Lower Manhattan Pedestrianization Study

Rudolph W. Giuliani, Mayor
City of New York

Joseph B. Rose, Director
Department of City Planning

Christopher R. Lynn, Commissioner
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Executive Summary

Lower Manhattan is experiencing the early stages of a renaissance that will realize the long-held promise of downtown as an integrated 24-hour community. The signs of renewal are everywhere. Wall Street has rebounded. A City-sponsored package of incentives involving zoning changes and certain tax benefits has resulted in the conversion of older office buildings to residential use throughout Lower Manhattan. Thousands of new apartment units are projected in the next few years. Other office buildings have been modernized with state-of-the-art computer and communication technology. Hotel conversions are planned to accommodate the burgeoning tourist population. New retail stores have located downtown.

The physical reconstruction now transforming downtown is not confined to the renovation and reuse of buildings. The implementation of street improvements, as recommended in this study, would contribute to downtown’s rejuvenation as an appealing, vibrant, and economically-vital community. This project, a joint effort of the Department of City Planning and the Department of Transportation, would improve the pedestrian circulation system downtown by reducing congestion, improving safety, and providing better pedestrian access to mass transit, offices, stores, the waterfront, open spaces, and tourist attractions. Matching city and federal funds of approximately $1.8 million are available to test and evaluate the recommendations and implement physical and operational street improvements. City capital funds would augment this effort.

The study focuses on key pedestrian streets, as determined by an analysis of circulation patterns based on extensive pedestrian counts. These streets include Broadway and Wall, Broad, John/Dey, Fulton, Chambers, Liberty, Church, Rector, and Beaver streets, and Exchange Place. Waterfront access would be improved and significant new pedestrian space created by street direction changes and sidewalk widenings on streets that lead to the East River, including the foot of Wall Street, Coenties Slip, Old Slip, and Burling Slip. These new open spaces, furnished with seating, landscaping, and sidewalk cafes, would become destinations attractive to residents, workers, and visitors. Sidewalk widenings on Wall Street, Liberty Street, and Broad Street would improve access to mass transit and new residential buildings. Neckdowns, extensions of the sidewalk at the street corner, located at intersections with congested subway entrances/exits would ease crowding during rush hours. Improved pavement markings, traffic signalization changes, and no standing regulations at key intersections would increase pedestrian safety. The project also complements city-wide efforts to improve the function, aesthetics, and safety of the city’s streets by removing or relocating pedestrian obstructions to reduce sidewalk clutter.

These improvements to the pedestrian circulation system are complemented by the redesign of downtown’s streets developed by the area’s business improvement district, the Alliance for Downtown New York. Distinctive street and pedestrian lighting, new street furniture, special pavement, curb, and crosswalk treatments, and directional, informational, regulatory, and commercial signage would make walking in Lower Manhattan easier and more pleasant.
**Project Description**

Lower Manhattan is New York City’s historic core, a global business center accommodating 340,000 workers daily, a major tourist attraction, a civic center, and a growing residential community of 14,000 people. The area functions first as an office district and downtown travel patterns are determined by a nine to five weekday schedule. Walking is the predominant and most efficient mode of travel within Lower Manhattan. Pedestrian volumes are among the highest in the city, a reflection of Lower Manhattan’s density and conditions which encourage movement on foot: outstanding mass transit access, a compact street system, short walking distances, and clusters of intense activity.

However, the tight packing of activities downtown generates heavy vehicular and pedestrian movement and an intense competition between cars, trucks and pedestrians for limited space. Walking is often slow and uncomfortable. Roadbeds and sidewalks are narrow and congested; sidewalks are further constricted by obstructions. Often, the sidewalks cannot accommodate the pedestrian traffic, causing people to overflow into the streets, creating conflicts with vehicles and dangerous conditions for pedestrians. Pedestrian-vehicular conflict is further aggravated by delays at intersections where turning vehicles meet heavy pedestrian flows. Poor directional and informational signage often makes navigating downtown difficult.

The midweek pedestrian and vehicular congestion disappears in non-business hours. Downtown lacks many of the amenities that attract evening and weekend crowds. While a significant destination for tourists, Lower Manhattan has few hotels or quality restaurants and no theaters or movie houses to keep tourists downtown at night or overnight. The city has implemented recent zoning changes and a package of financial incentives to convert empty office buildings to residential uses that is revitalizing the area.

Improving selected streets in Lower Manhattan for pedestrians will make walking safer, faster and more efficient, thereby helping to strengthen the economic viability of Lower Manhattan in terms of commercial activity, retailing, and tourism. Making walking more attractive, efficient, and enjoyable and reducing pedestrian-vehicular conflicts will also increase the proportion of pedestrian trips relative to vehicular trips, thereby improving air quality. The study seeks to improve the walking environment through pedestrian enhancements and traffic calming techniques, the development of feasible and realistic design proposals, and the testing and implementation of proposed interventions. Project funding includes approximately $1,700,000 for physical and operational improvements. This study is part of a citywide pedestrianization study undertaken jointly by the New York City Departments of City Planning and Transportation and funded by the City of New York and the federal government under the Congestion Mitigation and Air Quality (CMAQ) program of the 1991 Intermodal Surface Transportation Efficiency Act (ISTEA).

**Project Study Area**

The study area is Lower Manhattan south of Chambers Street and the Brooklyn Bridge from the East River to the Hudson River. The key pedestrian streets are the primary study area (Map 1). Broadway, Church Street/Trinity Place, Chambers and Liberty streets are important for vehicles and pedestrians. Primary pedestrian streets are Wall Street, Nassau/Broad Street, Fulton Street, and Dey/John Street. Secondary pedestrian streets are Rector and Beaver streets, Exchange Place, Hanover Square (Old Slip), and Coenties Slip. Streets important primarily for vehicular circulation comprise the secondary study area. All other streets form the tertiary area.
Map 1
Key Pedestrian Streets

Legend
- Key Pedestrian Streets
- Key Pedestrian Streets with Significant Vehicular Traffic

Lower Manhattan Pedestrianization Study
City of New York  Department of City Planning  Department of Transportation
**Project Goals and Objectives**

1. Increase the speed and efficiency of pedestrian movement by improving access to subways, PATH trains, buses, and ferries and to nodes of intense activity, such as the South Street Seaport, the World Trade Center, and the World Financial Center; promoting public access to the waterfront and enhancing links to public open spaces; identifying pedestrian enhancements that could be incorporated into ongoing projects, such as the Alliance for Downtown New York’s streetscape design project, the East River esplanade, Route 9A (West Street), the Whitehall Ferry Terminal, and the Brooklyn Bridge Promenade Improvement study; and increasing effective sidewalk widths and improving pedestrian levels-of-service by reducing obstructions and/or widening sidewalks.

2. Improve the quality of Lower Manhattan’s streets by working with the local business improvement district to upgrade and coordinate physical elements, such as signage, lighting, landscaping, pavement, and street furniture.

3. Enhance pedestrian safety by reducing pedestrian-vehicular conflict and/or reducing vehicle trips and speed on important pedestrian streets.

4. Improve air quality by encouraging pedestrian rather than vehicular trips.

5. Develop a range of specific design proposals varying in cost and complexity; test proposed interventions and improvements; establish an inclusive advisory committee; and provide a basis for coordinating actions affecting Lower Manhattan’s streets, such as capital improvements and maintenance efforts by City agencies, the business improvement district, and other entities.

6. Use the recommended pedestrian improvements to identify the types and locations of pedestrian circulation improvements to be required in the Department of City Planning’s proposed rezoning for Lower Manhattan.
Existing Conditions

Journey-to-Work

Lower Manhattan’s role as a major employment center attracts pedestrians to the area, with mass transit as the primary delivery system. 1990 Census data for work destinations in the census blocks south of Chambers Street and the Brooklyn Bridge were analyzed to identify the primary modes of transportation to Lower Manhattan. Over 80 percent of the 340,000 daily commuters use mass transit as the primary mode of travel for the journey-to-work trip: 48 percent take the subway, 13 percent take a local or express bus, 16 percent use rail (which includes PATH), and 2 percent ride ferries. Ferry ridership does not reflect the total number of commuters, as ferries are not usually the primary mode for journey-to-work. Approximately 10 percent of commuters drive alone to work; another 5 percent car pool.

Public Transportation

Lower Manhattan functions in effect as an intermodal hub due to the variety and proximity of mass transit services, including subway, rail, bus, and ferry.

Subway System

Lower Manhattan is served by five subway lines: the Seventh Avenue IRT (1, 2, 3, and 9); the Lexington Avenue IRT (4, 5, and 6); the Eighth Avenue IND (A, C, and E); Broadway BMT (N and R); and Nassau Street BMT (J, M, and Z). The subway lines which serve Lower Manhattan run in a north-south direction under Greenwich Street, Church Street, Broadway, Nassau/Broad Street, and William Street. The 21 subway stations are aligned in several east-west catchment areas along Chambers, Fulton, and Wall streets and at South Ferry at the island’s tip. As a result, most subway riders are able to leave the subway in the catchment area closest to their destination and pedestrian travel is concentrated on the above-mentioned key east-west streets. Streets of secondary importance to the subway system include Park Place, Dey/John Street, Rector Street, Exchange Place, and Beaver and Water streets. Most of downtown is within a five-minute walk of a subway line. The Chambers Street/World Trade Center/Park Place and the Fulton Street subway station complexes are the busiest downtown, ranking in 1994 7th and 8th, respectively, among 425 stations citywide. On an average weekday about 285,000 riders use the 15 downtown subway stations.

Thirteen downtown subway stations have been or are slated for capital improvements under NYC Transit’s Station Rehabilitation Program and all 128 subway station entrances downtown have been or will be improved. The welter of entrance styles has been consolidated into two types, an Art-Moderne design used for the IND line and a Beaux-Arts design for the IRT and BMT lines; long-closed stairs at the Fulton/Nassau subway complex were eliminated, removing unnecessary sidewalk clutter; and on-street stanchions denoting hard-to-find subway entrances have been installed.

PATH (Port Authority Trans-Hudson)

The Port Authority Trans-Hudson commuter train connects New Jersey with Manhattan. Approximately 47,000 of the 118,000 riders using the World Trade Center PATH station remain in Lower Manhattan. The heavy pedestrian traffic generated by the PATH train station in the World Trade Center flows either in a southeasterly direction along Liberty Street and the adjacent off-street open space corridor or due east on Dey/John Street.
Bus Service

The extensive mass transit system is augmented by seven local bus routes and several dozen express bus routes operated by the city and private carriers which bring additional daily commuters into Lower Manhattan. Buses originate in New Jersey, Westchester, Brooklyn, Queens, Staten Island, and the Upper East Side. Most express buses operate on southbound Broadway, northbound Church Street, and on Water Street and Park Place. Most local bus routes run north and south on West Street, Church Street/Trinity Place, Broadway, and Water Street; a minority of lines run east and west on Chambers Street, Barclay Street, Vesey Street, and Park Row. Bus layover and queuing are major sources of vehicular congestion in the downtown area. A free shuttle bus between the World Financial Center, the South Street Seaport, and South Ferry is provided by the Alliance for Downtown New York and New York Waterways. It is based on a route analysis issued by the Department of City Planning.

Ferry Service

NYC DOT operates the Staten Island ferry from Whitehall Terminal in Lower Manhattan to St. George in Staten Island. Approximately 11,000 of the 35,000 daily Staten Island Ferry riders work in Lower Manhattan south of Chambers Street. The NYC Economic Development Corporation is proceeding with plans for a new Whitehall Ferry Terminal to replace the existing structure. Pedestrian access to the ferry will be improved by reconfiguring Peter Minuit Plaza, the jumble of traffic triangles fronting the terminal, into more useable open space.

Private ferry lines serving New Jersey commuters operate between Hoboken and Jersey City and Battery Park City on the Hudson River, where the terminal is being improved; between Weehawken and Port Liberte and the Battery Maritime building at South Ferry; and between Highland and Pier 11 at Wall Street on the East River. Ferry service also operates between Pier 11 and the La Guardia Marine Air Terminal, Queens, and Bay Ridge, Brooklyn.
Primary Streets Important for Pedestrians and Vehicles

*Broadway* is the pedestrian and vehicular spine of Lower Manhattan and the primary connection uptown. Bisecting downtown into east and west, the wide street runs the length of the area from Chambers Street to Bowling Green, where it splits into State and Whitehall streets. It is the southbound distributor of local traffic and the most important north-south transit corridor, with corresponding heavy pedestrian and vehicular volumes. Defined by tall streetwall buildings, Broadway is a major retail street, offers view corridors to the Hudson and East rivers, and connects City Hall Park at the north to Battery Park at the south.

*Church Street/Trinity Place* is a wide street that acts as Broadway’s pair, the northbound vehicular spine within the core and a transit corridor with heavy pedestrian flows both along its length and at major cross streets, particularly in the four blocks framing the World Trade Center. Vehicular volumes are high, particularly in the morning, and local and commuter bus traffic is substantial.

*Chambers Street* is a narrow two-way street at the northern boundary of the study area. Only seven blocks long, Chambers Street is the major east-west vehicular street linking West Street and the Brooklyn Bridge. Its heavy volumes and limited capacity contribute to congestion, poor levels of vehicular service, and lengthy delays. Chambers Street is also key for pedestrians, providing transit access, active retail, and a direct link between the waterfront, open spaces, and schools in and near Battery Park City to the west and the government office buildings and courthouses in the Civic Center to the east. West of Broadway the narrow sidewalks are insufficient for the pedestrian traffic they carry.

*Liberty Street west of Broadway* is a major pedestrian and vehicular street. It connects the office, retail, and transit hub at the World Trade Center to Wall Street via an off-street open space corridor and to Battery Park City via at-grade and pedestrian bridge crossings at West Street. Consequently, the intersection of Liberty and Church streets has the highest pedestrian volumes in Lower Manhattan. Liberty Street, the only street that runs from river to river, is an important east-west vehicular street linking West Street to Broadway and through traffic to South Street. While important to traffic circulation, Liberty Street west of Broadway is too wide for the number of cars using it. Conversely, the sidewalks on the south side of the street are narrow and inadequate for the pedestrian volumes they carry.

Pedestrian-Emphasis Streets

*Wall Street* is the most important pedestrian street in the financial core. One of the city’s most symbolically-important streets, this narrow, canyon-like street connects Broadway to the East River. It is a major pedestrian corridor providing transit access to a regional employment center. It is also a major tourist attraction; its intersection with Broad Street is a key public place, the site of Federal Hall and the New York Stock Exchange. Pedestrian volumes are heavy. Wall Street is closed to vehicles at Broadway. While eastbound vehicular traffic entering Wall Street from Broad Street is generally light, east of Water Street the street carries more vehicles as it widens and becomes two-way.

*Nassau/Broad Street* is a key north-south pedestrian street one block east of Broadway. North of Wall Street is Nassau Street, a narrow, one-way northbound retail street that is closed to vehicular traffic for the five blocks from Maiden Lane to Spruce Street. The pedestrian mall attracts high midday pedestrian volumes. The street features decorative paving, bollards, distinctive lighting, banners, and signs. South of Wall Street the street continues as Broad Street, a curving two-way street of varying width that ends at South Street. Vehicular volumes are relatively light, particularly southbound. Pedestrian volumes are not high, due in large measure to the empty office buildings along the street.
Fulton Street and Dey/John Street/Burling Slip, located one block south, exhibit similar characteristics and a similar importance for pedestrians. These narrow east-west streets directly connect the World Trade Center and the South Street Seaport, Pier 17, and the Fulton Fish Market, nodes of high-intensity use on opposite sides of Lower Manhattan. While vehicular traffic is moderate, pedestrian volumes are high and narrow sidewalks contribute to failing levels-of-service. Both streets are retail and transit corridors and provide access to the waterfront. Both streets are closed to vehicles during the midday, Monday to Friday. Fulton Street is closed to vehicles at all times in the South Street Seaport between Water and South streets.

Coenties Slip and Hanover Square (Old Slip) are short two-way street segments between Pearl and Water streets with light vehicular traffic and excess roadbed width. While peak-hour pedestrian volumes are moderate, each street is an important pedestrian link between the financial district and open spaces and the waterfront to the east. Coenties Slip is a one-block street that connects Vietnam Veterans Memorial Plaza with the Fraunces Tavern Historical Block and open space and archaeological exhibits at 85 Broad Street. Old Slip links Hanover Square physically and visually to the East River waterfront.

Rector Street is separated into unconnected segments by West Street. In Battery Park City, Rector Place is a two-way dead-end street surrounding a small park. East of the highway, Rector Street is a very narrow eastbound street for the four blocks to Broadway. The street provides pedestrian access to transit and retail uses. Rector Street is the only street that connects Broadway and West Street between Liberty Street and Battery Place and permits access to parking garages, yet peak-hour vehicular volumes are light.

Exchange Place is a narrow street that runs four blocks from Broadway to Hanover Street and provides access to subway stations. Pedestrian traffic is moderate, but the sidewalks are extremely narrow and congested. Although ignored in practice, vehicular through traffic is prohibited between Broad and William streets from 8:00 a.m. to 7:00 p.m. during the work week.

Beaver Street, also a short, narrow street, is the key east-west street in the center of the fan-like New Amsterdam street plan. The street links Wall Street to lower Broadway at Bowling Green. Retail stores and nearby residential clusters attract pedestrians. Subway connections are available at both ends of the street. This one-way street carries light vehicular traffic.

Off-Street Pedestrian Routes

The pedestrian street system is augmented by off-street paths unavailable to moving vehicles, including open spaces, building lobbies and atriums, and pedestrian concourses and bridges. West Street is spanned by three pedestrian bridges, one at Chambers Street and two connecting the World Trade Center and the World Financial Center that are used by about 60,000 persons daily. Two pedestrian bridges link the World Trade Center to buildings north of Vesey Street and south of Liberty Street, although the latter bridge is closed. A pedestrian bridge over Liberty Street connects the buildings of the World Financial Center.

Pedestrians may also use a substantial system of underground concourses, particularly at retail and subway station complexes. The underground concourse at the World Trade Center provides 150,000 people a day access to offices, transit, and retail shops and connects the pedestrian to streets as far north as Chambers Street. Pedestrians also use the off-street open space corridor that connects the World Trade Center to Wall Street via Liberty, Marine Midland, and Chase Manhattan plazas. The Brooklyn Bridge walkway links Brooklyn with Lower Manhattan.
Pedestrian Volumes

Pedestrian counts on key streets were done at more than 30 mid-block and corner locations during October and November 1994 and April 1996. Spot counts of thirty minutes to an hour were also done at numerous locations on busy and not-so-busy streets to establish a sense of pedestrian activity in the remainder of Lower Manhattan. Pedestrian volumes were available from previous DOT counts on Fulton Street and DPR and DCP counts on Chambers Street.

The heaviest pedestrian flow in the morning and evening rush hours is on the major east-west streets with mass transit access. In general, the predominant pedestrian flow is eastbound in the morning and the reverse at night, while the midday flow on most streets is balanced in both directions. North-south streets, particularly Broadway, are more significant as links to commercial uses, such as restaurants and stores, and have higher volumes during the lunchtime peak than during the peak commuter hours.

In the morning more than 9,000 pedestrians per hour exit the PATH and subway stations at the southeast corner of the World Trade Center at Liberty and Church streets and then proceed east and/or south to the financial core. Wall Street and Dey Street have morning pedestrian volumes of over 5,200 people per hour. The intersection of Broadway and John and Dey streets has very high pedestrian volumes throughout the day, with over 7,000 people during each of the three peak periods: the north-south crosswalks had over 2,600 and 3,700 people per hour in addition to the 4,000 pedestrians crossing Broadway. Broad Street has less pedestrian traffic, with 3,000 to 4,000 people per hour, a reflection of the high vacancy rates of the office buildings fronting the street between Beaver and Wall streets.

On Fulton Street pedestrian volumes reached 6,700 during the midday peak hour. During the same period Chambers Street sidewalks carried up to 4,200 pedestrians. Midday volumes at Church and Liberty and on Wall Street were less heavy, far below that of the morning and evening peak periods.

Pedestrian Level-of-Service (LOS) Analysis

The peak 15-minute period pedestrian counts were analyzed to determine preliminary pedestrian levels-of-service (LOS) using the Federal Highway Capacity Manual (FHWA) standard methodology. The level-of-service analysis assesses objective criteria of comfort or congestion by evaluating the carrying capacity of the walkway based on the number of pedestrians, the width of the sidewalk, and the type and location of obstructions. Effective sidewalk width measures the sidewalk space available for walking and is defined as sidewalk width minus buffer zones and obstructions. A sidewalk can be sectioned into four corridors: the building wall line, the amenity strip, the curb line, and the clear walkway, the space available for the unimpeded movement of the pedestrian.

The methodology considers convenience factors, such as the ability to select walking speeds, bypass slower pedestrians, and avoid conflicts with others. Other quantitative measures include the ability to cross a pedestrian traffic stream and to walk in the reverse direction of the major pedestrian flow. The methodology also accounts for short-term fluctuations in pedestrian flow -- platooning or bunching -- due to signalized intersections and/or mass transit. Levels of service from A to F characterize the quality of flow at various fractions of the maximum walkway capacity, where LOS C represents average conditions for pedestrian speed, efficiency, and comfort.

Pedestrian levels-of-service for the surveyed mid-block locations are shown in Table 1. The LOS at mid-block sidewalk locations where pedestrian counts were done generally had LOS B or C under platoon
conditions. Blocks on Wall, Broad, and Liberty streets had LOS D or E due to obstructed sidewalk space. However, even good levels-of-service at the mid-block deteriorated at corners, particularly those with transit station stairwells and other obstructions, where the effective sidewalk width is reduced to less than five feet.

Table 1  Pedestrian LOS Analysis

<table>
<thead>
<tr>
<th>Street</th>
<th>ESW</th>
<th>AM Peak Hour</th>
<th>Midday Peak Hour</th>
<th>PM Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PED</td>
<td>PFM</td>
<td>LOS</td>
<td>PED</td>
</tr>
<tr>
<td>Liberty Street south sidewalk (Broadway to Church Street)</td>
<td>8</td>
<td>1208</td>
<td>14</td>
<td>D</td>
</tr>
<tr>
<td>Church Street east sidewalk (Liberty to Cedar streets)</td>
<td>16</td>
<td>734</td>
<td>7</td>
<td>B</td>
</tr>
<tr>
<td>Church Street west sidewalk (Liberty to Cedar streets)</td>
<td>12</td>
<td>991</td>
<td>10</td>
<td>C</td>
</tr>
<tr>
<td>Liberty Street south sidewalk (Greenwich to Church streets)</td>
<td>8</td>
<td>515</td>
<td>8</td>
<td>C</td>
</tr>
<tr>
<td>Liberty Street north sidewalk (Greenwich to Church streets)</td>
<td>30</td>
<td>2415</td>
<td>9</td>
<td>C</td>
</tr>
<tr>
<td>Wall Street north sidewalk (Nassau to William streets)</td>
<td>6</td>
<td>570</td>
<td>10</td>
<td>C</td>
</tr>
<tr>
<td>Wall Street south sidewalk (Nassau to William streets)</td>
<td>6</td>
<td>818</td>
<td>13</td>
<td>D</td>
</tr>
<tr>
<td>Wall Street north sidewalk (William to Gold streets)</td>
<td>8</td>
<td>804</td>
<td>11</td>
<td>D</td>
</tr>
<tr>
<td>Wall Street south sidewalk (William to Hanover streets)</td>
<td>12</td>
<td>866</td>
<td>9</td>
<td>C</td>
</tr>
<tr>
<td>Broad Street west sidewalk (Wall Street to Exchange Place)</td>
<td>2</td>
<td>424</td>
<td>18</td>
<td>E</td>
</tr>
<tr>
<td>Broad Street east sidewalk (Wall Street to Exchange Place)</td>
<td>12</td>
<td>400</td>
<td>6</td>
<td>B</td>
</tr>
</tbody>
</table>

Source: New York City Department of City Planning field surveys, 1994

Legend
ESW: Effective sidewalk width
PFM: Pedestrians per foot per minute
LOS: Level-of-service

Pedestrian Accidents

Data on vehicular and pedestrian accidents was compiled for all streets in the study area for five years (1988-1992) from New York State Department of Transportation summary files. Tables 2 and 3 highlight streets and locations with high pedestrian accident rates, defined as an average of one or more pedestrian accidents per year (Map 2). Chambers Street is far and away the most dangerous street in the area for pedestrians. While it ranked third in the total number of pedestrian accidents, the street is only six blocks long compared to the much greater length of Broadway and Church Street. More relevant is that Chambers Street had four of the five highest-accident intersections and the three highest mid-block accident locations.

Table 2  Streets with the Most Pedestrian Accidents

<table>
<thead>
<tr>
<th>North/South Street</th>
<th>Number</th>
<th>East/West Street</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broadway/Whitehall</td>
<td>136</td>
<td>Chambers Street</td>
<td>90</td>
</tr>
<tr>
<td>Church/Trinity</td>
<td>91</td>
<td>Maiden Ln./Courtland St.</td>
<td>45</td>
</tr>
<tr>
<td>Water Street</td>
<td>85</td>
<td>Fulton Street</td>
<td>40</td>
</tr>
<tr>
<td>Broad Street</td>
<td>38</td>
<td>John/Dey Streets</td>
<td>33</td>
</tr>
<tr>
<td>South Street</td>
<td>36</td>
<td>Liberty Street</td>
<td>25</td>
</tr>
</tbody>
</table>

Source: NYS Department of Transportation, Accident data summaries 1988-1992

Table 3  Intersections With the Most Accidents/Year

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Accidents/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chambers Street at Broadway and at Church Street</td>
<td>4.4</td>
</tr>
<tr>
<td>Chambers Street at Centre Street and at West Broadway</td>
<td>3.6</td>
</tr>
<tr>
<td>Water Street at Maiden Lane</td>
<td>2.4</td>
</tr>
<tr>
<td>Church Street at Vesey Street, Fulton Street at South Street; Broadway at John/Dey Streets; Broad Street at Beaver Street</td>
<td>2.2</td>
</tr>
<tr>
<td>West Street at Liberty Street and at Vesey Street</td>
<td>2.0</td>
</tr>
</tbody>
</table>
Sidewalk Conditions

The sidewalks downtown have an inconsistent design treatment and are generally in a poor state of repair. The standard city paving as approved by DOT is poured concrete scored in a grid of five feet square, yet the Kaplan Fund found more than 20 pavement types downtown, including tinted concrete, stone, and brick. The sidewalks of many office buildings constructed in the recent past have been treated distinctively.

Damage to sidewalks is exacerbated on narrow retail streets where curb space is at a premium and parking on the sidewalk is common practice. While property owners are responsible for the maintenance of abutting sidewalks, the difficulty of keeping sidewalks in good condition is compounded by the subsurface conditions, including utilities, building vaults, and subway tunnels and platforms. Subway access and ventilation grates line the curbs of the five north-south streets providing subway entry into Lower Manhattan. Poorly maintained grates imbedded unevenly in the sidewalks are another potential hazard to pedestrians.

Sidewalk Widths

Sidewalks in Lower Manhattan were analyzed and classified according to width. Sidewalk widths vary greatly and there is no consistent relationship to overall curb width. In addition, there is no relationship between sidewalk width and pedestrian volumes.

The widest sidewalks, of 18 feet or more, are located on Trinity Place, Broadway, and Water Street. The sidewalks of the latter two streets are often supplemented by adjacent open spaces. Standard sidewalks of about 15 feet are located on the grid-like streets south of Chambers and west of Broadway. Narrow sidewalks of less than 12 feet are common in Lower Manhattan, particularly in the historic core and on important pedestrian streets such as Fulton, John, and Nassau streets. Certain sidewalks, such as Rector Street and Exchange Place, are less than four feet wide, often forcing pedestrians to walk in the roadbed.

Sidewalk Elements

More than 50 obstacles or elements, both fixed and temporary, impede pedestrian traffic on the sidewalk, particularly at corners (Map 3/Key). All street lighting, traffic control devices, parking meters, regulatory, directional, and informational signs, public safety elements (fire hydrants and alarm boxes), as well as pedestrian amenities such as public telephones, mail boxes, street trees and planters, and benches, are located on the sidewalk. The sidewalk is further obstructed by elements associated with building use, including retail displays, stand pipes, cellar doors and elevators, loading bays, canopies, scaffolding, and garbage awaiting collection, and by commercial activity on the sidewalk, such as newsstands, news boxes, vendors, and the loading and unloading of goods.

Mass transit adds obstacles, such as entrance/exit stairwells, which are often located at corners where sidewalk congestion is worst. Most subway entrances in Lower Manhattan encroach on the sidewalk. On Church Street, for example, there are 24 stairwells within a ten-block area. New developments are required to relocate subway entrances within buildings to improve pedestrian flow and reduce congestion. Recently constructed office buildings at 33 Maiden Lane and 60 Wall Street have relocated subway stations within public lobbies.

Newsstands further reduce sidewalk capacity, particularly at corners and subway entrances. While the placement of newsstands is regulated by DOT "to ensure [that] ... newsstands do not unduly interfere with pedestrian circulation...," the guidelines are not applicable to newsstands licensed prior to mid-1991. There
are 37 newsstands located south of Chambers Street: 22 are sited flush to subway stairs and the rest are within 10 feet of a corner. Pedestrian congestion is exacerbated in particular by newsstands located at Park Place and Broadway, at Park Place and Church Street, at Broadway and Murray Street, at Fulton and Nassau streets, and at three of the four corners at Wall and William streets. Pedestrian flow has been greatly improved by the recent removal of three newsstands, at Fulton Street and Broadway and at subway entrances on Broad Street south of Exchange Place and on Broadway south of Wall Street.

News boxes also contribute to poor pedestrian flow, since they are usually chained to streetlights, traffic signals, or sign posts located at intersections. At least one news box is located at each of the 165 street intersections downtown. Certain street corners are occupied by as many as six or seven news boxes attached to fixed streetscape elements. In contrast, due to the narrow and congested sidewalks, bus shelters are unavailable in Lower Manhattan except for two located on the same Park Row block frontage, at South Ferry, and a half-dozen on both sides of Water Street.

Licensed and unlicensed street vendors locate where pedestrian volumes are highest, thereby contributing to congestion, clutter, and litter. For instance, the effective width of Broadway’s east sidewalk from Ann to Wall Street is substantially curtailed by the unrelieved stretch of vendors.

The City has recently developed a number of policies and programs to reduce sidewalk congestion and improve the character of the streetscape. Mayoral Executive Order 22 issued in April 1995 detailed sidewalk corner clearances to alleviate congestion and improve safety. The policy states that, to the maximum extent possible, structures and objects shall not be placed in the corner or corner quadrant, defined as ten feet either side of the area created by extending the building line to the curb, and that existing elements shall be relocated as public health and safety permit. A proposal for a city-wide coordinated street furniture franchise is well-advanced. Under its terms, the City will contract with a private operator to replace the existing inventory of major street furniture items in all five boroughs with up to 500 newsstands, 3,500 bus shelters, and 100 new pay toilets. The City is also pursuing legislation to regulate the placement of news boxes.

**Distinctive and Pedestrian Lighting**

Street lights in Lower Manhattan are standard cobra-head fixtures designed to illuminate the vehicular segment of the street, with the exception of Battery Park City, where distinctive street and pedestrian lights are located along each curb. Approximately a dozen distinctive light poles, principally the Bishop’s crook, are scattered throughout the rest of downtown, at locations such as John Street and Greenwich Street near the Brooklyn-Battery Tunnel, without apparent reference to historic areas.

Pedestrian lighting has until recently been confined to the pedestrian malls on Nassau Street and at the South Street Seaport and to privately-owned open spaces, such as Liberty and Home Insurance plazas. In 1995, the Alliance for Downtown New York, Inc., attached single and double pedestrian light fixtures to all 560 light poles within the business improvement district boundaries south of Murray, Fulton and John streets. The Alliance has also promoted facade lighting that illuminates both the sidewalk and the building’s architecture.
Pedestrian Signs

Orientation is difficult downtown, since, unlike the rest of Manhattan, the island’s tip lacks the grid street pattern and streets are named and not numbered. Existing directional and informational signs for pedestrians are sparse, poorly placed and do not comprise a public informational system. There are only three pedestrian maps located in Lower Manhattan that show all of downtown. Other informational maps located at tourist nodes, such as the South Street Seaport, the World Trade Center, the World Financial Center, Battery Park City, and City Hall Park show only the immediate area surrounding the attraction.

Informational and historical signage is either absent or outdated. Signs to the waterfront are confined to those marking the East River esplanade, a series of painted fish hanging from the elevated FDR Drive and stenciled on the sidewalk at the foot of Wall Street. The streets bounded by Wall Street, Pearl Street, and Broadway, which constitute the original 17th-century street plan of New Amsterdam and colonial New York, were landmarked in 1983, but are not marked by special street signs.

The Kaplan Fund has recently developed a downtown Heritage Trail that expands an earlier trail installed for the U.S. Bicentennial. Four routes marked by color-coded dots placed on the sidewalk tie together the area’s attractions and a Visitors Center providing maps and information is located in Federal Hall at Wall and Broad streets. Approximately 50 important sites will be identified by historical markers and pedestrian maps of Lower Manhattan located on the adjacent sidewalk.

Directional signs to mass transit are lacking. Almost none of the existing pedestrian or area maps show transit nodes and the only street signs directing pedestrians to mass transit are PATH signs located on Fulton, Church, and Chambers streets. The New York City subway system provides maps which show transit linkages and neighborhood street maps, but such useful information is only found inside the stations. Subway entrances located inside buildings improve pedestrian flow and reduce congestion, but the small signs that mark these entrances tend to be unnoticed. The recent station reconstruction of the Fulton/Nassau Street station complex by NYC Transit improved greatly the quality of pedestrian orientation. Sidewalk stanchions indicating the presence of a subway entrance/exit within a building are now located on John, Fulton and William streets.

Existing pedestrian signage is often lost in the competition of vehicular, regulatory, and commercial signs. The resulting visual clutter is a serious drawback to finding one’s way in Lower Manhattan. Outdated and unnecessary signs compound the problem. The orientation of existing signs is also problematic. Almost all street signs face the direction of vehicular flow. The pedestrian walking against the direction of traffic is likely to miss pertinent site-specific historical or directional information.
Vehicular Circulation

Lower Manhattan, at the narrow tip of an island and bounded by water on three sides, functions as a cul-de-sac, making vehicular circulation difficult. The streets are discontinuous, some only blocks long, and minor cross streets have been eliminated by development to create super blocks such as the World Trade Center and Southbridge Towers. Direct east-west access is particularly limited: only eastbound Liberty Street/Maiden Lane runs from river to river.

The downtown street network can be broken into a half-dozen discrete districts, some of which operate as de facto traffic cells limiting ease of travel, with Broadway or Church Street serving as the north-south midline. Battery Park City is separated from the rest of Lower Manhattan by West Street and the streets serve local traffic only. Unlike the rest of downtown, the streets in the area north of the World Trade Center at Vesey Street follow the typical grid system, but the crosstown streets terminate at Broadway and City Hall Park. East-west through traffic connecting West Street and the Brooklyn Bridge loops around the park on Chambers Street, Park Row, and Barclay and Vesey streets. The streets in the area south of the World Trade Center between Liberty Street and Battery Place are particularly fragmented: only Rector Street links West Street and Broadway.

Vehicular traffic is heaviest on the major north and south streets providing entry and exit into Lower Manhattan. West Street, the Brooklyn-Battery Tunnel, and the elevated FDR Drive are the arterial streets located on the periphery of the area. The majority of vehicular traffic enters the area southbound on West Street, West Broadway, Broadway, Centre Street, and Pearl/Water and South streets; west- and southbound from the Brooklyn Bridge to Chambers Street and Park Row; and via the FDR Drive and the Brooklyn-Battery Tunnel. The major vehicular corridors carrying northbound traffic out of downtown are West, Water, Church, and South streets and Park Row.

Vehicular Volumes

Vehicular volumes in the study area were compiled to analyze the pattern of vehicular use. Vehicular volumes for all downtown streets for the a.m. (and p.m.) peak hour were compiled from November 1991 data collected for the NYS DOT Route 9A project (Map 4). Twenty-four hour automatic traffic recorder (ATRs) counts were taken by NYC DOT in January 1995 at 16 locations in Lower Manhattan. Additional vehicular counts in the area south of Wall Street and east of Broadway were taken by NYC DCP in April 1996.

West Street carries the greatest proportion of vehicular traffic within the study area, with over 2,000 vehicles in each direction in the peak morning and evening periods. In the core of the study area, southbound Broadway and West Broadway and northbound Church Street carry the most midweek daily traffic. The a.m. peak hour traffic volumes on Broadway range from about 1,250 at Vesey/Ann Street to less than 1,000 vehicles between Liberty and Morris streets. The volume and pattern of the a.m. rush hour is similar but reversed on northbound Church Street, with less than 500 vehicles per hour at Battery Place, increasing to 1,475 cars at Vesey Street. Both streets are major express commuter and local bus routes: 220 buses stop on Church Street north and south of Liberty Street during the a.m. peak hour. Broad Street carries light traffic, particularly southbound, with less than 500 vehicles in both directions.

Pearl/Water and South streets carry the most vehicular traffic on the east side of Lower Manhattan. On Water Street two-way a.m. volumes peaked at 1535 cars/hour at Frankfort Street (Brooklyn Bridge) and then declined to 830 vehicles/hour at Wall Street. On South Street 24-hour two-way midweek volumes averaged from 8,700 vehicles at John Street to 11,200 vehicles at Wall Street. Traffic volumes on east-west through streets are considerably lighter than on major north-south streets, with...
the exception of Chambers, Barclay, and Vesey streets and Park Row, which circulate traffic between West Street and the Brooklyn Bridge. Chambers Street provides a direct two-way connection between West Street and the Brooklyn Bridge and also acts as the vehicular entryway for almost all north-south traffic entering and exiting downtown west of Park Row. Westbound peak a.m. volumes on Chambers Street range from 750 vehicles/hour between Centre and Elk streets to less than 500 vehicles between Greenwich and West Street. Eastbound Chambers Street travel is lighter, with 400 to 500 cars per hour. Vesey Street, the other east-west through corridor, has two-way volumes of about 1,000 automobiles/hour between West and Church Streets.

Average daily traffic volumes on east-west streets are one-third that of Broadway and Church Street: Liberty and Wall streets and Maiden Lane ranged from 3,000 to 5,000 vehicles over 24 hours. The Liberty Street/Maiden Lane corridor, the most direct crosstown route, has light morning peak-hour traffic, with between 200 and 325 vehicles/hour eastbound and 300 to 400 vehicles/hour westbound. Other streets important to pedestrians also have relatively light vehicular traffic. Eastbound Fulton Street carries from 275 to 450 vehicles/hour between Gold and Church streets. John and Wall streets have minimal a.m. peak hour traffic of 115 and 225 vehicles, respectively.

**Controlled Intersections**

Broadway bisects Lower Manhattan into two distinct street networks. West of Broadway the streets follow a more typical grid pattern; primarily, intersections are controlled by traffic signals. The major north-south streets in Lower Manhattan west of Park Row and Broadway are signalized at virtually every intersection throughout their lengths. Traffic lights along the major signalized corridors are progressively timed to promote traffic flow and usually have a total green/amber phase of between 48 and 56 seconds out of a 90-second cycle.

East of Broadway the streets are more irregular, narrower, and carry less vehicular traffic. Intersections are generally controlled by stop signs. Only Water Street is signalized throughout its length. South Street is controlled by a mix of lights and stop signs. Fulton Street and Liberty Street/Maiden Lane are the only signalized east-west streets. Most intersections in the financial core north and south of Wall Street are controlled primarily by one, two-, and three-way stop signs or are uncontrolled, particularly at minor cross streets. In the core traffic signals are located only along Broad Street at Exchange Place and Beaver Street.

The T-intersections of Broadway at Murray Street, John/Dey Street, Wall Street, Morris Street, and Thomas Street north of Chambers Street have a de facto all-pedestrian signal phase. The red light on Broadway prevents all vehicular movement through the intersection and pedestrians may and do freely use the intersection in all directions. In addition, the pedestrian may use the crosswalks parallel to Broadway at all times during the signal phase. The angled geometry of the intersection at John/Dey Street and transit entrances at the street corners also promote the diagonal crossing of Broadway at this location.

Other intersections with a de facto all-pedestrian phase include Fulton Street at South Street, Vesey Street at Washington Street, and Battery Place at Greenwich Street. An all-pedestrian phase of approximately 20 seconds is built into the signal cycle at Pearl Street at Maiden Lane, Broadway/State Street at Battery Place, and State/Whitehall Street at Water Street.
Legend

Two-way Streets
One-way Streets
250 - 499 Vehicles per Hour
500 - 999 Vehicles per Hour
1000 - 1999 Vehicles per Hour
2000+ Vehicles per Hour

Sources: NYSDOT Route 9A, 1992
NYCDOT, 1995
NYCDCP, 1996 - 97
Pavement Markings

Many intersections in Lower Manhattan lack appropriate crosswalk markings or stop lines. The lack of visible markings is most acute on Broadway, Water Street, and Church Street. Ladder crosswalks are marked at some, but not all, of the high-accident locations, most notably at Chambers Street intersections. The Broadway intersections with all-pedestrian signal cycles and other such intersections are not marked by a Barnes Dance crosswalk, except at Broadway and Thomas Street, which is distinctively paved.

Distinctive crosswalk treatments are confined to pedestrian streets closed to traffic: Nassau Street from Maiden Lane to Spruce Street and Fulton, Water, and Front streets in the South Street Seaport. Intersections controlled by stop signs are absent crosswalk striping or stop lines with the exception of Greenwich Street between Murray and Barclay streets and at Washington Street and Battery Place.

The width of the crosswalk is not related to the intensity of pedestrian use: standard city practice is to mark the crosswalk from curb line to the building line, thereby matching the existing sidewalk, whether narrow or wide. Crosswalk markings also usually follow the geometry of the intersection, even when the adjoining streets are misaligned, rather than reflecting the path pedestrians follow.
Problems and Opportunities

An analysis of the existing pedestrian and vehicular conditions in Lower Manhattan has identified a number of problems and opportunities, which have been classified into four categories: pedestrian congestion; pedestrian safety; pedestrian-vehicular conflict; and streetscape improvements (Map 5).

Pedestrian Congestion

Most key pedestrian streets downtown are characterized by high levels of congestion. The sidewalks are crowded during the weekday morning, midday, and evening periods, making walking slow, inefficient, and uncomfortable. Factors that contribute to pedestrian congestion include: high pedestrian volumes, narrow and/or obstructed sidewalks; and narrow and/or obstructed corners. High pedestrian volumes are generated by major transit nodes, employment centers, and retail strips.

The heaviest pedestrian volumes occur on Chambers Street between West Broadway/Hudson Street and Broadway; Broadway between Chambers and Beaver streets; Fulton Street between Church and Gold streets; John/Dey Street between Church and William streets; Liberty Street between Church Street and Broadway; and Wall Street between Broadway and Pearl Street.

Narrow sidewalks result from existing street plans, for instance, the landmarked New Amsterdam Street Plan. Obstructed corners and sidewalks are common throughout Lower Manhattan. Narrow and/or obstructed corners result from the concentration at the intersection of street furniture, including lamp posts, traffic control devices, telephones, fire hydrants, trash receptacles, and mailboxes, and elements such as vendors, newsstands, newspaper boxes, and transit entrances/exits that obstruct pedestrian movement. Further sidewalk obstructions include elements associated with building use, including retail displays, standpipes, cellar doors and elevators, loading bays, canopies, scaffolding, garbage awaiting collection, and commercial activity on the sidewalk.

Streets where narrow and/or obstructed sidewalks contribute to pedestrian congestion include: Chambers Street; Fulton Street; Dey/John Street; Rector Street; Exchange Place; Church Street between Vesey and Barclay streets; and Nassau/Broad Street between Maiden Lane and Exchange Place. Specific narrow and/or obstructed corners include: Chambers Street at West Broadway and Church Street; Chambers Street at West Broadway and Church Street; Church Street at Warren Street, Park Place, and Liberty Street; Broadway at Murray Street, Park Place, Fulton and Wall streets and Exchange Place; Nassau Street at Fulton and John streets; Nassau/Broad Street at Wall Street; and Wall Street at William Street.

Pedestrian Safety

Unsafe elements that contribute to pedestrian conflicts include lack of appropriate pavement markings, intersection geometry, and multiple turning movements. Pavement markings to clearly delineate pedestrian space from vehicular space are crucial for mitigating conflicts in high-accident locations. Appropriate pavement markings are lacking at a number of key intersections in Lower Manhattan. Intersections with an all-pedestrian signal phase that are not specially marked include Broadway at Murray, Dey/John, Wall and Morris streets, Whitehall Street at Bowling Green, and Fulton Street at South Street. Intersections with a high number of pedestrian accidents that do not feature high-visibility or “ladder” crosswalks include Chambers Street at West Broadway, Church Street, and Broadway; Church Street at Fulton, Dey, and Cortlandt streets; Broad Street at Beaver Street; and Whitehall Street at State and Water streets. Stop lines are not marked at signalized intersections or at most stop-controlled intersections.
Intersection geometry also contributes to unsafe pedestrian conditions. Many of Lower Manhattan’s intersections are not aligned and street widths vary dramatically from one side of the intersection to another, further exacerbating the problem. Vehicles cross the intersection diagonally, complicating the through movement, and turning vehicles often perform similar difficult and dangerous maneuvers. Pedestrians cross the intersection diagonally and/or jaywalk. Specific misaligned intersections include Chambers Street at Broadway, where the roadbed width differs considerably; Church Street at Vesey Street; Broadway at Ann Street and John Street; Broad Street at Wall and Beaver Streets; Water Street at Fulton and John Streets; and William Street at Pearl Street.

Multiple turning movements occur at intersections where two-way streets meet either one- or two-way streets, contributing to pedestrian-vehicular and vehicular-vehicular conflicts. Delays to turning vehicles arise at such intersections when pedestrian volumes are high. Turning movements create friction by either slowing down traffic along curb lanes or requiring through traffic and buses to move around the blocked lane. Illegal parking, double parking and standing adds to curb friction by reducing the number of moving traffic lanes and forcing turning traffic to maneuver around parked or standing vehicles. Locations where multiple turning movements are a problem include: Chambers Street from Hudson to Centre streets; Church Street at Park Place and Vesey and Liberty streets; Broadway at Park Place and Vesey and John streets; Fulton Street at Gold and Water streets; Broad Street at Beaver Street; and Water Street at Whitehall Street.

**Pedestrian-Vehicular Conflict**

Pedestrian-vehicular conflict is caused by a myriad of factors: vehicles blocking the intersection; vehicles parked on the sidewalk; and vehicular curb cuts. Vehicles blocking the intersection are predominate along the major arterials in Lower Manhattan. Drivers often ignore “Don’t Block the Box” pavement markings in the intersection and thereby impede pedestrian and traffic flow when the signal turns red. A similar problem occurs when vehicles ignore crosswalks or stop lines and invade the intersection, endangering pedestrians by forcing them to navigate between vehicles or to walk outside the marked crosswalk. Areas with this specific condition include: Chambers Street at Church Street, Broadway, and Centre Street; Broadway at John/Dey Street; Church Street at Liberty Street; Nassau Street at Maiden Lane; and Nassau/Broad Street at Wall Street.

Vehicles park on sidewalks quite frequently in Lower Manhattan, more often with delivery trucks than cars, due to the very narrow streets and frequent violations of curbside parking regulations. In order to make deliveries without blocking the roadway, delivery trucks park on the sidewalk, forcing pedestrians to walk in the roadway. The problem can be compounded depending upon the time of day and the level of pedestrian volumes. Key pedestrian streets most affected by this condition include: Fulton and John/Dey streets between Church Street and Broadway; Nassau Street between Liberty Street and Maiden Lane; Wall Street between Broad and William streets; Exchange Place between William and Hanover streets; and Fulton Street at Water Street.

Vehicular curb cuts for parking garages and lots and loading bays, while necessary, can contribute to pedestrian-vehicular conflict. Pedestrians on the sidewalk are often forced to stop for entering or exiting vehicles or to walk around standing vehicles, often into the roadway. Specific areas where curb cuts cause problems include: Chambers Street between Hudson Street and West Broadway; Fulton Street between Church Street and Broadway and between Cliff and Pearl streets; Dey/John Street between Nassau and Gold streets and between Water and South streets; Liberty Street between West and Church streets; and Exchange Place between Broad and William streets.
Map 5
Problems and Opportunities

Problem: Pedestrian Congestion

Legend
- High Pedestrian Volumes
- Narrow and/or Obstructed Sidewalks
- Narrow and/or Obstructed Corners

Problem: Pedestrian Safety

Legend
- Lack of Pavement Marking
- Intersection Geometry
- Multiple Turning Movements

Problem: Pedestrian-Vehicular Conflict

Legend
- Vehicles Blocking Intersection
- Vehicles on Sidewalk
- Curb Cuts

Opportunities: Pedestrian Improvements

Legend
- Recaptured Pedestrian Space
  (Excess Roadbed Unnecessary for Vehicular Traffic)
- Mass Transit Access
- Waterfront/Open Space Access

Lower Manhattan Pedestrianization Study
City of New York Department of City Planning Department of Transportation
Opportunities for Pedestrian Streetscape Improvements

Pedestrian streetscape improvements offer the potential to relieve pedestrian congestion, improve orientation, and create a more pleasant, comfortable, and secure pedestrian environment by providing amenities now lacking in Lower Manhattan. The study has identified a number of opportunities to improve pedestrian circulation by recapturing for pedestrian use roadbed unnecessary for vehicular circulation, to provide better access to mass transit, including subways, PATH, buses, and ferries, and to provide improved visual and physical access to open spaces and the waterfront.

Pedestrian space can be recaptured by narrowing the roadbed and widening the sidewalks on: Wall Street from Broad/Nassau Street to South Street; Broad Street from Wall to Water streets; John Street, Hanover Square, and Coenties Slip from Pearl Street to Water Street; Liberty Street from West Street to Broadway; and Fulton Street from Broadway to Gold Street.

Improved access to mass transit encourages pedestrian trips, provides better circulation, and relieves congestion at station entrances/exits, the interface between the surface and subsurface pedestrian circulation systems. Implementing sidewalk widenings, neckdowns, and the mayoral executive order on clear corner zones will provide additional space and eliminate bottlenecks at intersections with transit access. Installing subway stanchions on the sidewalks will help to identify subway station entrances/exits located in buildings that are otherwise invisible to the pedestrian, as has been done at the Fulton Street complex.

Clear corner zones offer the opportunity to improve congested intersections as well. The policy promotes pedestrian movement and safety by delineating the area of the sidewalk at corners that is to remain unobstructed and free of clutter. Clear corner zones are proposed at obstructed and/or narrow intersections on most key pedestrian streets, including Broadway, Church Street, Chambers Street, Wall Street, Broad Street, Fulton Street, and John/Dey Street.

Certain key pedestrian streets with minor traffic circulation provide an opportunity to improve pedestrian access from the financial core to the open spaces along Water Street and the East River esplanade and piers. The study proposes a package of recommendations for these windows to the waterfront -- the foot of Wall Street, and the slips (Coenties, Burling, and Old Slip) -- to change the direction of traffic, narrow roadbeds, widen sidewalks, improve orientation, and reduce clutter. In addition to improving pedestrian access to the waterfront, the actions will provide small amounts of additional useable open space and will rationalize vehicular entry and exit into the core.

In addition there is an opportunity to address the lack of pedestrian amenities in Lower Manhattan, including special paving treatments, distinctive crosswalk treatments, street trees and planters, benches and seats, public artwork, and public restrooms, pedestrian lighting, and improved pedestrian signage. The Alliance for Downtown New York is currently engaged in an urban design study of the area streets that will develop recommendations to improve the streetscape.
Recommended Actions

Four types of pedestrian improvements are recommended for Lower Manhattan: street geometry; intersection pavement markings; pedestrian and vehicular traffic management; and pedestrian amenities. Certain recommended actions occur once or infrequently; others apply throughout the study area (Table 4/Map 6).

Street Geometry

Lower Manhattan’s disjointed streets meet at odd angles and intervals. Misaligned intersections contribute to pedestrian-vehicular and vehicular-vehicular conflict. Other downtown streets with high pedestrian volumes have excessively wide roadbeds in relation to traffic or roadbeds that vary in width from block to block. These streets offer the opportunity to recapture needed space for the pedestrian, thereby relieving congestion, while providing amenities, including additional open space near tourist attractions and the waterfront. Curb line changes to the public right-of-way are recommended to standardize the intersection, narrow the roadbed, or make the roadbed a uniform width.

The widening of sidewalks is often recommended in conjunction with a proposed street direction change from two-way to one-way. Additional sidewalk space will decrease congestion and improve pedestrian flow and levels-of-service. Certain key pedestrian streets with minor traffic circulation provide an opportunity to improve pedestrian access from the financial core to the open spaces along Water Street and the East River esplanade and piers. Widened sidewalks are proposed on: Wall Street between Broad and South streets; Broad Street between Wall and Water streets; Liberty Street between West Street and Broadway; Broadway between Vesey/Ann and Fulton streets; Church Street for the block between Barclay and Vesey streets; and Hanover Square, Coenties Slip, and Burling Slip for the block between Water and Pearl streets.

Neckdowns or corner extensions extend the sidewalk into the roadbed at the intersection only, usually by slightly less than the width of a parking lane. Neckdowns lessen congestion by providing pedestrians with additional queuing space at the corner where congestion is greatest and improve safety by decreasing the distance and time it takes to cross the intersection and by slowing vehicular turning movements. Neckdowns also can be used to standardize the street geometry at misaligned intersections. The study recommends neckdowns at congested corners that are obstructed by subway stairwells to improve access to mass transit and relieve congestion at station entrances/exits. In each case neckdowns are located only in the parking lane; no lanes of moving traffic are impacted, though turning movements may be affected. Neckdowns are proposed on: the east side of Broadway at Chambers Street; the west side of Church Street at Chambers, Warren, and Murray streets; the east side of West Broadway and the east side of Greenwich Street at Chambers Street; the north side of Park Place at Church Street and Broadway; the west side of Water Street at Wall Street; and Fulton Street at Nassau, William, and Water streets.

Street closings prohibit vehicular traffic from using the street and reserve it for pedestrian use. Streets may be closed at all times or only certain hours of the day. A closed street may be redesigned as open space or as a pedestrian mall to eliminate curbs, resurface the roadbed, and provide seating, lighting, and landscaping. Street closings reduce the number of vehicular routes and can inconvenience deliveries by making block access circuitous and are recommended where pedestrian volumes are high, congestion is evident, and vehicular flow is light or can easily be diverted. The study has recommended as an alternative option closing Wall Street to traffic for the two blocks between Water and South streets.
Reconfiguring the traffic islands would improve the intersection geometry at the foot of City Hall Park as suggested in DOT’s Brooklyn Bridge ramps study. The triangle formed by the confluence of Broadway, Park Row, Barclay Street, and Vesey/Ann Street is difficult for pedestrians and vehicles. Improving the intersection geometry within the triangle of the roadbed would improve pedestrian safety and may increase vehicular flow. The adjusted traffic island geometry would provide a better refuge for crossing pedestrians and improve the channelization of vehicles.

Intersection Pavement Markings

A lack of appropriate intersection markings contributes to vehicular encroachment, pedestrian-vehicular conflict, and decreased pedestrian safety. The study has recommended five kinds of pavement markings.

Widened crosswalks are recommended at all signalized intersections with high pedestrian volumes and at intersections with proposed sidewalk widenings and neckdowns. Crosswalks are typically marked from curb line to property line, or the width of the sidewalk, which in Lower Manhattan are particularly narrow. The width of the crosswalk is not related to the volume of pedestrian traffic using it. Widened crosswalks will accommodate more crossing pedestrians, thereby increasing pedestrian safety, without vehicular spillbacks. In particular, the nearside crosswalks on one-way streets have no vehicular conflicts and can be widened without decreasing pedestrian safety. Crosswalk widenings are proposed throughout the study area at signalized intersections on key pedestrian streets, including Broadway, Church Street, Chambers Street, Wall Street, Fulton Street, John Street, and Rector Street.

The study proposes to mark new crosswalks at intersections controlled by stop signs. With few exceptions, crosswalks are not marked at downtown intersections controlled by stop signs. New crosswalks on key east-west pedestrian streets, especially in the financial core, will improve pedestrian flow and safety. New crosswalks are proposed at the intersection of Chambers Street and Elk Street; at the intersection of Broadway and Park Row; on Whitehall Street where it intersects with Beaver, Bridge, Pearl, and Stone streets; on Wall Street where it intersects with Broad and William streets; at the intersection of Broad and Pearl streets; on Fulton Street where it intersects with Cliff and Pearl streets; and on John Street at Nassau, William, Pearl and Water streets.

High-visibility crosswalks, crosswalks with vertical stripes or “ladders” within its transverse bands, increase visibility and awareness of the shared intersection. These lines are 12" to 24" wide and spaced 12" to 24" apart. High-visibility crosswalks are recommended at intersections with an average of two or more pedestrian accidents per year. The use of high-visibility crosswalks in some locations will not weaken or detract from crosswalks where special-emphasis markings are not used. High-visibility crosswalks are proposed on: Chambers Street at Broadway, Church Street, and West Broadway; Church Street at Fulton, Dey, Cortlandt, and Liberty streets; Broadway at Fulton Street; Whitehall Street at Water Street; Broad Street at Beaver and Water streets; and Fulton Street at Water Street.

The Barnes dance crosswalk is used to mark a signal-controlled intersection with an all-pedestrian phase that permits pedestrians to cross the intersection in all directions at once. Two types of Barnes dance pavement markings are illustrated in the Manual of Uniform Traffic Control Devices (MUTCD), one that marks the entire box of the intersection and one that marks two diagonal pathways at the corners intersecting the typically-marked crosswalks. The study recommends such markings at T-intersections with a de facto all-pedestrian phase that does not require eliminating signal timing from moving traffic. Barnes dance crosswalks should be marked at the intersections of Broadway and Dey/John Streets, Wall Street, and Morris Streets, at Whitehall Street and Bowling Green, and at Fulton and South streets. In addition, the three
intersections with existing all-pedestrian phases -- Broadway/State Street at Battery Place; Whitehall Street at State and Water streets; and Maiden Lane at Pearl Street -- could also be so marked.

**Stop lines** are recommended at all controlled intersections, particularly at stop signs, where none currently exist. Stop lines are solid white lines, normally 12 to 24 inches wide, marked across all approach lanes. Stop lines and message words are used to help prevent cars from encroaching in marked crosswalks and thereby reduce pedestrian-vehicular conflict. Stop lines are proposed at every signal- or stop-controlled intersection in Lower Manhattan. The word “Stop” should be marked on William Street at Wall Street.

**Traffic Management**

Traffic management strategies have been recommended to direct and regulate vehicular and pedestrian traffic in order to reduce congestion and pedestrian-vehicular conflict and improve efficiency and safety.

The study proposes **changes in street direction from two-way to one-way** on a number of streets important for pedestrian movement and access to mass transit, residential and retail uses, and the waterfront. These streets carry light vehicular traffic and two-way travel is either unnecessary to circulation or provides inappropriate vehicular access to the congested streets of the financial core. The action in some instances changes a short two-way segment to the predominant traffic direction of the remainder of the street. Street direction changes are often proposed in tandem with roadbed narrowings and sidewalk widenings, thus reducing pedestrian congestion. The change to one-way traffic operation will eliminate turning movements and reduce pedestrian-vehicular conflict and improve safety. The traffic impacts on the vehicular circulation system in Lower Manhattan were assessed to assure their feasibility. Street direction changes include making: Broad Street one-way northbound between Wall and Water streets; Wall Street one-way eastbound between Water and South streets; and Hanover Square one-way westbound, Coenties Slip one-way eastbound, and Burling Slip one-way westbound for the block between Water and Pearl streets.

An **early pedestrian walk signal** permits pedestrians to enter the intersection prior to vehicular traffic traveling in the same direction. Normally, signals controlling vehicles and pedestrians work in unison. An early pedestrian walk signal helps protect pedestrians at locations with high pedestrian accidents and pedestrian-vehicular conflicts due to heavy turning movements. An early signal for pedestrians is of short duration and does not contribute significantly to vehicular delay or congestion. Early pedestrian walk signals exist at Chambers and Centre streets and at Vesey Street and West Broadway and are proposed at the Chambers Street intersections from Broadway to Hudson Street and at Broadway and Warren Street.

The study suggests **coordinating the signal timing** at adjacent intersections to promote more efficient pedestrian and vehicular movement. Adjusting the signal timing progression at a series of intersections can promote either pedestrian or vehicular circulation. Coordinating the signal timing can promote vehicular platoons, whereby cars stop and start at the same time, and thus can create significant breaks in traffic flow, thereby permitting greater freedom of movement for pedestrians. Specific sites where coordinated signal timing is proposed include the Chambers Street and Brooklyn Bridge intersections with Centre Street and the Wall and Rector street intersections with Broadway.

**Barriers** placed on the sidewalk, including bollards, guardrails, pipe and chain fences, jersey barriers, and planters, function as obstacles to both vehicles and pedestrians. Barriers serve to separate and protect pedestrians from moving vehicles, to prevent vehicles from mounting the sidewalk, and to prevent pedestrians from entering the street. Sidewalk barriers are proposed at two locations. Barriers are recommended on both sides of Centre Street at City Hall Park and the Municipal Building to prevent illegal
Table 4
Types of Interventions

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Map 6
Recommended Interventions

Legend
- Street Geometry
- Intersections
- Pedestrian Improvements
- Traffic Management
- Widened Sidewalk
- Street Direction Change
- Signalization Changes

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pedestrian crossings. A barrier is recommended at the intersection of Fulton and Gold streets to discourage unsafe and illegal parking and goods delivery by large trucks. Bollards have also been suggested, in part to replace existing sidewalk planters, on both sides of Wall Street from Broad to Pearl streets.

It is recommended that **operable or removable barriers** replace the typical wooden horse or trash can now used to close streets to vehicular traffic during the midday hours. Barriers located in the roadway eliminate improper vehicular use of the midday pedestrian street while providing emergency access, yet allow unimpeded vehicular access when traffic is permitted. Operable or removable barriers are proposed on Fulton Street at Broadway and Gold Street and on John Street at Broadway and William Street.

**Regulations prohibiting vehicles from stopping or standing at corners** are proposed to clear cars from the curb lane at key pedestrian intersections. Eliminating vehicles at the corner will improve sight lines of vehicular traffic for crossing pedestrians and keep encroaching vehicles out of pedestrian paths at misaligned corners, thereby reducing pedestrian-vehicular conflict. “No stopping” or “no standing” regulations at curbside are proposed on Broadway at John/Dey, Liberty, and Cedar streets and Exchange Place.

The study has suggested **improving vehicular signage** by repairing and replacing signs, removing outdated signs, consolidating signs to reduce clutter, and adding signs when needed. In addition, a number of the study recommendations require changes in the posted signs regulating moving traffic. Improved vehicular signage is proposed at the intersection of Chambers and Elk streets; on Broad Street between Wall and Water streets; at the intersection of Fulton and South streets; and on John Street between Water and Pearl streets.

The study proposes to **relocate bus stops** which are placed too close to corners, resulting in queuing buses that block the intersection, thereby impeding crossing pedestrians and vehicles. The problem is most acute at the intersection of key east-west pedestrian streets with Broadway and Church Street, where bus lanes are designated. Bus stops are to be relocated at the intersections of Broadway and Dey/John Streets and at Liberty and Church streets.

**Pedestrian Amenities and Streetscape Improvements**

Pedestrian amenities and streetscape improvements are recommended to relieve pedestrian congestion, improve orientation, and create a more pleasant, comfortable, and secure pedestrian environment.

The study builds on the mayoral executive order on **clear corner zones** at congested intersections. The policy promotes pedestrian movement and safety by delineating the area of the sidewalk corner or corner quadrant that should remain unobstructed and free of clutter. Clear corner zones are proposed at obstructed and/or narrow intersections on most key pedestrian streets, including Broadway, Church Street, Chambers Street, Wall Street, Broad Street, Fulton Street, and John/Dey Street.

The study also identified an opportunity to address the lack of **special pedestrian amenities** in Lower Manhattan, including special paving treatments, distinctive crosswalk treatments, street trees and planters, benches and seats, public artwork, public restrooms, pedestrian lighting, and improved pedestrian signage. The Alliance for Downtown New York has done an urban design study of the streets within the business improvement district that has developed recommendations to improve the streetscape. This study recommends improving orientation and access to mass transit by installing subway stanchions on the sidewalks to identify subway station entrances/exits located in buildings that are otherwise invisible to the pedestrian, as has been done at the Fulton Street complex. Stanchions should mark entrances on Broadway at Cedar and Thames streets and at Wall and Pine streets east of William Street.
Street Profiles

Broadway (Whitehall Street/State Street)

Broadway is Lower Manhattan’s most important street, running the length of Lower Manhattan from Chambers Street to Bowling Green, where it forks, continuing as State Street on the west and Whitehall Street on the east. The street is the pedestrian and vehicular spine of Lower Manhattan and, coupled with Trinity Place/Church Street, is the major north-south arterial within the core and extending north to midtown Manhattan. The street bisects the study area into east and west and, topographically, Broadway is the ridge line from which the streets slope down to each riverbank. Broadway connects the open spaces of City Hall Park on the north with Bowling Green and Battery Park at the tip of the island.

Pedestrian volumes are heavy along and across Broadway. The street is the primary north-south corridor for pedestrian access to the mass transit system. Pedestrian traffic is also generated by office buildings, retail stores, PATH, the Staten Island Ferry terminal, and local, express, and tourist buses. Traffic is heavy throughout the day. Broadway distributes local traffic within downtown and serves local and through traffic destined for the Brooklyn Bridge, Brooklyn-Battery Tunnel, and Holland Tunnel. A significant component of peak hour traffic on Broadway is local and commuter buses.

Problems and Opportunities

- Pedestrian congestion results from obstructed corners and sidewalks
- Crossing volumes are heavy, resulting in pedestrian/vehicular conflicts at intersections
- The intersection geometry is poor and pedestrian accidents are frequent at Broadway and Chambers and John/Dey streets
- The T-intersections at John/Dey, Wall, and Morris streets and Bowling Green have a de facto all-pedestrian signal phase
- Stop lines are not marked at controlled intersections
- Crosswalks are not marked at stop-controlled intersections
- Illegal parking, double parking and standing add to curb friction and impede bus flow

Recommended Actions (See Maps 7-11)

- Locate a neckdown on Broadway at Chambers Street
- Widen the east sidewalk between Ann and Fulton streets and regularize the se corner at Ann Street
- Pave the entrance to the City Hall parking lot at Broadway and Murray Street as sidewalk and provide a curb cut for vehicular entry/exit
- Install attractive removable barriers at Fulton and John streets for the daily street closing
- Implement clear corner zones and relocate newsstands at congested corners
- Mark ladder crosswalks at high accident locations
- Mark Barnes dance crosswalks at intersections with an all-pedestrian phase
- Mark new crosswalks at stop-controlled intersections and between the Park Row medians
- Add stop lines at all controlled intersections
- Initiate early pedestrian walk signals at Chambers and Warren streets
- Coordinate the signal timing at Wall and Rector streets to clear cars from the intersection
- Enforce “Don’t block the box” regulations at Chambers Street and “no standing anytime” prohibitions in the bus lane and at key corners
- Relocate the bus stop south of Dey Street fifty feet farther south of the intersection

Church Street/Trinity Place
Church Street and Trinity Place form a continuous route from Battery Park to Chambers Street. The street carries heavy pedestrian and vehicular traffic. Paired with southbound Broadway, the one-way wide street is the northbound vehicular spine within the core, connecting downtown with midtown, Brooklyn, and New Jersey via Sixth Avenue and the Brooklyn Battery and Holland tunnels. Church Street/Trinity Place is a mass transit corridor, providing pedestrian access to the subways, local and express buses, the PATH train, and ferries. The street is also a commercial and retail corridor, at its busiest on the blocks between Liberty and Vesey streets where Church Street borders the World Trade Center and the service road/parking lot that rings the complex.

The study addresses the segment of Trinity Place/Church Street between Rector Street and Chambers Street, where mass transit access and pedestrian traffic are concentrated, and has recommended actions to improve pedestrian circulation and safety, reduce pedestrian-vehicle conflicts, and improve access to mass transit.

Problems and Opportunities

- The street is an important mass transit and retail corridor fronting the World Trade Center
- Pedestrian traffic is heavy both along and across the street, particularly at Chambers, Fulton, Dey, Liberty, and Rector streets
- The street is the major northbound arterial and bus route within the core
- Pedestrian congestion occurs at corners with transit access, especially the intersections at Chambers, Warren, and Murray streets and Park Place
- Between Barclay and Vesey streets the street is wide and the sidewalks are narrow
- The Park Place, Vesey Street, and Liberty Street intersections are characterized by irregular intersection geometry, pedestrian-vehicular conflicts due to left and right turns, and a high number of pedestrian accidents
- At Fulton, Dey, and Cortlandt streets, there are high pedestrian volumes, pedestrian-vehicular conflicts, and a high number of accidents

Recommended Actions (See Maps 7-11)

- Install neckdowns on the west side of Church Street from Chambers Street to Park Place
- Narrow the roadbed and widen the east sidewalk between Barclay and Vesey streets
- Implement clear corner zones at most intersections
- Mark high-visibility crosswalks at Chambers, Fulton, Dey, and Cortlandt Streets
- Widen crosswalks and add stop lines at key intersections
- Curb line changes on Park Place and Liberty Street will improve the street geometry at their intersections with Church Street
Liberty Street

Liberty Street west of Broadway connects the office, retail, transit, and tourist hub at the World Trade Center to Wall Street via an off-street open space corridor and to the World Financial Center via pedestrian bridges spanning West Street. The intersection of Liberty and Church streets has the highest pedestrian volumes in Lower Manhattan. Unlike much of downtown, the street is open to light and air, created by the open spaces and buildings setback from the street.

Liberty Street, the only downtown street that runs from river to river, is a key east-west vehicular street linking West Street to Church Street and Broadway and through traffic to South Street. Liberty Street is one-way eastbound until Gold Street, where it merges with Maiden Lane and becomes two-way. The street also provides access to off-street parking south of the World Trade Center. Traffic volumes on Liberty Street are modest, but the heavy pedestrian flow leads to conflict and delay, particularly at Church Street and Broadway, where the intersections are misaligned. The recommendations will improve pedestrian circulation and access to open space, alleviate pedestrian congestion, and reduce pedestrian/vehicular conflicts.

Problems and Opportunities

- Liberty Street is a transit and tourist node and an express bus corridor
- Pedestrian volumes at Church and Liberty streets are the highest downtown
- The roadbed is excessively wide in relation to traffic between West Street and Broadway
- Black cars double park between Greenwich Street and Broadway
- Sidewalks on the south side of the street are narrow and congested
- The intersections of Liberty and Church streets and Broadway are offset and misaligned
- Pedestrian/vehicular conflicts result from turning movements at Church Street and Broadway
- Buses on Church Street block the Liberty Street intersection

Recommended Actions (See Map 9)

- Narrow the roadbed between West and Church streets and widen the south sidewalk by 6 feet
- Narrow the roadbed between Church Street and Broadway to 30 feet and widen the south sidewalk to better align the intersection
- Add high-visibility crosswalks and stop lines at the intersection of Church and Liberty streets and mark stop lines at Broadway and Liberty Street
- Relocate express bus stops north of the Church/Liberty Street intersection
Streetscape Legend/Recommendations

**Street**

- STREET NAME
- STREET DIRECTION - EXISTING
- STREET DIRECTION - PROPOSED
- ROADBED/SIDEWALK DIMENSION
- LANE MARKINGS
- CROSSWALK - EXISTING
- CROSSWALK - PROPOSED
- HIGH-VISIBILITY CROSSWALK EXISTING / PROPOSED
- STOP LINE EXISTING / PROPOSED
- BARNES DANCE CROSSWALK PROPOSED
- DON'T BLOCK THE BOX GRID
- REMOVABLE BARRIER PROPOSED
- COORDINATE SIGNALS PROPOSED
- EARLY PEDESTRIAN WALK SIGNAL PROPOSED
- RECONFIGURED TRAFFIC ISLANDS PROPOSED

**Sidewalk**

- FIRE HYDRANT
- TELEPHONE
- NEWS BOX
- TRASH CAN
- ALARM BOX
- MAIL BOX
- BUS SHELTER
- BUS STOP
- STREET TREE
- SUBWAY ENTRANCE/EXIT
- NEWSSTAND
- STREET LIGHT
- TRAFFIC SIGNAL
- BOLLARD
- PLANTER
- VENTILATION SHAFT
- VENDOR
- INFORMATION SIGN
- STOP SIGN
- SIGN POLE
- PARKING METER
- CURB CUT
- GRATES
- BENCH
- ARTWORK
- CANOPY
- PUBLIC TOILET
- FENCE/BARRIER
- ELEVATOR DOOR
- BICYCLE RACK
- FLAGPOLE
- NECKDOWN PROPOSED
- SIDEWALK WIDENING PROPOSED
- CLEAR CORNER ZONE PROPOSED

**Building**

- BUILDING ENTRANCE
- RETAIL ENTRANCE
- SERVICE ENTRANCE
- CLOSED ENTRANCE
- CLOCK
- STAIRS

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Map 8
Recommended Actions: Broadway and Church Street

Lower Manhattan Pedestrianization Study
City of New York  Department of City Planning  Department of Transportation
Map 9
Recommended Actions: Broadway and Church Street/Trinity Place

Lower Manhattan Pedestrianization Study
City of New York  Department of City Planning  Department of Transportation
Map 10
Recommended Actions: Broadway and Trinity Place

Lower Manhattan Pedestrianization Study

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Map 11
Recommended Actions: Broadway and Whitehall Street

Lower Manhattan Pedestrianization Study

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Chambers Street

The northern border of the study area, Chambers Street is a major thoroughfare providing two-way vehicular access between West Street and the Brooklyn Bridge and to and from the north-south arterial streets carrying traffic in and out of Lower Manhattan, including West Street, West Broadway, Church Street, Broadway, and Centre Street. Chambers Street is also a key pedestrian route linking subway stations, Battery Park City, the Civic Center, and the Brooklyn Bridge promenade. The street is a significant retail and institutional corridor and provides views of and direct access to the Hudson River waterfront and the area’s open spaces, including Hudson River, Washington Market, and City Hall parks.

The heavy pedestrian and vehicular volumes on Chambers Street result in congestion and delay that is exacerbated by the narrow roadbed and sidewalks. The heavy turning movements on and off the street contribute to severe pedestrian-vehicular conflict, as reflected in the fact that Chambers Street has the highest number of pedestrian accidents per intersection in the study area. NYC DOT, as part of its study of improved pedestrian access to/from the Brooklyn Bridge, examined changing the operation of segments of Chambers Street from two-way to one-way westbound. This study proposes more modest street improvements to alleviate pedestrian congestion and reduce pedestrian-vehicular conflicts.

Problems and Opportunities

- Pedestrian volumes are heavier on the north side of the street
- Sidewalk and corner widths are reduced by encroachments, causing pedestrian congestion
- The street provides vehicular access between West Street and the Brooklyn Bridge
- The street has heavy two-way traffic and high turning volumes at intersections, causing vehicular congestion and delay and conflict with pedestrians
- Chambers Street intersections have the highest number of pedestrian accidents
- Pedestrians cross illegally at the Centre Street intersection
- Pedestrians cross Chambers Street at the unmarked Elk Street intersection
- The intersection with Broadway is misaligned and the roadbed between Broadway and Centre Street is excessively wide
- East- and westbound vehicles block the Broadway and Church Street intersections
- Illegal on-street parking reduces vehicular capacity during peak periods

Recommended Actions (See Maps 12-14)

- Install pedestrian barriers at Centre Street to channel pedestrians to the marked crosswalks
- Coordinate the timing of traffic signals at Centre Street and the Brooklyn Bridge on-ramp
- Install neckdowns at the southeast corner of Broadway, in order to regularize the intersection, and on Church Street, West Broadway, and Greenwich Street at Chambers Street
- Mark the westbound left-turn only lane at Broadway
- Initiate early pedestrian walk signals at Broadway, Church Street, and West Broadway
- Mark high-visibility crosswalks at high accident intersections, including Broadway, Church Street, and West Broadway/Hudson Street, and add stop lines at all controlled intersections
- Implement clear corner zones at congested and/or obstructed intersections
- Enforce "Don’t Block the Box" regulations at Broadway and Church Street
Map 12
Recommended Actions: Chambers Street

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Map 13
Recommended Actions: Chambers Street

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Map 14
Recommended Actions: Chambers Street

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Wall Street

Wall Street, the principal pedestrian street through the financial core, is a major destination for commuters and tourists alike. It is one of the city’s most historic streets, the site of seminal events in American history, and symbolically is known worldwide as the capitol of capital. The street itself is unimposing, a short, narrow street of varied width that runs seven blocks from its start at Broadway on the west to South Street and the waterfront on the east. Wall Street is closed to traffic from Broadway. From Broad Street to Water Street it is one-way eastbound, with one moving and one parking lane; between Water and South streets the fan-shaped street widens and becomes two-way. The street carries light vehicular traffic and heavy pedestrian volumes. Pedestrian congestion is most evident at the subway stations located at Wall Street and Broadway, Broad/Nassau Street, and William Street.

The study proposes to improve the street geometry, intersection pavement markings, and pedestrian amenities on Wall Street. The department has also worked with the BID to recommend streetscape improvements and urban design treatments to reinforce the street’s centrality and historic character. The study has recommended changing the street direction to one-way eastbound, narrowing the roadbed, and widening the north sidewalk. An alternative option is to close the foot of Wall Street to vehicular traffic between Water and South streets. The proposal would require a discretionary action, subject to the Uniform Land Use Review Procedure (ULURP), to map the street for restricted use. Front Street would remain open to traffic in both scenarios. The actions would provide additional open space; improve pedestrian access to the waterfront; and reduce pedestrian-vehicular conflict and improve pedestrian safety by eliminating vehicular turning movements. The preferred option would effect local vehicular circulation patterns and would eliminate 30 metered parking spaces located in the middle of the street.

Problems and Opportunities

- Wall Street is a commuter/tourist destination and a transit corridor
- The street provides view corridors and direct access to the waterfront
- Wall Street has high pedestrian and low vehicular volumes
- The roadbed varies in width
- At the foot of Wall Street the roadbed is extremely wide, far in excess of vehicular needs, and could be recaptured for pedestrian use
- Sidewalks and corners are narrow and/or obstructed and contribute to pedestrian congestion, particularly at Broad/Nassau Street and William Street
- Pedestrian-vehicular conflicts exist at Broad, William, and Water streets
- The traffic signal at Broadway and Wall Street has an all-pedestrian phase
- Crosswalks and stop lines are unmarked at intersections controlled by stop signs

Recommended Actions (See Maps 15-17)

- Narrow the roadbed between Broadway and Water Street and widen the sidewalks
- Change the street direction between Water and South streets to one-way eastbound, narrow the roadbed, widen the north sidewalk as useable open space and provide pedestrian amenities
- Place neckdowns on Water Street at the northwest and southwest corners of Wall Street
- Install clear corners at obstructed corners at Broadway, Broad, William, and Water streets
- Relocate newsstands at Wall and William streets
- Mark a Barnes Dance crosswalk at Broadway and Wall Street; install attractive movable barriers
- Mark new crosswalks and stop lines at intersections controlled by stop signs

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Map 16
Recommended Actions: Wall Street

Lower Manhattan Pedestrianization Study

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Department of Transportation
Map 17
Recommended Actions: Wall Street
Broad Street/Nassau Street

Broad Street, a six-block north-south street between Wall and South streets, is the key pedestrian street within the financial core and the New Amsterdam street grid. The street was originally a water channel, hence its curving shape and irregular intersection geometry. The roadbed is over 50 feet wide at the ends and narrows to less than 30 feet at the middle (Beaver Street). The street is two-way south of Exchange Place, with moderate northbound and light southbound traffic well below the capacity of the roadbed. At Wall Street, Broad Street becomes Nassau Street, a narrow, one-way northbound street. The five blocks of Nassau Street between Maiden Lane and Spruce Street are closed to traffic, with deliveries permitted before 10:00 a.m. and after 6:00 p.m. The pedestrian mall, lined with retail stores, features special signage and lighting, bollards have replaced the curb and the roadbed is paved with brick and asphalt.

Pedestrian volumes on Nassau Street are high, particularly during the midday. Pedestrian volumes on Broad Street are modest, except at Wall Street near the New York Stock Exchange and Federal Hall, due to the empty office buildings lining the street. The revitalization of Broad Street is essential to downtown and has been targeted for improvement. A city-sponsored package of financial incentives and recent zoning changes have spurred residential and office redevelopment in Lower Manhattan. The local Business Improvement District has initiated a redesign of Broad Street and has scheduled events to attract visitors to the area.

Broad Street offers the opportunity to act as the pedestrian spine of a revitalized core. Pedestrian improvements to the street would contribute substantially to the area’s regrowth by relieving pedestrian congestion, reducing pedestrian-vehicular conflict, and adding pedestrian amenities. The study proposes to change the street direction of Broad Street from two-way to one-way northbound, narrow the roadbed to 30 feet and widen the sidewalks. Other recommended actions include marking new and high-visibility crosswalks and adding stop lines at controlled intersections, implementing clear corner zones, and providing pedestrian amenities.

Problems and Opportunities

- Moderate pedestrian volumes reflect the vacancy rate in Broad Street office buildings
- Residential, office, and retail development is occurring in response to financial and zoning initiatives
- Two-way traffic is not essential for vehicular circulation: traffic volumes are low in both directions, particularly southbound, and the street is wide in relation to vehicular volumes
- Sidewalks are narrow and congested, particularly between Wall Street and Beaver Street, and street corners are obstructed
- The irregular intersection geometry at Broad and Wall and Beaver streets contributes to conflicts
- Pedestrian accidents are high at the intersections of Broad and Beaver and Water streets
- Left and right turning movements engender pedestrian-vehicular conflict

Recommended Actions (See Maps 18-19)

- Change the street direction between Water Street and Wall Street to one-way northbound
- Narrow the roadbed to 30 feet, widen the sidewalks, and provide pedestrian amenities
- Mark high-visibility crosswalks at Beaver and Water streets
- Mark new crosswalks and stop lines at stop-controlled intersections, such as Bridge and Pearl streets
- Implement clear corner zones at Exchange Place, Beaver Street, Stone Street, and South William Street
**Fulton Street**

Fulton Street is a narrow east-west street extending for ten blocks between Church and South streets. It provides a direct connection between the World Trade Center and the South Street Seaport and Pier 17, nodes of high-intensity use on opposite sides of Lower Manhattan. Fulton Street is a major transit and retail corridor and provides pedestrian access to the East River waterfront and esplanade. It has moderate vehicular traffic and heavy pedestrian traffic. Fulton Street is one-way westbound between Gold and Church streets and is two-way from Gold Street to Water Street. The four blocks from Gold Street to Broadway are closed to vehicular traffic from 11:00 a.m. to 2:00 p.m. during the midweek. In the South Street Seaport Fulton Street is closed to traffic: the two blocks between Water and South streets are attractively designed, paved, and landscaped for pedestrian use.

The study recommends actions that will improve pedestrian circulation and safety and provide improved access to transit, nodes of high-intensity use, retail stores, open spaces, and the waterfront.

**Problems and Opportunities**

- The street is a retail and transit corridor that links activity nodes
- Fulton Street has moderate vehicular and heavy pedestrian traffic
- The roadbed width is inconsistent
- The intersections at William, Nassau, and Water streets are misaligned
- Fulton Street is closed to midday traffic between Gold Street and Broadway
- Corners and sidewalks between Church and William Streets are narrow and/or obstructed
- Controlled intersections are not marked by stop lines

**Recommended Actions**

- Narrow the roadbed from Broadway to Gold Street and widen the north sidewalk by 4 feet
- Improve the intersection geometry at William, Nassau, and Water streets by installing neckdowns at the corners
- Install attractive removable bollards at Broadway and Gold Street to close the street to traffic during the midday
- Install clear corners at Broadway and at Cliff, Pearl, Nassau, and William Streets
- Relocate newsstands at Broadway, William Street, and Gold Street
- Add stop lines and widen crosswalks at most intersections
**Dey Street/John Street/Burling Slip**

Like Fulton Street one block to the north, Dey/John Street is an east-west transit and retail corridor, provides access to the East River waterfront, and connects the World Trade Center and the South Street Seaport. Pedestrian volumes are high, particularly at Broadway, where the misaligned John and Dey streets meet, and the blocks between Broadway and William Street are closed to vehicles midday during the business week. Vehicular volumes are light.

Dey Street, John Street, and Burling Slip run nine blocks between Church and South Streets. Dey Street is a one-block street between the World Trade Center and Broadway carrying one-way westbound traffic. John Street continues from Broadway one-way eastbound until Pearl Street, where it becomes two-way until South Street. Traffic is light on Dey Street, which serves as a delivery street for Century 21. Traffic ranges from light to moderate on John Street, and declines again at Water Street where John Street becomes Burling Slip.

Recommended are actions to improve pedestrian circulation, reduce congestion, and improve safety and rationalize vehicular entry into the congested core and eliminate vehicular turning movements, thereby improving traffic flow.

**Problems and Opportunities**

- The street has heavy pedestrian and light vehicular traffic
- The Church Street intersection is a high pedestrian-accident location
- Vehicles park on the Dey Street sidewalk
- At Dey/John Street and Broadway the intersection geometry is misaligned, vehicles, including stopped buses, block the intersection, the traffic signal includes an all-pedestrian phase that is not marked, and pedestrian accidents are numerous
- John Street between Broadway and William Street is closed to midday traffic
- Sidewalks and corners are narrow and obstructed
- The extremely light westbound traffic cannot continue eastbound at Pearl Street and the multiple turning movements created by exiting traffic causes pedestrian-vehicular conflicts
- The roadbed between Pearl and Water Streets is wider than necessary to move traffic

**Recommended Actions**

- Mark a high-visibility crosswalk at Church Street
- At the intersection of Dey/John Street and Broadway, mark a Barnes Dance crosswalk, implement clear corner zones, relocate bus stops on the west side of Broadway towards mid-block, enforce “no standing” curb regulations at the corner, and install an attractive operable barrier for the midday closing of the street
- Implement clear corner zones at congested intersections, such as Nassau Street
- Change the street direction for the one block between Pearl and Water streets from two-way to one-way eastbound, narrow the roadbed, and widen the north sidewalk
**Rector Street**

Rector Street is a transit corridor connecting West Street and Broadway, Wall Street, and the financial core. The street is divided into two unconnected segments by West Street, making Battery Park City and the Hudson River waterfront inaccessible to pedestrians at Rector Street. Rector Place is a two-block street with two-way traffic separated by a park in Battery Park City to the west of West Street. To the east, Rector Street is a narrow, one-way eastbound street running four blocks to Broadway. The street slopes down from the Broadway ridge line toward the Hudson River. The Trinity Church graveyard borders the north side of Rector Street on the block between Trinity Place and Broadway.

Pedestrian traffic is moderate but congested due to extremely narrow sidewalks and crosswalks. Pedestrians will still be unable to cross West Street at Rector Street after the Route 9A project is completed. While peak hour vehicular volumes are modest, Rector Street is the only street in the traffic cell between Liberty Street and Battery Place that provides vehicular access to Broadway from West Street. It also provides access to parking garages located south of the World Trade Center.

Given these conditions, the study has recommended modest actions to improve pedestrian circulation and transit access.

**Problems and Opportunities**

- The street is a retail and transit corridor that links West Street and Broadway
- The Route 9A project does not improve pedestrian access to Battery Park City
- The street has moderate pedestrian volumes but extremely narrow sidewalks
- Rector Street at Trinity Place and Broadway is beset by pedestrian congestion, due to narrow and obstructed corners, and pedestrian-vehicular conflict, due to heavy turning movements
- Despite light traffic, Rector Street provides access to Broadway and off-street parking
- Vehicles park illegally or on the sidewalks

**Recommended Actions**

- Widen the crosswalks, mark stop lines, and implement clear corner zones at Rector Street at Trinity Place and Broadway
- Coordinate the signal timing at the intersections of Broadway/Wall Street and Broadway/ Rector Street to better enable pedestrians to cross the street
**Coenties Slip and Hanover Square**

Coenties Slip is a short street, one block long, located between Pearl and Water streets that directly connects Vietnam Veterans Memorial Plaza with the office core. It is a two-way street carrying light vehicular traffic and moderate pedestrian volumes. Hanover Square, one block north of Coenties Slip, also provides access between the core and the waterfront. Located between Pearl and Water streets, Hanover Square is a two-way street that connects Old Slip, a two-way street separated by a narrow block between Water and South streets, and William Street, a narrow one-way northbound street west of Pearl Street. The street, which varies in width, carries light vehicular volumes and moderate pedestrian volumes.

The recommended actions will improve pedestrian circulation; physically and visually link Hanover Square and Coenties Slip with adjacent open spaces and the waterfront piers and esplanade along the East River; rationalize vehicular entry into the narrow, congested 17th-century street system of New Amsterdam; and, eliminate vehicular turning movements, thereby improving traffic flow at major intersections. Traffic circulation on Pearl and Water streets will not be hampered, although access to Hanover Square and Coenties Slip will be slightly less direct and convenient, and on-street parking will not be affected.

**Problems and Opportunities**

- Coenties Slip and Hanover Square are key pedestrian links that connect attractive open spaces and landmark buildings at either street end and provide direct physical and/or visual access to the waterfront
- Traffic volumes on both streets are low in each direction
- Despite the low volumes, turning vehicles impede through traffic on Water and Pearl streets
- Two-way traffic is not essential for vehicular circulation
- The roadbed is extremely wide, far in excess of necessary vehicular capacity, and could be recaptured for pedestrian use
- The recaptured pavement could be designed to maximize pedestrian use
- Pedestrian crossings at Pearl Street are unmarked
- On Coenties Slip the wide roadbed encourages black cars to double park

**Recommended Actions (See Map 20)**

- Change the street direction of Coenties Slip and Hanover Square from two-way to one-way
- Narrow the roadbed to a uniform 34 feet, with one (or two) moving and two parking lanes
- Widen the north sidewalk of Coenties Slip by between 4 feet at Pearl Street and 58 feet at Water Street and Hanover Square by from 8 feet at Water Street and 16 feet at Pearl Street
- Mark new crosswalks and stop lines at the intersections with Pearl Street
- Reposition as necessary all traffic control devices, catch basins, and street fixtures and add/remove regulatory street signs
- Provide pedestrian amenities (seating, landscaping, signage, lighting)
Map 20
Recommended Actions: Coenties Slip and Hanover Square

Lower Manhattan Pedestrianization Study
City of New York Department of City Planning
Department of Transportation
Beaver Street

Beaver Street provides access to mass transit, retail uses, and open spaces. The street runs diagonally for five blocks between Whitehall and Wall streets within the landmarked New Amsterdam street plan. It dead-ends at Bowling Green, providing a physical and visual link to open space. The street is one-way westbound and has light vehicular and pedestrian traffic. The study recommends minor actions to improve pedestrian circulation and safety.

Problems and Opportunities

- There are residential developments on and in the immediate vicinity of Beaver Street
- While Beaver Street has light vehicular traffic, pedestrian-vehicular conflicts occur at the intersections of Beaver and Whitehall streets and Beaver and Broad streets
- The Beaver/Broad Street intersection is misaligned and is a high-accident location
- Sidewalks between Hanover and Broad streets are narrow and obstructed

Recommended Actions

- Mark high-visibility crosswalks and stop lines at the intersection of Beaver and Broad streets
- Mark new crosswalks and stop lines at William and Whitehall streets
- Implement clear corner zones at congested corners from Broad to Hanover streets
- In addition, the proposed changes to the street direction and roadbed width on Broad Street will improve the intersection geometry at Beaver Street, improve traffic flow, and reduce pedestrian-vehicular conflicts by eliminating turning movements

Exchange Place

Exchange Place is a retail and transit street that runs three blocks between Broadway and Hanover Street within the New Amsterdam street plan. Exchange Place is one-way eastbound, with moderate vehicular and pedestrian traffic. It provides vehicular access to Wall Street via Broad Street. East of Broad Street it operates as a service road and is closed to vehicles except for deliveries between Broad and William Streets Monday through Friday from 7:00 a.m. to 7:00 p.m. The study proposes modest measures to improve pedestrian circulation and reduce pedestrian-vehicular conflict. In addition, the proposal to change the street direction and narrow the roadbed on Broad Street would improve the Exchange Place intersection.

Problems and Opportunities

- Exchange Place is a pedestrian shortcut between Broadway and the financial core
- Pedestrian-vehicular conflicts occur at Exchange Place and Broadway and Broad Street
- The intersection of Exchange Place and Broadway has narrow and obstructed corners
- Sidewalks between Broadway and Hanover Street are extremely narrow
- Vehicles block the sidewalk between Broad and William streets

Recommended Actions

- Add stop lines and widen crosswalks
- Implement “no standing” regulations at Exchange Place at Broadway and Broad Street
- Enforce the clear corner zone from Broadway to Hanover Street
Tests and Test Locations

Physical and operational tests of the recommended actions are proposed in order to evaluate the benefits and/or impacts of the proposals on pedestrian and vehicular circulation, congestion, and safety. Five intersections and one street segment were selected as priorities for testing.

Table 5 Tests and Test Locations

<table>
<thead>
<tr>
<th>Location</th>
<th>Tests</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chambers Street at Broadway</td>
<td>Neckdown on Broadway at Chambers Street</td>
<td>Neckdown will be concrete or timber curb filled with asphalt. Thermoplastic striping will be installed prior to neckdown. NYPD enforcement in progress.</td>
</tr>
<tr>
<td></td>
<td>Realign crosswalks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mark high-visibility crosswalks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mark stop lines</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Enforce “Don’t Block the Box” regulations</td>
<td></td>
</tr>
<tr>
<td>John/Dey Street at Broadway</td>
<td>Mark Barnes dance crosswalk extending to south side of John Street</td>
<td>DOT approves. Given pedestrian crossing time is sufficient. Must install additional walk signals.</td>
</tr>
<tr>
<td></td>
<td>Mark stop line</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Relocate bus stop</td>
<td></td>
</tr>
<tr>
<td>Wall Street at Broadway</td>
<td>Mark Barnes dance crosswalk</td>
<td>DOT approves. Given pedestrian crossing time is sufficient. Must install additional walk signals.</td>
</tr>
<tr>
<td></td>
<td>Mark stop line</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Coordinate signal timing with that at Rector Street and Broadway</td>
<td>Engineering site survey required. Performed by BID consultant.</td>
</tr>
<tr>
<td></td>
<td>Implement clear corner zones</td>
<td></td>
</tr>
<tr>
<td>Wall Street at Broad/Nassau</td>
<td>Mark crosswalks</td>
<td>Crosswalks to be marked only parallel to Wall Street.</td>
</tr>
<tr>
<td>Street</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wall Street at William Street</td>
<td>Narrow roadbed to uniform width of 22 feet</td>
<td>Widened sidewalks would be installed as timber curbs filled with asphalt. Crosswalks to be marked parallel to Wall Street only. Thermoplastic striping to be marked prior to sidewalk widening. “Stop” message will also be marked.</td>
</tr>
<tr>
<td></td>
<td>Mark new crosswalks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mark stop line</td>
<td></td>
</tr>
<tr>
<td>Coenties Slip and Hanover</td>
<td>Change the street direction from two-way to one-way, narrow the road</td>
<td>DOT approves. Engineering site survey required. Coordinate with DOT re: street design: paving plan, drainage, crowning. Install as interim improvements bollards marking new curb line, new regulatory signage and pavement markings, and temporary traffic signal.</td>
</tr>
<tr>
<td>Square from Pearl to Water</td>
<td>bed and widen the sidewalks</td>
<td></td>
</tr>
<tr>
<td>streets</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Traffic Impact Analysis

This analysis assesses the impacts on vehicular circulation resulting from the proposed changes to the
downtown street network. Twelve scenarios, including the closing of one street segment, were originally
considered and analyzed. The following four scenarios involving street direction changes on five street
segments were selected for further analysis:

- Change Wall Street between Water and South streets from two-way to one-way eastbound
- Change Hanover Square (William Street/Old Slip) for the one block from Pearl to Water
  streets from two-way to one-way (north)westbound and change Coenties Slip for its one
  block from Pearl to Water streets from two-way to one-way (south)eastbound
- Change Broad Street between Wall and Water streets from two-way to one-way northbound
- Change John Street for the one block between Pearl and Water streets from two-way to one-
  way eastbound

Additionally, a fifth scenario analyzed the combined impacts of the first three actions. The feasibility of the
proposed changes to the street network are based on: traffic circulation and street access; the vehicular
storage capacity of short streets expected to absorb the redistributed traffic; and the capacity of the street
system under proposed conditions.

Using appropriate methodology (1994 Enhanced HCM signalized/unsignalized intersection analysis), the
analysis calculated existing traffic volumes, volume-to-capacity (v/c) ratios, delays, and levels of service
(LOS) at the impacted intersections in the study area for the morning and evening weekday peak hours. The
traffic flow characteristics of signalized intersections are quantified in terms of the volume-to-capacity ratio
(v/c) ratio and average vehicle delay of intersection approaches or lane-groups. The quality of flow is
expressed in terms of levels of service ranging from A for minimal delay to F for long delays (over 60
seconds) and congestion. For unsignalized intersections, LOS is based on general delay ranges and reserve
or unused road capacity.

Vehicular Traffic

The study area for the traffic analysis is bounded by Wall Street and Maiden Lane on the north, Broadway
on the west, Whitehall Street on the south, and Water Street and South Street on the east. The existing traffic
network has three major north-south roadways that carry heavy volumes of through and local traffic and
narrow, irregularly-patterned streets laid out in the 17th century that carry local one-way east- and westbound
traffic. The major streets in the study area are one-way southbound Broadway, which continues at Bowling
Green as one-way southbound Whitehall Street (which becomes two-way between Water and Pearl streets);
two-way north- and southbound Water Street; and two-way north- and southbound South Street. Two-way
north- and southbound Broad Street carries lesser volumes of traffic. All east- and westbound streets in the
study area, including Wall Street, carry minor traffic volumes. Broadway, Wall Street, and Broad Street are
the major pedestrian streets in the traffic study area.

Surface Traffic Network

Existing vehicular traffic volumes, turning movements, and classification and pedestrian volumes are based
on DCP field counts collected in spring 1996 and 1997. Street network characteristics are based on field
inventories of existing street conditions, including street widths, sidewalk widths, traffic direction flows,
number of moving lanes, number of parking lanes, parking regulations, the location of off-street parking
facilities, vehicular curb cuts, and bus stops, traffic control devices (signals and stop signs), signal timing
(cycle length and phases), and pavement markings analysis. The peak periods analyzed for traffic conditions are Monday to Friday 8:30 to 9:30 a.m. (which in all cases are heavier than the 5:30 to 6:30 p.m. peak hour). Map 21 shows 1996/97 traffic volumes for the a.m. peak hour; Map 22 shows projected traffic volumes for the future no-build conditions in the year 2000. Levels of service were calculated for existing and no-build conditions and four build scenarios (Tables 7 and 8) for the peak a.m. period.

**Build Scenario 1: Wall Street**

Wall Street was analyzed to determine the impacts on downtown vehicular circulation resulting from changing the street direction from two-way to one-way eastbound between Water and South streets. Three intersections on Wall Street, three intersections on Maiden Lane, seven intersections on Old Slip/William Street, three intersections on Gouverneur Lane, and four intersections on Water Street were subject to detailed traffic analysis (Map 23). All approaches continue to operate at no-build or acceptable levels-of-service.

The eastbound approach at Maiden Lane’s intersection with Water Street continues to operate at LOS E. At Wall Street and Water Street, the proposed action eliminates the westbound left- and right-turning movements, which operated at LOS F. At Wall and Front streets, southbound left and through movements decline from LOS A to LOS B. The southbound right and westbound left turns are eliminated. Diverted Wall Street traffic at Old Slip and Water Street delays westbound movements, which drop from LOS A to LOS B.

**Build Scenario 2: Coenties Slip and Hanover Square**

The traffic impacts of changing Coenties Slip from two-way to one-way (south)eastbound and Hanover Square from two-way to one-way (north)westbound were analyzed to determine their feasibility. Four intersections on Water Street and five intersections on Pearl Street were subject to detailed traffic analysis (Map 24). While two intersections on Water Street and one on Pearl Street are impacted by the proposed action, all intersections continue to operate at acceptable levels-of-service in this scenario.

At Water Street and Coenties Slip the eastbound left and right turns decline from LOS B to LOS C. At Water Street and Old Slip the eastbound movements, which operated at LOS C, are eliminated. The westbound left from Coenties Slip to southbound Pearl Street is also eliminated.

**Build Scenario 3: Broad Street**

The feasibility of changing the street direction on Broad Street from two-way to one-way northbound between Wall and Water streets was assessed. Eight intersections on Broad Street, nine intersections on Broadway/Whitehall Street, eight intersections on Water Street, three intersections on Pearl Street, and three intersections on Beaver Street were subject to detailed traffic analysis (Map 25). Levels-of-service at four of the thirteen signalized intersections and one of the fourteen stop-controlled (and two uncontrolled) intersections are affected by the action, with one significant impact.

Traffic diverted from Broad Street to Broadway/Whitehall Street affects the LOS for southbound left turns at Whitehall and Water streets, which drops from LOS D to an unacceptable LOS F. **As mitigation, three seconds of additional signal timing could be assigned from Water Street to Whitehall Street. No standing regulations would be instituted along the west curb from State to Pearl streets and the lane restriped for shared left and right turns.** The southbound left turn would then operate at LOS D, while the rest of the intersection would continue to operate at LOS B/C. Table 9 summarizes the analysis of the mitigation.
measures. Westbound movements at Water Street and Old Slip operate at LOS C instead of LOS B. Three signalized intersections (Broad Street at Exchange Place, Beaver Street, and Water Street) have improved levels-of-service for northbound movements no longer delayed by eliminated southbound traffic.

**Build Scenario 4: John Street**

It is recommended that John Street between Pearl and Water Streets be changed from two-way to one-way eastbound. Westbound traffic volumes are so minor, with 20 peak-hour cars, that a traffic analysis was deemed unnecessary. While access to the affected block of John Street would be slightly circuitous, the actions would eliminate turning movements and improve traffic flow at both intersections.

**Build Scenario 5: Combined (Scenarios 1, 2, and 3)**

The combined traffic impacts of three proposed actions were evaluated. The nine intersections on Water Street between Maiden Lane and Whitehall/State Street were the locations where actions overlapped in their impact on the traffic network. Levels-of-service at eight signalized intersections and three stop-controlled intersections are affected in this scenario, with one significant impact (Map 26).

In this scenario all traffic operations continue to operate at either no-build or acceptable levels of service, except, as in Scenario 3, the southbound left turn at Water and Whitehall streets. This approach declines from LOS D to LOS F unless mitigated as proposed above. Table 9 summarizes the analysis of the mitigation measure. In addition, north- and southbound traffic declines from LOS B to C. Levels of service deteriorate at four other signalized intersections. Eastbound movements on Wall Street at Water Street drop from LOS C to D. Eastbound movements on Water Street at Broad Street drop from LOS B to LOS C, as do eastbound movements at Coenties Slip and Water Street. Northbound traffic on Broad Street at Beaver Street also declines from LOS B to C. Levels of service at three stop-controlled intersections -- Wall Street at Pearl and Front streets and Old Slip at Water Street -- decline from A to B.

The combined build scenario improves levels of service by eliminating all southbound movement on Broad Street from Wall Street to Water Street, westbound movement on Wall Street from South to Water Streets, westbound movement on Coenties Slip, and eastbound movement on Hanover Square for the block between Pearl and Water streets.
### Table 7  Existing (1997), No-Build, and Build Traffic Conditions
**Signalized Intersections**

<table>
<thead>
<tr>
<th>Signalized Intersection</th>
<th>Dir/Lane Group</th>
<th>Existing</th>
<th>No-Build</th>
<th>Build 1</th>
<th>Build 2</th>
<th>Build 3</th>
<th>Build Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>V/C ! Ratio</td>
<td>Delay*</td>
<td>LOS</td>
<td>V/C ! Ratio</td>
<td>Delay*</td>
<td>LOS</td>
</tr>
<tr>
<td><strong>AM Peak Hour</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broadway @ Wall Street</td>
<td>Sb -LT</td>
<td>0.47</td>
<td>5.3</td>
<td>B</td>
<td>0.51</td>
<td>5.3</td>
<td>B</td>
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<td>Broadway @ Rector Street</td>
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<td>25.8</td>
<td>D</td>
<td>0.64</td>
<td>26.2</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>Sb -T</td>
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<td>5.4</td>
<td>B</td>
<td>0.53</td>
<td>5.6</td>
<td>B</td>
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<td>3.5</td>
<td>A</td>
<td>0.61</td>
<td>3.7</td>
<td>A</td>
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<tr>
<td></td>
<td>-TR</td>
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<td>15.3</td>
<td>C</td>
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<td>0.18</td>
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<td>Broadway @ Exchange Place</td>
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<td>23.3</td>
<td>C</td>
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<td>Broad Street @ Beaver Street</td>
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<td>0.21</td>
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<td>Broad Street @ Water Street</td>
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<td>11.7</td>
<td>B</td>
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<td>Wh -LR</td>
<td>0.92</td>
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<td>15.2</td>
<td>B</td>
<td>0.59</td>
<td>16.2</td>
<td>C</td>
</tr>
</tbody>
</table>

- **V/C ratio over 1.2 is incalculable**
- **Delay in seconds by lane group**
- # Denotes a significant impact as defined by the CEQR Technical Manual 1993

Source: Existing volumes DCP field counts, April 1996, April/May 1997
## Table 7 Existing (1997), No-Build, and Build Traffic Conditions
### Signalized Intersections

<table>
<thead>
<tr>
<th>Signalized Intersection</th>
<th>Dir/Lane Group</th>
<th>Existing</th>
<th>No Build</th>
<th>Build 1</th>
<th>Build 2</th>
<th>Build 3</th>
<th>Build Combined</th>
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</thead>
<tbody>
<tr>
<td></td>
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<td>V/C ! Ratio</td>
<td>Delay*</td>
<td>LOS</td>
<td>V/C ! Ratio</td>
<td>Delay*</td>
<td>LOS</td>
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<td><strong>Wall Street @ South Street</strong></td>
<td></td>
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<td><strong>Maiden Lane @ South Street</strong></td>
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<td>9.4</td>
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* V/c ratio over 1.2 is incalculable
* Denotes a significant impact as defined by the CIQR Technical Manual 1993

Source: Existing volumes DCP field counts, April 1996, April/May 1997
Table 8  Existing (1997), No-Build, and Build Traffic Conditions
Unsignalized Intersections

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<th>Unsignalized Intersection</th>
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*Average total delay in seconds

Source: Existing volumes DCP field counts, April 1996, April/May 1997
### Table 8  
**Existing (1997), No-Build, and Build Traffic Conditions**

**Unsignalized Intersections**

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<th>Unsignalized Intersection</th>
<th>Dir/Lane Group</th>
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*Average total delay in seconds

Source: Existing volumes DCP field counts, April 1996, April/May 1997
Table 9  No-Build, Build, and Mitigated Build Traffic Conditions
Water Street and Whitehall Street

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<th>Build 2</th>
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* V/C ratio over 1.2 is incalculable
# Denotes a significant impact as defined by the CEQR Technical Manual 1993

Source: Existing volumes DCP field counts, April 1996, April/May 1997
Map 21

Existing Traffic Conditions: AM Peak Hour

Lower Manhattan Pedestrianization Study
City of New York  ●  Department of City Planning  ●  Department of Transportation
Map 23
Build Traffic Conditions: AM Peak Hour

Scenario 1 (Wall Street One-way Eastbound from South to Water Streets)
Map 24
Build Traffic Conditions: AM Peak Hour

Scenario 2 (Coenties Slip and Hanover Square One-way from Pearl to Water Streets)
Map 25
Build Traffic Conditions: AM Peak Hour

Scenario 3 (Broad Street One-way from Water to Wall Streets)
Credits

Department of City Planning

Joseph B. Rose, Director
Andrew S. Lynn, Executive Director
William Bernstein, First Deputy Executive Director
Sandy Hornick, Deputy Executive Director, Strategic Planning
Michael Levine, Director of Studies

Transportation Division

Floyd Lapp, Director
Glen A. Price III, Deputy Director
Jack Schmidt, Deputy Director
Regina Myer, former Deputy Director
Scott Wise, Project Manager
Hayes Lord, City Planner
Janet Homs, City Planner
Heather Barrow, former City Planner
Howard Snyder, former College Aide

The following staff contributed to data collection and analysis and report production: Daniel Campo, Antonia Comaro, Shampa Chanda, Jerry Cheng, Gary Dearborn, Ruthie Gray, Douglas Jacobs, Paul Januszewski, Kenneth Laidlow, Marian Lee, Eliot Lerman, Shaogang Li, Conrad Misek, Olga Olovyanikov, Christina Parrelli, Benny Phillips, Stratos Prassas, Omatti Ramlakham, Alan L. Ripps, Judith Ross, Evette Soto, Nicolae Stossel, Lydia Velasquez, George Wade

Zoning and Urban Design Division

Marilyn Mammano, former Director
Geoffrey Baker, Chief Urban Designer
Lauren Otis, former Chief Urban Designer

Manhattan Borough Office

Richard Barth, Director
Khalid Afzal
Philip Schneider

Department of Transportation

Christopher R. Lynn, Commissioner
Joan McDonald, Chief Transportation Officer

Harley Brook-Hitching, Assistant Commissioner, Business Mobility
Luiz Aragão, Chief, Urban Mobility
Randy Wade, Director, Pedestrian Projects
Glynis Berry, former Director, Pedestrian Projects
Michael King, Director, Traffic Calming
Lisa Lau

Peter A. Pennica, Chief, Plans and Surveys
Naim Rasheed, Director, Office of Project Analysis/CEQR
Mesoret Yilma

Jay Jaber, Deputy Director of Highway Design/Construction
Ben Eliya
Lyonel Noel

Leon Heyward, Manhattan Borough Commissioner
Michael Harnett, former Borough Engineer

Alan Borock, Director, Signal Engineering
Woon Yan

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