

Left Turns and Pedestrian Safety

TRB
2012



Pedestrian Safety Through the Decades

Decade	NYC Pedestrian Fatalities Avg per Year	Pedestrian Fatalities per 100,000 Residents per Year	% Pedestrian
1910 – 1919	381	7.3	70%
1920 – 1929	735	11.7	70%
1930 – 1939	693	9.6	70%
1940 – 1949	567	7.4	84%
1950 – 1959	454	5.8	72%
1960 – 1969	434	5.5	60%
1970 – 1979	386	5.2	52%
1980 – 1989	331	4.6	55%
1990 – 1999	261	3.4	51%
2000 – 2009	167	2.0	51%

Pedestrian Fatalities and Severe Injuries

- 28% reduction in pedestrian fatalities since 2001
- 22% reduction in pedestrian severe injuries since 2001



Year	NYC Pedestrian Fatalities	NYC Pedestrian Severe Injuries
2001	193	1,452
2002	186	1,417
2003	177	1,418
2004	155	1,311
2005	157	1,285
2006	168	1,353
2007	139	1,313
2008	151	1,308
2009	156	1,161
2010	152	1,134
2011	138	--

NYC vs. USA

- National fatality rates are several times higher than NYC rates
- NYC has much higher pedestrian activity than rest of USA
- NYC has lower VMT per capita, driven at lower speeds

Traffic Fatalities per 100,000 Residents Yearly Average (2008-2010)

	Pedestrian	Non-Pedestrian	Total
NYC	1.82	1.43	3.26
USA (less NYC)	1.38	10.16	11.54

Journey-to-Work Transit + Walking Mode Share (2008-2010)

68.3%
8.2%

Sources: NYCDOT, NHTSA FARS, Census ACS 2010 3-year estimates (excl. worked at home)

Why Focus on Left Turns?

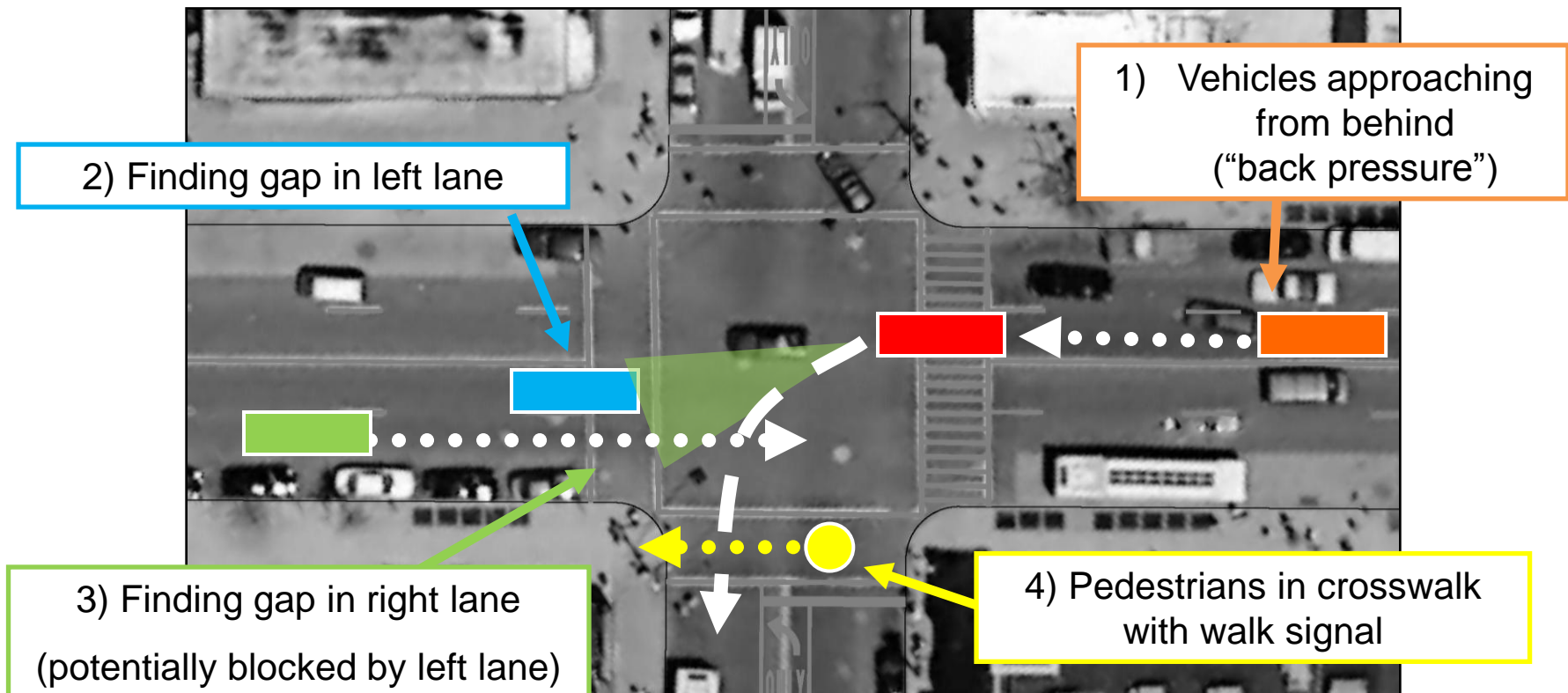
- Among pedestrian fatality and severe injury crashes:
 - LT crashes outnumber RT crashes 3 to 1
 - Driver failure to yield while turning is a leading factor:
 - Among pedestrians struck while crossing at a signalized location, 57% were crossing with the signal



8th Avenue & 125 Street, Manhattan

Two-Way Streets: The Left Turn Problem

- Difficulty of driver task: four concerns at intersection (**red car**)
- Result: acceleration across oncoming lanes and into crosswalk
- Waiting for gap removes most left-lane capacity



Two-Way Toolbox: One-Way Streets

- Mid-century conversions laid groundwork for massive safety improvements
- Advantages:
 - Eliminates two-way left-turn condition
 - Signal coordination for directional travel
- Challenges:
 - Speeding in low-volume areas
 - Cross-street mobility/network issues
 - Bus transit
 - Bicycle mobility
 - Effects on retail business



Seventh Avenue, Manhattan

Two-Way Toolbox: Left Turn Restrictions

- Advantages
 - Eliminates left turn hazard among compliant vehicles
- Challenges
 - Network/mobility
 - Additional right turns
 - Local public acceptance



Flatbush Avenue Left Turn Restrictions

- Major thoroughfare:
1500-1800 vph
(peak direction)
- Left turns banned
- Right-turn jughandles
naturally present due to
position in grid



Flatbush Avenue at Carlton Avenue, Brooklyn

Two-Way Toolbox: Dedicated Turn Phases

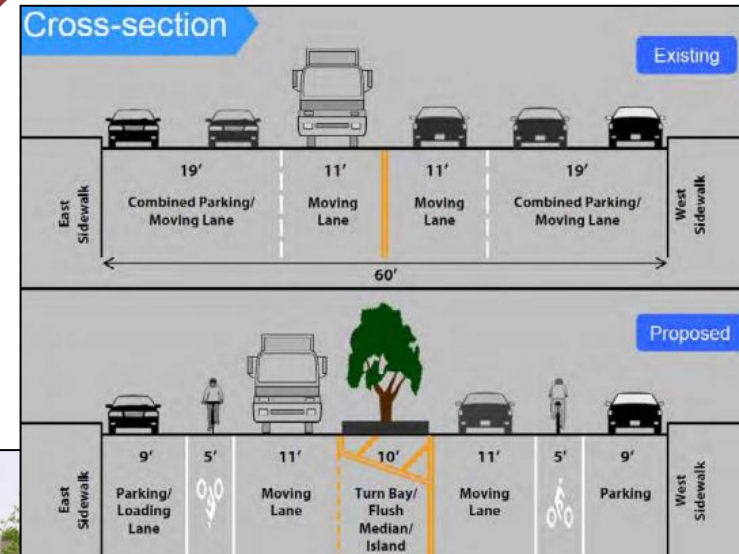
- Advantages
 - Theoretical elimination of vehicle-pedestrian and vehicle-vehicle conflicts
 - Higher left-turn throughput
- Challenges
 - Low pedestrian compliance
 - Time required in signal cycle



14th Street at 1st Avenue, Manhattan

Two-Way Toolbox: Road Diets w/ Turn Bays

- Conversion from 4 lanes to 2 plus left turn bays, or addition of turn bays on wide 2-lane streets
- Advantages
 - Eliminates “Back Pressure”
 - Reduces needed gap to one lane
 - Provides room for bike lanes, pedestrian refuge islands, and other improvements
- Challenges
 - May not be feasible on higher-volume streets



Vanderbilt Avenue, Brooklyn

Road Diet – Allerton Avenue



Before: Allerton Avenue, Bronx

- 2-way, 4-lane street converted to one lane each direction plus left turn bays, refuge islands, and bike lanes



After: Allerton Avenue, Bronx

- 26% reduction in injury crashes
- 48% reduction in pedestrian injuries

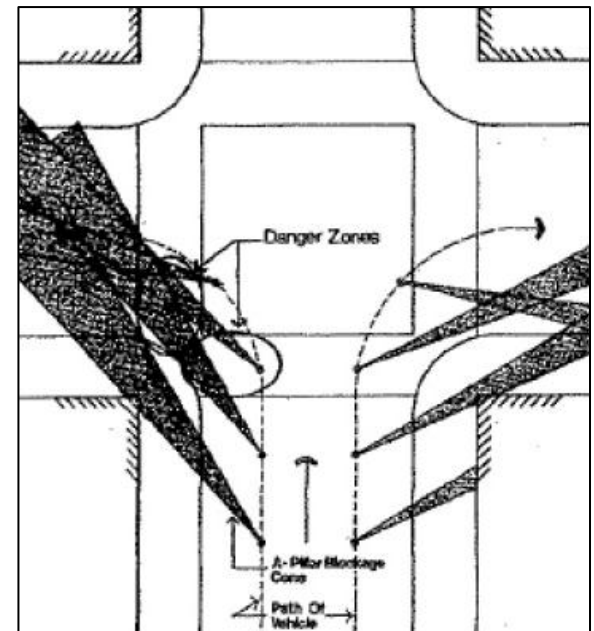
Two-Way Don't: Move Lefts to the Right

- Moving left turns further right may create room for refuge islands, but:
 - Worsens line of sight for turning vehicles of through vehicles
 - Introduces turn-vs.-turn conflict as left turns cross
 - Moves turns further from receiving crosswalks



One-Way Streets: The Left Turn Problem

- “A-pillar” between windshield and driver window creates blind spot on left side
- Parking blocks view of pedestrians at approach
- Blind spot tracks pedestrians crossing in the same direction as moving vehicles



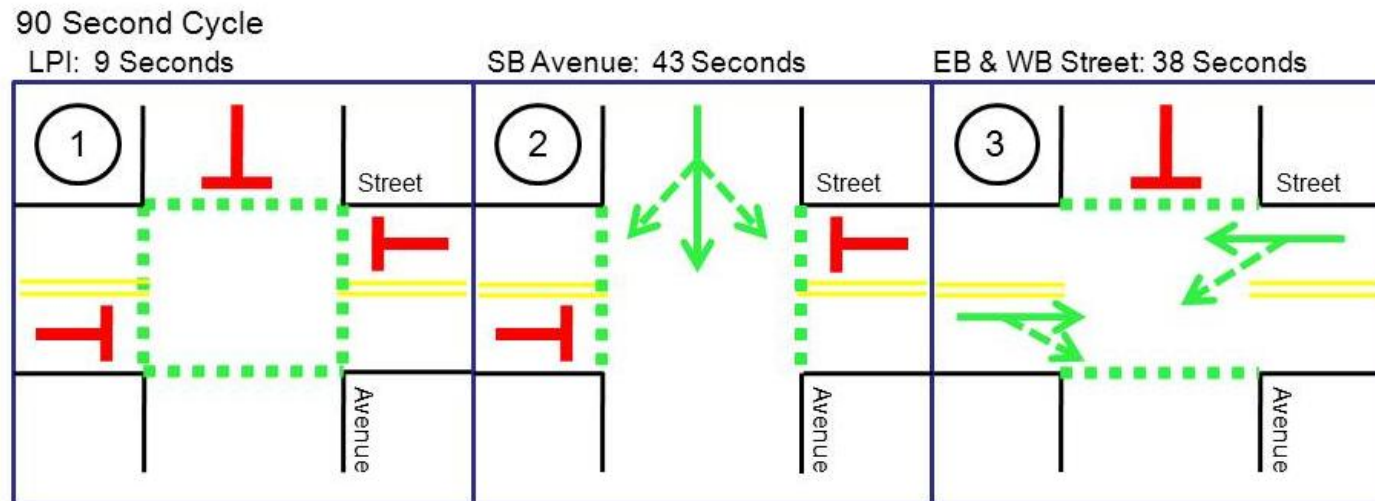
One-Way Toolbox: Yield to Pedestrian Sign

- New MUTCD standard sign (R10-15)
- Advantages
 - Instructs drivers on requirement to yield to pedestrians
- Challenges
 - Effectiveness may be limited



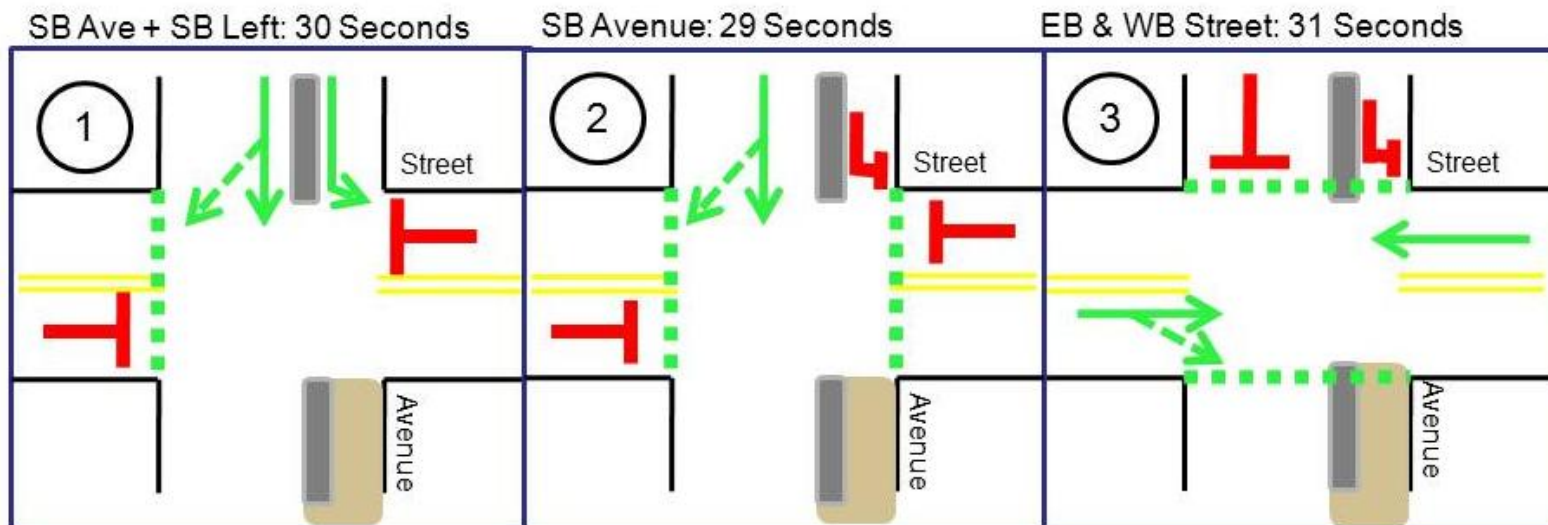
One-Way Toolbox: Leading Pedestrian Intervals

- Hold parallel/turning traffic for several seconds at beginning of pedestrian “Walk” phase
- Advantages
 - Gives pedestrians head start to “take” crosswalk before adjacent through/left turn movement phase
 - Reduces turning vehicle conflicts by increasing pedestrian visibility
- Challenges
 - Requires time in signal cycle – holds all vehicles, not just turns

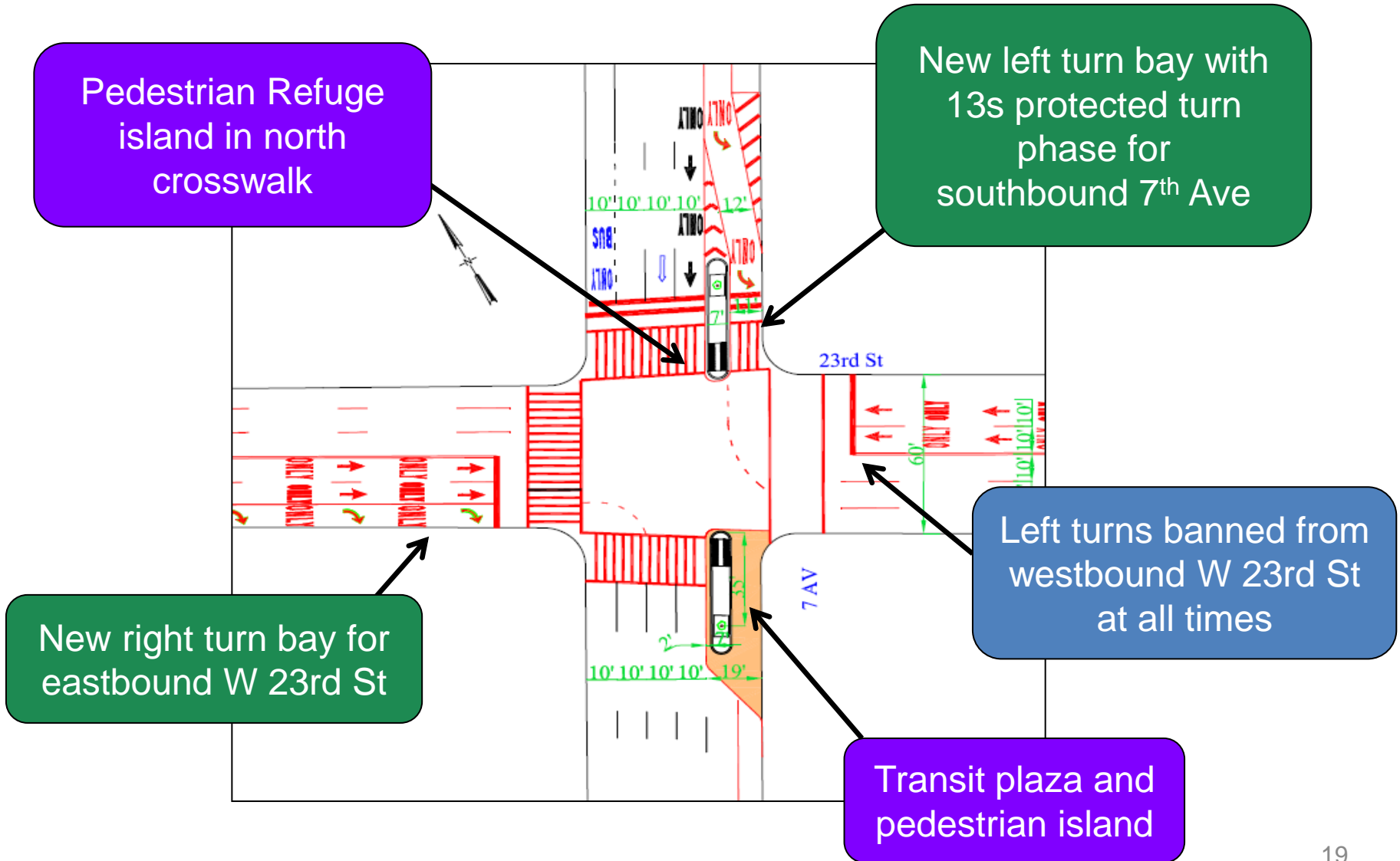


One-Way Toolbox: Split Phase

- Provides separate phases for left turns and pedestrian crossings
- Advantages
 - Provides dedicated pedestrian phase in one crosswalk
 - Increases turning throughput
- Challenges
 - Takes signal time from through-moving vehicles/cross-traffic



7th Avenue at 23rd Street Split Phase



Pedestrian Refuge island in north crosswalk

New left turn bay with 13s protected turn phase for southbound 7th Ave

Left turns banned from westbound W 23rd St at all times

New right turn bay for eastbound W 23rd St

Transit plaza and pedestrian island

7th Avenue at 23rd Street Split Phase



One-Way Toolbox: Daylighting

- Provide clear curb lane at approaches where one-way traffic turns left
- Advantages
 - Improves mutual visibility of pedestrians and left-turning drivers
 - Can provide room for curb extensions or neighborhood amenities
- Challenges
 - Removes parking



Lexington Avenue, Manhattan

One-Way Toolbox: Bike Path Mixing Zone

- Left-turn lane directly adjacent to bike path at approach to intersection
- Advantages
 - Compatible with left-side bike lanes and paths
 - Like daylighting, improves sightlines among drivers, pedestrians, and bicyclists
- Challenges
 - Removes parking



Grand Street, Manhattan

Needs & Challenges

- Public acceptance
 - Parking and curbside use
- Effect on mobility
 - Turn restrictions
 - Signal timing
- Compliance
 - Drivers and pedestrians
- Research & Data
 - Crash data quality
 - Project evaluation in complex urban settings



Chrystie Street at Broome Street, Manhattan

Questions?

Thank
You