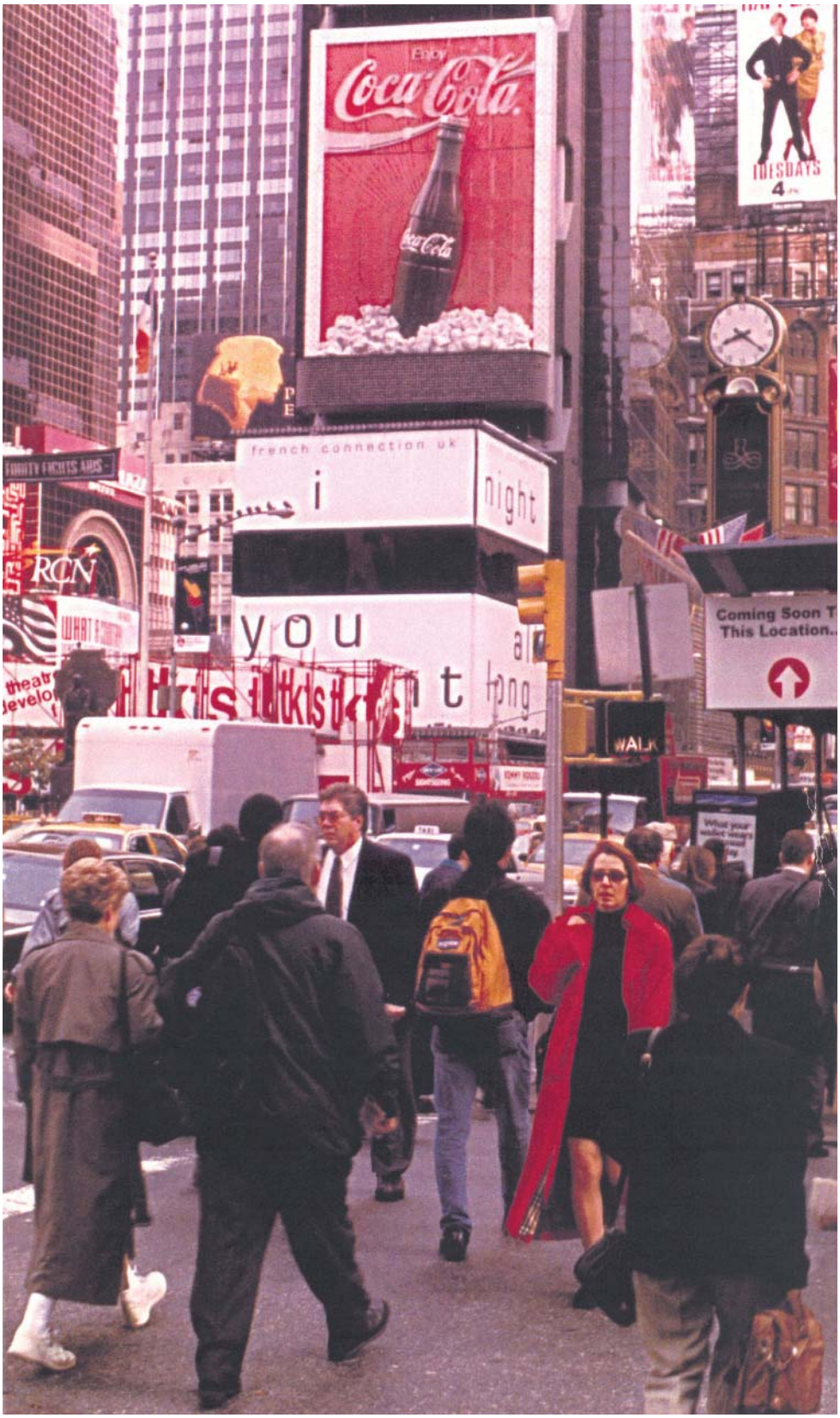
Midtown Manhattan Pedestrian Network Development Project



Rudolph W. Giuliani
Mayor
New York City

Joseph B. Rose
Director
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June 2000

MIDTOWN MANHATTAN
PEDESTRIAN NETWORK DEVELOPMENT PROJECT
PHASE I

Final Report

June 2000

Rudolph W. Giuliani, Mayor
City of New York

Joseph B. Rose, Director
Department of City Planning

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TABLE OF CONTENTS

LIST OF MAPS AND TABLES

MAPS

TABLES

EXECUTIVE SUMMARY

Transportation and access issues are important considerations in maintaining and strengthening the City's core areas. This project, a joint effort of the Department of City Planning and the Department of Transportation, evaluates pedestrian as well as vehicular circulation to reduce pedestrian-vehicular conflicts and pedestrian and vehicular congestion, and to improve safety, access, convenience and the urban environment.

This first phase of the Midtown Manhattan Pedestrian Network Development project focuses on West Midtown, from West 38th Street to West 53rd Street between Sixth and Eighth avenues. The study area contains the Theater District, parts of the Garment District, and borders the Port Authority Bus Terminal.

New York City and State initiatives to reverse the deterioration of Times Square and West 42nd Street, have spurred new private-sector investments resulting in the development of hotels, entertainment facilities, offices and even residential buildings. The distinctive Times Square islands are vibrant with visitors, reflecting their confidence in and endorsement of the transformations. With the completion of the on-going developments, and more on the way, the pedestrian volumes in the area are expected to increase further.

General problems, prevalent area-wide, include: pedestrian congestion; pedestrian-vehicular conflicts; inefficient curbside management; underutilized taxi stands; lengthy truck loading/unloading hours; inappropriate signage; vehicular non-compliance with existing curb and moving regulations; and the absence of amenities for pedestrians. Vehicular congestion and delay, particularly due to turning vehicles, double parking, taxi pick-up and drop-offs, and truck delivery, contribute to the reduced capacity of the streets and, in many cases, obstruct buses from reaching curbside bus stops.

Priority locations for improvement were identified within the study area based on pedestrian-vehicular conflicts as reflected in locations with high pedestrian accidents, and prominent pedestrian corridors - including: West 42nd Street between Sixth and Eighth avenues; Eighth Avenue between West 40th and West 43rd streets; and the Times Square Bow-Tie between West 43rd and West 47th streets.

More specifically, the problems observed in the area were due to factors including: signal timing, and street geometry. Signal timing was inadequate for pedestrians on Broadway at West 45th Street and on Eighth Avenue at West 42nd Street.

The study recommends exploring the possibility of increased green time for pedestrians in the pre-theater hours, in conjunction with exploring alternatives to reduce traffic on West 42nd Street. In Times Square at West 45th Street, Broadway and Seventh Avenue decrease in street width and then increase again to the south. This provides excess roadbed space to the north and south sides of this narrowed intersection and creates an opportunity to widen the sidewalks.

Recommended Actions

Address Pedestrian Congestion and Safety

- Change curb lines to widen sidewalks and street corners;
- Mark widened high-visibility crosswalks at accident locations; a Barnes dance cross walk; and a new crosswalk and traffic signal on West 42nd Street;
- Clear corners and relocate street furniture that obstructs pedestrian circulation; and
- Increase signal time for pedestrians in the Bow Tie and near PABT during evening off peak hours.

Address Pedestrian-Vehicular Conflict and Vehicular Congestion and Delay

- Prohibit turns and channelize traffic through lane markings, signs, and enforcement;
- Limit truck delivery hours to off peak hours, i.e. 10 AM - 4 PM; extend bus stops; in stitute no stopping/parking regulations; and
- Improve taxi circulation through increased use of taxi stands; new taxi dispatch loca tions.

Enhance Pedestrian Space and Facilitate Traffic in the Times Square Bow-Tie (*Map 13: Recommended Sidewalk Widenings in the Times Square Bow Tie*)

- Widen sidewalks by taking advantage of excess roadbed north and south of the bottle neck while maintaining the existing three traffic lanes each on Broadway and Seventh Avenue; and
- Alternatively, widen sidewalks and reconfigure Broadway with two traffic lanes and Seventh Avenue with four traffic lanes to facilitate through traffic.

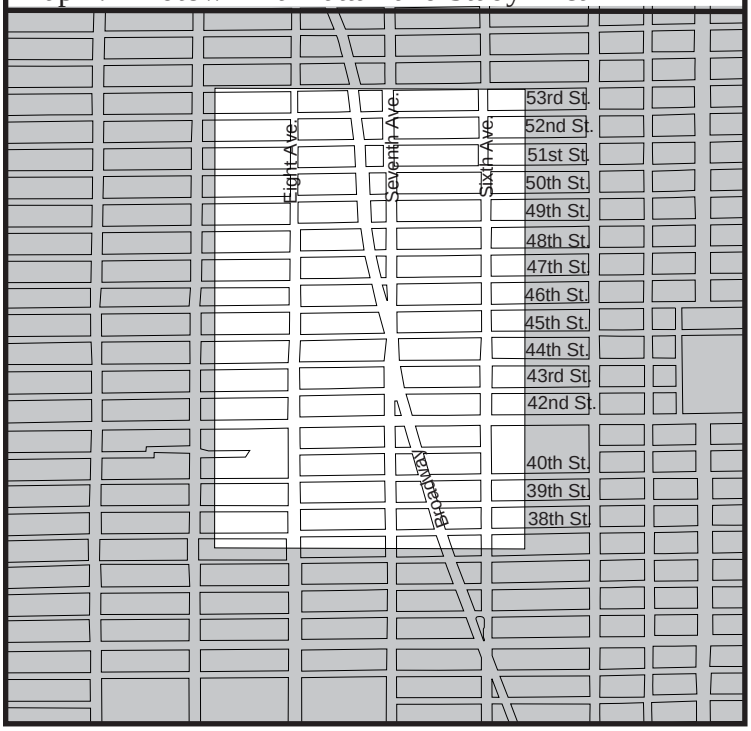
INTRODUCTION

One of the densest, busiest, and most vibrant places in the world, Midtown Manhattan is the largest business district in the country. Midtown's core is an area of approximately four square miles bounded by Third Avenue to the east, Ninth Avenue to the west, 59th Street and Central Park South to the north, and 30th Street to the south (*Map 1: Midtown Manhattan and Study Area*). It contains an intense variety of activities, including commercial, residential, institutional, entertainment, and tourist uses. Three regional transportation hubs and an outstanding mass transit system are used daily by millions of people to access the area. In addition, the city's street grid and the Queensboro Bridge and Lincoln and Midtown tunnels provide vehicular access to Midtown from the city and the region.

Goals and Objectives

The study focuses on the Times Square and the Theater District based on an analysis of factors important to pedestrian and vehicular circulation: existing land uses; growth of new tourist and entertainment activities; new development; shift of the CBD west; US Census journey-to-work data; transportation hubs; mass transit access; pedestrian and vehicular volumes; pedestrian accidents; street and sidewalk widths; and the involvement of business improvement districts (BIDs) and other entities in street improvement projects. This project evaluates the pedestrian and vehicular network and the existing infrastructure in Times Square and the Theater District and recommends implementation measures to improve safety, mobility, and convenience for pedestrians and vehicles.

Map 1: Midtown Manhattan and Study Area



The study area, from Sixth to Eighth avenues and West 38th to West 53rd streets, has enormous volumes of pedestrian and vehicular traffic. This is due to the proximity of the Port Authority Bus Terminal and 15 subway lines; the renaissance of New York City as a mecca for tourists; the redevelopment activity on West 42nd Street and Times Square, and the growth of commerce, theaters, and hotels. The high pedestrian and vehicular volumes contribute to congestion and create conflict and unsafe conditions, that are exacerbated by the irregular geometry of the Times Square Bow Tie (where Broadway crosses Seventh Avenue between West 42nd and 47th streets). The competition for space is intense and the resulting pedestrian environment is impeded by obstructed sidewalks, conflicts with traffic, and poor directional and informational signs.

Project Scope

The work program includes reviewing past studies for Midtown and analyzing the recommended actions; collecting data and analyzing existing conditions of pedestrian/vehicular activity and conflicts; inventorying and mapping street furniture; developing priority recommendations for short- and long-range improvements; and producing conceptual and schematic designs. The traffic impacts of the proposals will be analyzed, and the feasibility of recommended actions will be tested and evaluated, while simultaneously installing immediate low-cost improvements.

The project develops a range of site-specific design proposals for physical and operational street improvements varying in scope, complexity, cost and term. Selected streets with the most immediate links to mass transit, retail corridors, activity nodes and tourist attractions, will be given priority for recommended improvements. Measures to improve the pedestrian network include: widened sidewalks and street corners; removal of pedestrian obstructions on sidewalks; crosswalk treatments; high-visibility pavement markings; changes in signal timing and turning regulations; curb use changes; restriped lanes to channel traffic; improved lighting and directional signs; and street furniture. Low cost tests and recommended measures for improvement would be implemented by DOT during the second phase of the project.

On-Going Street Improvement Projects

The City has developed a number of policies and programs to alleviate pedestrian congestion and improve the streetscape. A 1995 mayoral executive order mandates clearing street corners of unnecessary clutter. In northern Midtown, the Departments of City Planning and Transportation propose to reconfigure the street geometry within Columbus Circle to improve pedestrian and vehicular circulation and transform the circle into a major civic space. Improved pedestrian connections within a renovated Grand Central Terminal are currently underway. DOT's Midtown projects include the reconfiguration of Herald Square at Broadway, Sixth Avenue, and West 34th Street, street sign improvements from West 51st to 54th streets between Fifth and Eighth avenues, and the relocation of designated tour bus layovers in Times Square. DOT, in conjunction with DCP and the New York Police Department (NYPD), has installed pedestrian separators and mid-block crosswalks at West 50th Street and Fifth and Sixth avenues in a pilot program intended to lessen pedestrian-vehicular conflict and improve crosstown vehicular flow. Street corner extensions, or neckdowns, identifying pylons, and other street improvements on West 47th Street between Fifth and Sixth avenues planned by the NYC Economic Development Corporation (EDC) will enhance the Diamond District's appeal as a specialty retail street.

Other organizations addressing circulation within Midtown include: the Times Square Business Improvement District (BID), Grand Central Partnership, 34th Street Partnership, Bryant Park Restoration Corporation, Fifth Avenue Association, Rockefeller Association, Fashion Center BID, and the Cityscape Institute.

The Grand Central Partnership, 34th Street Partnership, and the Fifth Avenue Association have reduced sidewalk clutter and congestion by installing clear corner zones; new street lighting, banners, planters, news boxes, trash cans; and distinctive crosswalks. The Fashion Center BID is reinforcing the unique identity of the area with banners and a sculpture of a button and a needle, symbolic of the garment district. The Cityscape Institute has initiated a demonstration project to redesign the streetscape on West 55th Street between Fifth and Eighth avenues.

The Times Square BID faces the challenge of accelerated changes on the New 42nd Street and in the Theater District, which is quickly becoming the most popular destination for tourists and retailers. Their efforts in the area are visible through an area-wide map, the (existing and) planned Times Square visitors center to be housed in a former theater; directional maps, and banners for street identity. The BID will also be recommending improvements to mid-block pedestrian connections and the traffic islands in the Times Square Bow Tie.

EXISTING CONDITIONS

Land Use

The predominant land use within Midtown Manhattan is commercial office buildings. Other commercial uses includes theaters, hotels, retail, and tourist attractions. Broadway theaters are concentrated north of West 42nd Street between Sixth and Eighth avenues. Hotels are clustered in the Theater District, north and south of Grand Central Station, and south of Central Park. Streets with major ground floor retail uses include: 34th Street and Herald Square; West 42nd to West 51st streets from Fifth to Sixth avenues; 57th Street from Lexington to Ninth avenues; and Third Avenue from East 34th to East 38th streets. The Empire State Building, Times Square, the Theater District, Rockefeller Center, Fifth Avenue, Bryant Park, the New York Public Library, and Central Park are among the tourist attractions in Midtown. Residential buildings are clustered around Columbus Circle and along Ninth Avenue; around Bloomingdale's at East 59th Street; and south and east of Third Avenue and East 34th Street.

Special streets include: 42nd Street; Fifth and Madison avenues; the Millinery district on West 37th Street; Club Row on West 44th Street, Little Brazil on West 46th Street, the Diamond District on West 47th Street, all between Fifth and Sixth avenues; Restaurant Row on West 46th Street between Eighth and Ninth avenues; Music Row on West 48th Street between Sixth and Seventh avenues; East 53rd Street with the Museum of Modern Art, Lever House, the CBS, Seagram's, and Citicorp buildings; 57th Street, with theme restaurants and retail outlets, second-floor art galleries, and Carnegie Hall; and 59th Street, with Columbus Circle, Central Park, first-class hotels, Bloomingdale's, and the Queensboro Bridge.

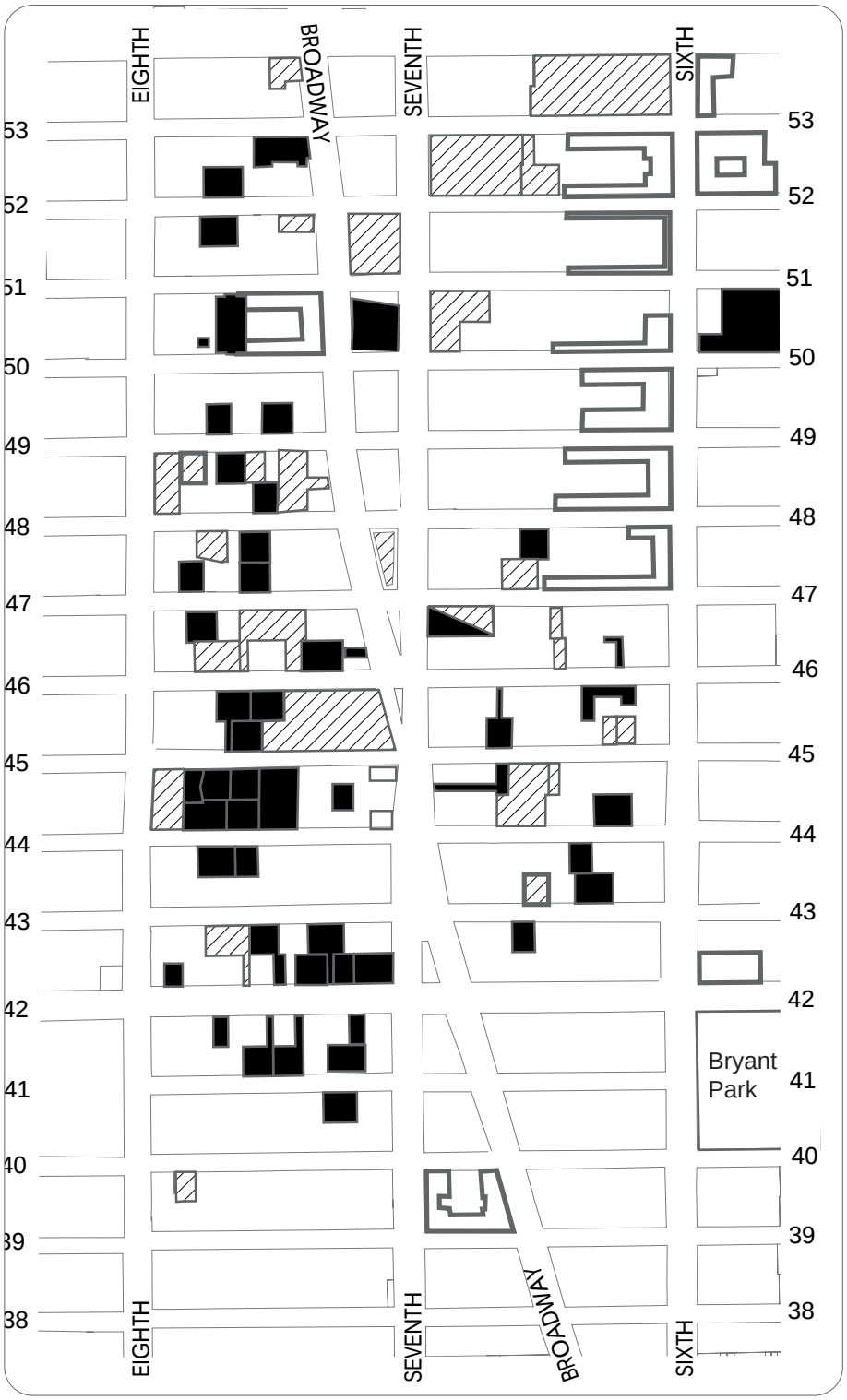
Times Square and the Theater District are the center of the city's cultural, theatrical, and entertainment world, generating significant pedestrian and vehicular traffic: it is estimated that the area attracts 31 million tourists annually. Times Square is "the crossroads of the world" and Broadway is synonymous internationally with theater. Outside of London there is no greater concentration of legitimate theaters: each year the 39 Broadway theaters, 33 of which are landmarks, draw nine million people. The district's 20 hotels, with one-fifth of all hotel rooms in the city, lodge 1.7 million guests. The area also boasts 200 restaurants and several museums, cinemas, and concert halls. There are 46 open spaces in or on the edge of the study area *(Map 2: Land Use*), including Central Park, Bryant Park, Rockefeller Center, and 11 mid-block building plazas and passageways accessible to the public.

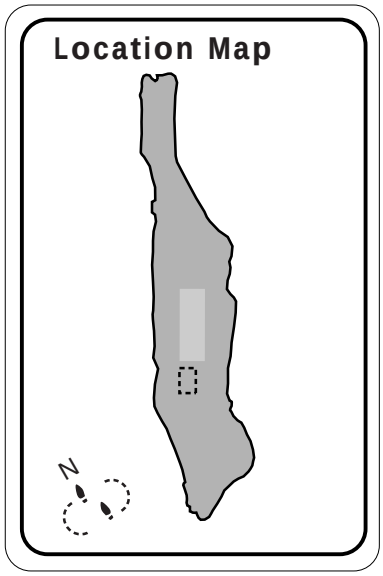
New Development

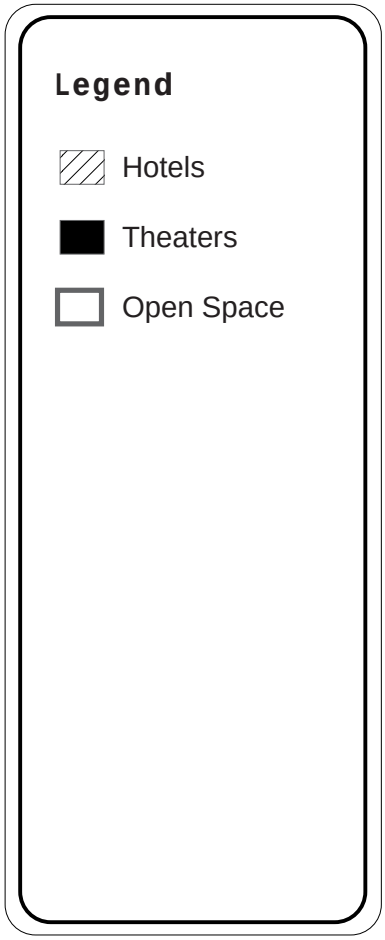
New York City's recovering economy is reflected in low real estate vacancies, conversions of older buildings to office or residential use, and new construction. New York has regained its position as a world class tourist destination, as evidenced by hotel occupancy rates. The state-sponsored redevelopment of West 42nd Street is in full swing, thereby reversing the deterioration of Times Square and preserving a part of the city's heritage. The proposed development of eight million square feet includes office buildings planned or under construction, hotels, stores, reconstructed theaters such as the New Victory and New Amsterdam theaters, and other tourist attractions, which are expected to generate over 1200 new vehicle trips in the PM peak hour. Other new projects nearby include stores, six hotels, and two residential buildings on Eighth Avenue near West 50th Street (*Map 3: New Development*).

DCP has proposed to rezone the Theater Subdistrict (boundaries) to allow the wider transfer of available development rights from traditional Broadway Theaters in exchange for the preservation of the Theaters for legitimate theater use and a contribution to a theater subdistrict fund. The proposal also proposes new land use and urban design controls for both sides of Eighth Avenue to ensure the orderly growth and development of the corridors and to establish a better streetscape and pedestrian environment and a built form that is compatible with the surrounding context and neighborhood character.

Map 2
Land Use: Theaters, Hotels and Open Space







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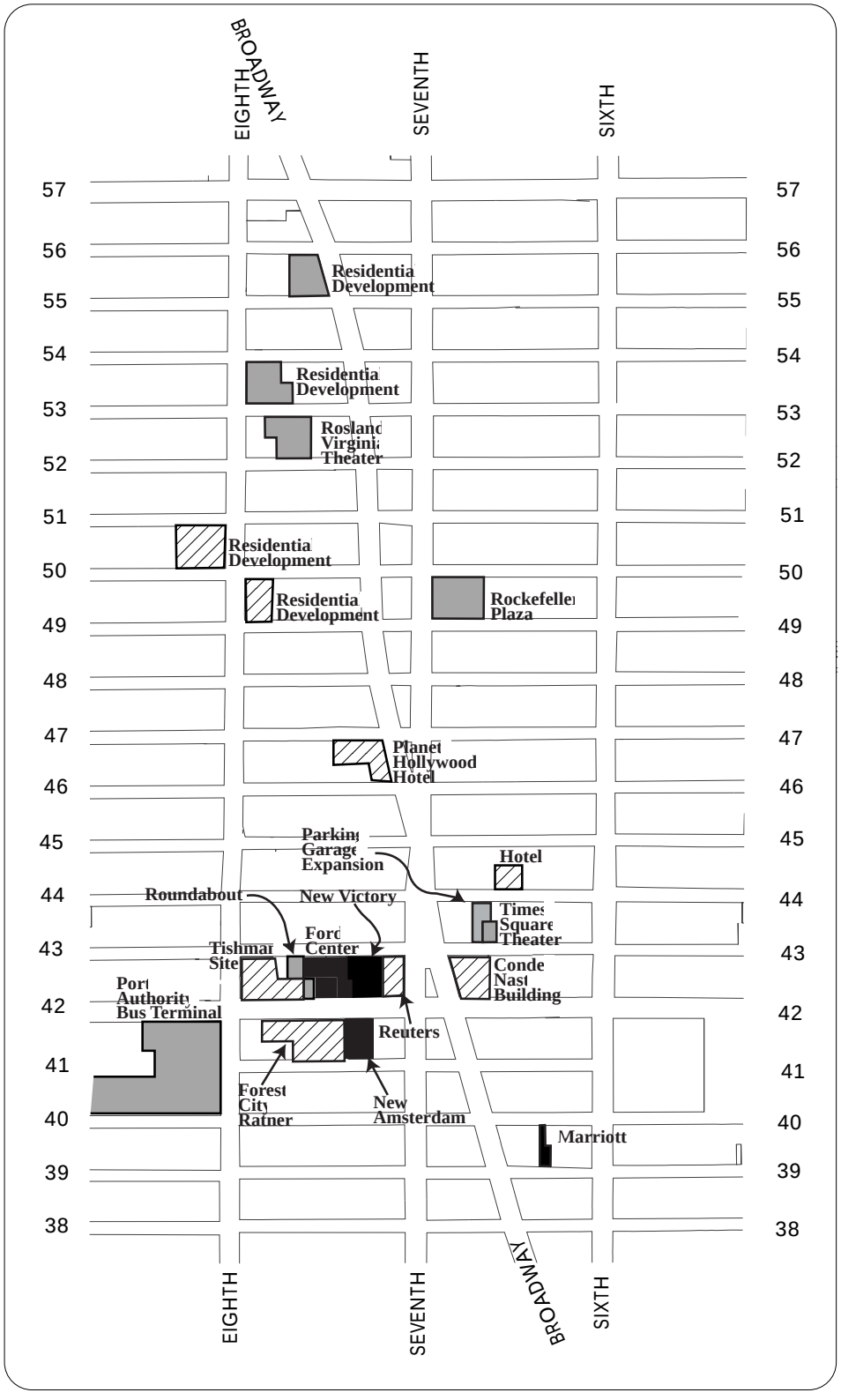
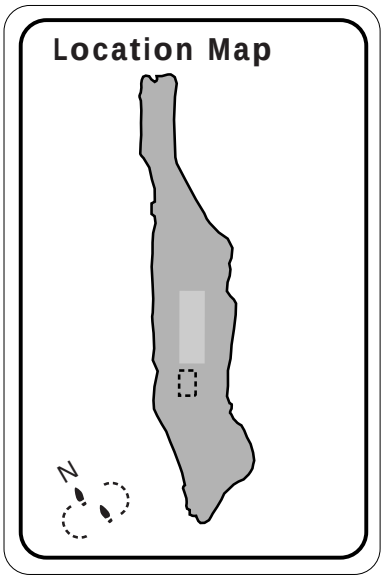
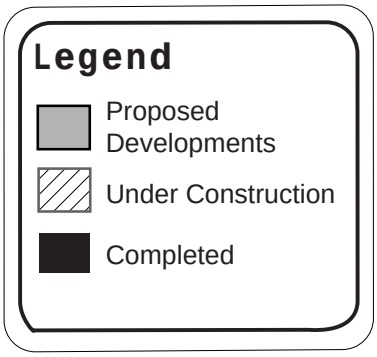
Map 3
New Developments







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Journey to Work

The 1990 US Census Journey to Work (JTW) data was analyzed to rank clusters of census tracts by concentration of working population (*Appendix: Table A*). Daily, approximately 800,000 people journey to work in Midtown Manhattan. Grand Central Terminal and vicinity draws 22 percent of the workforce; the tracts north of Grand Central Terminal and south of Central Park each employ 17 percent. The study area (Census Tracts 113, 119, 125, and 131, from West 38th to 55th streets and Sixth to Eighth avenues) employs 136,375 people, or 17 percent of Midtown Manhattan's workers. Approximately 80 percent of these workers rely on transit as their primary commute mode.

Transportation Hubs

The region's three transportation hubs are located in Midtown Manhattan, in or near the study area. Penn Station at West 34th Street and Seventh Avenue serves New Jersey and Long Island commuters and Amtrak; the Port Authority Bus Terminal (PABT) at West 42nd Street and Eighth Avenue primarily serves New Jersey and the Hudson Valley region, and Grand Central Terminal at East 42nd Street and Park Avenue serves the northern suburbs and Connecticut. The Port Authority Trans-Hudson (PATH) station at West 33rd Street and Sixth Avenue also links New York and New Jersey. Integrated within these complexes are connections to NYC Transit subways. The 1996 Hub-Bound Travel Report registers approximately 670,000 passengers (in and out bound) for the three hubs on a fall business day; 310,000 passengers at Penn Station, 185,000 at the PABT, and 175,000 at Grand Central Terminal.

Subways

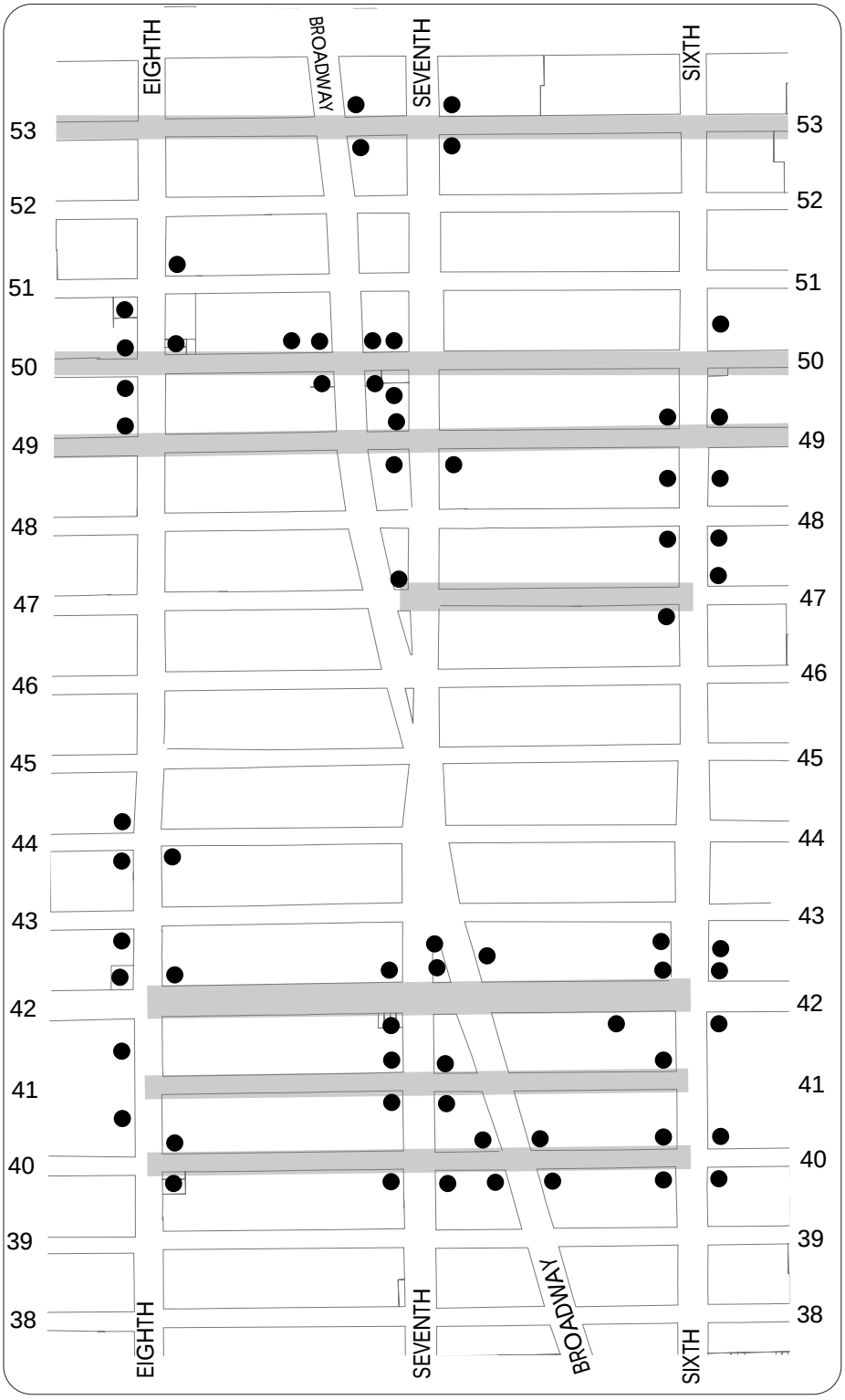
Times Square and the Theater District are served by 15 subway lines: the Eighth Avenue IND A, C and E; the Seventh Avenue/Broadway IRT 1, 2, 3 and 9; the Broadway BMT N and R; the Sixth Avenue IRT B, D, Q and F; the Flushing IRT 7; and the 42nd Street shuttle. Subway stations on these north-south routes are generally aligned in three east-west catchment areas along West 40th to 42nd streets, West 47th to 50th streets, and West 53rd Street (*Map 4: Transit Nodes and Corridors*). A weekday average[1] of almost 118,000 people enter the Times Square/PABT stations, where eleven converging lines are connected by underground walkways, making it the second busiest in the system. Twenty-six entrances/exits between West 40th and 44th streets provide access to the complex.

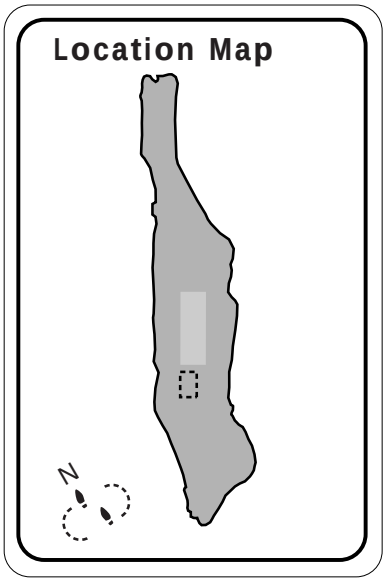
Buses

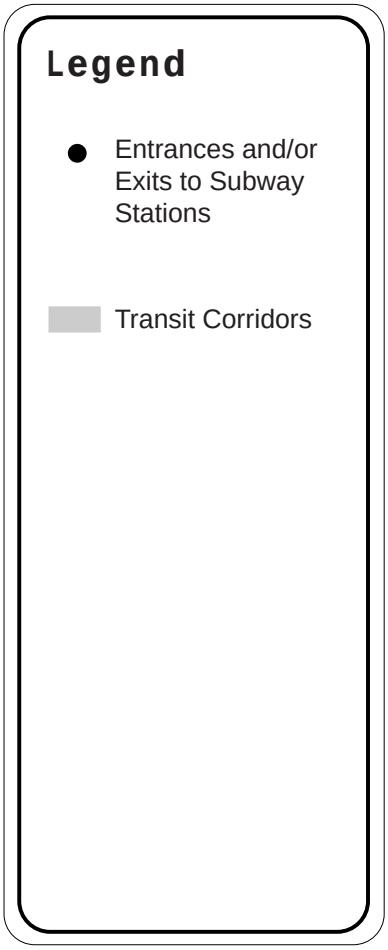
MTA bus routes servicing the area include: the M6 and M7 on Sixth Avenue and Broadway/Seventh Avenue; the M10 and M104 on Broadway/Seventh Avenue and Eighth Avenue; the M42 and M104 on West 42nd Street; the M27 on Broadway/Seventh Avenue, Eighth Avenue, West 49th and 50th streets; the M50 on West 49th and 50th streets; and the M30, M31, and M57 on West 57th Street. Peak hour bus lanes are designated on 42nd and 57th streets and Sixth and Eighth avenues; 49th and 50th streets are designated transit corridors for buses and taxis. Express and tour buses also operate in the area.

1 The 1995 Subway Registration Report does not provides the exact location where people enter the system. For instance, registrants at Times Square and 42nd Street/PABT include all people using entrances on West 42nd Street between Sixth and Eighth avenues.

Map 4
Major Transit Nodes and Corridors







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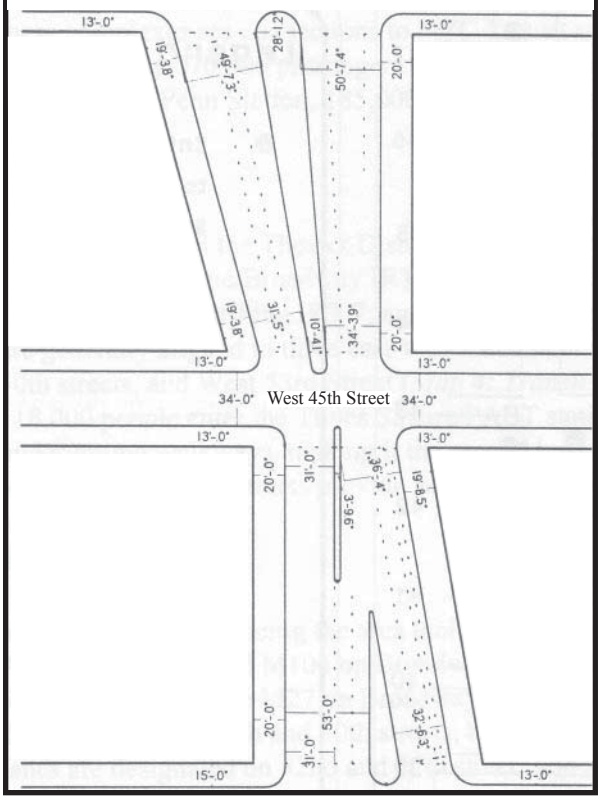
Street Directions and Widths

Midtown's streets are laid out on a grid. Avenues are north-south corridors, usually wide streets carrying one way traffic. Third, Madison, Sixth and Eighth avenues are northbound; Lexington, Fifth, Seventh, and Ninth avenues and Broadway are southbound. In general, the avenues are 100 feet wide, with 60-70 foot roads and 15-20 foot sidewalks. Fifth Avenue has a 55 foot roadbed and 22.5 foot sidewalks. Park Avenue is two way and the widest avenue at 140 foot. The narrowest, Lexington Avenue has a 51 foot roadbed and 12 foot sidewalks.

Streets are east-west corridors. The most important Midtown crosstown streets -- 34th Street, 42nd Street, 57th Street, and 59th Street/Central Park South -- carry heavy two-way traffic and are 100 feet wide, with 55-60 foot roads and wide sidewalks of 20-22.5 feet. All other crosstown streets are narrow one-way streets; in general, eastbound streets are even numbered and westbound streets are odd numbered. These directions are reversed on segments of West 33rd, West 41st, and East 59th streets. One-way streets typically have 30-35 foot roadbeds and 13-15 foot sidewalks.

Map 5 - Times Square Bow Tie Street Geometry



Map 5 Times Square Bow Tie Street GeometryThe grid of the street network is interrupted by the diagonal of Broadway, forming major public spaces at Columbus Circle at Eighth Avenue and Central Park South (West 59th Street), Times Square at Seventh Avenue and West 45th Street, and Herald Square at Sixth Avenue and West 34th Street.

The two northbound corridors in the study area, Sixth and Eighth avenues, carry more traffic and fewer pedestrians than Broadway and Seventh Avenue. Sixth Avenue has a 66 foot roadbed, with five travel lanes, a parking lane, a bike lane, and 17 foot sidewalks. Eighth Avenue, a local truck route, has a 70 foot roadbed divided into four moving lanes and two parking lanes. Sidewalks are 15 feet wide.

The southbound avenues, Broadway and Seventh Avenue, typically have 60 foot roads and 20 foot sidewalks. Broadway has four moving lanes, two parking lanes, and a bike lane. Seventh Avenue has four moving and two parking lanes. Where Broadway diagonally crosses Seventh Avenue at West 45th Street, creating short blocks and the traffic islands known as the Times Square Bow Tie, both avenues decrease from 60 feet to 34 feet and 31 feet, respectively, then increase again to 60 feet to the south (*Map 5: Times Square Bow Tie Street Geometry*). Seventh Avenue and Broadway each have three moving lanes at West 45th Street; to the north and south of the Bow Tie intersection lanes are not clearly marked nor uniform in width.

Pedestrian Volumes

Midtown Manhattan has extremely high pedestrian volumes. Grand Central Partnership's and 34th Street Partnership's Fall 1996 average AM, MD, and PM peak hour pedestrian counts recorded over 9,200 pedestrians at Fifth Avenue and East 42nd Street and 11,040 pedestrians at Seventh Avenue and West 34th Street.

Times Square and the Theater District are heavily traversed by pedestrians -- commuters, visitors, and tourists -- throughout the day. Pedestrian counts conducted in August 1997 by Philip Habib and Associates for the Times Square BID, on Seventh Avenue and Broadway between West 42nd and West 44th streets show that from 12:00 PM noon onwards, hourly volumes on matinee Wednesdays range from 3,700 to 7,000 pedestrians. On an average Saturday at midnight, there are almost 5,000 pedestrians in Times Square on West 42nd Street at Seventh Avenue, despite the fact that major sites in the area are vacant, being prepared for redevelopment, or under construction. In September 1996, high volumes of pedestrians were noted along Eighth Avenue and in the Times Square Bow Tie: the most pedestrians were located on West 44th Street at Broadway during the evening peak hour. The 1992 42nd Street Light Rail Transit Line Final Environmental Impact Statement (CEQR 92DOT008M) recorded peak hour pedestrian volumes on West 42nd Street between Seventh Avenue and Broadway of about 4,890 during the AM peak hour; 4,150 during the midday peak hour; and 6,400 during the PM peak hour, at a time prior to the development of millions of square feet of commercial space.

Field observations reveal that the major pedestrian corridors are those avenues and streets nearest theaters and hotels --Broadway and Seventh Avenue and West 44th to West 47th streets -- and those connecting to transit nodes such as the Port Authority Bus Terminal at Eighth Avenue between West 40th and West 42nd streets and the Times Square subway complex at West 42nd Street and Broadway, Seventh and Eighth avenues. Crosstown streets with subway entrances/exits at two or more intersections between Sixth and Eighth avenues -- West 40th Street (4 entrances/exits), West 42nd Street (3), West 47th Street (3), West 49th Street (2), West 50th Street (3), and West 53rd Street (2) -- are important pedestrian corridors.

On the avenues, the heaviest pedestrian volumes were observed on: the west side of Seventh Avenue between West 39th and West 45th streets, then continuing on Broadway between West 45th and West 47th streets; the east side of Seventh Avenue between West 44th and West 50th streets; and on both sides of Broadway between West 47th and West 53rd streets. On crosstown streets high pedestrians volumes are found on the north side of West 40th and West 41st streets; both sides of West 42nd, West 45th, and West 47th streets; the south side of West 50th Street between Sixth and Eighth avenues; and both sides of West 44th, West 46th, and West 53rd streets between Broadway and Eighth Avenue.

Certain mid-block through passageways, such as Shubert Alley, are also important pedestrian paths between the Port Authority Bus Terminal, the Theater District, and the Midtown office core and carry significant pedestrian traffic, particularly in the peak commuter hours.

Pedestrian Accidents

Pedestrian safety is one of the most critical factors in assessing the circulation network. DOT's pedestrian accident data over five years was analyzed to identify Midtown locations with high numbers of accidents and fatalities. There were 4,840 pedestrian accidents, 3,583 at intersections and 1,257 at mid-block locations, including 31 fatalities, over the five-year period, 1989-1994. Every intersection within Midtown's core had at least one pedestrian accident. The north-south avenues with the most pedestrian accidents are Fifth Avenue, Seventh Avenue, and Eighth Avenue. The most dangerous east-west streets are the wide, two-way streets: 34th Street, 42nd Street, and 57th Street. One-way east-west streets where pedestrians are most vulnerable are 33rd, 40th, and 50th streets.

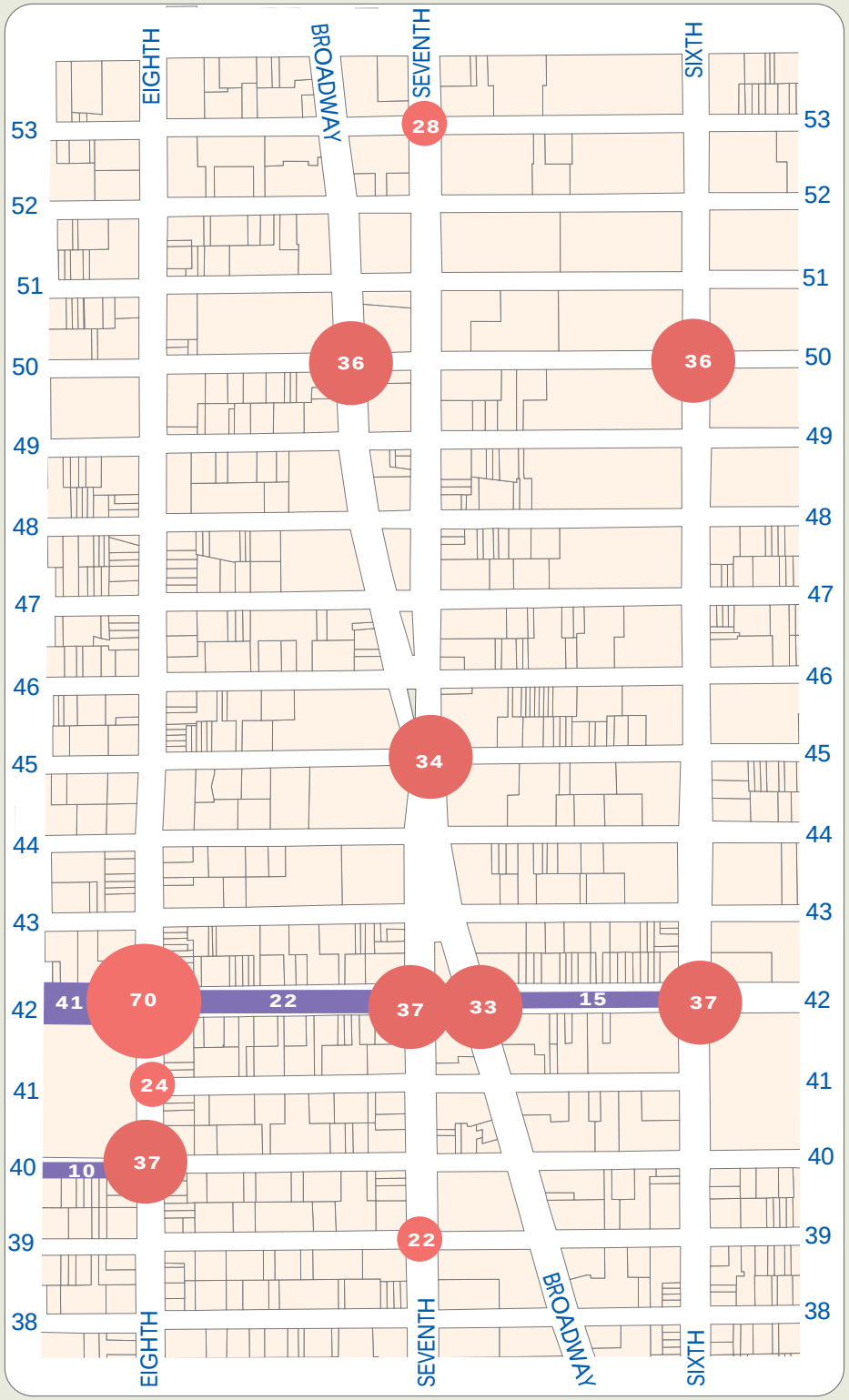
Forty Midtown intersections had twenty or more pedestrian accidents during the five-year period studied. Exceptionally large numbers of pedestrian were injured at East 33rd Street and Park Avenue (97), West 34th and West 42nd streets at Eighth Avenue (70 each), and West 34th Street, Broadway and Sixth Avenue [Herald Square] (57). Thirty or more pedestrians were injured at 13 intersections, (five of which are in the study area): West 34th Street at Seventh Avenue; West 40th Street at Eighth Avenue; 42nd Street at Third, Lexington, Fifth, Sixth, Seventh, and Ninth avenues and Broadway; West 45th Street at Broadway/Seventh Avenue; and 57th Street at Third, Lexington, and Ninth avenues (*Appendix: Table B*).

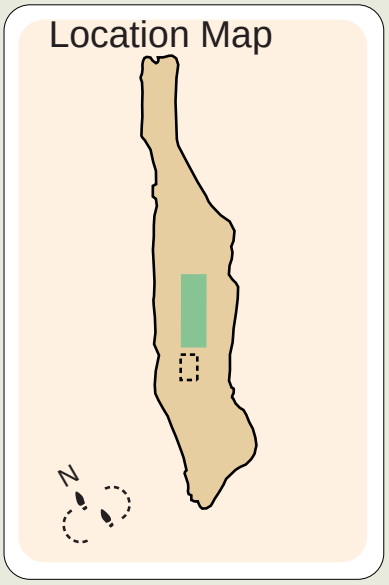
Seventeen mid-block locations had ten or more pedestrian accidents. Mid-block pedestrian accidents took place more frequently on east-west cross streets than on north-south avenues. The most mid-block accidents happened along 34th, 42nd, and 57th streets, wide, two-way streets. Crosstown streets in the block between Fifth and Sixth avenues had high numbers of mid-block accidents compared to other one-way streets (*Appendix: Table C*).

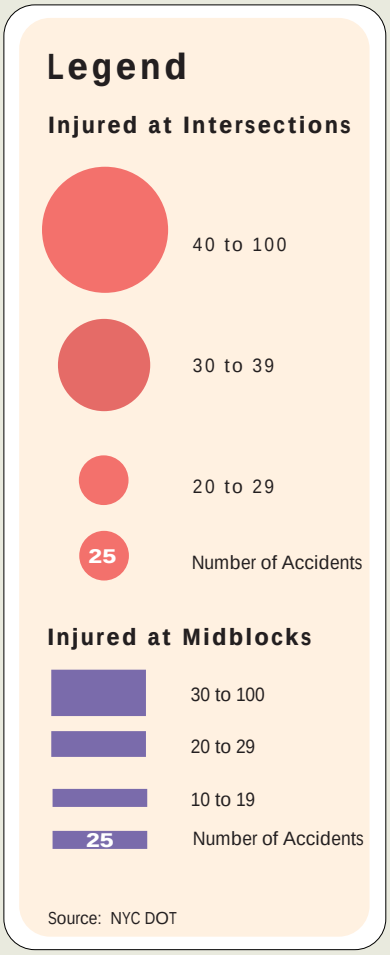
Thirty-one pedestrian fatalities occurred in Midtown, 19 at intersections and 12 at mid-block. Two fatalities were recorded at intersections along 45th, 48th, 49th, 52nd and 55th streets. Between Fifth and Sixth avenues mid-block fatalities happened on West 47th, 50th, and 59th streets (*Appendix: Table D*).

In the study area, eleven intersections and two mid-blocks ranked among Midtown's highest pedestrian accident locations: West 42nd Street between Sixth and Eighth avenues is the most dangerous street in the study area and in Midtown. Pedestrian accidents are also high on Eighth Avenue between West 40th Street and West 42nd streets, on Seventh Avenue at West 39th, West 45th, and West 53rd streets; and on Broadway and Sixth Avenue at West 50th Street (*Map 6: Pedestrian Accidents*). Five pedestrian fatalities took place within the study area: on Sixth Avenue at West 52nd Street; on Seventh Avenue at West 43rd and West 47th streets; on Broadway at West 50th Street; and on Eighth Avenue at West 48th Street.

Map 6
Locations with High Numbers of Pedestrian Accidents: 1989-1994







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Vehicular Volumes

As part of the screening process, available vehicular volumes for Midtown were studied. The 1995 DOT screenline count on 60th Street and at Manhattan tunnels and bridges, recorded southbound traffic (entries to CBD), which ranged from 21,576 vehicles in the AM peak hour to 19,476 in the PM peak hour; and northbound traffic (departures from CBD), which ranged from 18,520 vehicles in the AM peak hour to 22,806 in the PM peak hour. Vehicle entering the CBD via the Queensboro bridge, Midtown and Lincoln Tunnels ranged from 13,920 in the AM peak hour to 8,408 in the PM peak hour; vehicles departing the CBD at these locations ranged from 6,082 in the AM peak hour to 12,162 in the PM peak hour. Thus between 40,000 to 60,000 vehicles may be expected in Midtown in the peak hours.

The vehicular volume counts from the 42nd Street Light Rail Transit EIS (CEQR 92DOT008M) as shown in Table 1 reveal that in the study area, Sixth and Eighth avenues carry the most traffic with approximately 2,000 to 2,400 northbound vehicles in peak hours; the southbound avenues carry far fewer vehicles, about 1,200 on Broadway and 1,675 on Seventh Avenue. On 42nd Street between 500 and 900 vehicles travel in each direction. Peak hour volumes on one way streets ranged from 300 to 600 vehicles.

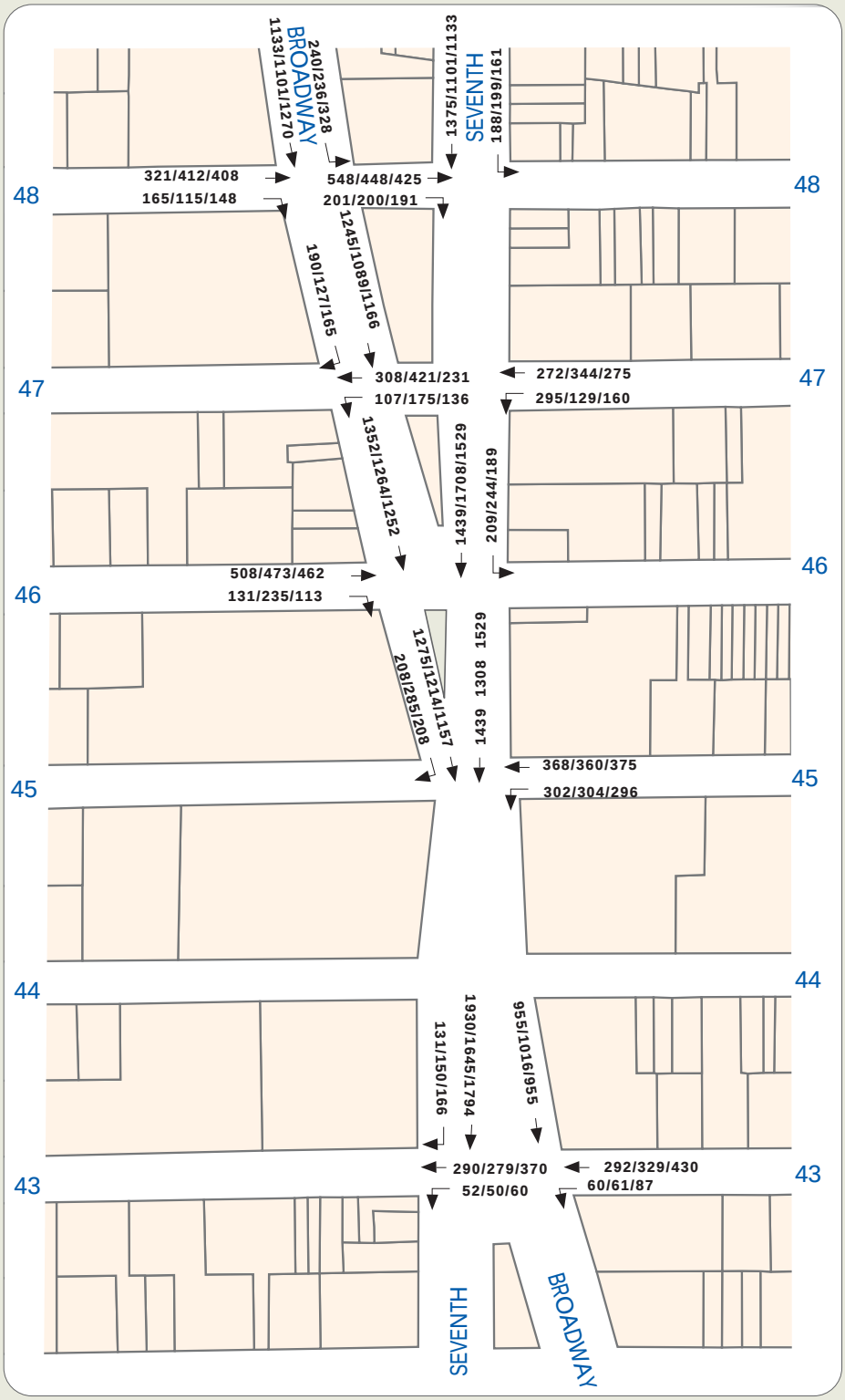
DOT's 1997 peak period vehicular volumes and turning movements on selected streets in the Times Square Bow Tie (*Map 7: Vehicular Volumes and Turning Movements*) indicate the link between poor traffic flow and the high number of turning movements. The irregular street geometry and the short crosstown blocks with limited vehicular storage capacity in the Times Square Bow Tie area further increases the conflict and confusion. The pre-theater traffic causes a fourth peak hour between 7 and 8 PM, and an additional one on matinee Wednesdays. On Seventh Avenue, approximately 60 percent of the traffic is taxis and five percent heavy vehicles (buses and trucks). On Broadway, approximately 30 percent of the traffic is taxis and 10 percent buses and trucks.

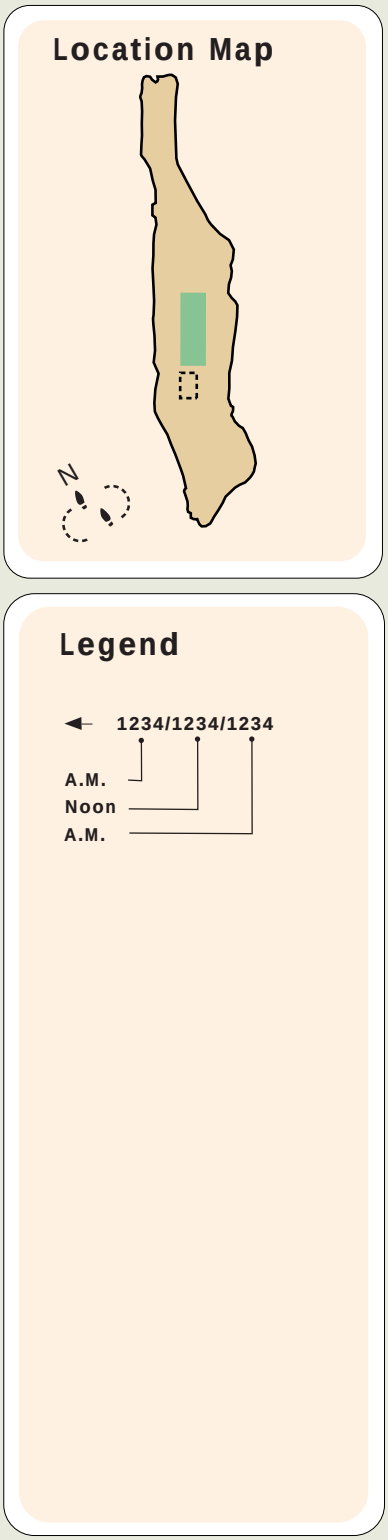
Table 1 - Vehicular Volumes

Approaching N/S Traffic on 42nd Street	AM Peak hour	PM Peak Hour	AM Peak hour	PM Peak Hour	Approaching E/W Traffic on Eighth Avenue	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
	Southbound		Northbound			Eastbound		Westbound	
Ninth Avenue	1880	1940			West 39th Street				650
Eighth Avenue			2135	2395	West 40th Street		550		
Seventh Avenue	1670	1675			West 41st Street				585
Broadway	1450	1190			West 42nd Street		625		625
Sixth Avenue			1990	2140	West 43rd Street				545
Fifth Avenue	1840	1720			West 44th Street		380		
Madison Avenue			1455	1520	West 45th Street				435
Lexington Avenue	1610	1425			West 46th Street		300		
Third Aveue			2530	2650	West 47th Street				475

Source: 42nd Street Light Rail Transit Line EIS (CEQR 92DOT008M)

Map 7
Vehicular Volumes and Turning Movements





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Signalization

All study area intersections are signalized, with a 90-second signal cycle. Traffic has typically 45-49 seconds of green time on the avenues and 31-35 seconds on the streets, with 5 seconds amber and all-red for each phase. In the Bow Tie, the avenues have 45 seconds green time and the streets 35 seconds which is a recent change to improve crosstown movement from the previous timing of 53 seconds green time for the avenues and 26 seconds for the streets which aimed to expedite traffic through the bottleneck at West 45th Street. At Eighth Avenue and West 42nd Street the 13 seconds green signal timing dedicated to the eastbound left turn reduces northbound signal timing (*Map 8: Signal Timing*). The T-intersection at Sixth Avenue and West 41st Street, a major entrance to Bryant Park, has an all-pedestrian phase.

Pavement Markings

Pavement markings include: lane markings; stop lines; crosswalks; "don't block the box" striping; turning lane arrows; bus lanes; and fire lanes. These white markings are often faded by use. Travel lanes are generally marked on the avenues, while crosstown streets, though wide enough to accommodate two vehicles, are usually not marked. All intersections have crosswalks, but the few intersections east of Eighth Avenue marked with high-visibility crosswalks do not necessarily correspond with high accident locations. On Broadway and Seventh Avenue, only West 42nd and 43rd streets have ladder crosswalk markings. "Don't block the box" grids are marked at Sixth Avenue at West 50th and 53rd streets; Seventh Avenue at West 38th Street; and Broadway at West 40th Street.

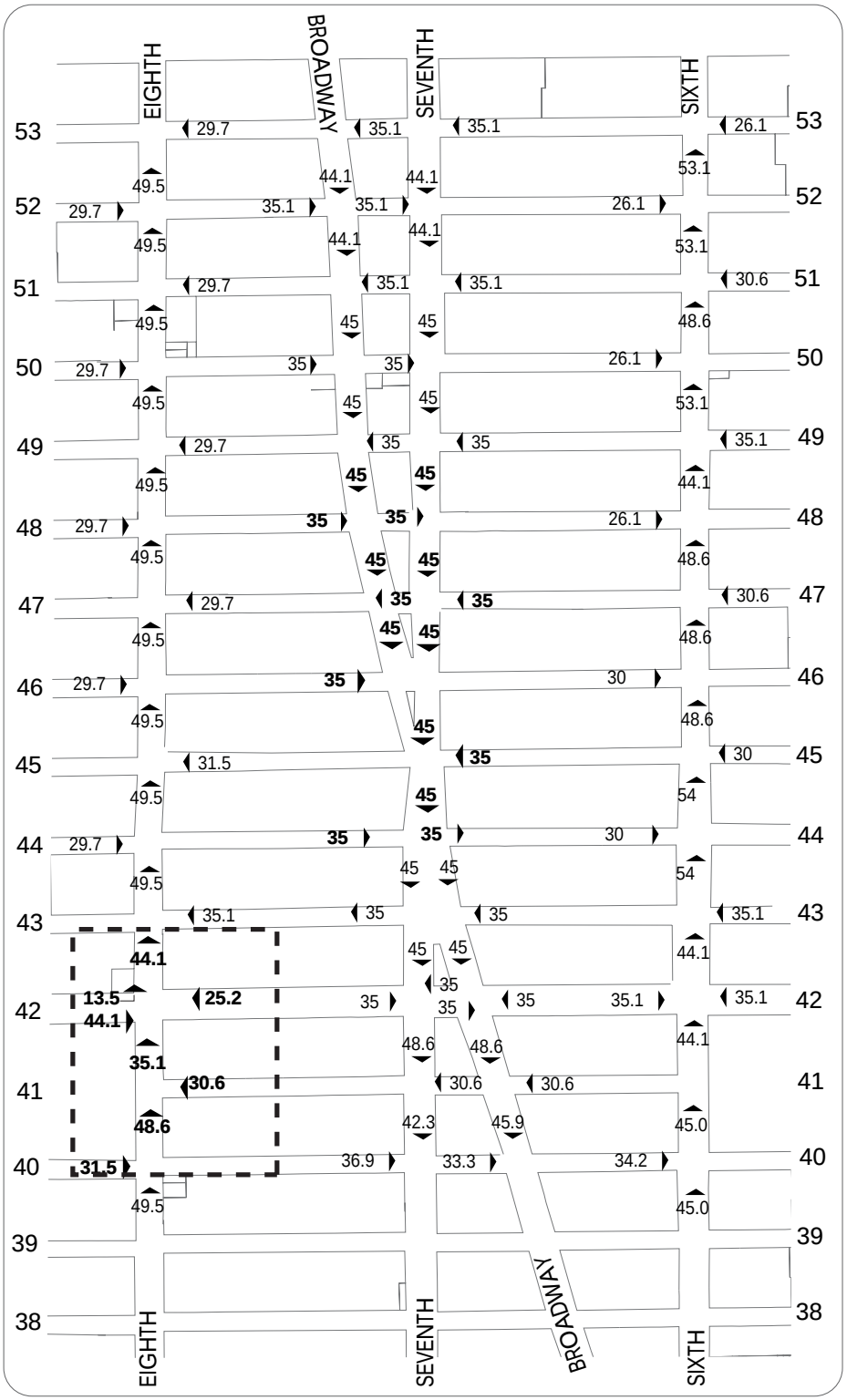
Curb and Moving Regulations

Curbside functions include truck delivery, taxi pick up/drop off, official or diplomatic parking, hotel loading, bus stops/layovers, and parking. Designated curb uses in the Theater District are predominantly no stopping/no standing/no parking; hotel loading zones; truck delivery; tour/express/MTA bus stops; and taxi stands (*Map 9: Curb and Moving Regulations*). On-street metered parking is prevalent on crosstown streets in the north part of the study area. Truck loading and unloading hours, which in other parts of Midtown are between 10 AM and 4 PM, range in the Theater District from 6 AM to 7 PM. The 23 taxi stands in the study area are underutilized by taxis and passengers, resulting in pickups and drop offs at congested or unsafe locations, such as the Times Square traffic islands. There is one taxi dispatch stand at PABT and DOT is in the process of locating a second on Broadway at West 50th Street. Hotel loading zones often function as informal taxi dispatch locations. Tour buses also have designated curbside layover areas. Existing turn prohibitions in the Times Square Bow Tie are designed to minimize confusion and conflicts.

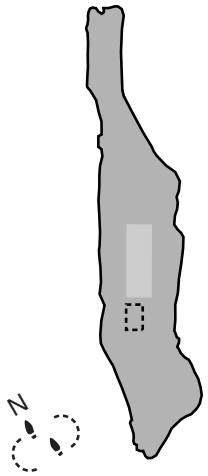
Off-Street Parking

There are approximately 86 parking garages and lots located in the vicinity of the study area from West 38th to 57th streets and Sixth to Ninth avenues (*Map 10: Off-Street Parking*). Five garages are concentrated on West 41st Street between Seventh and Eighth avenues; five more are located on West 42nd Street from Eighth to Ninth avenues adjacent to the Port Authority. Four garages are on West 40th Street and three each are on West 43rd, 47th, 48th, 56th and 57th streets. On the major avenues, seven garages are on Sixth Avenue, six on Broadway; four on Seventh Avenue, and five on Eighth Avenue.

Map 8
Signal Timing



Location Map



Legend

35.1 Green Time in Seconds

Areas with a difference in the timing pattern

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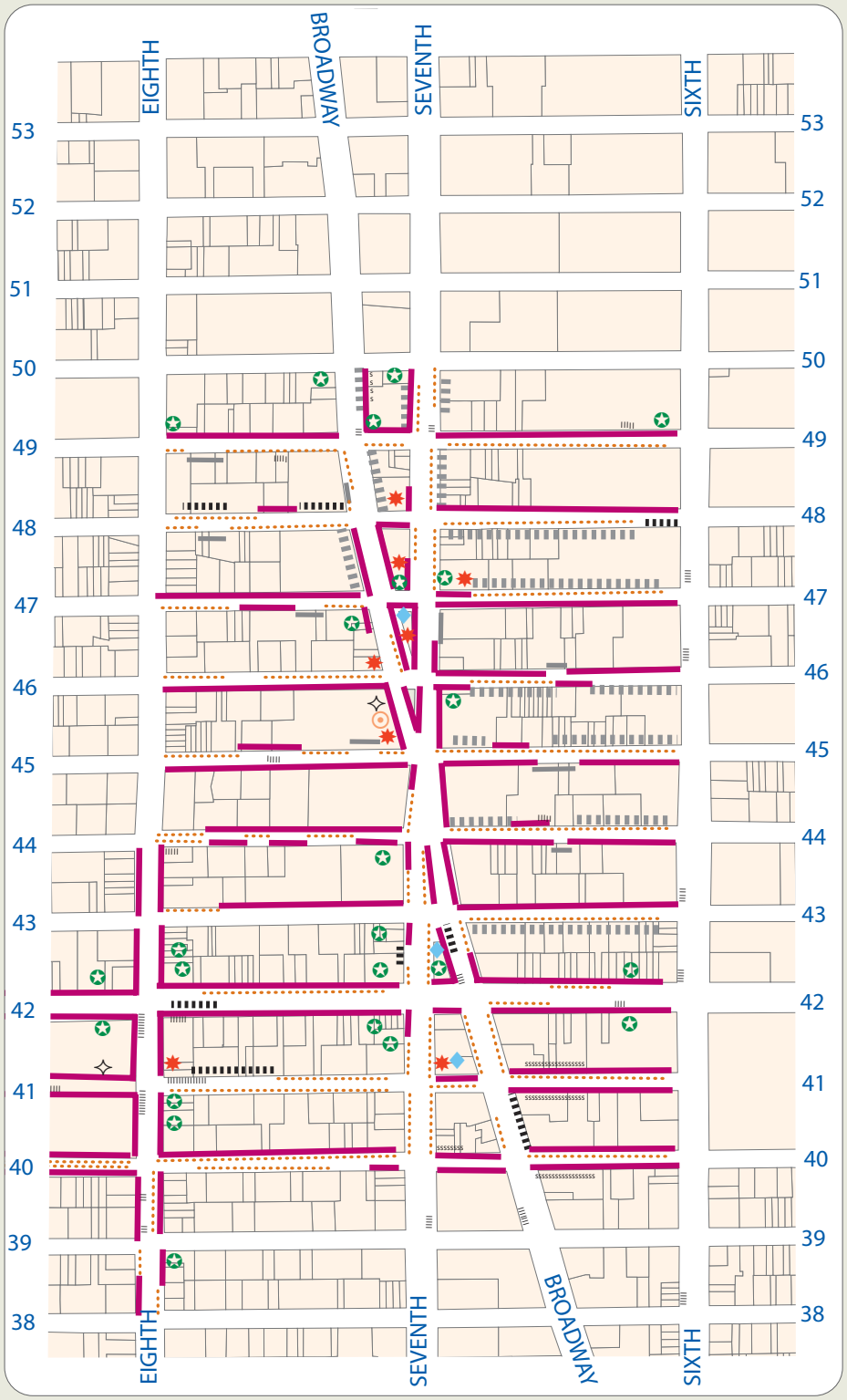
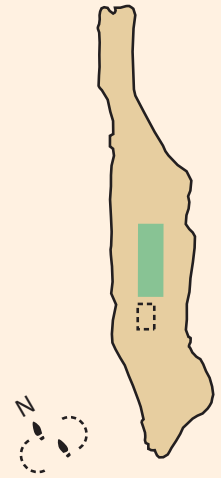
Map 9
Existing Curb and Moving Regulations



Location Map



Legend

Existing Curb Regulations

- No Parking, No Standing, No Stopping
- No Standing, Trucks Loading & Unloading
- No Standing, Hotel Loading Zone
- Authorized Parking (Police, Fire, Medical, Diplomatic)
- Limited Metered Parking
- Restricted Parking
- Taxi Stand

Bus Stops

- MTA Bus with Handicap Symbol
- MTA Bus
- Airport Bus
- Express Bus
- Tour Bus

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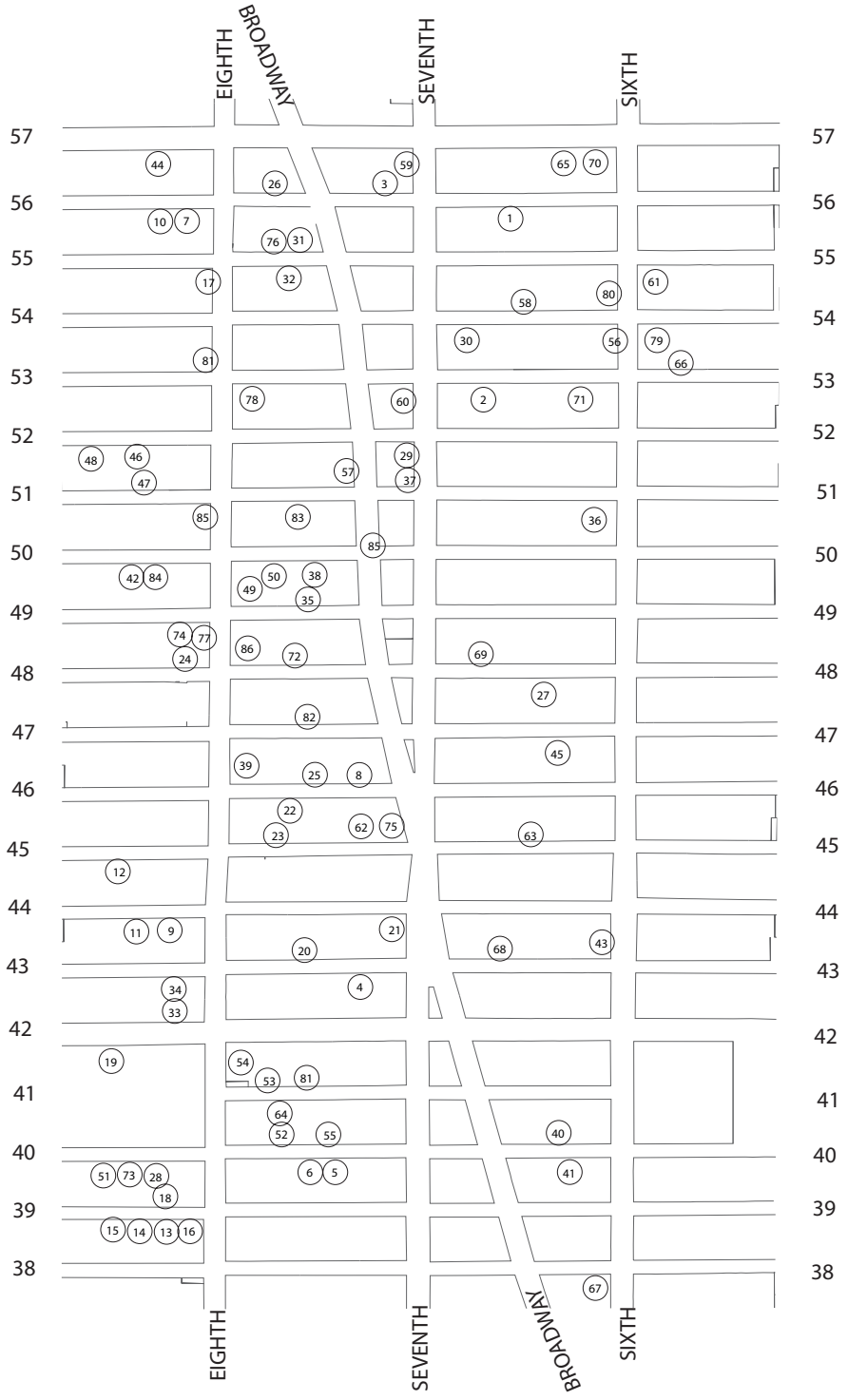
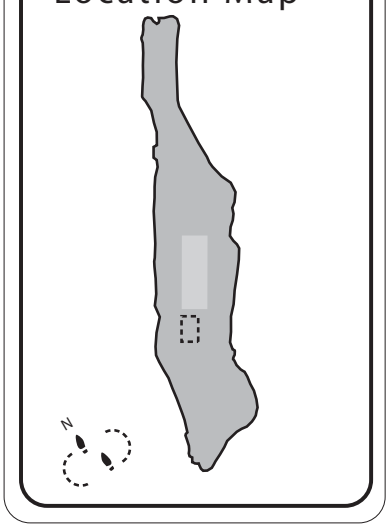
Map 10
Off-Street Parking





Garages and Lots:

1. 132 West 56th Garage
2. 159 West 53rd Parking
3. 211 West 56th Garage
4. 250 West Parking Garage
5. 251 West 40th Garage
6. 252 West 40th Garage
7. 30-30 Parking Corp
8. 303 West 46th Corp
9. 306 West 44th Corp
10. 330 West 56th Corp
11. 333 West 46th Corp
12. 344 West 45th Corp
13. 379 5th Realty Corp
14. 379 5th Realty Corp
15. 379 5th Realty Corp
16. 39th Parking
17. 8th Avenue Parking
18. A&W Parking
19. ABL Parking
20. Advance Parking
21. Astor Parking
22. Bowser 45th Parking
23. Bowser 45th Parking
24. Bright Management
25. Canal Development
26. Central Parking System
27. Chapman
28. Cherry Parking
29. Circle Parking
30. Command Parking
31. Delta Parkinig
32. Dependable Parking
33. DynamicPark
34. Dynamic Park
35. Eastway Tenant
36. Elzab Development Corp
37. Equitable Center
38. Friars Garage
39. Garfield Parking
40. Global Parking
41. Guardian 40th Corp
42. Guardian 8th Avenue
43. Guardian Hippodrome Corp
44. Irvin Garage
45. Irene Garages Corp
46. Jay B Realty Corp
47. Jay B Realty Corp
48. Jay B Realty Corp
49. July Garages
50. July Garages
51. Kinney 40th
52. Kinney Systems
53. Kinney 42nd St Inc
54. Kinney 42nd St Inc
55. Kinney Systems
56. Kinney Systems
57. Kinney Systems
58. Kinney Systems
59. Kinney Systems
60. Leslie Craig Corp
61. Manhattan Parking
62. Marriot Hotels inc
63. MBS 605 Parking Corp
64. Mets Parking Inc
65. Meyers Parking
66. Meyers Parking
67. Meyers Parking
68. Meyers Parking
69. New York Kinney Inc
71. PM Associates
70. Park-Serve
72. Port Parking Systems
73. Quick Parking Corp
74. Ravner and Zigebal
75. Resource Parking Corp
76. Second Parking
77. Square Lebanon Corp
78. Stramac Parking
79. Sundance Parking
80. The Fisher Sixth
81. Times Square Garage
82. West 47th St Garage Corp
83. West 50th Corp
84. West 50th Corp
85. Zenith Parking Corp
86. Zenith Parking Corp

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SITE-SPECIFIC FINDINGS

The analysis of existing conditions identified certain study area streets and avenues, described below, as most important for pedestrian and vehicular circulation (*Map 11: Pedestrian Corridors*).

Sixth Avenue

Sixth Avenue carries heavy northbound vehicular traffic. The corridor is distinguished by office buildings setback from the street, creating a nearly continuous ribbon of public plazas and open spaces that link Bryant Park at West 42nd Street to Central Park at West 59th Street. The avenue is the gateway to special retail streets between West 44th and West 47th streets, such as Club Row, Little Brazil, and the Diamond District. Sixth Avenue is a local bus route and provides subway access at West 40th, West 42nd, West 47th, West 48th, West 49th, and West 50th streets. Pedestrian accidents are high at West 42nd and West 50th streets.

Broadway

Broadway is the most important north-south pedestrian corridor, linking Columbus Circle, Times Square, and Herald Square. It is heavily congested with pedestrians, generated by the concentration of offices, theaters, hotels, and retail stores. Broadway has transit nodes, including subway and bus stops, at West 40th , West 42nd, West 47th , West 49th , West 50th and West 53rd streets. The street's unusual geometry as it slices through the street grid provides excellent view corridors, particularly for tourists, while aggravating traffic causing, delay, and congestion. While Broadway has relatively light traffic, vehicular congestion is most acute between West 44th to West 53rd streets, where the road capacity is reduced by double parking and non-compliance with curb regulations.

Seventh Avenue

Seventh Avenue has pronounced pedestrian and vehicular traffic, much of it taxis, which constitute as much as half the vehicles along the corridor. Seventh Avenue has high pedestrian volumes due to office buildings on the avenue and the concentration of theaters and hotels on either side of the avenue. Transit nodes are located at West 40th, West 41st, West 42nd ,West 43rd, West 47th, West 49th, West 50th, and West 53rd streets. Seventh Avenue carries the bulk of southbound traffic in the area. Vehicular problems on Seventh Avenue are concentrated south of the Bow Tie between West 40th and West 44th streets.

Times Square Bow Tie

The Times Square Bow Tie intersections (where Broadway crosses Seventh Avenue between West 42nd and 47th streets) are the most critical in the study area. The high pedestrian and vehicular volumes on Broadway and Seventh Avenue that contribute to congestion, conflict, and unsafe pedestrian conditions are exacerbated by the unique and irregular geometry of the Times Square Bow Tie. The street geometry is not only misaligned and confusing for drivers as they continue southbound, but at West 45th Street, where the avenues intersect diagonally,

the roadbeds each narrow from 60 feet to 31-34 feet. Traffic on Broadway and Seventh Avenue is constrained by the six lanes at this intersection, resulting in surplus roadbed on the avenues to the north and south. Sidewalks are overcrowded, suggesting an imbalance in the overall allocation of street space.

Pedestrian volumes in the Bow Tie are extremely heavy in the PM and pre-theater peak hours with theater goers and commuters. The traffic islands within Times Square, particularly Duffy Square and the TKTS booth, offer the best places to experience the excitement and cacophony of Times Square and are important destinations for tourists and local people alike. A walk into Duffy Square before or after a Broadway show often caps a visit to the Theater District. Pedestrian congestion is severe; pedestrians often spill off the traffic islands into the roadbed or occupy the street in front of tour buses standing at designated layovers in the Bow Tie. Broadway/Seventh Avenue and West 45th Street is one of only two high accident intersections without subway access.

Eighth Avenue

Eighth Avenue has the heaviest peak hour vehicular traffic in the area. Commuters from the transportation hub and transit nodes throng the area. Eighth Avenue has transit nodes on West 40th, West 42nd, West 43rd, West 44th, West 49th, West 50th, and West 51st streets. The most dangerous locations for pedestrians are between West 40th and West 42nd streets, those streets near the Port Authority Bus Terminal that provide access to the Lincoln Tunnel or where changes in signal timing contribute to vehicular delay and congestion. With the recent development activity on Eighth Avenue, pedestrian and vehicular traffic may increase in the future.

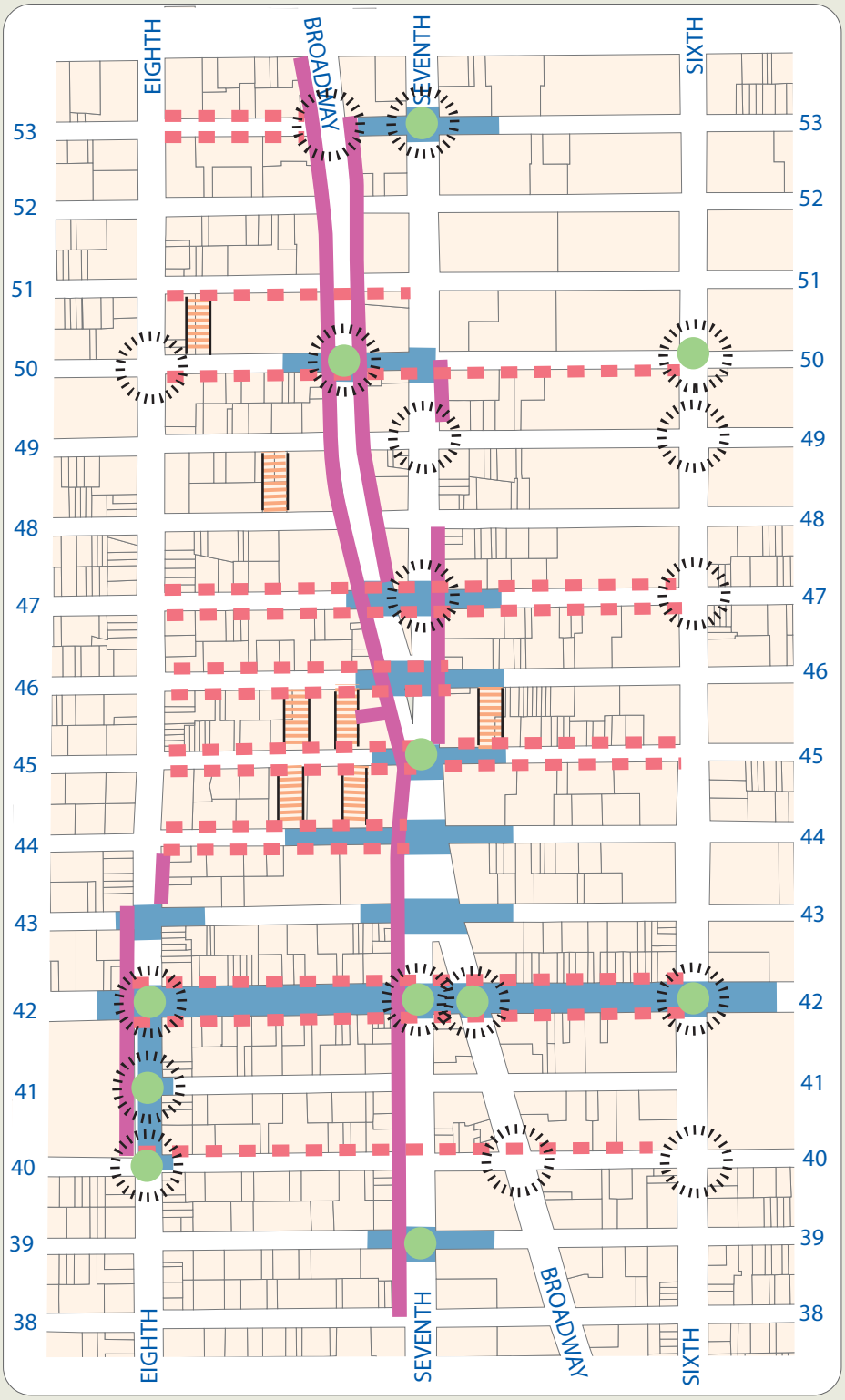
West 42nd Street

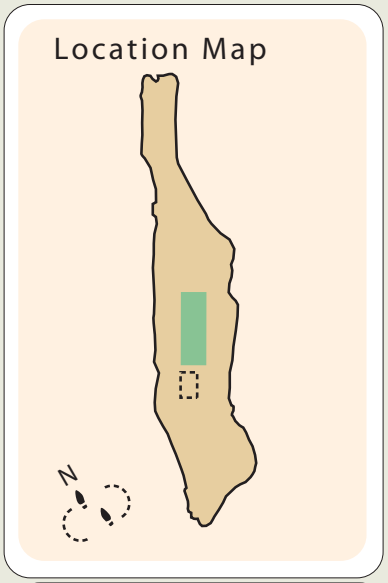
Arguably the most important street in the area, and perhaps Midtown Manhattan, West 42nd Street is a wide, two-way east-west street with heavy pedestrian and vehicular flows. The most significant transit corridor in the area, it links the Port Authority Bus Terminal, numerous subway stations, and Grand Central Station, and connects Times Square with Bryant Park to the east. The street is the epicenter of new and planned office, hotel, theater, entertainment, and retail development, that will add substantially to the congestion in the area. West 42nd Street has the highest number of pedestrian accidents, both in the Theater District and in Midtown.

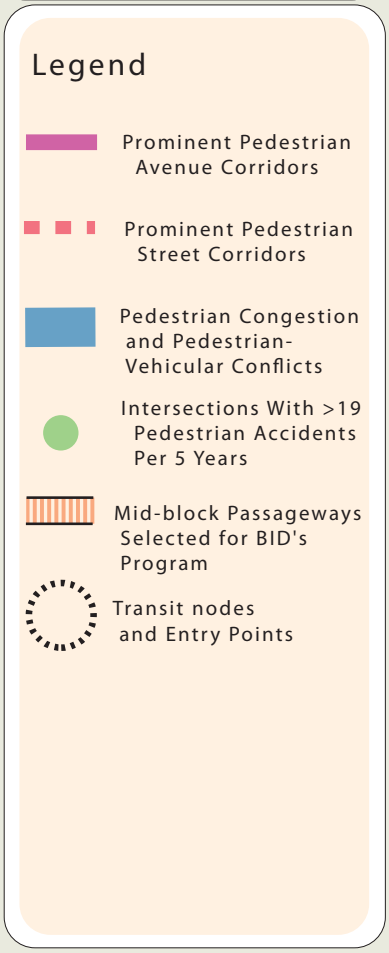
West 40th and West 41st streets

These two one-way crosstown streets define the southern edge of the Theater District. The short street segments between Sixth and Eighth avenues, a direct link between the Port Authority Bus Terminal and Bryant Park, are transit corridors with high peak hour pedestrian volumes, particularly on the north sidewalks. The concentration of off-street parking facilities on these streets leads to frequent mid-block pedestrian-vehicular conflicts. West 41st Street and Sixth Avenue has an all-pedestrian signal phase.

Map 11
Pedestrian Corridors







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West 44th to West 47th streets

These streets between Seventh and Eighth avenues have the highest concentration of theaters and hotels in Midtown. They offer pedestrian access to and from the Times Square Bow Tie, including Duffy Square, new retail uses, such as the All-Star Cafe and Virgin Records at Seventh Avenue, and specialty retail streets east of Sixth Avenue. Heavy pedestrian and vehicular volumes and turning movements to and from the avenues in the Bow Tie contribute to conflict, congestion, and delay on these cross streets. One of the five pedestrian fatalities in the study area took place at West 47th Street and Seventh Avenue. Conversely, mid-block through passageways provide north-south shortcuts through these blocks.

West 50th Street

West 50th Street between Sixth and Eighth avenues is a major transit corridor and carries heavy pedestrian traffic, particularly on the south sidewalk. Subway entrances/exits are located on each avenue and the street is a designated transit way for bus and taxi use only between Lexington and Eighth avenues. The street is a direct link to Rockefeller Center and Radio City Music Hall to the east. The intersections at West 50th Street and Sixth Avenue and Broadway have a high number of pedestrian accidents, including one fatality at the latter intersection.

PROBLEMS AND OPPORTUNITIES

The problems observed in the study area and identified in the findings have been categorized into four types: Pedestrian Safety; Pedestrian Congestion; Quality of Pedestrian Environment; and Vehicular Congestion and Delay. These categories are interconnected and impact each other. Pedestrian and vehicular congestion and urban environment affect pedestrian safety; congestion and safety affect quality of urban environment, and so forth. Site-specific problems are listed in a matrix (*Appendix: Table E*) and mapped (*Map 12: Problems and Opportunities*). The opportunities include easily available resources which may be used for improving pedestrian and vehicular circulation, such as excess roadbed width, wide sidewalks, midblock passageways, unused taxi stands and such.

Pedestrian Safety

Pedestrian safety is endangered by conflicts with moving vehicles, at intersections and sometimes at sidewalk curb cuts; insufficient corner queuing space; encroaching vehicles; pedestrian hazards, such as protruding signs and slippery or uneven walking surfaces; and illegally-parked vehicles that force buses to drop off and pick up people in the street. General safety problems prevalent area-wide include: narrow and/or obstructed crosswalks; sidewalks with uneven, pitted surfaces and narrow curb cuts at crosswalks; poor design and condition of subway ventilation grates; and a lack of appropriate street markings, such as high-visibility ladder crosswalks.

Pedestrian-vehicular conflicts are prevalent throughout the area and are most pronounced along prominent pedestrian corridors. The 42nd Street Development study[1] found the worst traffic congestion during AM, midday, PM, and pre-theater peak hours on West 42nd Street at Eighth, Seventh, Sixth, and Ninth avenues, in that order. Broadway and Seventh Avenue, at West 43rd, West 44th, and West 45th streets, also experience significant problems during peak hours. The incidence of conflict at these critical locations is evidenced by the high number of pedestrian accidents at West 42nd Street between Sixth and Eighth avenues; Eighth Avenue between West 40th Street and West 42nd Street, the Times Square Bow Tie, Broadway and Seventh Avenue between West 43rd and 47th streets; and West 39th Street between Broadway and Seventh Avenue. Pedestrian-vehicular conflicts at mid-block are accentuated by through-block pedestrian passageways that offer alternatives to walking on the major north-south avenues.

1 New Development and Mitigation Measures: According to the January1994, 42nd Street Development Project FEIS, projects on 42nd Street are expected to generate a substantial number of trips and incur significant traffic impacts. Signal phasing, timing modification, curb parking regulation modifications, and enforcement of curbside parking and standing prohibitions could mitigate impacts substantially but not fully. Five-foot sidewalk widenings at two locations on Seventh Avenue would not mitigate midday impact. Impacts on several other sidewalks, including the corner at Seventh Avenue and West 43rd Street would remain unmitigated. The very serious congestion at the intersection of West 42nd Street and Seventh Avenue/Broadway could not be fully mitigated even with re-striping of the affected crosswalks. Pedestrians would be expected to adjust their street-crossing behavior to accommodate the overcrowding.

Pedestrian Congestion

Seventh Avenue and Broadway carry the heaviest pedestrian volumes. The major east-west pedestrian streets link offices, hotels, theaters and transit nodes. Transit corridors -- crosstown streets with two or more intersections with subway entrances/exits between Sixth and Eighth avenues -- include West 40th Street (4 entrances/exits), West 42nd Street (3), West 47th Street (3), West 49th Street (2), West 50th Street (3), and West 53rd Street (2). (The existence of plazas and mid-block passageways also accentuates the importance for pedestrians on certain minor streets.)

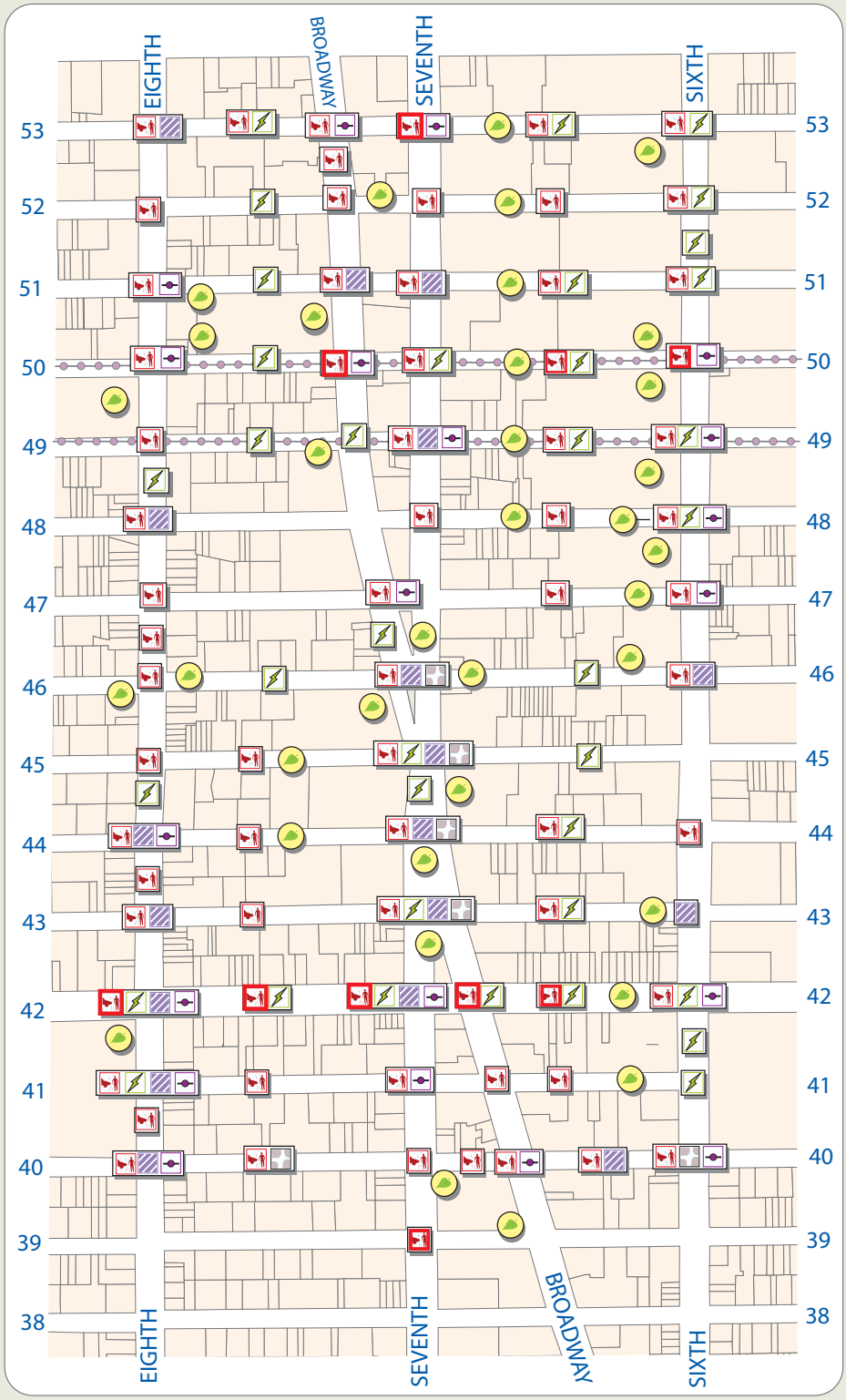
Critical intersections with severe pedestrian congestion, as identified by high pedestrian volumes accidents; and limited corner and crosswalk space, are near the PABT on Eighth Avenue at West 40th, West 41st, and West 42nd streets and in Times Square on Seventh Avenue and Broadway between West 42nd Street and West 47th Street. The traffic islands within Times Square are important destinations, particularly Duffy Square and the TKTS booth. They offer the best places to experience (and photograph.) However, accessing these islands or negotiating the intersections at other critical locations is a challenge. The sidewalks along these corridors are congested and frequently obstructed. Pedestrians often spill off the street corner into the roadbed due to inadequate queuing space, contributing to pedestrian-vehicular conflict, delay, and congestion.

Quality of Pedestrian Environment

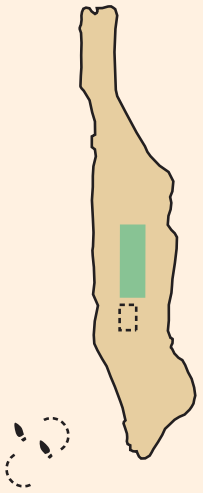
The quality of the pedestrian environment is affected by the ability to easily orient oneself and navigate the area, the availability of public amenities, and the general quality of the urban streetscape. The study area, in general, lacks necessary directional signs and maps showing prominent destinations as well as taxi stands, bus stops, subway entrances, and open spaces, to assist people in getting around. For instance, while familiar to the work population in the area, the public spaces fronting Sixth Avenue between West 47th and West 53rd streets may be unknown to tourists and theater-goers in Times Square. Taxi stands are conveniently located throughout the Theater District, but the lack of signs directing tourists, theater-goers, hotel guests, and business visitors to them contributes to their underutilization.

Public amenities, including, seating, public toilets, landscaping, and pedestrian lighting, are also inadequate. Despite the crowds, public seating in the Times Square traffic islands is limited to planters and statue pedestals, and public toilets are absent. The condition of sidewalks, crosswalks, pedestrian islands and plazas are important to the appeal of an area: the walking experience is affected by the quality of the sidewalk paving material, the finish, and the uninterrupted flow of spaces. Subway ventilation grates, which constitute a large part of the sidewalks in this transit-rich area, are poorly maintained and their design is not suitable for certain type of footwear with heels.

Map 12
Problems and Opportunities



Location Map



Legend

Pedestrian Vehicular Conflicts
- heavy pedestrian volumes
- heavy vehicular volumes
- signal timing

Illegal Vehicular Action
- gridlock
- spillbacks

Narrow Obstructed Walkway
- on corner/sidewalk
- narrow sidewalk
- pedestrian congestion

Geometric Design & Condition
- intersection street geometry
- pavement markings

Transit Node

Opportunity and Resources

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Vehicular Congestion and Delay

Vehicular congestion and delay result from heavy pedestrian and vehicular volumes, pedestrian conflict with turning vehicles, un-channelized and disrupted traffic movements, irregular geometric roadbed design, and poor traffic and curbside management. While many taxis, trucks, and buses directly service the area and others drive there for specific reasons, many additional vehicles simply enter the area to cross the town east/west or north/south. During peak hours, the existing conditions, which include the number of moving lanes, fail to process the high volume of pedestrian and vehicular traffic, resulting in gridlock conditions.

Vehicular congestion and delay is also caused due to vehicles blocking the crosswalk, intersection or bus lane; loss of moving lanes due to double-parked vehicles or stopped taxis interrupting traffic; truck delivery hours which conflict with the peak traffic hours; illegally parked vehicles; and aggressive or unsafe driver actions, such as illegal turns; sudden speeds; weaving, and lane changing.

Taxis comprise 30 to 50 percent of the total traffic. There are approximately 23 designated taxi stands within the Theater District that most people are not aware of and are therefore not used optimally, contributing to unnecessary taxi trips and passenger pick-ups from the middle of the road. Most of the curb sides in the Bow Tie area are reserved for truck loading/unloading, bus stops, and authorized vehicles. Curbside loading hours of 7 AM to 7 PM conflict with the morning and evening peak hours and the Wednesday 2:00 and 4:30 PM matinee peak hours. Restrictions limiting curb use to standing tour buses are complied with infrequently, as are signs prohibiting vehicle idling.

While the road geometry and lane widths are fairly standard on Sixth and Eighth avenues, this is not the case on Broadway and Seventh Avenue where they intersect diagonally, forming the Times Square Bow Tie, at West 45th Street. Here the roadbed narrows to 31-34 feet from 60 feet. The loss of traffic lanes due to under-/inappropriate utilization and mismanagement of existing space exacerbates the poor traffic flow. Uneven lane widths, confusing lane striping, and inadequate signs to guide motorists contribute to chaotic traffic conditions and turning vehicles in the short blocks between Broadway and Seventh Avenue add to the traffic congestion. As noted in the *Times Square 'Bow Tie' Pedestrian and Vehicular Circulation Improvement Study* (1988), and as confirmed by field observations, the traffic flows on Broadway and Seventh Avenue are constrained by the six lanes at West 45th Street, resulting in surplus roadbed on the avenues to the north and south; and sidewalks are crowded, suggesting an imbalance in the overall allocation of street space.

PROBLEMS AND OPPORTUNITIES

A package of complementary recommended-actions has been developed to achieve area-wide improvements targeted to address identified problems and opportunities. General recommendations to improve the project area include the improvement of sidewalk and crosswalk paving surfaces, wider high-visibility crosswalks, lane channelization and dedicated turning lanes, and other such measures. Site-specific recommendations, developed to work separately or in combination, include physical and operational improvements, such as wider sidewalks and street corners; roadbed and sidewalk management; enforcement of existing and new curb and moving regulations; taxi circulation improvements; and using available resources to make pedestrian improvements without impacting traffic.

Large volumes of pedestrians are to be expected in an area such as Times Square and the Theater District, given the special attractions and the exceptional access by public transport. Pedestrian congestion and inconvenience can be alleviated by the improved management of sidewalks and roadbeds. Sidewalk management includes: clearing corners of clutter and locating street furniture and commercial activities to allow uninterrupted pedestrian movement; changing curb regulations to minimize loading activity conflicts with peak pedestrian demand hours; identifying optional locations for vehicles parked by officials on the pedestrian islands; cooperating with building owners/occupants to keep sidewalks clear and unobstructed (building extensions, awning poles, cellar doors, garbage awaiting pick-up, and other barriers); setting standards for mitigating the displacement of pedestrians from sidewalks during construction activities; and coordinating trash collection days and hours.

The operational factors of roadbed management include: regulating curb use to optimize use of the number of moving lanes; restricting turning movements at severely congested intersections; limiting access hours for heavy vehicles; prohibiting long vehicles in the area; allowing loading and unloading activities only during selected hours; acknowledging the heavy volumes of pedestrians and integrating their needs in the larger design; and informing people of their obligations through signage and outreach, and enforcing compliance. Other management factors, dealing with geometric design, include clearly striping crosswalks and traffic lanes of uniform width, and marking dedicated lanes for vehicular movements and buses.

Design Rationale and Constraints

- Create a safe area for pedestrians and motorists by minimizing conflicts and obstructions
- Increase pedestrian space (sidewalk widenings) where roadbeds have excess width resulting in underutilized areas
- Provide neckdowns near accident areas, transit nodes, taxi stands, express and tour bus stops
- Use underutilized resources to minimize capital costs and physical changes
- Reduce traffic volume entering the area and channelize traffic with clear signs and markings
- Coordinate with and reinforce other improvement efforts in Midtown

Priority Areas

Four priority subareas within the study boundaries have been selected based on their critical importance to pedestrians and the identification of multiple problems and/or opportunities. These are:

- Seventh Avenue and Broadway from West 42nd to 47th Street in the Times Square Bow Tie;
- West 42nd Street between Sixth Avenue and Eighth Avenue;
- Eighth Avenue between West 40th and 42nd streets in front of the Port Authority Bus Terminal; and
- West 44th to 47th streets between Seventh and Eighth avenues and West 50th Street between Sixth and Eighth avenues.

The individual locations selected are:

- Seventh Avenue and West 53rd Street
- Broadway and West 50th Street
- Seventh Avenue and West 39th Street

Recommended Actions

Address Pedestrian Congestion and Safety

- Change curb lines to widen sidewalks and street corners;
- Mark widened high-visibility crosswalks at accident locations; a Barnes dance crosswalk; and a new crosswalk and traffic signal on West 42nd Street;
- Clear corners, relocate street furniture that obstructs pedestrian circulation; and
- Increase signal time for pedestrians in the Bow Tie and near PABT during evening off peak hours.

Address Pedestrian-Vehicular Conflict and Vehicular Congestion and Delay

- Prohibit turns, channelize traffic through lane markings, signs, and enforcement;
- Limit truck delivery hours to off peak hours, i.e. 10 AM - 4 PM; extend bus stops; institute no stopping/parking regulations; and
- Improve taxi circulation through increased use of taxi stands; new taxi dispatch locations.

Enhance Pedestrian Space and Facilitate Traffic in the Times Square Bow-Tie (*Maps 13 and 14: Recommended Sidewalk Widenings in the Times Square Bow Tie*)

- Widen sidewalks by taking advantage of excess roadbed north and south of the bottleneck while maintaining the existing three traffic lanes each on Broadway and Seventh Avenue; and
- Alternatively, widen sidewalks and reconfigure Broadway with two traffic lanes and Seventh Avenue with four traffic lanes to facilitate through traffic.

Map 13
Proposed Recommendations for Sidewalk Widenings in the Times Square Bow Tie

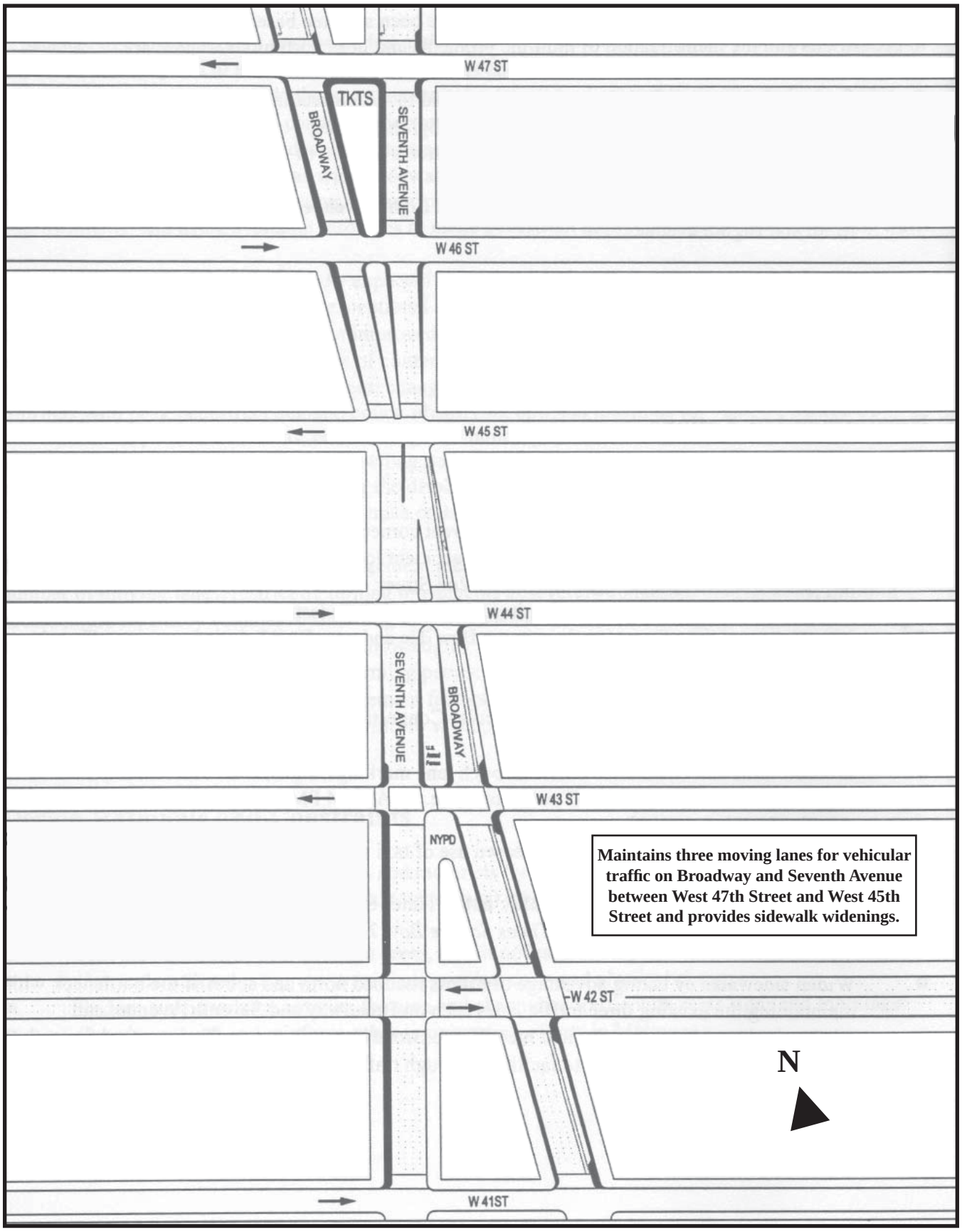

Table 2 - Recommended Actions Table

COMPONENT	RATIONALE	TIME FRAME (TERM)			AGENCY
		SHORT	MID	LONG	
Street Design and Geometry					
Improve and maintain condition of walkways and ventilation grates	Improve pedestrian safety and mobility on the sidewalks and crosswalks; increase effective sidewalk space by using ventilation grates with smaller gaps, properly flushed with sidewalks		✓		MTA/DOT
Provide enhanced crosswalks and roadbed treatments at mid-block passageways and in Times Square Bow Tie	Improve pedestrian safety through high-visibility crosswalks which clearly demarcate and differentiate the pedestrian zone from the vehicular street space and encourage motorist caution		✓		DOT
Change curb lines to widen sidewalks and street corners in the Bow Tie; on Eighth Avenue at the PABT; at mid-block passageways; and at high-accident intersections	Improve pedestrian safety and reduce congestion by enhancing pedestrian space		✓		DOT
Change curb lines to widen roadbed on Seventh Avenue at West 45th Street, such that there are two lanes on Broadway and four lanes on Seventh Avenue	Redistribute the six southbound lanes in the Bow Tie to encourage use of Broadway for local traffic and Seventh Avenue for through traffic			✓	DOT
Clear street corners by relocating street furniture/uses within 20 feet of existing location	Improve effective sidewalk and street corner space on congested pedestrian corridors, implemented incrementally with curb line changes		✓		BID/DOT
Install appropriately-located and designed panels/posts for maps and signs	Improve orientation in Theater District for tourists, visitors, and commuters through informational signs and maps designed and placed to avoid signage clutter		✓		BID/DOT
Landscape public spaces and locate amenities	Improve streetscape and convenience for visitors through an integrated design for the Bow Tie islands		✓	✓	Parks/DOT
Encourage building setbacks, widened sidewalks, and the relocation of subway entrances within new buildings in Times Square/West 42nd Street	Mitigate impacts of West 42nd Street development as per the 42nd Street Development Project SEIS		✓	✓	NYS ESDC/BID
Explore additional safety measures on West 42nd Street between Seventh and Eighth avenues	Improve pedestrian safety on congested high-accident corridor where development is expected to attract additional pedestrian/vehicular traffic			✓	

COMPONENT	RATIONALE	TIME FRAME (TERM)			AGENCY
		SHORT	MID	LONG	
Traffic Movement and Turn Prohibitions					
Prohibit exiting Lincoln Tunnel traffic to make right turns from Dyer Avenue onto West 42nd Street as per the 42nd Street Light Rail EIS	Reduce eastbound volume of traffic on West 42nd Street			✓	NYPD/DOT
Prohibit right turns from West 44th Street to Broadway	Reduce congestion and conflicts caused by turning vehicles		✓		NYPD/DOT
Prohibit left turns from West 45th Street to Seventh Avenue	Reduce congestion and conflicts caused by turning vehicles		✓		NYPD/DOT
Prohibit right turns from West 46th Street to Seventh Avenue and Broadway	Reduce congestion and conflicts caused by turning vehicles		✓		
Prohibit left turns from West 47th Street to Broadway	Reduce congestion and conflicts caused by turning vehicles		✓		NYPD/DOT
Encourage taxis to pick up and drop off passengers from taxi stands only	Use 23 underutilized, conveniently-located taxi stands in the Theater District and Port Authority Bus Terminal vicinity to reduce congestion caused by circulating taxis		✓		TLC/DOT
Restrict entry onto Broadway between West 44th and 47th streets for all traffic except buses, trucks with permits, bicycles, horse-cabs, service/emergency vehicles	Encourage use of Broadway to serve local traffic needs and divert the remaining through traffic to a widened Seventh Avenue as a long range goal to enhance pedestrian space in the Bow Tie			✓	DOT
Curb Use Regulations					
Limit truck delivery to off peak hours 10 AM to 4 PM	7 AM to 7 PM delivery hours conflict with AM and PM peak hour traffic	✓			DOT
Extend MTA bus stops	Reduce congestion caused by buses queuing at intersections	✓			MTA/DOT
Locate new taxi dispatch stands	Allow people to safely and conveniently find a taxi and minimize empty taxis congesting the area in search of customers		✓		BID/TLC/ DOT
Designate no stopping zones at curbs adjacent to mid-block passageways	Ensure pedestrian safety and clear sight lines at mid-block crossings	✓			DOT

COMPONENT	RATIONALE	TIME FRAME (TERM)			AGENCY
		SHORT	MID	LONG	
Timing Changes					
Provide an early release pedestrian walk signal	Improve safety on Eighth Avenue near the Port Authority Bus Terminal		✓		DOT
Provide longer green time for pedestrians	Improve pedestrian safety by increasing green time in the Times Square Bow Tie during pre-theater peak hours and on West 42nd Street/Eighth Avenue during PM peak hours		✓		DOT
Street Markings Signal					
Mark widened and/or high-visibility crosswalks	Increase pedestrian safety and minimize pedestrian-vehicular conflicts in areas with high pedestrian volumes	✓			DOT
Mark Barnes dance crosswalk	T-intersection with a pedestrian phase at West 41st Street/Sixth Avenue (Bryant Park)	✓			DOT
Stripe pedestrian zone on the surplus roadbed in the Bow Tie as an interim measure	Provide additional space for pedestrians on the north and south sides of West 45th Street and ensure consistent lane widths	✓			DOT
Regulatory and Informational Signs for Motorists					
Sign special pedestrian areas	Caution motorists to be aware of pedestrians	✓			DOT
Install signs to channelize traffic	Reduce confusion and congestion and optimize street space	✓			DOT
Install "Don't block the box" signs	Discourage vehicles from blocking congested intersections	✓			DOT
Install turn prohibition and next available turn signs	Reduce confusion and allow motorists to plan ahead before approaching Theater District or exiting the Lincoln Tunnel	✓			DOT
Install signs showing the best routes to and from tunnel	Guide motorists to the best route to their destination	✓			DOT
Install missing regulatory signs	Turn prohibitions and taxi stand locations in the Theater District	✓			DOT

COMPONENT	RATIONALE	TIME FRAME (TERM)			AGENCY
		SHORT	MID	LONG	
Informational Signs for Pedestrians					
Install maps and signs to guide pedestrians to taxi stands, bus stops, subways, and open spaces	Increase use of existing resources, improve orientation and mobility, and encourage use of mid-block passageways and plazas with seating	✓			BID/DOT
Install signs to guide people to photography areas	Increase safety by discouraging photography from the road	✓			BID/DOT
Public Amenities					
Provide automated public toilets (APTs); seating and drinking water	Improve pedestrian comfort and convenience		✓		CB4/CB5/ DOT/ DEP
Enforcement and ITS (Intelligent Transportation Systems)					
Enforce existing curb regulations	Increase street space by restricting illegal parking, which reduces effective number of lanes, particularly during peak hours	✓			NYPD
Enforce existing turning regulations	Increase safety and reduce conflicts caused by inappropriate and illegal turning movements, particularly in the Times Square Bow Tie and on West 42nd Street	✓			NYPD
Enforce existing transit way regulations which permit buses and taxis with passengers only	Increase safety, reduce conflicts, and channelize traffic on West 49th and West 50th streets	✓			NYPD
Enforce existing prohibitions on engine idling	Maintain air quality from deteriorating further.	✓			NYPD
Install wide-area detection system	Monitor illegal parking in Times Square area with ITS cameras	✓			DOT
Congestion Pricing					
Manage travel demand through ITS	To be planned comprehensively for Midtown Manhattan			✓	NYMT

CONCLUSIONS

Recommendations resulting from this study include changes in curb widths to take advantage of excess roadbed capacity throughout the larger Bow-Tie area. These changes occur from south of 50th Street on Broadway and South of 48th Street on Seventh Avenue to just north of 41st Street on both Broadway and Seventh Avenue. Throughout the Bow-Tie area, restricting curbside delivery parking to the hours of 10 a.m. to 4 p.m. has been proposed. These guidelines are consistent with much of the rest of Midtown. At 42nd Street and Eighth Avenue, an a leading pedestrian indicator has been recommended to ease congestion caused by the large numbers of pedestrians associated with the Port Authority Bus Terminal. Finally, proposed turning restrictions in the Bow-Tie area would encourage channelization of traffic this improving circulation for both pedestrians and vehicles.

Summary of Level of Service Analysis (LOS)

The traffic impact analysis for the proposed recommendations has been prepared, which discloses the effects of each action, and evaluates the level of service (LOS) for vehicles and pedestrians based on City Environmental Quality Review (CEQR) criteria. Among other factors, the LOS for vehicular traffic depends on the volume; turning movements and traffic composition; number and width of lanes; curb uses; signal timing; and conflicts with pedestrians. Factors affecting the LOS for pedestrians include: pedestrian volumes; effective sidewalk widths; conditions on corners and at intersections; signal timing and vehicular volumes. The range of LOS can vary from A, highly desired, to F as undesirable. Improved LOS for pedestrians in the study area, should not come at the cost of deteriorated LOS for vehicles within the area or elsewhere. New traffic and pedestrian volume data was gathered to assess the feasibility of recommended turn prohibitions, curb line changes and signal timing. A summary of the results of the LOS analysis is presented in the appendix.

Background

To conduct the no-build network analysis, background growth of half a percent per year over four years and adjusted project growth from the 42nd Street Development Project have been added to the existing conditions traffic network. Alternatively, the build network incorporates the NYCDCP recommendations for turning restrictions, a leading pedestrian indicator, and lane changes resulting from curb widenings.

Five sets of recommendations developed in the Midtown Manhattan Pedestrian Project impact the traffic network: neckdowns and curb widenings in the Times Square Bow-Tie area; changes in curb regulations for deliveries; turning restrictions in the Bow-Tie; a leading pedestrian indicator (lpi) at 42nd Street and Eighth Avenue; and a turning restriction at Dyer Avenue and 42nd Street.

Analysis

Turning Restrictions. To address the proposed turning restrictions in the Bow-Tie area, trips were reassigned to alternate turning movements. In total, there are four proposed turning restrictions and resultant trip reassignments.

- Left turns from West 47th Street to Broadway are restricted; turning cars are reassigned to the preceeding left turn onto Seventh Avenue.
- Similarly, right turns from 46th Street to Broadway are restricted and trips are reassigned to the following right turn onto Seventh Avenue.
- At 45th Street and Times Square the second left turn is restricted.
- At 44th Street, turn restrictions prohibit cars from turning right onto Broadway.

For the first three trip reassignments, changes in the network occur north of 44th Street. For example, between 45th and 44th streets, vehicles return to the avenue onto which they would have originally turned. These cars are reassigned to the earlier right turn onto Seventh Avenue. Vehicles affected by the fourth turning restriction would return to Broadway through a left turn from Seventh Avenue onto 42nd Street and a subsequent right turn from 42nd Street onto Broadway.

Leading Pedestrian Indicator. At 42nd Street and Eighth Avenue, a leading pedestrian indicator (LPI) is recommended to ease congestion caused by the large pedestrian volumes generated by the Port Authority Bus Terminal. To analyze the effects of this proposal, an eight second LPI was integrated into the analysis of build conditions. Three seconds were taken from the northbound avenue traffic, and two seconds were taken from each of the east-west movements – the protected eastbound to northbound left turn and the combined eastbound-westbound phases.

Finally, As per the recommendations made by NYCDOT in the 42nd Street Light Rail FEIS, it is recommended that right turns off of Dyer Avenue onto eastbound 42nd Street are restricted. For analysis, trips were reassigned using the same methodology as the Light Rail FEIS.

Mitigation Measures

The LOS analysis of the future build scenario generated eight intersections which may experience significant negative impacts. A series of standard mitigation measures has been proposed to offset these impacts. They are as follows:

Impacts by the Dyer Avenue Turn Restriction

Intersection: 40th and Broadway
Mitigation: Timing - Shift of 3 seconds (from SB to EB) during AM
Parking - Daylighting on south side of 40th

Intersection: 40th and Seventh
Mitigation: Timing - Shift of 1 second during AM.

Intersection: 40th and Eighth
Mitigation: Timing - Shift of 3 seconds in signal timing during all periods.
Parking - Daylighting (as in 42nd St. Light Rail EIS)

Intersection: 42nd and Tenth
Mitigation: Timing - New signal phase during all times.

Impacted by Leading Pedestrian Indicator
Intersection: 42nd and Eighth
Mitigation: Timing - Shift of 3 seconds (to NB) signal timing during MD and 5 seconds (to NB) during AM. (2 seconds taken from lpi in both periods)

Impacted by Bow-Tie Turn Restrictions
Intersection: 42nd and Seventh
Mitigation: Timing - Shift of 3 seconds in signal timing during MD
Parking - Daylighting on east side of Seventh Avenue

Intersection: 43rd and Seventh
Mitigation: Timing - Shift of 3 seconds (from WB to SB) in signal timing during AM.
Parking - Daylighting on east side Seventh Avenue

Intersection: 45th and Seventh
Mitigation: Timing - Shift of 2 to 3 seconds in signal timing during all periods.
Parking - Daylighting on north side of 45th Street.

Next Steps

To further assess the feasibility of the proposed recommendations, a preliminary design investigation will be conducted. This includes an engineering site survey to determine the physical features and infrastructure of the study area, both surface and subsurface. The preliminary design investigation explores such features topography, utilities, vaults, and the drainage system, since these factors are critical in determining the feasibility of geometric design changes.

In addition, existing curb regulations, particularly designated taxi stands and truck loading/unloading, will be explored in relation to existing and future land uses to determine their most appropriate locations. Currently, DCP is initiating meetings with DOT and the Taxi and Limousine Commission (TLC) to explore possible recommendations related to taxi stands. The results of this process will appear as supplementary text to this document.

In summary, following necessary approvals from the appropriate agencies, field tests would be conducted to evaluate the effectiveness of proposed measures such as: striping the pavement to temporarily widen the sidewalks; prohibiting turns; changing off peak signal timing; and improving street markings and signage. These would be undertaken jointly with DOT. Low-cost physical and operational improvements would be permanently implemented depending on the success of the tests.

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APPENDIX

APPENDIX

Table A
1990 US Census Journey to Work for Census Tracts in Midtown Manhattan

Census Tract	Total	Drive Alone	Car Pool	Motor cycle	Taxi	Subway	Bus	Railroad	Ferry	Bike	Walk	Other	Home
72	16683	1553	824	30	130	7158	9667	2234	70	21	1588	86	290
74	26086	2483	1427	0	493	11394	3927	4167	130	28	1732	175	130
76	14255	1382	764	2	246	6957	1943	2090	63	18	646	44	100
80	30176	2595	1347	0	486	13446	4832	5239	145	56	1703	118	209
82	38327	3424	1624	12	728	17401	6205	6623	160	148	1798	98	106
84	24514	2138	1333	0	405	11827	3782	3710	92	64	990	81	92
92	66595	5540	2560	15	1329	30406	10403	12500	399	86	2999	317	41
94	57919	5204	2526	10	1292	26740	8831	10163	549	83	2326	195	0
96	52879	4498	2872	17	941	25223	9146	8083	240	101	1602	148	8
100	44732	3918	1896	17	1106	20016	7195	6988	320	107	2888	166	115
101	20112	2049	935	0	366	9403	2282	4113	188	23	616	85	52
102	53361	4492	2389	22	1569	23889	9147	8164	265	76	3077	249	22
103	7182	749	553	0	43	3858	841	698	35	9	296	4	96
104	44545	3789	1848	18	935	20801	7580	6727	174	106	2326	182	59
109	31633	2723	1762	31	700	15983	4337	4956	102	37	794	125	83
111	7916	869	500	0	101	4065	908	826	43	85	418	15	86
112.01	15174	1478	621	0	555	6660	2557	1768	98	39	1240	49	109
112.02	24638	2476	890	18	949	10368	3981	3522	121	31	1983	191	41
112.03	10665	899	777	0	328	4876	1802	872	13	23	973	51	51
113	41051	3594	2429	9	966	19407	6876	6327	134	43	1146	97	23
115	10360	1082	702	0	198	5196	1475	1042	30	26	504	10	95
119	25914	2623	1311	0	407	12637	3789	3902	102	39	1027	55	22
121	5911	673	331	0	114	2334	593	556	20	33	953	27	277
125	28627	2435	1115	27	490	13395	4614	5032	162	57	1153	127	20
127	6915	706	306	10	219	2802	898	872	66	22	1223	24	137
131	40783	4071	1630	0	991	19416	6222	5741	163	119	2191	145	94
133	5078	766	447	0	51	1790	595	340	35	10	812	29	203
137	34563	3377	1482	17	883	16232	5376	3961	142	70	2482	104	437
139	7097	660	389	10	102	2923	892	513	30	26	1136	51	365
Total	793691	72246	37590	265	17123	366603	130696	121729	4091	1586	42622	3048	3363
% Total	100.00%	9.10%	4.74%	0.03%	2.16%	46.19%	16.47%	15.34%	0.52%	0.20%	5.37%	0.38%	0.42%
Aggregate % Total	100.00%	16.03%				78.51%				5.57%		0.81%	

Source: 1990 US Census Transportation Planning Package

Table B - Midtown Manhattan Pedestrian Accidents at Intersections

RANK	#	LOCATION	RANK	#	LOCATION
1	97	East 33rd Street and Park Avenue	21	27	West 41st Street and Ninth Avenue
2	70	West 34th Street and Eighth Avenue		27	East 42 nd Street and Madison Avenue
	70	**West 42nd Street and Eight Avenue**		27	West 57th Street and Sixth Avenue
4	57	West 34th Street and Sixth Avenue/Broadway		27	West 33rd Street and Broadway
5	43	West 42nd and Fifth Avenue	25	25	West 42nd Street and Park Avenue
	43	West 42nd Street and Ninth Avenue		25	West 34th Street and Lexington Avenue
7	38	West 34th Street and Seventh Avenue	27	**24**	**West 41st Street and Eighth Avenue**
8	**37**	**West 40th Street and Eighth Avenue**		24	West 57th Street and Broadway
	37	**West 42nd Street and Sixth Avenue**		24	West 57th Street and Eighth Avenue
	37	**West 42nd Street and Seventh Avenue**	30	23	East 32 nd Street and Third Avenue
	37	East 42nd Street and Lexington Avenue	31	22	West 33rd Street and Seventh Avenue
12	36	West 57th Street and Ninth Avenue		22	West 36th Street and Eighth Avenue
13	**34**	**West 45th Street and Seventh Avenue/Broadway**		**22**	**West 39th Street and Seventh Avenue**
	34	East 57th Street and Lexington Avenue		22	West 44th Street and Ninth Avenue
15	33	East 57th Street and Third Avenue		22	West 51th Street and Fifth Avenue
	33	**West 42nd Street and Broadway**	36	21	West 34th Street and Park Avenue
17	31	East 42nd Street and Third Avenue	37	20	West 35th Street and Eighth Avenue
18	29	East 40th Street and Park Avenue		20	West 36th Street and Seventh Avenue
19	28	East 34th Street and Third Avenue		**20**	**West 50th Street and Sixth Avenue**
	28	**West 53rd Street and Seventh Avenue**		**20**	**West 50th Street and Broadway**
				20	West 53rd Street and Fifth Avenue

Table C - Midtown Mahattan Pedestrian Accidents at Midblocks 1989 - 1994

RANK	#	LOCATIONS	RANK	#	LOCATIONS
1	41	W 42nd St. between Eighth & Ninth avenues	11	13	W 34th St. between Eighth & Ninth avenues
2	39	W 34th St. between Seventh & Eighth avenues	12	12	E 42nd St. between Park & Lexington avenues
3	23	W 42nd St. between Fifth & Sixth avenues		12	W 47th St. between Fifth & Sixth avenues
4	**22**	**W 42nd St. between Seventh & Eighth avenues**	14	11	E 40th St. between Fifth & Madison
5	21	W 57th St. between Sixth & Seventh avenues		11	E 42nd St. between Lex & Third avenues
	21	W 33rd St. between Seventh & Eighth avenues	16	10	W 40th St. between Eighth & Ninth avenues
7	18	E 42nd St. between Fifth & Madison avenues		10	W 57th St. between Fifth & Sixth avenues
8	**15**	**W 42nd St. between Sixth Avenue & Broadway**		10	W 57th St. between Seventh Avenue & Broadway
9	14	E 34th St. between Fifth & Madison avenues			
	14	W 57th St. between Eighth & Ninth avenues			

Table D - Midtown Mahattan Pedestrian Fatalities 1989 - 1994

#	FATALITIES AT INTERSECTION	#	FATALITIES AT MID-BLOCKS
3	Third Avenue at East 31st , 41st and 52nd streets	2	Ninth Avenue between - W 29th & 30th streets; & W 44th & 45th streets
3	**Seventh Avenue** at West 37th, **43rd, 47th streets**	2	40th Street between - Madison & Fifth avenues; & Eighth & Ninth avenues
2	Lexington Avenue at East 48th and 59th streets	1	Park Avenue between East 56th and 57th streets
2	Park Avenue at East 33rd and 49th streets	1	Madison Avenue between East 49th and 50th streets
2	**Eighth Avenue at West 48th and** 57th streets	1	Fifth Avenue between West 54th and 55th streets
2	Ninth Avenue at West 49th and 55th streets	1	West 36th Street between Seventh and Eighth avenues
2	**Broadway at West 50th and** 55th street	1	East 41st Street between Park and Lexington avenues
1	Madison Avenue at East 45th Street	1	West 47th Street between Fifth and Sixth avenues
1	**Sixth Avenue at West 52nd Street**	1	West 50th Street between Fifth Avenue and Rockefeller Plaza
1	Vanderbilt Avenue at East 45th Street	1	Central Pk South between Grand Army Plaza and Sixth Avenue

Source: NYC Department of Transportation, Pedestrian Accidents 1989 - 1994

Table E - Problems and Opportunities Matrix

LOCATION	PROBLEM	OPPORTUNITY
6th Avenue *One-way northbound*		
At 53rd Street *One-way westbound*	Gridlock situations created by westbound 53rd St. traffic Pedestrian congestion on crowded corners	Public plaza and open landscaped spaces with seating Prominent pedestrian movement corridor Destination: 53rd Street museums
Between 52nd and 53rd Streets		Excess space on sidewalks for placing maps/signage
At 52nd Street *One-way eastbound*	Vehicular encroachments and spillbacks Turning conflicts	Public plaza and open landscaped spaces with seating
Between 51st and 52nd Streets	Noncompliance of bus lane regulations	Excess space on sidewalks for placing maps/signage
At 51st Street *One-way westbound*	Vehicular encroachment	Midblock passage Public plaza and open landscaped spaces with seating
At 50th Street *One-way eastbound*	Heavy pedestrian and vehicular volumes and conflicts vehicular congestion High accident location Vehicular encroachments and spill backs Transit node: pedestrian congestion	Public plaza and open landscaped spaces with seating Photo opportunity Destination: Radio City
At 49th Street *One-way westbound*	Transit node: pedestrian congestion Heavy pedestrian and vehicular congestion and conflict	Public plaza and open landscaped spaces with seating
At 48th Street *One-way eastbound*	Transit node: pedestrian congestion Vehicular spillbacks	Public plaza and open landscaped spaces with seating Destination: Music Row
At 47th Street *One-way westbound*	Transit node: pedestrian congestion on southwest corner Subway exit & 3 vendors Trucks loading in bus lane	Prominent pedestrian movment corridor Public plaza and open landscaped spaces with seating Destination: Diamond District
Between 46th and 47th Streets	Lacks characteristics of surrounding business district	Excess space on sidewalks for placing maps/signage
At 46th Street *One-way eastbound*	Pedestrian congestion at corners	Prominent pedestrian movement corridor Destination: Little Brazil
Between 45th and 46th Streets		Excess space on sidewalks for placing maps/signage
At 45th Street *One-way westbound*		Public plaza and open spaces
At 44th Street *One-way eastbound*	Pedestrian - vehicular conflict where Eastbound 44th St traffic turns left onto 6th Avenue	Destination: Clubs
Between 43rd and 44th Streets		Excess space on sidewalks for placing maps/signage
At 43rd Street *One-way westbound*	Congestion on corners (6 news boxes, 2 trashcans, 6 pay phones, 4 food vendors)	Public plaza and open landscaped spaces with seating
At 42nd Street *Two-way east-west*	Pedestrian and vehicular volumes and conflicts High accident location Vehicles block intersection Transit node: pedestrian congestion	Prominent pedestrian movement corridor
Between 41st and 42nd Street	"No standing anytime" regulations on left curb not obeyed Right side bus lane not obeyed	View corridor to be developed and photo opportunity
At 41st Street *One-way westbound*	Buses standing in right part of t - intersection Buses can not reach bus stop and discharge passengers within intersection	All-pedestrian phase stoplight View corridor to be developed and photo opportunity
At 40th Street *One-way eastbound*	Transit node: pedestrian congestion	Prominent pedestrian movement corridor

LOCATION		PROBLEM	OPPORTUNITY
7th AVENUE	*One-way southbound*		
At 53rd Street	*One-way westbound*	High accident location Transit node: pedestrian congestion	Prominent pedestrian movment corridor
At 52nd Street	*One-way eastbound*	Taxis and black cars standing for hotels	
At 51st Street	*One-way westbound*	Pedestrian congestion on cluttered corners	
At 50th Steet	*One-way eastbound*	Heavy pedestrian volumes Vehicular encroachments and spill backs	
At 49th Street	*One-way westbound*	Transit node: pedestrian congestion	
At 48th Street	*One-way eastbound*	Heavy pedestrian and vehicular volumes and conflicts	Prominent pedestrian movement corridor Destination: Music Row
At 47th Street	*One-way westbound*	Heavy pedestrian and vehicular volumes and conflicts Transit node: pedestrian congestion	Prominent pedestrian movement corridor
Between 46th and 47th Street		Persons queuing at TKTS stand end up in roadway MTA and tour buses compete for bus stop	Excess roadbed width Destination: TKTS stand
At 46th Street	*One-way eastbound*	Heavy pedestrian and vehicular volumes and conflicts High accident location Misaligned intersection Congestion on obstructed corners	View corridor and photo opportunity Excess roadbed width
Between 45th and 46th Streets			Destinations: Marriott Hotel and Virgin Mega Store
At 45th Street	*One-way westbound*	Heavy pedestrian and vehicular volumes and conflicts High accident location Misaligned intersection Pedestrian congestion on obstructed corners	Prominent pedestrian movement corridor
At Broadway	*One-way so. bound*	Misaligned intersection High accident location Illegally standing vehicles causes loss of roadway	
At 44th Street	*One-way eastbound*	Misaligned intersection Pedestrian congestion on obstructed corners	Prominent pedestrian movement corridor
At 43rd Street	*One-way westbound*	Misaligned intersection Vehicles standing in bus lane	Excess roadbed width Photo opportunity
At 42nd Street	*Two-way east-west*	Heavy pedestrian and vehicular volumes High accident location Vehicles block intersection Transit node: pedestrian congestion	Prominent pedestrian movement corridor
At 41st Street	*One-way westbound*	Heavy Pedestrian - vehicular volumes and conflicts Transit node: pedestrian congestion	
At 40th Street	*One-way eastbound*	Heavy pedestrian and vehicular volumes	Public plaza and open space
Between 39th and 40th Streets			Excess space on sidewalk for placing maps/signage
At 39th Street	*One-way westbound*	High accident location	Public plaza and open space

LOCATION	PROBLEM	OPPORTUNITY
BROADWAY *One-way Southbound*		
At 53rd Street *One-way westbound*	Transit node: pedestrian congestion	Public plaza and open space Destination: CBS / David Letterman
Between 52nd and 53rd Street	Pedestrian - vehicular conflict at parking garage	
At 52nd Street *One-way eastbound*		Public plaza and open space
At 51st Street *One-way westbound*	Pedestrian congestion on cluttered corners	Public plaza and open space
Between 50th and 51st Street		Excess space on sidewalks for placing maps/signage
At 50th Street *One-way eastbound*	Heavy pedestrian and vehicular volumes and conflicts High accident location Transit node: pedestrian congestion Difficult to locate downtown train entrance	Public plaza and open landscaped space with seating
At 49th Street *One-way westbound*	Vehicular encroachments and spill backs	
At 48th Street *One-way eastbound*		Prominent pedestrian movement corridor
Between 47th and 48th Street		Taxi stand and bike lane
At 47th Street *One-way westbound*	Heavy pedestrian and vehicular volumes and conflicts Pedestrian congestion on obstructed corners	Prominent pedestrian movement corridor
Between 46th and 47th Street	MTA and tour buses compete for bus stop Persons queuing at TKTS booth end up in roadway	Destination: TKTS
At 46th Street *One-way eastbound*	Heavy pedestrian and vehicular volumes and conflicts Misaligned intersection Pedestrian congestion on obstructed corners	Excess roadbed width Photo opportunity
Between 45th and 46th Streets		Destinations: Marriott Hotel and Virgin Mega Store
At 45th Street *One-way westbound*	Heavy pedestrian and vehicular volumes and conflicts Misaligned intersection	Prominent pedestrian movement corridor
At 7th Avenue *One-way southbound*	See 7th Avenue problems and opportunities	
At 44th Street *One-way eastbound*	Misaligned intersection	Excess roadbed width
At 43rd Street *One-way westbound*	Misaligned intersection	Excess roadbed width Photo opportunity
Between 42nd and 43rd Streets		4 Times Square Building's excess space on sidewalk and placing maps/signage
At 42nd Street *Two-way east-west*	Heavy pedestrian volumes High accident location Vehicular encroachment and spill back	Prominent pedestrian movement corridor
At 41st Street *One-way westbound*	Pedestrian - vehicular conflicts	
At 40th Street *One-way eastbound*	Transit node: pedestrian congestion	Public plaza and open landscaped space with seating
Between 39th and 40th Streets		Excess space on sidewalk for landscaping and placing maps/signage

LOCATION		PROBLEM	OPPORTUNITY
8th AVENUE	*One-way northbound*		
At 53rd Street	*One-way westbound*	Heavy pedestrian and vehicular volumes Store portrudes at southwest corner	
At 52nd Street	*One-way eastbound*		
At 51st Street	*One-way westbound*	Transit node: pedestrian congestion Vehicular traffic moves at high velocity	
At 50th Street	*One-way eastbound*	Pedestrian volumes and conflicts Transit node: pedestrian congestion M27 bus right turn onto 50th from 8th	
Between 49th and 50th Street			Public plaza and open landscaped areas with seating Space for maps/signage
At 49th Street	*One-way westbound*	Transit node: pedestrian congestion	
Between 48th and 49th Street		Hotel loading zone conflicts with designated bus lane	
At 48th Street	*One-way eastbound*	Phone booths on every corner Store on northwest corner portrudes into sidewalk space	
At 47th Street	*One-way westbound*	Pedestrian - vehicular conflicts	
Between 46th and 47th Street		Pedestrian - vehicular conflict at parking lot entrance	
At 46th Street	*One-way eastbound*	Heavy pedestrian volumes High accident location	Neckdown, Prominent pedestrian movement corridor Destination: Restaurant Row
At 45th Street	*One-way westbound*	Heavy pedestrian volumes	Prominent pedestrian movement corridor Destination: theaters
Between 44th and 45th Street		Hotel loading zone conflicts with designated bus lane	
At 44th Street	*One-way eastbound*	Heavy pedestrian and vehicular volumes Transit node: pedestrian congestion Retail display obstructs southeast corner	Prominent pedestrian movement corridor
Between 43rd and 44th Streets		Frequent midblock crossings (esp. Pm rush)	Prominent pedestrian movement
At 43rd Street	*One-way westbound*	Pedestrian congestion on corners	Ventilation shafts on corners
At 42nd Street	*Two-way east-west*	Pedestrian and vehicular volumes and conflicts High accident location (70 injured = highest in study area) Transit node: pedestrian congestion	Prominent pedestrian movement corridor Destination: Port Authority
Between 41st and 42nd Streets			Excess space on west sidewalk for signage/maps
At 41st Street	*One-way westbound*	Heavy pedestrian and vehicular volumes and conflicts High accident location Pedestrian congestion on obstructed corners Vehicles block intersection (spillbacks)	Prominent pedestrian movement corridor Destination: Port Authority
Between 40th and 41st Streets			Excess space on west sidewalk for signage/maps
At 40th Street	*One-way eastbound*	Heavy pedestrian and vehiculars volumes High accident location Transit node: pedestrian congestion	Prominent pedestrian movement corridor Destination: Port Authority

LOCATION	PROBLEM	OPPORTUNITY
53rd Street *One-way westbound*		
Between 6th and 7th Avenues	Pedestrian - Vehicular conflicts at loading dock Turning conflicts at hotel, garage, and loading dock Illegal standing reduces roadway to one lane	Midblock passage Prominent pedestrian movement corridor
Between 7th Avenue and Broadway	Transit node (midblock exits)	Open landscaped space with seating
Between Broadway and 8th Avenue	Illegal standing reduces roadway capacity to one lane Northside sidewalk blocked by theater equipment	Excess roadbed width (4ft wider than in other blocks)
52nd Street *One-way eastbound*		
Between 6th and 7th Avenue	Frequent midblock pedestrian crossings Conflicts at loading docks	Midblock passage Excess space on sidewalks for maps, signage
Between 7th Avenue and Broadway	Pedestrian-vehicular conflicts at curb cuts Turning conflicts at loading docks	
Between Broadway and 8th Avenue	Heavy vehicular congestion Lack identity of surrounding streets	Public plaza and open space
51st Street *One-way westbound*		
Between 6th and 7th Avenue	Pedestrian - vehicular conflicts at loading docks Illegal standing and parking reduces roadway to one lane Turning conflicts at loading docks	Midblock passage Excess space on sidewalks for maps, signage
Between Broadway and 8th Avenue	Pedestrian - vehicular conflicts at loading docks Lacks identity of surrounding streets	Excess space on sidewalks for maps, signage
50th Street *One-way eastbound*		
Between 6th and 7th Avenues	Midblock pedestrian crossings Noncompliance of transit corridor regulations	Midblock passage Excess space on sidewalks for maps, signage
Between Broadway and 8th Avenue	Heavy vehicular volumes Noncompliance of transit corridor regulations Turning conflicts at loading bays	Excess space on sidewalks for maps, signage
49th Street *One-way westbound*		
Between 6th and 7th Avenues	Frequent midblock crossings Noncompliance of transit corridor regulations	Midblock passage
Between 7th Avenue and Broadway	Heavy congestion creates vehicular spillbacks Noncompliance of transit corridor regulations	
Between Broadway and 8th Avenue	Noncompliance of transit corridor regulations	
48th Street *One-way eastbound*		
Between 6th and 7th Avenues	Turning conflicts with parking facility and at loading docks	Midblock passage Inconsistent roadbed width Destination: Music Row
Between 7th Avenue and Broadway	Heavy congestion creates vehicular spillbacks	
Between Broadway and 8th Avenue	Frequent midblock crossings Turning conflicts with parking facility Heavy vehicular congestion (esp. Pre-theater)	Public plaza and open landscaped space with seating Midblock passage
47th Street *One-way westbound*		
Between 6th and 7th Avenues	Heavy vehicular congestion created by turning movments at intersections	Prominent pedestrian movement corridor
Between Broadway and 8th Avenue		Midblock passage

LOCATION	PROBLEM	OPPORTUNITY
46th Street *One-way eastbound*		
Between 6th and 7th Avenues	Illegal parking and standing Turn conflicts at loading docks	Midblock passage
Between Broadway and 8th Avenue	Illegal parking and standing reduces roadway to one lane	Prominent pedestrian movement corridor
45th Street *One-way westbound*		
Between 6th Avenue and Broadway	Double parking reduces 45th street to one lane Pedestrian - vehicular conflicts at loading docks	
Between Broadway and 8th Avenue	Frequent midblock crossings (esp. PM rush)	Midblock passage Prominent pedestrian movement corridor
44th Street *One-way eastbound*		
Between 6th Avenue and Broadway	Turning conflicts with parking garage Double parking on north curb and illegal standing on south curb reduces level of service	
Between 7th and 8th Avenues	Frequent midblock crossings (esp. PM rush) Curb cuts with major activities	Prominent pedestrian movement corridor
43rd Street *One-way westbound*		
Between 6th Avenue and Broadway	Pedestrian - vehicular conflicts with garages Merchant portruding far into southside sidewalk Illegal standing reduces 43rd street to one lane	
Between 7th and 8th Avenues	Curb cuts with major activity (6 along north curb) Trucks loading at theaters	
42nd Street *Two-way east-west*		
Between 6th Avenue and Broadway	Frequent midblock crossings, dangerous conditions Illegal parking and standing blocks bus lane	Midblock passage Prominent pedestrian movement corridor
Between 7th and 8th Avenues	Frequent midblock crossings, dangerous conditions Illegal parking and standing blocks bus lanes	Prominent pedestrian movement corridor
Between 8th and 9th Avenues	Frequent midblock crossings, dangerous conditions Taxi pick ups at PABT; Illegal parking and standing	Prominent pedestrian movement corridor
At 9th Avenue *One-way so. bound*	Heavy vehicular volumes High accident location	Prominent pedestrian movement corridor
41st Street *One-way westbound*		
Between 6th Avenue and Broadway	Pedestrian conflicts with driveways and loading docks	Midblock passage
Between 7th and 8th Avenues	Pedestrian conflicts with driveways Heavy vehicular volumes (pm rush)	Prominent pedestrian movement corridor (PM rush)
Between 8th and 9th Avenues	Dark tunnel underneath PABT Driver confusion	
At 9th Avenue *One-way so. bound*	High accident location Misaligned intersection	Excess roadbed, curb line changes in DCP West Midtown Transit Study
40th Street *One-way eastbound*		
Between 6th Avenue and Broadway	Pedestrian - vehicular conflicts with garages Vendors block sidewalk	
Between Broadway and 7th Avenue	Curb cuts with major activity	Excess space on sidewalk for maps/signage
Between 7th and 8th Avenues	Curb cuts with major activity Difficult to locate subway entrance	Prominent pedestrian movement corridor
Between 8th and 9th Avenues	High accident location: mid-block crossings	

Midtown Manhattan Pedestrian Project
Table F: HCS Summary for Peak Hours

Key: Lane group or Peak Hour not Analyzed in HCS

Signalized Intersection	Dir/Lane Grp	Peak Period	EXISTING v/c Ratio	EXISTING Lane Grp Delay	EXISTING Lane Grp LOS	NO BUILD v/c Ratio	NO BUILD Lane Grp Delay	NO BUILD Lane Grp LOS	FUTURE (Revised) v/c Ratio	FUTURE (Revised) Lane Grp Delay	FUTURE (Revised) Lane Grp LOS	FUTURE (Mitigated) v/c Ratio	FUTURE (Mitigated) Lane Grp Delay	FUTURE (Mitigated) Lane Grp LOS
40th St & Bway	EB / TR	AM	0.726	19.20	C	0.771	20.5	C	1.048	56.0	E	0.822	20.2	C
		MD	0.577	16.60	C	0.646	17.6	C	0.841	23.1	C			
		PM	0.620	17.20	C	0.732	19.3	C	0.925	29.2	D			
	SB / LT	AM	0.462	10.00	B	0.477	10.1	B	0.477	10.1	B	0.509	11.6	B
		MD	0.443	9.80	B	0.464	10.0	B	0.464	10.0	B			
		PM	0.447	9.90	B	0.472	10.0	B	0.472	10.0	B			
40th St & 7th Av	EB / TR	AM	0.683	16.90	C	0.716	17.5	C	0.969	33.9	D	0.900	23.7	C
		MD	0.540	14.80	B	0.587	15.4	C	0.767	18.8	C			
		PM	0.380	13.20	B	0.451	13.9	B	0.630	15.9	C			
	SB / LT	AM	0.804	15.60	C	0.841	16.6	C	0.841	16.6	C	0.902	20.4	C
		MD	0.654	13.10	B	0.703	13.8	B	0.703	13.8	B			
		PM	0.750	14.50	B	0.791	15.3	C	0.791	15.3	C			
40th St & 8th Av	EB / L	AM										0.457	15.5	C
												0.609	17.7	C
												0.493	15.9	C
	EB / LT	AM	0.936	33.50	D	0.983	41.4	E	1.467	386.8	F	0.904	26.8	D
		MD	0.801	23.20	C	0.896	28.9	D	1.231	157.1	F	0.639	17.4	C
		PM	0.558	17.80	C	0.704	20.2	C	0.994	43.1	E	0.517	15.8	C
	NB / TR	AM	0.562	9.60	B	0.582	9.7	B	0.562	9.7	B	0.619	11.3	B
		MD	0.538	9.40	B	0.567	9.6	B	0.567	9.6	B	0.602	11.2	B
		PM	0.438	8.60	B	0.460	8.7	B	0.460	8.7	B	0.489	10.2	B
41st St & Bway	WB / LT	AM	0.650	20.00	C	0.677	20.6	C	0.677	20.6	C			
		MD	0.534	17.80	C	0.573	18.4	C	0.573	18.4	C			
		PM	0.618	19.20	C	0.646	19.8	C	0.646	19.8	C			
	SB/ TR	AM	0.625	10.40	B	0.488	9.0	B	0.669	11.0	B			
		MD	0.415	8.50	B	0.629	10.4	B	0.629	10.4	B			
		PM	0.607	10.20	B	0.656	10.8	B	0.656	10.8	B			
41st St & 7th Av	WB / LT	AM	0.526	17.70	C	0.548	18.0	C	0.548	18.0	C	0.548	18.0	C
		MD	0.396	16.30	C	0.428	16.6	C	0.428	16.6	C	0.365	16.0	C
		PM	0.514	17.50	C	0.573	18.3	C	0.573	18.3	C	0.573	18.3	C
	SB / T	AM										0.932	19.3	C
		MD										0.761	12.4	B
		PM										0.88	15.9	C
	SB / TR	AM	0.941	19.50	C	0.984	25.4	D	1.358	261.5	F	0.485	9.3	C
		MD	0.741	11.90	B	0.794	12.9	B	1.096	65.2	F	0.38	8.4	B
		PM	0.808	13.20	B	0.877	15.4	C	1.210	132.5	F	0.359	8.2	B
41st St & 8th Av	WB / TR	AM	0.624	18.90	C	0.688	20.1	C	0.688	20.1	C			
		MD	0.549	17.80	C	0.692	20.2	C	0.692	20.2	C			
		PM	0.564	18.00	C	0.708	20.5	C	0.708	20.5	C			
	NB / LT	AM	0.598	9.90	B	0.623	10.2	B	0.658	10.5	B			
		MD	0.568	9.60	B	0.608	10.0	B	0.631	10.2	B			
		PM	0.458	8.70	B	0.493	9.0	B	0.508	9.1	B			
42nd St & Bway	EB / TR	AM	0.325	13.70	B	0.347	13.9	B	0.155	12.7	B			
		MD	0.317	13.70	B	0.366	14.0	B	0.342	13.9	B			
		PM	0.279	13.40	B	0.324	13.7	B	0.224	13.1	B			
	WB / DfL	AM	0.668	21.70	C	0.774	28.8	D	0.455	15.3	C			
	WB / T		0.284	13.50	B	0.328	13.8	B	0.328	13.8	B			
	WB / LT	MD	0.478	15.00	B	0.594	13.6	C	0.581	16.1	C			
		PM	0.617	16.60	C	0.697	17.9	C	0.646	17.0	C			
	SB / LTR	AM	0.451	10.30	B	0.473	10.5	B	0.597	11.7	B			
		MD	0.449	10.30	B	0.483	10.5	B	0.558	11.3	B			
		PM	0.421	10.10	B	0.459	10.4	B	0.576	11.5	B			
42nd St & 7th Av	EB / TR	AM	0.495	15.20	C	0.592	16.3	C	0.569	17.1	C	0.569	17.1	C
No Build Dot		MD	0.447	14.70	B	0.617	16.6	C	0.478	15.1	C	0.478	15.1	C
restriped lanes		PM	0.419	14.50	B	0.549	15.7	C	0.509	15.6	C	0.523	16.2	C
Ex 5, No Bld 4	WB / LT	AM	0.261	13.30	B	0.305	13.6	B	0.288	13.5	B	0.288	13.5	B
		MD	0.358	14.00	B	0.443	14.6	B	0.435	14.6	B	0.435	14.6	B
		PM	0.404	14.30	B	0.462	14.8	B	0.496	15.2	C	0.510	15.8	C
	SB / LTR	AM	0.874	16.90	C	0.937	20.7	C	1.439	351.0	F	0.965	23.5	C
		MD	0.762	14.00	B	0.825	15.4	C	1.289	195.7	F	0.864	16.6	C
		PM	0.855	16.20	C	0.896	17.9	C	1.543	492.9	F	1.013	32.4	D
42nd St & 8th Av	EB / LT	AM	0.427	10.20	B	0.472	10.5	B	0.161	10.5	B	0.173	11.9	B
		MD	0.492	10.70	B	0.608	11.9	B	0.404	12.1	B	0.414	12.6	B
		PM	0.317	9.40	B	0.398	9.9	B	0.207	10.8	B			
	WB / TR	AM	0.335	18.70	C	0.403	19.2	C	0.511	19.3	C	0.570	21.5	C
		MD	0.575	20.80	C	0.718	23.0	C	0.822	25.4	D	0.851	27.4	D
		PM	0.589	21.00	C	0.680	22.2	C	0.765	23.3	C			
	NB / LTR	AM	0.828	19.50	C	0.867	20.6	C	1.052	49.7	E	0.917	22.1	C
		MD	0.771	18.30	C	0.843	19.9	C	0.998	34.5	D	0.917	23.0	C
		PM	0.665	16.70	C	0.734	17.7	C	0.853	21.6	C			

Midtown Manhattan Pedestrian Project
Table F: HCS Summary for Peak Hours

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Signalized Intersection	Dir/Lane Grp	Peak Period	EXISTING v/c Ratio	EXISTING Lane Grp Delay	EXISTING Lane Grp LOS	NO BUILD v/c Ratio	NO BUILD Lane Grp Delay	NO BUILD Lane Grp LOS	FUTURE (Revised) v/c Ratio	FUTURE (Revised) Lane Grp Delay	FUTURE (Revised) Lane Grp LOS	FUTURE (Mitigated) v/c Ratio	FUTURE (Mitigated) Lane Grp Delay	FUTURE (Mitigated) Lane Grp LOS
42nd St & Dyer	EB / T	AM	0.350	14.40	B	0.397	14.7	B	0.397	14.7	B			
		MD	0.308	14.10	B	0.379	14.6	B	0.379	14.6	B			
		PM	0.264	13.80	B	0.313	14.1	B	0.313	14.1	B			
	WB / T	AM	0.133	13.00	B	0.146	13.1	B	0.147	13.1	B			
		MD	0.258	13.80	B	0.298	14.0	B	0.298	14.0	B			
		PM	0.316	14.10	B	0.362	14.5	B	0.362	14.5	B			
	NB / L	AM	0.410	9.60	B	0.418	9.7	B	0.261	8.7	B			
		MD	0.270	8.70	B	0.275	8.8	B	0.173	8.2	B			
		PM	0.236	8.50	B	0.241	8.6	B	0.153	8.1	B			
	NB / R	AM	0.424	9.80	B	0.456	10.0	B						
		MD	0.265	8.70	B	0.304	8.9	B						
		PM	0.253	8.60	B	0.281	8.8	B						
42nd St & 10th Av	EB / LT	AM	0.383	14.20	B	0.430	14.6	B	0.454	14.8	B	0.345	12.5	B
		MD	0.256	13.30	B	0.323	13.7	B	0.333	13.8	B	0.261	12.0	B
	EB / DfL	PM	0.921	62.90	F	1.151	163.9	F	1.275	264.0	F	EB / LT		
	EB / T	PM	0.156	12.70	B	0.198	12.9	B	0.198	12.9	B	0.288	12.1	B
	WB / TR	AM	0.528	15.40	C	0.549	15.6	C	0.667	17.1	C	0.822	24.9	C
		MD	0.566	15.80	C	0.610	16.3	C	0.693	17.5	C	0.826	24.6	C
		PM	0.577	15.90	C	0.629	16.6	C	0.703	17.7	C	0.838	25.0	C
	NB / LTR	AM	0.727	13.20	B	0.750	13.6	B	0.750	13.6	B	0.801	15.9	C
		MD	0.772	14.00	B	0.801	14.6	B	0.801	14.6	B	0.856	17.4	C
		PM	0.820	15.00	B	0.845	15.6	C	0.845	15.6	C	0.903	19.2	C
43rd St & Bway	WB / LT	AM	0.371	14.10	B	0.408	14.4	B	0.408	14.4	B			
		MD	0.402	14.40	B	0.474	15.0	B	0.474	15.0	B			
		PM	0.352	14.00	B	0.457	14.8	B	0.457	14.8	B			
	SB / T	AM	0.602	11.80	B	0.628	12.1	B	0.544	11.1	B			
		MD	0.605	11.80	B	0.644	12.3	B	0.569	11.4	B			
		PM	0.576	11.50	B	0.619	12.0	B	0.532	11.0	B			
43rd St & 7th Av	WB / LT	AM	0.367	14.10	B	0.411	14.5	B	0.411	14.5	B	0.448	16.2	C
		MD	0.397	14.30	B	0.484	15.2	C	0.484	15.2	C			
		PM	0.348	13.90	B	0.467	15.0	B	0.467	15.0	B			
	SB / TR	AM	0.710	12.90	B	0.767	13.8	B	1.057	47.6	F	0.994	27.0	D
		MD	0.636	12.00	B	0.717	13.0	B	0.983	26.8	D			
		PM	0.654	12.20	B	0.723	13.1	B	0.999	29.4	D			
44th St & Bway	EB / TR	AM	0.613	16.90	C	0.691	18.4	C	0.398	14.3	B			
No Build Dot		MD	0.515	15.50	C	0.646	17.4	C	0.411	14.4	B			
restriped lanes		PM	0.548	15.80	C	0.722	18.9	C	0.454	14.8	B			
Ex 2, No Bld 3	SB / LT	AM	0.971	29.70	D	0.704	13.2	B	0.704	13.2	B			
		MD	1.025	42.00	E	0.744	13.9	B	0.744	13.9	B			
		PM	1.032	44.40	E	0.746	14.0	B	0.746	14.0	B			
44th St & 7th Av	EB / TR	AM	0.763	20.20	C	0.863	25.0	C	1.285	191.4	F	0.827	23.4	C
		MD	0.740	19.40	C	0.887	26.7	D	1.165	115.2	F	0.782	20.8	C
		PM	0.836	23.00	C	0.971	36.7	D	1.288	202.6	F	0.545	15.7	C
	EB / R	AM										0.87	32.4	D
		MD										0.864	31.2	D
		PM										0.712	20.5	C
	SB / T	AM	0.792	14.40	B	0.837	15.5	C	0.837	15.5	C	0.875	17.7	C
		MD	0.680	12.60	B	0.738	13.4	B	0.738	13.4	B	0.771	14.9	B
		PM	0.726	13.20	B	0.777	14.1	B	0.777	14.1	B	0.777	14.1	B
45th St & Bway	WB / LT	AM	0.763	20.50	C	0.771	20.7	C	0.387	14.2	B			
		MD	0.555	15.90	C	0.777	21.1	C	0.393	14.3	B			
		PM	0.710	18.80	C	0.728	19.2	C	0.375	14.1	B			
	SB / TR	AM	0.881	18.20	C	0.905	19.7	C	0.803	15.3	C			
		MD	0.918	21.00	C	0.945	23.6	C	0.783	15.0	B			
		PM	0.769	14.40	B	0.792	14.9	B	0.694	13.0	B			
45th St & 7th Av	WB / L	AM										0.739	21.9	C
		MD										0.777	24.2	C
		PM										0.709	20.5	C
	WB / LT	AM	0.844	23.40	C	0.897	27.4	D	1.334	244.8	F	0.564	15.9	C
		MD	0.856	24.30	C	0.945	33.5	D	1.386	297.5	F	0.581	16.2	C
		PM	0.784	20.60	C	0.866	24.6	C	1.266	185.1	F	0.532	15.5	C
	SB / T	AM	0.765	14.40	B	0.810	15.2	C	0.907	19.0	C	0.907	19.0	C
		MD	0.714	13.20	B	0.771	14.2	B	0.928	20.5	C	0.928	20.5	C
		PM	0.771	14.20	B	0.817	15.3	C	0.913	19.2	C	0.913	19.2	C
46st St & 7th Av	EB / TR	AM	0.697	18.10	C	0.715	18.50	C	0.907	27.8	D			
		MD	0.675	17.80	C	0.698	18.20	C	1.036	54.9	E	0.846	25.8	D
		PM	0.451	14.80	B	0.475	15.00	B	0.592	16.4	C			
	EB / R	AM												
	mitigation	MD										0.692	20.3	C
		PM												
	SB / LT	AM	0.715	13.10	B	0.756	13.80	B	0.796	14.6	B			
		MD	0.708	13.00	B	0.755	13.80	B	0.688	12.8	B	0.688	12.8	B
		PM	0.716	13.10	B	0.750	13.70	B	0.801	14.7	B			

Midtown Manhattan Pedestrian Project
Table F: HCS Summary for Peak Hours

Key: Lane group or Peak Hour not Analyzed in HCS

Signalized Intersection	Dir/Lane Grp	Peak Period	EXISTING v/c Ratio	EXISTING Lane Grp Delay	EXISTING Lane Grp LOS	NO BUILD v/c Ratio	NO BUILD Lane Grp Delay	NO BUILD Lane Grp LOS	FUTURE (Revised) v/c Ratio	FUTURE (Revised) Lane Grp Delay	FUTURE (Revised) Lane Grp LOS	FUTURE (Mitigated) v/c Ratio	FUTURE (Mitigated) Lane Grp Delay	FUTURE (Mitigated) Lane Grp LOS
46st St & Bway	EB / TR	AM	0.894	26.70	D	0.916	28.9	D	0.723	18.6	C			
		MD	0.936	32.20	D	0.960	35.9	D	0.644	17.1	C			
		PM	0.582	16.30	C	0.602	16.5	C	0.482	15.1	C			
	SB / T	AM	0.579	11.40	B	0.596	11.6	B	0.759	14.2	B			
		MD	0.548	11.10	B	0.566	11.3	B	0.673	12.7	B			
		PM	0.532	11.00	B	0.548	11.1	B	0.674	12.7	B			
47th St & 7th Av	WB / L	AM	0.991	56.80	E	1.020	65.0	F	1.379	304.2	F	0.752	23.8	C
		MD	0.305	13.70	B	0.323	13.8	B	0.713	20.2	C			
		PM	0.379	14.30	B	0.397	14.5	B	0.726	20.9	C			
	WB / T	AM	0.615	17.60	C	0.625	17.9	C	0.625	17.9	C	0.691	18.5	C
		MD	0.736	21.00	C	0.753	21.6	C	0.753	21.6	C			
		PM	0.575	16.70	C	0.589	17.0	C	0.589	17.0	C			
	SB / TR	AM	0.587	11.50	B	0.618	11.8	B	0.562	11.2	B	0.562	11.2	B
	(SB/ T for build)	MD	0.625	11.90	B	0.662	12.3	B	0.595	11.6	B			
		PM	0.544	11.00	B	0.572	11.3	B	0.625	11.9	B			
	SB / R	AM							0.362	9.8	B	0.371	9.9	B
		MD							0.507	11.3	B			
		PM							0.163	8.5	B			
47th St & Bway	WB / LT	AM	0.645	17.30	C	0.658	17.6	C	0.412	14.4	B			
		MD	0.804	21.80	C	0.821	22.6	C	0.416	14.5	B			
		PM	0.538	15.80	C	0.553	16.0	B	0.223	13.1	B			
	SB / TR	AM	0.687	12.80	B	0.704	13.0	B	0.693	12.9	B			
	(SB/ T for build)	MD	0.543	11.10	B	0.560	11.2	B	0.587	11.6	B			
		PM	0.598	11.60	B	0.614	11.8	B	0.604	11.8	B			
	SB / R	AM							0.387	10.0	B			
		MD							0.240	9.0	B			
		PM							0.339	9.6	B			
48th St & 7th Av	EB / TR	AM	0.620	16.50	C	0.639	16.8	C	0.639	16.8	C			
		MD	0.540	15.60	C	0.557	15.8	C	0.557	15.8	C			
		PM	0.476	14.90	B	0.498	15.1	C	0.498	15.1	C			
	SB / LT	AM	0.771	14.20	B	0.811	15.1	C	0.811	15.1	C			
		MD	0.820	15.40	C	0.868	17.0	C	0.868	17.0	C			
		PM	0.739	13.50	B	0.776	14.2	B	0.776	14.2	B			
48th St & Bway	EB / TR	AM	0.832	23.40	C	0.859	25.1	D	0.859	25.1	D			
		MD	0.659	17.50	C	0.679	18.0	C	0.679	18.0	C			
		PM	0.710	18.70	C	0.738	19.4	C	0.738	19.4	C			
	SB / LT	AM	0.832	15.90	C	0.859	16.8	C	0.859	16.8	C			
		MD	0.646	12.20	B	0.667	12.5	B	0.667	12.5	B			
		PM	0.634	12.10	B	0.653	12.3	B	0.653	12.3	B			
49th St & Bway	WB / LT	AM	0.590	16.30	C	0.604	16.5	C	0.604	16.5	C			
		MD	0.346	13.90	B	0.514	15.4	C	0.514	15.4	C			
		PM	0.446	14.70	B	0.456	14.8	B	0.456	14.8	B			
	SB / TR	AM	0.673	12.50	B	0.691	12.8	B	0.691	12.8	C			
		MD	0.532	11.00	B	0.549	11.1	B	0.549	11.1	B			
		PM	0.598	11.60	B	0.615	11.8	B	0.615	11.8	B			

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