Left Turns and Pedestrian Safety

Ryan Russo, Assistant Commissioner, Traffic Management
New York City Department of Transportation
Transportation Research Board Annual Meeting, January 23, 2012
<table>
<thead>
<tr>
<th>Decade</th>
<th>NYC Pedestrian Fatalities Avg per Year</th>
<th>Pedestrian Fatalities per 100,000 Residents per Year</th>
<th>% Pedestrian</th>
</tr>
</thead>
<tbody>
<tr>
<td>1910 – 1919</td>
<td>381</td>
<td>7.3</td>
<td>70%</td>
</tr>
<tr>
<td>1920 – 1929</td>
<td>735</td>
<td>11.7</td>
<td>70%</td>
</tr>
<tr>
<td>1930 – 1939</td>
<td>693</td>
<td>9.6</td>
<td>70%</td>
</tr>
<tr>
<td>1940 – 1949</td>
<td>567</td>
<td>7.4</td>
<td>84%</td>
</tr>
<tr>
<td>1950 – 1959</td>
<td>454</td>
<td>5.8</td>
<td>72%</td>
</tr>
<tr>
<td>1960 – 1969</td>
<td>434</td>
<td>5.5</td>
<td>60%</td>
</tr>
<tr>
<td>1970 – 1979</td>
<td>386</td>
<td>5.2</td>
<td>52%</td>
</tr>
<tr>
<td>1980 – 1989</td>
<td>331</td>
<td>4.6</td>
<td>55%</td>
</tr>
<tr>
<td>1990 – 1999</td>
<td>261</td>
<td>3.4</td>
<td>51%</td>
</tr>
<tr>
<td>2000 – 2009</td>
<td>167</td>
<td>2.0</td>
<td>51%</td>
</tr>
</tbody>
</table>
Pedestrian Fatalities and Severe Injuries

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

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

<table>
<thead>
<tr>
<th>Traffic Fatalities per 100,000 Residents</th>
<th>Journey-to-Work Transit + Walking Mode Share (2008-2010)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrian</td>
<td>Non-Pedestrian</td>
</tr>
<tr>
<td>NYC</td>
<td>1.82</td>
</tr>
<tr>
<td>USA (less NYC)</td>
<td>1.38</td>
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</tbody>
</table>

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

1. Vehicles approaching from behind ("back pressure")
2. Finding gap in left lane
3. Finding gap in right lane (potentially blocked by left lane)
4. Pedestrians in crosswalk with walk signal
Two-Way Toolbox: One-Way Streets

- **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
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

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

New right turn bay for eastbound W 23rd St

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

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
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