

Making Safer Streets

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New York City
Department of
Transportation



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HSBC

SPEED LIMIT
30

ONE WAY

NO LEFT TURN

STOP
HERE ON
RED
SIGNAL

WINDWASH.COM

Introduction

Over the past decade, New York City has seen a 30% decline in traffic fatalities, the lowest level since records were first kept in 1910, making New York City's streets the safest of any big city in the United States.

NYCDOT is committed to continuing to improve the safety of our streets, with a goal of cutting traffic fatalities in half by 2030.

Making streets safer requires more than the traditional "3 Es" of engineering, education, and enforcement. It also requires working closely with local communities to collaboratively plan changes in how streets are designed and operated. And it requires learning from our successes to identify and implement the most effective approaches to street design.

This report focuses on how smart and innovative street design can dramatically improve the safety of our streets. The results reported here are based on "before and after" comparisons of crash data for projects implemented in the last seven years. **This analysis is the largest examination of the safety effects of innovative roadway engineering conducted in a major American city**, or perhaps any city globally.

This detailed quantitative analysis is possible only because of the breadth of innovation that NYCDOT has brought to NYC streets, and the community support these changes have garnered. The City and its residents can use these results to continue to work collaboratively to make safer streets throughout the five boroughs.

This report

- Focuses on how street redesigns can dramatically improve safety for all users.
- Presents quantitative assessment of projects based on before and after comparisons of crash data of projects implemented by the agency in the last seven years.
- Contains results that, for the first time, are based on a large number of projects involving a range of street redesigns, in a NYC-specific context.
- Highlights how signals, street geometry, markings, and signs can be used to make streets function better and more safely, and improve not only safety but also the attractiveness and usability of the street for pedestrians, drivers, and cyclists.
- Illustrates benefits of NYCDOT's innovative approach to street re-engineering using protected bicycle paths, dedicated lanes for buses, through traffic and turns, signal timing changes, network redesigns, and other treatments.

Street Design & Traffic Safety

In large part due to new street designs, the last decade has witnessed steady declines in the number of people killed or seriously injured in traffic crashes in NYC:

- 30% decline in fatalities since 2001. (See Figure 1)
- 29% decline in people killed or severely injured since 2001. (See Figure 2)
- 1,000 NYC lives have been saved by the decrease in traffic fatalities since 2001—including pedestrians, bicyclists, motorcyclists, drivers, and passengers

In 2010, NYCDOT released a comprehensive *Pedestrian Safety Study & Action Plan*. The plan identified the need to concentrate efforts along major corridors and at complex intersections where serious crashes are most prevalent.

Until NYCDOT began to systematically evaluate its re-engineering efforts, there was relatively little data available, locally or nationally, showing the effectiveness of projects that combined traffic engineering and the newer traffic calming techniques, particularly in large, dense urban street networks like that of NYC.

As NYCDOT projects were completed, agency planners were able to evaluate the effectiveness of each project on a broad range of metrics, including traffic safety. The agency thus began to build a base of experience with quantitative results specific to NYC. These results are shared with the public through NYCDOT's *Sustainable Streets Index* report, which each year since 2009 has profiled a dozen major projects on a range of evaluation metrics including before and after crash histories.

This report builds on the approach of the *Sustainable Streets Index*, but with a broader set of projects, and focusing specifically on projects that have shown significant reductions in crashes that involve personal injuries. The resulting set of projects is quite diverse, ranging from complete street corridor and intersection redesigns to installation of targeted treatments.

Table 1 (p. 6) shows reductions in injury crashes for a large sample of NYCDOT projects. Crash reductions vary widely—from 12% to 88%, based on comparing crash levels for three years prior to implementation with two to three years of “after” data. The broad

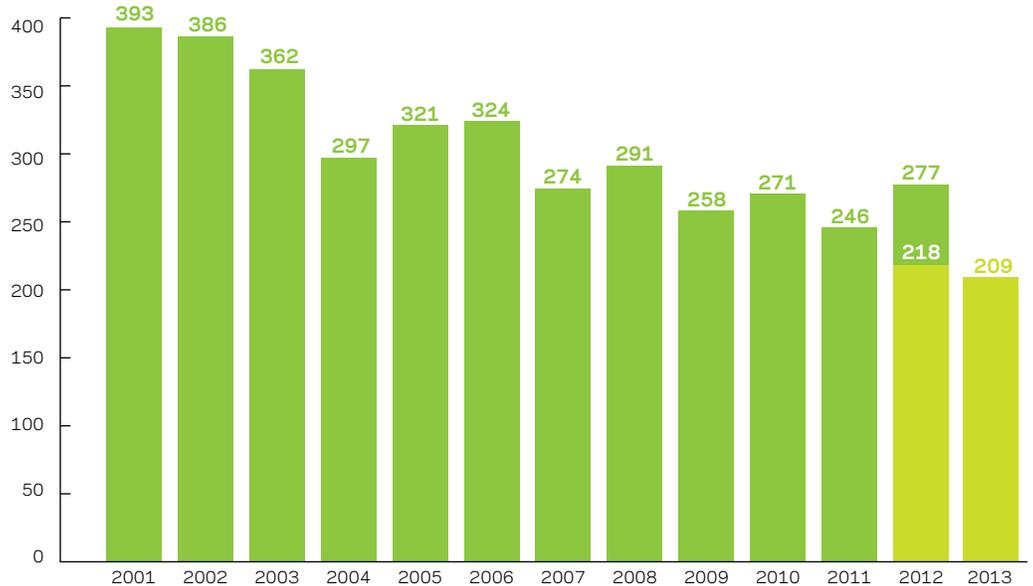


The fundamental characteristic of the successful projects is that they create the opportunity for drivers, pedestrians, and cyclists to move through the street network simply and easily, minimizing the unexpected, the confusing, and the potential for surprises.

FIGURE 1
Traffic fatalities in New York City

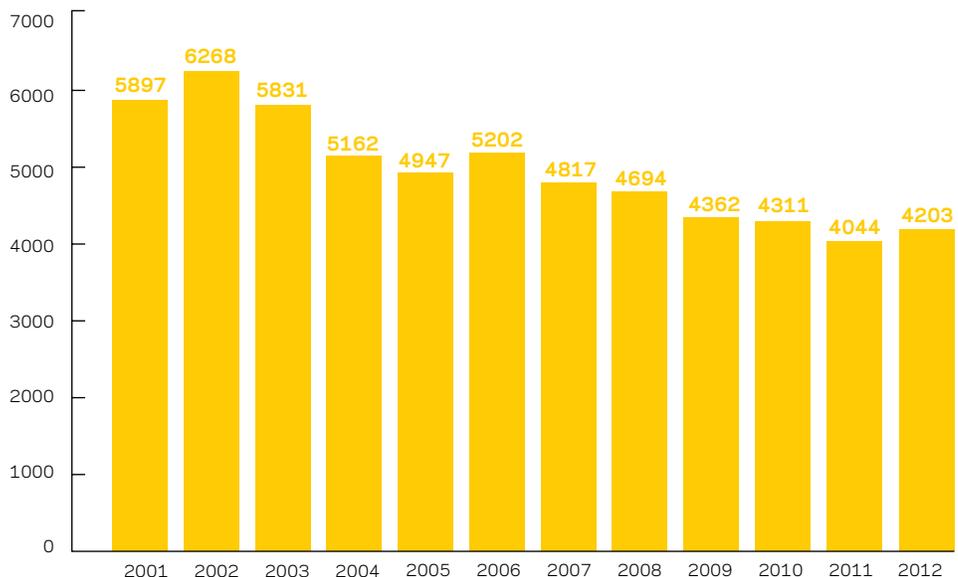
Please note that the 2013 data is year to date (through Sept). The 2012 data in light green indicates the number of fatalities last year at the same time.

■ Full Year
■ Partial Year



SOURCE: NYPD / NYCDOT Fatality Database

FIGURE 2
People Killed or Severely Injured



SOURCE: NYPD/NYCDOT Fatality Database and NYSDOT/ALIS Crash Database as of mid-October 2013

TABLE 1

Reductions in crashes with injuries and/or fatalities

Comparison of annualized crash rates for three years prior to project implementation and two to three years after.

Year	Borough	Project	Reduction in crashes w/ injuries
2007	Bk	9th St, Prospect Park West to Hamilton Ave: 4-to-3 conversion with bike lanes	-19%
2007	Bx	Southern Blvd, Boston Rd to Bronx Park South: bike lanes	-28%
2007	Mn	9th Ave, W 14th to W 16th: pedestrian plaza, network redesign	-46%
2007	Mn	9th Ave, W 16th St to W 23rd St: bike path	-52%
2007	Qn	Jewel Ave, 164th St to Main St: 4-to-2 conversion with bike lanes and median	-37%
2008	Bk	Vanderbilt Ave, Atlantic Ave to Grand Army Plaza: bike lanes and pedestrian safety islands	-15%
2008	Bx	Bronx Hub, Intersection of 3rd Ave, Willis Ave, Melrose Ave, and E 149th St: pedestrian plaza, network redesign with pedestrian safety islands	-17%
2008	Bx	Lafayette Ave, Underhill Ave to Newman Ave: 4-to-3 conversion with pedestrian safety islands	-24%
2008	Mn	8th Ave, Bank St to W 23rd St: bike path	-20%
2008	Mn	9th Ave, W 31st St to W 23rd St: bike path	-44%
2008	Mn	Broadway, W 42nd St to W 35th St: bike path, pedestrian plazas	-32%
2008	Mn	Madison Square, Intersection of Broadway, 5th Ave and 23rd St: pedestrian plazas, network redesign	-34%
2008	Mn	Park Ave & E 33rd St: network redesign with pedestrian safety islands	-88%
2008	Mn	Park Ave & E 40th St: network redesign with pedestrian safety islands	-57%
2008	Qn	Bowne St, Northern Blvd to Sanford Ave: 3-to-2 conversion with pedestrian safety islands	-23%
2009	Bk	Gerritsen Ave, Whitney Ave to Nostrand Ave: 4-to-3 conversion, wide parking lanes & pedestrian safety islands	-40%
2009	Bk	Park Circle: network redesign with pedestrian safety islands	-27%
2009	Bx	Allerton Ave, Boston Rd to E. Gun Hill Rd: 4-to-3 conversion with bike lanes and pedestrian safety islands	-28%
2009	Mn	Allen & Pike Sts: bike path, pedestrian plazas, network redesign	-18%
2009	Mn	Green Light for Midtown, Broadway from W 59th St to W 26th St: pedestrian plazas and network redesign	-24%
2009	Qn	Jackson Ave & Pulaski Br: network redesign with pedestrian safety islands	-63%
2010	Bk	West 6th St, 65th St to 86th St: 4-to-3 conversion with wide parking lanes and islands	-31%
2010*	Bx	Crames Square, Intersection of 163rd St, Southern Blvd and Hunts Point Ave: network redesign with pedestrian plaza and islands	-24%
2010	Bx	Randall Ave/Leggett Ave/Tiffany St: 4-to-3 conversion with bike lanes	-23%
2010*	Bx	Southern Blvd., Westchester Ave to 142nd St: 4-to-3 conversion with wide parking lanes and pedestrian safety islands	-20%
2010*	Mn	1st Ave, E 1st St to E 33rd St: bike path and select bus service	-12%
2010*	Mn	Broadway, E 23rd St to E 17th St & Park Ave, E 17th St to E 14th St: network redesign with plaza	-24%
2010*	Mn	Central Park West and W 81st St: leading pedestrian interval	-18%
2010	Mn	Water & Whitehall Sts: network redesign with pedestrian plaza	-20%
2010*	Qn	Hoyt Ave at RFK Bridge: network redesign and pedestrian enhancements	-33%
2010*	Qn	Hoyt Ave South and 29th St: new signal and crosswalks	-42%
2011*	Bk	Myrtle Ave, Flatbush Ave to Wyckoff Ave: off-peak signal timing	-32%
2011*	Bx	Grand Concourse, E 140th St to Mosholu Parkway: off-peak signal timing	-14%
2011*	Bx	Macombs Rd, University Ave to Jerome Ave: 4-to-3 conversion with wide parking lanes, islands and intersection redesigns	-41%
2011*	Mn	7th Ave and W 23rd St: intersection redesign	-63%
2011*	Mn	Columbus Ave, W 96th St to W 77th St: bike path	-25%
2011*	Mn	Madison Ave and E 135th St: intersection redesign	-18%
2011*	Qn	Vernon Blvd and 36th Ave: pedestrian island and median extension	-19%

*only two years of after data available

SOURCE: NYPD AIS/TAMS Crash Database

range reflects the diversity of both street conditions and project attributes. The largest reductions in crashes are generally achieved in projects where the redesigns were most extensive, where causes of crashes were most susceptible to safety re-engineering, and often where the problems were worse — i.e., higher crash areas.

Designing streets to accommodate cycling has also had a notable effect on safety (see Figure 3). Since 2000, there has been a 72% decrease in the average risk of serious injury experienced by cyclists in NYC, while the number of trips by bike has nearly tripled. During this period, over 470 lane miles of bicycle routes were added to NYC streets, many using advanced bicycle facility design including parking protected paths, mixing zones, and bicycle signals. These designs along with simply providing an interconnected network along popular routes have led to reduced risk. The increased presence of cyclists on the streets also enhances safety. Since the launch of Citi Bike in May, cycling within the area served by Citi Bike has spiked by 25% with over 5 million Citi Bike rides to date. Meanwhile, the number of cyclist fatalities in NYC, year to date, is lower in 2013 than any year since record keeping began in 1983.

By looking across this diverse set of projects, it is possible to start to draw conclusions about what approaches are most successful in improving traffic safety. The fundamental characteristic of the successful projects, whether large or small, is that they create the opportunity for all users — drivers, pedestrians, and cyclists — to move through the street network simply and easily, providing clear paths that get them where they want to go, minimizing the unexpected, the confusing, and the potential for surprises. By addressing issues of complexity, confusion, lack of visibility of vulnerable street users, and excessive vehicular speeds which are most likely to cause death or severe injury, the projects highlighted in the study reduce the risk of crashes.

In tackling these issues, safety projects also make streets into attractive places where people are comfortable and want to be. Safety measures thus also fundamentally serve the mobility, quality of life, and economic well-being of everyone, as well as the specific goal of traffic safety.

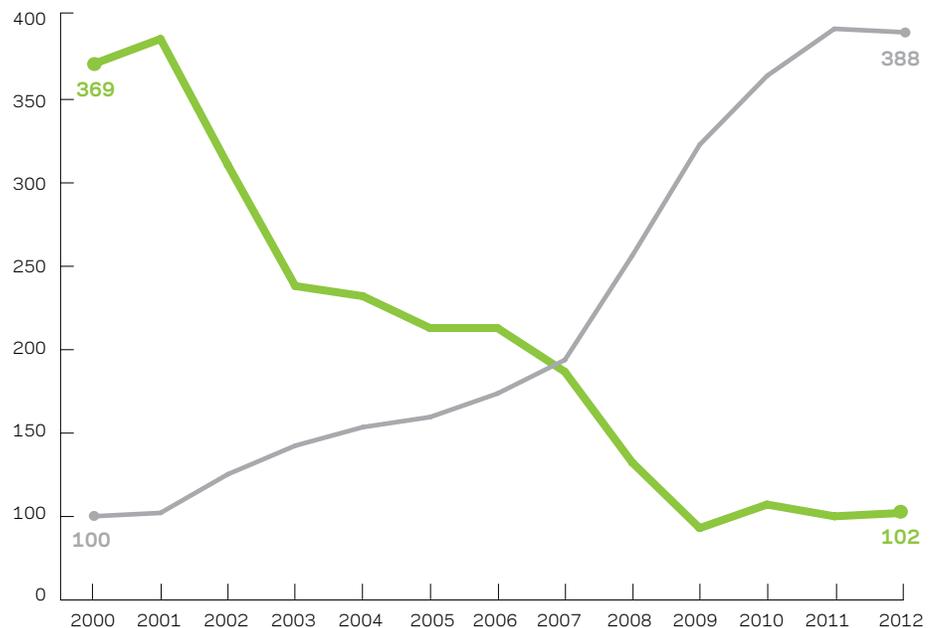
FIGURE 3

New York City Cycling Risk

Index of risk of serious injury to cyclists, taking into account bike volumes and number of crashes involving serious injury to cyclists

NYC In-Season Cycling Indicator: Based on weekday 12-hour counts taken between April and October at 6 key cycling locations, indexed to the year 2000 count: <http://www.nyc.gov/html/dot/downloads/pdf/2013-nyc-cycling-in-the-city.pdf>

- Cycling Risk Indicator
- In-Season Cycling Indicator



SOURCE: Bicyclist Fatalities: NYCDOT-NYPD Traffic Fatality Database as of mid-October 2013
Bicyclist Severe Injuries: NYSDOT SIMS/ALIS Crash Database (Type A injuries reported in crashes involving bicycles.)

Making safer streets always requires traffic engineering expertise and judgment, and some aspects such as turning radii and traffic signal timing are quite technical in nature. However, key concepts to designing safer streets are actually quite simple and common-sense driven. The remaining sections of this report highlight five key ways to design safer streets. Each section includes a drawing that highlights the effect on street operations, provides examples of projects and crash reduction results where the approach was a key part of the design, and identifies traffic engineering and traffic calming treatments that are often used to put the concept into reality on the streets of the city.

These concepts, summarized below, represent a distillation of NYCDOT's experience with street design projects that have proven most effective in reducing crashes:

- **Make the street easy to use** by accommodating desire lines and minimizing the complexity of driving, walking, and biking, thus reducing crash risk by providing a direct, simple way to move through the street network.
- **Create safety in numbers**, which makes vulnerable street users such as pedestrians and cyclists more visible. The same design principle, applied to arterial streets when traffic is light, reduces the opportunity for excessive speeds.
- **Make the invisible visible** by putting users where they can see each other.
- **Choose quality over quantity** so that roadway and intersection geometries serve the first three design principles.
- **Look beyond the (immediate) problem** by expanding the focus area if solutions at a particular location can't be addressed in isolation.



Make the Street Easy to Use

Difficulty and complexity increase risks on busy city streets. Streets that are easy to use reduce that risk and make for a safer, more attractive experience.

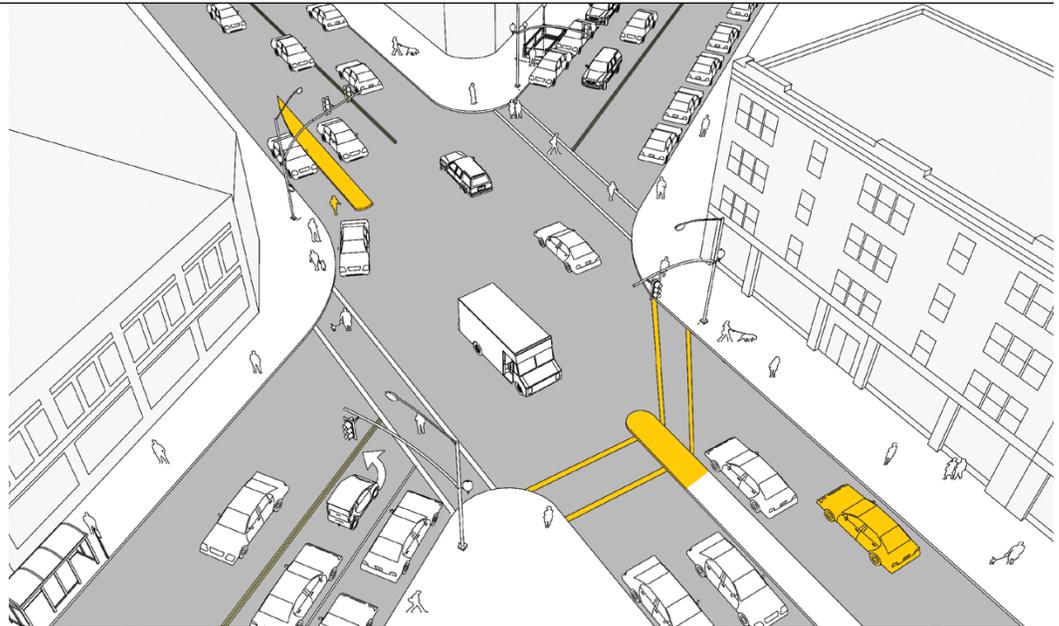
Accommodate Desire Lines

Making a street easy to use starts with understanding what people want to do. A street should accommodate desire lines—how people actually want to move through

a space. Users should be provided with a simple and clear path, with minimized complexity and without needing to go out of their way. Pathways for each movement and user can be clearly marked. Conflicting movements such as between pedestrians and vehicles can be separated, each given its own space and/or time for movement.

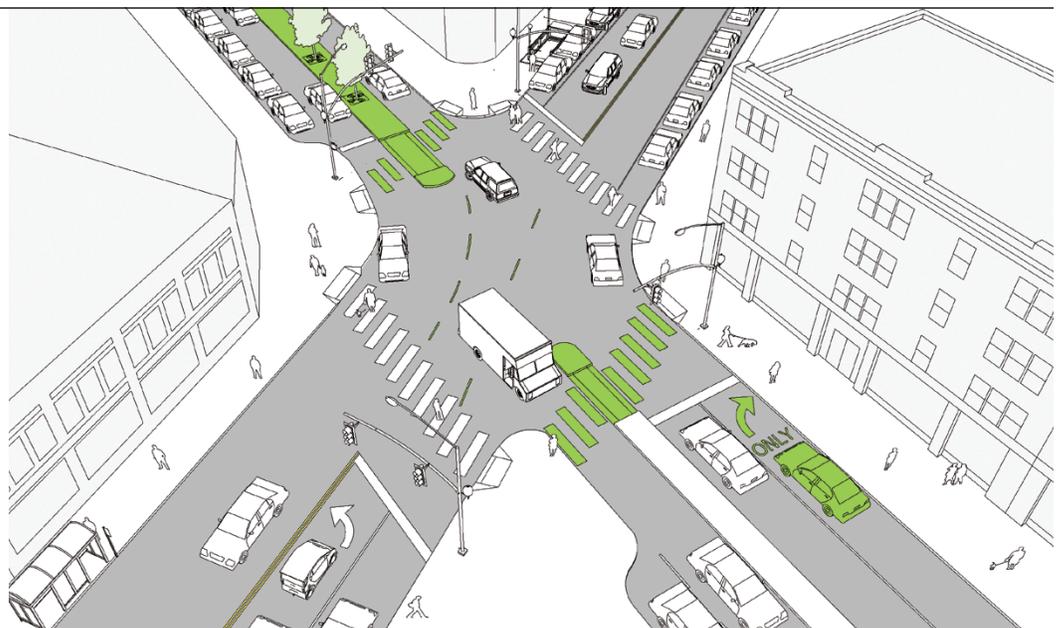
BEFORE

- Long indirect crosswalks
- Undefined lanes for drivers
- Long waits for green or walk because multiple legs of traffic each have a signal phase



AFTER

- Shorter pedestrian crossings
- Lane designations show clear path for drivers
- Shorter waits with low volume legs removed from main intersection



**MANHATTAN:
7th Ave & W 23rd St**

Injury crashes down by **63%**
Treatments: 1, 2, 5,



**QUEENS:
Jackson Ave &
Pulaski Br**

Injury crashes down by **63%**
Treatments: 1, 3, 4, 5, 7



**MANHATTAN:
Madison Ave &
E 135th St**

Injury crashes down by **18%**
Treatments: 1, 2, 3, 4, 5,
6, 7



**Street Treatments
often used with this
strategy:**

- 1 Delayed Turning**
Allows through vehicles to move while holding turning vehicles, giving pedestrians a head start or a conflict free crossing
- 2 Restrict Turns**
Remove difficult turns that cause conflicts and create opportunities for additional improvements
- 3 Extend Medians**
Lengthen/widen existing medians to tighten up intersection
- 4 Eliminate Movements**
Reduce number of movements entering a complicated intersection
- 5 Lane Designation**
Clarifies who belongs where
- 6 Create Right Angle Intersections**
Slows vehicles turning into pedestrian crossings and shortens crossing distances
- 7 Crosswalks**
Add crosswalks where pedestrians want to cross

<p>QUEENS: Hoyt Ave South & 29th St Injury crashes down by 42% Treatments: 1, 2, 4, 6</p>	<p>BEFORE</p> 	<p>AFTER</p> 
<p>BROOKLYN: Park Circle Injury crashes down by 27% Treatments: 1, 2, 3, 4, 5, 6</p>		
<p>QUEENS: Vernon Blvd & 36th Ave Injury crashes down by 19% Treatments: 2, 3, 4, 5, 6</p>		

Street Treatments often used with this strategy:

- 1 Clear Merges and Transitions**
 By improving alignments and clearly marking merges driving is simplified
- 2 Lane Designation**
 Clarifies who belongs where
- 3 Bicycle paths and lanes**
 Clearly designates the bicycle right of way
- 4 Signals and Controls**
 Adding control to an intersection for all users eliminates confusion
- 5 Pedestrian Safety Islands**
 Pedestrians wait midway through crossing the street. Shortens distance to cross at one time. Adds visual cues to presence of pedestrians. Beautifies corridor
- 6 Crosswalks**
 Add crosswalks where pedestrians want to cross

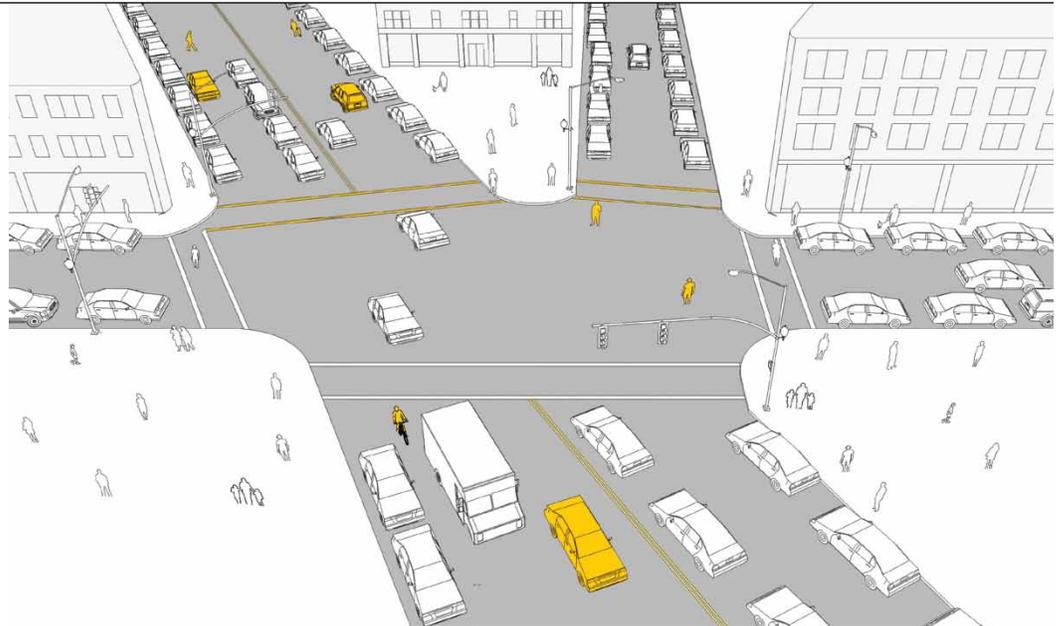
Create Safety in Numbers

Draw Users Together

Perhaps the simplest way to improve safety for more vulnerable users is to increase their presence on the street. Encouraging these users toward a specific location makes their presence more predictable to drivers. Creating facilities that draws users is key to increasing these volumes.

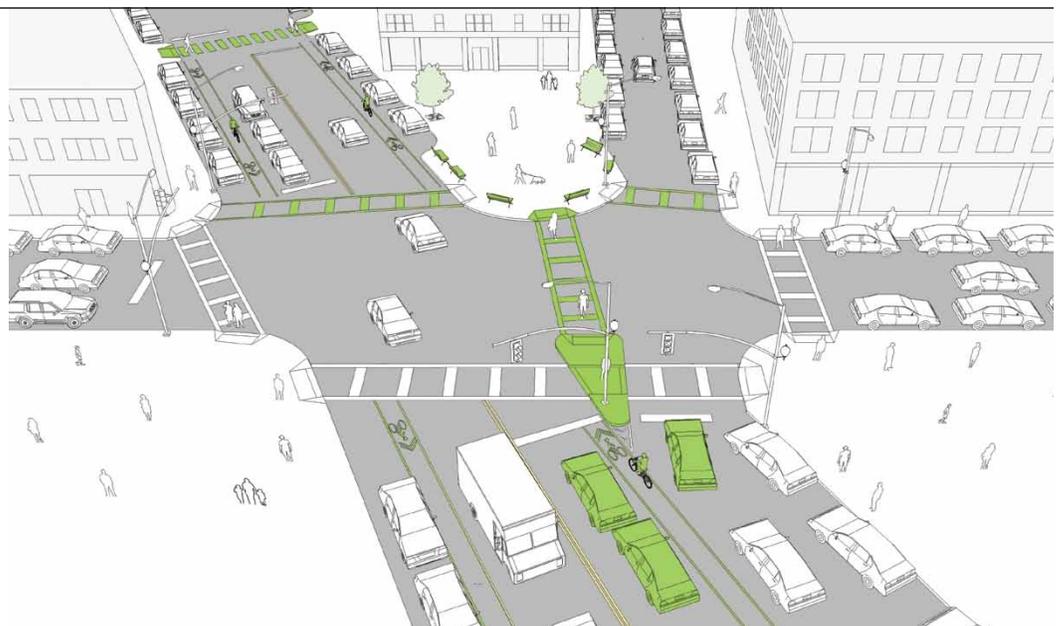
BEFORE

- Long indirect crosswalks lead to jaywalking
- No defined spaces for cyclists
- Undefined lane destination for drivers increases unpredictably



AFTER

- Direct crosswalks reduce jaywalking
- Hi-visibility crosswalks protect pedestrians at intersection
- Bike lane attracts and organizes cyclists
- Safety islands draw pedestrians to safe crossings
- Clear lane designation for all users
- New pedestrian amenities



BEFORE

AFTER

MANHATTAN:
Columbus Ave, W 96th St to W 77th St
 Injury crashes down by **25%**
 Treatments: 2, 4



MANHATTAN:
Water St & Whitehall St
 Injury crashes down by **20%**
 Treatments 3



BROOKLYN:
Vanderbilt Ave, Atlantic Ave to Grand Army Plaza
 Injury crashes down by **15%**
 Treatment: 2, 4



MANHATTAN:
6 1/2 Ave
 Pedestrian/vehicle conflicts have been reduced to **5%** vs. **95%** in the before condition
 Treatments: 1, 2, 3, 4



Street Treatments often used with this strategy:

- 1 Midblock Crosswalks**
Provide midblock crossing close to desire lines
- 2 Pedestrian Ramps and Safety Islands**
Provide access and waiting areas for pedestrians
- 3 Pedestrian Plazas**
Draws pedestrians to specific zones and alerts drivers that pedestrians are present
- 4 Bicycle Facilities**
Makes cyclists feel comfortable and increases awareness and predictability

Create Safety in Numbers

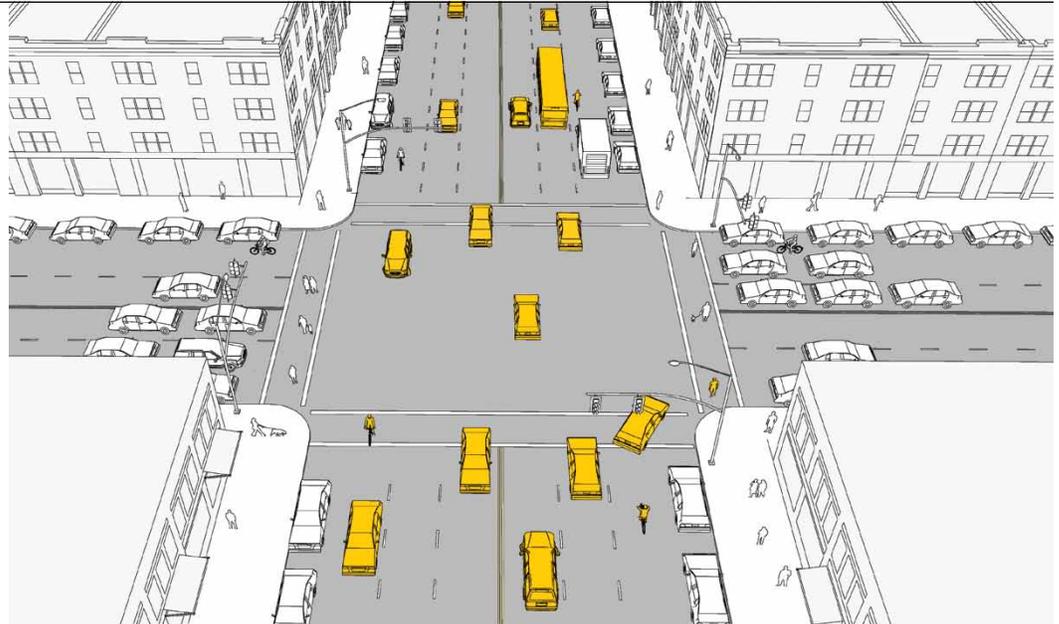
Create platoons of vehicles

Signal timing and phasing can be used in conjunction with street design to further this concept of increasing numbers to create a safer street. Timing can be used to create platoons that not only encourage vehicles to behave as a group but also creates clear gaps for pedestrians to cross the street and bicyclists to travel.

Phasing can be used to platoon left turners, buses, and pedestrians to clarify movements and to give a head start or a separate phase.

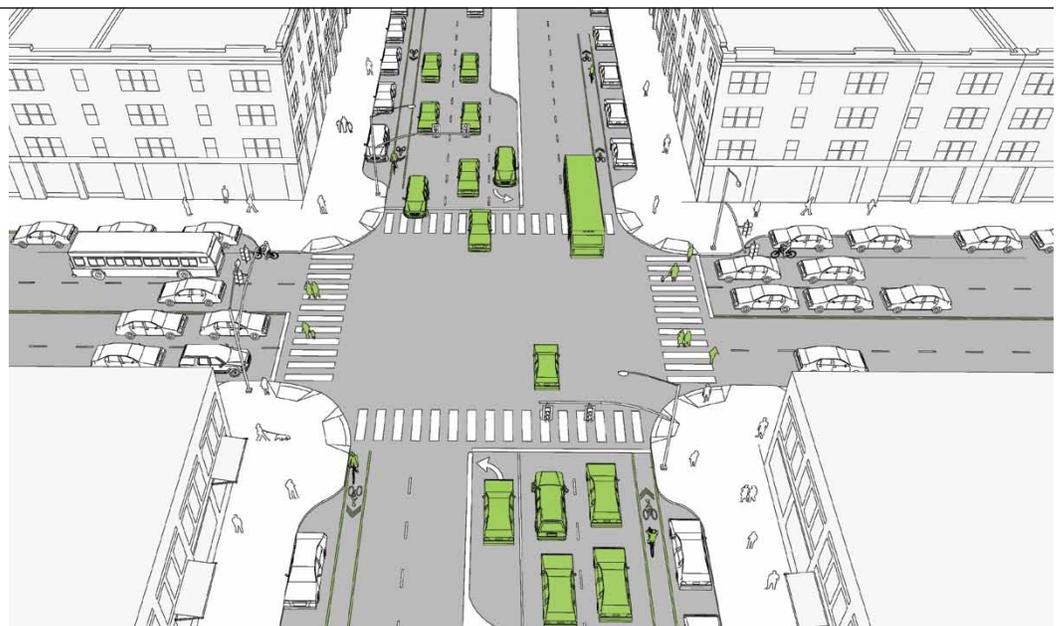
BEFORE

- Vehicles are randomly spaced
- Speeding and weaving occurs as vehicles are more free to move about
- Pedestrians and left turners conflict
- Bikers and buses among unevenly spaced vehicles
- Street feels chaotic and unpredictable



AFTER

- Groups of cars with gaps in between
- Turning vehicles wait as platoon of pedestrians get head start
- Traffic is orderly and grouped
- Signal queue jump allows bus to get ahead of platoon



BROOKLYN:
Myrtle Ave, Flatbush Ave to Wycoff Ave

Injury crashes down by **32%**
Treatments: 1, 3



MANHATTAN:
Central Park West and W 81st St

Injury crashes down by **18%**
Treatment: 2



BRONX:
Grand Concourse, E 140th St to Mosholu Pkwy

Injury crashes down by **14%**
Treatments: 1, 3, 5



Street Treatments often used with this strategy:

- 1 Green Waves**
Keep drivers travelling in a platoon at a consistent speed of travel
- 4 Leading Bus Interval**
Gives buses a chance to get to ahead of the platoon

- 2 Leading Pedestrian Intervals**
Gives platoon of pedestrians a head start

- 3 Off-Peak Signal Timing**
Reduces opportunity to speed

- 5 Left Turn Phases**
Separate turning traffic from oncoming traffic and pedestrians

Make the Invisible Visible

What you can't see can, in fact, hurt you. The mutual visibility of pedestrian, drivers, and cyclists is key to ensuring safe passage through an intersection where their paths cross.

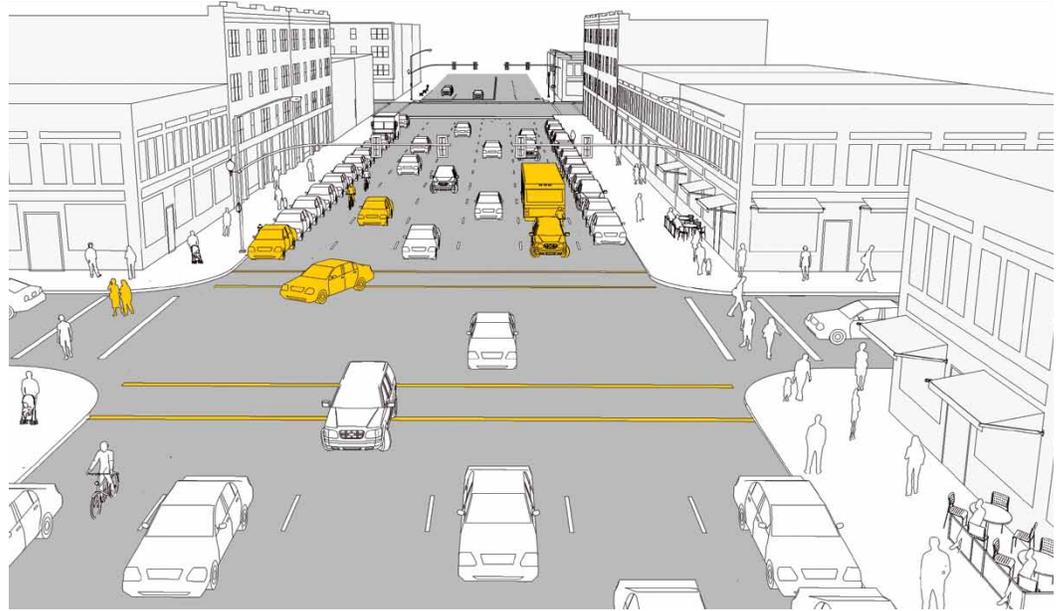
they can see one another. Visual cues can call attention to the potential presence of user, or to slow drivers as they navigate a non-typical streetscape. When all else fails the invisible movement can be investigated for elimination.

Put people where they can see each other

Street design can greatly enhance visibility of all users. People should be moved into positions where

BEFORE

- Sight lines for turning vehicles is impeded by parked cars
- Bicyclists and pedestrians who have right of way are not fully visible
- Not predictable whether traffic will turn or continue straight
- Street can feel overwhelming



AFTER

- Bikers and turning vehicles share curbside lanes to increase visibility and predictability
- Daylighting with extensions increases visibility for pedestrians
- Street feels manageable and predictable



	BEFORE	AFTER
<p>MANHATTAN: Park Ave & E 33rd St Injury crashes down by 88% Treatments: 2, 3, 4, 6</p>		
<p>MANHATTAN: Allen and Pike Sts, Houston St to South St Injury crashes down by 18% Treatments: 3, 4, 5, 6</p>		
<p>MANHATTAN: 1st Ave, E 1st St to E 33rd St Injury crashes down by 12% Treatments: 1, 2, 3, 4, 5</p>		

Street Treatments often used with this strategy:

- 1 Mixing Zones**
Increases visibility between drivers, cyclists, and pedestrians
- 2 Daylighting**
Improves visibility between drivers and pedestrians in the crosswalk
- 3 Curb Extensions**
Brings pedestrians into sightline of drivers, shortens crossing distances
- 4 Pedestrian Safety Islands**
Pedestrians wait midway through crossing the street. Shortens distance to cross at one time. Adds visual cues to presence of pedestrians. Beautifies corridor
- 5 Leading Pedestrian Interval**
Pedestrian walk signal proceeds green for turning movement to give peds a head start
- 6 Eliminate Unsafe Movements**
When it is clear that a specific action is causing a majority of accidents, efforts should be made to eliminate the movement.

Choose Quality Over Quantity

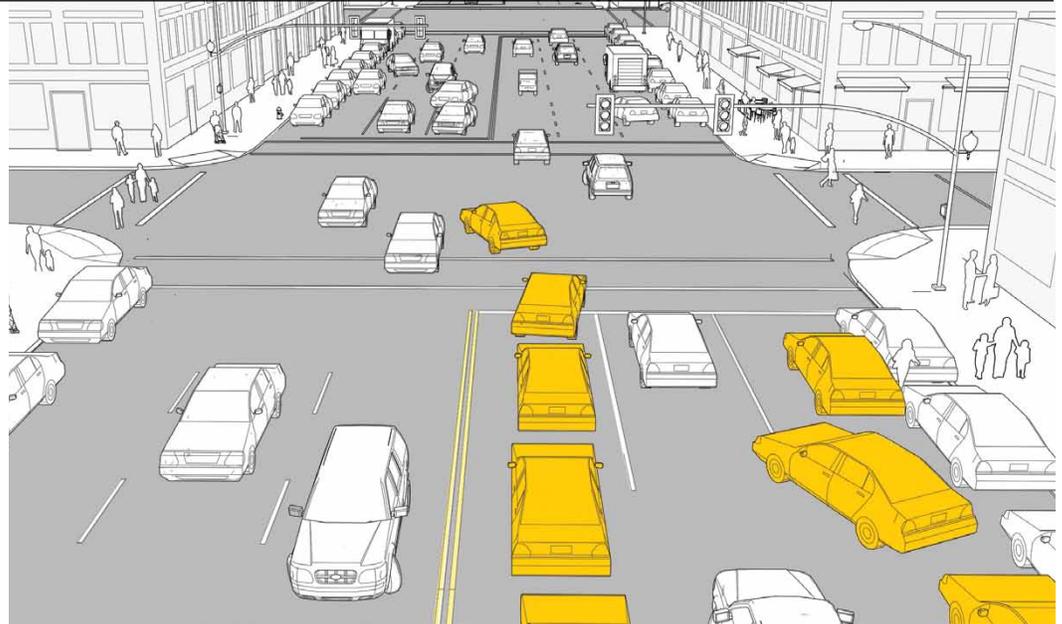
New York City streets have many demands placed on them. These demands evolve over time. If the street is not updated to serve current needs, chaotic conditions can prevail. By clearly marking what part of the street should serve each use, and prioritizing the most important uses, streets can work better and be safer.

Substitute two good lanes for three poor lanes

Travel lanes are only truly effective when they can function without disruption. In many cases, a road with numerous undesignated lanes can get congested due to double parking and/or turning occurring in what is supposed to be a through lane. By designating space for other roadway actions, the through lanes, while reduced, can function more efficiently.

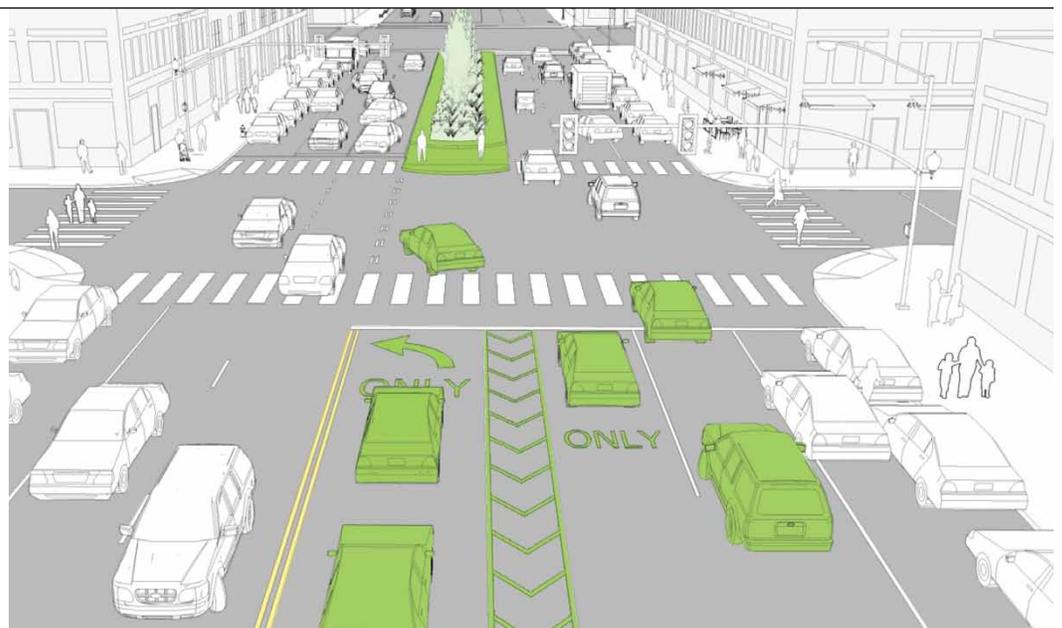
BEFORE

- Drivers constantly change lanes to get around left turns and double-parked cars
- Difficult to drive
- Congested and unpredictable
- Leads to rear-end and left turn crashes



AFTER

- Through lanes are clear of turning and stopped vehicles
- Easier to drive
- Better traffic flow
- Easier to anticipate drivers' movements
- Safer



	BEFORE	AFTER
<p>BROOKLYN: Gerritsen Ave, Whitney Ave to Nostrand Ave Injury crashes down by 40% Treatments: 1, 2, 3</p>		
<p>BRONX: Randall Ave/ Leggett Ave/ Tiffany St Injury crashes down by 23% Treatments: 1, 4</p>		
<p>BRONX: Southern Blvd, Westchester Ave to E 142nd St Injury crashes down by 20% Treatments: 1, 2, 3</p>		

Street Treatments often used with this strategy:

- 1 Dedicated left turn lanes**
 Relieves pressure drivers may feel to make the turn too quickly or too soon
- 2 Wide parking lane**
 Keeps double-parked cars from blocking the adjacent lane as well as allowing bike riders to travel outside traffic flow
- 3 Pedestrian Safety Islands**
 Pedestrians wait midway through crossing the street. Shortens distance to cross at one time. Adds visual cues to presence of pedestrians. Beautifies corridor
- 4 Bike lanes**
 Designates space for cyclists

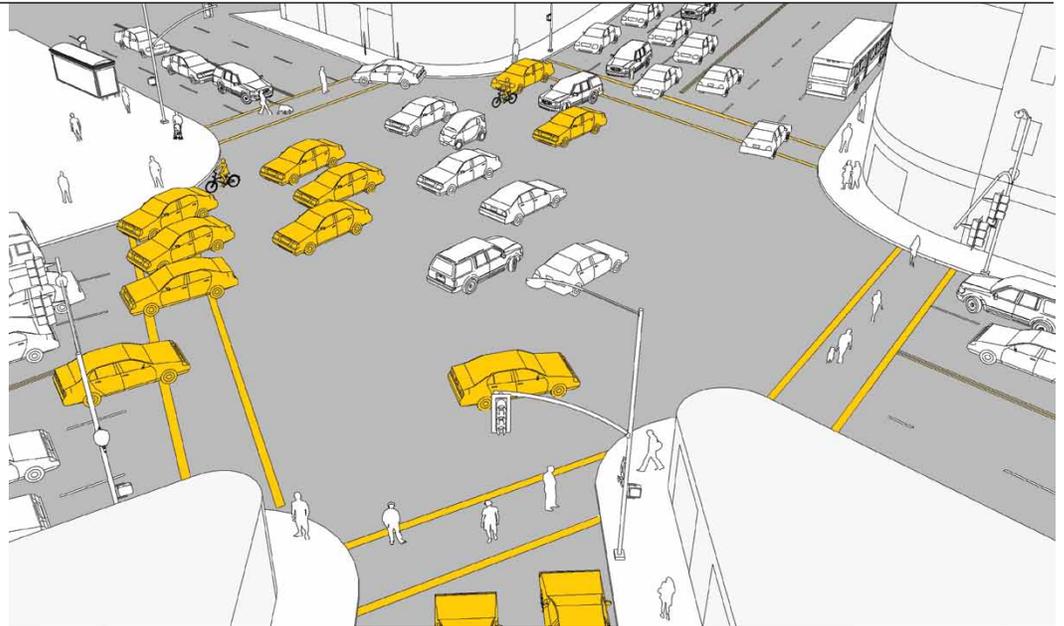
Choose Quality Over Quantity

Simplify complex intersections

There are many complex intersections throughout the city where streets meet at odd angles, particularly in the outer boroughs where neighborhood grids converge. These intersections often have approaches that can be diverted or completely removed, thus creating standard right-angle geometry and adding time for remaining movements.

BEFORE

- Large, multi leg intersection competes for signal time
- Long indirect crosswalks
- Pedestrians crossing along unprotected desire lines
- No separation between vehicle movements



AFTER

- Restricted turns
- Some traffic approaches removed from main intersection with dividers or islands
- Simplified signal timing
- New shorter crossings that accommodate desire lines
- New plaza space for pedestrians to enjoy and to enhance the local district.



	BEFORE	AFTER
<p>MANHATTAN: Madison Square Injury crashes down by 34% Treatments: 1, 4, 5</p>		
<p>MANHATTAN: Herald Square Injury crashes down by 25% Treatments: 1, 2, 3, 4, 5</p>		
<p>MANHATTAN: Times Square Injury crashes down by 20% Treatments: 1, 2, 3, 4, 5</p>		
<p>BRONX: Bronx Hub Injury crashes down by 17% Treatments: 1, 2, 3, 4, 5</p>		

Street Treatments often used with this strategy:

- 1 Network Change**
Redirect an approach of traffic to other parts of the local street network or forced turns at main intersection
- 2 Turn Bans**
Relocate high conflict turns to lower demand intersections
- 3 Removal of Low Volume Approach**
Completely remove approach from intersection
- 4 Square Off Intersection**
Sharpen radii, reshape approaches to enter on better angle
- 5 Public Space Creation**
Turn underutilized roadbed into public amenity

Look Beyond the Problem

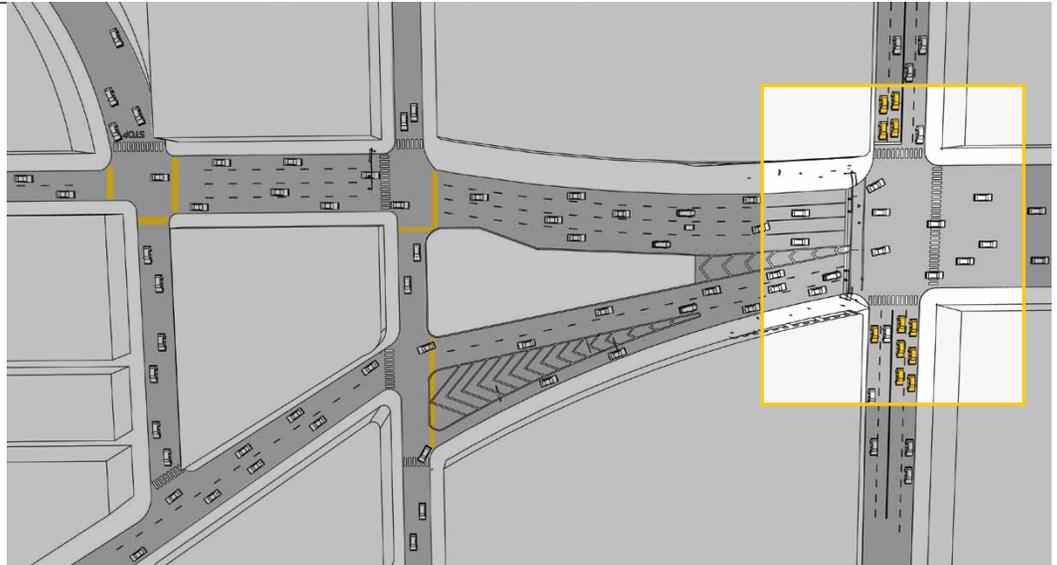
Expand the focus area

Sometimes, even with careful analysis, it can be difficult to identify any solution to a particular problem location. Expanding a project area to include its local street network can unlock new possibilities. Looking beyond the intersection or corridor can help further improve the main project area. Intersection problems

can often be addressed with corridor redesigns that reassess which movements need to be accommodated at which intersection.

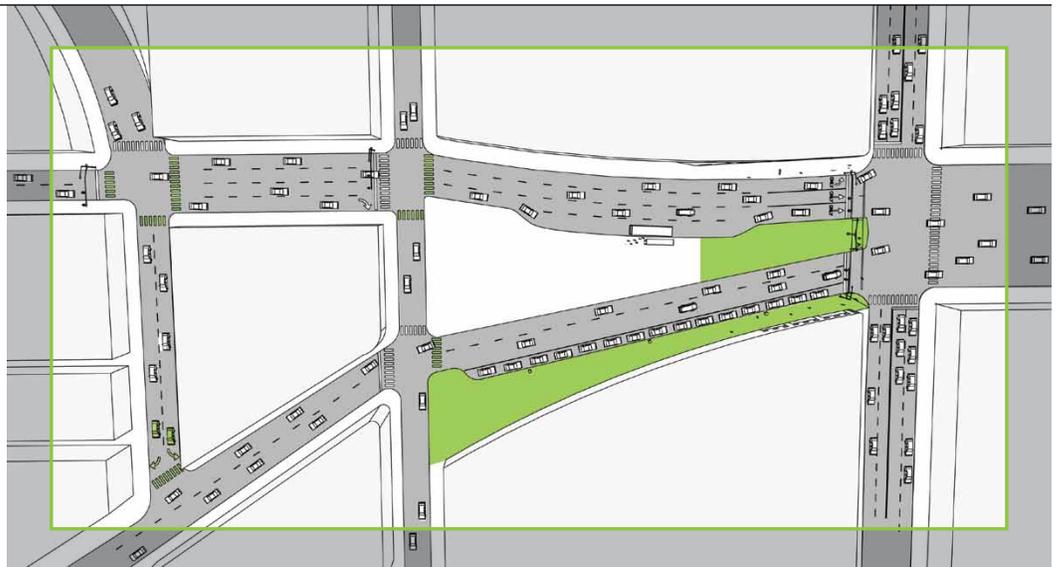
BEFORE

- Large, complex intersection is difficult to navigate
- Long waits because each traffic leg needs a signal phase
- Poor connectivity along corridors leading to main intersection



AFTER

- Minimize presence of legs with lower volumes
- Corridors leading into intersection are matched to volume they carry
- Turn bans at intersection accommodated elsewhere in local network



	BEFORE	AFTER
<p>MANHATTAN: 9th Ave, W 15th to W 14th St Injury crashes down by 46% Treatments: 1, 2, 3, 5</p>		
<p>QUEENS: Hoyt Ave/Astoria Blvd/33rd St/31st St Injury crashes down by 33% Treatments: 2, 5</p>		
<p>MANHATTAN: Broadway, E 23rd to E 17th St & Park Ave, E 17th to E 14th St Injury crashes down by 24% Treatments: 1, 2, 4</p>		
<p>BRONX: Southern Blvd/Hunts Point Ave/163rd Street Injury crashes down by 24% Treatments: 1, 2, 4, 5</p>		

Street Treatments often used with this strategy:

- 1 Network Change**
Redirect a leg of traffic to other parts of the local street network
- 2 Turn Bans**
Relocate high conflict turns to lower demand intersections
- 3 Signal Progression Changes**
Modify progression of signals on corridors heading into intersection to meter flow
- 4 Road Diet**
Examine roadways leading to project area to ensure they are to scale with local neighborhood network
- 5 Lane Designations and Signal Phasing**
Clarifies who belongs where and when each movement can operate

New York City Department of Transportation



Janette Sadik-Khan

Commissioner

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Deputy Commissioner
Traffic and Planning

This report was developed by the New York City Department of Transportation's Division of Traffic and Planning. Deputy Commissioner Bruce Schaller directed the report team which consisted of Assistant Commissioner Ryan Russo, Joshua Benson, Sean Quinn, Matthew Roe, and Seth Hostetter. Graphic design and production by Pure+Applied.

Projects listed in this report were developed, designed, and implemented by various individuals and divisions across the DOT as well as in collaboration with other city and state agencies. Additionally, each project had the input and support of citizens, elected officials, and community boards. The final results can be considered a true team effort.





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