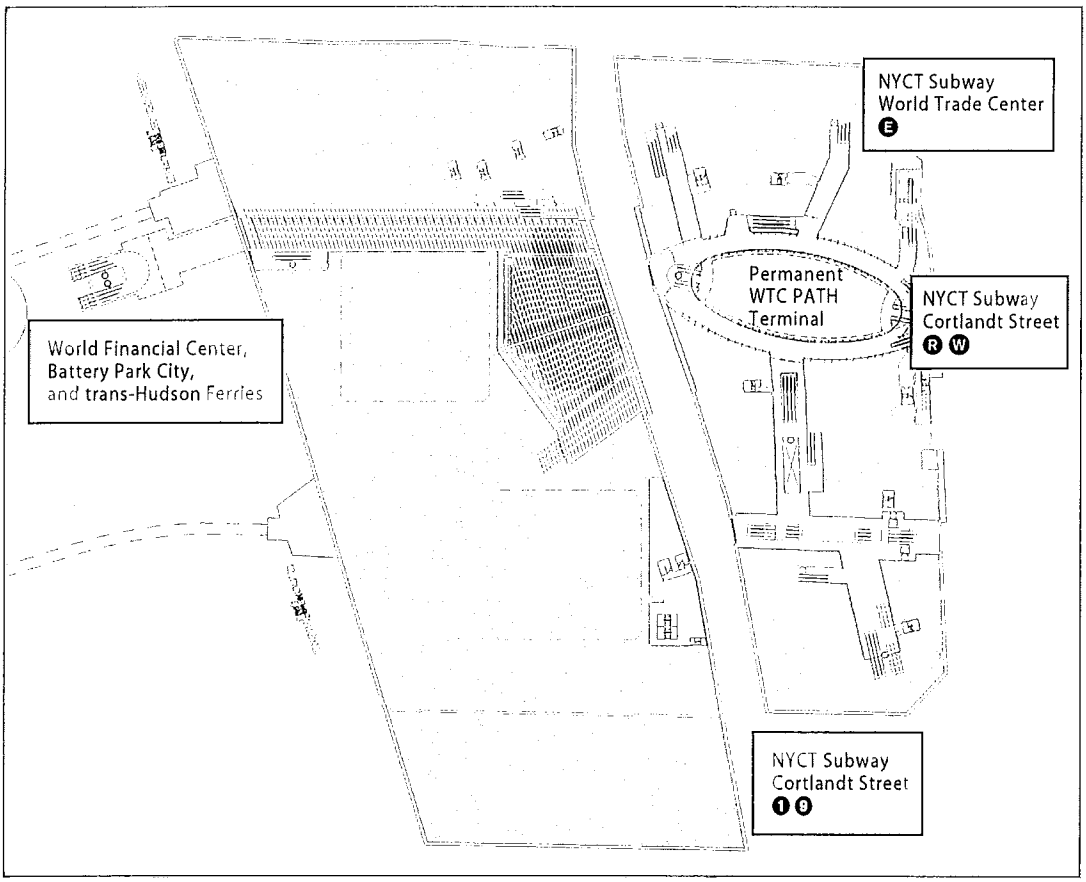
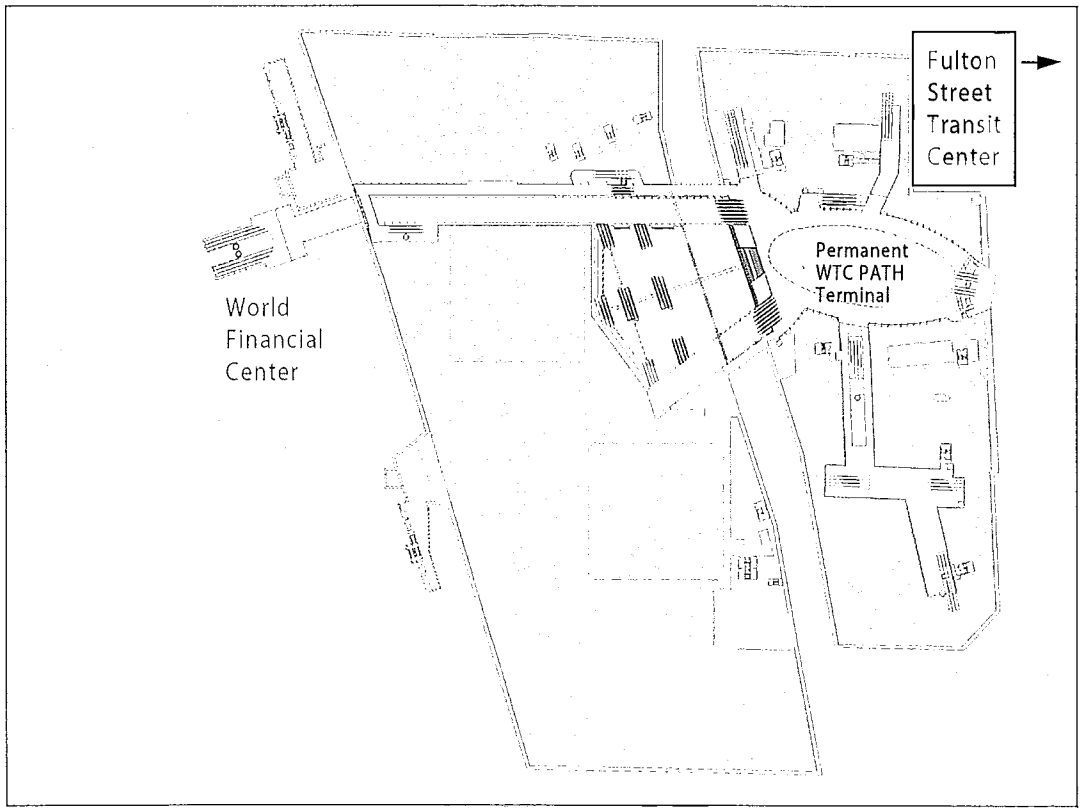


Concourse Level (Balcony)



Concourse Level (Main)

Figure 8A-3

Pedestrian Connections

many users. Thus, any potential impacts of the Preferred Alternative to its users and to PATH operations would be beneficial.

DESIGN YEAR (2025)

FUTURE COMMON TO ALL ALTERNATIVES

In addition to the PATH system improvements described above under "Construction Period", PANYNJ is considering extending the PATH system from its current terminal at Newark Penn Station to connect with the Newark Liberty International Airport AirTrain rail system. When constructed, PATH would provide a direct rail connection between Lower Manhattan and the airport. The Newark Liberty International Airport extension will be undertaken independent of the Preferred Alternative.

As shown in Table 8A-7, by the design year, average weekday PATH usage to the WTC site is projected to be 167,718, an increase of 13.6 percent from 2000 levels. The AM peak hour usage is estimated to be 29,001, which is a 9 percent increase over 2000 ridership (see Appendix C).

Table 8A-7
PATH Ridership Forecast for WTC Service in the Design Year (2025)

Year	Average Weekday Trips			AM Peak Hour		
	Terminal Users	Weekday Boardings	Weekday Alightings	Terminal Users	Weekday Boardings	Weekday Alightings
2000	142,300	67,000	75,300	26,604	4,107	22,497
2025	161,718	76,143	85,575	29,001	5,660	23,341

Absent a Preferred Alternative, those demanding trans-Hudson service to and from the WTC site may be diverted to other modes of travel as the temporary WTC PATH stations nears or exceeds in reasonable capacity. However, for analysis purposes, it is assumed that these trips would continue to be made in some capacity.

NO ACTION ALTERNATIVE

Under the No Action Alternative, PATH service to Lower Manhattan would be eliminated by the design year since the temporary station would exceed its useful life. Over 162,000 weekday passengers who would have used the Permanent WTC PATH Terminal in year 2025 would be required to divert to alternate modes of transportation to access Lower Manhattan. These passenger diversions would require a more expensive and time-consuming commute for PATH riders and may involve additional transfers. Adverse impacts on vehicular traffic, other transit services, and the pedestrian network in the area are addressed in subsequent sections of this chapter.

Fifteen percent of PATH passengers who would have used the Permanent WTC Terminal if it were available would still use PATH as one leg of a multi-modal commute to Lower Manhattan. These passengers would instead use the Christopher Street or 9th Street PATH Station and then either walk or transfer to the NYCT subway. In year 2025, 24,258 total passengers would be diverted to these two stations each weekday, and 4,350 passengers would be diverted during the AM peak hour. It is anticipated that each station would attract half of these riders. Although both stations will have been renovated to include an additional exit/entrance than exist today, the

addition of almost 2,200 passengers to each of these stations during the AM peak hour would substantially impact the safe and efficient operation of each station.

PREFERRED ALTERNATIVE

No impacts to PATH riders or its operations are expected in 2025, the design year for the Preferred Alternative, if the terminal is constructed. Rather, the terminal would provide added passenger capacity that would be required given the completed redevelopment of the WTC site. The Preferred Alternative would accommodate elements that the temporary WTC PATH station could not, including pedestrian linkages to surrounding buildings, all area NYCT subways lines, and more convenient access to trans-Hudson ferries. Multiple entrances and exits would reduce walking times to access and egress the new terminal, which would lead to shorter walking distances and commute times for many users. Thus, any potential impacts of the Preferred Alternative to its users and to PATH operations would be beneficial.

E. MITIGATION

The Preferred Alternative would have positive benefits to PATH system operations and the convenience of its passengers. Since the Preferred Alternative would not adversely impact PATH operations, mitigation is not required. ✳

A. INTRODUCTION

This section of Chapter 8 describes vehicular traffic and parking conditions in the area and assesses whether the Preferred Alternative for a Permanent World Trade Center (WTC) PATH Terminal would be expected to create adverse impacts. The analyses that follow provide an overview of existing conditions, both before the events of September 11, 2001 and post-September 11, 2001 (i.e., current conditions) to establish a baseline from which future conditions are developed.

The traffic analyses focus on a study area and representative intersections at which adverse impacts could occur during construction of the Preferred Alternative. Adverse impacts are not expected once the Terminal is operational. The Port Authority of New York and New Jersey (PANYNJ) surveys indicate that PATH service does not generate a substantial level of connecting trips by either auto or taxi. The original PATH Terminal that was destroyed on September 11, 2001 generated a minimal volume of auto and taxi trips—just 1 percent of connecting trips to or from PATH were made by auto and less than ½ percent were made by taxi. With no new or induced riders directly resulting from the proposed Terminal, as compared to pre-September 11, 2001 projections, new auto and taxi trips are not expected. There is potential for the Terminal to create impacts resulting from construction vehicles traveling to and from the site. However, the analyses described below indicate that the volume of construction-related traffic is very low and has a limited potential for impacts that would require mitigation. There would be an adverse impact at only one location—Route 9A and Liberty Street in the PM peak hour—which can be mitigated via signal timing changes.

The parking analyses provide a summary of parking facilities in the area—either to accommodate construction staff who might drive to the area (although the vast majority can be expected to use public transportation) and potential impacts on blocks along which on-street parking may be prohibited to accommodate construction work zones or to facilitate the movement of vehicles into or out of the area during construction.

Additional data pertaining to the discussion that follows is presented in Appendix C of this Environmental Impact Statement (EIS).

B. METHODOLOGY

The analyses begin with a presentation of traffic and parking conditions pre- and post-September 11, 2001 based on available traffic data accumulated as part of several ongoing transportation and redevelopment proposals in Lower Manhattan, including the WTC Memorial and Redevelopment Plan and Fulton Street Transit Center. Future baseline (i.e., No Build) conditions are presented based on background traffic growth in the area and using analysis assumptions developed for other Lower Manhattan projects. Future Build conditions during construction of the Preferred Alternative were established based on current plans and estimates provided by

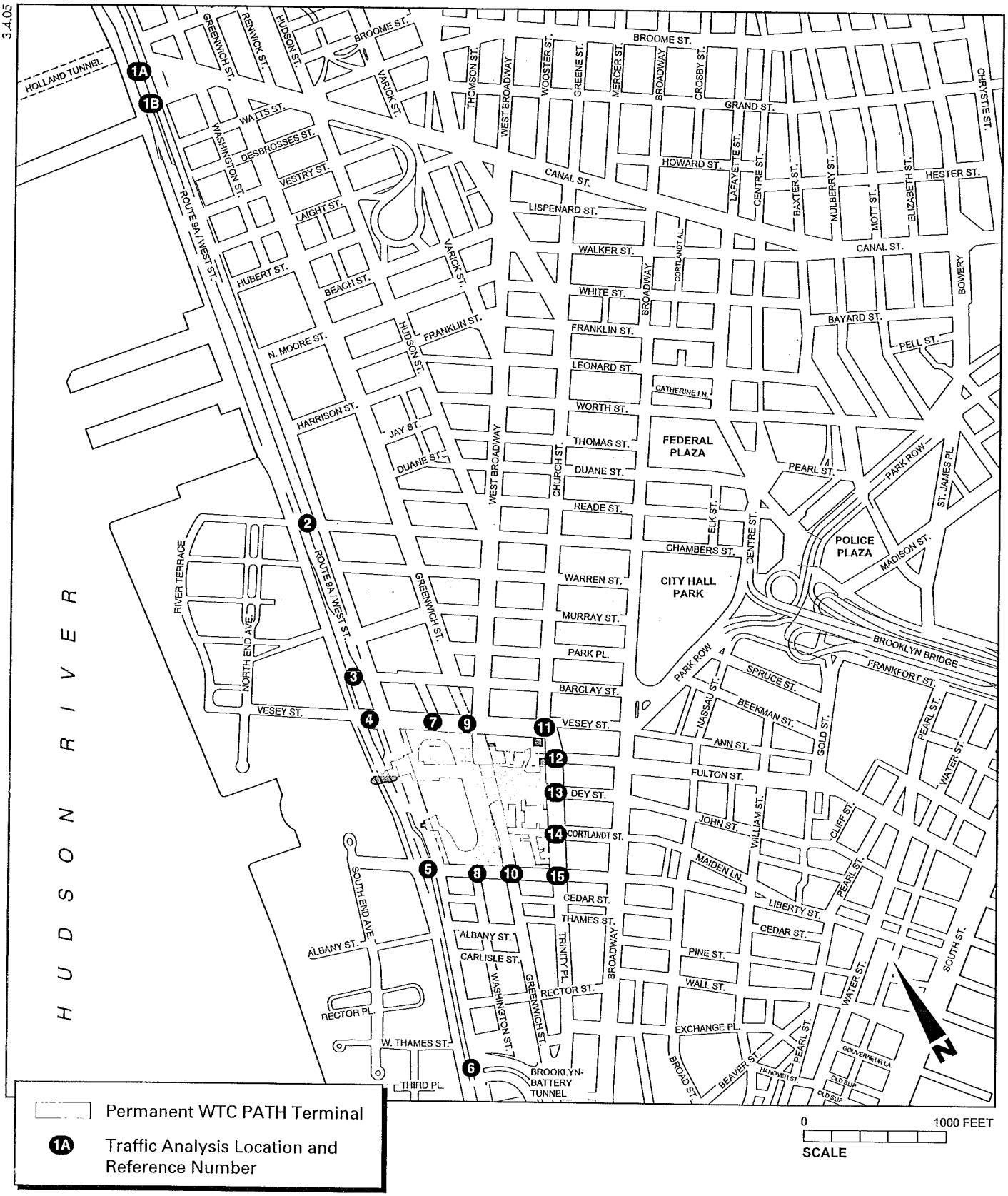
PANYNJ—projections of construction vehicles, construction employees, days and hours of construction activity, and currently anticipated street and/or lane closures to safely complete construction of the Terminal and facilitate the flow of traffic in the area. As noted above, the cumulative effects of PATH and other Lower Manhattan recovery projects construction is addressed in Chapter 15, "Cumulative Effects."

The traffic study area and analysis locations focus on the perimeter of the Project Site and on other intersections away from the site through which construction vehicles are expected to pass. These include key intersections along Route 9A leading to and from the Holland Tunnel (for trips to and from New Jersey) and the Brooklyn-Battery Tunnel (for trips to and from Brooklyn and Staten Island), and along Church Street and Broadway (for trips that could be made to/from parts of Brooklyn, Queens, Long Island, the Bronx, or Westchester). Commercial vehicle/truck traffic is not permitted on several major arterial roadways and bridges in the area, such as the FDR Drive, the Henry Hudson Parkway (Route 9A north of 57th Street), and the Brooklyn Bridge, and it is therefore expected that the vast majority of construction vehicle activity will approach and leave the Project Site via Route 9A en route to the Holland Tunnel and the Brooklyn-Battery Tunnel (BBT).

Eighteen intersections were initially considered for analysis as the traffic study area. These locations, which are listed below, were considered to represent key intersections where project-generated impacts may occur.

- Route 9A and Canal Street
- Route 9A and Chambers Street
- Route 9A and Barclay Street
- Route 9A and Vesey Street
- Route 9A and Liberty Street
- Route 9A and the BBT entrance/exit
- Washington Street and Vesey Street
- Greenwich Street/West Broadway and Vesey Street
- Church Street and Vesey Street
- Washington Street and Liberty Street
- Greenwich Street and Liberty Street
- Church Street and Liberty Street
- Church Street and Fulton Street
- Church Street and Dey Street
- Church Street and Cortlandt Street
- West Broadway and Chambers Street
- Broadway and Canal Street
- Broadway and the Bowery

The construction vehicle traffic assignment determined that a very minimal amount of traffic would pass through the West Broadway/Chambers Street, Broadway/Canal Street, and Broadway/Bowery intersections (two construction vehicles or less in each of the peak hours), so conditions at these intersections have not been analyzed since it is unlikely that they would be adversely impacted. Therefore, the remaining 15 intersections, shown in Figure 8B-1, comprise the traffic study area and were the focus of quantitative levels of service that follow later in this section.



PERMANENT WTC PATH TERMINAL
Final Environmental Impact Statement

Figure 8B-1
Traffic Analysis Locations

The analysis of traffic conditions is based on level of service (LOS) criteria defined for signalized intersections in the *2000 Highway Capacity Manual (HCM)*:

- LOS A describes operations with very low delays, i.e., 10.0 seconds or less per vehicle. This occurs when signal progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all.
- LOS B describes operations with delays in the range of 10.1 to 20.0 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. Again, most vehicles do not stop at the intersection.
- LOS C describes operations with delays in the range of 20.1 to 35.0 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. The number of vehicles stopping is noticeable at this level, although many still pass through the intersection without stopping.
- LOS D describes operations with delays in the range of 35.1 to 55.0 seconds per vehicle. At LOS D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volume-to-capacity (v/c) ratios. Many vehicles stop, and the proportion of vehicles not stopping declines.
- LOS E describes operations with delays in the range of 55.1 to 80.0 seconds per vehicle. This is considered to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios.
- LOS F describes operations with delays in excess of 80.0 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with oversaturation, i.e., when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios with cycle failures. Poor progression and long cycle lengths may also be contribute to such delays. Often, vehicles do not pass through the intersection in one signal cycle.

Based on guidance in the *New York City Environmental Quality Review Technical Manual*, in New York City, LOSs A, B, and C are considered acceptable, LOS D is generally considered marginally acceptable up to mid-LOS D (45 seconds of delay for signalized intersections) and unacceptable above mid-LOS D, and LOS E and F indicate congestion.

For unsignalized intersections (such as Route 9A and Barclay Street), delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the Stop line: LOS A describes operations with very low delay, i.e., 10.0 seconds or less per vehicle; LOS B describes operations with delays in the range of 10.1 to 15.0 seconds; LOS C has delays in the range of 15.1 to 25.0 seconds; LOS D, 25.1 to 35.0 seconds per vehicle; and LOS E, 35.1 to 50.0 seconds per vehicle, which is considered to be the limit of acceptable delay. LOS F describes operation with delays in excess of 50.0 seconds per vehicle, which is considered problematic to most drivers. This condition exists when there are insufficient gaps of suitable duration to allow side street traffic to cross safely through a major vehicular traffic stream.

The definition of an adverse traffic impacts is based on the following criteria, which have been used for other major transportation improvement projects such as this (e.g., the Second Avenue Subway): deterioration in level of service from below mid-LOS D (less than 45 seconds of

delay) to above mid-LOS D (greater than 45 seconds of delay) or to LOS E or F as long as the increase in delay is 10 seconds or more; deterioration from LOS E to LOS F, or within LOS E or within LOS F, as long as the increase in delay is 10 seconds or more.

Since the Preferred Alternative is not expected to induce new PATH ridership nor new vehicular traffic, detailed analyses were not needed to conclude that there would be no traffic impacts in the 2009 opening and 2025 design years, which is documented in this section of the EIS. However, detailed traffic level of service analyses are presented for the year 2006 peak construction condition. A No Action Alternative without PATH service to the WTC site, on the other hand, would result in substantial increases in vehicular traffic in Lower Manhattan.

C. DESCRIPTION OF THE AFFECTED ENVIRONMENT

PRE-SEPTEMBER 11, 2001 BASELINE CONDITIONS

STREET NETWORK AND TRAFFIC VOLUMES

The study area and most of Lower Manhattan's street network follow a grid pattern that is typical of most of Manhattan. The major north-south roadways in the area include Route 9A which is two-way, and Church Street and Broadway, which function as a one-way pair (Church Street northbound, Broadway southbound). Each of these north-south roadways carries several traffic lanes and possesses substantial capacity. The east-west roadways in the area have more limited traffic-carrying capacity. These roadways include Chambers Street, which is two-directional, carrying one to two lanes of traffic per direction; Vesey Street, which is two-way (when open before the events of September 11, 2001) between Route 9A on the west and Church Street on the east and generally carrying two traffic lanes per direction; and one-way eastbound between Church Street and Broadway with generally two moving lanes (sometimes three) of traffic although three striped lanes exist. South of the Project Site, Liberty Street was the primary east-west street. Pre-September 11, 2001, Liberty Street served as a primarily eastbound street with two to three lanes of traffic, and also included a westbound "service road" around the southern periphery of the WTC site.

Route 9A is the major traffic carrier in the area with the predominant traffic flows being northbound in the morning and southbound in the evening. In the AM peak hour, northbound Route 9A carried approximately 3,200 vehicles per hour (vph) at Liberty Street and 2,800 vph at Vesey Street, and about 2,150 vph southbound at Vesey Street and 2,350 vph at Liberty Street. During the midday peak hour, northbound volumes were about 2,200 vph at Liberty Street and 2,050 vph at Vesey Street, while southbound volumes were approximately 1,800 vph at Vesey Street and 2,000 vph at Liberty Street. During the PM peak hour, northbound volumes were about 2,250 to 2,300 vph at both locations, and southbound volumes were about 2,400 vph at Vesey Street and 2,850 vph at Liberty Street. Route 9A carries both through traffic that bypasses the area and local traffic destined to the WTC vicinity and Lower Manhattan.

Other than Route 9A, Trinity Place/Church Street is the major northbound traffic route in the western half of Lower Manhattan. Pre-September 11, 2001, traffic volumes were generally about 1,250 vph in the AM peak hour at Liberty Street and 1,850 vph farther north at Vesey Street. Midday peak hour volumes were considerably lower, about 950 vph at Liberty Street and 1,400 vph at Vesey Street. PM peak hour volumes were about 900 vph at Liberty Street and 1,500 vph at Vesey Street.

Broadway is the southbound counterpart to Church Street, carrying generally two to four moving lanes. Before September 11, 2001, AM peak hour traffic volumes were generally about 1,400 vph at Vesey Street and 1,000 vph at Liberty Street. Midday peak hour volumes were approximately 1,200 vph at Vesey Street and 900 vph at Liberty Street, while PM peak hour volumes were generally 1,500 vph at Vesey Street and 850 vph at Liberty Street.

Before the terrorist attacks of September 11, 2001, Vesey Street operated two ways between Battery Park City/World Financial Center and Church Street, and one-way eastbound east of Church Street. Pre-September 11, 2001, eastbound Vesey Street carried about 900 vph approaching Church Street; in the midday, it carried about 500 vph, and in the PM peak hour, it carried about 350 vph at this location. Westbound volumes were generally about 400 to 450 vph approaching Route 9A.

Detailed traffic volume data are provided in Appendix C. These volumes were developed by several state and local agencies, including PANYNJ, Lower Manhattan Development Corporation (LMDC), New York Metropolitan Transportation Council (NYMTC), New York State Department of Transportation (NYSDOT), Metropolitan Transportation Authority (MTA), the New York City Department of Transportation (NYCDOT), and the New York City Department of City Planning (NYCDCP). Working cooperatively as part of the Lower Manhattan Working Group, their efforts focused on the range of major transportation projects proposed and being studied in Lower Manhattan to ensure that all of the Lower Manhattan recovery projects use a consistent set of baseline traffic volumes for their individual analyses.

TRAFFIC LEVELS OF SERVICE

Each of the intersections defined previously as analysis locations were analyzed using *2000 HCM* procedures. For pre-September 11, 2001 conditions, Table 8B-1 presents an overview of the "existing" levels of service, showing each intersection's "overall" level of service for signalized intersections (the overall intersection LOS is a weighted average of all of the individual traffic movements); for the unsignalized Route 9A/Barclay Street intersection, the critical traffic movement's level of service is shown. Detailed intersection-by-intersection level of service data is provided in Appendix C.

As shown above, the majority of the intersections being studied operated at overall acceptable levels of service, with the notable exception of the intersection of Route 9A at the entrance/exit of the BBT. Even though the "overall" intersection levels of service are generally acceptable, several specific traffic movements operated at congested levels of service E or F (i.e., westbound Vesey Street approaching Route 9A during all three traffic analysis hours, southbound left turns from Route 9A onto Liberty Street during all three traffic analysis hours, and a select number of others). Detailed traffic level of service summaries are presented in Appendix C.

PARKING

An inventory of pre-September 11, 2001 public parking facilities was conducted as part of the PANYNJ and LMDC's *Lower Manhattan Transportation Report Phase One* in early- to-mid-2002. The information presented here is primarily taken from that report and from work being conducted as part of LMDC's *World Trade Center Memorial and Redevelopment Plan Generic Environmental Impact Statement (GEIS).*

Table 8B-1
Pre-September 11, 2001 Conditions: Intersection Levels of Service

Intersection	Ref. No.	AM Peak Hour	Midday Peak Hour	PM Peak Hour
Route 9A and Canal Street	1A/1B	C	B	E
Route 9A and Chambers Street	2	C	C	D
Route 9A and Barclay Street (critical approach)	3	C	C	C
Route 9A and Vesey Street	4	D	D	D
Route 9A and Liberty Street	5	D	C	C
Route 9A and BBT Entrance/Exit	6	F	F	F
Washington Street and Vesey Street	7	A	A	A
Washington Street and Liberty Street	8	A	A	A
Greenwich Street/West Broadway and Vesey Street	9	D	B	C
Greenwich Street and Liberty Street	10	B	A	B
Church Street and Vesey Street	11	C	D	D
Church Street and Fulton Street	12	B	B	B
Church Street and Dey Street	13	A	B	A
Church Street and Cortlandt Street	14	C	B	B
Church Street and Liberty Street	15	B	B	B

Note: Refer to Figure 8B-1.

Prior to the events of September 11, 2001, there were 20 identified off-street parking facilities within ¼ mile of the WTC containing over 7,000 spaces, and an additional 46 facilities between ¼ mile and ½ mile of the site with an additional 6,800 spaces. Occupancy of these spaces at midday, generally considered peak utilization time, was approximately 86 percent for the former and 90 percent for the latter.

Legal on-street parking is much more limited. Although data is not available for the entire area pre-September 11, 2001, post-September 11, 2001 surveys conducted for LMDC's *World Trade Center Memorial and Redevelopment Plan GEIS* indicate that within a ½-mile walking distance of the WTC site, occupancy of legal on-street spaces was 85 to 90 percent, or about one available space for every 11 blockfaces.

CHANGES IN THE AFFECTED ENVIRONMENT SINCE SEPTEMBER 11, 2001

STREET NETWORK AND TRAFFIC VOLUMES

Traffic volumes in Lower Manhattan have generally decreased by about 20 percent since September 11, 2001. However, this areawide overview does not mean that such decreases have occurred uniformly throughout Lower Manhattan or that all streets have experienced lower volumes. For example, due to the closures of Vesey and Liberty Streets near the WTC site, which previously enabled traffic to proceed from Route 9A to streets more centrally located within Lower Manhattan, some traffic has diverted from Route 9A to Broadway, thus increasing Broadway's traffic volumes over its pre-September 11, 2001 levels. An overview of general traffic volumes on some of the area's major streets follows and detailed volumes are provided in Appendix C.

Route 9A remains the major traffic carrier in the area with the predominant traffic flows still being northbound in the morning and southbound in the evening. In the AM peak hour, northbound Route 9A carries approximately 2,450 vph at Liberty and Vesey Streets, and about 1,850 vph southbound at both of these cross-street locations, which is considerably lower than pre-September 11, 2001 volumes. During the midday peak hour, northbound volumes are 1,650 vph at both Liberty and Vesey Streets, while southbound volumes are approximately 1,550 to 1,600 vph at both locations, also considerably lower than before September 11, 2001. During the PM peak hour, northbound volumes are 1,900 to 1,950 vph at both locations, and southbound volumes are 2,300 to 2,350 vph at the two cross-street locations, with just the northbound volume being considerably lower.

Northbound Trinity Place/Church Street traffic volumes are generally about 750 vph in the AM peak hour at Liberty Street and 1,100 vph farther north at Vesey Street, about two-thirds their levels pre-September 11, 2001. Midday peak hour volumes are similar to AM levels, with approximately 650 vph at Liberty Street and 1,050 vph at Vesey Street. PM peak hour volumes are 500 vph at Liberty Street and 800 vph at Vesey Street, just over half of their pre-September 11, 2001 levels.

Broadway is the southbound counterpart to Church Street. Post-September 11, 2001, AM peak hour traffic volumes are generally about 1,650 vph at Vesey Street and 1,000 vph at Liberty Street. Midday peak hour volumes are approximately 1,300 vph at Vesey Street and 700 vph at Liberty Street. PM peak hour volumes are generally about 1,350 vph at Vesey Street and 600 vph at Liberty Street.

Before September 11, 2001, Vesey Street operated as an east-west connector street between Route 9A and interior destinations in Lower Manhattan. However, Vesey Street is currently closed to regular vehicle traffic between Route 9A and Church Street.

Peak hour traffic volumes at representative locations are presented in Appendix C. These volumes were also developed by several local and state agencies working cooperatively as part of the Lower Manhattan Working Group on the range of major transportation projects proposed and being studied in Lower Manhattan, as described above.

TRAFFIC LEVELS OF SERVICE

Table 8B-2 presents an overview of the post-September 11, 2001 traffic levels of service, showing each signalized intersection's "overall" level of service (again, the overall intersection LOS is a weighted average of all the individual traffic movements); for the unsignalized Route 9A/Barclay Street intersection, the critical traffic movement's level of service is shown. Detailed intersection-by-intersection level of service data is provided in Appendix C.

The majority of the analysis locations continue to operate at overall acceptable levels of service. The notable exception of the intersection of Route 9A at the entrance/exit of the BBT, as was also true prior to September 11, 2001. Even though the "overall" intersection levels of service are generally acceptable, several specific traffic movements operate at unacceptable levels of service E or F (i.e., northbound left turns from Route 9A onto Liberty Street into the Battery Park City area during all three traffic analysis hours, and a select number of others). Detailed traffic level of service summaries are presented in the Appendix C.

Table 8B-2
Comparison of Pre- and Post-September 11, 2001 Intersection Levels of Service

Intersection	Ref. No.	AM Peak Hour		Midday Peak Hour		PM Peak Hour	
		Pre-Sep 11	Post-Sep 11	Pre-Sep 11	Post-Sep 11	Pre-Sep 11	Post-Sep 11
Route 9A and Canal Street	1A/ 1B	C	C	B	B	E	B
Route 9A and Chambers Street	2	C	C	C	B	D	C
Route 9A and Barclay Street	3	C	N/A	C	N/A	C	N/A
Route 9A and Vesey Street	4	D	F	D	D	D	D
Route 9A and Liberty Street	5	D	C	C	B	C	D
Route 9A and BBT Entrance/Exit	6	F	F	F	F	F	F
Washington Street and Vesey Street	7	A	N/A	A	N/A	A	N/A
Washington Street and Liberty Street	8	A	N/A	A	N/A	A	N/A
Greenwich Street/West Broadway and Vesey Street	9	D	N/A	B	N/A	C	N/A
Greenwich Street and Liberty Street	10	B	N/A	A	N/A	B	N/A
Church Street and Vesey Street	11	C	B	D	B	D	A
Church Street and Fulton Street	12	B	B	B	B	B	B
Church Street and Dey Street	13	A	A	B	A	A	A
Church Street and Cortlandt Street	14	C	A	B	B	B	B
Church Street and Liberty Street	15	B	A	B	A	B	A
Note: Refer to Figure 8B-1							

PARKING

An inventory of current parking conditions was conducted as part of LMDC's *World Trade Center Memorial and Redevelopment Plan GEIS* in September 2003 for all off-street public parking facilities within ¼ mile and ½ mile radii of the WTC site.

There are 19 off-street parking facilities within ¼ mile of the WTC site containing close to 5,150 spaces, and an additional 48 facilities between ¼ mile and ½ mile of the site with an additional 8,000 spaces. The surveyed occupancy of these spaces at midday was approximately 82 percent for the former and 55 percent for the latter. This 55 percent level includes the 2,000-space parking garage at 2 Morris Street which is currently closed. When this facility is not accounted for, there are 6,000 spaces available within ¼ mile and ½ mile from the WTC site, with an overall midday utilization of about 73 percent.

Legal on-street parking is very limited. Surveys conducted for LMDC indicate that within a ½-mile walking distance of the WTC site, occupancy of legal on-street spaces was 85 to 90 percent, or about one unoccupied space for every 11 blockfaces.

D. PROBABLE IMPACTS OF THE PROJECT ALTERNATIVES

This section addresses the potential for adverse traffic impacts for three analysis years—the construction year, the opening year, and the design year for the Permanent WTC PATH Terminal. As stated previously, the Terminal is not expected to induce new riders as compared to pre-September 11, 2001 forecasts. Furthermore, new riders to the system would be attributed

to residential and commercial development in the area rather than to the operation of the Preferred Alternative.

CONSTRUCTION PERIOD (2006)

FUTURE COMMON TO ALL ALTERNATIVES

The detailed construction year analyses were conducted for several Lower Manhattan projects (i.e., the Fulton Street Transit Center, South Ferry Terminal, Route 9A Project, and the World Trade Center Memorial and Redevelopment Plan). The anticipated traffic levels of service at the 15 traffic study area intersections are shown in Table 8B-3 below. These analyses assume that Liberty and Vesey Streets remain closed to through traffic in 2006. The operation of other area streets was assumed to be the same as today.

Table 8B-3
2006 No Action Alternative: Intersection Levels of Service

Intersection	Ref. No.	AM Peak Hour	Midday Peak Hour	PM Peak Hour
Route 9A and Canal Street	1A/1B	C	C	C
Route 9A and Chambers Street	2	C	B	C
Route 9A and Barclay Street (critical approach)	3	C	B	B
Route 9A and Vesey Street	4	F	E	E
Route 9A and Liberty Street	5	A	A	B
Route 9A and BBT Entrance/Exit	6	F	F	F
Washington Street and Vesey Street	7	NA	NA	NA
Washington Street and Liberty Street	8	NA	NA	NA
Greenwich Street/West Broadway and Vesey Street	9	NA	NA	NA
Greenwich Street and Liberty Street	10	NA	NA	NA
Church Street and Vesey Street	11	B	B	A
Church Street and Fulton Street	12	C	C	B
Church Street and Dey Street	13	B	B	A
Church Street and Cortlandt Street	14	C	D	C
Church Street and Liberty Street	15	B	A	A

Note: NA = Not applicable; closed for construction or security reasons.

The findings of these analyses show that there would be some modest change in traffic conditions as compared to 2003. The results shown in Table 8B-3 represent the baseline against which potential impacts of construction vehicles generated by the Preferred Alternative is compared.

NO ACTION ALTERNATIVE

Since the No Action Alternative itself would not generate construction period traffic, this alternative would not result in any adverse traffic impacts during the construction period.

PREFERRED ALTERNATIVE

The Preferred Alternative would generate approximately 15 construction vehicles in each of the weekday peak hours, with a relatively even distribution of incoming and outgoing traffic. (Refer to Chapter 3, "Construction Methods and Materials," for a description of the volumes and hours of the day.)

The projected construction vehicle trips were assigned to the traffic study area's streets, as shown in Figure 8B-2. The results show that a relatively modest volume of construction vehicles are expected to pass through the various intersections being analyzed in the area, ranging from three to 15 vehicles, with no more than seven expected on any one approach, which is a very modest increase.

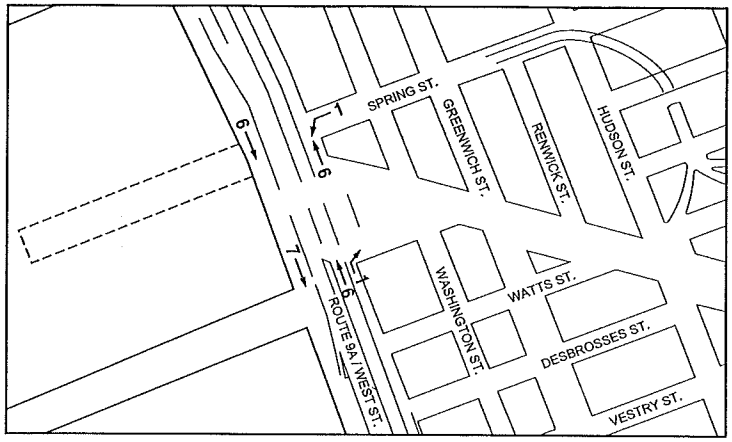
Traffic levels of service were analyzed with the addition of these construction vehicles, and the resulting overall intersection levels of service are shown in Tables 8B-4 through 8B-6 (detailed level of service findings for each traffic movement at each analysis location are provided in Appendix C). The overall intersection level of service is presented below for signalized intersections; for the unsignalized intersection of Route 9A and Barclay Street, the critical traffic movement's level of service is shown.

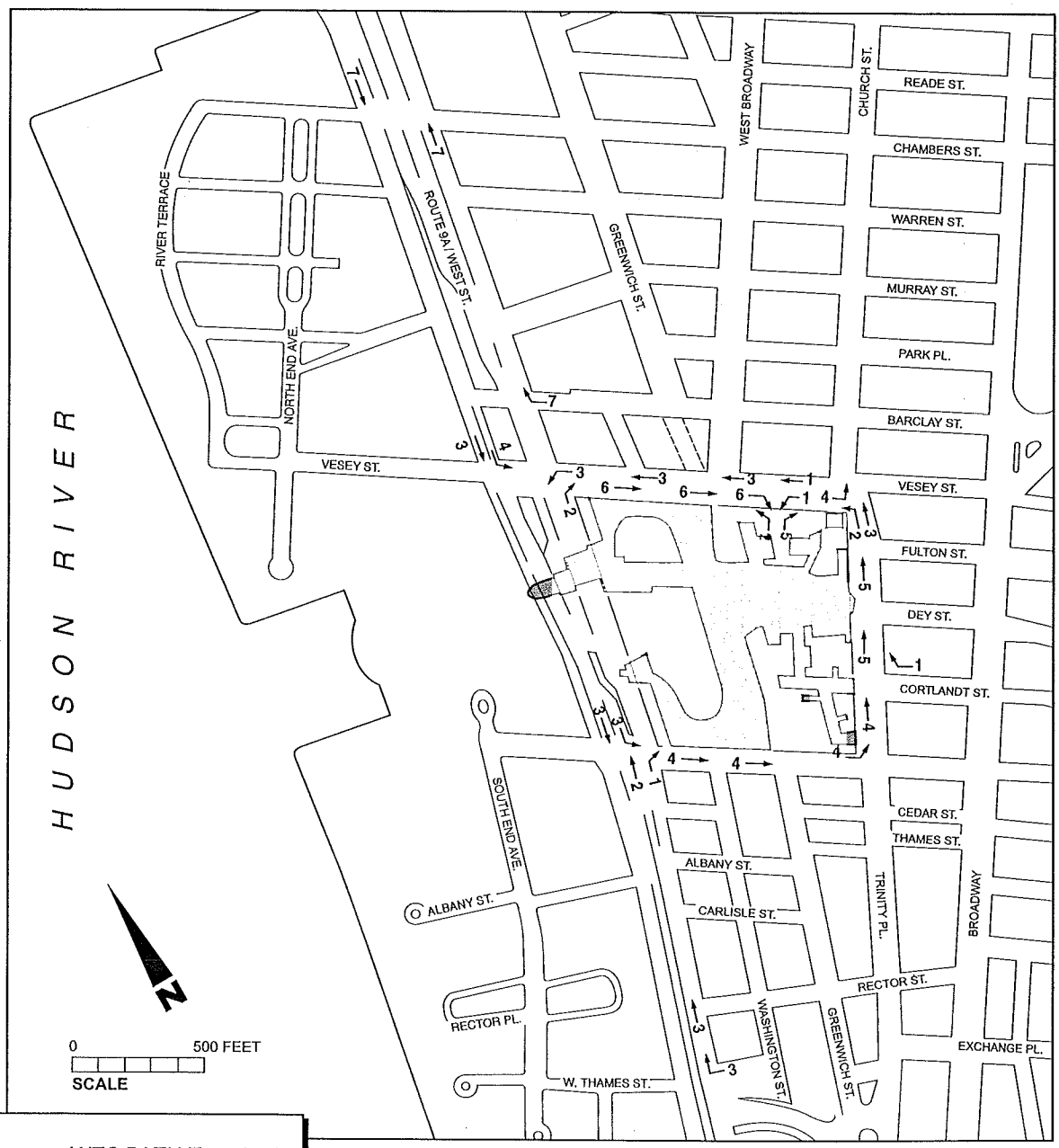
Table 8B-4
2006 No Action and Preferred Alternatives:
AM Peak Hour Intersection Levels of Service

Intersection	Ref. No.	2006 No Action	2006 Preferred Alternative	Required Mitigation
Route 9A and Canal Street	1A/1B	C	C	None
Route 9A and Chambers Street	2	C	C	None
Route 9A and Barclay Street (critical approach)	3	C	C	None
Route 9A and Vesey Street	4	F	F	None
Route 9A and Liberty Street	5	A	A	None
Route 9A and BBT Entrance/Exit	6	D	D	None
Washington Street and Vesey Street	7	NA	NA	None
Washington Street and Liberty Street	8	NA	NA	None
Greenwich Street/West Broadway and Vesey Street	9	NA	NA	None
Greenwich Street and Liberty Street	10	NA	NA	None
Church Street and Vesey Street	11	B	B	None
Church Street and Fulton Street	12	C	C	None
Church Street and Dey Street	13	B	B	None
Church Street and Cortlandt Street	14	C	C	None
Church Street and Liberty Street	15	B	B	None

Note: NA = Not applicable; closed for construction or security reasons.

There would be no impacts requiring mitigation in the AM or midday traffic analysis hours. In the PM peak hour, there would be an impact at one location—Route 9A and Liberty Street. This impact would occur due to increased delays to southbound traffic although the overall intersection is expected to operate at an acceptable level of service.





Permanent WTC PATH Terminal

Figure 8B-2

Peak Hourly Construction Period Truck Trips

Table 8B-5
2006 No Action and Preferred Alternatives: Midday Peak Hour Intersection Levels of Service

Intersection	Ref. No.	2006 No Action	2006 Preferred Alternative	Required Mitigation
Route 9A and Canal Street	1A/1B	C	C	None
Route 9A and Chambers Street	2	B	B	None
Route 9A and Barclay Street (critical approach)	3	B	B	None
Route 9A and Vesey Street	4	E	E	None
Route 9A and Liberty Street	5	A	A	None
Route 9A and BBT Entrance/Exit	6	D	D	None
Washington Street and Vesey Street	7	NA	NA	None
Washington Street and Liberty Street	8	NA	NA	None
Greenwich Street/West Broadway and Vesey Street	9	NA	NA	None
Greenwich Street and Liberty Street	10	NA	NA	None
Church Street and Vesey Street	11	B	B	None
Church Street and Fulton Street	12	C	C	None
Church Street and Dey Street	13	B	B	None
Church Street and Cortlandt Street	14	D	D	None
Church Street and Liberty Street	15	A	A	None
Note: NA = Not applicable; closed for construction or security reasons.				

Table 8B-6
2006 No Action and Preferred Alternatives: PM Peak Hour Intersection Levels of Service

Intersection	Ref. No.	2006 No Action	2006 Preferred Alternative	Required Mitigation
Route 9A and Canal Street	1A/1B	C	C	None
Route 9A and Chambers Street	2	C	C	None
Route 9A and Barclay Street (critical approach)	3	B	B	None
Route 9A and Vesey Street	4	E	E	None
Route 9A and Liberty Street	5	B	C	Signal timing adjustment
Route 9A and BBT Entrance/Exit	6	E	E	None
Washington Street and Vesey Street	7	NA	NA	None
Washington Street and Liberty Street	8	NA	NA	None
Greenwich Street/West Broadway and Vesey Street	9	NA	NA	None
Greenwich Street and Liberty Street	10	NA	NA	None
Church Street and Vesey Street	11	A	A	None
Church Street and Fulton Street	12	B	B	None
Church Street and Dey Street	13	A	A	None
Church Street and Cortlandt Street	14	C	C	None
Church Street and Liberty Street	15	A	A	None
Note: NA = Not applicable; closed for construction or security reasons.				

OPENING YEAR (2009)

FUTURE COMMON TO ALL ALTERNATIVES

By the opening year for the Permanent WTC PATH Terminal, it is expected that background conditions in Lower Manhattan will change as compared to today. As new development occurs on and around the WTC site, vehicular traffic and parking demand in Lower Manhattan will increase. However, the ongoing reconstruction of streets in Lower Manhattan and the infrastructure improvements planned with the WTC Memorial and Redevelopment Plan and the Route 9A Project will improve circulation in the immediate vicinity of the Project Site.

At present, LMDC, PANYJ, NYSDOT, and the New York City Department of Transportation are coordinating a circulation plan for new and existing streets in Lower Manhattan. This plan is expected to be implemented by 2009.

NO ACTION ALTERNATIVE

Under the No Action Alternative, PANYNJ would maintain the temporary WTC PATH station, and the Preferred Alternative itself would not generate vehicle trips. Therefore, the No Action Alternative would not result in traffic impacts in the opening year.

PREFERRED ALTERNATIVE

The Preferred Alternative would generate a minimal number of new vehicle trips since only approximately 1 percent of riders would transfer between PATH and automobiles and only ½ percent transfer between PATH and taxis (based on surveys conducted by PANYNJ before September 11, 2001. As described in the DEIS, a sub-grade concourse between the Permanent WTC PATH Terminal and Liberty Plaza Park, as was proposed in the Terminal with a Liberty Plaza Connection Alternative, would have improved traffic circulation at the intersection of Church and Liberty Streets. Although this connection is no longer proposed, the Preferred Alternative would not result in adverse changes in traffic conditions as compared to the No Action Alternative. Therefore, the Preferred Alternative is not expected to result in significant adverse traffic impacts in its opening year.

DESIGN YEAR (2025)

FUTURE COMMON TO ALL ALTERNATIVES

By 2025, all elements of the WTC Memorial and Redevelopment Plan will be completed as will the other private development currently planned in Lower Manhattan. The combined completion and occupation of these projects will increase traffic flows in Lower Manhattan. However, the capacity improvements that are planned as part of the transportation recovery efforts, including mitigation measures being proposed as part of the *World Trade Center Memorial and Redevelopment Plan Generic Environmental Impact Statement* should help to alleviate congestion as compared to the conditions that existed before September 11, 2001.

NO ACTION ALTERNATIVE

Because the temporary station would need to be retired from service, the 2025 No Action Alternative would result in former PATH riders who would drive to Lower Manhattan or use

commuter vans or express buses. The percentage diversion to these alternative modes is assumed to be the same for 2025 as cited above for the opening year.

Weekday, AM peak hour projections for year 2025 indicate that approximately 26,045 PATH riders would enter Lower Manhattan at the WTC Terminal and that approximately 4,510 would board PATH trains at the WTC Terminal for trips to New Jersey. Table 8B-7 presents the estimated volume of vehicle trips that would be made into and out of Lower Manhattan should there be no WTC PATH service.

Table 8B-7
2025 No Action Alternative: Projected Increase in AM Peak Hour Vehicle Trips from Diverted PATH Customers

Trips	Autos	Buses	Vans	Total
Inbound	866	109	26	1,001
Outbound	153	32	8	193
Total	1,019	141	34	1,194

Note: Assumes average occupancies of 1.5 persons per auto, 50 persons per bus, and 10 persons per van for inbound trips, and 1.5 persons per auto, 30 persons per bus, and 6 persons per van for "reverse commute" outbound trips in the AM peak hour.

As shown in Table 8B-7, it is estimated that under the No Action Alternative there would be 866 new auto trips into Lower Manhattan in the AM peak hour, 109 new bus trips, and 26 new commuter van trips, for a total of 1,001 new inbound trips under a worst case scenario with no PATH WTC service. It is estimated that there would be 153 new auto trips out from Lower Manhattan in the AM peak hour ("reverse commute" trips), 32 new bus trips, and 8 new commuter van trips, for a total of 193 new outbound trips. (As described above, lower vehicle occupancies were applied for reverse commuters). Overall, 1,194 new vehicular trips can be expected within Lower Manhattan during the AM peak hour, and a generally comparable volume in the PM peak hour although in the opposite direction.

The addition of approximately 1,200 additional vehicle trips in each of the peak hours in the Lower Manhattan area would represent an increase in traffic and possible adverse impacts at key locations, especially near the portals to the area such as the Holland Tunnel and possibly along the Route 9A corridor, as was noted above for year 2009 conditions. A projected increase of approximately 1,001 new inbound vehicle trips would represent approximately 25 percent of the Holland Tunnel's inbound capacity and a considerable percentage of its toll plaza capacity in New Jersey. Furthermore, increased travel delays would be expected at key Lower Manhattan locations under the No Action Alternative.

PREFERRED ALTERNATIVE

Since a Permanent WTC PATH Terminal would be operational under this alternative, traffic volumes in the study area would be substantially lower than in the No Action Alternative described above. As described in the DEIS, the Terminal with a Liberty Plaza Connection Alternative would have resulted in improved traffic circulation as compared to the Preferred Alternative. However, since the Preferred Alternative would generate far fewer vehicle trips than the No Action Alternative in the design year, it would not result in significant adverse traffic impacts.

E. MITIGATION

As described in Chapter 2, "Project Alternatives" and Chapter 3, "Construction Methods and Materials," PANYNJ has committed to Environmental Performance Commitments (EPCs) as part of their planning, design, and construction of the Preferred Alternative. Four EPCs specifically address potential construction period impacts to access and circulation. Table 8B-8 shows these EPCs and current plans for their implementation.

Table 8B-8
Environmental Performance Commitments

Proposed Commitment	Implementation Plan
Establish a project-specific pedestrian and vehicular maintenance and protection plan.	PANYNJ will develop a Maintenance and Protection of Traffic Plan (MPT) as part of their contract documents for the Preferred Alternative. A construction Traffic Management Plan (TMP) will also be developed for the Lower Manhattan Recovery Projects to address these issues in a broader sense. The TMP will be coordinated by PANYNJ, LMDC, MTA, NYSDOT, NYCDOT, the Lower Manhattan Construction Command Center, and others, as appropriate, based on updated construction scheduling and staging as the designs of individual projects are advanced.
Promote public awareness through mechanisms such as: a) signage; b) telephone hotline; and c) Web site updates.	The TMP will have a public outreach component to communicate traffic information, lane closures, access changes, and travel advisories for the duration of project construction.
Ensure sufficient alternate street, building, and station access during construction period.	For the Preferred Alternative, the MPT Plan included in the contract documents will be used to implement this EPC. The TMP will address the access issues for the Lower Manhattan Recovery Projects by coordinating the individual MPTs required and times for specific land uses and infrastructure (i.e. bus stops, transit stations, etc.).
Regular communication with New York City Department of Transportation and participation in its construction efforts.	PANYNJ will consult with NYCDOT to develop the MPT Plan for the Preferred Alternative. NYCDOT will be active in the development, update, and implementation of the TMP for the Lower Manhattan Recovery Projects.

Although the EPCs would help to reduce potential congestion and vehicular access problems during the construction period, project-generated vehicle trips would result in one construction period impact during the PM peak hour at the intersection of Route 9A and Liberty Street. A modest transfer of 5 seconds of green signal time from the Liberty Street approach to Route 9A would mitigate this adverse impact. PANYNJ will incorporate this mitigation into the Project's MPT Plan.

As described in the *Route 9A Project Draft Supplemental Environmental Impact Statement*, NYSDOT will lead in preparing a Traffic Management Plan (TMP) for the Lower Manhattan Recovery Projects. PANYNJ will coordinate with NYSDOT to ensure that the construction period traffic mitigation required for the Preferred Alternative is incorporated into the coordinated TMP. ✳

A. INTRODUCTION

This section discusses and describes the various public transportation services that were provided both pre- and post-September 11, 2001, the travel characteristics and volumes of public transportation users in and through the study area, and an analysis of effects of the No Action and Preferred Alternatives on the public transit network in the World Trade Center (WTC) area. The public transportation services that are described and analyzed in this section include New York City Transit (NYCT) subways, New Jersey Transit (NJ Transit) commuter rail, trans-Hudson ferries, and local and express bus service. Since PATH service was already described in Section 8A, it is not developed further in this section.

Public transit is the primary means of transportation to Lower Manhattan. Before September 11, 2001, the WTC was both a major trip generator and transit hub served by 11 NYCT subway lines (1, 2, 3, 4, 5, 9, A, C, E, N and R) and over five dozen bus lines, and was the terminus for two PATH train lines. In addition, almost 17,000 round-trip passengers prior to September 11, 2001 used trans-Hudson ferries within a few blocks of the WTC site.

The terrorist attacks radically altered the transit network in the WTC area. Most substantially, the terrorist attacks destroyed the WTC PATH Terminal and the Cortlandt Street Station on the 1 and 9 line, and forced the closing of the E line's WTC Station and the Cortlandt Street Station on the N and R line. It also destroyed the 1 and 9 subway tunnel traversing the WTC site, which prevented 1 and 9 local subway service south of Chambers Street and impacted both local and express service along the entire Seventh Avenue Line.

Without WTC/Lower Manhattan PATH service, many former PATH riders diverted primarily to one of three routes or travel modes:

- NJ Transit commuter rail to Penn Station-New York with a transfer to Lower Manhattan-bound NYCT subway service.
- Uptown-bound PATH trains to Christopher Street Station with a transfer to Lower Manhattan-bound NYCT subway or bus service.
- Trans-Hudson ferries.

The Preferred Alternative is not expected to induce PATH ridership beyond levels that would have occurred had the terrorist attacks not happened. Therefore, the Preferred Alternative would not generate additional ridership on NYCT subways, local or express bus service, NJ Transit commuter rail, or trans-Hudson ferries from transferring PATH riders.

In November 2003, the opening of the temporary WTC PATH station allowed for resumed PATH service to Lower Manhattan. The Preferred Alternative would replace and enhance the passenger capacity of the former WTC PATH Terminal destroyed on September 11, 2001 and the temporary WTC PATH station that was recently opened. In time, the demand for

transportation services would grow as the WTC site is redeveloped and other previously planned or anticipated development occurs in Lower Manhattan. A fully functioning PATH system would be a necessary component in the public transportation system and the overall transportation network for the region in order to accommodate increasing transit demand. As stated in the "Probable Impacts" section below, if the Preferred Alternative is not implemented, the operation of the overall transit network would be impacted. West-of-Hudson travelers would be especially affected as their commute would likely be more expensive and time-consuming, and may involve additional transfers when compared to their former PATH commute. It is anticipated that the No Action condition would result in travel patterns similar to those of the period between September 11, 2001 and the opening of the temporary PATH station. This analysis draws upon that period as a basis for assessing the No Action condition.

B. METHODOLOGY

The analyses begin with a description of transit services that were available both pre- and post-September 11, 2001. Transit services, including local/express buses, commuter rail, NYCT subways, and trans-Hudson ferries, are reviewed in terms of frequency and service area. Historical ridership data are also compared and analyzed. The current and historical, or "existing conditions," service and ridership information are then compared to the expected system operations and ridership once the Preferred Alternative would open in 2009, and to the Terminal's 2025 design year.

A line-haul analysis is included for NYCT subway lines operating in the WTC area, comparing the average passenger load of each subway car to its corresponding guideline and maximum capacities. The arrival load represents the volume on board as a train enters a station while the leave load compares the volume to the capacity of a train as it departs.

The evaluation of potential subway line-haul impacts indicates the extent to which crowding may occur. Generally, any increase in load levels that remains within the guideline capacity is not considered substantial. Projected increases to a build condition that exceeds guideline capacity may be considered adverse if the project generates five or more passengers per car.

Based on a comparison of PATH ridership estimates to pre-September 11, 2001 conditions, it is not anticipated that the Preferred Alternative would generate substantial new riders at subway stations or on local buses or ferries. Furthermore, the Preferred Alternative would generate fewer riders on these services than the No Action Alternative. Therefore, this chapter provides a qualitative assessment of the project's effects on subway station operations, local bus service, and ferries.

C. DESCRIPTION OF THE AFFECTED ENVIRONMENT

PRE-SEPTEMBER 11, 2001 BASELINE CONDITIONS

NYCT SUBWAY SERVICE

The majority of commuters accessing the WTC area used the NYCT subway system. Figure 8C-1 provides a pre-September 11, 2001 map of the NYCT subway system in the WTC area.

Table 8C-1 presents subway station usage for May 2001 for the five subway stations nearest the WTC site. Turnstile registrations, which are recordings of the number of people entering the system through each turnstile, are the most comprehensive source of data on subway ridership at

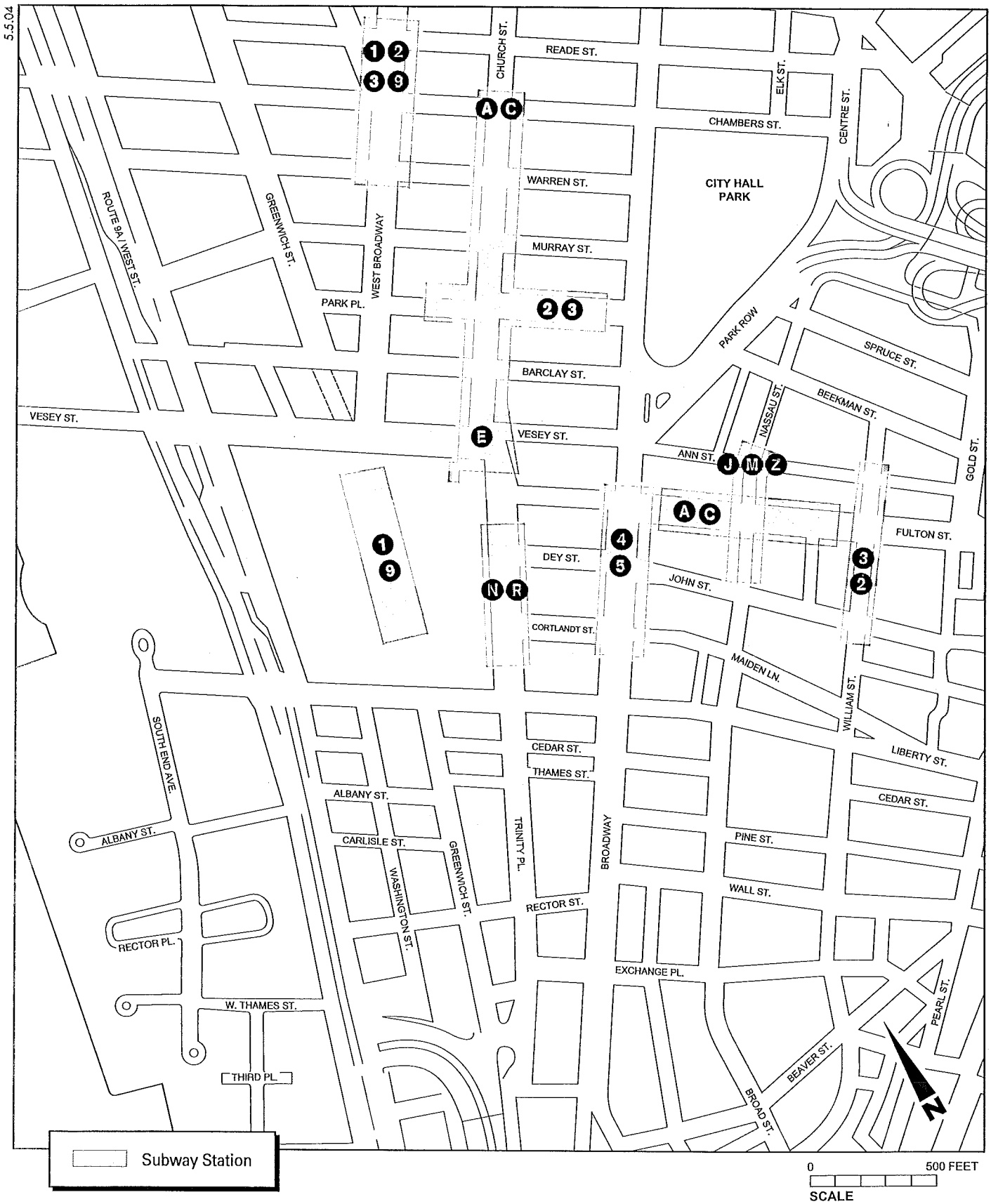


Figure 8C-1

Pre-September 11, 2001
Subway Station Locations

the station level. Although turnstile registrations provide a fair estimate of passenger boardings by station and time of day, comparable data is not available for passengers exiting each station. However, the patterns and magnitude of passenger flows can be assumed to be approximately the same during the morning peak period as during the evening peak given the high proportion of all trips that are related to commuting to work during the peaks. Thus, for example, according to Table 8C-1, 9,575 passengers entered the Cortlandt Street (1 and 9) Station between 4 PM and 7 PM, and approximately the same number of passengers would be expected to have exited the same station during the morning peak period.

Table 8C-1
Pre-September 11, 2001 (May 2001) Average Weekday Subway Turnstile Registration

Station	Routes	Time Period		
		6 AM – 9 AM	4 PM – 7 PM	24 Hour
Cortlandt Street	1, 9	1,569	9,575	19,446
Chambers Street	1, 2, 3, 9	1,219	5,880	17,432
Cortlandt Street	N, R	3,391	11,764	27,650
Fulton Street/Broadway-Nassau	A, C, J, M, Z, 2, 3, 4, 5	3,090	33,215	65,941
Chambers Street/ WTC/Park Place	A, C, E, 2, 3	3,949	28,742	62,713
Total		13,218	89,176	193,182

Source: New York City Transit

A subway line haul analysis was performed for the *WTC Memorial and Redevelopment Plan Generic Environmental Impact Statement (GEIS)*, using the *CEQR Technical Manual* guidelines for subway capacity, with ridership and subway data provided by NYCT. Volume to capacity (v/c) ratios were calculated for each subway line for the AM peak hour (8AM to 9AM). As shown in Table 8C-2, the southbound 5 train at Fulton Street operated above capacity with entering station v/c ratios of 1.36. The other subway lines that served the WTC area, including the 1 and 9 trains at Cortlandt Street, the N and R trains at Cortlandt Street, and the E train at WTC, operated well below capacity. The northbound 1 and 9 trains and the northbound 4 train had slightly higher leaving station v/c ratios compared with entering station v/c ratios, an indication that there was some reverse commuting from Lower Manhattan (i.e. passengers transferring from PATH and ferries).

LOCAL BUS SERVICE

The roles of local buses are to serve the immediate Lower Manhattan area and to connect it with various parts of Manhattan to the north and Downtown Brooklyn. Local bus routes are designed to collect and distribute passengers throughout the service area. All local bus routes operated during the weekdays and most provided weekend service. All public local bus routes were operated by NYCT and provided extensive service throughout Lower Manhattan. NYCT operated 12 local bus routes in Lower Manhattan including the M1, M1 Limited, M6, M9, M15 (South Ferry), M15 Limited (South Ferry), M15 (City Hall/Park Row), M15 Limited (City Hall/Park Row), M20, M22, M103, and B51.

Table 8C-2
Pre-September 11, 2001 (May 2001) Subway Line-Haul for WTC Area Stations

Station	Route	Direction	Peak Hour Capacity	Arrival Load		Leave Load	
				Volume	V/C	Volume	V/C
Cortlandt Street	1/9	Northbound	16,800	2,439	0.15	2,838	0.17
		Southbound	20,400	4,006	0.20	2,695	0.13
Park Place	2	Northbound	12,000	6,659	0.55	5,671	0.47
		Southbound	15,600	8,099	0.52	6,042	0.39
	3	Northbound	9,720	5,126	0.53	3,687	0.38
		Southbound	11,880	6,128	0.52	4,692	0.39
Fulton Street	4	Northbound	18,000	12,575	0.70	12,874	0.72
		Southbound	16,800	12,292	0.73	8,577	0.51
	5	Northbound	13,200	8,974	0.68	8,768	0.66
		Southbound	8,400	11,400	1.36	7,159	0.85
Broadway Nassau	A	Northbound	32,400	20,902	0.65	13,162	0.41
		Southbound	5,400	4,150	0.77	3,603	0.67
	C	Northbound	11,520	4,335	0.38	2,860	0.25
		Southbound	8,640	529	0.06	373	0.04
World Trade Center	E	Northbound	21,600	0	0.00	714	0.03
		Southbound	21,600	6,784	0.31	0	0.00
Cortlandt Street	N	Northbound	14,080	3,197	0.23	1,730	0.12
		Southbound	21,120	1,372	0.06	885	0.04
	R	Northbound	12,320	2,499	0.20	1,521	0.12
		Southbound	19,360	666	0.03	235	0.01

Source: *WTC Memorial and Redevelopment Plan Generic Environmental Impact Statement* (GEIS).

Since local buses operated with relatively short headways (less than 10 minutes) and made many stops, service was frequent throughout Lower Manhattan, particularly during weekday morning and afternoon peak periods. All local bus routes in the study area started/terminated in Lower Manhattan and connected with destinations in Midtown and Upper Manhattan with the exception of the B51, which operated between Lower Manhattan and Downtown Brooklyn via the Manhattan Bridge. The busiest local bus route in Lower Manhattan (and New York City) was the M15 (including limited-stop service), which typically served over 65,000 riders on an average weekday. The M15 was also the only bus route with two different terminal points in Lower Manhattan (South Ferry and Park Row/City Hall). The M15 and the M1 routes operated "limited stop" local service that skipped selected bus stops to provide faster service.

The closest local bus service to the WTC site was provided by the M1 from Harlem and M6 from Central Park South. These two bus routes traveled southbound along Broadway to South Ferry and northbound on Trinity Place/Church Street for their return trips uptown. Other nearby bus routes east of the WTC site included the M15 (Harlem), M103 (Harlem), and B51 (Downtown Brooklyn) routes, which all terminated at City Hall/Park Row (a 5-10 minute walk from the WTC site). West of the WTC, three local bus routes provided local service. The M22 traveled between Grand Street/FDR Drive on the Lower East Side via westbound Chambers Street to the World Financial Center at Vesey Street. On its eastbound trip, the M22 also passed along City Hall/Park Row. Terminating at Battery Park City were the M20 from Lincoln Center from the north and the M9 from Union Square, which approached from the south. Both bus

routes served the WTC site along Route 9A and South End Avenue. A map of each of the aforementioned local bus routes serving Lower Manhattan is provided in Figure 8C-2. Table 8C-3 presents the pre-September 11, 2001 data provided by NYCT on the average weekday bus ridership for the total length of these routes. This data was obtained from the Urban Planning and Transportation Study that was prepared in September 2002 by the Port Authority of New York and New Jersey (PANYNJ) and the Lower Manhattan Development Corporation (LMDC).

Table 8C-3
Pre-September 11, 2001 Average Weekday Local Bus Ridership

Route	Ridership
M1 & M1 Limited	19,080
M6	7,198
M9	5,015
M15 (all variations)	65,385
M20	5,150
M22	3,927
M103	15,402
B51	927
Total	122,084

Source: *Lower Manhattan and the World Trade Center Site: Urban Planning and Transportation Study* (PANYNJ and LMDC, September 2002)

EXPRESS BUS SERVICE

The role of express bus service in the study area is to serve commuters from communities generally outside of Manhattan, and to transport them to and from Lower Manhattan. A total of 36 express bus routes operated between Lower Manhattan and various parts of New York City (mostly the outer boroughs). These express bus routes operated on a limited schedule (usually during the morning and evening peak periods) and were designed to bring commuters from distant locations into Lower Manhattan in a quick and efficient manner. New York express bus routes utilized one of three travel corridors within Lower Manhattan—Broadway/Church Street, Route 9A, or Water Street.

NYCT operated the majority of New York City express bus routes to and from Lower Manhattan, including 20 routes from Staten Island and three routes each from Manhattan and Brooklyn. To many Staten Island commuters, these routes provided the only direct transit service to Manhattan other than the Staten Island Ferry. Staten Island express bus service was operated solely by NYCT and included the X3 and X4 buses, which terminated on Murray Street in Battery Park City; the X8, which terminated on Frankfort Street; the X11, X12A, X16, X17A and X19 buses, which terminated on Worth Street and Broadway; the X13, X15, X18 and X20 buses, which terminated on Water Street and Broad Street; and the X1, X6, X7, X9, X10, X12B, X14 and X17C buses, which stopped in Lower Manhattan but terminated elsewhere. NYCT also operated three express buses, X25, X90, and X92, to Lower Manhattan from Manhattan's East Side and three express routes from Brooklyn, the X27, X28 and X29.

There were ten other New York City express bus routes subsidized by the New York City Department of Transportation (NYCDOT) and operated by private bus companies. Command Bus Company operated five bus routes from Brooklyn (BM1, BM2, BM2S, BM3 and BM4). Queens Surface Corp. and Triborough Coach Lines each operated two bus routes from Queens

(QM1, QM1A, QM11 and QM24W). Liberty Lines Express operated one bus route from the Bronx (BxM18). A map of the express bus routes serving Lower Manhattan is provided in Figure 8C-3. Table 8C-4 presents the average weekday ridership for NYCT and NYCDOT subsidized express bus routes for pre-September 11, 2001.

Table 8C-4
Pre-September 11, 2001 Average Weekday Express Bus Ridership

Bus Route		Ridership
NYCT (Staten Island Routes)	X1	6,352
	X3	972
	X4	1,301
	X6	1,124
	X7	1,218
	X8	1,587
	X9	874
	X10	3,362
	X11	966
	X12	2,212
	X13 / X14	1,402
	X15	2,005
	X16	468
	X17A & X17C	3,807
	X18	605
	X19	1,356
	X20	201
	Total	29,812
NYCT (Manhattan Routes)	X25	147
	X26	No service
	X90	714
	X92	765
	Total	1,626
NYCT (Brooklyn Routes)	X27	3,963
	X28	4,141
	X29	657
	Total	8,761
Command Bus	BM1	2,459
	BM2	2,166
	BM3	1,872
	BM4	1,057
	Total	7,554
NYCDOT Franchise (Queens)	QM1/1A	1,888
	QM11	739
	QM24W	462
	Total	3,089
Liberty Lines Express	BxM18	335
Total Express Bus		51,177

Source: *Lower Manhattan and the World Trade Center Site: PANYNJ and LMDC Urban Planning and Transportation Study* (Beyer Blinder Belle, September 2002)

Although of lesser importance due to the volume of riders and frequency of operations, it should also be noted that NJ Transit operated two commuter bus routes (120 and 134), Westchester County Bee-Line operated one route (BXM4C), ten privately operated express bus routes served

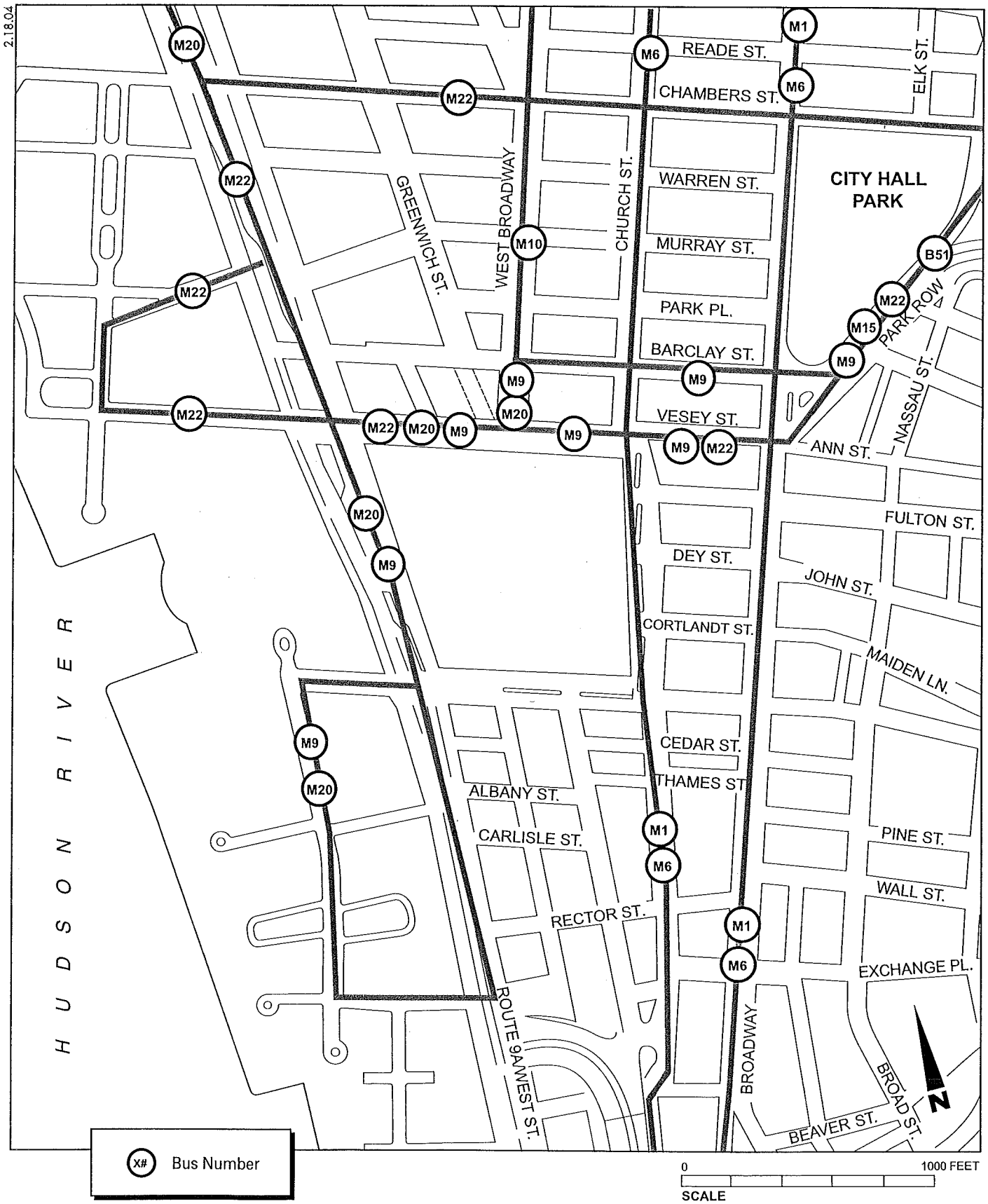


Figure 8C-2

Pre-September 11, 2001
Local Bus Routes

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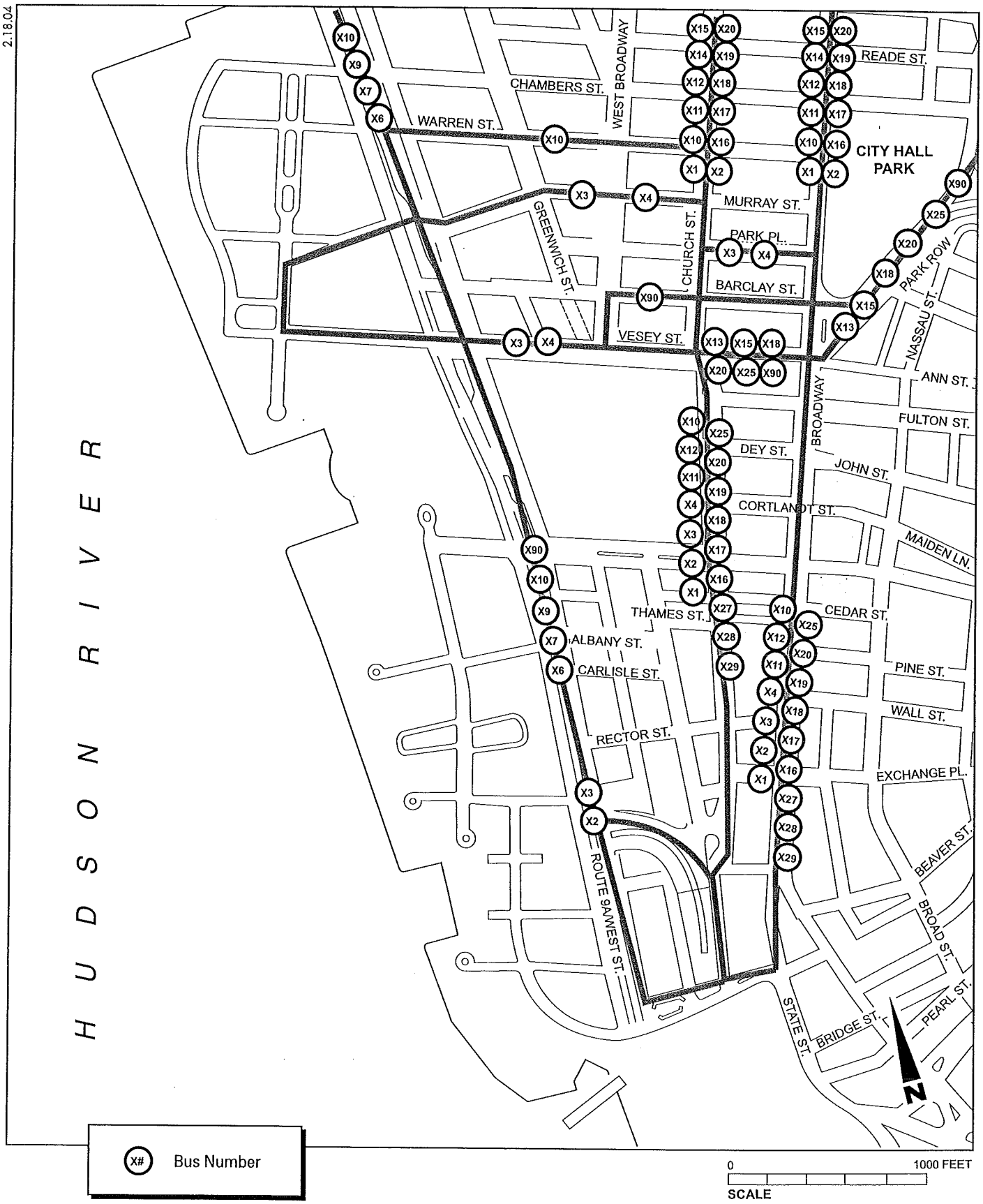

Figure 8C-3

Pre-September 11, 2001
Express Bus Routes

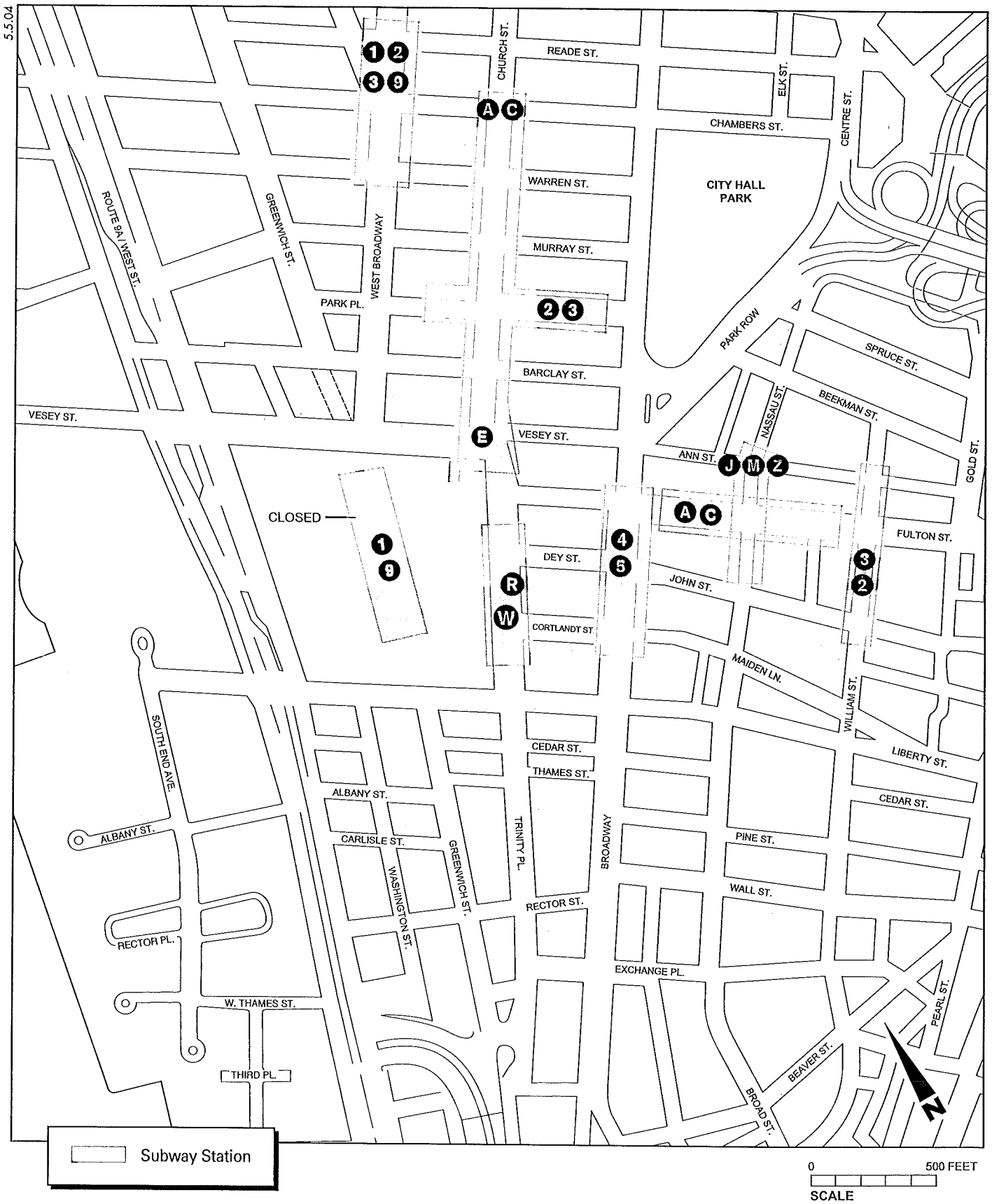

Figure 8C-4

Post-September 11, 2001
Subway Station Locations

suburban New Jersey communities, and two routes served Pennsylvania with Manhattan-bound morning peak period weekday service and outbound service during the evening peak period.

NEW JERSEY TRANSIT COMMUTER RAIL

Although NJ Transit commuter rail did not directly serve Lower Manhattan, many of its passengers used it in conjunction with PATH to do so. Prior to September 11, 2001, NJ Transit commuter rail passengers destined for Lower Manhattan would transfer to PATH service at either Newark or Hoboken depending on their particular line. Passengers on the Northeast Corridor, Raritan Valley, or North Jersey Coast Lines would transfer at Newark, while all other lines would transfer at Hoboken.

TRANS-HUDSON FERRIES

Prior to September 11, 2001, trans-Hudson ferry service was a small but growing part of the transportation network in Lower Manhattan consisting of almost 17,000 average weekday passengers. Table 8C-5 provides a listing of the various trans-Hudson ferry routes that served Lower Manhattan prior to the events of September 11, 2001. Table 8C-5 also indicates the average weekday ridership for each of these ferry routes.

Table 8C-5
Pre-September 11, 2001 Trans-Hudson Ferry Routes to Lower Manhattan

Manhattan Landing	New Jersey Landing	Operator	Average Weekday Ridership
World Financial Center	Colgate (Jersey City, NJ)	NY Waterway	1,572
	Harborside (Jersey City, NJ)		1,478
	Hoboken (NJ Transit Terminal)		8,970
	Liberty Harbor Marina		258
North Cove Marina	Liberty Landing Marina	Liberty Park Water Taxi	545
Pier 11	Atlantic Highlands, NJ	Seastreak	500
	Highlands, NJ	Seastreak	777
	Highlands, NJ	New York Fast Ferry	791
	Port Imperial (Weehawken, NJ)	NY Waterway	1,194
	Port Liberte, NJ	NY Waterway	835
Total Average Weekday Ridership			16,920

Source: *Lower Manhattan and the World Trade Center Site: PANYNJ and LMDC Urban Planning and Transportation Study* (Beyer Blinder Belle, September 2002)

CHANGES IN THE AFFECTED ENVIRONMENT SINCE SEPTEMBER 11, 2001

This section presents an overview of the various changes that were imposed on the WTC-area transit facilities and services due to the September 11, 2001 terrorist attacks. With the exception of the trans-Hudson ferries, the conditions described below do not reflect those after the temporary WTC PATH station was opened in November 2003. Following its opening, travel patterns to Lower Manhattan have begun to return to pre-September 11, 2001 conditions.

NYCT SUBWAY SERVICE

The NYCT subway system changed substantially as a result of September 11, 2001. Due to the destruction of the WTC concourse, which had been the principal point of access to the local Eighth Avenue (E) Subway Line WTC Station and the Broadway (N and R) Line's Cortlandt Street Station, these station facilities were immediately closed. Both of these subway stations were reopened, however, during the first half of 2002.

In addition, a portion of the Seventh Avenue Line (1 and 9) tunnel that traversed a portion of the WTC site was destroyed, severing the line and eliminating all service south of Chambers Street. Prior to the reconstruction and reopening of the damaged tunnel in September 2002, service along the entire Broadway Line was radically affected. Because of the need to continue to operate local service north of Chambers Street and the physical inability to turn back local trains at or south of Chambers Street, service was reconfigured to operate Seventh Avenue local trains through to Brooklyn. The 1 train operated as an all-stop local from the Bronx to New Lots Avenue, Brooklyn. The 9 train, which had previously provided rush-hour skip-stop service with the 1 train north of 137th Street, was discontinued. The 2 train retained its route, but operated as a local in Manhattan. The 3 train operated express between East 148th Street in Harlem to 14th Street. The resulting service provided considerably less express service in Manhattan and no connecting Manhattan express service from Brooklyn. Subway service at the southernmost stations in Manhattan on other subway lines, including the Eighth Avenue Express and Broadway Local lines, were increased to compensate in part for the loss of 1 and 9 service. Figure 8C-4 shows these NYCT subway system changes following September 11, 2001.

Since the reopening of the damaged 1 and 9 subway tunnel in September 2002, subway service along this Seventh Avenue Line has returned to pre-September 11, 2001 levels.

Table 8C-6 provides an overview of the average weekday subway ridership, measured in turnstile registrations, for May 2002. Subway ridership decreased substantially at the five stations that served the WTC site.

Table 8C-6
Post-September 11, 2001 (May 2002) Average Weekday Subway Turnstile Registration

Station	Time Period			Change (May 2001 to May 2002) 24-Hour Total	
	6-9 AM	4-7 PM	24 Hours	Ridership	Percent
Cortlandt Street (1/9)	0	0	0	-19,466	-100.0%
Chambers Street (1/2)	955	4,339	14,001	-3,431	-19.7%
Cortlandt Street (N/R)	0	0	0	-27,650	-100.0%
Fulton St./B'way-Nassau St. (1, 2, 4, 5, A, C, J, M, Z)	2,277	30,163	62,616	-3,325	-5.0%
Chambers St.-WTC/Park Pl. (1, 2, A, C, E)	1,380	14,202	33,705	-29,008	-46.3%
Total	4,612	48,704	110,322		
Ridership Change (May 2001 to May 2002)	-8,606	-40,472	-82,860		
Percent Change (May 2001 to May 2002)	-65.1%	-45.4%	-42.9%		

Source: New York City Transit

Table 8C-7 summarizes the post-September 11, 2001 subway line haul results for the six subway stations in the vicinity of the WTC site for 2003. Due to the loss of employment in and reduction of commuter trips to Lower Manhattan, subway ridership and passenger distribution to the area's subway stations have altered. For the most part, line-haul levels at affected stations were lower than pre-September 11, 2001.

Table 8C-7
Post-September 11, 2001 (May 2002) Subway Line-Haul for WTC Area Stations

Station	Route	Direction	Total Peak Hour Capacity	Trains Entering Station		Trains Leaving Station	
				Volume	V/C	Volume	V/C
Cortlandt Street	1/9	Northbound	Station closed following September 11, 2001				
		Southbound	Station closed following September 11, 2001				
Park Place	2	Northbound	10,800	6,149	0.57	5,614	0.52
		Southbound	13,200	8,077	0.61	7,188	0.54
	3	Northbound	9,720	3,897	0.40	3,121	0.32
		Southbound	10,800	4,883	0.45	3,856	0.36
Fulton Street	4	Northbound	15,600	9,574	0.61	10,603	0.68
		Southbound	15,600	9,092	0.58	6,939	0.44
	5	Northbound	13,200	7,165	0.54	7,681	0.58
		Southbound	14,400	8,963	0.62	6,320	0.44
Broadway Nassau	A	Northbound	32,400	16,979	0.52	11,338	0.35
		Southbound	16,200	4,844	0.30	4,279	0.26
	C	Northbound	11,520	3,446	0.30	2,325	0.20
		Southbound	8,640	457	0.05	319	0.04
World Trade Center	E	Northbound	21,600	0	0.00	83	0.00
		Southbound	21,600	4,774	0.22	0	0.00
Cortlandt Street	N	Northbound	12,320	2,442	0.20	1,726	0.14
		Southbound	10,560	72	0.01	29	0.00
	R	Northbound	12,320	1,794	0.15	1,421	0.12
		Southbound	15,840	835	0.05	445	0.03

Source: *WTC Memorial and Redevelopment Plan Generic Environmental Impact Statement* (GEIS).

UPTOWN PATH LINES

Following the destruction of the WTC PATH Terminal on September 11, 2001, many commuters diverted to PATH's Midtown Manhattan routes. Once in Manhattan, these passengers connected to NYCT subways to reach destinations in Lower Manhattan. As a result, ridership at PATH's Christopher Street Station doubled from approximately 4,000 to 8,000 daily riders.

As a direct result of the dramatic increase in passengers exiting the Christopher Street PATH station in the morning, which has only one entry/exit location and narrow platforms, PANYNJ barred passengers from entering this station on weekdays from 7:00 to 9:45 AM. In addition, trains operating from Journal Square and Hoboken to 33rd Street did not stop at Christopher Street on weekdays from 4:30 to 7:00 PM.

LOCAL BUS SERVICE

Following September 11, 2001, NYCT's 12 local bus routes, which included the M1, M1 Limited, M6, M9, M15 (South Ferry), M15 Limited (South Ferry), M15 (City Hall/Park Row), M15 Limited (City Hall/Park Row), M20, M22, M103 and B51, continued to operate, albeit with some modifications to route and stop locations due to WTC-related street closings. Figure 8C-5 provides a map of these local bus routes following September 11, 2001.

The collective total ridership along the total length of these routes did not change substantially following September 11, 2001. Specific ridership data for the Lower Manhattan portion of these routes are not available, however. Table 8C-8 presents a comparison of pre- and post-September 11, 2001 average weekday bus ridership for the total length of these local routes.

Table 8C-8
Pre- and Post-September 11, 2001 Average Weekday Local Bus Ridership

Route	Pre-September 11, 2001	Post-September 11, 2001	Percent Change
M1 & M1 Limited	19,080	18,920	-0.8%
M6	7,198	7,089	-1.5%
M9	5,015	4,114	-18.0%
M15 (all variations)	65,385	65,422	0.1%
M20	5,150	6,172	19.8%
M22	3,927	3,679	-6.3%
M103	15,402	15,733	2.2%
B51	927	898	-3.1%
Total	122,084	122,027	-0.1%

Source: *Lower Manhattan and the World Trade Center Site: PANYNJ and LMDC Urban Planning and Transportation Study*

EXPRESS BUS SERVICE

Express bus service continues to operate much as it did prior to September 11, 2001. In addition to routing changes and bus stop relocations in Lower Manhattan due to street closings, the only other changes to NYCT express bus service involved the elimination of the X14 route from Staten Island and the implementation of a new route (X26) between Penn Station-New York and Battery Park City. Figure 8C-6 provides a map of the NYCT and NYCDOT-subsidized express bus routes following September 11, 2001.

Table 8C-9 presents a comparison of pre- and post-September 11, 2001 average weekday ridership for NYCT and NYCDOT-subsidized express bus routes. As shown, ridership fell on the majority of these routes. Overall, express bus ridership decreased by about 2 percent.

Express bus ridership to Lower Manhattan decreased about 3 percent in total on the express bus services provided by NJ Transit (120 and 134), Westchester County Bee-Line (BXM4C), and the privately operated express bus routes serving suburban New Jersey (11 routes) and Pennsylvania (two routes), despite the addition of one new route provided by Academy Bus between Hoboken and Lower Manhattan.

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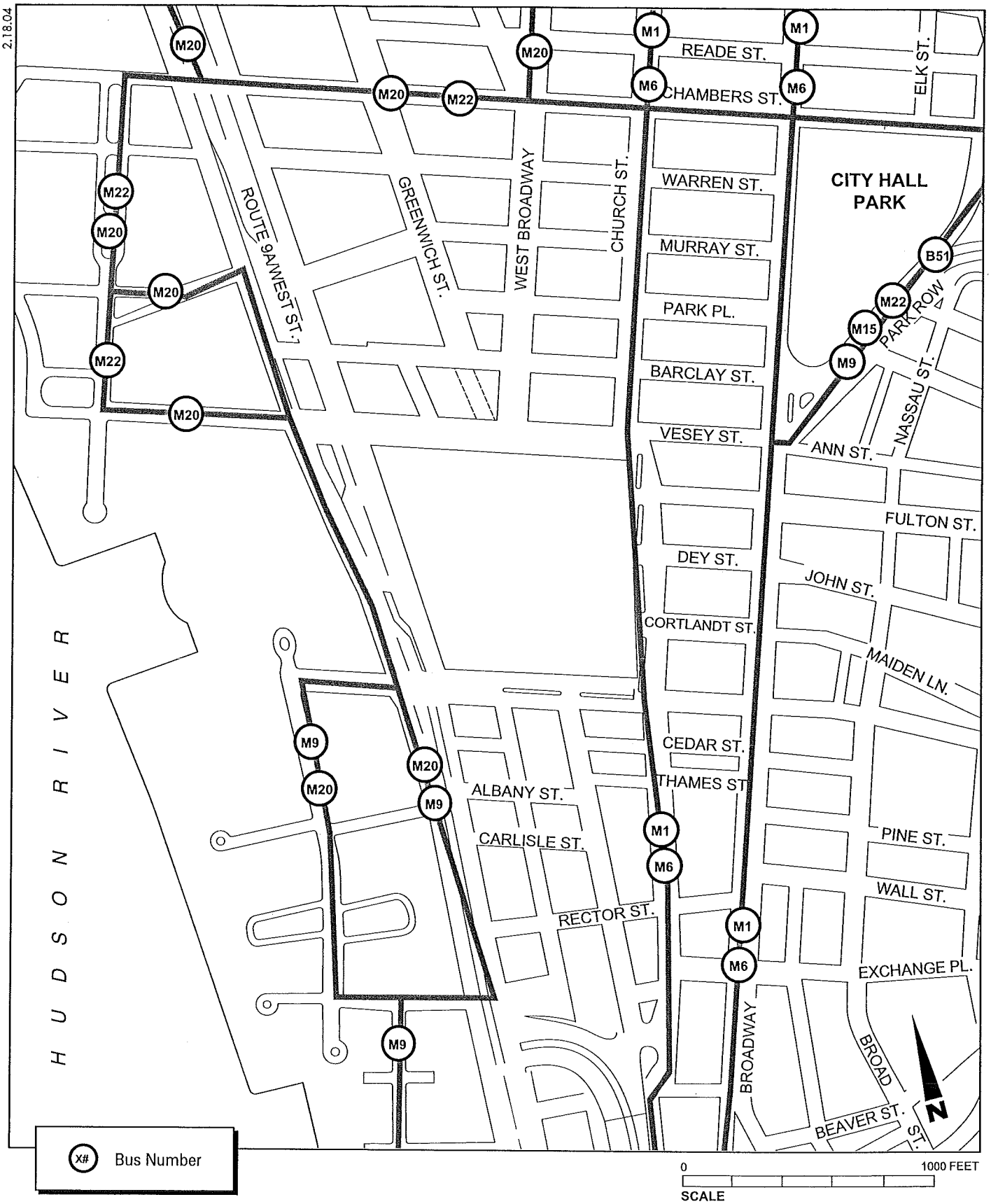

Figure 8C-5

Post-September 11, 2001
Local Bus Routes

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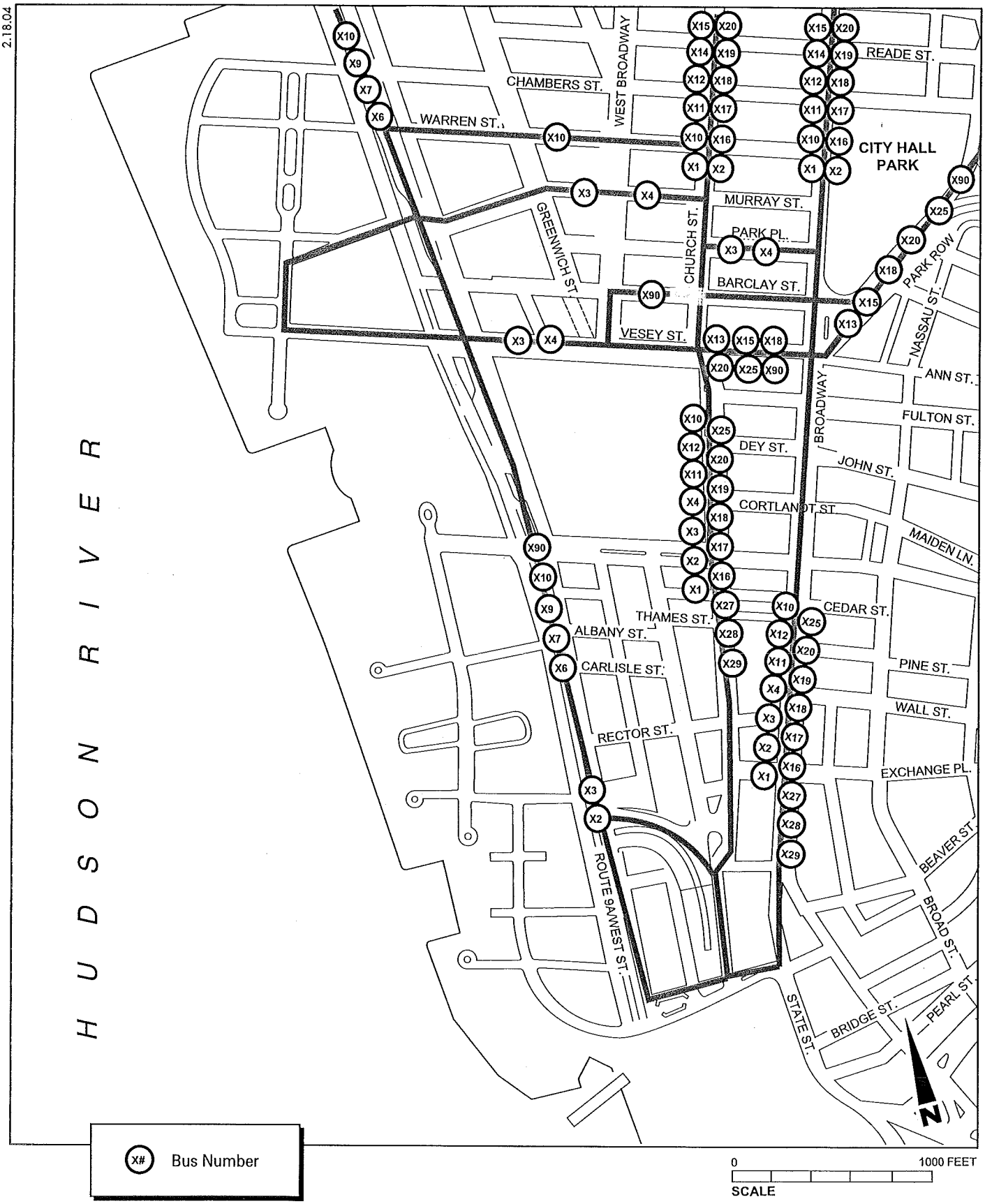

Figure 8C-6

Post-September 11, 2001 NYCT and NYCDOT Subsidized Express Bus Routes

Table 8C-9

Pre- and Post-September 11, 2001 Average Weekday Express Bus Ridership

Bus Route		Pre-September 11, 2001	Post-September 11, 2001	Percent Change
NYCT (Staten Island Routes)	X1	6,352	6,003	-5.5%
	X3	972	769	-20.9%
	X4	1,301	1,263	-2.9%
	X6	1,124	1,023	-9.0%
	X7	1,218	990	-18.7%
	X8	1,587	1,577	-0.6%
	X9	874	842	-3.7%
	X10	3,362	3,289	-2.2%
	X11	966	944	-2.3%
	X12	2,212	2,159	-2.4%
	X13 / X14	1,402	1,458	4.0%
	X15	2,005	1,653	-17.6%
	X16	468	510	9.0%
	X17A & X17C	3,807	4,752	24.8%
	X18	605	574	-5.1%
	X19	1,356	1,215	-10.4%
	X20	201	111	-44.8%
	Total	29,812	29,132	-2.3%
NYCT (Manhattan Routes)	X25	147	25	-83.0%
	X26	No service	189	100.0%
	X90	714	594	-16.8%
	X92	765	483	-36.9%
	Total	1,626	1,291	-20.6%
NYCT (Brooklyn Routes)	X27	3,963	4,242	7.0%
	X28	4,141	4,426	6.9%
	X29	657	717	9.1%
	Total	8,761	9,385	7.1%
Command Bus	BM1	2,459	2,448	-0.5%
	BM2	2,166	1,981	-8.5%
	BM3	1,872	1,852	-1.1%
	BM4	1,057	1,013	-4.2%
	Total	7,554	7,294	-3.4%
NYCDOT Franchise (Queens)	QM1/1A	1,888	1,811	-4.1%
	QM11	739	605	-18.1%
	QM24W	462	294	-36.4%
	Total	3,089	2,710	-12.3%
Liberty Lines Express	BxM18	335	333	-0.6%
Total Express Bus		51,177	50,145	-2.0%

Source: *Lower Manhattan and the World Trade Center Site: PANYNJ and LMDC Urban Planning and Transportation Study*

NJ TRANSIT COMMUTER RAIL

Following the events of September 11, NJ Transit commuter rail services to New York City increased by approximately 30 percent, requiring additional trains on its routes serving New York's Penn Station. Although this additional capacity could accommodate the demand generated by the absence of PATH service to Lower Manhattan, it precluded certain service enhancements planned for the NJ Transit system.

For example, NJ Transit completed construction of the Secaucus Transfer, which provides a link between the Northeast Corridor line serving Penn Station and the Main and Bergen County lines that serve Hoboken. Prior to its opening, passengers on several NJ Transit commuter rail lines would travel to Hoboken and then connect to PATH trains or ferries to access Midtown Manhattan. With the Secaucus Transfer, these passengers can now connect to Penn Station-bound commuter trains, resulting in a shorter commute time. Although the project was completed in summer of 2003, its full opening was delayed until the opening of the temporary WTC PATH station because NJ Transit could not support the increased ridership associated both with diverted PATH passengers and the Secaucus Transfer.

TRANS-HUDSON FERRIES

Following the events of September 11, 2001, demand for ferry service between New Jersey and the WTC area increased by about 164 percent to almost 45,000 average weekday riders, using June 2002 ridership totals. Ferry operators rushed to respond to this demand by implementing increased peak hour service and new routes. To provide for these new services, ferry operators placed orders for over 20 new vessels, and chartered numerous fishing, whale watching, and sightseeing boats to augment capacity in the interim.

Table 8C-10 provides a list of the post-September 11, 2001, trans-Hudson ferry routes serving Lower Manhattan. In addition, Table 8C-10 indicates the average weekday ridership for each of these ferry routes and the percent change for each route from pre-September 11, 2001 levels.

Immediately following September 11, 2001, the World Financial Center ferry terminal was closed to the general public, and the Colgate, Harborside, Hoboken, and Liberty Harbor Marina services using this facility were rerouted to Pier 11 on the East River. The World Financial Center ferry terminal continued to play a key role by accommodating special charter ferries that provided the only access to the New York Mercantile Exchange in the weeks after it reopened on September 17th. This role expanded throughout the fall as other firms located at the World Financial Center contracted similar charter services for their employees.

With most ferry services between New Jersey and Lower Manhattan consolidated at Pier 11, the capacity of this terminal was soon proved inadequate for the high level of demand. Between September 11 and September 17, 2001, two additional barges were installed bringing the total number of slips at this facility to ten, but severe crowding continued.

In response, PANYNJ developed a new ferry terminal adjacent to Pier A on the west side of Battery Park. This facility consisted of a barge with a covered passenger waiting area and six slips. On November 5, 2001, all NY Waterway ferries from Hoboken and Harborside were diverted from Pier 11 to Pier A, as were the ferries serving the Liberty Landing Marina. This shortened the length of these routes, thereby reducing travel times and allowing an increase in service frequency. Limited service to the World Financial Center terminal from Hoboken South and Colgate was also restored at this time.

Table 8C-10
Comparison of Pre- and Post-September 11, 2001 (June 2002) Trans-Hudson Ferry Ridership to Lower Manhattan

Manhattan Landing	New Jersey Landing	Operator	Net Change	
			Riders	Percent
World Financial Center	Colgate (Jersey City, NJ)	NY Waterway	4,626	194%
	Harborside (Jersey City, NJ)		0	-100%
	Hoboken (NJ Transit Terminal)		6,924	-23%
	Liberty Harbor Marina		0	-100%
	Pier 11 Shuttle Service		86	N/A
	Port Imperial (Weehawken, NJ)		0	N/A
North Cove Marina	Liberty Landing Marina	Liberty Park Water Taxi	0	-100%
Pier A	Colgate (Jersey City, NJ)	NY Waterway	2,423	N/A
	Hoboken (NJ Transit Terminal)	NY Waterway	9,774	N/A
	Liberty Landing Marina	Liberty Park Water Taxi	472	N/A
	Pavonia/Newport (Jersey City, NJ)	NY Waterway	2,846	N/A
Pier 11	Atlantic Highlands, NJ	Seastreak	796	59%
	Colgate (Jersey City, NJ)	NY Waterway	3,502	N/A
	East River Shuttle Service	NY Waterway	57	N/A
	Highlands, NJ	New York Fast Ferry	764	-3%
	Highlands, NJ	Seastreak	1,384	78%
	Hoboken (NJ Transit Terminal)	NY Waterway	6,378	N/A
	Keyport, NJ	New York Fast Ferry	152	N/A
	Liberty Harbor Marina	NY Waterway	1,320	N/A
	Port Imperial (Weehawken, NJ)	NY Waterway	1,748	46%
	Port Liberte, NJ	NY Waterway	660	-21%
	South Amboy, NJ	Seastreak	634	N/A
	World Financial Center Shuttle	NY Waterway	86	N/A
Total Average Weekday Ridership			44,632	164%

Notes: Pier A opened on November 5, 2001.
Source: *Lower Manhattan and the World Trade Center Site: PANYNJ and LMDC Urban Planning and Transportation Study* (Beyer Blinder Belle, September 2002)

Prior to the opening of the temporary WTC PATH station, trans-Hudson ferry services were distributed among three Lower Manhattan facilities: World Financial Center, Pier A, and Pier 11. Ferry service from the Jersey City communities of Colgate and Harborside were accommodated at Pier 11 on the east side of Manhattan. Colgate ferries also called at the World Financial Center with Harborside ferries calling at Pier A. Hoboken South ferries provided service to all three Lower Manhattan landings. The Newport service operated to Pier A exclusively, while ferries from the Liberty Landing Marina in Jersey City served Pier A and the North Cove Marina at Battery Park City. The Liberty Harbor Marina ferry served Pier 11. The ferries from Port Liberte and Port Imperial (Weehawken) continued to call at Pier 11. Direct service was also provided between Weehawken and the World Financial Center.

Of the ferry landings in Manhattan, Pier 11 on the East River saw the greatest increase in demand since September 11, 2001. Using June 2002 ridership data, passengers using this facility averaged more than 17,600 on a typical weekday, a nearly 300 percent increase over pre-September 11, 2001 levels. Much of this increase is attributable to the introduction to this facility of routes serving landings in Jersey City, Hoboken, and South Amboy, New Jersey. The ferry service to and from NJ Transit's Hoboken Terminal (Hoboken South) was the most heavily patronized of the services calling at Pier 11 with an average weekday ridership of almost 6,400 passengers, followed by the Colgate, Jersey City, route with 3,500. Both of these routes were implemented post-September 11, 2001. The ferry service at Port Imperial in Weehawken, previously the most heavily patronized Pier 11 service, experienced a 46 percent increase in ridership to about 1,750 passengers. Ridership on Seastreak's Highlands and Atlantic Highlands, New Jersey, runs also showed marked increases of 78 percent and 59 percent, respectively. Contrary to this trend has been the Port Liberte service, which experienced a 21 percent decrease in ridership from pre-September 11, 2001 levels.

When the temporary WTC PATH station reopened in November 2003, trans-Hudson ferry ridership decreased substantially. In response to this drop in demand, the Pier A ferry landing in Lower Manhattan was decommissioned and several ferry routes were discontinued. Figure 8C-7 provides a map of current trans-Hudson ferry service routes.

As shown in Table 8C-11, ridership on an average weekday during this period was 27,197 passengers. This was approximately a 61 percent decrease from ridership levels experienced in June 2002, prior to the opening of the temporary WTC PATH station. However, when compared to pre-September 11, 2001 ridership levels of 16,920 average weekday passengers, this was an increase of almost 61 percent despite the fact that lower ridership levels are typical of ferries during the winter months when the most recent data was obtained.

Table 8C-11

Trans-Hudson Ferry Ridership with Temporary PATH Service (January 2004)

Manhattan Landing	New Jersey Landing	Average Weekday Ridership
World Financial Center	Colgate (Jersey City, NJ)	2,520
	Hoboken (NJ Transit Terminal)	4,759
	Port Imperial (Weehawken, NJ)	363
North Cove Marina	Liberty Landing Marina	646
Pier 11	Atlantic Highlands, NJ	872
	Colgate (Jersey City, NJ)	1,609
	Highlands, NJ	1,184
	Belford, NJ	2,021
	Hoboken (NJ Transit Terminal)	7,191
	Newport, NJ	826
	Liberty Harbor Marina	1,605
	Port Imperial (Weehawken, NJ)	1,547
	Port Liberte, NJ	753
	South Amboy, NJ	660
	Harborside (Jersey City, NJ)	641
Total Average Weekday Ridership		27,197

Note: Data represents average weekday ridership from January 5, 2004 through January 9, 2004.
Source: New York City Department of Transportation, Office of Private Ferries (January 2004)

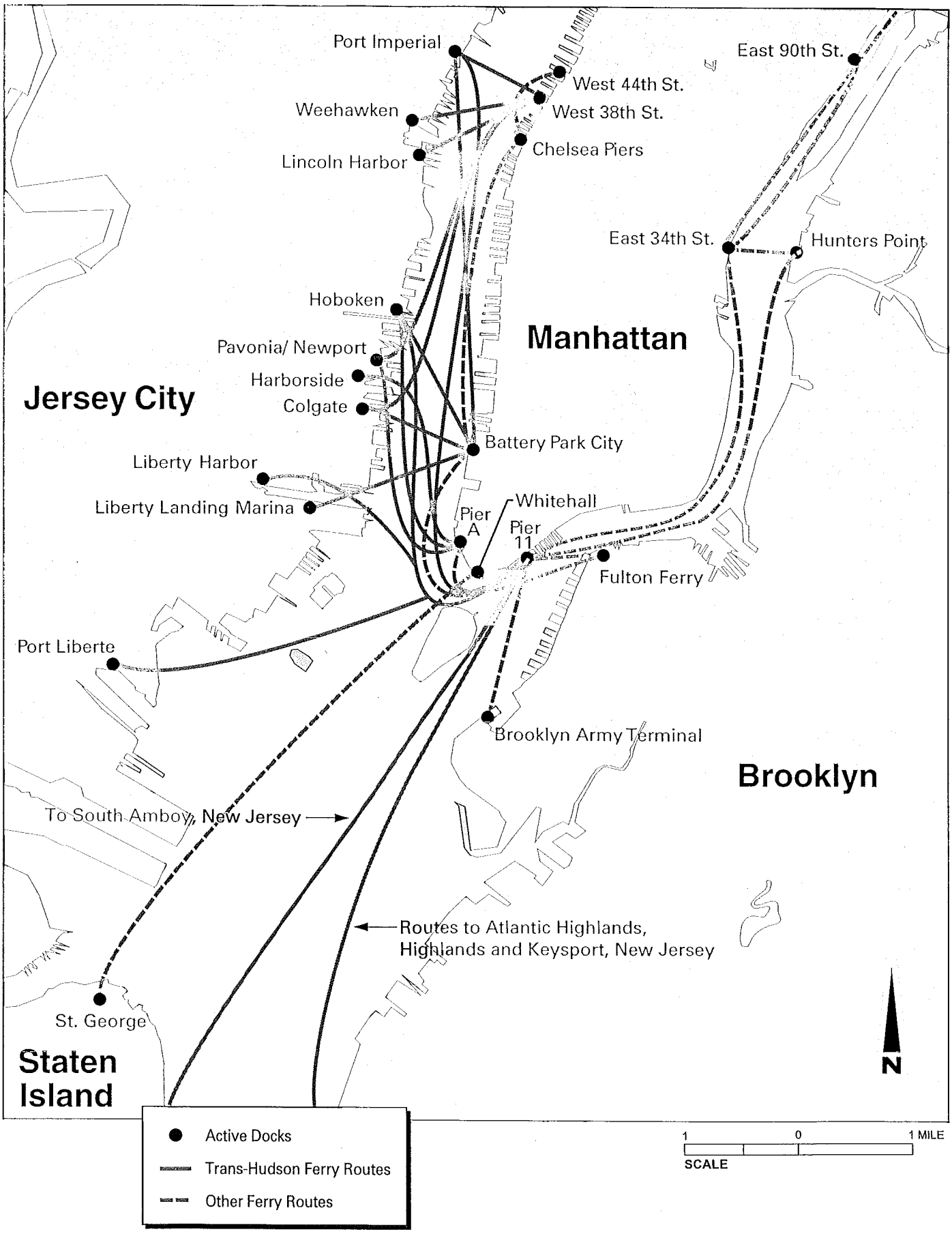

Figure 8C-7

Post-September 11, 2001 (June 2003) Trans-Hudson Ferry Routes

D. PROBABLE IMPACTS OF THE PROJECT ALTERNATIVES

CONSTRUCTION PERIOD (2006)

FUTURE COMMON TO ALL ALTERNATIVES

During the construction period of the Preferred Alternative, other transit projects would be under development in the study area, including the Fulton Street Transit Center, South Ferry Terminal, and Cortlandt Street Station. It is expected that these projects would open prior to or concurrent with the Permanent WTC PATH Terminal such that all of these facilities would be operational in 2009. However, a new World Financial Center Ferry Terminal, which is independent of the Preferred Alternative, is expected to be fully operational in 2005.

PANYNJ is constructing a new ferry terminal at the World Financial Center. Located on the Hudson River at the foot of Vesey Street, the new terminal will replace the existing, temporary facility adjacent to the Winter Garden. The new terminal has the capacity to berth a maximum of five vessels (four end loading and on side loading vessels). The terminal public space is designed to handle two full boat loads of 400 arriving passengers (800 total) and half a boat load of departing passengers (200 total) at any given time. The floating terminal will have a fabric roof, glass walls, restrooms, ticket booth and a concession area. Construction is expected to be completed by the end of 2005.

NO ACTION ALTERNATIVE

The temporary WTC PATH station was designed to accommodate anticipated passenger volumes through the construction period, years 2005 to 2008. If the Preferred Alternative is not undertaken, the temporary WTC PATH station would continue to provide access to Lower Manhattan for PATH passengers during these years. Therefore, the No Action Alternative would not impact transit passengers, which include users of local and express buses, commuter rail, commuter vans, NYCT subways, and ferries, during the construction period.

PREFERRED ALTERNATIVE

The construction of the Preferred Alternative is expected to induce a modest amount of construction-related roadway traffic to the area above the volume of construction vehicles associated with the rebuilding of the WTC itself and other projects in the area. This construction activity may lead to temporary closing, re-alignment, or narrowing of sidewalks and pedestrian passageways used to access subway station entrances/exits in the immediate area, specifically to the R and W line's Cortlandt Street Station and the E line's WTC Station. At no time, however, would any area subway station be completely closed due to construction activities. A Maintenance and Protection of Traffic (MPT) plan, which would include pedestrian traffic, would be in place during the construction period. Otherwise, no construction-related impacts are anticipated for NYCT subway riders or operations.

Construction-related activity may also require the temporary relocation or closing of bus stops and/or layover locations in the vicinity of the WTC site as well as the closing, re-alignment or narrowing of sidewalks used to access some bus stops. Construction-related traffic may thus modestly impact bus operations in the immediate area.

Construction activity associated with the Preferred Alternative is not anticipated to impact ferry riders or operations.

OPENING YEAR (2009)

FUTURE COMMON TO ALL ALTERNATIVES

In addition to their planning for a Permanent WTC PATH Terminal, PANYNJ is planning to implement improvements elsewhere on the PATH system as described in Chapter 8, Section A, "PATH". In addition, other transit agencies are planning projects that will collectively improve access to, from, and within Lower Manhattan by the 2009 opening year. These current proposals are described below.

Fulton Street Transit Center

The Fulton Street Transit Center will rehabilitate, reconfigure, and enhance the multilevel complex of subway stations in the area of Fulton Street, Nassau Street, and Broadway, and will provide new connections to stations on Church Street. The project will improve platforms, mezzanines, and connecting corridors, and will provide a new central concourse with an above-grade presence. The facility has a below-grade concourse connection to NYCT's R and W station at Cortlandt Street and the Preferred Alternative's lower concourse. The Fulton Street Transit Center is projected for completion by 2009.

Cortlandt Street Station Reconstruction

MTA will reconstruct the Cortlandt Street Station on the 1 and 9 line, which has been closed since the terrorist attacks. It is expected that the Cortlandt Street Station will reopen in 2009.

South Ferry Terminal

The MTA will reconstruct the existing South Ferry Subway Station into a new terminal that will eliminate the physical and operational deficiencies of the existing station, improve reliability of 1/9 service along either line, and improve intermodal connectivity with other transit services in its vicinity. South Ferry is the southern terminus of the NYCT 1 and 9 subway lines, which serve the full length of the west side between South Ferry and 242nd Street in the Bronx. The South Ferry Terminal will consist of two levels: the lower level will contain two transit tracks serving a single-island platform, and the upper level will house the fare-control mezzanine and a connection to the Whitehall Street Station of the R and W subway lines. Construction on the project is anticipated to commence in 2005, with a completion in late 2007.

Hudson-Bergen Light Rail

In 2005, NJ Transit plans to open Minimum Operating Segment (MOS) 2 of the Hudson-Bergen Light Rail system. This segment will extend service from Hoboken Terminal to the Tonnelle Avenue Park-and-Ride in North Bergen, New Jersey. NJ Transit and FTA are also preparing an Environmental Impact Statement for MOS3 of the HBLR, which would extend service south in Bayonne from 22nd Street to 8th Street and north from Tonnelle Avenue to a terminus in Tenafly. It is anticipated that the MOS3 will be completed before 2025.

The HBLR has transfers to the PATH system at Hoboken and Exchange Place. As the expansions are completed, it is anticipated that some commuters would use HBLR and PATH for their travel to Lower Manhattan. It is expected that these commuters would primarily divert from private automobiles or from NJ Transit commuter rail and buses. As noted in Chapter 8, Section A, "PATH," the PATH ridership projections include these potential diversions.

NO ACTION ALTERNATIVE

If the Preferred Alternative is not constructed, it is expected that the temporary WTC PATH station presently operating would continue service in the opening year. Although its current transit connections would be retained, it is not expected that the temporary station would be directly linked to the reconstructed Cortlandt Street Station (1 and 9 line) or the completed Fulton Street Transit Center.

PREFERRED ALTERNATIVE

No impacts to transit riders or operations (subway, bus, or ferry) are expected once the Preferred Alternative is fully operational in 2009. The Preferred Alternative is not expected to induce PATH ridership beyond levels that would have occurred had the terrorist attacks not happened. Therefore, this alternative would not generate additional unforeseen ridership on NYCT subways, local or express bus service, NJ Transit commuter rail, or trans-Hudson ferries from transferring PATH riders.

The Preferred Alternative would provide greater passenger capacity than the temporary WTC PATH station currently in service, comparable to the former WTC PATH Terminal. This additional PATH capacity would serve to alleviate crowding on complementary transit services such as trans-Hudson ferry and bus service and downtown-bound subway service from Penn Station-New York.

The Preferred Alternative would provide weather-protected and ADA-compliant pedestrian connections between the PATH rail system, the NYCT subway system, and to area buildings, and would provide more convenient access to trans-Hudson ferries.

DESIGN YEAR (2025)

FUTURE COMMON TO ALL ALTERNATIVES

Transportation and transit infrastructure, in particular, are a key component of the redevelopment plans for Lower Manhattan. Several projects are currently being studied or planned that would improve existing facilities and would provide for new routes to serve the area. In addition to the projects described above for the construction period and the opening year as well as PATH system improvements shown in Chapter 8, Section A, "PATH" and above, two new facilities would be completed by 2025.

Second Avenue Subway

The Metropolitan Transportation Authority (MTA) plans to construct a new subway line along Manhattan's east side from 125th Street to Hanover Square. In the vicinity of the Project Site, the Second Avenue Subway would follow Water Street with a station located at Fulton Street. FTA issued a Record of Decision for the Second Avenue Subway in 2004.

JFK Airport Access

LMDC, MTA, PANYNJ, and the New York City Economic Development Corporation undertook a transportation study to identify a feasible rail link that will 1) serve Long Island commuters by creating a direct connection between Lower Manhattan and the Long Island Rail Road's Jamaica station, and 2) serve JFK airport passengers by improving the connection between Lower Manhattan and JFK International Airport. The study identified two leading

options: Constructing a New Tunnel across the East River, and utilizing the existing MTA-NYCT's Montague Tunnel which currently serves the M and R subway services. The proposed Lower Manhattan terminal for this rail service would be connected to the Fulton Street Transit Center and the Permanent WTC PATH Terminal. The rail access to JFK will be undertaken as a separate action from this project and will undergo an independent environmental review.

NO ACTION ALTERNATIVE

By 2025 under the No Action Alternative, the temporary WTC PATH station would close and service between New Jersey and Lower Manhattan would be suspended. Thus, WTC-bound PATH passengers would be diverted to other modes of travel. Given this worst case scenario, 153,632 projected weekday WTC PATH Terminal users in design year 2025 would divert to other modes of public transportation to access Lower Manhattan, and 27,551 passengers would divert during the AM peak hour. The majority of these commuters would require a more expensive and time-consuming commute, potentially involving additional transfers, than if the Preferred Alternative were operational. Table 8C-12 provides projected weekday and AM peak hour diversions for each available mode of public transportation for the year 2025.

Although current trans-Hudson buses and commuter vans are operating at or near capacity during peak hours, added capacity may be obtained through the purchase and operation of additional vehicles, as was noted above for the opening year condition. The impact of these additional buses and vans to the roadway network are described further in Chapter 8, Section B.

The passenger capacity of ferries may also be increased through the operation of additional boats or larger boats. Port infrastructure would likely need to be expanded to accommodate the demand for ferry services.

During the AM peak hour, the NYCT subway system would be required to serve over 11,000 added passengers. As discussed earlier in this section, the subway system contains available line-haul capacity to accommodate passengers transferring from NJ Transit commuter rail, PABT-bound buses, and Midtown Manhattan PATH passengers.

Table 8C-12
2025 No Action Alternative: Diversions to Public Transportation without the Permanent WTC PATH Terminal

Mode	Diverted Weekday Passenger Trips	Diverted AM Peak Hour Passenger Trips
Bus to Lower Manhattan	33,961	6,090
Bus to PABT / NYCT Subway	8,086	1,450
Commuter Railroad / NYCT Subway	29,109	5,220
Commuter Van	1,617	290
Ferry	56,601	10,150
Uptown PATH / NYCT Subway	24,258	4,350
Total	153,632	27,551

Notes: The "Diverted Weekday Passenger Trips" are considered conservative estimates since they are derived using the projected number of trips anticipated for the Permanent WTC PATH Terminal. Without this investment in public transportation infrastructure, the number of trips to Lower Manhattan from west-of-Hudson locations would be somewhat less.

The No Action Alternative, on the other hand, would severely impact NJ Transit commuter rail services. During the AM peak hour, the system would be required to accommodate an additional 5,220 passengers, in addition to the ridership growth that NJ Transit would have already experienced. Severe crowding during the AM and PM peak periods would be commonplace. Train throughput would also be impacted as trains would require longer dwell times for passengers to board and alight.

In addition, although upgrades are planned for the Ninth Street PATH station, it will not have adequate capacity to support general system growth if the Preferred Alternative is not constructed.

PREFERRED ALTERNATIVE

No impacts to transit riders or operations (subway, bus, or ferry) are expected in the design year. The Preferred Alternative is not expected to induce PATH ridership beyond levels that would have occurred had the terrorist attacks not happened. Therefore, this alternative would not generate additional unforeseen ridership on NYCT subways, local or express bus service, NJ Transit commuter rail, or trans-Hudson ferries from transferring PATH riders.

The Preferred Alternative would provide greater passenger capacity than the temporary WTC PATH station currently in service, comparable to the former WTC PATH Terminal. This additional PATH capacity would serve to alleviate crowding on complementary transit services such as trans-Hudson ferry and bus service and downtown-bound subway service from Penn Station-New York.

The Preferred Alternative would provide weather-protected and ADA-compliant pedestrian connections between the PATH rail system, the NYCT subway system, and to area buildings, and would provide more convenient access to trans-Hudson ferries.

E. MITIGATION

The Preferred Alternative would not adversely impact the operation of other transit service to, from, and within Lower Manhattan. Since the Preferred Alternative would provide for enhanced PATH service and improved connectivity to other modes, any impacts to transit service would be beneficial. Thus, mitigation is not required. ✷

A. INTRODUCTION

This section describes on-street pedestrian conditions in the vicinity of the World Trade Center (WTC) site to identify whether the Permanent WTC PATH Terminal would adversely impact conditions in the area. The analyses that follow provide an overview of existing conditions, both before and after September 11, 2001, in order to establish a baseline from which future conditions are developed and can be compared. Pre-September 11, 2001 volumes were used to evaluate opening year (2009) and design year (2025) impacts. Conditions during the construction period (2006) are estimated based on current (post-September 11, 2001) activities.

The analyses focus on a pedestrian study area and representative intersections at which increases in congestion could occur as a result of the Terminal's construction or relocated on-street access points differing from the pre-September 11, 2001 WTC PATH Terminal. The Preferred Alternative includes improved pedestrian access for Lower Manhattan with connections to the World Financial Center and the Dey Street concourse, which would be constructed by the Metropolitan Transportation Authority (MTA) as part of the Fulton Street Transit Center.

The No Action and Preferred Alternatives, as evaluated in this Environmental Impact Statement (EIS), account for the numerous development projects planned for Lower Manhattan, including the World Trade Center Memorial and Redevelopment Plan, Washington Street Urban Renewal Area, Battery Park City, and other residential and commercial projects. With the exception of the World Trade Center Memorial and Redevelopment Plan, these projects were planned prior to September 11, 2001, and they were expected to generate new demand for PATH service. Projections of PATH ridership in the opening year (2009) and design year (2025) account for these planned developments, which would occur with or without the Preferred Alternative. Thus, the Preferred Alternative would not directly induce new PATH riders, exceeding levels that would have been experienced had the terrorist attacks not occurred. However, the analyses contained in this section indicate that some crosswalks are adversely impacted in the study area. These impacts are partially the result of increased activity from projects independent of the Preferred Alternative, such as the Memorial, a Performing Arts Center, and cultural facilities on the WTC site, as well as from repositioned access points to the Preferred Alternative. The impacts can be mitigated by widening crosswalks.

Per the analysis framework prepared for the Lower Manhattan recovery projects, the Preferred Alternative's potential impacts on pedestrian conditions is based on two baseline conditions. The first is a pre-September 11, 2001 baseline, which is used to evaluate project-generated impacts in the opening and design years. The pre-September 11, 2001 baseline is applied under the assumption that much of the activity in Lower Manhattan lost to the terrorist attacks would be restored by 2009. For the short-term construction-period analysis, the project's effects are compared to a baseline network that reflects 2003 conditions. This chapter describes potential impacts resulting only from the construction of the Preferred Alternative. The cumulative construction-period effects of PATH and the other Lower Manhattan recovery projects are

presented in Chapter 15, "Cumulative Effects." Given that the opening and design years analyses presented in this chapter assume a baseline condition that included the pre-September 11, 2001 WTC and PATH terminal, the build condition includes the other Lower Manhattan recovery projects. As such, the 2009 and 2025 analyses are essentially a cumulative impacts assessment for the recovery projects. However, in order to discern the relative effect of the new PATH Terminal, this chapter identifies the percentage of the impact attributed to changes in the on-street circulation of PATH riders. For those locations at which 50 percent or more of the new pedestrian volumes would be PATH riders, project-generated impacts are identified and mitigation measures are proposed.

B. METHODOLOGY

The pedestrian study area, illustrated in Figure 8D-1, includes the intersections that would most likely be used by future PATH patrons. These intersections include:

- Route 9A (West Street) at Vesey Street (north, south and east crosswalks);
- Route 9A (West Street) at Liberty Street (north, south and east crosswalks);
- West Broadway at Vesey Street (all crosswalks);
- Greenwich Street at Fulton Street (all crosswalks at new intersection);
- Greenwich Street at Cortlandt Street (new midblock crosswalk);
- Greenwich Street at Liberty Street (all crosswalks);
- Church Street at Vesey Street (all crosswalks);
- Church Street at Fulton Street (all crosswalks);
- Church Street at Dey Street (all crosswalks);
- Church Street at Cortlandt Street (all crosswalks); and
- Church Street at Liberty Street (all crosswalks and northwest corner reservoir).

To evaluate potential impacts during the construction period, the analyses compare pedestrian conditions with and without the Preferred Alternative in 2006. On-street pedestrian volumes in the construction period include pedestrian counts following September 11, 2001, projected temporary WTC PATH station riders, and growth in the period following September 11, 2001. Pedestrian network geometries were collected after September 11, 2001 and the latest Lower Manhattan construction staging plans were reviewed to model the analyses.

To evaluate potential impacts of the Preferred Alternative during the design year, projected future conditions are compared to on-street pedestrian conditions before September 11, 2001, the equivalent condition had the terrorist attacks not occurred. As described above, no new PATH ridership would be induced by the Preferred Alternative, but possible changes in pedestrian access patterns for new entry points may create differences in crosswalk flows.

Pedestrian volumes for pre-September 11, 2001 conditions were increased by 0.5 percent per year for comparison purposes. This rate is commonly applied to estimate background growth for development projects in Manhattan per methodologies specified in the *New York City Environmental Quality Review (CEQR) Technical Manual* (December 2001). Current volumes of on-street pedestrians are based on counts collected following September 11, 2001. Based on these survey data, three peak hours were selected for analysis: AM (8:15 AM to 9:15 AM), midday (12 PM to 1 PM) and PM (5 PM to 6 PM). Pedestrian volume networks were calculated as a joint effort between the Port Authority of New York and New Jersey (PANYNJ) for this EIS, and the Metropolitan Transportation Authority (MTA), New York State Department of

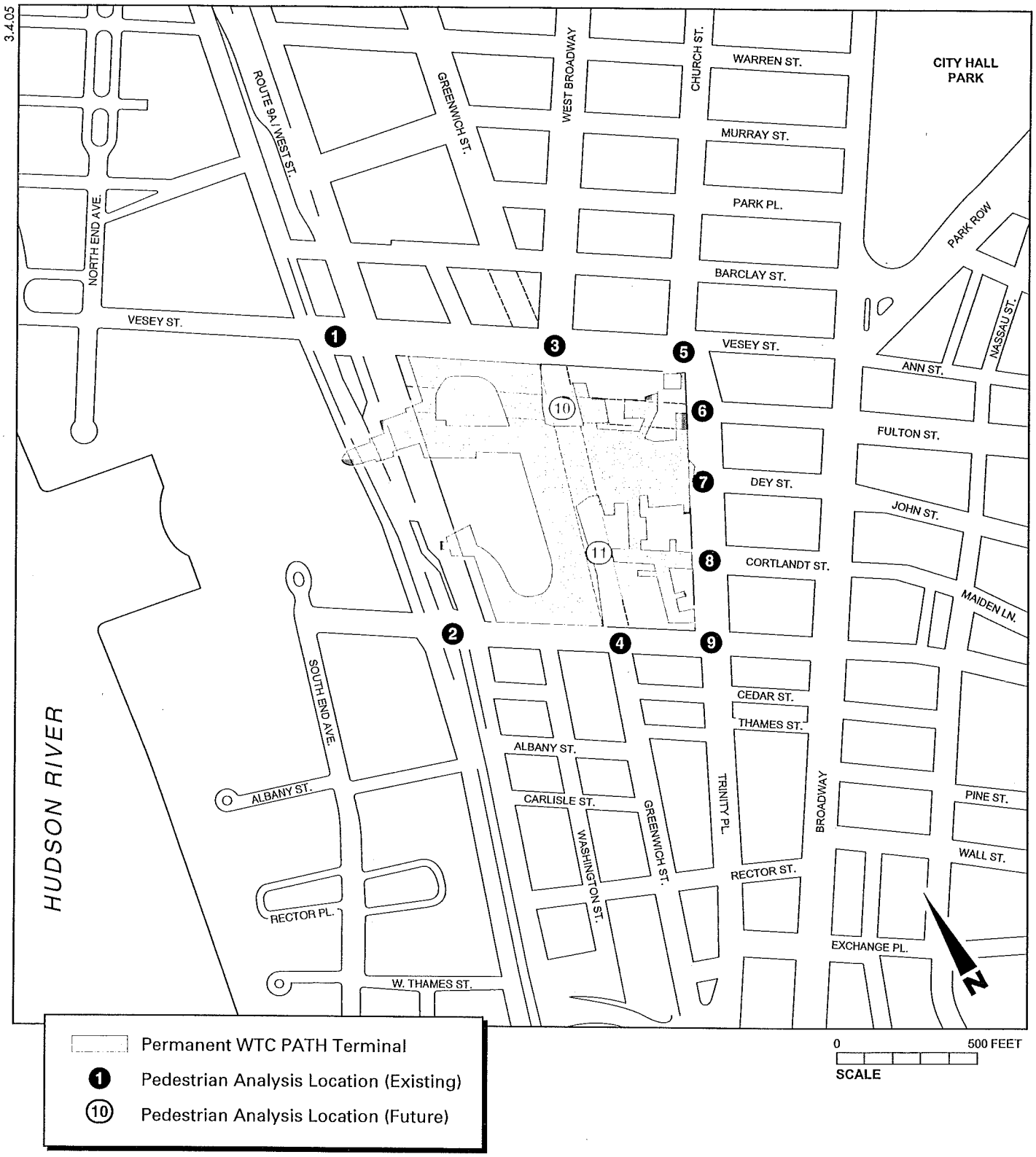

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Figure 8D-1
Pedestrian Analysis Locations

Transportation (NYSDOT), and Lower Manhattan Development Corporation (LMDC) for their respective EISs to ensure consistency between these closely related projects.

The pedestrian level of service analyses were based on *2000 Highway Capacity Manual (HCM)* procedures, conducted for crosswalk and corner reservoir levels of service at key intersections that could be affected by the Preferred Alternative.

Crosswalks and street corner conditions are influenced by the effects of traffic signals. Street corners must be able to provide sufficient space for a mix of standing pedestrians (queued to cross a street) and circulating pedestrians (crossing the other street or moving around the corner). The *HCM* applies a measure of time and space availability based on the area of the corner, signal timings, and the space used by circulating pedestrians. The total "time-space" available for these activities is the net area of the corner (in square feet) multiplied by the signal cycle length and expressed as square feet-minutes. The analysis then determines the total circulation time for all pedestrian movements at the corner (expressed as pedestrian-minutes). The ratio of net circulation time-space divided by total pedestrian circulation time provides the level of service measurement of square feet per pedestrian.

Crosswalk level of service is also a function of time and space. Similar to corner analyses, crosswalk conditions are expressed as a measurement of the area available (the crosswalk width multiplied by the width of the street) and the signal timing, which is expressed as square feet-minutes. The average time required for a pedestrian to cross the street is calculated based on the width of the street and an assumed walking speed. As per guidance in the *CEQR Technical Manual*, a walking speed of 4 feet per second is commonly used for projects in New York City. The ratio of average crossing time to the time-space available in the crosswalk is the level of service measurement of available square feet per pedestrian. Additionally, in the first seconds of the "walk" cycle, the pedestrians queued to cross the street create a surge effect as they begin to cross. Therefore, the crosswalk level of service analysis incorporates a factor for this "surge" to estimate worst-case conditions. The level of service analysis also accounts for vehicular turning movements that pass through the crosswalk. Table 8D-1 summarizes level of service definitions for crosswalks and corner reservoirs.

For Manhattan, levels of service (LOS) A through D reflect acceptable conditions, while LOS E and F reflect congested conditions (*CEQR Technical Manual*, December 2001).

Off-street pedestrian flows were calculated by the PANYNJ Traffic Engineering Department to design the underground concourses of the Preferred Alternative. It is assumed that these concourses would be designed to process pedestrians at acceptable levels of service, and are therefore not analyzed in this EIS. Absent the Preferred Alternative, the WTC Memorial and Redevelopment would design a pedestrian network with sufficient capacity for pedestrians using the WTC site.

C. DESCRIPTION OF THE AFFECTED ENVIRONMENT

PRE-SEPTEMBER 11, 2001 BASELINE CONDITIONS

Prior to September 11, 2001, the pedestrian crossing network functioned at acceptable levels of service, with the exception of the Church Street intersections at Vesey, Fulton, Dey, Cortlandt, and Liberty Streets. These locations contained one or more crosswalks that operated at LOS E or

Table 8D-1
Pedestrian Level of Service Definitions

LOS	Circulation Area (Square Feet per Pedestrian)	Description
A	130+	Pedestrians move in desired paths without altering their movements in response to other pedestrians. Walking speeds are freely selected and conflicts between pedestrians are unlikely.
B	40-129	Sufficient area is provided to allow pedestrians to freely select walking speeds, to bypass other pedestrians and to avoid crossing conflicts with others. At this level, pedestrians begin to be aware of other pedestrians and to respond to their presence in the selection of their walking path.
C	24-39	Sufficient space is available to select normal walking speeds and to bypass other pedestrians in primarily unidirectional streams. Where reverse-direction or crossing movements exist, minor conflicts will occur and speeds and volume will be somewhat lower.
D	15-23	Freedom to select individual walking speed and to bypass other pedestrians is restricted. Where crossing reverse-flow movements exist, the probability of conflict is high and its avoidance requires frequent changes in speed and position. The level of service provides reasonably fluid flow; however, considerable friction and interaction between pedestrians is likely to occur.
E	6-14	Virtually all pedestrians would have their normal walking speed restricted, requiring frequent adjustment of gait. At the lower range of this level of service, forward movement is possible only by shuffling. Insufficient space is provided for passing of slower pedestrians. Cross- or reverse-flow movements are possible only with extreme difficulties. Design volumes approach the limit of walkway capacity, with resulting stoppages and interruptions in flow.
F	0-5	All walking speeds are severely restricted and forward progress is made only by shuffling. There is frequent, unavoidable contact with other pedestrians. Cross- and reverse-flow movements are virtually impossible. Flow is sporadic and unstable. Space is more characteristic of queued pedestrians than of moving pedestrians.

Source: Transportation Research Board, *2000 Highway Capacity Manual.*

F, according to analyses performed for the Fulton Street Transit Center and World Trade Center Memorial and Redevelopment Plan EISs. Table 8D-2 summarizes the results of the pre-September 11, 2001 conditions.

The east crosswalk at the intersection of Church at Vesey Streets operated at LOS E in the midday peak hour and the west crosswalk operated at LOS E in the AM, midday, and PM peak hours. The east crosswalk at the intersection of Church at Fulton Streets operated at LOS E in the AM, midday and PM peak hours, and the south crosswalk operated at LOS E in the AM and PM peak hours. The east crosswalk at the intersection of Church and Dey Streets operated at LOS E in the AM, midday and PM peak hours, and the north and south crosswalks operated at LOS E in the PM peak hour. The east crosswalk at the intersection of Church and Cortlandt Streets operated at LOS E in the midday and PM peak hours. The north crosswalk at Church and Liberty Streets operated at LOS E in the AM and PM peak hours, the south crosswalk operated at LOS F in the AM peak hour, and the west intersection operated at LOS F in the AM peak hour and LOS E in the PM peak hour. Heavy commuter, tourist, and

Table 8D-2
Pre-September 11, 2001 Pedestrian Level of Service

Location	AM Peak Hour	Midday Peak Hour	PM Peak Hour
Route 9A (West Street) at Vesey Street (1)			
North Crosswalk	A	A	A
East Crosswalk	N/A	N/A	N/A
South Crosswalk	A	A	A
Route 9A (West Street) at Liberty Street (2)			
North Crosswalk	B	B	B
East Crosswalk	N/A	N/A	N/A
South Crosswalk	A	A	A
West Broadway at Vesey Street (3)			
North Crosswalk	N/A	N/A	N/A
East Crosswalk	C	C	C
West Crosswalk	B	B	B
Greenwich Street at Liberty Street (4)			
East Crosswalk	D	D	C
South Crosswalk	N/A	N/A	N/A
West Crosswalk	B	B	B
Church Street at Vesey Street (5)			
North Crosswalk	B	C	B
East Crosswalk	D	E	D
South Crosswalk	C	C	C
West Crosswalk	E	E	E
Church Street at Fulton Street (6)			
North Crosswalk	C	C	B
East Crosswalk	E	E	E
South Crosswalk	E	D	E
Church Street at Dey Street (7)			
North Crosswalk	D	C	E
East Crosswalk	E	E	E
South Crosswalk	D	C	E
Church Street at Cortlandt Street (8)			
North Crosswalk	B	C	B
East Crosswalk	C	E	E
South Crosswalk	C	D	C
Church Street at Liberty Street (9)			
North Crosswalk	E	D	E
East Crosswalk	B	B	C
South Crosswalk	F	C	D
West Crosswalk	F	D	E
Northwest Corner	N/A	N/A	N/A

Note: Refer to Figure 8D-1 for location numbers.

shopping traffic between the WTC site and points east of Church Street contributed to these conditions. Other crosswalks along Vesey and Liberty Streets operated with acceptable levels of service.

CHANGES IN THE AFFECTED ENVIRONMENT SINCE SEPTEMBER 11, 2001

Following September 11, 2001, the pedestrian network functioned at acceptable levels of service due to the substantially reduced pedestrian activity due to the absence of the WTC and the pre-September 11, 2001 WTC PATH Terminal, with the exception of the Church Street intersections at Vesey and Fulton Streets. These locations contained one or more crosswalks that operated at LOS E. The events of September 11, 2001, which destroyed the WTC PATH facility, resulted in a major shift in transit mode from New Jersey to Lower Manhattan. This demand was temporarily filled between September 12, 2001 and November 22, 2003 by increased ferry ridership to Lower Manhattan, increased PATH ridership to 33rd Street, Christopher Street, and 9th Street Stations with transfers to subways, and increased NJ Transit ridership with transfers to subways. Table 8D-3 summarizes the LOS analysis for conditions since September 11, 2001.

The west crosswalk at the intersection of Church and Vesey Streets experienced LOS E in the PM peak hour, and the east crosswalk at the intersection of Church and Fulton Streets experienced LOS E in the PM peak hour. Other crosswalks along Church, Vesey, and Liberty Streets operated at acceptable levels of service. Tourist, shopper, and business interaction between the temporary WTC site viewing area on Church Street and primary office and subway destinations to the east of Church Street contributed to these conditions.

The temporary WTC PATH station restored service to Lower Manhattan on November 23, 2003. Because pedestrian surveys for the post-September 11, 2001 conditions were conducted prior to the opening of the temporary WTC PATH station, trips directly associated with the facility are not reflected in the analysis results shown in Table 8D-3. However, future conditions in the 2006 construction period have been adjusted to account for trips to and from the temporary station.

The Route 9A pedestrian overpass at Liberty Street (formerly known as South Bridge) was destroyed on September 11, 2001 and reconstructed in approximately the same location. The Liberty Street overpass was reconstructed prior to pedestrian counts and observations conducted in 2003. The former North Bridge spanning Route 9A, which was located south of 3 World Financial Center at the Winter Garden, was also destroyed on September 11, 2001. However, the replacement pedestrian bridge was reconstructed north of 3 World Financial Center and south of Vesey Street in November 2003, after pedestrian counts and observations were conducted. Pedestrian conditions crossing Route 9A in the period following September 11, 2001 were analyzed under November 2003 conditions, which included pedestrian overpasses at Liberty and Vesey Streets, but did not include temporary WTC PATH station trips. According to observations, pedestrian levels of service at the overpasses were acceptable in the post-September 11, 2001 conditions, and included lower volumes than pre-September 11, 2001 conditions. Pedestrian volumes are shown in Appendix C.

Table 8D-3
Post-September 11, 2001 Pedestrian Level of Service

Location	AM Peak Hour	Midday Peak Hour	PM Peak Hour
Route 9A (West Street) at Vesey Street (1)			
North Crosswalk	C	B	C
East Crosswalk	N/A	N/A	N/A
South Crosswalk	A	A	A
Route 9A (West Street) at Liberty Street (2)			
North Crosswalk	Out of service for other construction; pedestrians diverted to overpass		
East Crosswalk			
South Crosswalk			
West Broadway at Vesey Street (3)			
North Crosswalk	Out of service for other construction; pedestrians diverted to walkway		
East Crosswalk			
West Crosswalk			
Greenwich Street at Liberty Street (4)			
East Crosswalk	Out of service for other construction; pedestrians diverted to walkway		
South Crosswalk			
West Crosswalk			
Church Street at Vesey Street (5)			
North Crosswalk	B	B	B
East Crosswalk	C	D	C
South Crosswalk	B	B	B
West Crosswalk	D	D	E
Church Street at Fulton Street (6)			
North Crosswalk	A	A	A
East Crosswalk	D	D	E
South Crosswalk	A	A	A
Church Street at Dey Street (7)			
North Crosswalk	A	A	B
East Crosswalk	C	D	D
South Crosswalk	B	B	B
Church Street at Cortlandt Street (8)			
North Crosswalk	A	B	B
East Crosswalk	B	D	D
South Crosswalk	B	B	B
Church Street at Liberty Street (9)			
North Crosswalk	B	B	C
East Crosswalk	A	B	B
South Crosswalk	B	B	B
West Crosswalk	B	C	B
Northwest Corner	N/A	N/A	N/A

Note: Refer to Figure 8D-1 for location numbers.