Preface

Bicycle commuter, Lafayette Street bicycle lane.

The *New York City Bicycle Master Plan* is the final report of the first phase of the Bicycle Network Development (BND) Project, a joint Department of City Planning (DCP)-Department of Transportation (DOT) effort. The goal of the BND Project is to increase bicycle ridership in New York City, and the purpose of the *Plan* is to articulate the City's action plan. The BND Project is partially financed through the Congestion Mitigation Air Quality (CMAQ) program of the federal Intermodal Surface Transportation Efficiency Act (ISTEA). The federal program provides funding for the planning, design and development of bikeways as a means of improving air quality, reducing energy costs, reducing congestion on existing roadways, and helping to provide for lower overall transportation costs.

The *Bicycle Master Plan* is divided into nine sections:

- The Benefits of Cycling
- Cycling in New York City
- The On-Street Network
- Bridges
- The Greenway System
- Access to Mass Transit
- A Comprehensive Bicycle Program
- Design Guidelines
- Next Steps

Much of the information in this report is derived from BND Project tasks, including the Citywide network; the All-Agency Bicycle Policy; bicycle facility design guidelines; and a map of recommended routes for public distribution. New York City is committed to making cycling part of the City's transportation system and encourages individuals and communities to participate in the implementation of this *Plan*.

Executive Summary

The use of the bicycle in New York City has been rising steadily during the last decade. More and more New Yorkers are embracing the bicycle as a liberating, healthy, inexpensive, environmentally beneficial and, in general, fun way to travel. Despite its reputation for insufferable congestion, New York City is in many ways ideal for cycling, offering dense land use (ideal for short trips), relatively flat topography, a spectacular, expansive waterfront, and an extensive, linear park system.

The objective of the *New York City Bicycle Master Plan* is to encourage cycling as a mode of transportation. The goals of the *Plan* are as follows:

- Implement and maintain the city's bicycle network and greenway system
- Improve cycling safety
- Provide bicycle parking and support facilities
- Improve bicycle access on bridges and mass transit facilities
- Institutionalize cycling in public agencies and private organizations

Consistent with these goals, the *Plan* identifies a 909 mile, city-wide bicycle network and proposes design guidelines to assist in the implementation of the network. The network maps are enclosed in the back of the report. The *Plan* also reports on the New York City Greenway, a multi-agency initiative to develop bicycle routes connecting the city's parkland, and recommends improved bicycle access to bridges and mass transit. Finally, the *Plan* proposes a Comprehensive Bicycle Program, documenting existing and proposing new multi-agency initiatives in the areas of bicycle encouragement, engineering, enforcement and education.

Implementation of the *Plan* could have a profoundly positive impact on New York City, enhancing New Yorkers transportation and recreation options, improving the city's air quality, alleviating the city's notorious noise pollution and congestion and, in general, transforming New York City into a more welcoming, enjoyable place in which to live and visit.

Eastern Parkway multi-use path.

The Benefits of Cycling

Cyclists on the City Island Esplanade.

The bicycle is one of the most environmentally efficient modes of transportation. By using a renewable energy source, the human body, the bicycle, in contrast to the automobile, is non-polluting. The bicycle also uses much less space than the automobile, and is considerably more quiet than other modes of transportation. These benefits are especially attractive in New York City, as we struggle with noise and congestion issues, and are working to meet the federal mandates of the 1990 Clean Air Act.

The bicycle also has tremendous health benefits. Cycling is ranked among the top three exercises for improving cardiovascular fitness. According to the U.S. Center for Disease Control, the most effective activity regimens are moderate in intensity, individualized and incorporated into daily activity. Cycling to work, school or shopping as part of one's regular daily routine can be both a sustainable and time-efficient exercise regimen for maintaining acceptable levels of fitness.

Cycling can be informative and pleasurable. By traveling by bicycle, the rider becomes a part of the environment rather than isolated from it, getting to know different neighborhoods in the city and finding attractions that could be missed in an automobile.

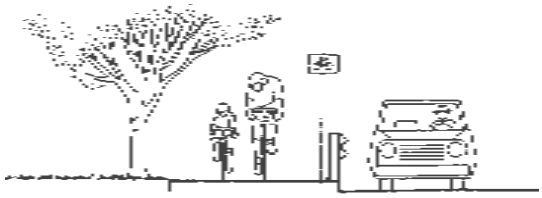
The bicycle is also economically efficient. According to estimates by Transportation Alternatives, an advocacy organization devoted to environmentally-friendly transportation, bicycle riding costs the frequent cyclist only one-quarter as much as driving, assuming cyclists replace their bicycles every three years. Transportation Alternatives estimates that the annual savings would average $1,100 per motorist.

Cycling in New York City

Map of existing bikeways in NYC.

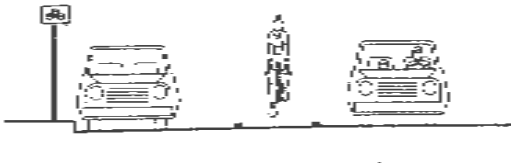
Existing Bicycle Use

There are approximately 119 miles of bicycle facilities in New York City. The facilities, which are distributed among all five boroughs, range from multi-use park paths, to on-street lanes on such major arteries as Broadway and First Avenue in Manhattan, and signed routes on Bay Street in Staten Island. Although designated as "bicycle" facilities, on-street lanes are shared with in-line skaters, and off-street paths are shared with skaters, joggers and pedestrians.



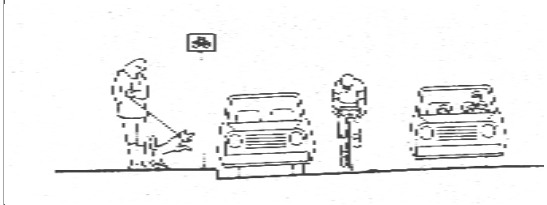
Multi-use Path: Separated from the roadway and delineated by pavement markings and regulatory signage. Bicycle paths are usually shared with multiple users, including pedestrians, runners and skaters.

Example: Shore Parkway, Brooklyn



On-Street Bicycle Lane: Part of the roadway and delineated by pavement markings and regulatory signage. The lane, which can be shared with in-line skaters, is usually located next to curb lane parking, and may include a marked buffer zone.

Example: Lafayette Street, Manhattan

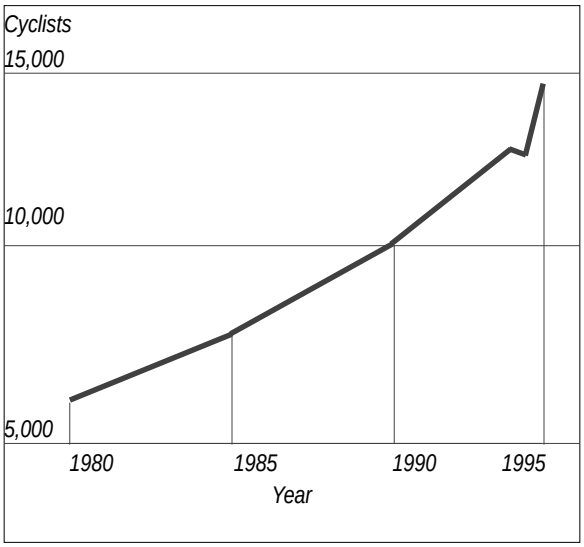


Signed Bicycle Route: Shared use of the roadway, typically designated with informational signs.

Example: Henry Street, Brooklyn

Existing Bikeway Classifications

Bicycle use in New York City has increased substantially. Since 1980, DOT has monitored bicycle travel across a screenline at 50th Street in midtown Manhattan, on the Staten Island Ferry to lower Manhattan, and across the Queensboro, Williamsburg and Brooklyn Bridges. Statistics show that daily bicycle use in 1995 had increased by 124% over the 1980 levels. (See table below). Transportation Alternatives estimates that on a given day, as many as 80,000 New Yorkers use the bicycle for commutation, commercial delivery or recreation.



Bicycle use in New York City 1980 - 1995
Manhattan 50th Street Screenline *Source: NYC DOT*

In addition to cycling, New York City has seen a dramatic rise in another non-polluting mode of transportation - in-line skating. According to the International In-line Skating Association (ILSA), the number of skaters nationally has risen from 20,000 in 1984 to 6.3 million in 1991; American Sports Data recently documented over 10 million skaters in the U.S. 1995 counts along the East River Park esplanade and the Hudson River interim path indicate that in-line skaters outnumber cyclists along off-street paths by a ratio of 2 to 1.

In-line Skater

Planning for in-line skating is impeded by the absence of a national design standard. However, recent legislation has identified in-line skaters rightful place on roadways. According to New York State law, in-line skaters on roadways are subject to the same rules and regulations as drivers of vehicles and "shall be driven on a usable bicycle or in-line skates lane, or near the right-hand curb or edge of the roadway or upon a usable right-hand shoulder so as to prevent undue interference with the flow of traffic" (See Appendix G). New York City law permits skating on sidewalks, and prohibits reckless behavior.

The BND Project acknowledges skating's popularity and recognizes that future on- and off-street bicycle facilities must accommodate, where possible, shared use by cyclists and skaters.

Potential Bicycle Use

Despite the increase in cycling in New York City, the comparative number of cyclists remains low. According to the 1990 Census, bicycle trips comprised only 0.9% of all trips made by vehicles in the city. This low number is due in large part to the difficult cycling conditions and absence of sufficient facilities. New York City's dense land use and flat topography renders the city ideal for cycling. New Yorker's predilection for trips under five miles (62.7%, 1990 Census) bodes well for converting trips from auto to bicycle. In fact, the Federal Highway Administration (FHWA) has targeted 10% of all short (five miles or less), individual vehicle trips to be made by bicycle by the year 2000.

A 1990 survey conducted by DOT indicates significant potential bicycle ridership. According to the survey, nearly 50% of the 688 Manhattan office workers living within 10 miles of their job and responding to the survey would cycle to work if provided with the following amenities:

- On-street bicycle lanes
- Building access for secure bicycle parking
- Facilities to shower and change clothes

Following significant investment in bicycle facilities, cities in industrialized countries have experienced dramatic increases in the level of cycling. For example, Copenhagen experienced a cycling increase of 50% in five years; Eugene, Oregon experienced an increase of 75%; and Toronto experienced an increase of 270%. In addition, cycling constitutes 25%, 18% and 11% of nationwide trips in Denmark, Netherlands and the former West Germany, respectively; 30% of all work and school commutes in Japan; and 50% of all trips in China.

DOT Survey: Interest in Bicycle Commuting in New York City	
Distance (1-way)	Percent who would commute
0-5 miles	45%
5-10 miles	54%
0-10 miles (subtotal)	49%
>10 miles	19%

The City of Chicago, similar to New York in terms of size, age and physical, social and climactic characteristics, has developed bicycle programs in an attempt to increase cycling. Chicago hopes to transfer 10% of auto trips to cycling by the year 2000 by constructing a 300 mile bicycle network, adopting a bicycle parking ordinance and expanding municipal bicycle-parking facilities, increasing commercial, governmental, and police use of bicycles, and increasing educational programs for cyclists and drivers.

In addition to investing in bicycle facilities, all cities with high levels of cycling have adopted comprehensive bicycle programs, with key elements including education, consistent facility maintenance, traffic enforcement and, perhaps most importantly, the institutionalization of cycling. According to the FHWA's study, *The National Bicycling and Walking Study - Transportation Choices for a Changing America*, successful state and local bicycling programs are characterized by the integration, or institutionalization of cyclists' needs through policies, programs and procedures of various governmental agencies. New York City's comprehensive bicycle program, which includes the institutionalization of cycling, is proposed in the final section of this *Plan*.

The On-Street Network

In an effort to increase the level of cycling by improving bicycle facilities, the BND Project has developed a proposal for a city-wide network of 900 miles. The components of the network are as follows:

Existing Facilities	**miles**
Multi-Use Paths:	51
Seasonal Bicycle Paths/Lanes: (Central & Prospect Park Loop Roads)	11.5
On-street Bicycle Lanes:	41
Signed Bicycle Routes:	8
Bike Accessible Bridges:	7.5
Subtotal	119
Proposed Network	**miles**
Recommended Routes: (Streets which do not contain bicycle facilities but are suitable for cycling, or would be suitable with minimal capital investment i.e., striping and/or signage.)	678
Capital Investment Routes: (On and off-street locations appropriate for cycling with capital investment, i.e., path construction, striping and signage.)	112
Subtotal	790
Total Mileage:	909

Planning Process

The Network methodology for on-street bicycle lanes, described below, generally follows a methodology recommended by the Federal Highway Administration (FHWA):

Identify the major destinations

The identification of destinations is based on the assumption that commuters using bicycles wish to travel to the same places as those using automobiles and public transportation. The major destinations include the central business districts, universities, hospitals and educational and cultural institutions. Given the strong recreational component of cycling, parks were also identified as major destinations.

Educational institutions are major destinations for cyclists.

Identify travel corridors

The travel corridors are those routes which directly link the major origins and destinations. It logically follows that the travel corridors tend to follow the city's major traffic arteries. The travel corridors can also be thought of as "desire lines" - they may not represent where cyclists are today, but rather the most direct route which cyclists wish to follow.

Cycling skill levels

The FHWA identifies three types of skill levels - A (advanced); B (moderate); and C (beginner). The network is designed primarily for B and C cyclists who, according to the FHWA, value accessible, direct roadways, designated bicycle facilities and lower traffic volumes.

Select specific routes

Routes were selected within the travel corridors based on the following "performance criteria":

1. *Accessibility* and *directness* to major origins and destinations.

2. *Connections* with other routes.

3. *Attractiveness* of the route.

4. *Low conflict* with other modes.

5. *Feasibility* of implementation.

6. *Safety* to cyclists and pedestrians: A stress level methodology, described below, was developed in an attempt to rank the safety, or suitability, of existing roadways.

Stress level methodology

The "stress level" is based on a methodology developed by the Traffic Institute at Northwestern University and the Madison, Wisconsin Department of Transportation. The following five stress levels were identified:

1. *Low* - Suitable for all cyclists (except children under age 10).

2. *Moderate* - Suitable for A and B cyclists; alterations may be needed to accommodate younger cyclists.

3. *Significant* - Suitable for A cyclists; alterations may be needed to accommodate B cyclists; not recommended for C cyclists.

4. *Demanding* - Alterations may be needed to accommodate A cyclists; not recommended for B and C cyclists.

5. *Severe* - Not suitable for bicycles.

The following variables were identified as affecting a cyclist's stress level:

1. Curb lane width

2. Curb lane traffic volume

3. Vehicle speed

By riding the entire network, the BND Project was able to evaluate the route stress level.

See Appendix C for more detailed information on stress level methodology.

Public Outreach

The network has been developed with extensive consultation with other City agencies, advocacy organizations, community boards, elected officials, and the bicycle community. Listed below are the Project's primary public outreach efforts.

Technical Advisory Committee

Since the beginning of the BND Project in the summer of 1994, seven Technical Advisory Committee (TAC) meetings have been held. The purpose of each meeting was to report on the Project's progress, and to solicit review and comments from TAC members. For a list of the TAC members, see Appendix B.

Borough Subcommittees

Following TAC meetings, BND Project staff met with TAC members and other interested groups and individuals on a borough-by-borough basis. This format allowed for detailed discussions on recommended routes with borough-based planners and cyclists.

Borough and Community Boards

Presentations of the draft network were made to the Borough Boards. The Borough Board members encompass the Borough President, community board chairs, and local and state elected officials. As the design of specific routes advances, presentations will be made to the affected community boards. The new on-street lane on St. Nicholas Avenue in Upper Manhattan was approved by the affected community boards prior to implementation.

Volunteers

To reach out to those who are familiar with cycling in the City, but may not be active members of the bicycle community, the Project posted notices On-line and in the Transportation Alternatives' newsletter *City Cyclist* seeking additional input. In addition, the Project coordinated the *European Experience*, an all-day FHWA seminar on European bicycle and pedestrian facilities, and has made presentations to such advocacy organizations as Transportation Alternatives and The New York Cycling Club.

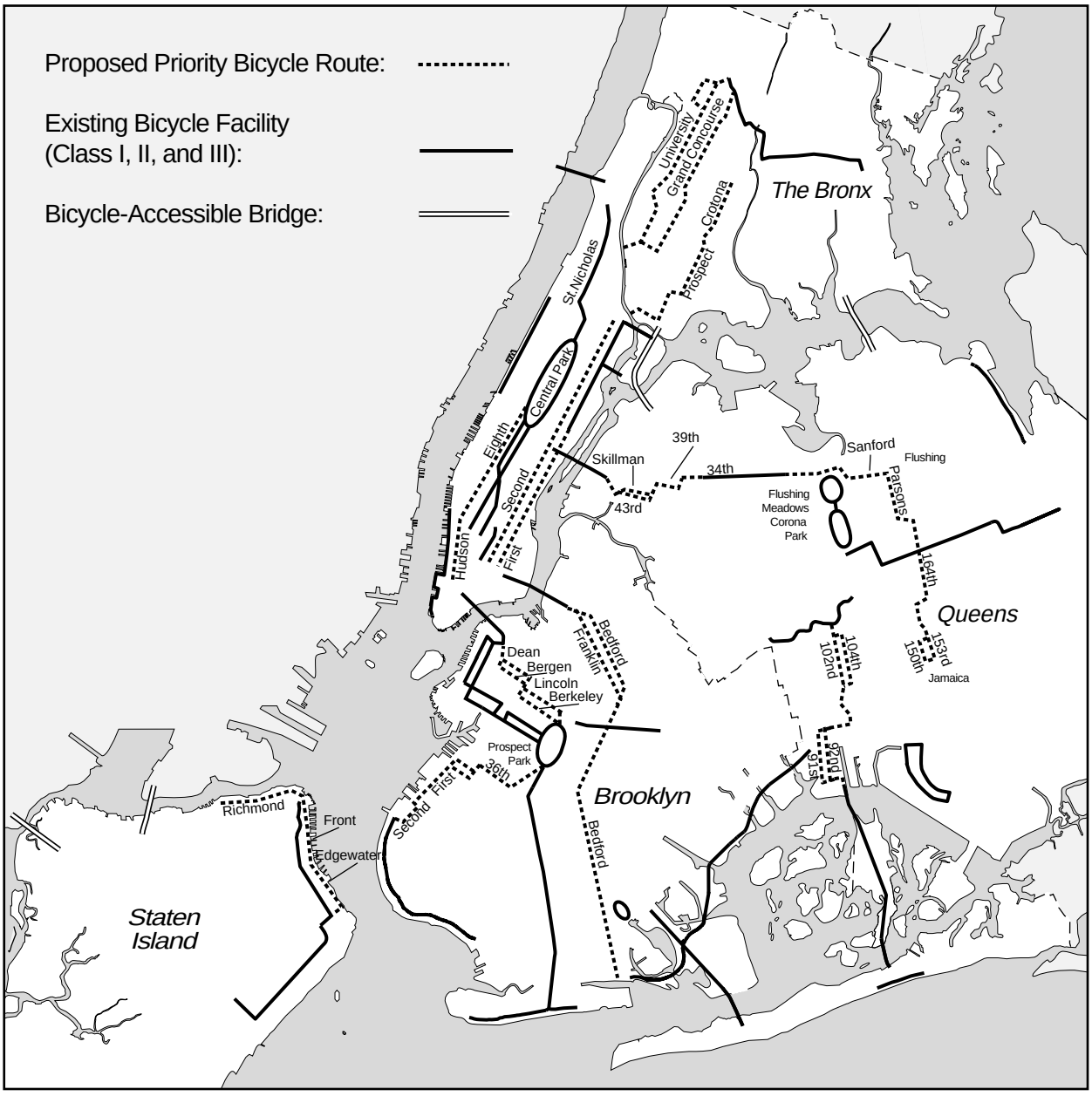
Implementation of on-street routes

With an identified city-wide network, the implementation of bicycle facilities will follow a designated plan. Prior to implementation, however, DOT completes the following analysis:

- Street and traffic data collection
- Existing motor vehicle level of service analysis (LOS)
- Projected LOS with proposed bicycle facility design
- Community outreach
- Technical drawings
- Pre- and post-implementation bicycle counts

See Appendix D for a more detailed discussion of the DOT implementation process.

Priority Routes: On-Street



The BND Project has identified priority routes based on the following criteria.

- Potential for connecting to and expanding an existing system.
- Potential for a high volume of use because of proximity to major employ ment, retail, cultural or educational centers, or regional parks.
- Geographic balance throughout the city.
- Reasonable implementation cost, funded through existing capital projects or agency operational budgets.

The following pages describe the priorities. At least five of these routes (one per borough) will be implemented by the BND Project.

The Bronx

Grand Concourse

Grand Concourse

In an effort to improve the safety of this wide north-south thoroughfare, DOT has received funding (separate from BND) for its redesign. The design will consider all modes of transportation, including bicycles and pedestrians.

Crotona-Prospect Avenue

This north-south route was originally proposed in *The Bronx Greenway Plan* by the Bronx Borough President. The route provides a connection to Fordham University and links some of the City's major open space resources: Randall's Island, St. Mary's, Crotona and Bronx Parks, the New York Botanical Gardens and the Bronx Zoo.

University Avenue

This north-south route connects the Mosholu-Pelham Greenway and Van Cortlandt Park to the north and Manhattan via the Macombs Dam Bridge to the south.

Brooklyn

Bergen Street

Prospect Park to Brooklyn Bridge

This proposed route links the city's most popular cycling bridge with the Borough's major park. The route travels through Boerum Hill and Park Slope via Adams, Bergen, Dean, 5th, Lincoln and Berkeley.

College and Hospital connections

The Bedford and Franklin Avenue pair is a critical north-south route, linking Brooklyn and Medgar Evers Colleges, Pratt Institute, Long Island University, Brooklyn Law School and the Long Island Hospital. The proposed route is located within the Flatbush travel corridor.

Sunset Park Connector

DOT has received funding to construct an on-street link between Prospect Park, Sunset Park and the Shore Parkway bicycle path.

Manhattan

Queensboro Bridge bicycle path

Linkage to East River Bridges

Improved access is needed to all of the East River crossings. The following routes are proposed:

Queensboro: First and Second Avenues to 59th Street.

Manhattan: Allen Street (north) and Pike Street (south).

Brooklyn: Wagner-Pearl and Spruce-Dover to Centre Street.

Williamsburg: Ridge and Pitt to Houston (north), and Madison to East River Park (south).

St. Nicholas Avenue

The St. Nicholas Avenue route, which was implemented in Spring 1996, connects Central Park with Harlem, the George Washington Bridge multi-use path and the Bronx via the Broadway Bridge over the Harlem River.

Hudson Street and Eighth Avenue

This proposed north-bound route connects the West Side of Lower Manhattan to Central Park. Major destinations along the route include Penn Station and the Port Authority Bus Terminal, the Greenwich Village and Tribeca Historic Districts, and the local commercial, cultural and tourist attractions in Clinton, Chelsea, Greenwich Village and Tribeca. CDOT is currently studying this route's feasibility.

First and Second Avenues

This critical north-south route currently has an on-street lane on First Avenue from 72nd Street to 125th Street. Additional study is needed to determine the feasibility of lanes along the entire length of First and Second Avenues.

Queens

Unisphere, Flushing-Meadows-Corona Park

Improved Access to Flushing-Meadows-Corona Park

Access to the paths located within the park would be improved via upgraded existing entrances at 34th Avenue and 114th Street and by the Brooklyn-Queens Greenway routes.

Flushing/Jamaica Corridor

This proposed route links two major commercial districts of the borough via Sanford, Parsons Blvd, Oak, 164th Street, 84th Rd, Parsons Blvd, 89th and 88th avenues, and 150th and 153rd Streets.

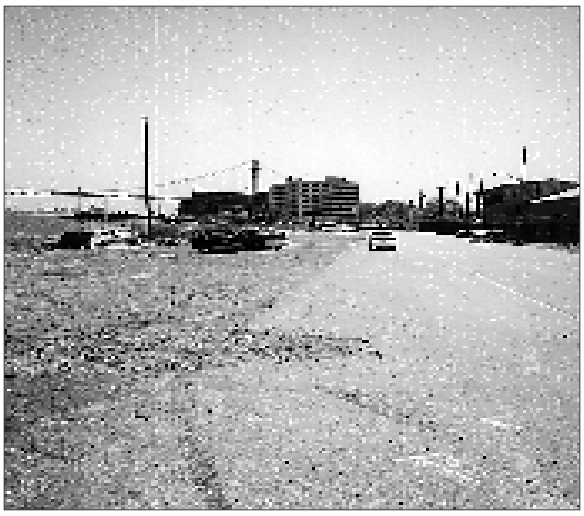
Northern Boulevard Corridor

Northern Boulevard is a priority corridor due to its cross-borough connection, linking Long Island City in the west, Flushing Meadows-Corona Park in the center and Alley Pond Park/ Little Neck Bay in the east. Due to heavy traffic on Northern Blvd, a parallel route is proposed along Skillman, 43rd and 39th avenues in Sunnyside Gardens, and the recently implemented bicycle lane on 34th Avenue in Jackson Heights. The proposed extension of the 34th Avenue bicycle lane will connect to Flushing Meadows-Corona Park and the Queens portion of the Brooklyn-Queens Greenway.

Woodhaven / CrossBay Boulevard Corridor

This proposed route links Forest Park with Jamaica Bay via 102nd and 104th Streets, 103rd, Hawtree, Centreville, Cohancey Street bridge, 157th, 92nd and 91st streets and the Cross Bay Blvd. Bridge bicycle lane.

Staten Island



Front Street, East Shore waterfront

East Shore Waterfront Route

This proposed route serves as both a commuter and recreational route, bringing cyclists to the Staten Island Ferry and the Alice Austen House. Spectacular waterfront views are found along the entire route.

St. George Ferry Terminal

As one of the city's intermodal hubs, the St. George Ferry Terminal is in need of such improvements as directional signage, improved connections between the SIRTOA trains and the ferries, and bicycle parking on ferries and in the terminal.

Richmond Terrace

Sufficient space exists on most portions of the St. George-Snug Harbor segment of Richmond Terrace to accommodate a bicycle facility. The route will provide cyclists with connections to the major civic, commercial and intermodal resources at St. George and the open space and cultural facilities at Snug Harbor.

Bridges

New York City bridges

New York City has 43 major water crossings. Bicycle access over bridges is critical to the establishment of a successful bicycle network. Existing access over New York City's bridges ranges from safe and scenic to dangerous and difficult to non-existent. A number of the city's major bridges are under reconstruction, and bicycle/pedestrian access improvements have been included in these efforts. In addition, the BND Project has identified a number of potential capital projects to create or enhance bridge access. The bridges and the responsible agencies are listed below, followed by brief descriptions of existing and potential improvements.

East River Bridges

Brooklyn Bridge

Brooklyn (DOT)

The city's oldest and most heavily used cycling bridge, the Brooklyn Bridge has a shared bicycle/pedestrian promenade. A major improvement by DOT in 1983 extended the promenade to the local street network in both Manhattan and Brooklyn. However, the Brooklyn terminus remains challenging for bicycles and pedestrians due to complex vehicular turning movements, heavy traffic volumes and the path's location in the center of east and west bound travel lanes. CDOT is currently considering a proposal for the Manhattan side which would connect the promenade directly with City Hall Park, reducing bicycle/motor vehicle conflict.

Manhattan (DOT)

The sidewalks located on both sides of the Bridge are currently closed. DOT is currently reconstructing the bridge, and the 10'6" sidewalk located along the bridge's western side is scheduled to be reopened in mid 2000.

Williamsburg (DOT)

Currently under reconstruction, a new bicycle/pedestrian path will include a number of improvements, including replacing the stairs at the Manhattan terminus with a ramp, and enhancing the visibility of the Brooklyn terminus by relocating the ramp from the interior to the exterior of the Bridge.

Queensboro (DOT)

Also under reconstruction, the Queensboro Bridge bicycle path is the city's second most heavily used. The reconstruction project will replace the path's steel grating with concrete and construct a barrier between bicycle and motor vehicles on the Manhattan approach. Due to the reconstruction, the path is currently closed to cyclists and pedestrians between 3 and 8 pm, Monday through Friday; DOT operates a free shuttle during these hours. The path is scheduled for reopening following the reconstruction. DCP will receive funding to study access improvements to the approaches, both of which are difficult and dangerous at the Manhattan and Queens termini.

Triborough Bridge (MTA)

Although paths exist along this bridge linking Manhattan, the Bronx and Queens with the recreational facilities at Randall's Island, access is made difficult by the stairs leading to the bridge paths. Signs directing cyclists to walk along the paths are usually ignored. In its recently released Randall's Island Access Plan, the NYC Economic Development Corporation (EDC) recommends modifying the existing stairs and ramp on the Tri-borough Bridge for the Manhattan and Queens spans. The construction of new pedestrian bridges from all 3 boroughs and the establishment of ferry service were also proposed. Signs on Randall's Island directing cyclists to the existing Bridge paths are also needed as an immediate improvement.

Bronx-Whitestone (MTA) and Throgs-Neck (MTA)

Paths or sidewalks do not exist along either span. However, Queens Surface Corp., with assistance from DOT, installed bicycle racks on the QBX1 bus line in April, 1994 to bring cyclists across the Bronx-Whitestone Bridge. Cyclists board at 20th Avenue in Queens or Lafayette Avenue in the Bronx. This is the only bike-on-bus program currently operating in the region.

Harlem River Bridges

Eight of the nine bridges across the Harlem River provide shared bicycle/pedestrian access along sidewalks. Modest improvements, such as curb cuts and directional signage, would significantly improve cycling conditions along these critical crossings. Access along the scenic Henry Hudson Bridge (MTA) is currently limited to the narrow path on the lower span, though a wider, inaccessible path exists on the upper span. The MTA should consider creating access to the upper path, as noted in the 1992 DCP study. The closing of High Bridge, a safe and scenic bicycle and pedestrian crossing, should be reassessed by DPR.

Hudson River / New York Bay Bridges

Although a path exists along the George Washington Bridge (PANYNJ), the Verrazano-Narrows Bridge (MTA) is inaccessible to bicycles and pedestrians. DCP is currently studying possible access options, including a bike-on-bus program, the dedication of an existing lane for bicycles and pedestrians, and the construction of a new path or ferry service.

Arthur Kill / Kill Van Kull Bridges

Bayonne (Port Authority of NY & NJ)

Currently under reconstruction, the bicycle/pedestrian path's access could be improved through signage and the replacement of stairs with a ramp on the New Jersey side.

Outerbridge Crossing (Port Authority of NY & NJ)

Bicycle/pedestrian access was removed in 1963 on this Staten Island-New Jersey crossing.

Goethals (Port Authority of NY & NJ)

The current path is extremely narrow and is officially closed to cyclists. Long-term plans for a new bridge include a bicycle/pedestrian lane.

Jamaica Bay Bridges

Shore Parkway Bridges (DOT)

The six bridges along the Shore Parkway bicycle path have combined bicycle/pedestrian sidewalks. Hendrix and Spring Creek Bridges were reconstructed in the mid-1980s, and DOT has received state, federal and city funding to upgrade the Gerritsen, Mill, Paeradegat and Fresh Creek Bridges. DOT is currently in the design process.

Cross Bay Blvd/Congressman Joseph P Addabbo Bridge (DOT)

Reconstructed in 1991, an on-street lane and a separate pedestrian/fishing path were installed on this bridge.

Marine Parkway/Gil Hodges Bridge (TBTA)

Sidewalks exist on this Bridge, with signs instructing cyclists to "walk your bike". Although narrow, cyclists, pedestrians and fishers safely share these narrow paths. TBTA has included a multi-use path in its plans for the reconstruction of the Bridge, which is part of the proposed Rockaway-Gateway Greenway.

Additional Bridges

In addition to the city's major water crossings, bridges across industrial areas, railyards and smaller water bodies also need to provide better bicycle and pedestrian access. Listed below are two of the more popular crossings in need of improvements.

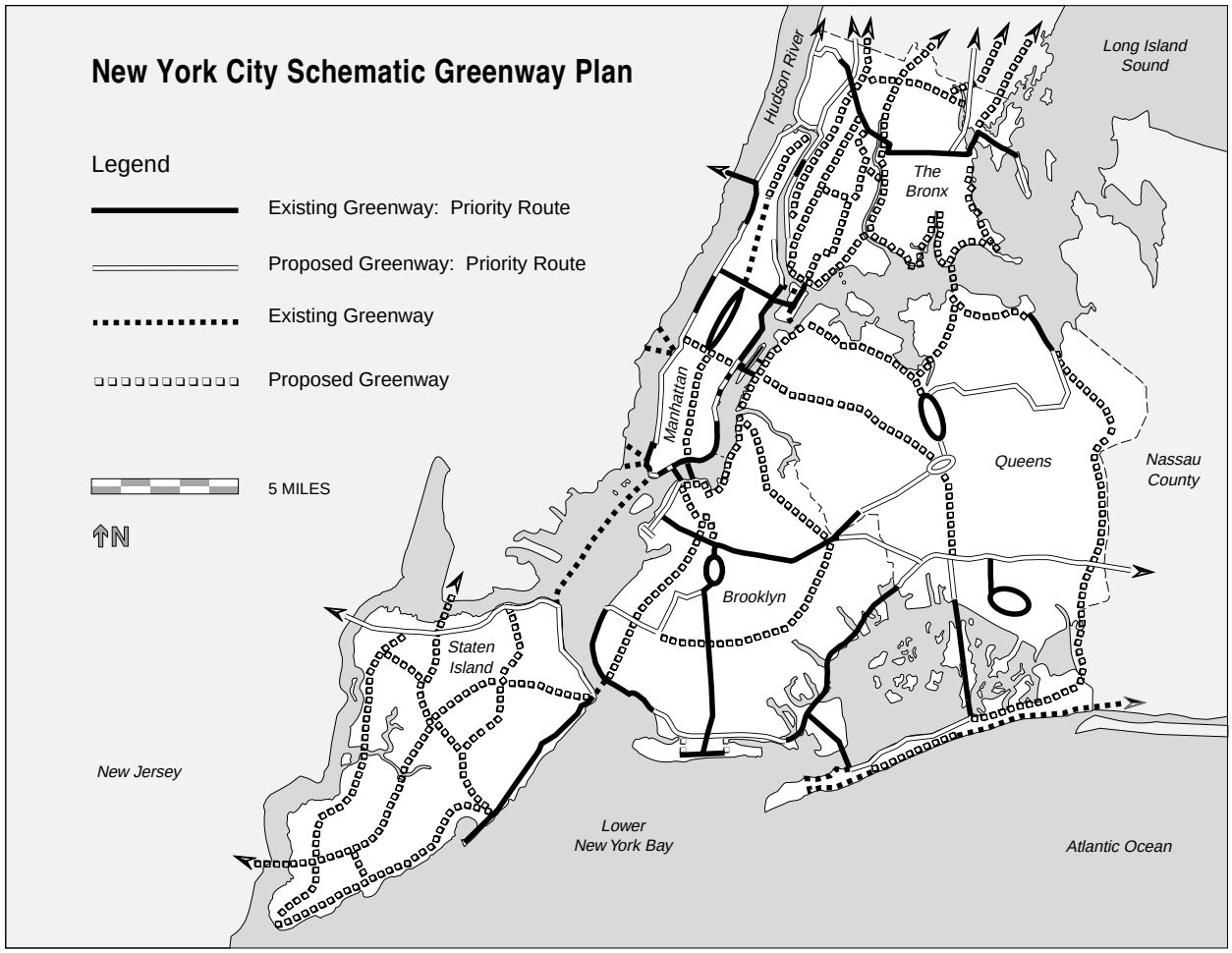
Queens Boulevard

Providing a direct connection to Long Island City and the Queensboro Bridge, this bridge over the Sunnyside rail yards is a critical component of the Network. Because of the narrow roadway width and heavy traffic volume, cyclists currently ride on the sidewalks, creating safety concerns.

Roosevelt Avenue

Similar to the Queens Boulevard Bridge, the sidewalks along this bridge currently serve both bicycles and pedestrians. Conflicts can emerge, especially during events at the adjacent Shea Stadium. Mitigating the bicycle/pedestrian conflicts on both the Queens Boulevard and Roosevelt Avenue Bridges requires further study.

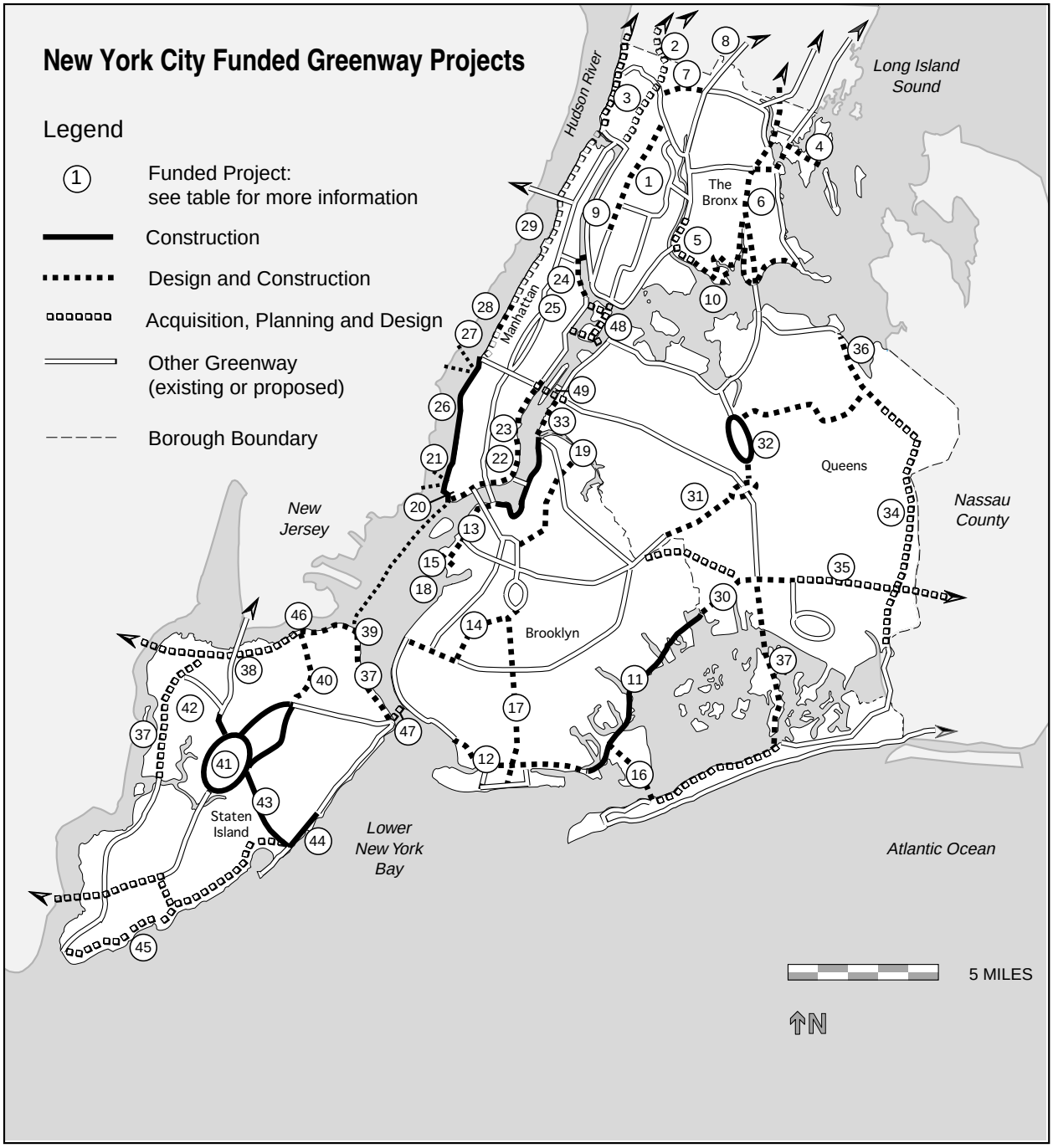
The Greenway System



A greenway is generally defined as a multi-use pathway for non-motorized transportation along natural and manmade linear spaces such as rail and highway rights-of-way, river corridors, waterfront spaces, parklands and, where necessary, city streets. In 1993, DCP released *A Greenway Plan for New York City*, which identifies a city-wide greenway system. Complementary greenway reports for the city have also been released, including the Bronx Borough President's *Bronx Greenway Plan*, the Staten Island Borough President's *Staten Island Bikeway and Cultural Trail*, the Manhattan Borough President's *Comprehensive Manhattan Waterfront Plan* and the Neighborhood Open Space Coalition's *Brooklyn-Queens Greenway*.

Since the completion of the DCP plan, over $61 million has been allocated by federal, state and city agencies for the implementation of the greenway system. These individual projects have been included in the 900 mile network.

Funded greenway projects are shown on the map on page 20 and the chart on page 21. Priority funded greenway projects are described on the following pages. The selection of priorities was based on the existence of partially completed routes and potential usage. The following pages also describe potential greenway projects which have not received funding.


New York City Funded Greenway Projects
Legend
Funded Project: see table for more information
Construction
Design and Construction
Acquisition, Planning and Design
Other Greenway (existing or proposed)
Borough Boundary
Hudson River
Long Island Sound
The Bronx
Manhattan
Queens
Nassau County
New Jersey
Brooklyn
Staten Island
Lower New York Bay
Atlantic Ocean
5 MILES
N

New York City Funded Greenway Projects

Note: numbering does not indicate project rank.

	Borough / Number / Project Name *	Type *	Funding *	Sponsor	Applicant	Total
	Bronx					**$12,044,875**
1	Grand Concourse Traffic Design Study	D, C	CMAQ 3	DOT	DOT	$425,000
2	Putnam RR Line: Van Cortlandt Park	A	CMAQ 3	DPR	DPR	$670,000
3	Putnam RR Line: Harlem River - Van Cort. Park	P	CMAQ 4	Bx. Boro Pres.	NOSC	$50,000
4	Mosholu/Pelham Parkway Extension	D, C	CMAQ 5, 6	DPR	Bx. Boro Pres.	$2,000,000
5	Bronx River Trailway	A, P	ENH 1	NYS DEC	NYS DEC	$923,000
6	Hutchinson Parkway Greenway	D, C	ENH 2	DPR	Bx. Boro Pres.	$800,000
7	Van Cortlandt Park / X-Country Trail	D, C	ENH 2	DPR	Friends of Van.Cort.Pk.	$469,150
8	Van Cortlandt Lakes Restoration & Access	D, C	ENH 3	DPR	DPR	$3,432,400
9	Harlem River Restoration	D, C	ENH 3	DPR / DEP	DPR / DEP	$1,675,325
10	Bronx Soundview Greenway	P, D, C	ENH 3	DCP / DPR	DCP / DPR	$1,600,000
	Brooklyn					**$9,073,650**
11	Shore Parkway Path: Knapp St - Penn. Avenue	D, C	EQBA	DPR	DPR	$3,800,000
12	Shore Parkway Path: Bay Parkway - Knapp St	P	CMAQ 3	DOT	DOT	$100,000
13	Brooklyn Waterfront Trail	P, D, C	CMAQ 5	DCP / DOT	DCP / DOT	$723,650
14	Sunset Park Connector	P, D	ENH 1	DOT	Transport. Alt	$300,000
15	Esplanade at Brooklyn Army Terminal	D, C	ENH 1	EDC	EDC	$625,000
16	Rockaway/Gateway Greenway: Flatbush Ave	D, C	ENH 1	DEC	NPS / NOSC	$1,250,000
17	Ocean Parkway Bicycle/Ped. Corridor	D, C	ENH 2	Bk. Boro Pres.	Bk. Boro Pres.	$1,090,000
18	Coffey St. Pier	D, C	ENH 3	DPR	DPR	$400,000
19	BQE Corridor Landscape Enhancement	D, C	ENH 3	DEP	DEP	$885,000
	Manhattan					**$16,308,430**
20	East River Docks	D, C	CMAQ 2, 4	EDC	DPR	$4,540,000
21	Pier 15 Rehabilitation	C	ENH 1	NYS Dorm. Auth.	South St. Seaport	$400,000
22	East River Bikeway/Esplanade: Pier A - 63rd	D, C	CMAQ 3, 5	EDC	EDC/Man. BP	$4,895,000
23	Stuyvesant Cove Park	C	CMAQ 5,ENH 1	DPR/DOT	CB #6 / Man. BP.	$850,800
24	Harlem River Esplanade:125th - 145th	D, C	CMAQ 2, 5	DPR	DPR	$1,375,000
25	Harlem Gateway Corridor	D, C	ENH 3	ESDC	Cityscape Inst.	$1,247,630
26	Route 9A Bikeway	D, C	NHS	NYS DOT	NYS DOT	N / A
27	Riverside Park Walk: 72th -155th	D, C	CMAQ 3	DPR	DPR	$1,625,000
28	Riverside Park Walk: 83rd - 91st	C	CMAQ 6	DPR	DPR	$1,250,000
29	Hudson R. Trail: 155th St - Bronx County line	P	CMAQ 3	DPR	DPR	$125,000
	Queens					**$6,356,677**
30	Shore Parkway: Penn. Ave - JFK Airport	D, C	CMAQ 3, 4	DPR	DPR	$1,905,000
31	Brooklyn / Queens Greenway: Queens	D, C	ENH 1	DOT / DPR	DOT / DPR	$1,040,000
32	Flushing Meadows Park Cultural Walkway	C	ENH 1	DPR	Qu. Boro Pres.	$93,000
33	Queens West Ped. / Bike Improvements	D, C	ENH 2	Qu. West D.C.	Qu. West D.C.	$640,677
34	Laurelton & Cross Island Parkway Greenways	P, D	ENH 2	DCP / DPR	DCP / DPR	$415,000
35	Southern Parkway Greenway & Conduit Blvd	P, D	ENH 2	DCP / DPR	DCP / DPR	$353,000
36	Alley Pond Path Reconstruction	D, C	ENH 3	DPR	DPR	$660,000
37	Rockaway / Gateway Greenway Cross Bay Blvd	D, C	ENH 3	NYS DEC	NYS DEC	$1,250,000
	Staten Island					**$10,072,000**
38	North Shore Rail with Trail	P, D, C	CMAQ 3, 6	DCP / DPR	DCP / DPR	$1,219,000
39	North Shore Esplanade Extension	D, C	ENH 1	EDC	EDC	$4,082,000
40	S. I. Bikeway & Cultural Trail: Lakes Segment	C	ENH 1	DPR	S. I. Boro Pres.	$300,000
41	S. I. Greenbelt: Forest Loop	D, C	CMAQ 4, 6	DPR	DPR	$2,000,000
42	S. I. Greenbelt: North / South Connector	C	ENH 3	DPR	S. I. Boro Pres.	$260,000
43	S. I. Greenbelt: Amundsen Trail	C	ENH 3	DPR	NYCDPR	$1,200,000
44	S. I. Bikeway & Cultural Trail: Beach Segment	C	ENH 3	DPR	S. I. Boro Pres.	$400,000
45	South Shore Greenway	P	ENH 3	DCP	NYCDCP	$111,000
46	Snug Harbor Ferry Terminal	C	ENH 3	DPR	Snug Harbor Cultural	$500,000
	Citywide / Multi-Borough					**$7,349,500**
47	Verrazano Bridge: Ped / Bike Access	P	CMAQ 3	DCP	DCP	$100,000
48	Randall's Island Access	P	CMAQ 4	EDC	DPR	$304,000
49	Queensboro Bridge Access	P	ENH 3	DCP	DCP	$75,000
	Bicycle Network Development	P, D, C	CMAQ1,2,5,6	DCP/DOT/DPR	DCP/DOT/DPR	$5,283,000
	Citywide Signage Study	D	CMAQ 3	DCP	DCP	$50,000
	On Street Bicycle Parking 1 & 2	C	ENH 1, 3	DOT	Transp. Alt.	$1,250,000
	Brooklyn/Queens Greenway User Map	P	ENH 1	DPR	NOSC	$80,000
	Waterborne Transportation: Manhattan - GNRA	P	ENH 2	GNRA / HRPC	NOSC	$207,500
	New York City					**$61,205,132**

P = Planning D = Design C = Construction CMAQ = Congestion Mitigation Air Quality ENH = Enhancement EQBA = Environ. Quality Bond Act NHS = National Highway System

The Bronx

Mosholu-Pelham Greenway

The Mosholu-Pelham Greenway

An existing greenway runs east-west along the Mosholu and Pelham Parkways, linking Van Cortlandt Park with the Bronx Zoo and the New York Botanical Gardens. DPR will design and construct an extension to connect the Greenway with Pelham Park and Orchard Beach to the east, and the Van Cortlandt Golf House to the west.

Putnam Railroad Trail

DPR has received funding to design and construct a north-south path within the abandoned rail corridor as it passes through Van Cortlandt Park. The path will connect to an existing 50 mile bicycle path located to the north, and with a proposed link across the Harlem River to Manhattan to the south.

Hutchinson River Greenway

DPR will design and construct a 3 mile route within the Hutchinson Parkway right-of-way. The route will connect the Mosholu-Pelham Greenway with Ferry Point Park and the QBX1 bike-on-bus over the Whitestone Bridge.

233rd Street

Roadway width and traffic volume prohibit on-street cycling along this street, a critical east-west route. An existing sidewalk, along the northern perimeter of Woodlawn Cemetary, could be upgraded to accommodate bicycles. This route is part of the Woodlawn-Seton Falls Greenway identified in the Bronx Borough President's *The Bronx Greenway Plan*.

Bronx Park

Although north-south paths exist along the perimeter of this park, there are limited east-west crossings. Cycling on Fordham Road, the major east-west connection, is undersirable due to heavy traffic. Multi-use paths are needed to accommodate bicycles and pedestrians.

Brooklyn

Shore Parkway bicycle path

Shore Parkway Bicycle Path: Bay to Knapp

The waterfront Shore Parkway Bicycle Path has two distinct, unconnected sections. DOT is planning an on-street connection between Bay Parkway and Knapp Street. Construction would create a continuous, 17 mile waterfront path.

Rockaway Gateway Greenway

Connecting with the Shore Parkway bicycle path, this DEC/National Park Service project will design a 20 mile route loop around Jamaica Bay. Construction along Flatbush Avenue is slated as the first phase of implementation.

Brooklyn Waterfront Trail

Consistent with proposals in the Red Hook community's 197-a Plan, this DCP/DOT project will connect the Brooklyn Bridge promenade path with the existing and proposed recreational facilities at Fulton Pier, Coffey Street Pier and the Erie Basin Promenade via multi-use paths and on-street lanes.

Improved Access to Prospect Park

The multi-use path along Eastern Parkway terminates at the Brooklyn Museum, creating conflicts between cyclists and pedestrians seeking access to the Brooklyn Public Library and Prospect Park. The path could be extended along the westbound service road, connecting into Grand Army Plaza and Prospect Park. Improved access is also needed at Park Circle, the Park's southern terminus.

Connections to the Shore Parkway Bicycle Path

Abundant parkland located adjacent to several inlets offers the potential for connecting the neighborhoods along Jamaica Bay with the city's longest bicycle/pedestrian path.

Manhattan

East River Park esplanade

East River Bikeway and Esplanade

EDC has developed a master plan for a 6 mile waterfront bikeway and esplanade, from Pier A and Battery Park to East 63rd Street. First phase construction will connect South Street Seaport with the existing esplanade along East River Park; other portions will be constructed in conjunction with several adjacent projects: Stuyvesant Cove (18th-23rd Streets), Wall Street Ferry and Esplanade project and construction at the FDR Drive. The esplanade will link the Hudson River Trail, which begins at Battery Park, with the existing esplanade north of East 63rd Street.

Harlem River Esplanade

A waterfront bicycle path will be constructed in conjunction with development of this underutilized parkland along the East River, from the Triborough Bridge at 125th Street to West 145th Street. The project, sponsored by DPR and the Manhattan Borough President's Office, will connect with the East River Esplanade to the south.

Hudson River, Battery Park City

Hudson River Trail

This route travels along the entire west side waterfronts of Manhattan and the Bronx. Segments include the proposed Route 9A bikeway/ walkway from the Battery to 59th Street, and DPR's Riverside Walk, to be constructed through Riverside Park. The Route 9A interim path, from Chambers to W 30th Street, has proven immensely popular. The route will ultimately connect with the Hudson River Valley Greenway and such regional trails as State Bicycle Route 9 and the East Coast Greenway.

Harlem River Drive: 155th Street - Dyckman

Members of the BND Advisory Committee have recommended development of a bicycle path along this narrow strip of waterfront parkland. The Manhattan Borough President's *Comprehensive Waterfront Plan* also recommends a waterfront route. DCP's *Plan for the Manhattan Waterfront* recommends use of the Bronx waterfront, from the Broadway Bridge to 155th Street, as an alternative. Additional study is needed to determine the feasibility of a Manhattan waterfront route.

Queens

Brooklyn-Queens Greenway: Vanderbilt Motor Parkway in Queens.

The Brooklyn / Queens Greenway

When completed, this 22-mile on- and off-street route, stretching from Coney Island in the south to Little Neck Bay in the north, will connect some of the city's major cultural institutions and tourist destinations, such as the Brooklyn Museum, the Brooklyn Botanic Garden and Shea Stadium and many of the city's finest parks. DOT and DPR have received funding to implement the Queens segment by 1998.

Conduit/Southern/Laurelton/Cross Island Greenways

DCP and DPR are planning and designing this 22 mile path through parkland located adjacent to the roadways. The route links such destinations as Highland Park, JFK Airport, and the existing Cross Island bicycle path.

Shore Parkway Bicycle Path: Access to JFK

This project will connect the Shore Parkway path with the existing bicycle lanes at JFK Airport, providing access to the many employment opportunities at the airport. DPR has received funding for design and construction and is currently in the consultant selection process.

Flushing Bay Esplanade

Flushing Bay Esplanade

Improved connections are needed along this esplanade. Access through a DPR concessionaire could provide linkage to the bicycle/pedestrian bridge over the Grand Central Parkway, and a 100' foot path could be constructed to connect with the LaGaurdia Airport loop road. Possible construction funds could be provided by a DEP mitigation project.

Shore Parkway Bicycle Path: Fountain Avenue Landfill

A short but critical segment of the bicycle path has been destroyed by landfill operations. Although ISTEA funding has been secured to construct a permanent path, cyclists and runners currently use the highway shoulder to traverse this massive segment. An interim path is needed for path users while design work proceeds on the permanent path.

Atlantic Avenue: Conduit Blvd-Jamaica

The avenue's wide median, which accommodates turn lanes, could be reconstructed to accommodate a multi-use path along this major east-west route.

Forest Park

The width and traffic volume of Forest Parkway and Freedom Drive inhibit on-street cycling on these streets. However, both streets contain sidewalks which could be upgraded to accommodate bicycles. The sidewalks also lead to paths which could connect cyclists with the auto-free Forest Park Drive East.

Staten Island

North Shore Rail Line, Harbor Herons Wetlands

Staten Island Rail with Trail

A multi-use path is planned along the abandoned North Shore rail line, offering spectacular views of New York Harbor. The route, which will serve as a segment of the East Coast Greenway, will connect with the St. George Ferry Terminal, Snug Harbor Cultural Center, and the existing Bayonne and proposed Goethals Bridge bicycle paths. Funding for a first phase implementation has been secured by DCP and DPR.

Staten Island Cultural Trail

Proposed in the *Staten Island Bikeway and Cultural Trail*, this DPR project will link the Snug Harbor Cultural Center with Clove Lakes and Silver Lake Parks.

Staten Island Greenbelt Trail

A 10 mile bicycle path will traverse the 2500 acre Greenbelt. Located at the center of Staten Island, the trail will provide access to the Greenbelt's many natural, cultural and historic resources. DPR has secured design and construction funds.

Richmond Avenue / Travis Avenue

Due to heavy traffic and limited roadway width, a multi-use path is needed along Richmond and Travis Avenues between the southern entrance of the Staten Island Mall and Arlene Street. The path would connect with the proposed on-street routes on Richmond Avenue to the south and Arlene Street to the north. Existing open space within the roadway rights-of-way provides the required path space.

Access to Mass Transit

Bicycle stencils on the outside doors of the Danish State Railways

Improving bicycle access to, from and on mass transit can increase both bicycle and mass transit ridership. When combined, bicycles and transit provide a more flexible, inexpensive, environmentally-friendly, and often faster alternative to the auto. Cyclists board mass transit for a variety of reasons, ranging from daily commuting purposes to reaching remote, scenic bicycle routes to reducing the length of a trip. With certain restrictions, subways, ferries and commuter rail lines in New York City provide cyclists with a range of transit options. These programs are described below and are shown on the chart on the following page.

Subways

New York City Transit (NYCT) permits bicycles on the subways, with certain provisos, including avoiding rush hour, use of the service gate for entry/exit, and boarding at the end of trains. The NYCT has recently released a Bicycle Safety Flyer which is available at subway stations. To direct cyclists on boarding the train and to promote bicycle access, the MTA could follow the lead of the Danish State Railways and place a bicycle stencil on the front and rear trains.

Rail

All four major rail lines, Amtrak, Long Island Rail Road (LIRR), Metro-North, New Jersey Transit and Port Authority Trans-Hudson Railroad (PATH), permit bicycles, with requirements ranging from purchasing a permit to riding during off-peak hours only.

These programs could be improved to increase ridership. Although both LIRR and Metro-North are under the jurisdiction of the MTA, different permits are required for boarding with a bicycle. The permitting process could be standardized to avoid confusion. In addition, all operators restrict cyclists to off-peak travel. This service could be improved by permitting cyclists on trains which travel against the dominant traffic flow during peak hours. As trains are upgraded, bicycle access and storage should be provided, much like the provisions for wheel chair accessibility. Innovations which local rail operators could adopt include providing bicycle storage on the lower level of two-level trains, as on California's new bi-level trains, and installing racks on the back of fold-up seats, as on Calgary's new lightweight commuter rail line.

Ferries

New York City's most famous ferry, the Staten Island Ferry, allows bicycles on board at no extra charge. Although popular, the Staten Island Ferry could be improved for cyclists through the installation of bicycle storage at the terminals and on-board the ferries. Although passenger-

only ferries have indoor storage areas, motor vehicle accessible ferries require cyclists to leave their bicycles on the lower deck with no facilities for secure storage. Providing a secure rack on both ferries would use limited space more effectively and reduce conflicts between passengers and cyclists. Two regional ferry operators, Express Navigation and NY Waterway, also permit bicycles on board; Express Navigation charges a $3 fee and NY Waterway charges a $1 fee. As the number of ferries continues to rise, the City should ensure consistent bicycle access to promote the use of both modes.

Buses

New York City has one "bike-on-bus" program. Installed on the QBX1 bus line, which links Queens with the Bronx over the Whitestone Bridge, the seasonal bike-on-bus permits two bicycles to be placed on a rack mounted on the front of the bus. DCP is exploring a bike-on-bus program for the Verrazano-Narrows Bridge.

If sited and publicized correctly, bike-on-bus programs might prove successful throughout the city, especially in those areas without subway access. Both Phoenix and Portland have successful bike-on-bus programs. Phoenix's 6-month bike-on-bus demonstration program on three routes showed a jump from 153 riders in the first month to 5,500 riders in the sixth month, and Portland's bike-on-bus program, which requires cyclists to take a ten-minute course on using the racks and to obtain a $5 permit, has proven so popular that a system wide installation has been proposed.

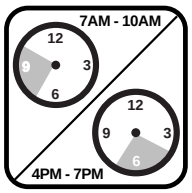
Bicycle Parking at Intermodal Centers

Thus far, efforts to encourage intermodal shift, where transit customers transfer from one transportation mode to another, have focused on developing auto "park-and-ride" lots at commuter rail stations. However, the FHWA's National Bicycling and Walking Study reports that a large portion of spaces at park-and-ride lots are occupied by autos that have been driven distances of 3 miles or less. With the appropriate storage, many of these energy-inefficient auto trips could be shifted to cycling.

In the New York area, lockers have been installed at select stations, on a trial basis, on the Long Island and Metro North commuter railroads. The St. George Ferry Terminal in Staten Island and the Shea Stadium stop on the 7 subway line in Queens may prove to be appropriate sites for lockers. Phase II of the BND Project will identify specific implementation locations and, where appropriate, work to install lockers.

Bicycle lockers, Long Island Rail Road station

Access to the Subway



Avoid Rush Hours

Bikes can be dangerous when they get in the way of a number of people. Avoid rush hour crowds. Use lines with larger subway cars:

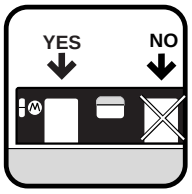
A C E B Q F D N R
M J Z L G

Carry Your Bike on Stairs

Wait until the staircase is not crowded. Carry your bike, don't bump it down the stairs. You could lose control.

Use Service Gate

Do not try to lift your bike over the turnstile. Signal the Token Clerk to release the service gate. Deposit a token or use a ***MetroCard*** & roll the turnstile. Pull the service gate to enter.



Board at end of Train

Board at the least crowded part of the train, usually the front or back. Never put your bike where it could block an aisle or a door.

Stand by Your Bike

Move your bike to allow others to pass or sit down. Make sure all items on the bike are secured. If there is a train or station evacuation, you must leave your bike behind to ensure a swift & safe exit for all passengers.

Courtesy + Common Sense = Bicycle Safety

Consideration of others along with reasonable judgment help produce a safer, more comfortable environment for bicycles.

Access to Mass Transit

Train

Amtrak (800) 872-7245 $5 box fee, no permit	**Train with Baggage Car required.** No box required for travel to & from Vermont, use car equipped with 20 bike racks.
LIRR (718) 558-8228 $5 permit required 2 bikes per car, max 4 per train.	**Weekdays Outbound:** No bikes on trains departing 7 AM - 9 AM & 3 PM - 8 PM. **Weekdays Inbound:** No bikes on trains arriving 6 AM -10 AM & 4 PM - 7 PM. **Weekends & Holidays:** see permit for details
Metro North (800) 872-7245 $5 permit required 2 bikes per car, max 4 per train.	**Weekdays Outbound:** No bikes on trains departing 6 AM - 9 AM & 3:01PM - 8:15 PM. **Weekday Inbound:** No bikes on trains arriving 6 AM - 10 AM & 4 PM - 7 PM. **Weekends:** no restrictions. **Holidays:** see permit for details.
New JerseyTransit (201) 762-5100 (201) 491-9400 Permit required, free avail. at Penn. Station, Hoboken, Newark	**Weekdays Outbound:** No bikes on trains departing 6 AM - 9:30 AM & 3:30 PM - 6 PM. **Weekday Inbound:** No bikes on trains arriving 6 AM - 9:30 AM & 3:30 PM - 6 PM. **Weekends:** **Holidays:** see permit for details.
PATH (800) 234-PATH (201) 216-6247 Permit required, free. 2 bikes per car	**Weekdays Outbound & Inbound:** No bikes on trains departing 6 AM - 9:30 AM & 3 PM - 6:30 PM. **Sat. Outbound:** No bikes on trains departing 7 AM - 2 PM. **Sat. Inbound:** No bikes on trains arriving 1 PM - 7 PM. **Sundays & Holidays:** no restrictions.

Ferry

Express Navigation (800) 262-8743	$3 extra fee.
Staten Island Ferry (212) 806-6940	Purchase ticket, no extra charge. Enter at lower level.
NY Waterway (800) 533-3779	**Port Imperial/Weehawken:** No bikes during rush hour. No bikes on Wall St. line $1 extra fee on W 38 St. line. **Bikes allowed all times on:** Hoboken - **W**orld **F**inancial **C**enter, Jersey City - **WFC**, Liberty Science Center - **WFC**, Lincoln Harbor - W 38 St, Queens/Hunters Point - E 34 St.

Bus

	ACCESS			CALL FOR RESTRICTIONS		ACCESS			CALL FOR RESTRICTIONS
	YES	NO	FEE			YES	NO	FEE	
Local: QBx 1	Y		N	(718)	Red & Tan	N			(201) 384-2400
						Y		N	(201) 529-3666
Suburban:					Suburban	Y		N	(908) 249-1100
Academy	Y		N	(908) 291-1300	W.C. Bee Line		N		(914) 285-5448
Asbury Park	Y		N	(212) 971-9054	VT Transit	Y		N	(802) 862-9671
Bieber				(215) 683-7333					
CT Limo				(203) 878-6867	**Inter-city:**				
Carey		N		(212) 972-5454	Bonanza	Y		$3	(800) 566-3815
DeCamp		N		(201) 783-7500	Greyhound	Y		$10	(800) 231-2222
Hampton Jitney	Y		$10	(800) 936-0440	Trailway Affiliate:				(800) 858-8555
Lakeland		N		(201) 366-0600	Adirondack	Y		N	(914) 339-4230
L.I. Bus				(516) 542-0100	Capitol	Y		N	(717) 233-7673
NJ Transit		N		(201) 491-7456	Martz	Y		N	(800) 233-8604
NY/Keansburg	Y		N	(212) 962-1122	Peter Pan	Y		N	(800) 343-9999
Olympia Trails	Y		N	(212) 964-6233	Susquehanna	Y		N	(717) 322-5361

Comprehensive Bicycle Program

The Comprehensive Bicycle Program is composed of four sections entitled *Encouragement, Education, Engineering,* and *Enforcement.* The overall aim of the Program is to encourage cycling in New York City through promotional literature and events (encouragement); the development and maintenance of appropriate facilities (engineering); enhancement of bicycle safety and respect for the cyclist's rightful place on the road (education); and the prevention of theft and policing of bicycle facilities (enforcement). Implementation of a comprehensive program is required if cycling is to become a significant component of the city's transportation system.

Encouragement

New York Cycling Map

In recognition of the complexities and resultant time required in implementing a city-wide network, the BND Project developed a city-wide map of recommended bicycle routes as a preliminary step in the effort to increase cycling. The *Map* serves two functions, as an aid for cyclists wishing to traverse the city on relatively "bicycle-friendly" streets, and as an opportunity to educate cyclists on bicycle laws, safety tips, and subway, train, bus and ferry access. The recommended routes are consistent with the routes identified in the network.

Bike Week

An annual spring event sponsored by Transportation Alternatives, city agencies and elected officials, *Bike Week* promotes commuting by bicycle by offering bicycle riding and repair workshops, free safety equipment and other free events.

Bike New York - The Five Boro Bike Tour

Sponsored by Hostelling International and DOT, this spring tour traverses 42 miles of streets which, during the tour, are closed to vehicular traffic. The 1996 tour recorded 34,000 cyclists, making *Bike New York* the largest cycling event in the country.

5 Boro Bike Tour

New York City Century

Sponsored by Transportation Alternatives, the Century Tour is a 100 mile route through low or no traffic areas, linking New York City's parks, bicycle paths and waterfront.

Additional tours

New York City is home to a growing number of bicycle tours and races, including the Tour of St. George in Staten Island and the Tour de Bronx; as well as such charity tours as the Advil Bike Tour for Multiple Sclerosis; American Diabetes Association Tour de Cure; and the New York City to Boston AIDS Bike Ride.

Community Policing Bicycle Patrol Program

NYPD officers on bicycles

The NYC Police Department's (NYPD) Community Policing Bicycle Patrol Program enhances patrol capacity by increasing accessibility of the beat areas. Participating precincts are equipped with at least ten bicycles and equipment, and funding for the program derives from private sources, such as area businesses or civic organizations.

The Program is an example of the unique efficiency and mobility afforded by the bicycle. As of the end of 1996, over half of the NYPD's precincts had implemented the Bicycle Patrol Program. In addition, uniformed officers on bicycles will patrol Yankee and Shea Stadiums. According to a recent Operations Order issued by the Police Commissioner, evaluations of the Community Policing Bicycle Patrol Program reveal that the Program "increases patrol visibility; provides positive interaction with citizens; improves beat officers' ability to respond to calls for service; and improves beat officers mobility and image in the community."

DOT Highway Quality Assurance Unit and Parking Control Unit

The Highway Quality Assurance unit of DOT successfully uses bicycles in Manhattan, Brooklyn and Queens to inspect construction and report potholes. A pilot program to use bicycles to issue parking summonses was started in June, 1996. Currently under evaluation, the programs appears to be successful.

Private Sector Initiatives

Given the proven positive impact that cycling to work can have on employees, such as improved health and heightened energy, employers could encourage cycling by providing bicycle training, secure storage and shower and changing facilities.

Institutionalization of Bicycle Planning

The following three initiatives have been developed to promote the institutionalization of bicycle planning.

All-Agency Bicycle Policy

The BND Project developed the All-Agency Bicycle Policy to guide the actions of City, State and regional agencies as they relate to the goal of encouraging cycling as a mode of transportation and a form of recreation. The four goals of the Policy are:

- Improve facilities
- Promote awareness
- Integrate with transit modes
- Improve safety

See Appendix D for the All-Agency Bicycle Policy.

Mayoral Bicycle / Pedestrian Advisory Council

Formed in July 1995, the Mayor's Bicycle/Pedestrian Advisory Committee (BPAC) is chaired by Rudy Washington, Deputy Mayor for Community Development and Business Services and is comprised of relevant city agencies and advocacy groups. The goals of the BPAC include:

- Interagency coordination in advancing the Network.
- Providing a forum for the cycling community to express its concerns.
- Incorporating bicycle facilities, where feasible and appropriate, in all future capital projects.
- Promoting enforcement of traffic rules.

New York Metropolitan Transportation Council Bicycle / Pedestrian Working Group

This organization, comprised of city, regional and state cycling advocates and government agencies, was instrumental in securing ISTEA funding for bicycle-related projects. In October, 1995, the Working Group became an official body of the New York Metropolitan Transportation Council (NYMTC). The Working Group provides NYMTC with technical assistance in the formation of the bicycle/pedestrian component of the region's Long Range Transportation Plan.

Engineering

Guidelines and Standards

The planning, design and implementation of all network facilities are guided by minimum standards. To guide the BND Project and other design professionals, a research library on national and international bicycle planning and design standards was compiled. This library is currently housed at the Department of City Planning, Transportation Division, and is available for use by appointment. The planning methodologies described in Chapter 2 and the Design Guidelines described in Chapter 5 are the first step in developing a uniform set of standards for New York City.

Bicycle Parking

The lack of secure parking in New York City is a major disincentive to cycling. This has been shown consistently in the DOT and DCP surveys. Although in-door parking is needed for all-day bicycle commuters, outdoor bicycle rack parking is appropriate and needed for messengers and shoppers. Cyclists currently lock their bicycles to available street furniture, which offers limited, not always secure, options for cyclists and can clutter already crowded sidewalks.

Short Term Parking: The On-street Bicycle Parking Facilities program (*CITYRACKS*) will help encourage cycling for short trips and errands by providing much needed bicycle parking. The program, which is funded through the ISTEA Enhancement Program, installed approximately 150 bicycle racks throughout the city in June, 1996. Additional funding for *CityRacks* has been approved, and 2,200 additional racks will be installed by 1999.

In conjunction with the Art Commission, the Landmarks Preservation Commission and Transportation Alternatives, DOT has chosen to install a continuous, curve-type rack in three forms:

- An inverted "U" to hold 2 to 3 bicycles.
- A 2-loop rack for 5 bicycles.
- A 3-loop rack for 7 bicycles.

All racks are constructed of 2' 3/8" unpainted, hot-dipped galvanized steel, and are installed with surface flange mounts and in-ground cement. The sites are identified by DOT, city agencies and through a request process (See Appendix F). Locations include commercial centers, museums and universities. All sites must be consistent with DOT siting standards.

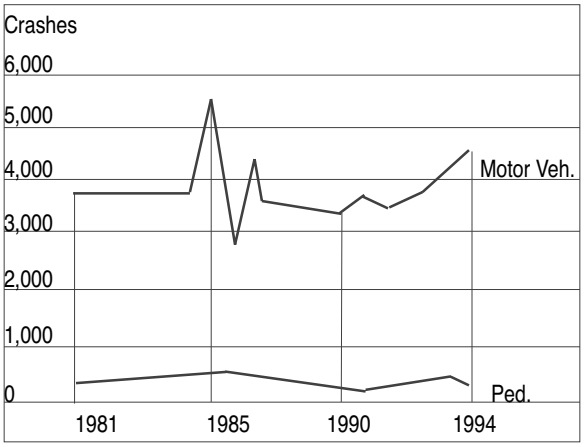
CITYRACKS

Long Term Storage: The restricted living and working spaces of many New Yorkers can preclude even owning a bicycle. Building storage can be established by designating a storage room, using space saving storage systems or by simply re-organizing existing space. The City's building code related to emergency access and the use of elevators, stairways and accessways can determine the availability of bicycle access and storage. Phase II of the BND project will address these issues.

Enforcement

A major disincentive to cycling is the number of cars and trucks on New York City streets, often driven with excessive speed and assertiveness. Statistics shows that the number of bicycle-motor vehicle accidents has increased since 1981 (see chart below). Enforcement of motor vehicle regulations, especially motor vehicle speeds and double parking in bicycle lanes, is needed to improve these conditions.

Likewise, enforcement of regulations is needed to improve bicycle-pedestrian conflict. Although pedestrian/bicycle accidents have decreased since 1981 (see chart below), cyclists are still sometimes considered a menace to pedestrians, as evidenced by the recent City Council legislation permitting the confiscation of bicycles being ridden on the sidewalks (see Appendix H). However, cyclists often ride illegally on the sidewalks to compensate for the lack of bicycle lanes and paths and to avoid congested streets. In addition, cyclists are often forced to weave to avoid pedestrians who unexpectedly step off the curb or are in the street, hailing cabs. Pedestrians and cyclists must be educated to respect each other's rights in the street.



Bicycle/Motor Vehicle and Bicycle/Pedestrian Crashes
Source: NYC DOT

Bicycle Theft

Theft is one of the greatest deterrents to cycling in New York City. 839 respondents to a 1992 Transportation Alternatives survey reported the theft of 860 bicycles, an average of 1.03 bicycles per peson. According to DOT, bicycle recovery rates during the 1980s averaged only one in 45 - a mere 2.2%.

To help deter theft, the NYPD operates a voluntary bicycle registration program which allows cyclists to engrave an ID at their local precinct. Increased publicity of this program could increase the number of participants and help deter theft. Improved building access for bicycles and construction of bicycle lockers could also be significant theft deterrents.

Fifth Avenue bicycle lane, obstructed by motor vehicle

Education

The competition for space on New York City's streets requires cooperation among all competing modes - auto, pedestrian, in-line skater and bicycle. The best way to ensure this cooperation is through effective educational programs. New York State Education Law mandates instruction in safety education, including highway and traffic safety and bicycle safety for all students in both elementary and secondary education. Instruction at an early age on how to ride a bicycle, and how to operate one in traffic, can lead to increased, and more responsible, use of this mode. Early respect for cycling can also have a positive impact on the skills of future car drivers. The following educational initiatives are offered.

DOT Safety Education Program

The Safety Education Program operates a number of programs on traffic safety in the city's public schools and senior and community centers. The YES (Youth Education for Safety) Program coordinates traffic safety events and assemblies with speakers from DOT's Speakers Bureau and sponsors an annual citywide YES conference. The Safety Education Program also sponsors theater programs and puppet presentations to educate students about passenger, pedestrian and bicycle safety. The BND Project will work closely with the Safety Education Program in Part II of the Project.

Safety City

Established in 1989, Safety City focuses on teaching children how to safely cross streets, drive bicycles and ride in cars. Safety City provides third graders in School District 5 in Central Harlem with hands-on, interactive safety training both inside a classroom and outdoors in a simulated New York City street and intersection. The program has been hailed

as a success. According to Harlem Hospital's Pediatric Trauma Unit, there has been a 50% drop in the number of children admitted for motor-vehicle related injuries since Safety City's inception.

The Safety City Program was expanded in 1995 to include the Mobile Safety City Program, a joint City Volunteer Corps project which transported the NYC intersection to schools in Brooklyn, Queens and Staten Island. In September 1996, a new Safety City was dedicated on Staten Island. This project is a cooperative effort between DOT, the NYC Board of Education and the NYPD. Funding is being sought to expand to all five boroughs.

Share the Road Safely

This recently initiated program is a joint DOT-NYPD effort to improve traffic safety. It focuses on planning and designing pedestrian improvements and has sponsored public service announcements on the radio on safe cycling. The BND Project recommends that this program be expanded to include bus and subway posters.

Design Guidelines

Design standards are a critical component in the Network implementation process. They help ensure a consistent, safe level of service for users and protect local government agencies from liability issues in the event of injury. NYC DOT is in the process of developing Bicycle Facility Design Standards. This chapter of the *Plan* offers the following Design Guidelines to be used while the DOT Standards are being developed.

The Design Guidelines are a compilation of national guidelines and examples of existing and proposed facilities in New York City. The Guidelines are intentionally broad, providing designers with the flexibility that is often required in a locale as complex as New York City.

Most local design guidelines have been based in whole or in part on national and state standards. The national standards are listed below.

1. *Guide to the Development of Bicycle Facilities*, AASHTO

Released in 1981, and updated in 1991, the AASHTO Guide has become the basic reference for facility designers across the country.

2. *Manual on Uniform Traffic Control Devices (MUTCD)*, Federal Highway Administration

Released in 1935, and updated in 1988, the MUTCD is the national manual for streets and highways. Conformance with the manual's standards is required in nearly every state by statute (New York included).

3. *Guidelines for Greenways*, The Greenway Collaborative

This document provides detailed advice on the planning, design and maintenance of multi-use paths and trails.

4. *Design & Maintenance Manual for Multi-use Trails*, Rails-to-Trails Conservancy

This document provides information similar to that found in Guidelines for Greenways, but with an emphasis on abandoned rail corridors and canal tow paths.

5. *Guidelines for Establishing In-Line Skate Trails in Park and Recreation Areas*, International In-Line Skating Association

As noted on page 5, bicycle facilities are divided into the following three categories:

Multi-use Path, separated from motor vehicle traffic

On-Street Bicycle Lane, designated by lane markings and signs

Signed Bicycle Route, designated by signs only

On-Street Facilities

Bicycle Lanes - Width

AASHTO: The minimum bicycle lane width requirement is **4 feet**. However, certain edge conditions dictate additional desirable bicycle lane width, see Figures A - C.

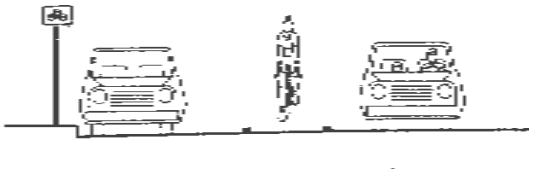


Figure A: Curbed street with parking

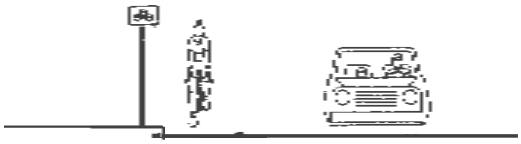


Figure B: Curbed street without parking

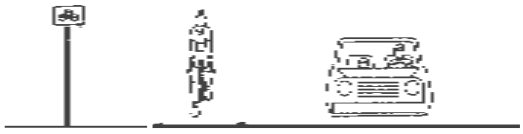


Figure C: Street without curb and gutter

Figure A depicts bicycle lanes on an urban curbed street with a parking lane. The recommended bicycle lane width for this location is **5 feet**. Bicycle lanes should never be located between the curb and parking lane, since visibility at intersections and driveways would be reduced and left turns would be prohibited.

Where parking is permitted but a parking lane is not provided, the combination lane, intended for both motor vehicle parking and bicycle use, should have a minimum width of **12 feet**. However, it is preferable to designate separate parking and bicycle lanes if the combination is used as an additional motor vehicle lane.

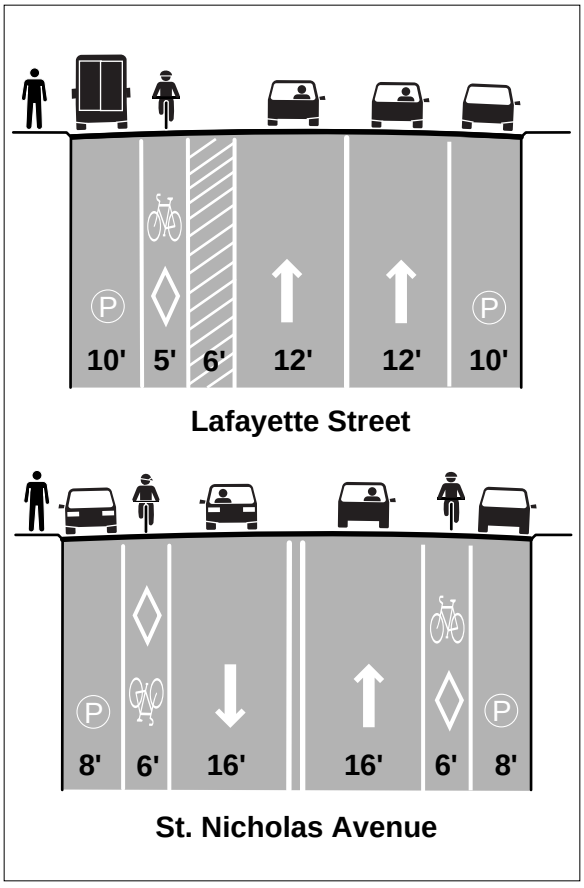
Figure B depicts bicycle lanes along the curb line of an urban street where parking is prohibited. Cyclists do not generally ride near a curb because of the possibility of debris or hitting a pedal on the curb. In addition, distinctive gutter pavement (i.e., concrete), which differs from the roadway pavement, can be hazardous for cyclists. In this case, there must be a **4 foot clearance** between the edge of the gutter pavement and the motor vehicle lane.

Figure C depicts bicycle lanes on a highway without curb or gutter. Bicycle lanes should be located between the motor vehicle lanes and the roadway shoulders. Bicycle lanes may have a minimum width of **4 feet**, where the shoulder can provide additional maneuvering width. A width of **5 feet** or greater is preferable; additional widths are desirable where substantial truck traffic is present, or where vehicle speeds exceed 35 mph.

New York City: The 1978 *Bikeway Planning and Policy Guidelines for New York City*, released two years prior to the AASHTO guidelines, recommended a minimum bicycle lane width of 3'6", and a recommended width of 4'. The Broadway, First, Fifth and Sixth Avenues lanes in Manhattan were based on these guideline.

However, recently implemented on-street lanes have surpassed the AASHTO recommendations. Manhattan's Lafayette Street bicycle lane, implemented in 1994, has a lane width which varies between **5 and 6 feet and a buffer** between the lane and vehicle traffic. The buffer, which has an average width of **6 feet**, provides greater protection from motor vehicles and space for deliveries. Space for the lane and buffer were provided by eliminating a lane of motor vehicle traffic.

More recently, the new St. Nicholas Avenue bicycle lane in Upper Manhattan has a width of **6 feet**. This width is made possible by reconfiguring the roadway's lane striping. In the future, on-street bicycle lane widths may need to increase even further to accommodate the growing number of in-line skaters.



Schematic design for new on-street bicycle lanes that surpass AASHTO recommendations.

Signed Bicycle Routes

Two types of signed bicycle routes, are identified by AASHTO: The short route, which essentially provides continuity to other bicycle facilities; and the long, or touring, route. Signed routes are usually identified only by MUTCD signage. For touring routes, a standard bicycle route marker with a numerical designation in accordance with the MUTCD can be used in place of a bicycle route sign. The number may respond to a parallel highway, indicating the route is a preferred alternate route for cyclists.

A number of routes have been designated in New York City, including Riverside Drive in Manhattan and Bay Street in Staten Island. Street width limitations usually neccessitate the designation of signed routes rather than lanes.

Width

Roadways with shoulders or wide curb lanes are often appropriate for signed routes. AASHTO recommends a minimum shoulder width of **4 feet** for the designation of a bicycle route. The minimum width increases as the percentage of trucks, buses and vehicle speeds increase. **12 feet** is the minimum width and **14 feet** is the preferred width for the designation of bicycle routes in wide curb lanes.

Signs and Pavement Markings

The design and use of signs and pavement markings these devices are specified by state statute, and must be consistent with the national standards of the MUTCD. The three MUTCD sign categories affecting motorists, pedestrians and cyclists are: Regulatory, Warning and Guidance.

Regulatory: The regulatory signs convey traffic laws or regulations which would not otherwise be apparent. Designated bicycle lane signs should be located prior to the beginning of a marked designated bicycle lane to warn motorists of the presence of cyclists.

Warning: These signs warn motorists or cyclists of potentially hazardous conditions on or adjacent to the road or path. The use of warning signs should be limited to areas where the condition might not be apparent to avoid overuse of a sign.

Guidance: These signs provide cyclists with information relating to route identification and direction to ensure that the route is accurately followed.

Most states have followed the MUTCD in developing pavement markings. Although most states have a lane striping width of 4 - 6 inch lane striping, Oregon and Florida have implemented 8 inch lane striping for greater visibility. A common marking material is thermoplastic paint with glass beads. This material has better visibility and wearing characteristics than paint. As shown in Figure D, DOT recently began installing an MUTCD thermoplastic symbol on on-street lanes.

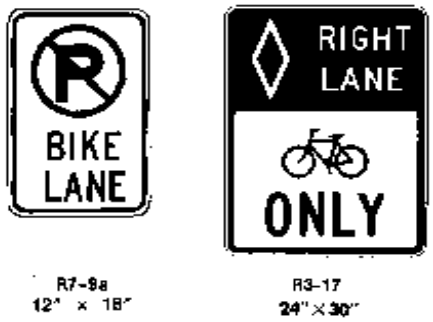


Figure A: Regulatory signs

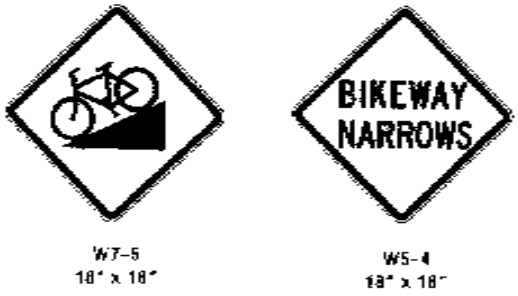


Figure B: Warning signs

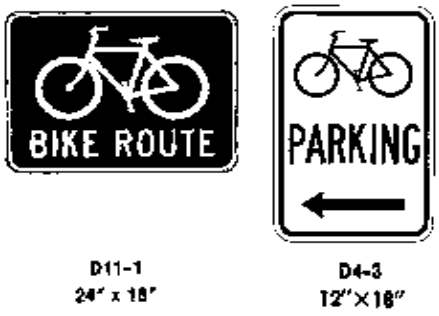


Figure C: Guidance signs

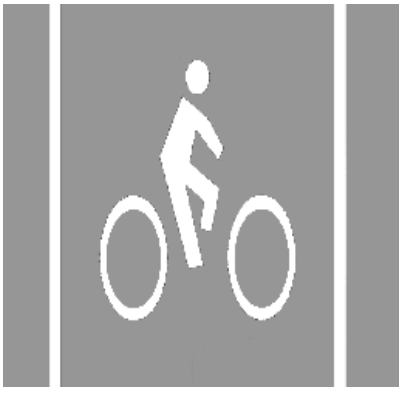


Figure D: MUTCD lane and symbol marking, adopted by DOT in 1995.

Intersections

Right-turning Motorists: Cyclists proceeding straight through intersections can cross the path of motorists turning right. According to AASHTO, striping and signing configurations which encourage these crossings in advance of the intersection, in a merging fashion, are preferable to those that force the crossing in the immediate vicinity of the intersection. AASHTO-recommended designs for bicycle lanes approaching a motor vehicle right-turn-only lane are shown in Figures A - D.

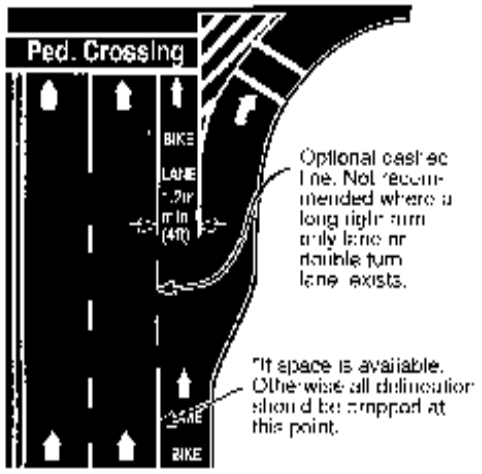


Figure A: Right-turn-only lane

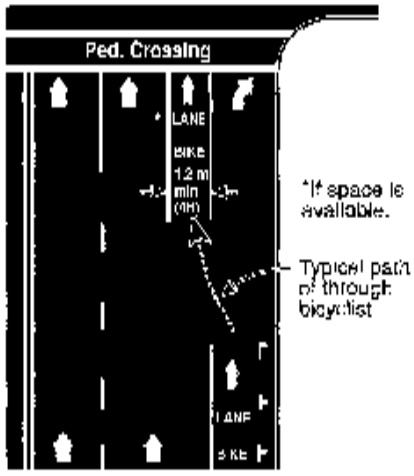


Figure B: Parking lane becomes right-turn-only lane

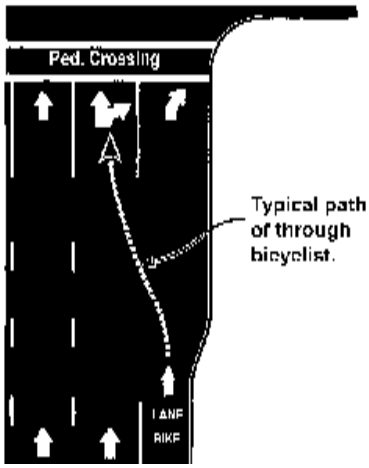


Figure C: Double right-turn-only lane

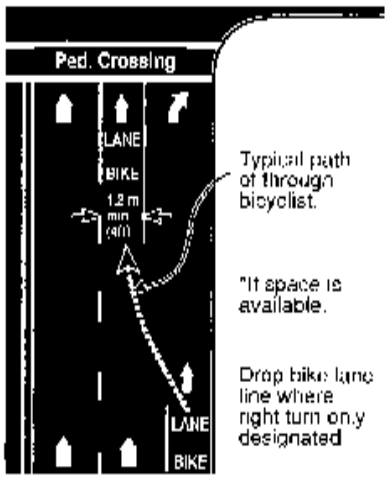
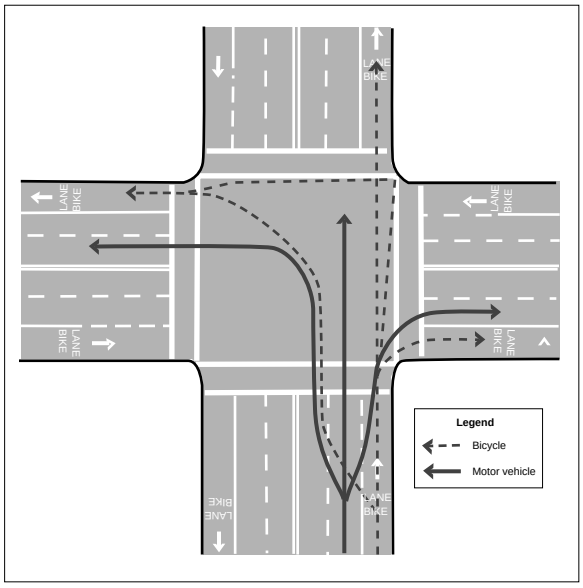


Figure D: Right lane becomes right-turn-only lane

Left-turning cyclists: Most vehicle codes allow the cyclist the option of making either a "vehicular style" left turn (where the cyclist merges to the same lane used for motor vehicle left turn lanes) or a "pedestrian style" left turn (where the cyclist proceeds straight through the intersection, turns left at the far side, then proceeds across the intersection again on the cross street).



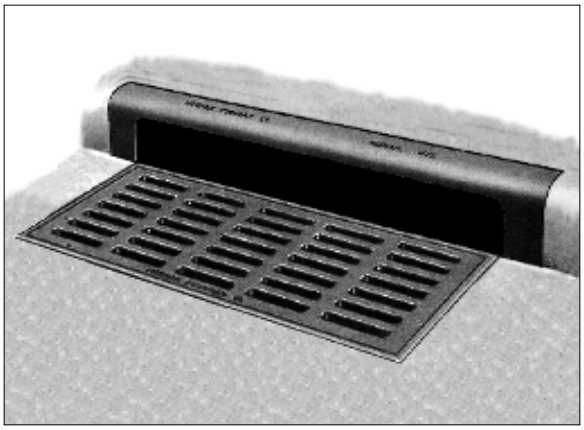
Typical traffic movements thourgh an intersection. Cyclists can turn left as a vehicle or as a pedestrian.

Drainage Grates

Drainage inlets with grate openings which are parallel to traffic can trap the front wheel of a bicycle, causing loss of steering control, resulting in serious damage to the bicycle wheel and frame and/or injury to the cyclist. Such grates should be replaced with bicycle-safe and hydraulically efficient ones, as below.

A temporary correction involves welding steel cross straps or bars perpendicular to the parallel bars to provide a maximum safe opening between straps. Identifying a hazardous grate with pavement marking is inadequate; a cyclist could miss the pavement marking in the dark or be forced over such a grate inlet by other traffic.

When a new roadway is designed, all drainage grate inlets and utility covers should be kept out of the cyclists' expected path. When an existing roadway is reconstructed, all drainage grate inlets and utility covers should be replaced wherever possible with bicycle-friendly castings to ensure the safety of cyclists.



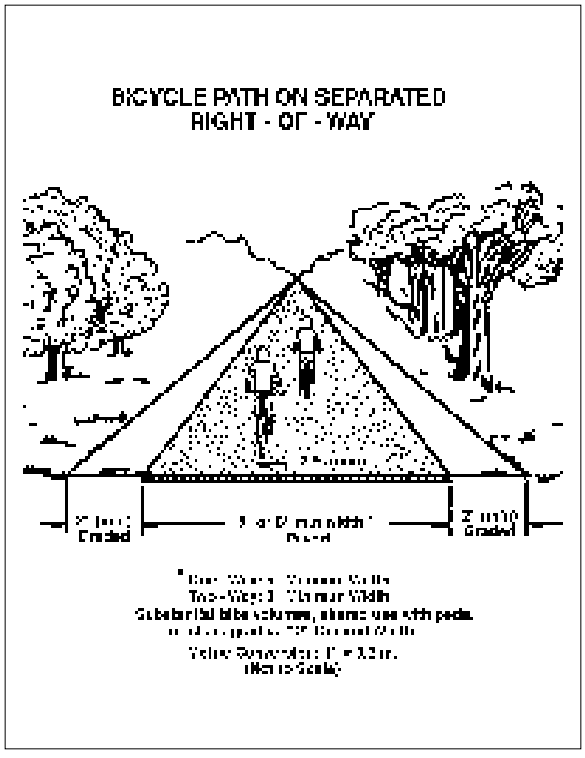
Bicycle-safe drainage grate

Multi - Use Paths

Width

One-directional path: AASHTO establishes **5 feet** as the minimum width of a one-directional bicycle path, but cautions that such a path will be used as a two-way facility unless measures are taken to assure one-way operation. The International In-Line Skating Association recommends **8 fee**t for one-way skating paths; **10 feet**, **6 inches** for combined bicycle / in-line skate, one-way paths.

Two-directional path: AASHTO establishes **8 feet** as a minimum and **10 feet** as a recommended width for a two-directional "bicycle path". If substantial bicycle volume and shared use with joggers and other pedestrians is anticipated, AASHTO recommends a width of **12 feet**. The Rails-to-Trails Conservancy recommends a width of **16 feet** for paths for "non-motorized" use in urban settings.



Widths recommended by AASHTO for multi-use paths.

New York City: Multi-use paths are generally shared by cyclists, pedestrians, joggers and, increasingly, in-line skaters. Pavement markings and signage or, where space and funds permit, physical dividers are used to separate a "wheels only" path (bicycles and in-line skates) from "feet only" path (runners and pedestrians). Typical widths of multi-use paths in New York City are shown below.

Existing Paths

Shore Parkway Bicycle Path		
(69th Street to 4th Avenue):	11'-6" to 14'	(wheels only)
(4th Avenue to Bay Parkway):	11' to 14'	(shared)
Ocean Parkway:	10'	(wheels only)
North Bronx Greenway:	8'	(shared)

New or Reconstructed Paths

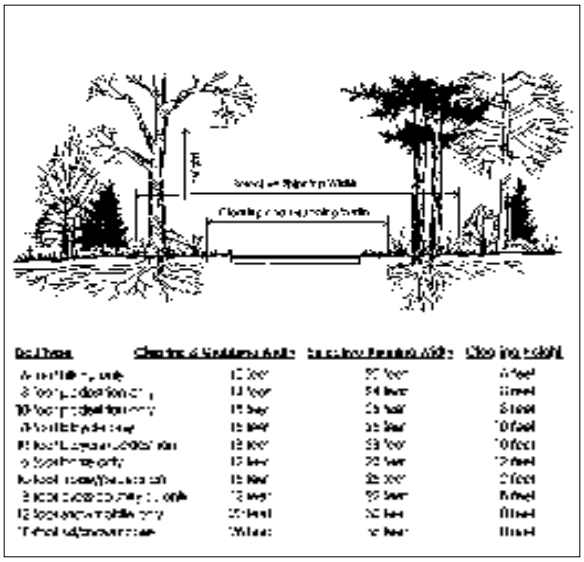
Shore Parkway Bicycle Path		
(Knapp St to Penn. Ave):	12'	(shared)
Route 9A:	16'	(wheels only)
East River Esplanade:	10'	(wheels only)

Buffer

AASHTO establishes a minimum **2 foot**, recommended **3 foot**, wide graded area located adjacent to both the sides of the path to provide clearance from trees, poles, walls, fences, guardrails. AASHTO further recommends a wide separation between a bicycle path and adjacent highway to instruct both the cyclist and the motorist that the path functions as an independent highway for non-motorized vehicles. When the distance between the edge of the roadway and the bicycle path is less than **5 feet**, construction of a physical divider is recommended. Such a divider should have a minimum height of **4.5 feet** to prevent the cyclist from toppling over the divider.

Vertical Clearance

AASHTO establishes a minimum vertical clearance of **8 feet**, although a greater clearance may be needed to permit passage of maintenance vehicles. A clearance of 10 feet is desirable in underpasses and tunnels. The Rails-to-Trails Conservancy provides specific vegetative clearance requirements.



Vegetative clearance chart, Rails-to-Trails Conservancy

Alignment

The minimum radius of curvature negotiable by a bicycle is a function of the superelevation rate of the bicycle path surface, the coefficient of friction between the bicycle tires and the bicycle path surface, and the speed of the bicycle. The chart below shows the additional, width required, based on curve radii.

Radius (ft.)	Additional Pavement Width (ft.)
0-25	4
25-50	3
50-75	2
75-100	1
100+	0

Grades

AASHTO recommends a maximum **5 percent** grade; higher grades are difficult to climb and, on the downhill, may cause some cyclists to exceed the speeds at which they are competent; grades over 5 percent and less than 500 feet long are acceptable when a higher design speed is used and additional width is provided; grades steeper than 3 percent may not be practical for bicycle paths with crushed stone surfaces.

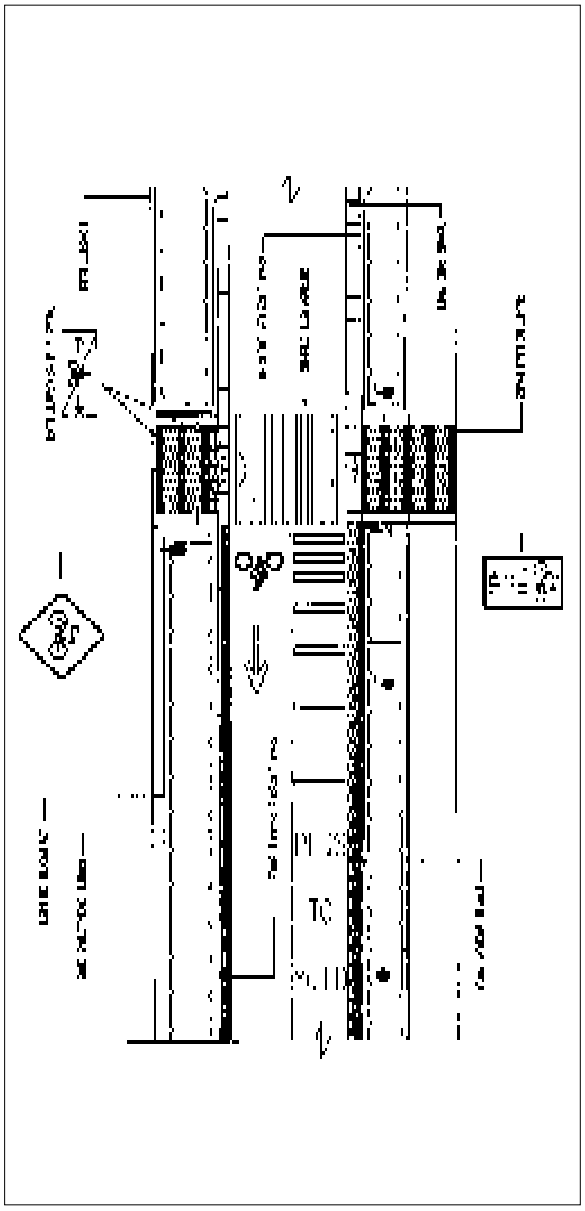
Signing and Pavement Marking

The regulatory, warning and informational types of MUTCD signing can be applied, where appropriate, to multi-use paths. AASHTO also recommends a **4"** wide yellow centerline stripe to separate opposite directions of travel. Warning stripes on fixed objects (i.e., bollards or elevated roadway columns) are also used to delineate lanes.

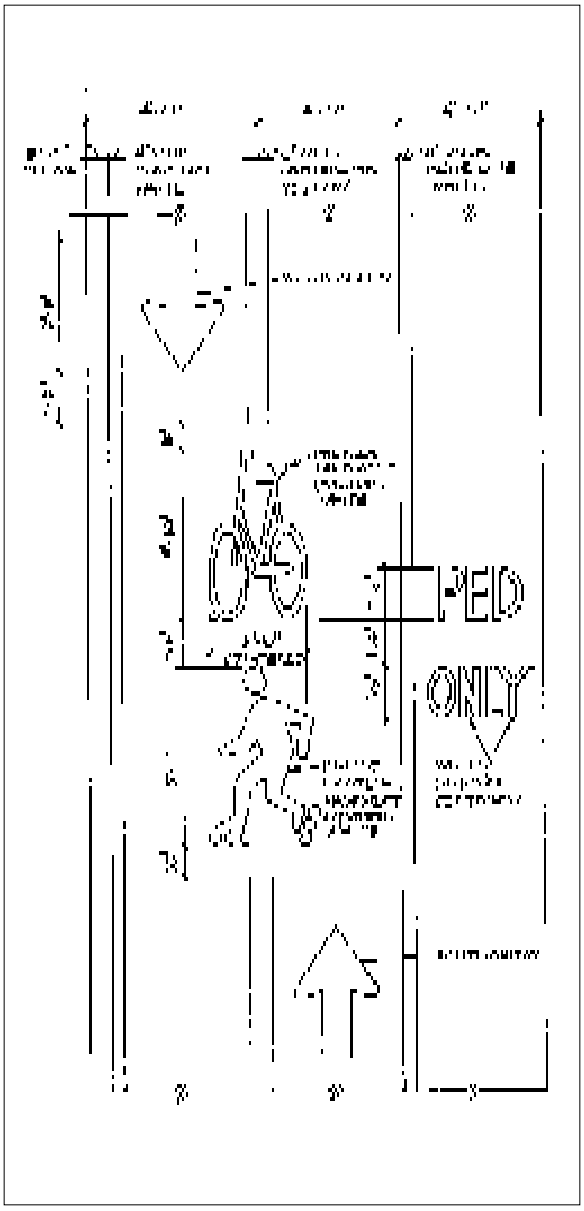
Travel Path Restriction Signs are used exclusively where there is a shared use with pedestrians and cyclists, an especially common occurance in New York City.

Travel Path Restriction Sign.

New York City: Unlike on-street lanes, off-street paths, generally under the joint jurisdiction of NYC DPR and DOT, are not subject to conformance with the State statute on traffic control devices. This permits greater flexibility in addressing the unique needs of cyclists and pedestrians.



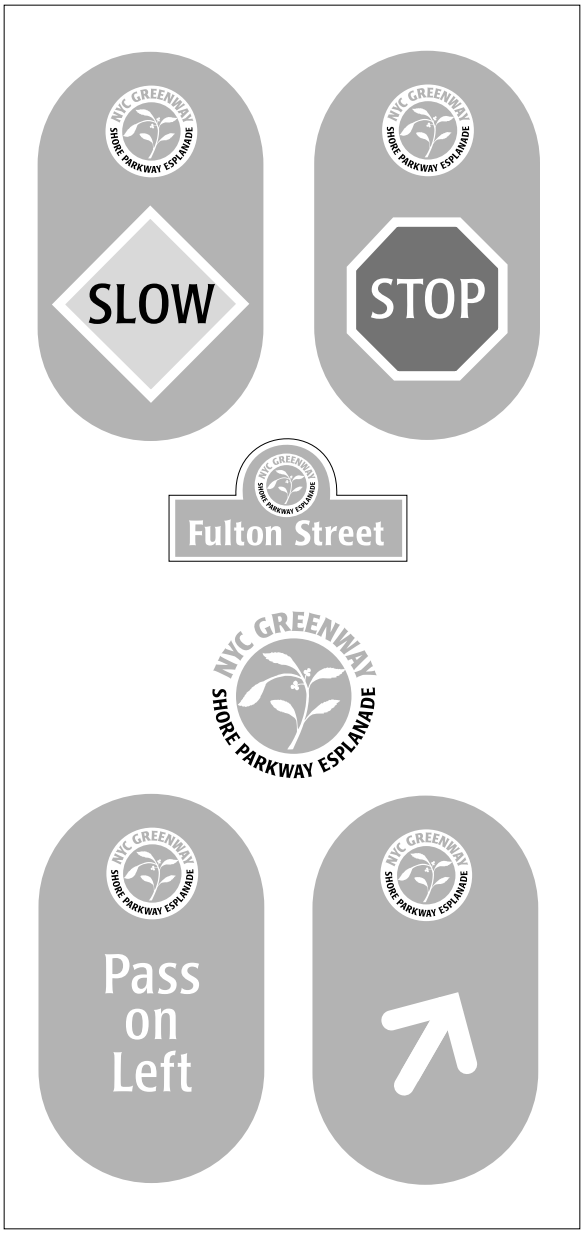
Proposed pavement marking and signage design for Route 9A Path. Source: NYS DOT



Proposed pavement marking and signage design for the Reconstruction of the Shore Parkway Bicycle Path. Source: DPR

The NYC DCP has recently proposed signage for the City's Greenway System in an effort to provide recognizable identity for a greenway while guiding users safely along the route. The signage uses a green color and vertical lozenge shape for easy recognition and installation on narrow paths, and a distinctive logo with the greenway's name. The signage will be consistent with MUTCD standards in the on-street segments of the Greenway system.

Proposed standard greenway signage. Source: DCP



Proposed standard greenway signage. Source: DCP

Intersections

AASHTO recommends the following for intersections of path users and motor vehicles:

Locate traffic controls (signal, stop sign, etc.) so that motorists and cyclists are not confused by which controls apply to them.

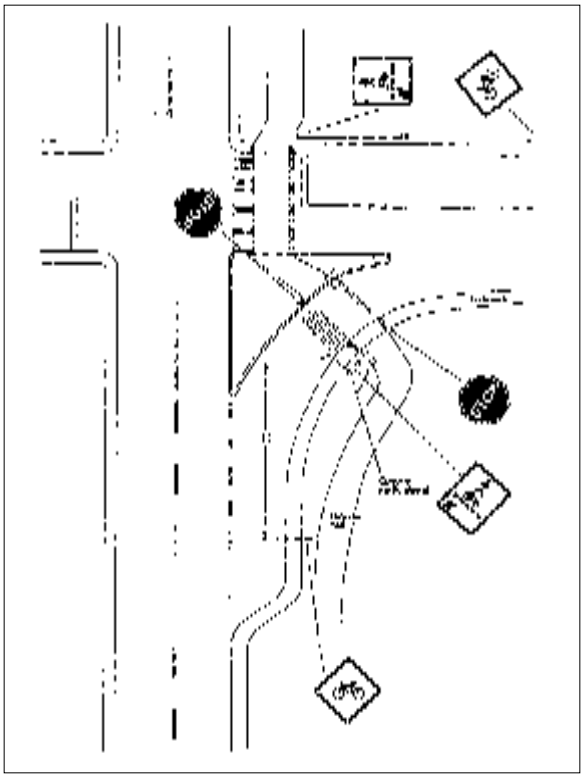
Site path-highway crossing away from intersections with other highways. Where physical constraints prohibit such independent intersections, the crossing may be at or adjacent to the pedestrian crossing.

Consider a refuge island for path users at crossings of high volume, multi-lane arterial highways.

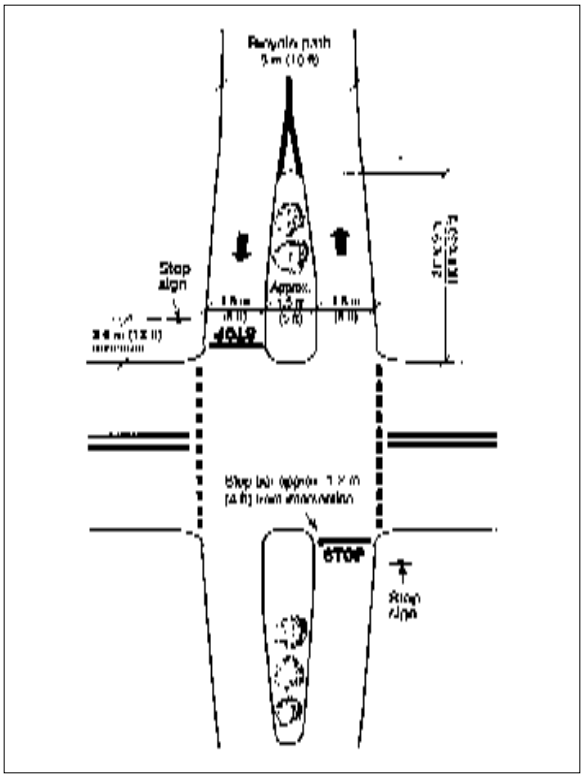
When a path terminates at an existing road, the path should be safely integrated into the existing system of roadways.

Path intersections and approaches should be on relatively flat grades; stopping sight distances at intersections should be checked with adequate warning provided.

Ramps for curb cuts at intersections should be the same width as paths, providing a smooth transition between the path and the roadway.



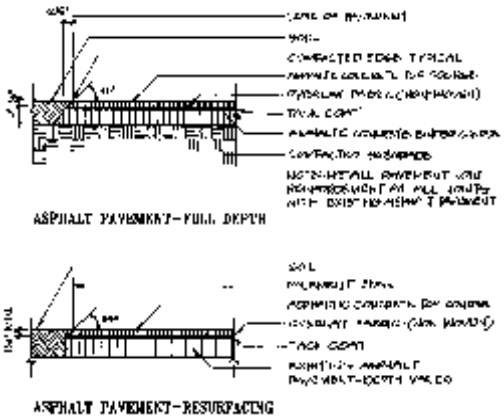
Intersection design of multi-use path crossing an arterial roadway. Bicycles and pedestrians use crosswalk and refuge island. Source: Velo Quebec



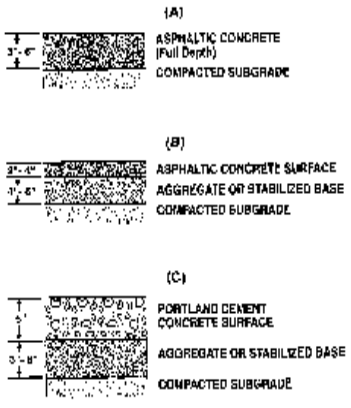
Intersection design for multi-use path crossing a local street. Source: North Carolina DOT

Pavement Materials

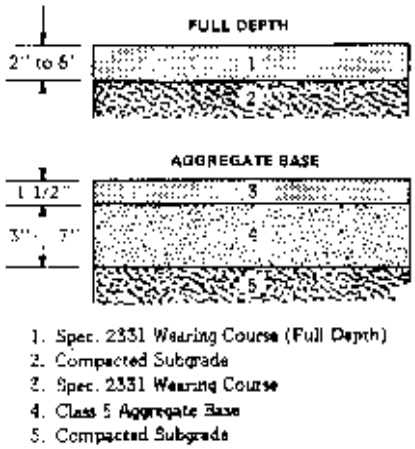
According to AASHTO, designing and selecting pavement sections for bicycle paths is in many ways similar to designing and selecting highway pavement sections. Asphalt has traditionally been the most common material, although subgrade stability and cost are the major factors affecting the material choice. In addition to asphalt, materials used in New York City paths include asphalt hex block unit pavers (Eastern Parkway path) and concrete (Ocean Parkway path). Hexblock has proven less desirable as a paving material because of its natural tendency to form a convex surface with aging, creating a rough riding surface.



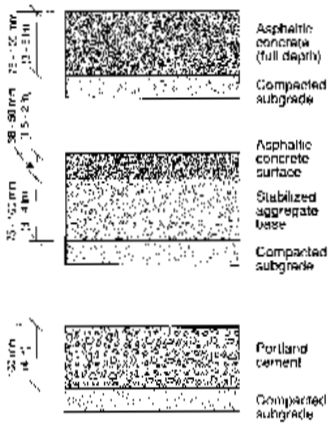
Reconstruction of the Shore Parkway Bicycle Path, NYC DPR



Bicycle Master Plan, Oregon DOT.



Bikeway Design Manual, Minnesota DOT



Bicycle Facilities Planning & Design Guidelines, N. Carolina DOT

Miscellaneous paving details for multi-use paths .

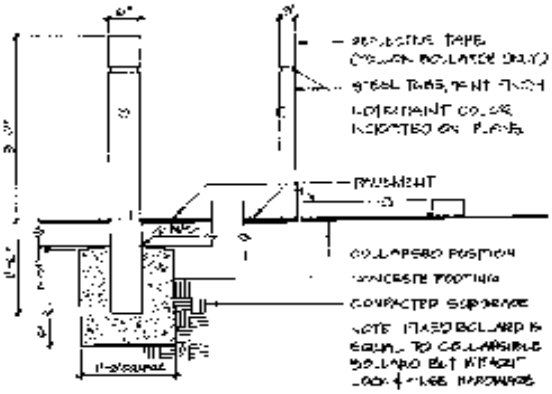
Vehicle Access Controls

Bicycle paths often need some form of physical barrier at roadway intersections to prevent unauthorized motor vehicles from entering. Barriers are especially warranted when paths are located near sensitive natural habitats. However, access for maintenance and emergency vehicles must be provided. Listed below are some possible examples of physical barriers:

Gates / Bollards: Lockable gates or collapsible bollards permit entrance by authorized vehicles. AASHTO recommends that, when more than one post is used, a 5 foot spacing is desirable; wider spacing can allow motor vehicle entry, while narrower spacing might prevent safe entry by bicycles. NYC DPR has developed several guard rail and bollard details for various locations throughout the city.

Additional methods for restricting access include curbing, fence and barrier rails or changes in elevation, such as graded berms.

Vegetation: A path can be divided into two narrow entryways and separated by low landscaping to prevent unauthorized access. Emergency vehicles could enter by straddling the landscaping. All terrain vehicles (ATVs) can usually drive over most plantings, rendering this alternative less effective.



Detail for a collapsible steel bollard.
Source: Reconstruction of the Shore Parkway Bicycle Path, DPR

Steel barrier rail installed along the perimeter of Marine Park, Brooklyn.

Vegatated berm along Flatbush Avenue and Floyd Bennett Field, Brooklyn.

Vehicular access controls.

Bridge Structures

Bicycle access to bridges is essential in New York, a city of islands, rivers and water crossings. AASHTO provides the following guidelines:

New structures: The minimum width should be the same as the approach path, plus an additional 2 foot wide clear area to provide a minimum horizontal distance from the railing or barrier and to provide maneuvering space if pedestrians or other cyclists are stopped on the bridge. In addition, access by emergency, patrol and maintenance vehicles should be considered in establishing both the vertical and horizontal design clearances.

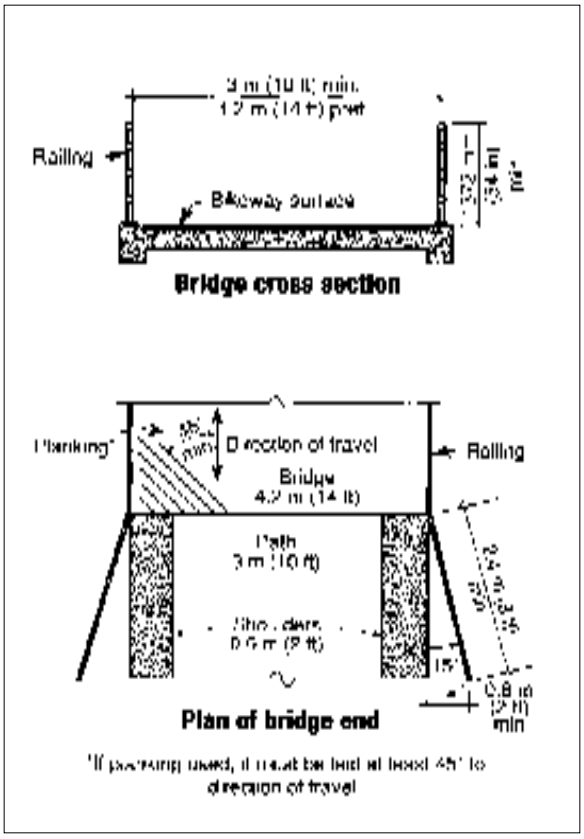
Railings, fences, or barriers on both sides of a bicycle path structure should be a minimum of 4.5 feet high. Smooth rub rails should be attached to the barriers at handlebar height of 3.5 feet.

Existing structures: AASHTO offers 3 options:

1. A path should be constructed across the bridge where (A) the facility will connect with a path on both ends; (B) sufficient width exists on that side of the bridge or can be obtained by widening or restriping lanes; and (C) bicycle traffic can be physically separated from motor vehicle traffic.

2. Wide curb lanes or on-street lanes should be provided where (A) the path transitions into lane or signed route at one end of the bridge and (B) sufficient width exists or can be obtained by widening or restriping.

3. Existing sidewalks should be used as one-way or two-way facilities where (A) conflicts between cyclists and pedestrians will not exceed tolerable limits and (B) the existing sidewalks are adequately wide. Under certain circumstances, the cyclist may be required to dismount and cross the structure as a pedestrian.



Details for multi-use brdiges. Source: North Carolina DOT

All of the examples described above are found on New York City bridges. Bicycle and pedestrians bridges are located along some of the City's Greenway routes, such as the bridges over the FDR Drive to East River Park. Multi-use paths are found on some of the city's major bridges, such as the Brooklyn, Williamsburg, Queensboro and George Washington Bridges. On-street lanes have recently been implemented on the Cross Bay Boulevard Bridge. In addition, although not officially designated as bicycle facilities, many bridge sidewalks, such as the sidewalks along the Harlem River bridges, serve as informal bicycle routes.

Width of NYC Bridge paths:

Brooklyn Bridge:	16 ' (center span)
	10 ' (Brooklyn approach)
Manhattan Bridge:	10' 6" (under construction)
Queensboro Bridge:	11' 10" (proposed)
Williamsburg Bridge:	12' (under construction)
George Washington Bridge:	7' 4" (between ropes)
	5' 8" (Manhattan approach)

When a structural solution cannot be achieved for a major bridge crossing, a "bike-on-bus" service is an option. The three methods of carrying bicycles on buses are (A) rear-mounted racks; (B) front-mounted racks and (C) by allowing bicycles inside the bus. The "bike-on-bus" has been implemented on the QBX1 bus line over the Whitestone Bridge, and is being explored as one alternative for bicycle access by DCP over the Verrazano-Narrows Bridge.

As stated by AASHTO, the appropriate width of a retrofitted bicycle facility on an existing bridge is best determined by the designer, on a case-by-case basis, due to the large number of variables.

Maintenance and Protection of Traffic

Temporary stair crossing over work zone during replacement of wood decking on the Brooklyn Bridge Promenade.

Federal law requires that construction projects which force the temporary closing of a bicycle facility provide a reasonable alternate route. These design guidelines recommend that the temporary facility be designed to ensure the safety of all modes, minimize any necessary detour distance and avoid forcing cyclists to dismount.

Innovative Infrastructure

European countries have historically exhibited more innovation in the development of bicycle facilities, due at least in part to the Europeans' greater acceptance of the bicycle as a viable mode of transportation. Increasingly, U.S. cities have looked to Europe to develop demonstration projects of innovative bicycle facilities. Described below are some of the more successful examples.

Pigmented Bicycle Lanes

Pigmented bicycle lanes are found in Dutch and German cities, and pigmented motor vehicle lanes are found in London and in Dutch cities to create a roadway hierarchy. The selection of a pavement color for bicycle lanes which differs from the motor vehicle lane has the following benefits: bicycles are given preferential status; vehicle speeds are reduced by creating the impression of a more narrow roadway for motor vehicles; and motor vehicle parking is discouraged. Oregon has proposed pigmented lanes for traffic calming purposes in its recent state transportation plan.

Center median bicycle lanes

A center median bicycle lane can sometimes reduce the number of conflicts between bicycles and motor vehicles as bicycles are not forced to cross the path of right turning vehicles. Seattle has successfully implemented a center median lane.

Shared bus-bike lane

Shared bus-bike lanes have proven successful in Madison, WI, Toronto, Ontario, London, UK and in the Lyon region in France. An exclusive bus lane can reduce the number of single occupancy vehicles and provide cyclists, under certain conditions, with a preferred lane.

Key ingredients for success include:

- Wide curb lanes of 14 to 16 feet.
- Peak bus headways of 1.5 - 2 minutes.
- Prominent sign & pavement markings.
- Limited right-turn movements.
- Consistent enforcement.

Recent technological improvements, such as compressed natural gas and improvements in emission controls, can render this an attractive option.

Shared bus-bike lane in Freiburg, Germany.

Contra-flow bicycle lanes

A contra-flow bicycle lane is a two-way bicycle lane located adjacent to a one-way motor vehicle lane. Although this alternative encourages cyclists to ride against motor vehicle traffic, and is therefore contrary to the rules of the road, the following special circumstance can justify its implementation:

- Direct access to destinations.
- A substantial number of cyclists are already using the roadway in a contra-flow direction.
- There are few intersections on the route and cyclists can merge into typical traffic flow.

Successful examples of contra-flow lanes are found in German, Dutch and English cities, Montreal and Eugene, OR.

Signals

Signal innovations include the following:

"Bicycle-exclusive" signal phase: Popular in the London and the Netherlands, the signal phase is activated by pushbuttons or metal detection loops embedded in the pavement. Adjustments to the timing of motor vehicle signals allow adequate time for bicycles to cross two or more lanes of traffic. A bicycle-exclusive signal is located at Herald Square in Manhattan. A remnant of the Sixth Avenue separated bicycle lane, this signal is not activated by cyclists.

Advanced stop lines: This alternative gives cyclists a head start at difficult left-turn movements.

Raised or separated bicycle lanes

This alternative can act as an effective hybrid of multi-use paths and on-street lanes, and has proven successful in Montreal, and cities in Oregon, Copenhagen, Denmark and Germany. Separation from motor vehicle traffic is achieved by either installing unit paver safety strips or constructing a slightly raised path on a mountable curb. These paths allow cyclists to enter or exit a lane for turning and passing slow moving cyclists. The separation also deters motorists from moving into the bicycle lane. The major disincentive to this alternative is higher implementation costs, complicated replacement after street repairs and an additional space requirement of approximately one meter.

The failure of the curb separated bicycle lane on Sixth Avenue in Manhattan, installed and removed in 1980 was an important lesson on the importance of designing a site specific facility. Located on one of the city's major corridors, with heavy motor vehicle and pedestrian use, the lane became a refuge for pedestrians and street vendors, forcing its removal within months.

Bicycle lane in Frankfurt, Germany separated from motor vehicle traffic by a series of rubberized curbs, anchor bolted into the street pavement.

Traffic Calming

Originating in European cities, but increasingly common in U.S. cities, traffic calming initiatives attempt to reduce the amount and speed of motor vehicle traffic and improve bicycle and pedestrian safety. Perhaps the most popular initiative to derive from Europe is the woonerf, or living yard. The woonerf, which is located exclusively on residential streets, involves the installation of traffic calming devices to prohibit motor vehicles from traveling faster than the speed of walking. This creates an environment where cyclists and pedestrians have a higher priority. Described below are the more popular traffic calming devices:

Speed table: This modified speed bump has proven effective in reducing motor vehicle speed and diverting volume to adjacent streets, although localities have been reluctant to install them as they are not found in the MUTCD. Speed tables should be located no more than 500 feet apart (to better control vehicle speed) and should not be located on emergency access routes. DOT is evaluating the effectiveness of speed tables installed at 8 locations in 1996.

Speed table used to slow vehicular traffic on a residential street in York, England.

Traffic circles (mini-roundabouts): Seattle has taken the lead in the installation of traffic circles. Constructed in the middle of a residential street, the Seattle traffic circles are custom fitted to an intersection's geometrics. Every circle is designed to allow a single unit truck to maneuver around the circle without running over it, although a two-foot concrete apron is built around the outside edge of the circle to accommodate larger trucks. The interior section of the circle is usually landscaped. A study of the impact of traffic circles at 14 intersections in Seattle revealed that the total number of collisions dropped from 51.6 to 2.2 after installation. Accidents within a one block radius also decreased, from 101 to 33.

Traffic circle used to reduce through vehicular traffic while allowing local access in a residential neighborhood of Seattle.

Chicanes: Chicanes are barriers placed in the street that require drivers to slow down and drive around them. Seattle, WA has found chicanes to be effective in the reduction of speed and traffic volumes at specific locations. However, the speeds between the chicanes has not significantly changed.

Bicycle Boulevard: The purpose of a bicycle boulevard is to provide a throughway where cyclists have precedence over automobiles, an indirect route that reduces travel time for cyclists, and a safe travel route that reduces conflicts between cyclists and motor vehicles. Palo Alto, CA constructed a bicycle boulevard along a 2 mile stretch of a residential street which runs parallel to a busy collector arterial. Barriers were constructed to prevent the through movement of motor vehicles but allow the through movement of cyclists. The boulevard continues to function as a local street, providing access to residences, on-street parking, and unrestricted local travel. An evaluation after 6 months showed a reduction in the amount of motor vehicle traffic, a nearly two-fold increase in bicycle traffic, and a slight reduction in bicycle traffic on nearby streets. Boulevard barriers include the installation of stop signs, curb extensions, one-way “chokers”, speed humps and traffic circles.

Benefits of the bicycle boulevard include the reduced cost of altering an existing street versus constructing a new path; increasing mobility and safety for cyclists and pedestrians and reducing motor vehicle speed and volume. Potential problems include increased motor vehicle traffic on adjacent streets; high risk of danger to cyclists and pedestrians at arterial roadway crossings; and high cost if there is a significant reliance on traffic signals.

Slow streets: The slow street is much like the Dutch woonerf. Examples of the slow street are found in Seattle and Berkeley, CA. The Seattle example, located in a new large-scale housing development, involved the installation of curb extensions (neck downs), the placement of the street and sidewalk at the same level, the clear delineation of motor vehicles parking areas and the placement of signs identifying the street as a slow speed, or woonerf, area.

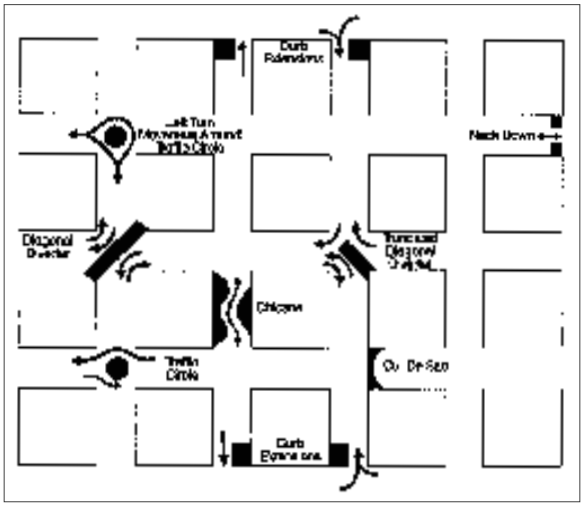


Diagram of typical traffic claming measures.

Next Steps

The bicycle has the potential to become an agent of change for New York City. Bicycle-friendly cities, such as Seattle, Portland, Davis, and Madison, are consistently ranked among the nation's most livable places. A long range vision for New York City as a place of increased bicycle use and decreased motorized vehicle use points to quieter streets, enhanced parks and open space, cleaner air and more pedestrian-friendly neighborhoods.

Achieving such a long-range vision in the nation's most dense city is a tremendous challenge. Yet it is not out of reach.

Building on the momentum of increased bicycle use in New York City, the two year old BND Project has made significant in-roads toward the goal of increasing cycling. The implementation of on- and off-street routes will now be guided by an identified citywide network. In addition, the Project is scheduled to distribute the *New York Cycling Map,* the City's first bicycle map, inconjunction with the release of the *Plan*. By identifying a network of the most bicycle-friendly streets, with connections to the city's major cultural, recreational and educational institutions and employment centers, the map will encourage cycling for recreation and commuting and instruct cyclists and in-line skaters on regulations and appropriate behavior. In ad-

dition to the efforts of the BND Project, City agencies have received over $61 million in federal funds to plan, design and construct individual greenway projects, further implementing the BND's city-wide network.

Finally, the institutionalization of cycling, perhaps the most critical measure needed to increase cycling, has made significant progress. Formal organizations of multiple agencies and advocacy groups, such as the Mayor's Bicycle Pedestrian Advisory Committee exist for the exchange of information on the state of cycling in New York City. In addition, the Bikeway/ Walkway Working Group is now a formal entity of the New York Metropolitan Transportation Committee, playing a critical role in the development of the region's Long Range Transportation Plan. None of these organizations were formally recognized as little as a year ago.

Much remains to be done, however. While the institutionalization of cycling has made progress, cycling is far from being considered a viable alternative in the city's transportation system. This is most evident in the recent opposition expressed by some of the city's communities to proposals for on-street bicycle lanes. However, with the *New York City Bicycle Master Plan*, the City can now follow a logical, cohesive plan in its efforts to increase cycling. (See Appendix A for a summary list of the *Plan's* recommendations). In addition, The BND Project has received authorization for Phase II, and a number of the Project tasks will implement recommendations from the *Plan*:

Bicycle Facility Capital Planning Process

A capital planning process will be established in BND II to ensure that bicycles are included, where appropriate, in capital projects. The projects include those recommended in the *Bicycle Master Plan*, the *NYC Greenway Plan* and long range transportation plan, *Critical Issues - Critical Choices: A Mobility Plan for the New York Region Through the Year 2015* by the New York Metropolitan Transportation Council (NYMTC). The establishment of a Capital Planning Process will better ensure the institutionalization of cycling.

Route Planning and Development

BND II will define scopes of work for those Greenway projects which have not received separate funding and continue to implement on- and off-street facilities.

Bicycle Parking and Storage

BND II will install additional on-street racks, increase bicycle access and storage in public and private buildings and, working with the MTA Metro North and the Long Island Railroad, install secure storage at major intermodal stations.

Bicycle Data Collection

BND II will develop a comprehensive system to collect and analyze bicycle data throughout New York City. This system will establish a historical record of usage at select locations and provide important information on existing and potential mode share and vehicle emission reductions.

Public Awareness Campaign

BND II will expand its efforts to improve bicycle safety, education and public perception by working with the City's established educational initiatives, such as DOT's Traffic Safety Division. In addition, BND II will emphasize efforts to deter bicycle theft through the expansion of the NYPD's bicycle registration program and promote equitable enforcement of bicycle, pedestrian and motor vehicle laws.

Appendix A: New York City Bicycle Master Plan Recommendations

Listed below are the *Plan's* recommendations to increase cycling in New York City. The participation of many public agencies and private organizations is needed for the successful implementation of these recommendations.

Reconstructing New York City with Bicycles In Mind

Much of the 900 mile network identified in this *Plan* can be implemented through the routine reconstruction of the city's aging infrastructure. Therefore, City agencies should consider permanent, dedicated bicycle/pedestrian facilities in the planning, design and reconstruction of such major facilities as bridges and highways.

On-street Facilities

Implement the city-wide network, starting with the following on-street priority routes:

The Bronx: Grand Concourse; Crotona-Prospect Avenue; University Avenue.
Brooklyn: Bergen and Dean; Bedford and Franklin Avenues; Sunset Park Connector.
Manhattan: Linkage to East River Bridges; Hudson Street and Eighth Avenue; First and Second Avenues.
Queens: Access to Flushing-Meadows-Corona Park; Flushing/Jamaica corridor; Woodhaven/ Cross Bay corridor.
Staten Island: East Shore Waterfront Route; St. George Ferry Terminal; Richmond Terrace

Off-street Facilities

Implement the New York City Greenway system, starting with the following priority routes:

The Bronx: Mosholu-Pelham Greenway extension; Putnam Railroad Trail; Hutchinson River Greenway.
Brooklyn: Shore Parkway Bicycle Path (Bay Parkway to Knapp Street); Rockaway Gateway Greenway; Brooklyn Waterfront Trail.
Manhattan: East River Bikeway and Esplanade; Harlem River Esplanade; Hudson River Trail.
Queens: Brooklyn/Queens Greenway; Cross Island-Southern Greenway; Shore Parkway Bicycle Path (JFK extension).
Staten Island: SI Rail with Trail; SI Cultural Trail; SI Greenbelt Trail.

Bridge Access

Brooklyn Bridge: Investigate enhanced access and safety to the Brooklyn and Manhattan termini of the promenade.

Queensboro Bridge: Implement the recommendations of the DCP Queensboro Bridge Bicycle/Pedestrian Access Study (scheduled for 1997).

Triborough Bridge: As a short term improvement, signs on Randall's Island directing cyclists to the existing bridge paths should be installed. Long term improvements include implementation of the recommendations of the EDC Randall's Island Access Plan, including modifying the existing stairs and ramps on the Manhattan and Queens spans of the Triborough Bridge; constructing new pedestrian bridges from all 3 boroughs; and establishing ferry service. The TBTA should also reassess their policy prohibiting bicycle riding on the Bridge.

Harlem River Bridges: Implement modest access improvements, such as curb cuts and directional signs.

Henry Hudson Bridge: The MTA should reconsider creating access to the upper path, as recommended in the 1992 DCP study.

High Bridge: DPR should reassess the closing of this safe and scenic bicycle and pedestrian bridge.

Verrazano-Narrows Bridge: The TBTA should implement the recommendations of the DCP Verrazano-Narrows Bridge Bicycle/Pedestrian Access Study (scheduled for completion in 1997).

Bayonne Bridge: PANYNJ should improve access to the existing path by installing signs and replacing the stairs with a ramp on the New Jersey side.

Goethals Bridge: A long term proposal is to construct a new bridge with a bicycle/pedestrian lane. As a short term improvement, the PANYNJ should investigate improving and reopening the existing substandard path by relocating existing path impediments, such as electrical boxes, pipes and signposts.

Queens Boulevard (Sunnyside rail yards) and *Roosevelt Avenue Bridges* (Flushing-Meadows-Corona Park): Investigate improvements for bicycle access, such as shared bicycle/pedestrian use of the sidewalks.

Mass Transit

Subways: The MTA should guide cyclists by placing bicycle stencils on the front and rear cars.

Rail: The MTA should standardize the permitting process for the LIRR and MetroNorth; permit cyclists on trains which travel against the dominant flow during peak hours; and provide bicycle access and storage as the trains are upgraded.

Ferries: Access on the Staten Island Ferry could be improved through the installation of bicycle storage at the terminals and on-board the ferries. Bicycle access on privately-operated ferries should be required by the City.

Buses: Install bike-on-bus racks in appropriate locations, such as those areas of the city with limited subway access.

Bicycle Parking

Continue to implement on-street bicycle parking throughout the City under DOT's City Racks Program.

Investigate amending City regulations to improve opportunities for secure bicycle storage in public and private buildings.

Install bicycle lockers at intermodal stations throughout the city.

Encouragement

Distribute the *New York Cycling Map*, and update as needed.

Expand the use of bicycles in issuing parking summonses if the DOT pilot program proves successful.

The NYPD should expand the highly successful Community Policing Bicycle Patrol Program.

The All-Agency Bicycle Policy should be formally adopted by the relevant agencies as a step toward institutionalizing cycling.

Education

Public schools must instruct elementary and secondary school students in safety education, including highway, traffic and bicycle safety, as required by NYS Education Law. Successful DOT projects, such as the YES (Youth Education for Safety) and the Safety City Program should be expanded.

The DOT-NYPD Share the Road Safely public service effort should be expanded from radio announcements to include bus and subway posters.

Enforcement

The NYPD should increase awareness of the bicycle registration program in an attempt to deter bicycle theft.

All modes - motorists, pedestrians and cyclists - must respect the rightful place of others in the street. Such traffic violations as double parked motor vehicles in bicycle lanes must be enforced.

Engineering

The *Plan's* Bicycle Facility Design Guidelines should be followed in implementing the city-wide bicycle network. Agencies should implement demonstration projects of innovative bicycle facilities, such as shared bike/bus lanes; pigmented lanes; bicycle boulevards; speed tables and traffic circles.

Appendix B: Technical Advisory Committee

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New York Transportation Coordinating Committee
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Alley Pond Environmental Center
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Bicycle Transportation Action
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Hudson River Park Conservancy
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5 Boro Bike Club
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Friends of Van Cortandt Park
Ramsey Adams

League of American Bicyclists
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Neighborhood Open Space Coalition
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New York Road Skaters Association
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Steve Faust
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Richard Gans
Shawn Hill
Zee Frank
Ted Katanskas
Charles Komanoff

Appendix C: Stress Level Methodology for Evaluating Bicycle-Compatible Roadways

The following evaluation closely follows a methodology developed by Alex Sorton, Northwestern University Traffic Institute, and Thomas Walsh, Wisconsin DOT. Madison is one of the country's model bicycle communities. Their system ranks the compatibility of existing roadways based on the relative level of stress a cyclist encounters on a given route. Adjustments can been made for conditions particular to New York City. The goal is to establish a predictable method for evaluating the subjective reactions of bicyclists to different roadway conditions. In addition, feasibility of implementation of Class 2 bicycle lanes can be determined along a specific route, subject to further analysis. Baseline data needed to complete the evaluation includes volume, as measured by curb lane hourly traffic volume, vehicular speed, and curb lane width.

Interpretation of Bicycling Stress Levels

Stress Level	Cyclist Skill Level	Interpretation
1	Low (L)	Inexperienced / Beginner
2	Low-Moderate (LM)	Intermediate
3	Moderate (M)	Intermediate - Experienced
4	Moderate-High(MH)	Experienced
5	High (H)	Expert

Stress levels are used to rate primary stress variables for proposed bicycle routes, assuming no changes to existing roadway conditions.

Primary Roadway Variables Affecting Stress

Curb lane width: Field measurement

Curb lane traffic volume: Average Daily Traffic x Peak Hour factor / number of lanes or highest hourly curb lane volume in a 24 four period (Automatic Traffic Recorder count).

Curb Lane Width* vs. Stress Level

*Curb lane is the right-most travel lane on two-way streets, and the left most travel lane on one-way streets.

Stress Level	Curb Lane Width (without parking)	Curb Lane Width (with parking)
1	≥ 15'	≥ 23'
2	14'	22'
3	12'	20'
4	11'	19'
5	≤ 10'	≤ 18'

Streets with bus routes where frequency is greater than every 15 minutes, 2 feet should be added to all curb lane measurements.

Curb Lane Traffic Volume* vs. Stress Level

*Curb lane is the right-most travel lane on two-way streets, and the left most travel lane on one-way streets.

Stress Level	Volume	Description
1	<50	Not applicable to New York City.
2	<150	Low
3	151-300	Moderate-heavy
4	301-500	Heavy
5	>500	Approaching capacity

Vehicle Speed vs. Stress Level

Stress Level	Speed	Description
1	<15 mph	Not applicable to New York City.
2	<25 mph	Low
3	26-34 mph	Moderate
4	35-44 mph	High
5	>45 mph	Approaching highway speed

Appendix D: Implementation Methodology for On-street Bicycle Lanes

Collect Data

- Number and width of travel lanes
- Turning movements
- Signal timing
- Vehicle classification
- Peak period traffic volumes including bicycles

Analyze Existing Level of Service (LOS)

Based on the 1985 Highway Capacity Manual (HCM), the LOS incorporates the collected data and determines the average delay for each vehicle using the critical intersection. Short delays result in a good LOS, whereas long delays result in a poor LOS. The LOS criteria is described below.

LOS	Stop delay/Vehicles (second)
A	< = 5.0
B	5.1 - 15.0
C	15.1 - 25.0
D	25.1 - 40.0
E	40.1 - 60.0
F	> = 60.0

Analyze Future LOS Analysis with Bicycle Facility

Following the determination of the existing LOS, an additional LOS analysis is performed with the same number of vehicles, but with a roadway reconfigured to accommodate an on-street lane.

Community Outreach

Once DOT has determined the suitability of an on-street lane based on the LOS analysis, presentations are made to the affected community boards and an implementation schedule is proposed. Fliers announcing the project are also distributed throughout the community.

Prepare Technical Drawings

Technical drawing's for signs & pavement markings are prepared, approval by DOT engineers required.

Implement Bicycle Facility

Signs and pavement markings are installed.

Bicycle Counts

Following implementation, the number of cyclists are counted to determine the impact of the on-street lane.

Appendix E: All Agency Bicycle Policy

The All Agency Bicycle Policy is proposed to guide the actions of city, state and regional agencies as they relate to the goal of encouraging bicycling as a mode of transportation and a form of recreation.

City Agencies

Board of Education
Department of Transportation
Department of City Planning
Economic Development Corporation
Department of Environmental Protection
Mayor's Office of Transportation
Department of Parks and Recreation
New York City Police Department

Elected Officials

Mayor office of Transportation
Office of The Bronx Borough President
Office of the Brooklyn Borough President
Office of the Manhattan Borough President
Office of the Queens Borough President
Office of the Staten Island Borough President

Other Government Agencies

Metropolitan Transportation Authority
National Park Service, Gateway National Recreation Area
New Jersey Transit
New York Ferry Initiative
New York Metropolitan Transportation Council
New York State Department of Education
New York State Department of Environmental Conservation
New York State Department of Motor Vehicles
New York State Department of Transportation
New York State Office of Parks, Recreation and Historic Preservation
Port Authority of New York and New Jersey
Urban Development Corporation

Nonprofit Advocacy Groups

American Youth Hostels
Appalachian Mountain Club
Bicycle Transportation Action
Central Park Cycling & Sports Club
Century Road Club
Different Spokes
5 Boro Bike Club
Kissena Cycling Club
L&M Tours
Metropolitan Greenways Council
Neighborhood Open Space Coalition/Friends of Gateway
New York Cycle Club
New York - New Jersey Trails Conference
Staten Island Bicycling Association
Transportation Alternatives

Mission Statement

The agencies whose activities affect bicycling in New York City are committed to supporting and promoting bicycling as a mode of transportation and form of recreation. This mission recognizes that increased bicycling would meet many policy goals of New York City and provide benefits to its residents and workers. These benefits include:

- Improved air quality
- Improved quality of life
- Enhanced mobility to locations not now well served by public transportation
- Enhanced mobility for population groups not well served by cars or public transportation
- Helping New York meet federal Clean Air Act mandates
- Increased transit use
- Increased pedestrian access
- Increased tourism
- Improved personal health

This mission also recognizes that New York City does not now offer an environment which satisfactorily supports bicycling, and that public policies and actions are needed to provide bicycling support commensurate with that provided other transportation modes.

Goals

This bicycle policy sets out four major goals to be pursued by the agencies as a framework for action. They can be described briefly as:

- Improve facilities
- Promote awareness
- Integrate with transit modes
- Improve safety

The following sections describe these goals, reasons for achieving them, any specific objectives which should be met, and actions which agencies may take to achieve the goals.

1. Improve facilities

Improving bicycle facilities means more than putting in place more miles of bikeways. It involves providing a safe, on-street bicycling environment and installing storage spaces and other infrastructure supporting bicycling. Improving facilities should help allow New York City residents and workers to bicycle safely and conveniently to destinations between five and ten miles distant for work, school, shopping and recreation. Providing such an environment would do much to attract more people to use bicycles more often.

Objectives which the agencies should adopt as milestones in meeting this goal include:

- Implement (officially designate, sign and stripe) and maintain a network of on-street bike lanes, (potentially reaching 500 miles in length) making bicycling a viable option for more New Yorkers.
- Implement the proposed 350-mile greenway system as part of the Class I bikeway network in New York City.
- Provide bicycle parking and support facilities in public and private spaces throughout the city.

The agencies should support bicycling not just in their functions related to planning and design, but in their maintenance and construction functions as well. They should make all possible efforts to secure federal transportation funding for the installation of bicycle facilities. In addition, New York City development policies should encourage private commercial property owners to install facilities for bicycling.

2. Promote awareness

A lack of awareness of the feasibility of bicycling and of the needs of bicyclists are two of the greatest obstacles to increased bicycle use. The riding and non-riding publics must be informed of facilities being put in place to encourage bicycling. The benefits to be gained from bicycling must also be highlighted. Increasing awareness of bicycling should encourage more of the non-riding public to use bicycles.

Efforts to increase awareness of bicycling should also be directed toward agency staffs and other public officials. Decades of promoting the automobile as the favored mode of travel have embedded institutional arrangements which give greater priority to automobiles than to bicycles. In recent years, awareness of bicycling has lagged behind the increasing use of bicycles in New York City and the increasing importance of this mode to the city in meeting its broader goals. The agencies should reverse this situation by treating bicycling as any other legitimate mode of transportation and by attempting to eliminate in their

actions, documents and organizational structures any implied hierarchy among transportation modes.

Some specific actions which the agencies could take include:

- Develop bicycle maps for each borough.
- Promote bicycle commuting through private employers participating in the Employee Commute Option (ECO) Program.
- Develop and implement a public awareness campaign via media on the merits of bicycling.
- Maintain communication with bicy cling and advocacy communities.
- Take actions with education depart ments.

3. Integrate with transit modes

The agencies should provide for the convenient use of bicycles to and on transit networks, including ferries, buses and rail transit. The integration of bicycling with other modes will encourage bicycling as well as increase transit ridership.

Some specific actions which the agencies could take include the following:

- Identify potential high-volume intermodal transfer points with the sub way, bus, rail and ferry systems.
- Provide bicycle access on transit through installing bike racks on buses, con structing bicycle storage at transit stations, allowing bicycles on railroads, and other programs.
- Encourage use of these facilities with promotional campaigns.

4. Improve safety

The fear of injury while bicycling is another of the major obstacles to increasing bicycle use. Contributing to the riding and non-riding publics' confidence in the safety of this mode could help increase bicycle use.

An objective which the agencies should adopt as milestone in meeting this goal is:

- Reduce bicycle fatality and injury rates per mile traveled.

Actions which the agencies should take to increase bicycling safety include:

- Educate traffic enforcement officials, bicyclists and the non-riding public about the rules of the road.
- Remove/improve roadway hazards such as parallel-bar sewage grates.
- Provide training for bicyclists.
- Educate the non-cycling public about the rights of bicyclists, and expand en forcement of bicycling and driving rules.
- Expand bicycle patrols on streets and in parks.

Appendix F: *CITYRACKS* Request Form

CITYRACKS REQUESTER

_____
Your Name

_____
Your Address Apt./Suite #

_____
City State Zip

_____
Daytime Telephone Number

_____
Your Relation to Establishment
(Owner, Customer, Employee, Student, etc.)

PROPOSED BICYCLE RACK LOCATION

_____
Name of Business or Establishment

_____
Street Address

_____
Borough State Zip

_____
From (cross street) To (cross street)

_____
Neighborhood

_____
Any Additional Information/Comments

IF KNOWN

_____
Block# Lot #

_____
Dimensions and Location of Vault

Please mail request form to CITYRACKS, NYC DOT, 40 Worth Street, Room 1029, NY, NY 10013

For more information, call the NYC DOT at 212-442-7705.

Appendix G: In-line skating legislation

In January 1996 the State of New York officially recognized in-line skates as a vehicle with the same rights and responsibilities as other roadway users. The following text is a copy of the memorandum of support, submitted by the bill's sponsors, which gives a concise description of the amendments to the vehicle and traffic law. A similar bill to amend the administrative traffic code of New York City has been submitted to the City Council. Sponsored New York City Council Members Dear, Eristoff and Leffler, the bill is presently in committee. At the time of this publication, a hearing has not been scheduled.

Sponsors

Assemblyman Stephen B. Kaufman
Senator Guy Velella

Title of Bill

An ACT to amend the general business law, the public health law, and the vehicle and traffic law, in relation to safety requirements in the manufacture, sale and use of in-line skates.

Purpose or General Idea of Bill

This bill would regulate the manufacture, sale and use of in-line skates for the purpose of preventing serious injuries from their use.

Summary of Specific Provisions

Section 391-I of the general business law is redesignated section 391-1, and a new section 391-m is added to define terms “protective gear”, “in-line skates”, “stopping device”, and “warning label”. Section 391-I further provides that after January 1, 1996 no in-line skates shall be sold in this state unless they are manufactured and assembled with a stopping device and a warning label, and protective gear is sold on the same premises.

Whenever there is a violation of this section, the Attorney General may bring an application for injunction in the name of the people and the court may impose a civil penalty of not more than $500.

Subdivision 15 of section 206 of the public health law is amended to authorize the commissioner to establish a statewide in-line skate helmet public education and awareness program and a statewide in-line skate helmet distribution program. The purpose of these programs is to provide a plan for city, county, town, and village efforts to reduce in-line skate related injuries and fatalities and to distribute helmets to people who can demonstrate economic hardship that precludes them from purchasing one.

The vehicle and traffic law is amended by adding two new sections 140-a and 140-b to define in-line skates and roller skates. The article heading of article 34 of Title VII of the vehicle & traffic law is amended as follows:

Operation of Bicycles and Play [Vehicles]

Subdivision (b) of section 1230 of the vehicle and traffic law is amended to make applicable to in-line skates the same regulations that are applicable to bicycles whenever the bicycle [or in-line skate] is operated upon any highway, private road open to the public, or path set aside for the exclusive use of bicycles or in-line skates.

Section 1231 of the vehicle and traffic and traffic law is amended to make traffic laws applicable to persons gliding on in-line skates as well as riding bicycles and skates that every person

gliding on in-line skates upon a roadway shall be granted all of the rights and shall be subject to all of the duties applicable to the driver of a vehicle.

Subdivision 1 of section 1233 of the vehicle and traffic law is amended to prohibit persons riding upon in-line skates from attaching the same or himself to any vehicle being operated upon a roadway.

Section 1234 of the vehicle and traffic law is amended to state in-line skates shall be driven either on a usable bicycle or in-line skates lane, or near the right-hand curb or edge of the roadway or upon a usable right-hand shoulder so as to prevent undue interference with the flow of traffic. This section also prohibits persons gliding on in-line skates upon a roadway from riding more than two abreast. It continues further to require persons gliding on in-line skates to come to full stop when entering the roadway from a private road, driveway, alley or a curb.

Section 1235 of the vehicle and traffic law is amended to read: No person gliding on in-line skates shall carry any package, bundle, or article which obstructs his or her vision in any direction. Section 1238 of the vehicle traffic law is amended to add a new subdivision 5-a which requires all persons less than fourteen years of age to wear a helmet meeting the standards of the American National Standards Institute while skating with in-line skates. Violators of the provisions of subdivision 5 or 5-
a will be fined no more than fifty dollars.

Paragraph (c) of subdivision 6 of section 1238 of the vehicle and traffic law is amended to allow the court to waive any fine for which a person who violates the provisions of subdivision five of this section would be liable if the court finds that due to reasons of economic hardship such person was unable to purchase a helmet or obtain a helmet from an in-line skate and bicycle helmet distribution program. Subdivision 8 of section 1238 of the vehicle and traffic law is amended to authorize a police officer to issue a summons for a violation of subdivisions 5, 5-a, and 6 inapplicable to any county, city, town or village that has enacted a local law or ordinance prior to the effective date of this act that prohibits a person who is less than fourteen years of age from skating with in-line skates without wearing helmet. A new subdivision 10 is added to state that no person shall wear or glide upon in-line skates during the period from one-half hour after sunset unless such person is also wearing an outer jacket or clothing of laminated or reflective material and of a bright color.

Effect of Current Amendments

Reference to gliding is expanded to include skating or gliding. Provisions regarding skating at night are clarified.

Justification

Over the years, the increasingly popular sport of in-line skating has caused countless serious injuries to skaters. The results of these injuries range from fractures to hospitalization to irreversible head injuries. Many injuries occurred at sites where protective gear was available, yet not worn. Currently, there is no requirements under the law for in-line skaters to wear any protective gear. This bill would require in-line skaters under age 14 to wear helmets and require that all protective gear be sold on the same premises as the in-line skate equipment. This bill would also prohibit the sale of in-line skates that are not constructed with stoppers, decreasing the number and severity of skating injuries.

Appendix H: Pedestrian Safety Legislation

On January 12th 1996, the City of New York amended administrative traffic code with the goal of enhancing the safety of pedestrians. The following text is a copy of amended law.

Introduced by Council Members

Dear, Weiner, Freed, Leffler, Eisland, Eristoff and McCaffrey; also Council Members Marshall, O'Donovan and Fusco — read and referred to Committee on Transportation. Amended December 12, 1995. Ordered re-printed and laid over.

Local Law

To amend administrative code of the city of New York, in relation to enhancing the rights and safety of pedestrians.

Be it enacted by the Council as follows

Section one: Chapter 1 of title 19 of the administrative code of the city of New York is amended by adding thereto a new subchapter three to read as follows:

Subchapter three, pedestrian right and safety

§19-176	Bicycle operation on sidewalk prohibited.
§19-177	Speed Limits; posting of signs.
§19-178	Truck Weight and Length Limitations.
§19-179	Traffic calming study.

§19-176 Bicycle operation on sidewalk prohibited.

a. For purposes of this section:
(1) The term "bicycle" shall mean a two or three wheeled device upon which a person or persons may ride, propelled by human power through a belt, a chain or gears, with such wheels in a tandem or tricycle, except that it shall not include such a device having solid tires and intended for use only on a sidewalk by a child.

(2) The term "sidewalk" shall mean that portion of the street, whether paved or unpaved, between the curb lines or the lateral lines of a roadway and the adjacent property lines, intended for the use of pedestrians. Where it is not clear which section is intended for the use of pedestrians the sidewalk will be deemed to be that portion of the street between the building line and the curb.

(3) The term "child" shall mean a person less than fourteen years of age.

b. No person shall ride a bicycle upon any sidewalk unless permitted by an official sign.

c. A person who violates subdivision b of this section under circumstances which create a substantial risk of physical injury to another person shall be guilty of a misdemeanor, punishable by a fine of not more than one hundred dollars and imprisonment for not more than twenty days or both such fine and imprisonment. Such person shall also be liable for a civil penalty of not more than one hundred dollars which may be recovered in a proceeding before the environmental control board. Where a summons or notice of violations is issued for a violation of this subdivision, a des-

ignated employee of the department, the department of sanitation or the department of parks and recreation or a police officer may seize and impound the bicycle. In any proceeding under this subdivision it shall be a defense that the defendant or respondent was less than fourteen years old at the time of the commission of the violation.

d. A bicycle impounded pursuant to this section shall be released to the owner or other person lawfully entitled to possession upon payment of the costs of removal and storage as set forth in the rules of the police department and proof of payment of any fine or civil penalty for the violation or, if a proceeding for the violation is pending in a court or before the environmental control board, upon the posting of a bond or other form of security acceptable to the police department in an amount which will assure the payment of such costs and any fine or civil penalty which may be imposed for the violation. If the court or the environmental control board finds in favor of the defendant or respondent, the owner shall be entitled forthwith to possession of the bicycle without charge or to the extent that any amount has been previously paid for release of the bicycle, such amount shall be refunded. The police department shall establish by rule the time within which bicycles which are not redeemed may be deemed abandoned and the procedures for disposal.

e. The owner of a bicycle shall be given the opportunity for a post seizure hearing within five business days before the environmental control board regarding the impoundment. The environmental control board shall render a determination within three business days after the conclusion of the hearing. Where the board finds that there was no basis for the impoundment, the owner shall be entitled forthwith to possession of the bicycle without charge or to the extent that any amount has been previously paid for release of the bicycle, such amount shall be refunded.

f. Upon the impoundment of a bicycle, the rider shall be given written notice of the procedure for redemption of the bicycle is not the owner there of notice provided to the rider shall be deemed to be notice to the notice to the owner. Where the defendant or respondent is less than eighteen years old such notice shall also be mailed to the parent, guardian or where relevant, employer of the respondent, if the name and address of such person is reasonably ascertainable.

g. The provisions of this section may be enforced by the department, the department of sanitation, the department of parks and recreation and the police department.

§19-177 Speed Limits.

a. The official speed limit for a vehicle in the city of New York shall be thirty miles per hour except where an official sign indicates that a different speed limits is in effect.

b. No person shall drive a vehicle on any street in excess of the speed limit in effect for that street.

c. The commissioner shall post a sign at each exit within the city of New York of each bridge and tunnel having only one terminus in the city of New York that states the speed limit within the city.

§19-178 Truck Weight and Length Limitations. The commissioner shall post a sign at each exit within the city of city of the New York of each bridge and tunnel having only one terminus in the city of New York that states the limits of truck weight and truck length within the city.

§19-179 Traffic calming study.

a. The commissioner shall conduct a study on the feasibility of installing traffic calming measures, including but not limited to, raised crosswalks, traffic circles and protected pedestrian phases in appropriate locations in the city. Within one year of the effective date of this local law, the commissioner shall submit a report of the department's findings to the council.

b. For purposes of this section, the following terms shall have the following meaning:

(1) "traffic calming" shall mean any engineering measure which slows vehicular traffic and accommodate other street users such as pedestrians, bicyclists or children at play.

(2) "raised crosswalks" shall mean crosswalks which are raised several inches above street level in order to slow vehicular traffic.

(3) "traffic circle" shall mean landscaped islands in the middle of intersections which can replace traffic control indications or stop signs on non-arterial streets.

(4) "protected pedestrian phases" shall mean traffic control indications that are adjusted to provide that all conflicting vehicular movements are stopped in order to accommodate pedestrian movement.

§2. This local law shall take effect sixty days after its enactment into law.

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NYS Department of Transportation
NY Metropolitan Transportation Council
Federal Transit Authority
Hudson River Park Conservancy
Port Authority of New York and New Jersey
Central Park Conservancy
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