



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

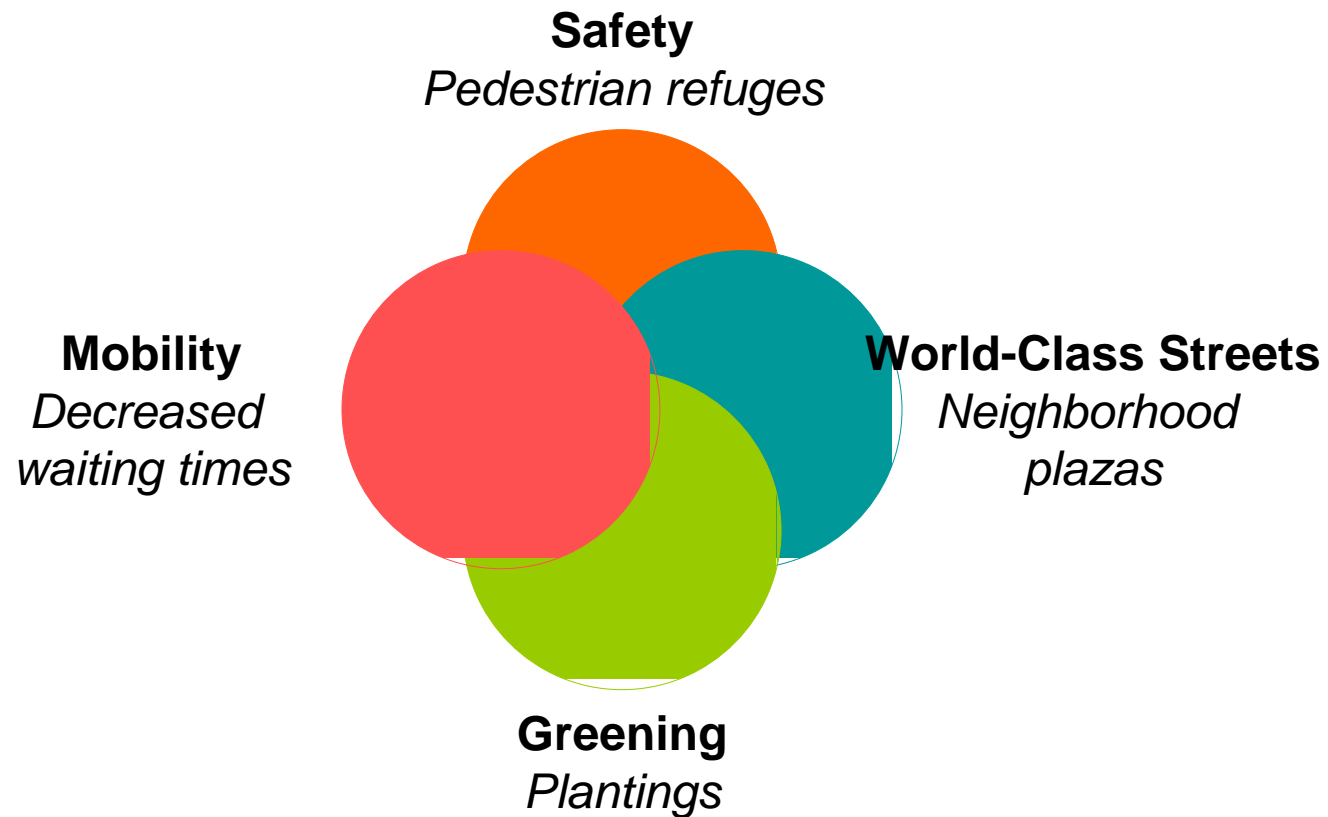
Spatial Analysis and GIS Support for Sustainable Pedestrian Safety

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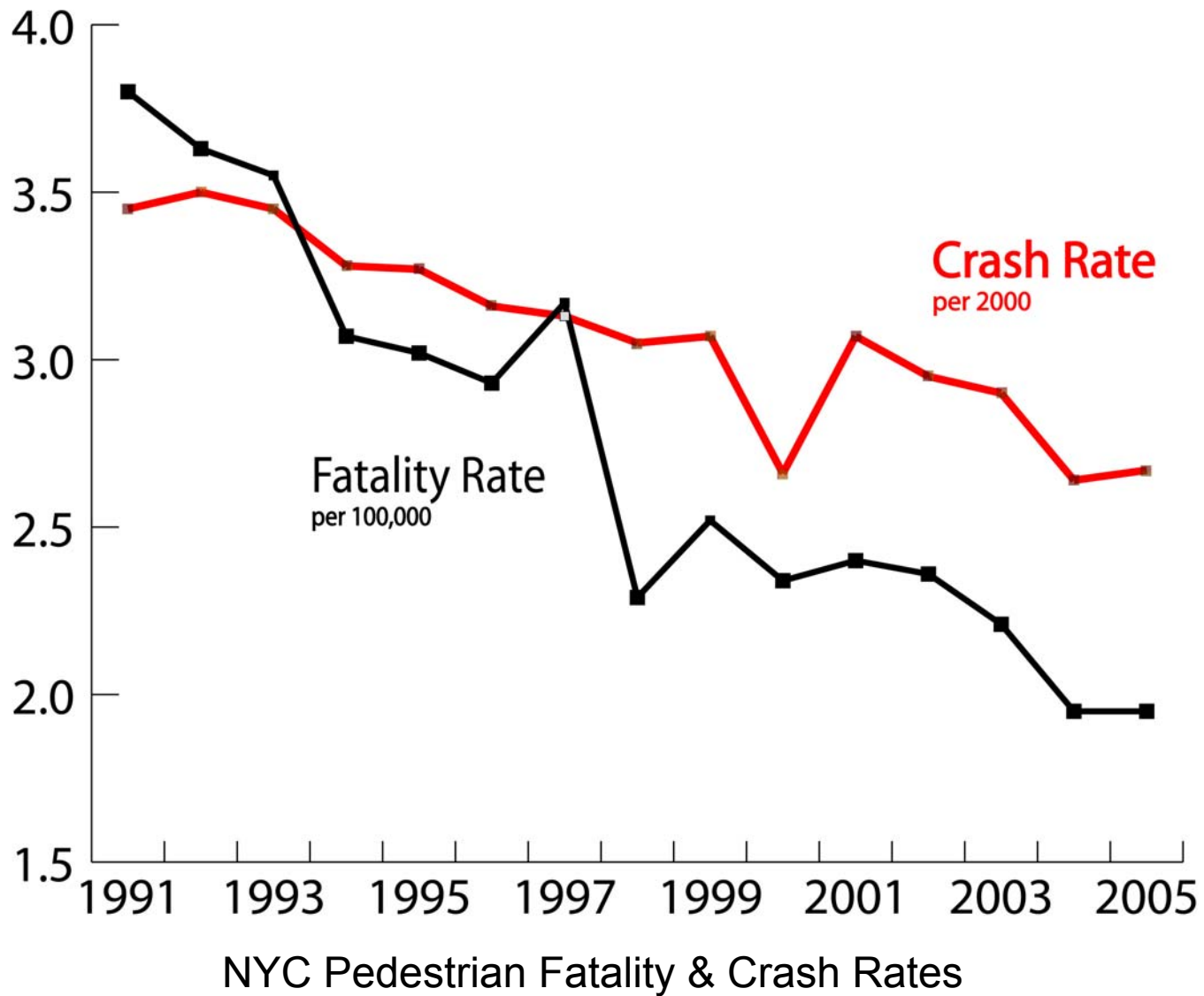
New York City Department of Transportation
Office of Research, Implementation & Safety

Sustainable Safety



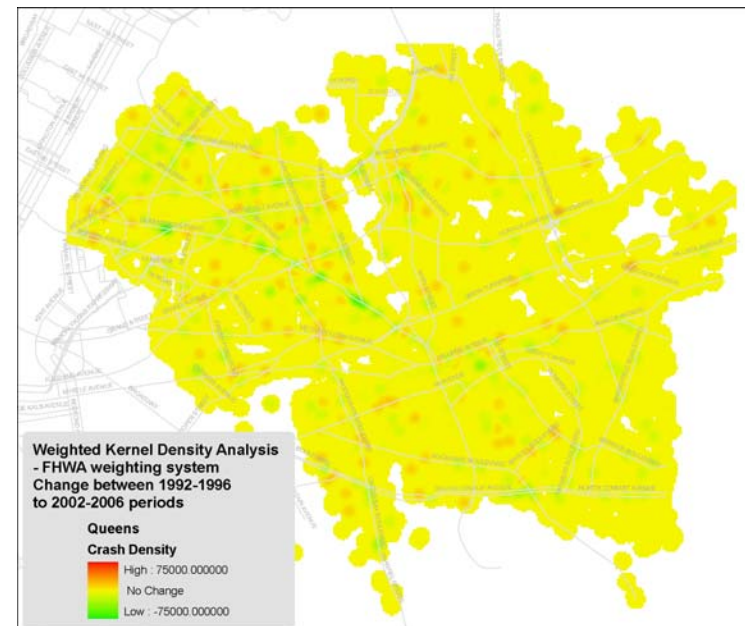
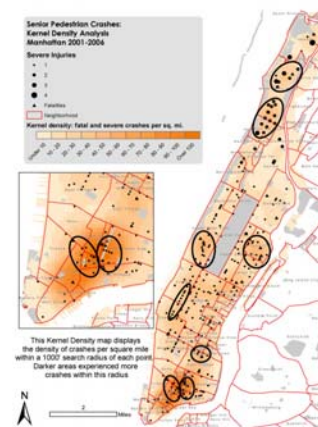
Targeted, cost-effective measures to support walking and other priority modes.

Crash Severity \neq Crash Frequency

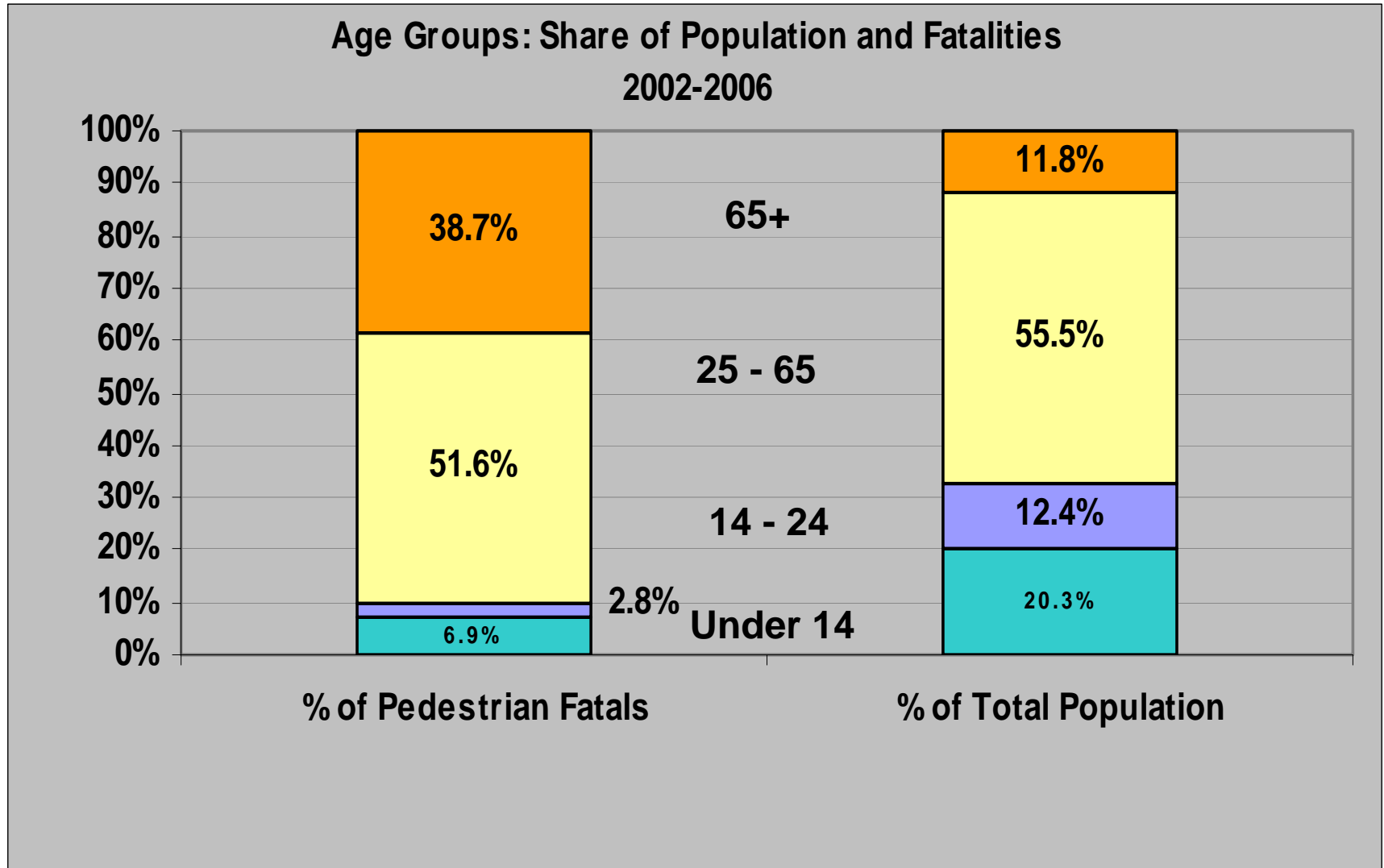


Methodology

- **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**

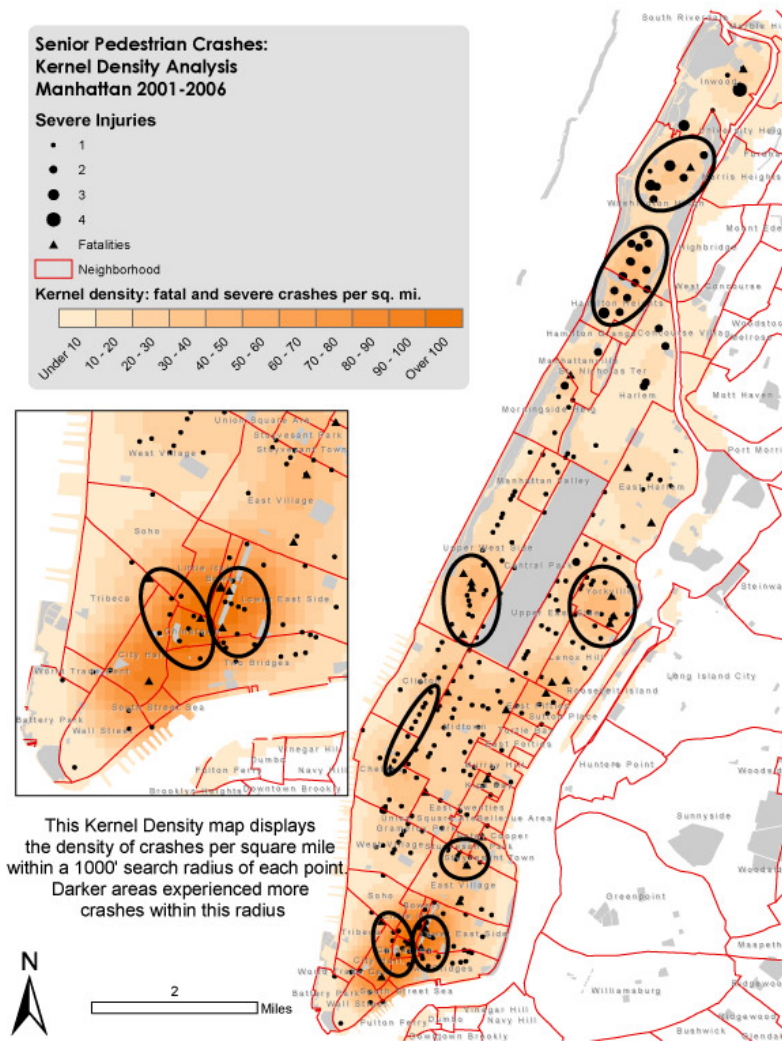


Seniors: An At-Risk Group



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



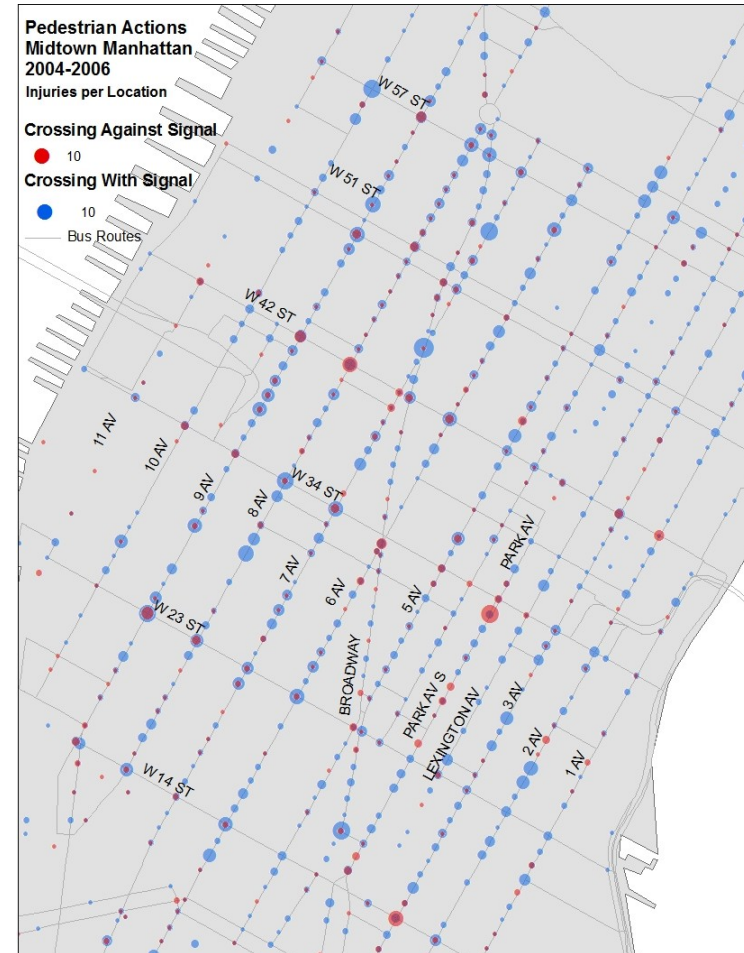
Planted Median Refuge with Roadway Narrowing

Neckdown/bulbout

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

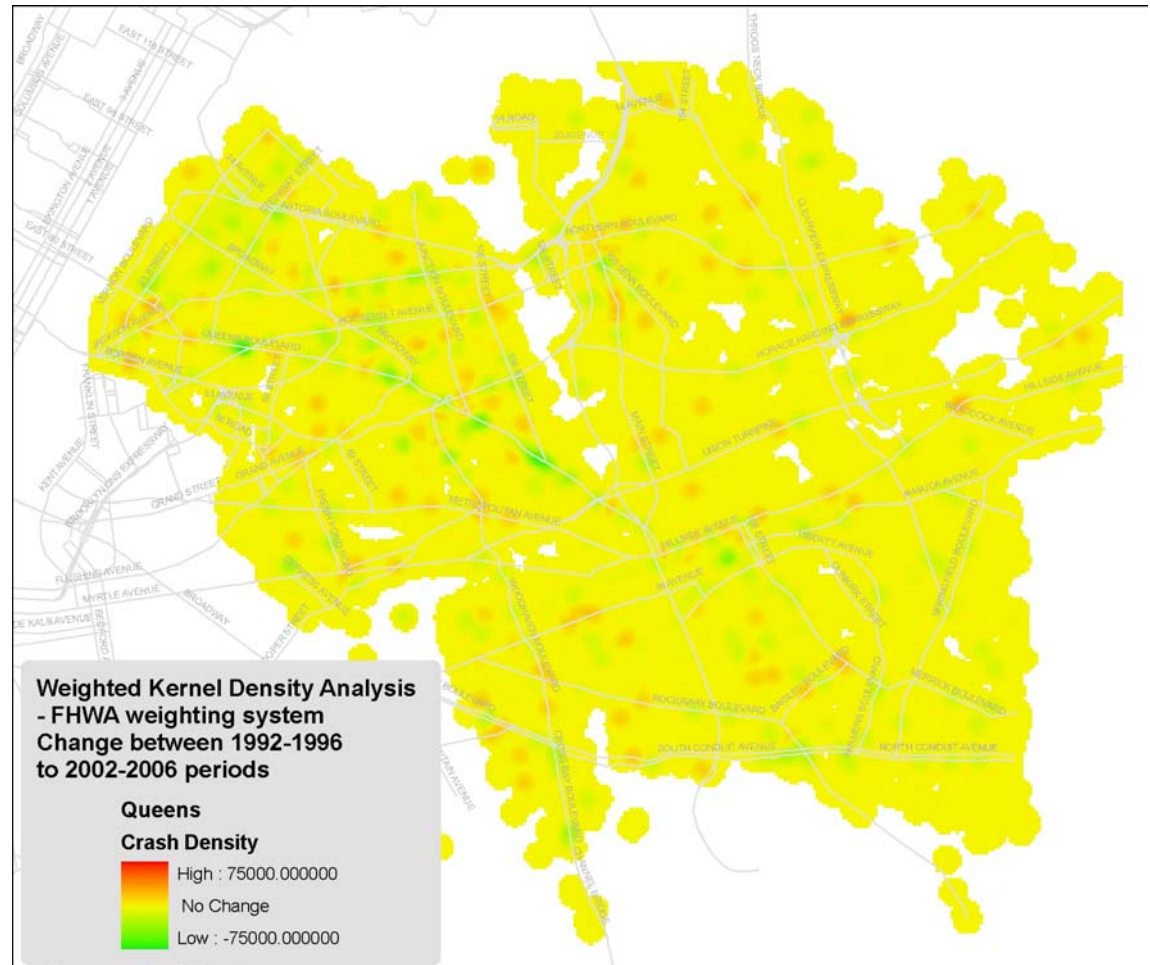
Contributing Factor Analysis and 'Severity Profile'

- 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* ($p < .0001$)



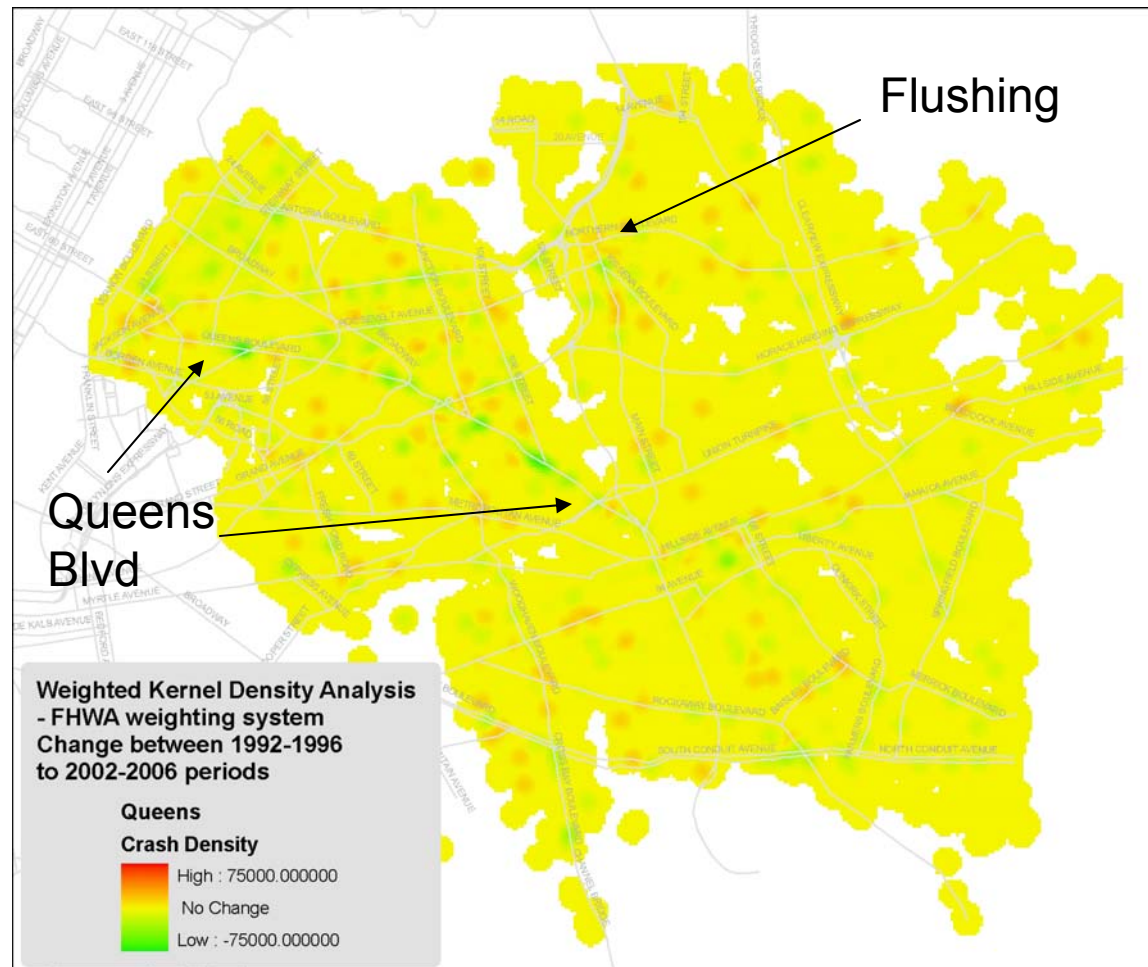
Time-Series Analysis

- 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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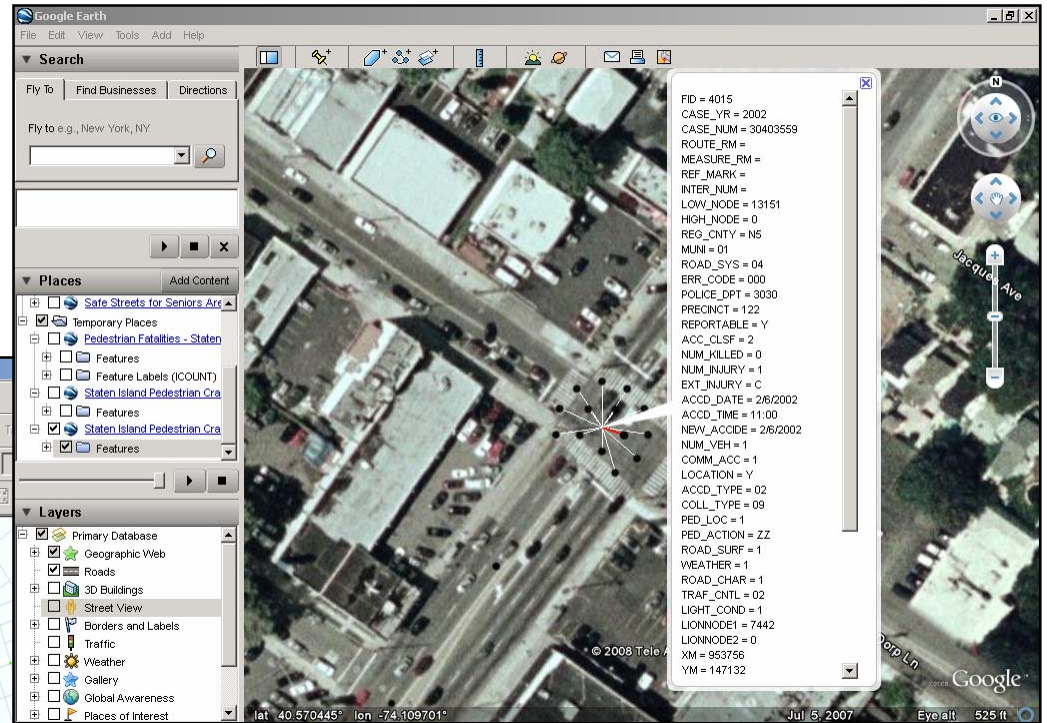
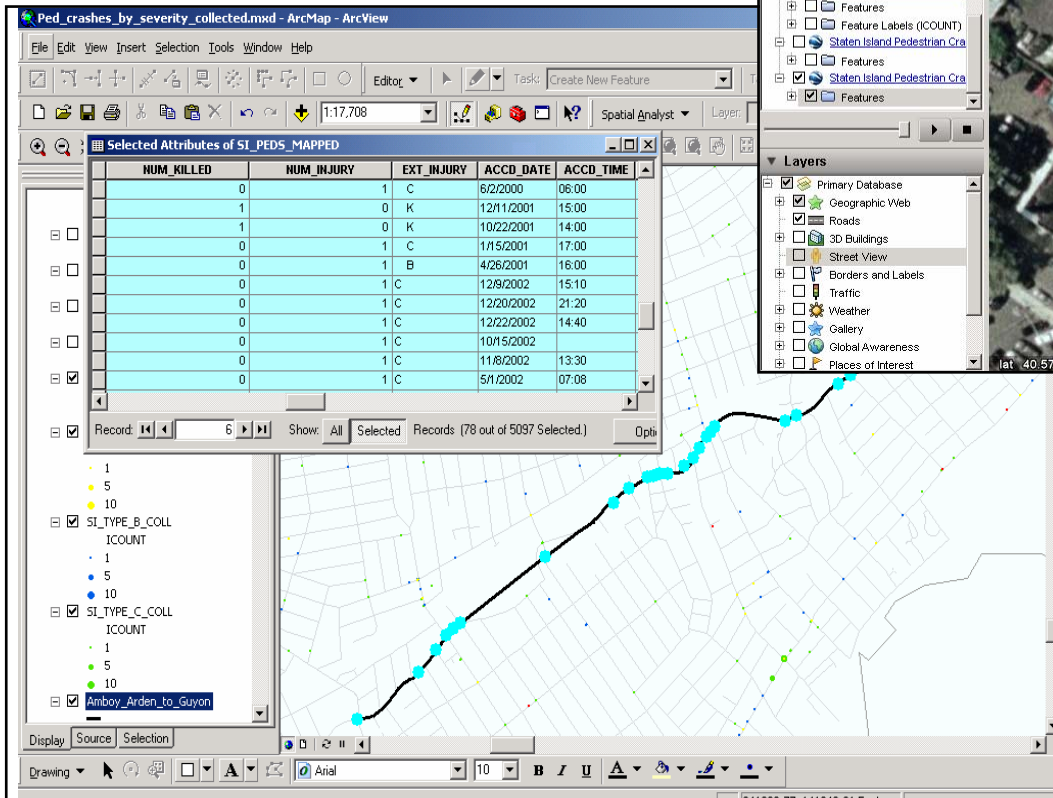


Mapping for Accessibility

- 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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