Thinking (and Building) Outside the MUTCD/AASHTO Box

The 9th Avenue Complete Street and Bicycle Path

Pro-Walk Pro-Bike
Seattle, Washington
September 5, 2008

NYC Dept. of Transportation
Bicycle Program
NYC Bicycle Ridership

- Commuter Bicycle traffic on East River Bridges is at an all time high.
- Bike share of Journey to Work is low:
  - 0.9% Manhattan
  - 0.5% NYC (5 Boroughs)
  - 0.4% US
NYC Bicycle Network Today

- **530+ Lane Miles** (As of Aug ’08)

  **Class 1 - Bicycle Path**

  ![Class 1 Image]

  200 Lane Miles

  **Class 2 - Bicycle Lane**

  ![Class 2 Image]

  240 Lane Miles

  **Class 3 - Bicycle Route**

  ![Class 3 Image]

  90 Lane Miles
NYC Bicycle Network: Unprecedented Expansion

- 3-Year 200-mile Bicycle Network expansion
- Increase connectivity
- Citywide Backbone of Safe & Convenient Routes.
Designing Streets for Cycling: MUTCD & AASHTO Guidance

- Limited Design Guidance
- Only Simple Roadway Configurations are Addressed
- Much is left to the discretion of the designer
Bicycle-Friendly Street Design in NYC: Challenges

- Intense Traffic
- Illegal Double Parking
- Wide One-Way Avenues
- Older Narrow Streets
History of Innovative Designs

- Buffered Bike Lanes
- Shared Lanes
- Bike Box
- On-Street Path
- Green Bike Lanes
- Wide Parking Lanes
- Parallel Routes

Shared Lane – 5th Ave, Brooklyn
Bike Box - Montgomery Street, Manhattan
On-Street Path – Tillary St, Brooklyn
Green Bike Lane, Adams Street, Brooklyn
Innovative Design: Buffered Bicycle Lanes

Before: Auto-Centric & Disorganized

After: Organized & Bike and Pedestrian-Friendly

9th Street, Park Slope, Brooklyn
Innovative Design: Intersection Markings

- AASHTO: “Bike lane striping …in most cases, should not continue through any street intersections.”
- Define Cyclist Position through Intersections
- Raise awareness to motorists about presence of cyclists
9th Avenue Design Approach

1. Study Best Practices
2. Interpret Standards & Guidelines to Constrained NYC Environment
3. “Complete Streets” Design Philosophy

Project Area
High Demand for More Robust Bike Routes

1. Enforcement Problems/Intrusion Rates of Standard Bike Lanes

2. Strong Call from NYC Cyclists for “Protected” or “Segregated” or “Separated” Paths

3. Success / Popularity of Some European Cycletrack Networks

4. Success / Popularity of NYC Greenways Near City Center

5. Potential Growth in Cycling / Mode Shift in NYC

Vesterbrogade, Copenhagen
9th Avenue Pre-Project Configuration

Cyclist Experience – Poor
- No Bicycle Facility
- Close overtaking by motorists
- Turning conflicts

Pedestrian Experience – Fair
- Pleasant Sidewalks
- Wide Street
- Turning Vehicle Conflicts
- Long Crossing Distance (70’)

Motorist Experience – Acceptable
- Congestion is Low
- Turning Vehicles Block Thru Lanes While Yielding
Complete Street Design Objectives

A **Safe** and **Comfortable** Street for All Users:

1. Higher quality cycling experience for all levels
2. Secure and pleasant pedestrian experience
3. Safe turning movements
AASHTO Guidance on Bike Lane Placement

- AASHTO: “Bike lanes should never be placed between the parking lane and curb lane. Bike lanes between the curb and parking lane can create obstacles for bicyclists from opening car doors and poor visibility at intersections and driveways and they prohibit bicyclists from making left turns” (p 23).
- Design must address these 3 issues
Additional Challenges in NYC Context

- Potential Path Intrusions
  - Pedestrians
    - Walking in if sidewalk crowded
    - Queuing in to cross street
  - Crossings
    - From loading vehicles, jaywalkers
  - Trash Placement/Pickup
  - Vendors

Blocked bike lane is frustrating but can be overcome; Blocked path traps cyclists
• Bicycle lane between sidewalk and parked vehicles
• Concrete pedestrian refuge islands at intersections
• Dedicated turn bays where turns cross bicycle path
1. Higher Quality Experience for Cyclists of All Levels

Standard Bicycle Lane Designs
• Bicycle lane between moving lane and parking lanes
• Susceptible to motor vehicle intrusion
• Little sense of safety and comfort on busy streets
• Few benefits to pedestrians
1. Higher Quality Experience for Cyclists of All Levels

**Fully Protected On-Street Bicycle Path**
- Parking Protects Bicycle Lane from Double Parking Intrusion
- Signal Phases Protect Cyclists from Turning Vehicles
- Buffer Area Eliminates Dooring Risk
1. Higher Quality Experience for Cyclists of All Levels

Fully Protected On-Street Bicycle Path
• Waiting area for safe right turns
1. Higher Quality Experience for Cyclists of All Levels

Attracting New Cyclists

- 9 months after completion, cycling up **40%**
- 12 hour weekday
  - 780 cyclists before
  - 1,100 cyclists after
- Sidewalk cycling down
2. Secure & Pleasant Pedestrian Experience

- Pedestrian Refuges Shorten Crosswalks
- Greener Streetscape
- Conflict-Free Crosswalks on Side Streets
2. Secure & Pleasant Pedestrian Experience
3. Safe Turning Movements

- 9 in 10 NYC Cyclist Fatalities Occur at Intersections
- Turning Crashes are Major Source of Pedestrian Serious Injuries and Fatalities
- Turning Conflicts are Could be Exacerbated by Bike Lanes Placed Behind Parking Lanes

Ninth Avenue Before
3. Safe Turning Movements

Standard Bike Lane Configuration
- Left Turns Block Bike or Travel Lane
- Buffer Confuses Motorists
- Unpredictable Turns

Protected Bike Path Configuration
- Left Turn Bays
- Clear & Stress-free left turns
- Bicycle & Pedestrian crossings conflict-free
3. Safe Turning Movements

Configuration After Project
- Left Turn Bays
- Signal Protected Movements
- Bicycle Signals and Left-Turn Signals separate conflicting movements
Pedestrian Experience
  Very Good
  – Shortens crosswalks by 20’ or more
  – Greener streetscape
  – Conflict-Free Crossings

Cyclist Experience
  Excellent
  – Fully protected bicycle path
  – Bicycle signal phases

Motorist Experience
  Very Good
  – New left turn lanes
  – Parking loss at left turn lanes
Project Challenges

- Unfamiliar Configuration & Rapid Installation
- Motorist Compliance
- Sanitation Access
- Emergency Vehicle Access
- Curbside Access & Parking Impacts
Conclusion: Success Worth Replicating

- Broadway Boulevard (August 2008)
- 9th Avenue Extension (October 2008)
- 8th Avenue, Northbound pair to 9th Ave (November 2008)
- Grand Street (October 2008)
3. Safe Turning Movements: 9th Avenue Signalization

Before Complete Street Redesign

Phase 1 - Major: Left turning vehicle conflicts

Phase 2 - Minor

After Complete Street Redesign

Phase 1 - Major: Left turning vehicles held

Phase 2 - Major: Bicyclists & Pedestrians held

Phase 3 - Minor

Legend:
- Blue: Pedestrian
- Green: Bicyclist
- Red: Vehicle
- Arrows: Travel Direction
3. Safe Turning Movements
Delivery Vehicle Compliance
Under Construction