

Thinking (and Building) Outside the MUTCD/AASHTO Box

The 9th Avenue Complete Street and Bicycle Path

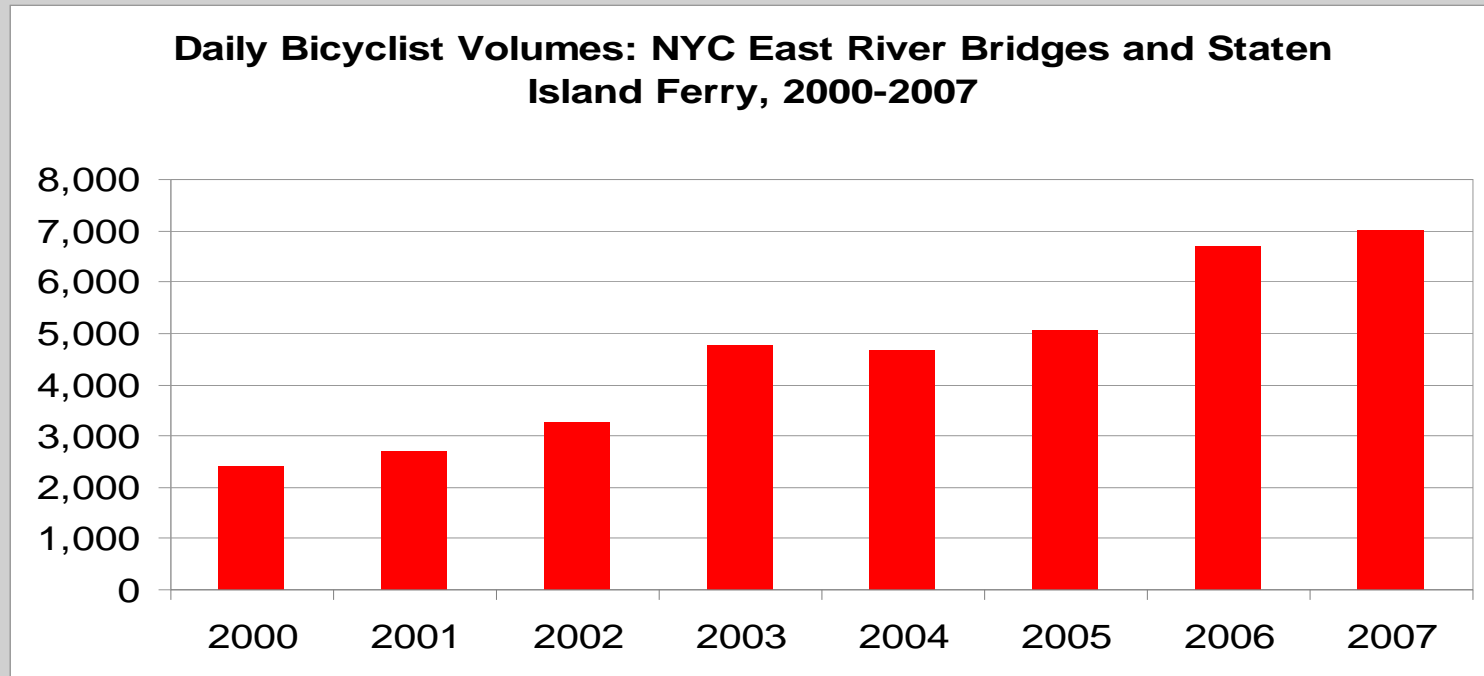


Pro-Walk Pro-Bike
Seattle, Washington
September 5, 2008



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



200 Lane Miles

Class 2 – Bicycle Lane



240 Lane Miles

Class 3 – Bicycle Route



90 Lane Miles

NYC Bicycle Network: Unprecedented Expansion

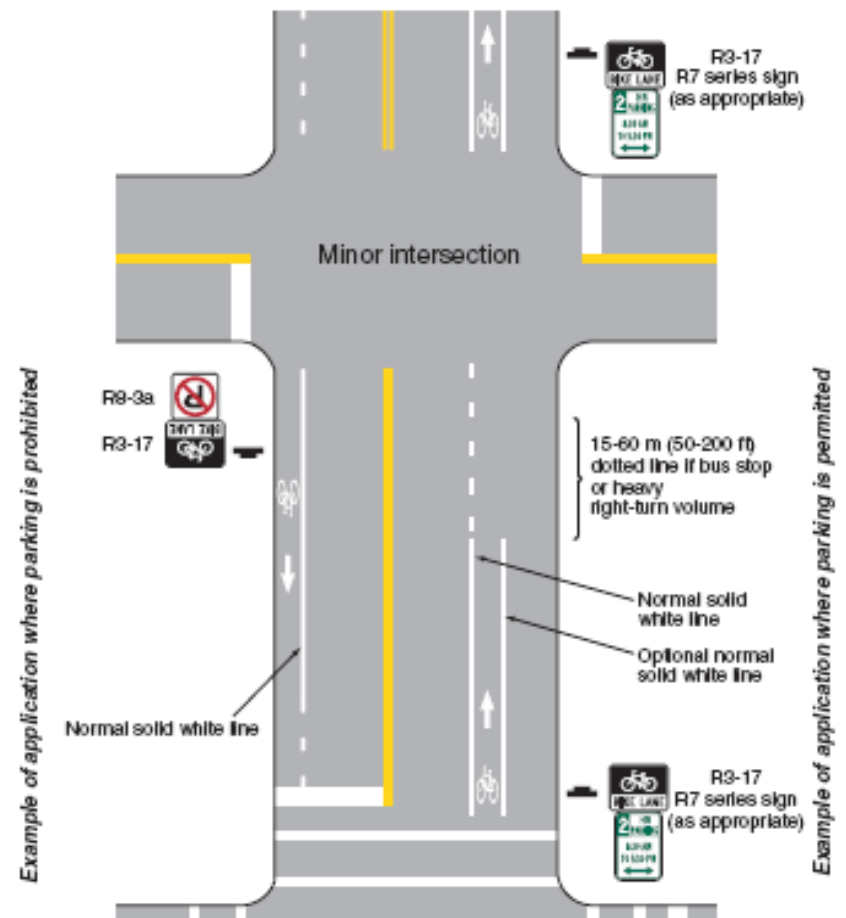


- 3-Year 200-mile Bicycle Network expansion
- Increase connectivity
- Citywide Backbone of **Safe & Convenient Routes.**

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

Figure 9C-5. Example of Pavement Markings for Bicycle Lanes on a Two-Way Street





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



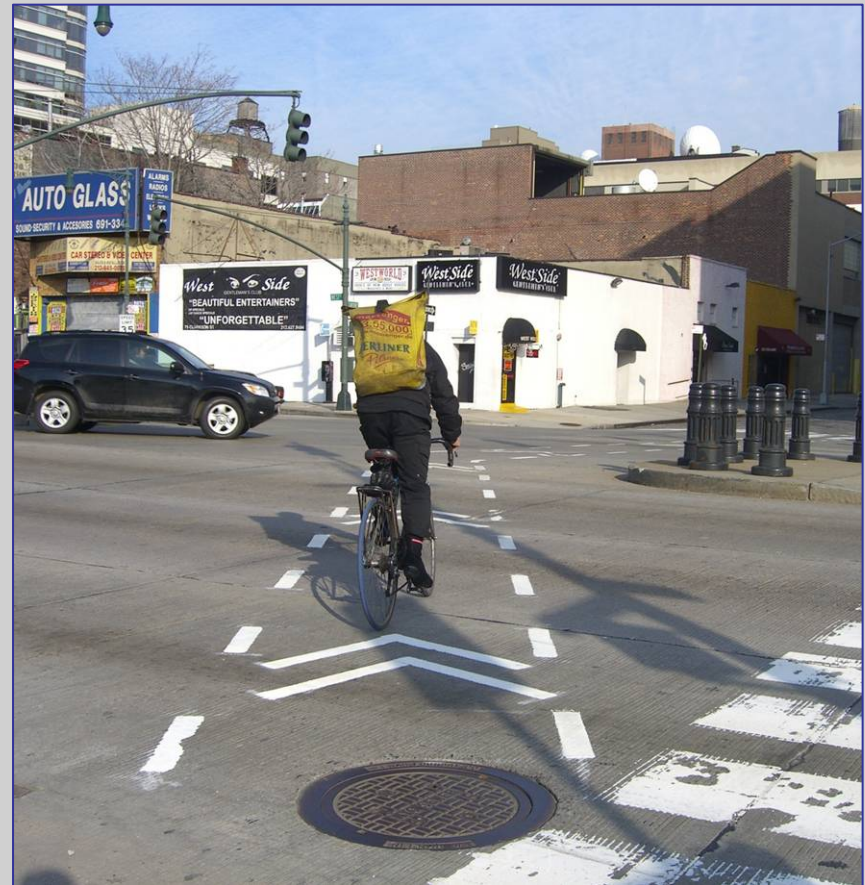
After: Organized &
Bike and
Pedestrian-Friendly



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

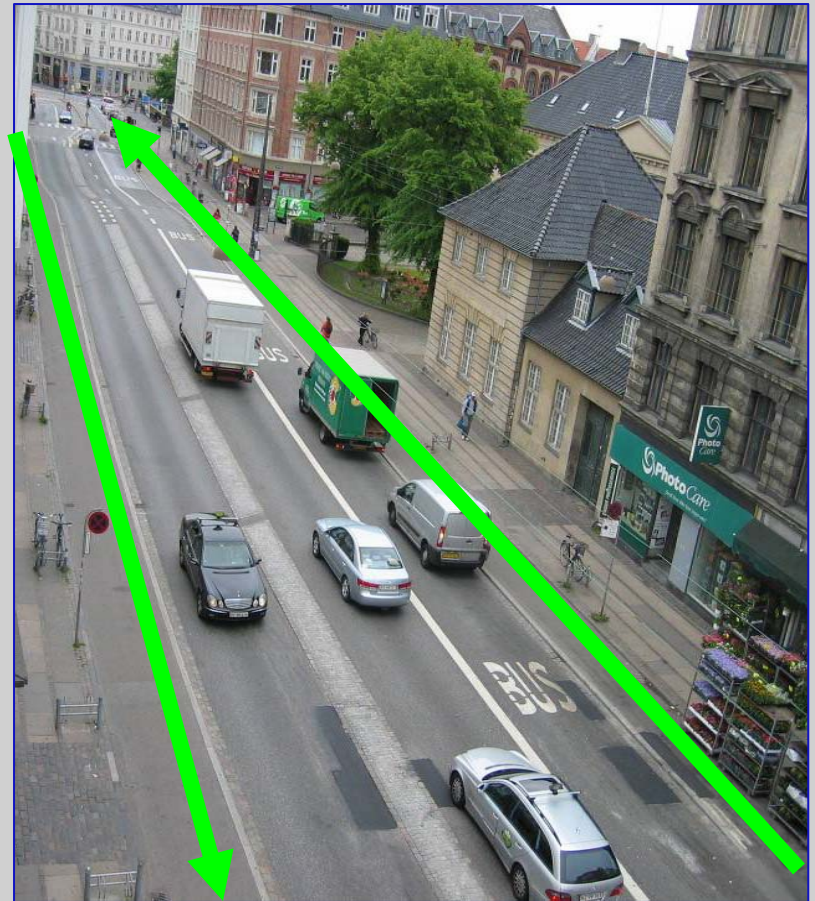
1. Study Best Practices
2. Interpret Standards & Guidelines to Constrained NYC Environment
3. “Complete Streets” Design Philosophy



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

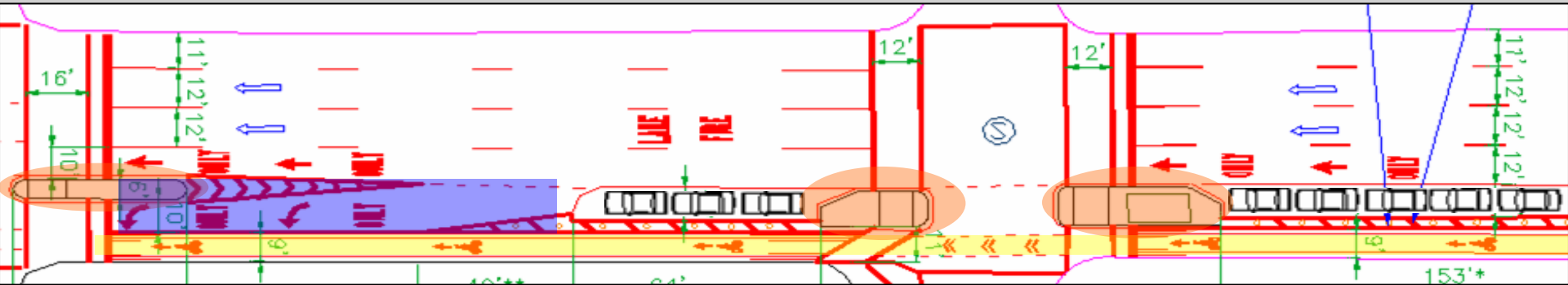
- **Potential Path Intrusions**
 - Pedestrians
 - Walking in if sidewalk crowded
 - Queuing in to cross street
 - Crossings
 - From loading vehicles, jaywalkers
 - Trash Placement/Pickup
 - Vendors

Blocked bike lane is frustrating but can be overcome; Blocked path traps cyclists



Curb separated bicycle lane on Sixth Avenue

Ninth Avenue Geometric Design



- 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

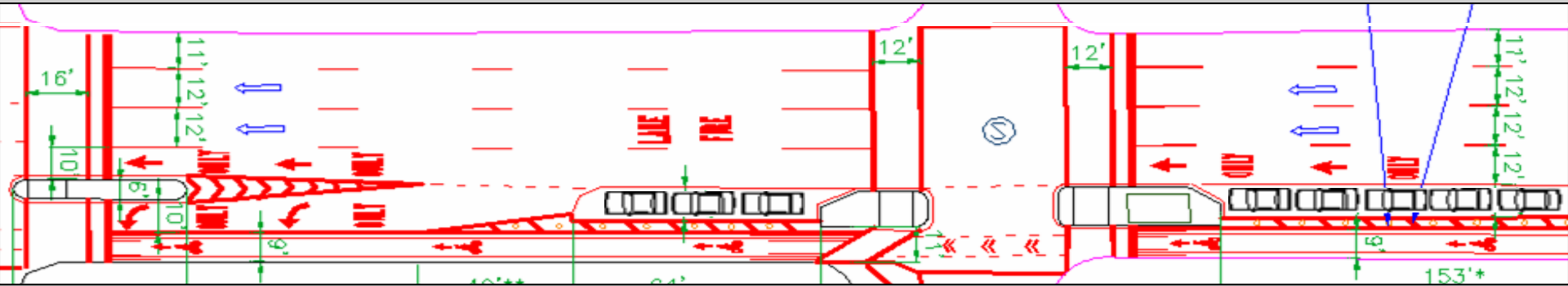
3. Safe Turning Movements

Configuration After Project

- Left Turn Bays
- Signal Protected Movements
- Bicycle Signals and Left-Turn Signals separate conflicting movements



Ninth Ave: Complete Street Design



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



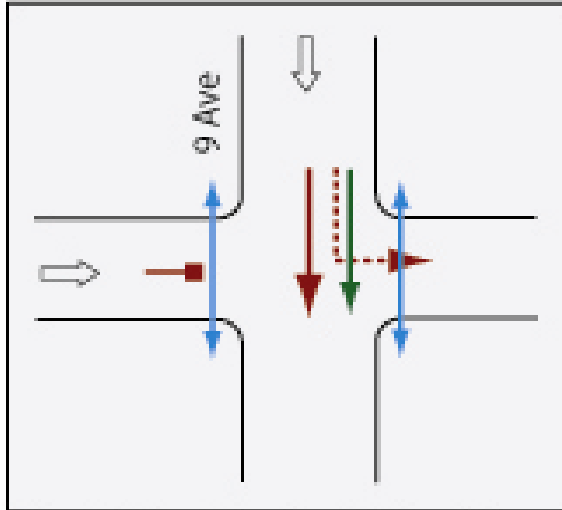
Conclusion: Success Worth Replicating



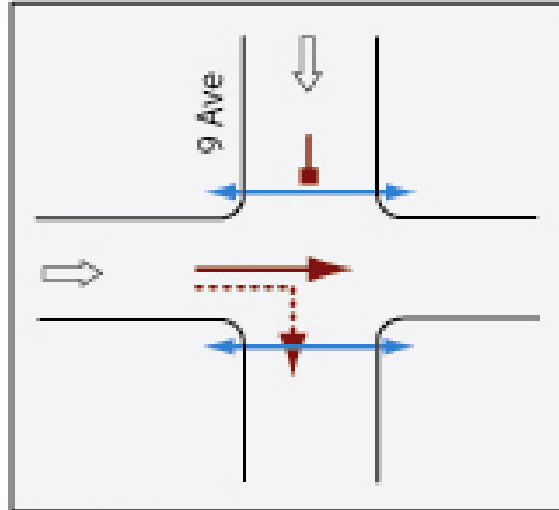
- Broadway Boulevard (August 2008)
- 9th Avenue Extension (October 2008)
- 8th Avenue, Northbound pair to 9th Ave (November 2008)
- Grand Street (October 2008)

3. Safe Turning Movements: 9th Avenue Signalization

Before Complete Street Redesign



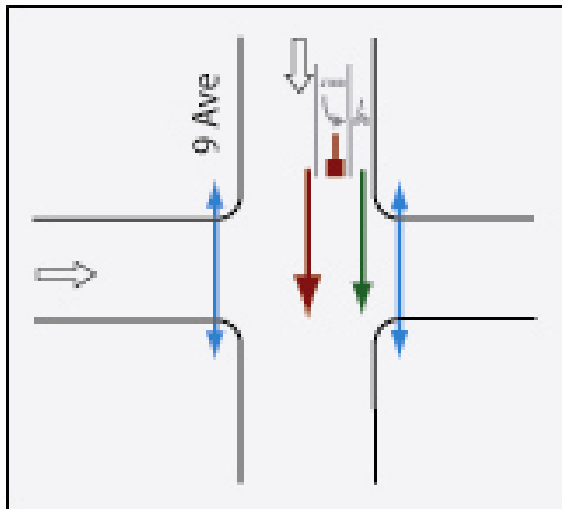
Phase 1 - Major: Left turning vehicle conflicts



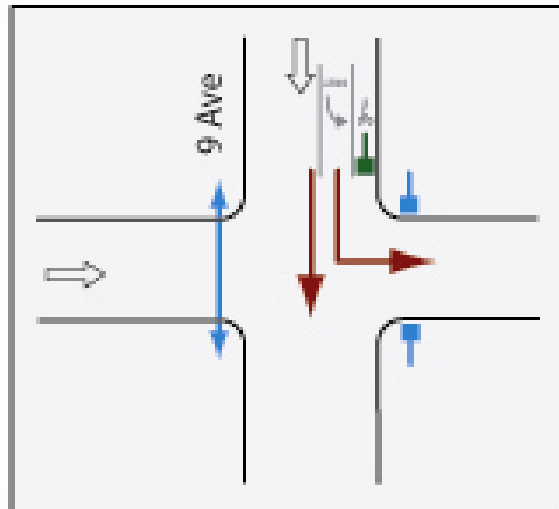
Phase 2 - Minor



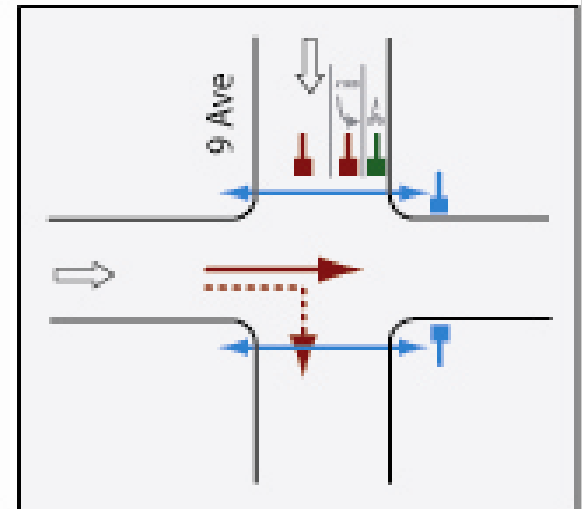
After Complete Street Redesign



Phase 1 - Major: Left turning vehicles held



Phase 2 - Major: Bicyclists & Pedestrians held



Phase 3 - Minor

3. Safe Turning Movements



Delivery Vehicle Compliance



Under Construction

