



New York City Department of Transportation  
Janette Sadik-Khan, Commissioner

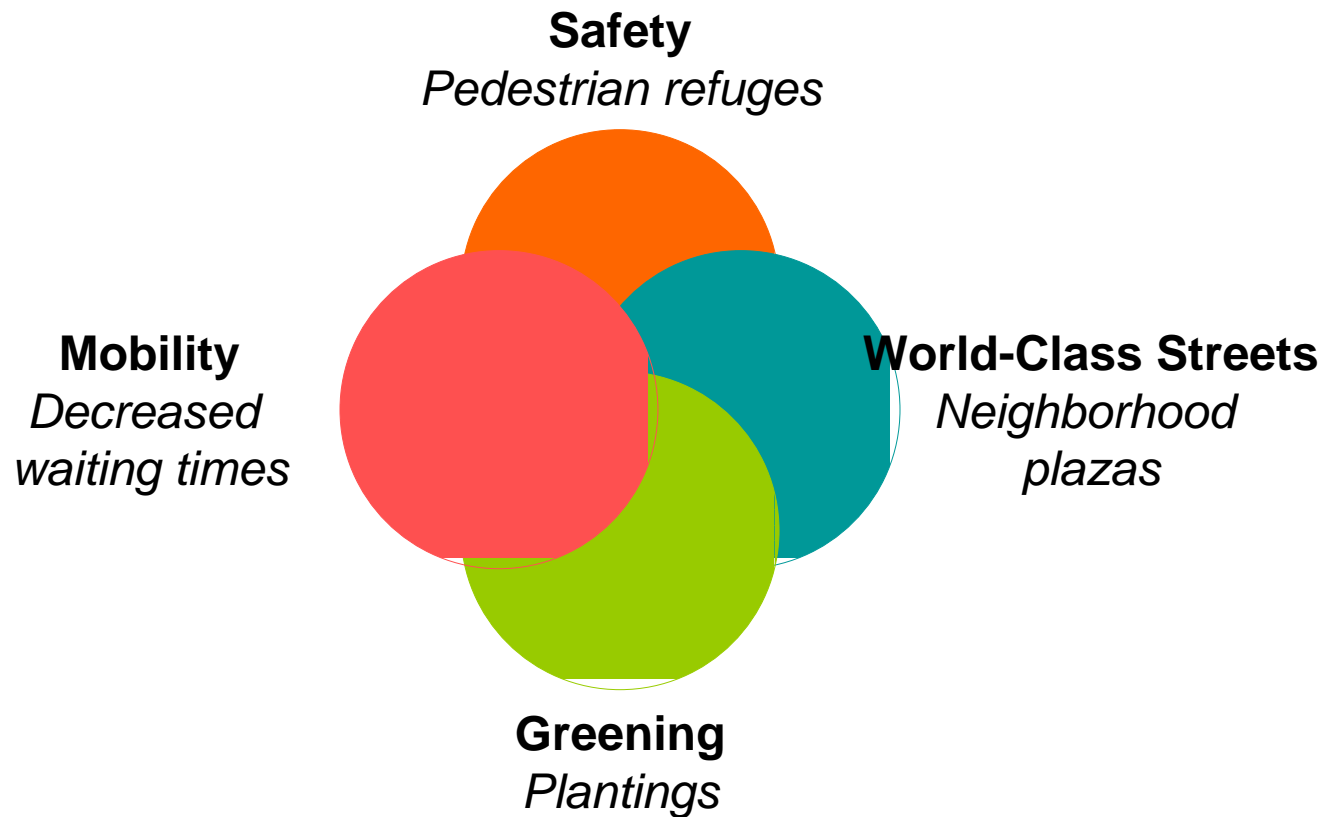
# Spatial Analysis and GIS Support for Sustainable Pedestrian Safety

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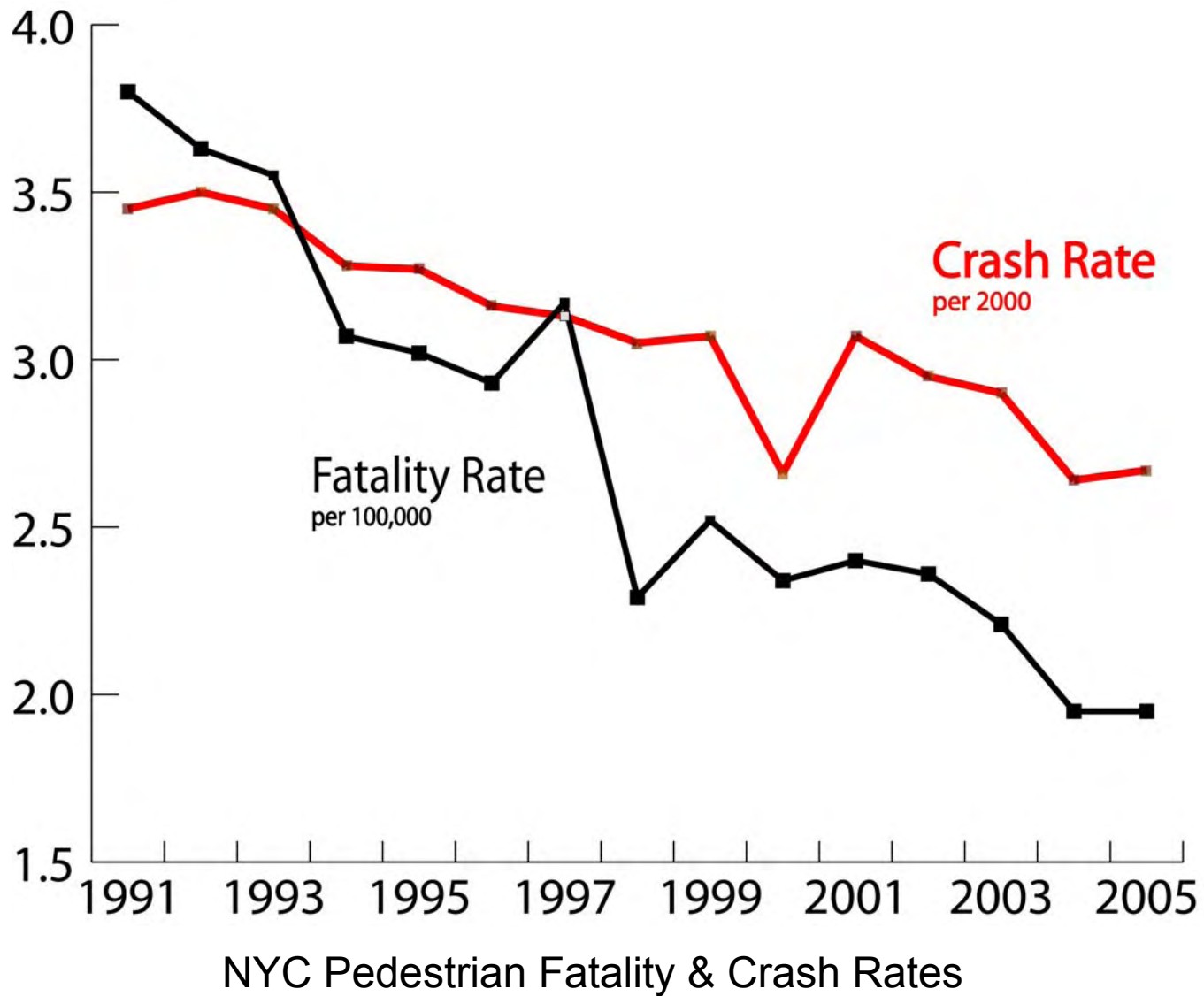
New York City Department of Transportation  
Office of Research, Implementation & Safety

# Sustainable Safety



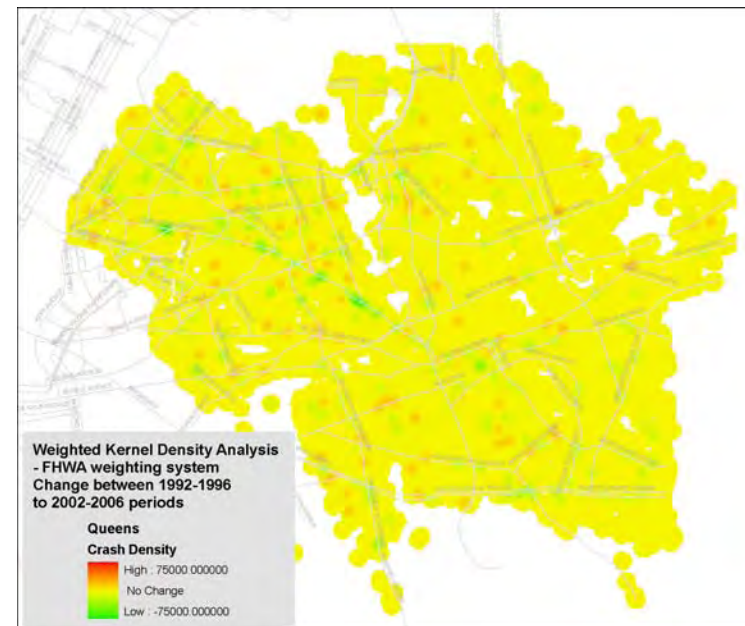
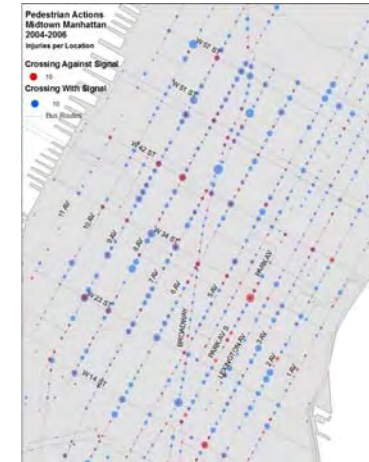
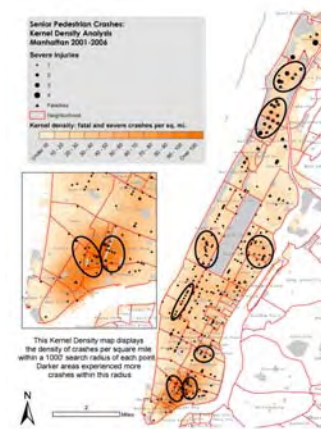
Targeted, cost-effective measures to support walking and other priority modes.

# Crash Severity $\neq$ Crash Frequency

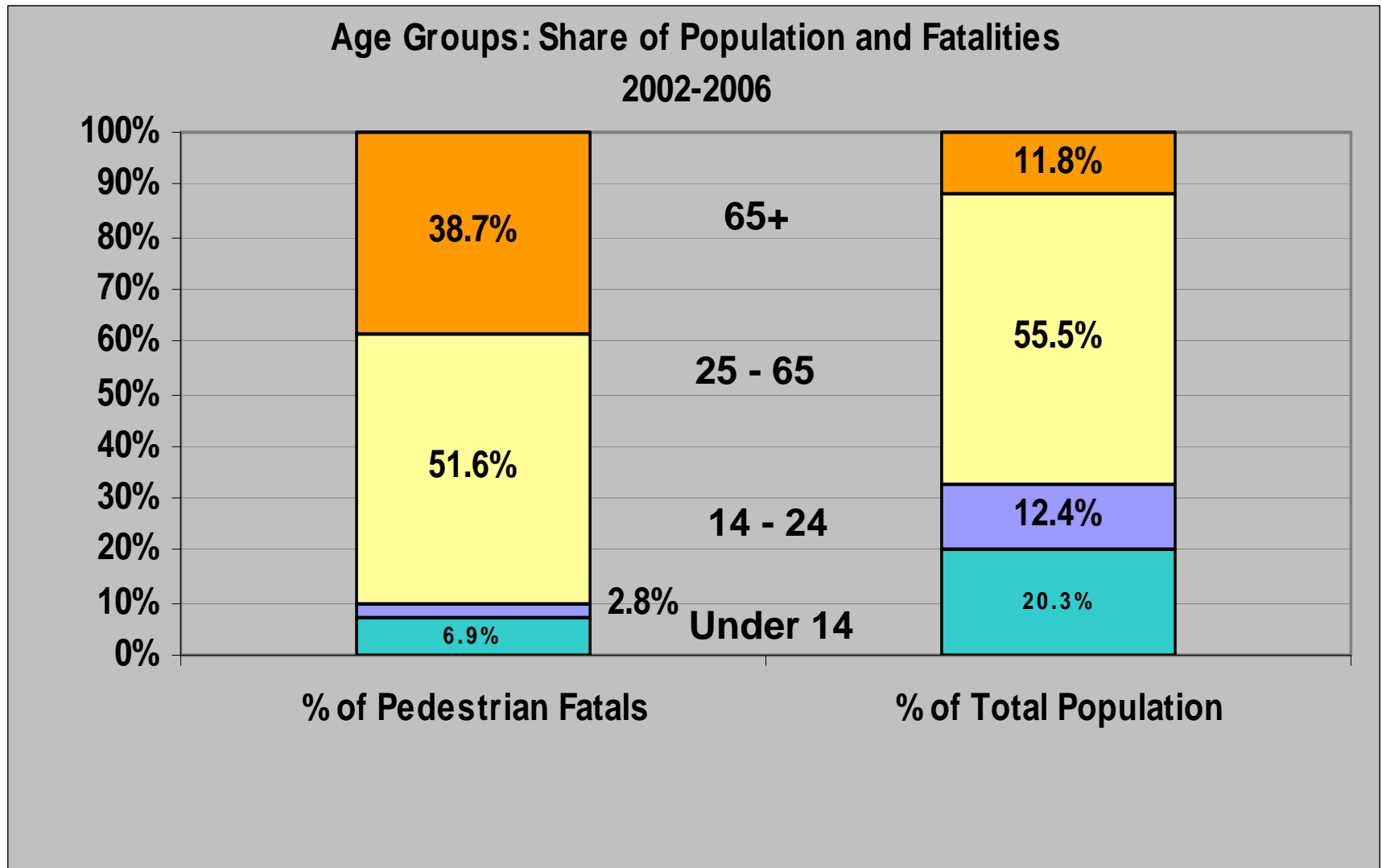


# Methodology

- **Problem:** Where should NYCDOT focus its pedestrian safety efforts?
- **Crash density analysis**
- **Crash Factors** and 'Severity Profiles'
- **Time-series** density analysis
- **Data Access via GIS**

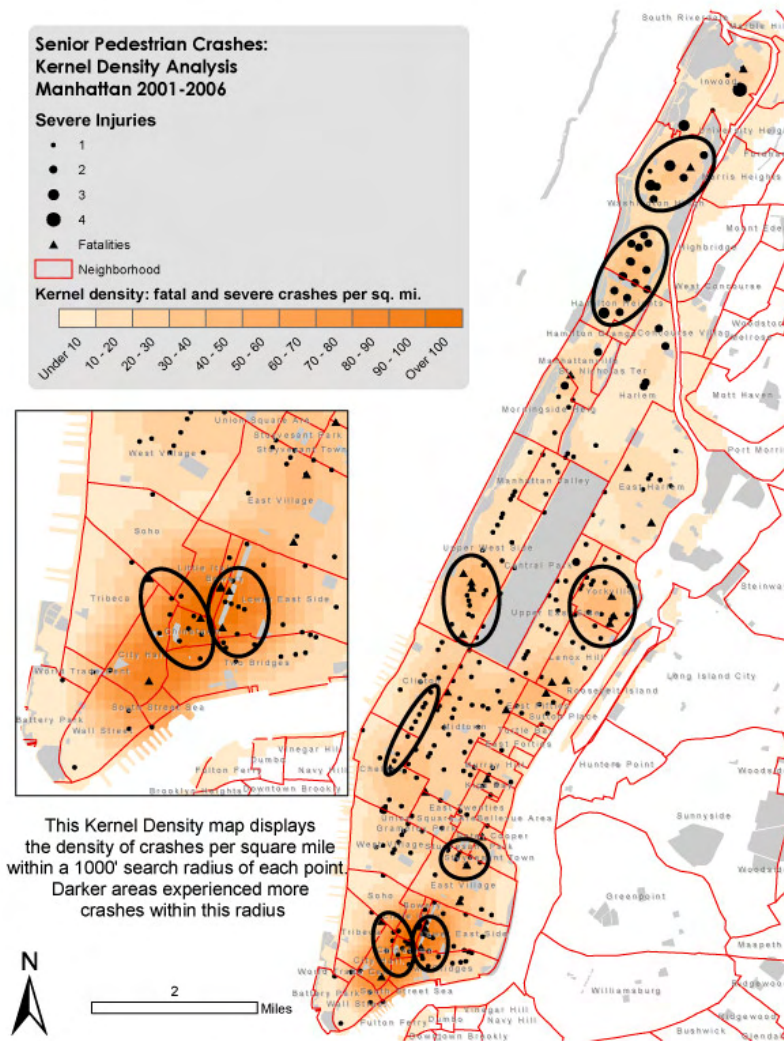


# Seniors: An At-Risk Group



# Kernel Density Analysis:

Where have senior pedestrians been severely injured?



- Extracted NYSDMV data
- Mapped senior pedestrian severe injury + fatality crashes
- Calculated density -Kernel function (1000' radius)
- Selected 25 focus areas
- Drew boundaries
- Investigated 5 pilot areas
- Implemented improvements in first 2 areas
- Consultant study initiated on 20 other areas

# Safe Streets for Seniors – Typical Treatments

Before



After



Planted Median Refuge with Roadway Narrowing

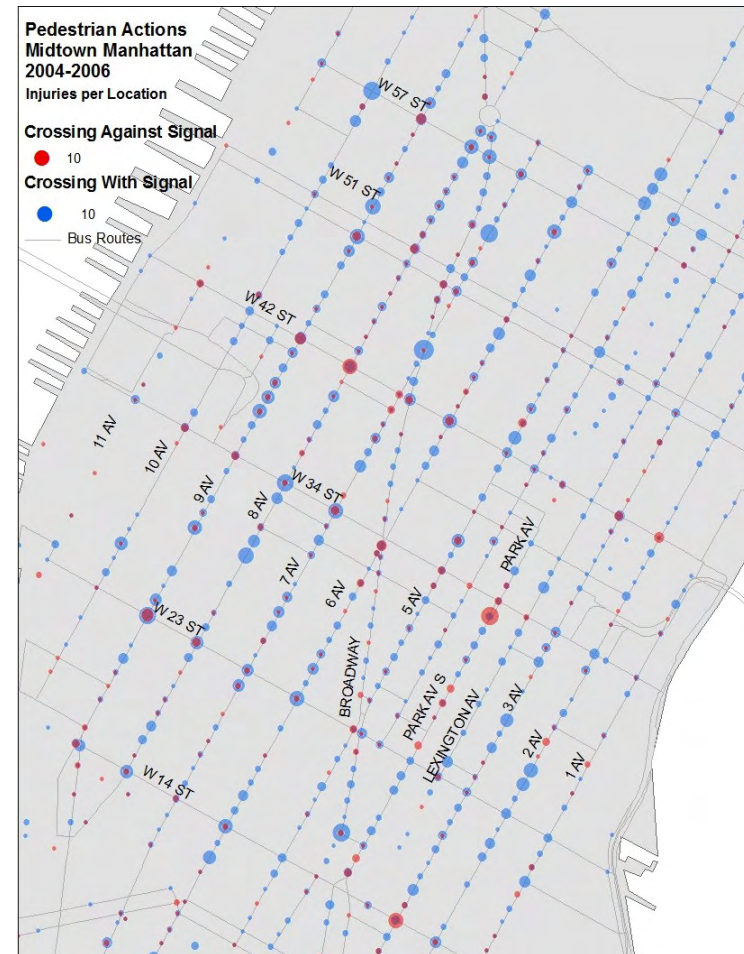


Neckdown/bulbout

- Signal Improvements:
- 3 ft/sec clearance
  - LPIs, up to 12 sec
  - Shorter waiting time/shorter cycles when possible

# Contributing Factor Analysis and 'Severity Profile'

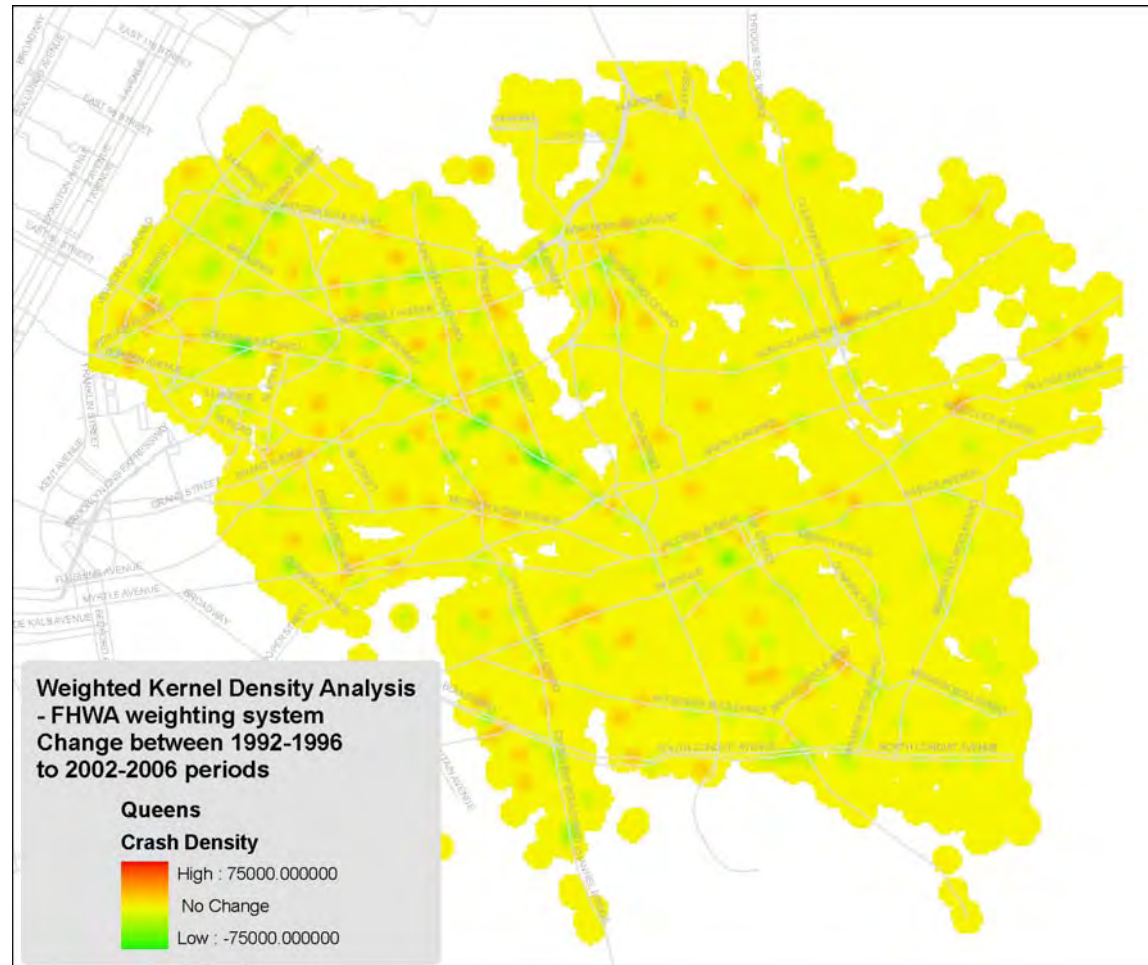
- What contributes to severity of pedestrian crashes?
  - Assumption: severity of crashes is more relevant than number of crashes
  - Hypothesis: higher speed crashes will occur at mid-block, at signalized locations, and when crossing against signal
- Mid-block vs. Intersection
  - *Insignificant difference in % fatal*
- Control Type
  - *Insignificant difference in % fatal*
- Signal Compliance
  - Crossing with (.6% fatal) vs. against signal (2.6% fatal):  
Fatality rate and KSI rate yield *extremely significant difference* ( $p < .0001$ )





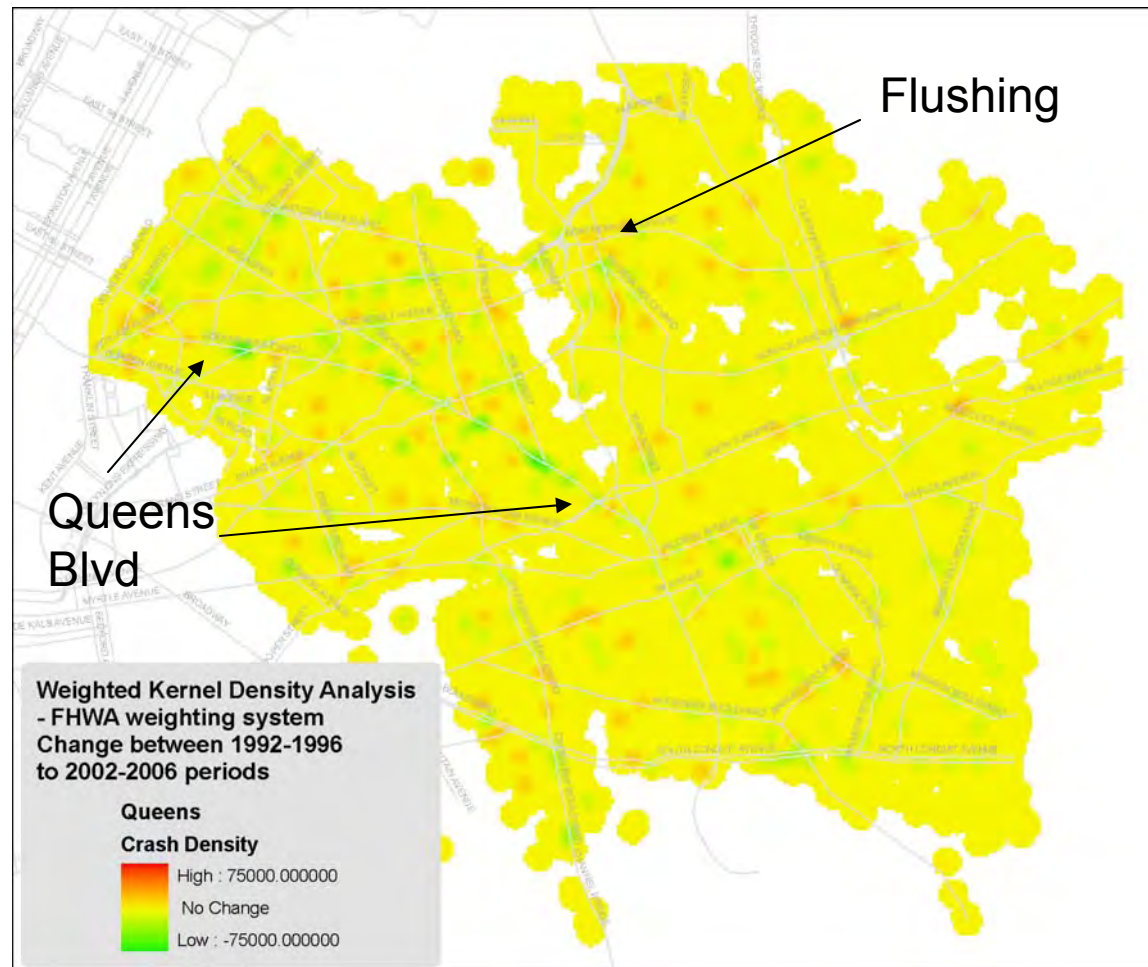
# Time-Series Analysis

- How have crash patterns changed over ten years?
- Weighted by severity
- Two 5-year periods analyzed
- Identify success of previous programs (e.g. Queens Boulevard) and emerging hotspots (e.g. Flushing)



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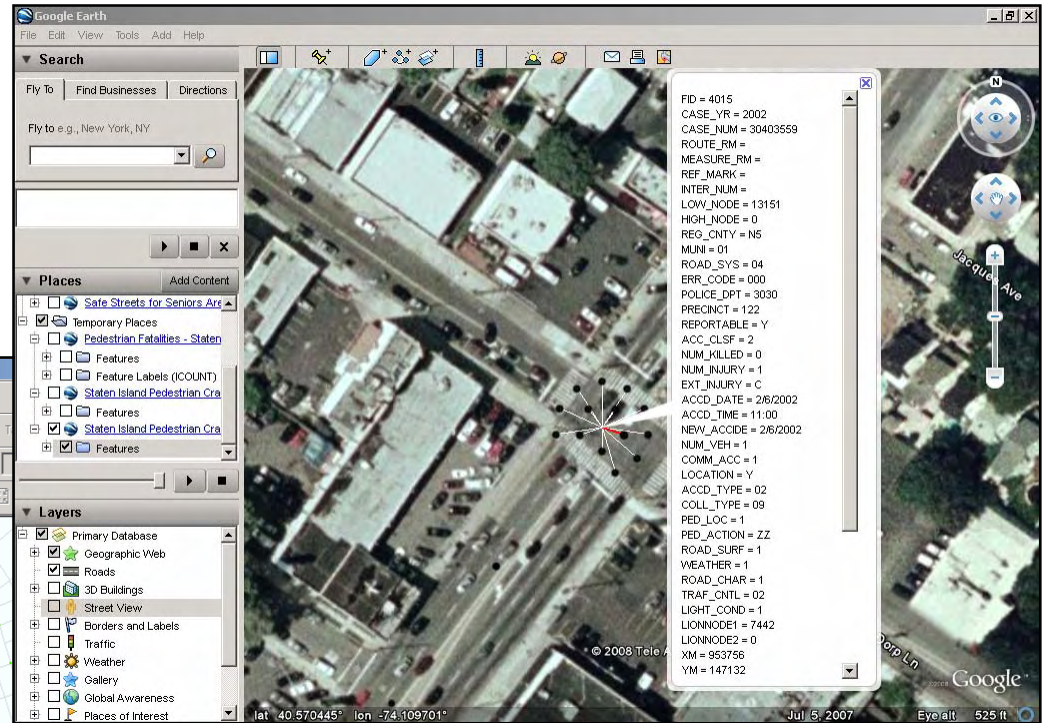
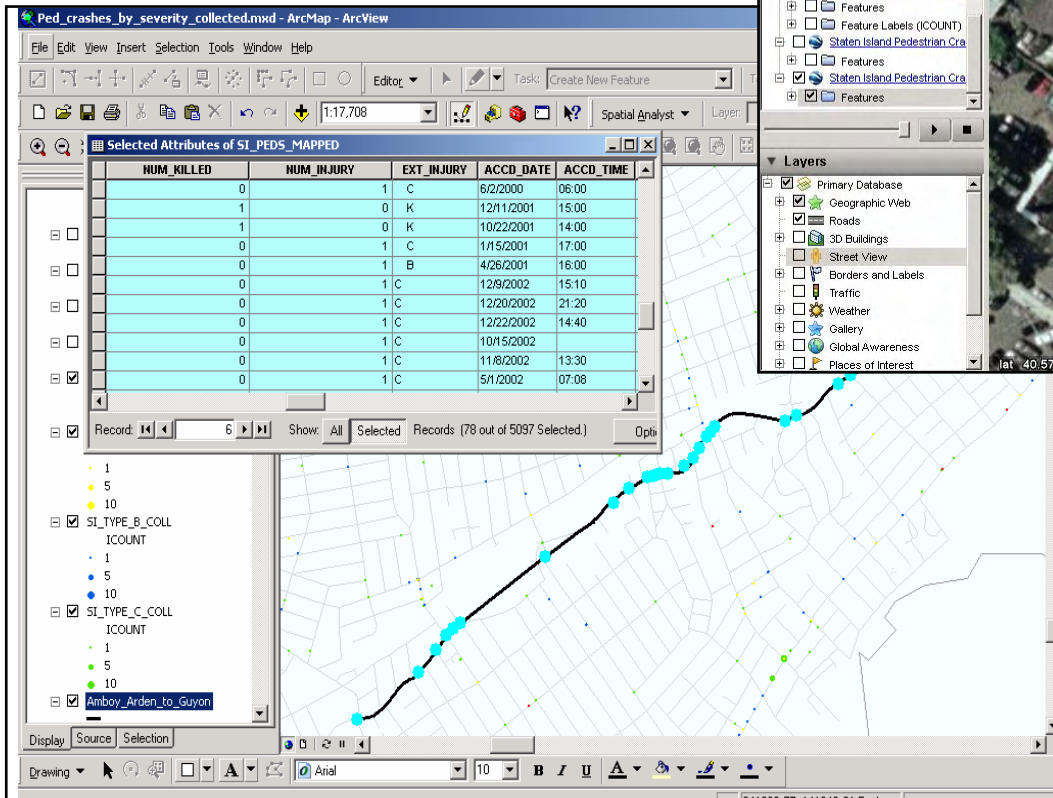


# Mapping for Accessibility

- All crashes mapped for GIS querying
- Eases corridor and large-area investigations
  - Community requests
  - Safe Streets for Seniors program
  - Congested Corridors
  - Other large projects

# Multiple Interfaces

For area-wide study,  
you need ArcGIS . . .



. . . for everything else, there's  
Google Earth

# Where to Look for Pedestrian Safety Issues

- Areas:
  - CBDs
  - NORCs – senior pedestrian safety
- Land Use:
  - Retail
  - Subway, Intermodal Stations – 15+ of top 20 in '06
- Facilities:
  - Undivided multilane roadways
  - Bridge & Tunnel Exits

# Regional Applications

- GIS can streamline daily data access
- Geospatial analysis (e.g. kernel density)
  - Can help identify sites for investigation at intersection, facility, and neighborhood level
  - Can identify problematic location types
- GIS can help planners correlate crash patterns to location types
  - crash types
  - severity profiles (% severe/fatal)

# Recommendations

- Goals might conflict: preventing crashes and decreasing their severity
- Decrease top speeds and peak acceleration rates
- Design for the users
  - 3 ft/sec timing in senior areas
- Mitigate turn conflicts
  - LPIs
  - Dedicated turn phases where unavoidable
- Improve compliance – or work around it
  - Decrease cycle length and design for convenience
  - Build tolerance for mistakes into the system without increasing speeds
- Examine effects of treatments on speed (short-term) and severe/fatal injuries (long term)

# Future Research Program

- Methodology
  - Severity vs. Frequency
  - How accurate is a ‘severity profile’ for ordinal ranking of priority locations for treatment?
  - How much do crashes vary from year to year at a given location
  - How do precinct reporting practices differ?
- Engineering
  - Before-and-after analysis of SSFS and other treatments
  - Safety effects of intersection control and facility design options
- Education
  - User knowledge and behavior
  - Effectiveness of targeted education efforts



# DOT Applications

- Ongoing Studies
- Continue to incorporate pedestrian mobility improvements into safety measures
- Expand engineering & planning toolbox
- Use new methods to prioritize locations for treatment



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# Questions?

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