Designing Arterials for Safe Speeds

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NACTO

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U.S. Department of Transportation
National Highway Traffic Safety Administration

TRAFFIC SAFETY FACTS

Crash • Stats

NHTSA
www.nhtsa.gov

DOT HS 812 115 | A Brief Statistical Summary | February 2015

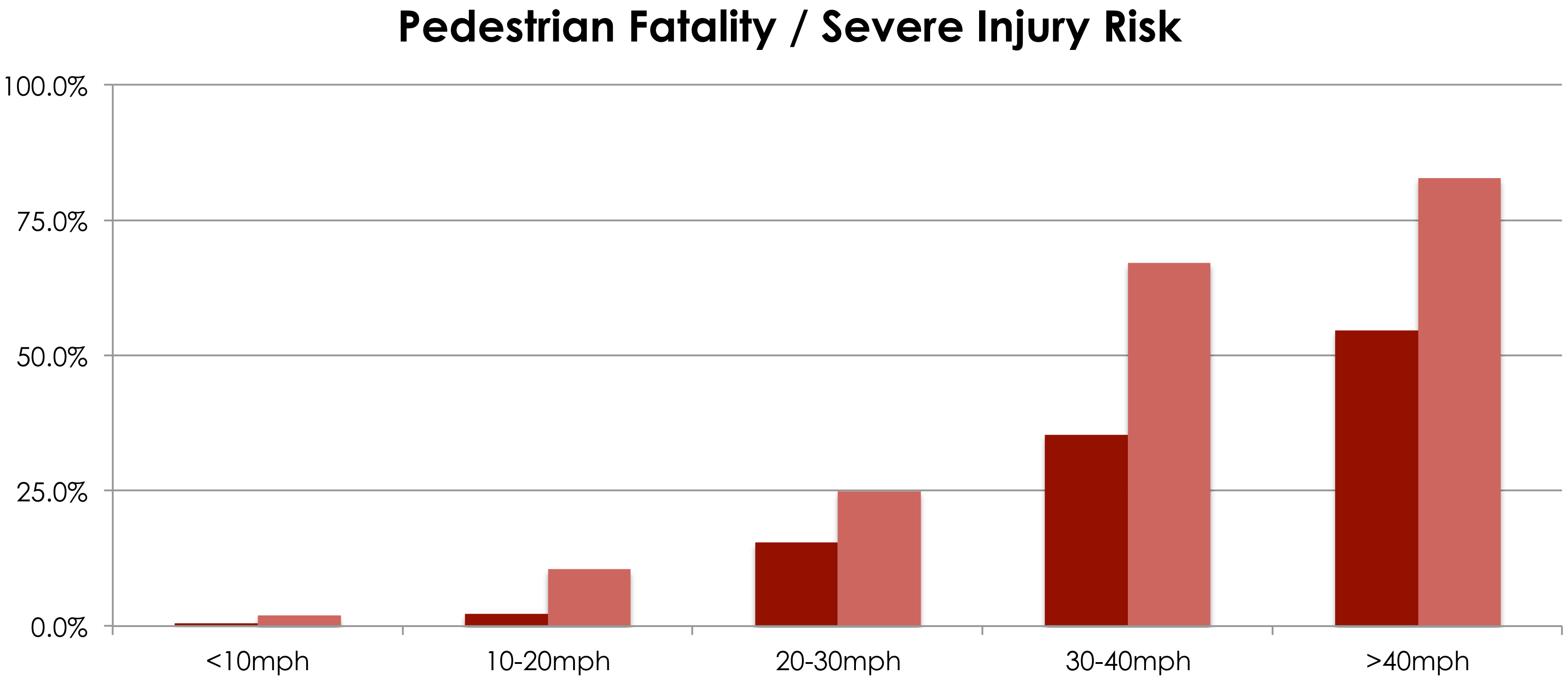
Critical Reasons for Crashes Investigated in the National Motor Vehicle Crash Causation Survey

Critical Reason	Estimated (Based on 94% of the NMVCCS crashes)	
	Number	Percentage* ± 95% conf. limits
Recognition Error	845,000	41% ±2.2%
Decision Error	684,000	33% ±3.7%
Performance Error	210,000	11% ±2.7%
Non-Performance Error (sleep, etc.)	145,000	7% ±1.0%
Other	162,000	8% ±1.9%
Total	2,046,000	100%

"The critical reason was assigned to the driver in an estimated **94%** of crashes."

Speed is the problem.

Vehicle Speed increases Risk



Tefft (AAA Foundation), 2011

Speed reduces recognition.

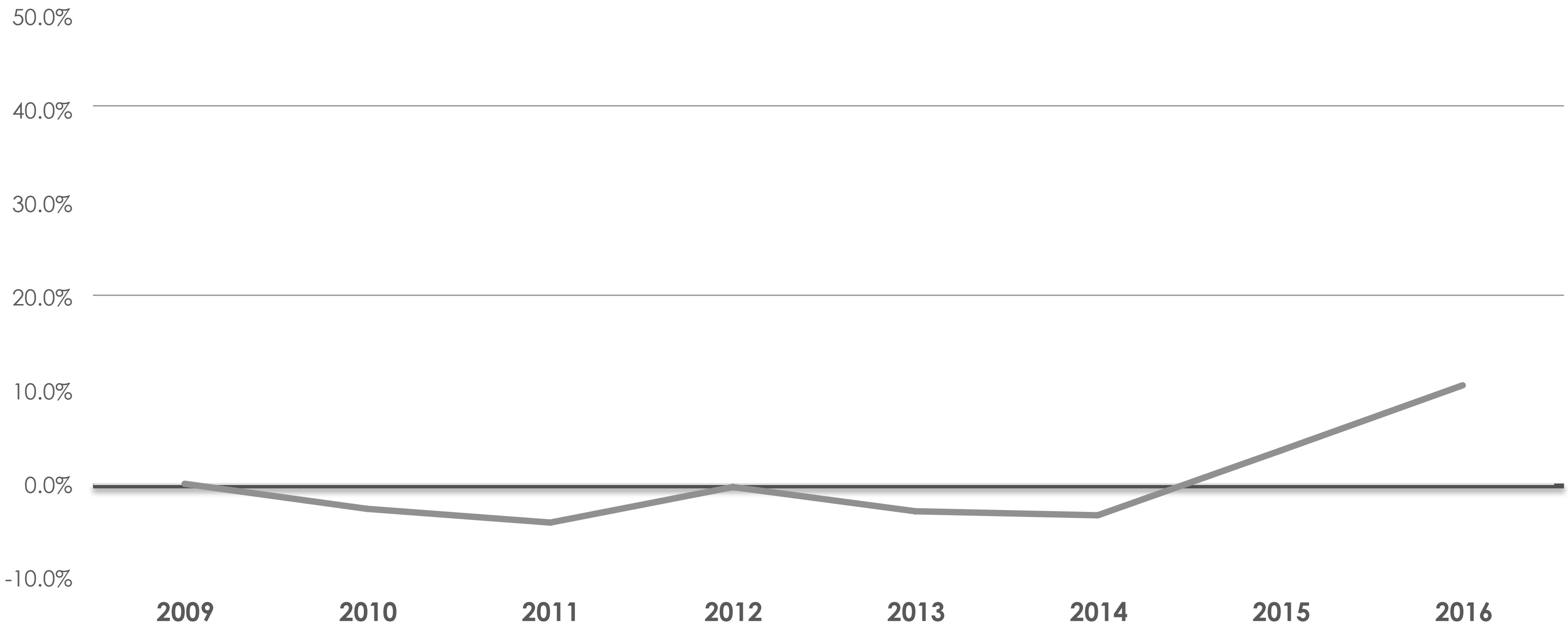
Speed reduces recognition.

Speed extends stop distance.

New York Ave, DC (*Google Maps*)

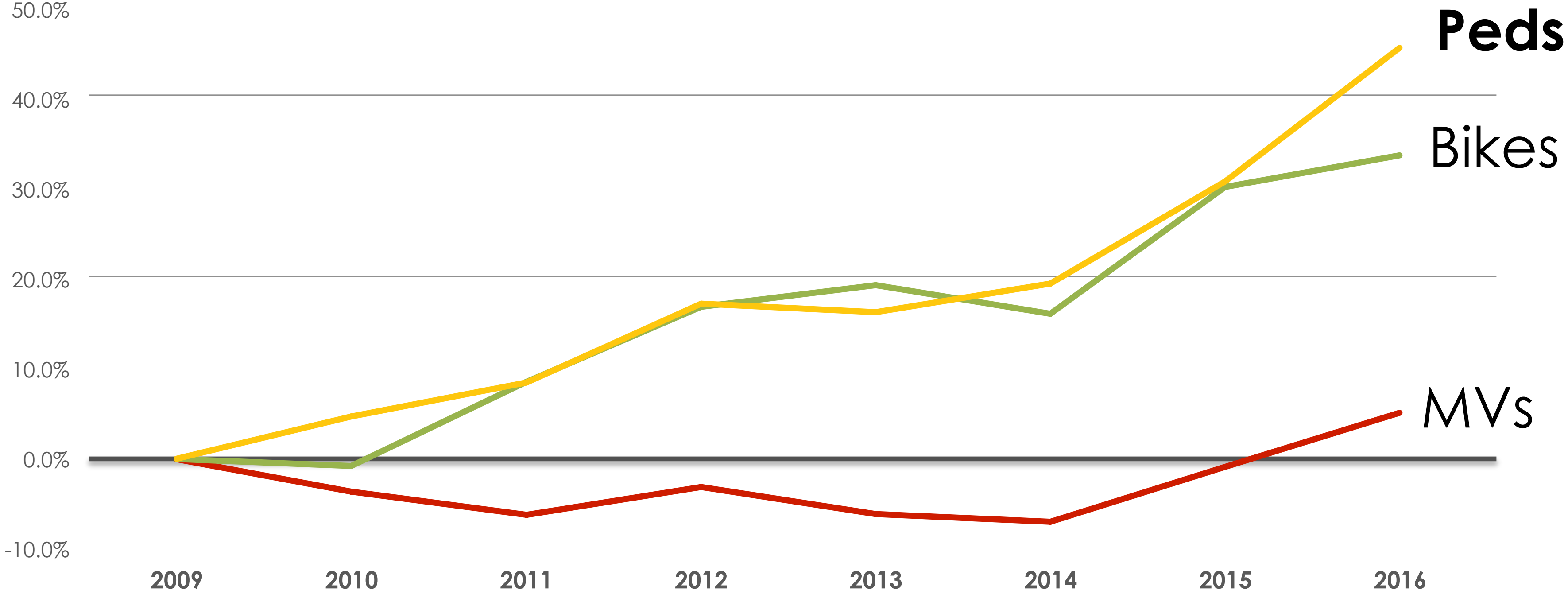
Speed extends stop distance.

While all fatalities are rising…



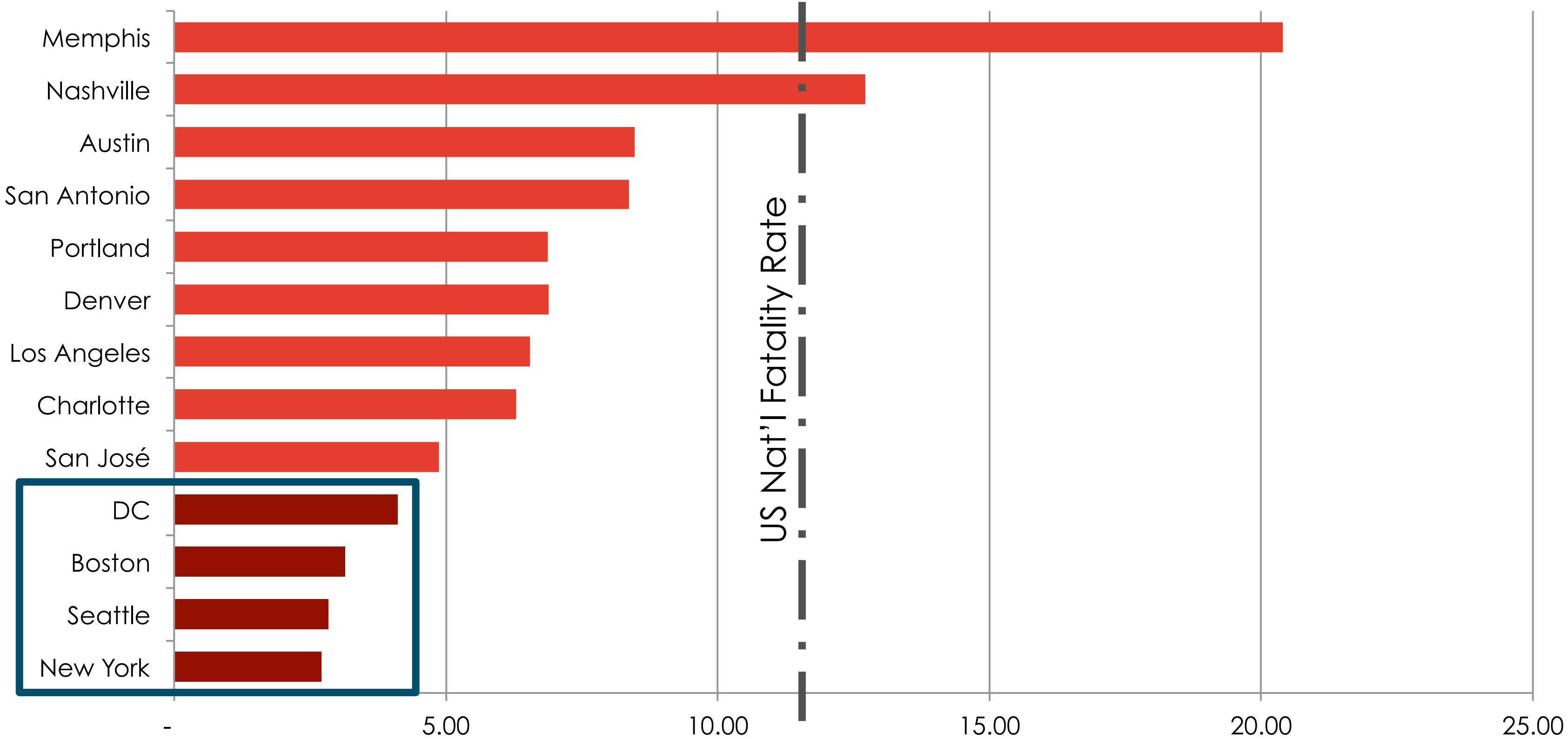
NHTSA, 2017

…Ped & Bike are Growing Fastest



NHTSA, 2017

Auto-Centric Design ≠ Safety



FARS data (NHTSA), 2016

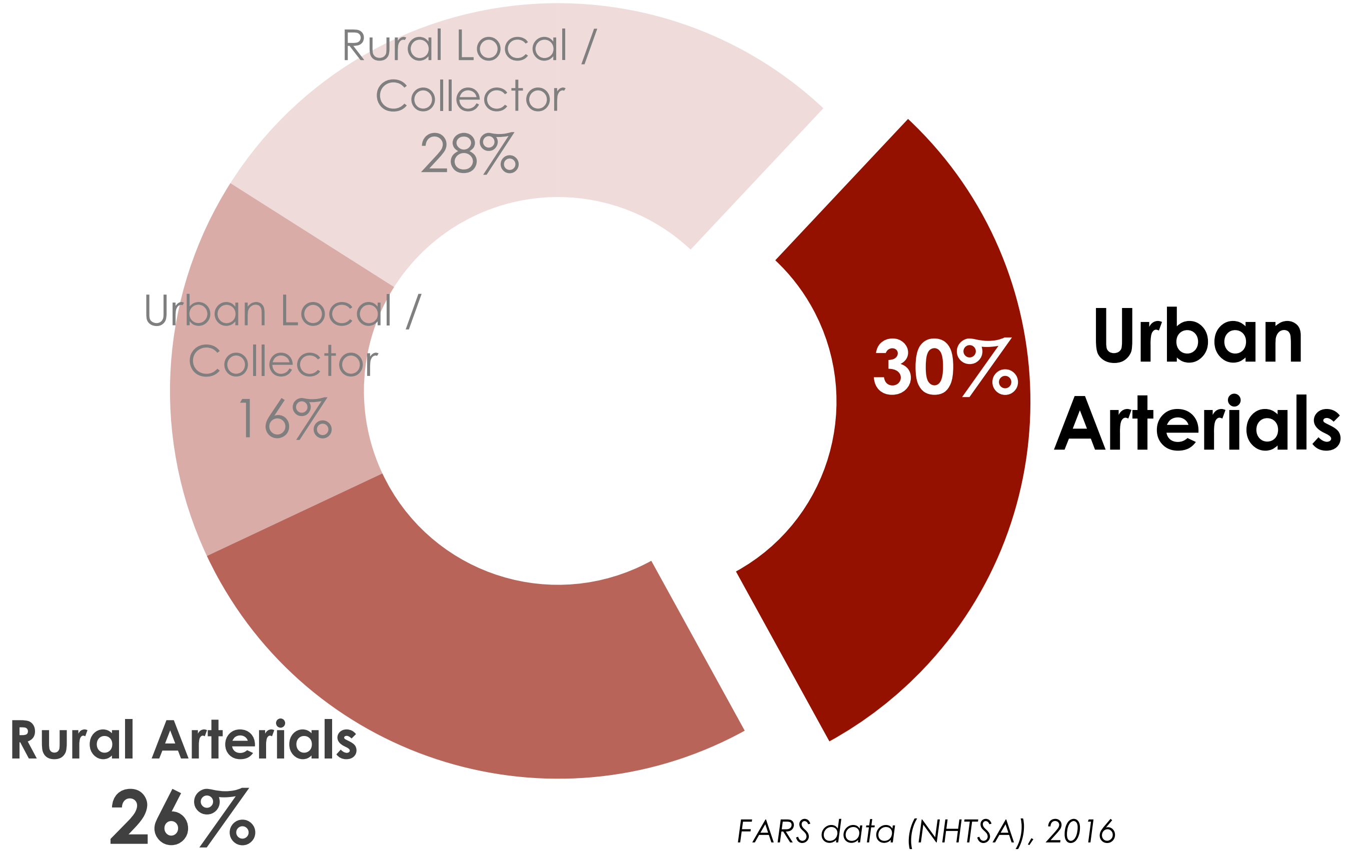
Really?

NYC DOT

Risk to people walking & biking is systemic.

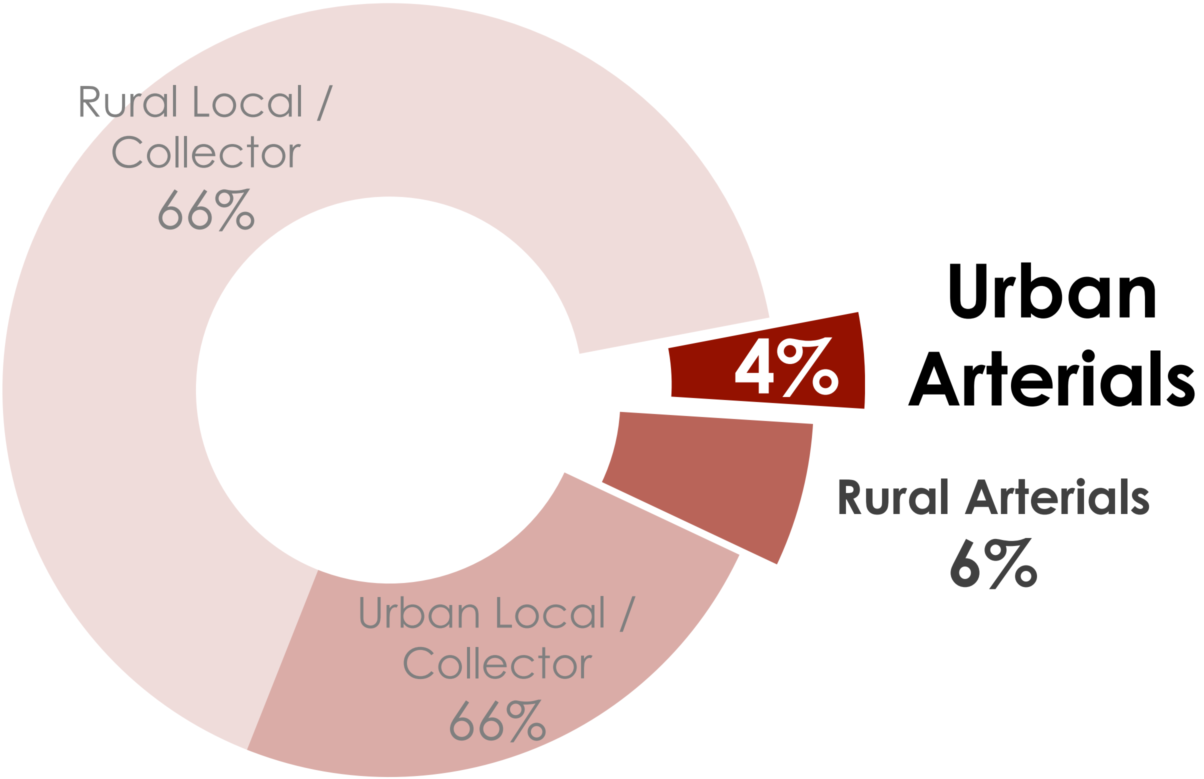
Dangerous by Design,
National Complete Streets Coalition

Most (non-freeway) traffic fatalities…



FARS data (NHTSA), 2016

...are on a small % of streets



FARS data (NHTSA), 2016

We need to proactively design streets for safe speed.

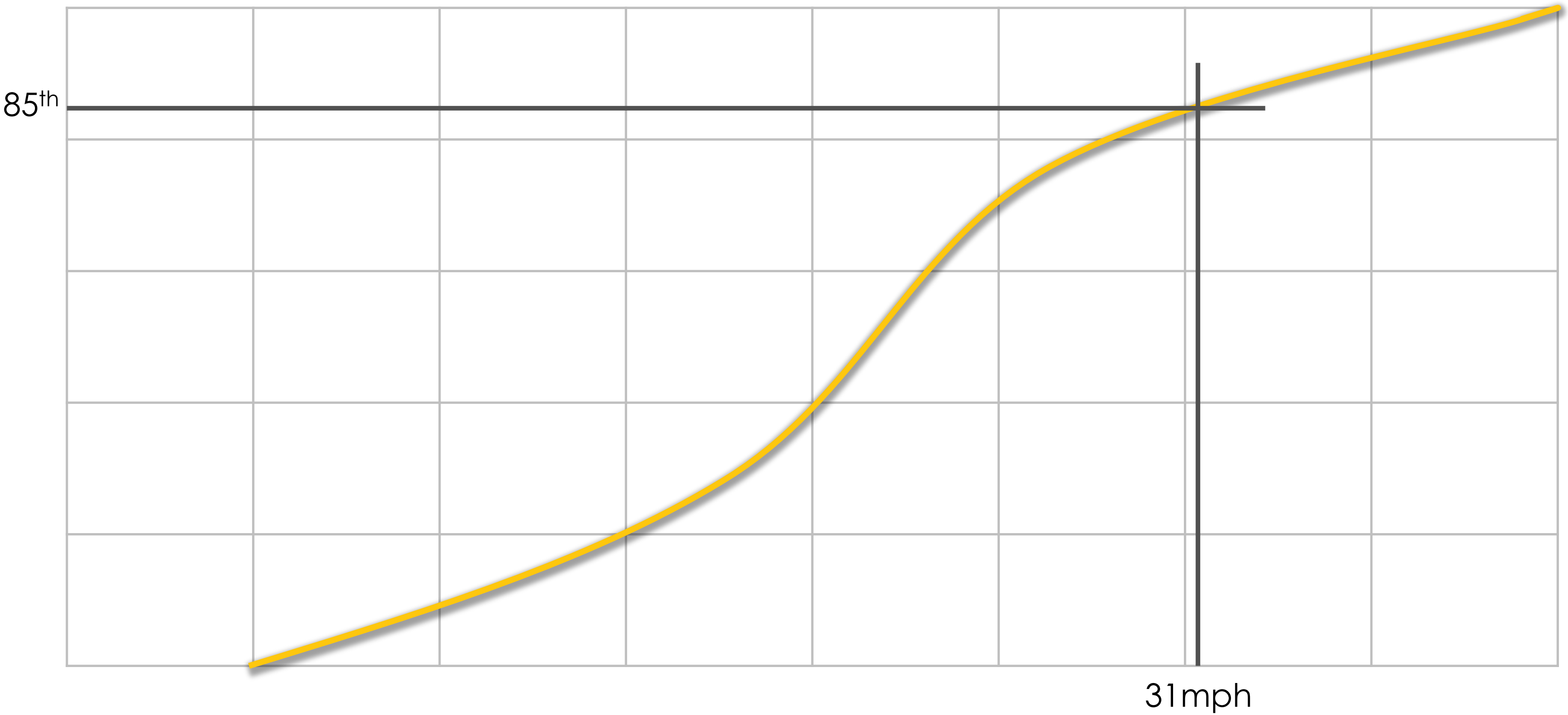
Passive Approach

Operating Speed →

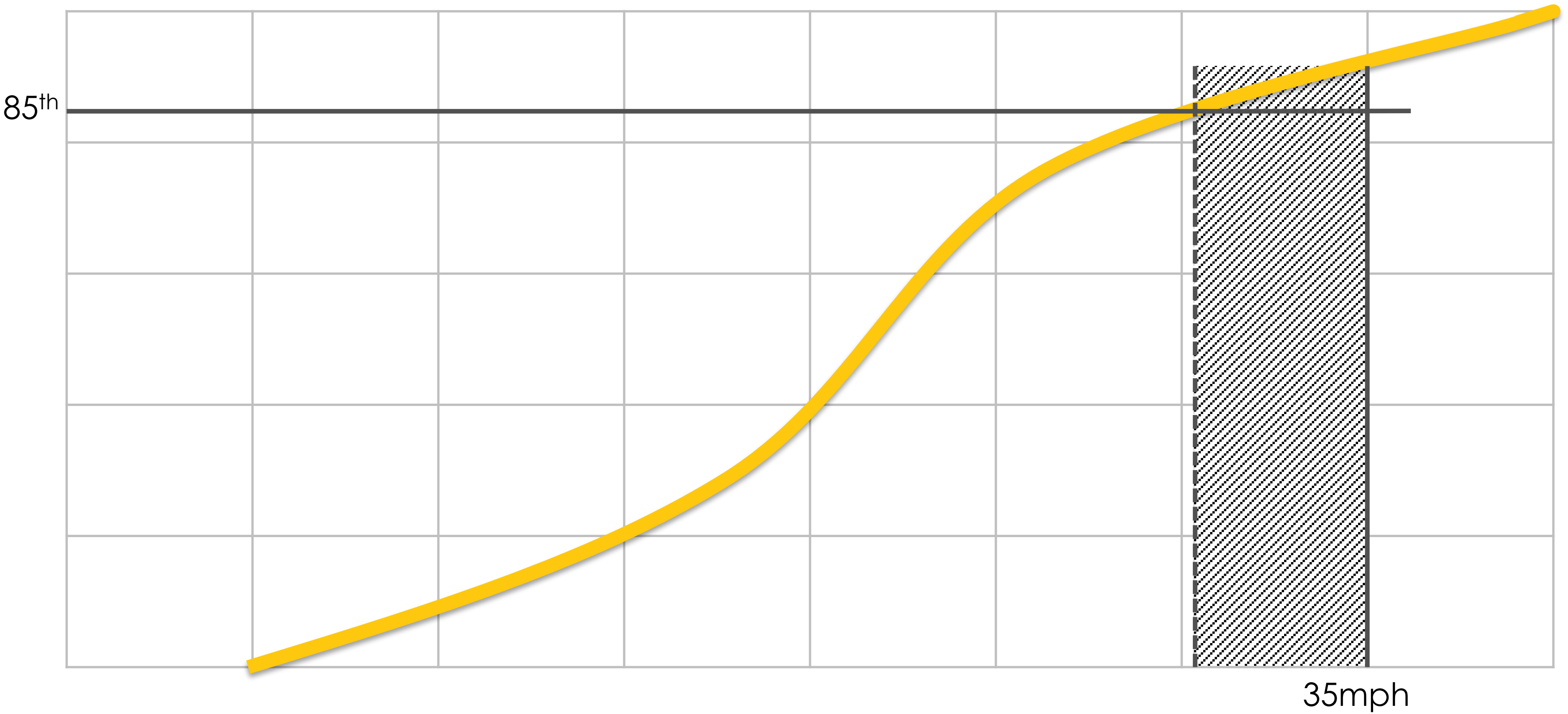
Design Speed →

Posted Speed

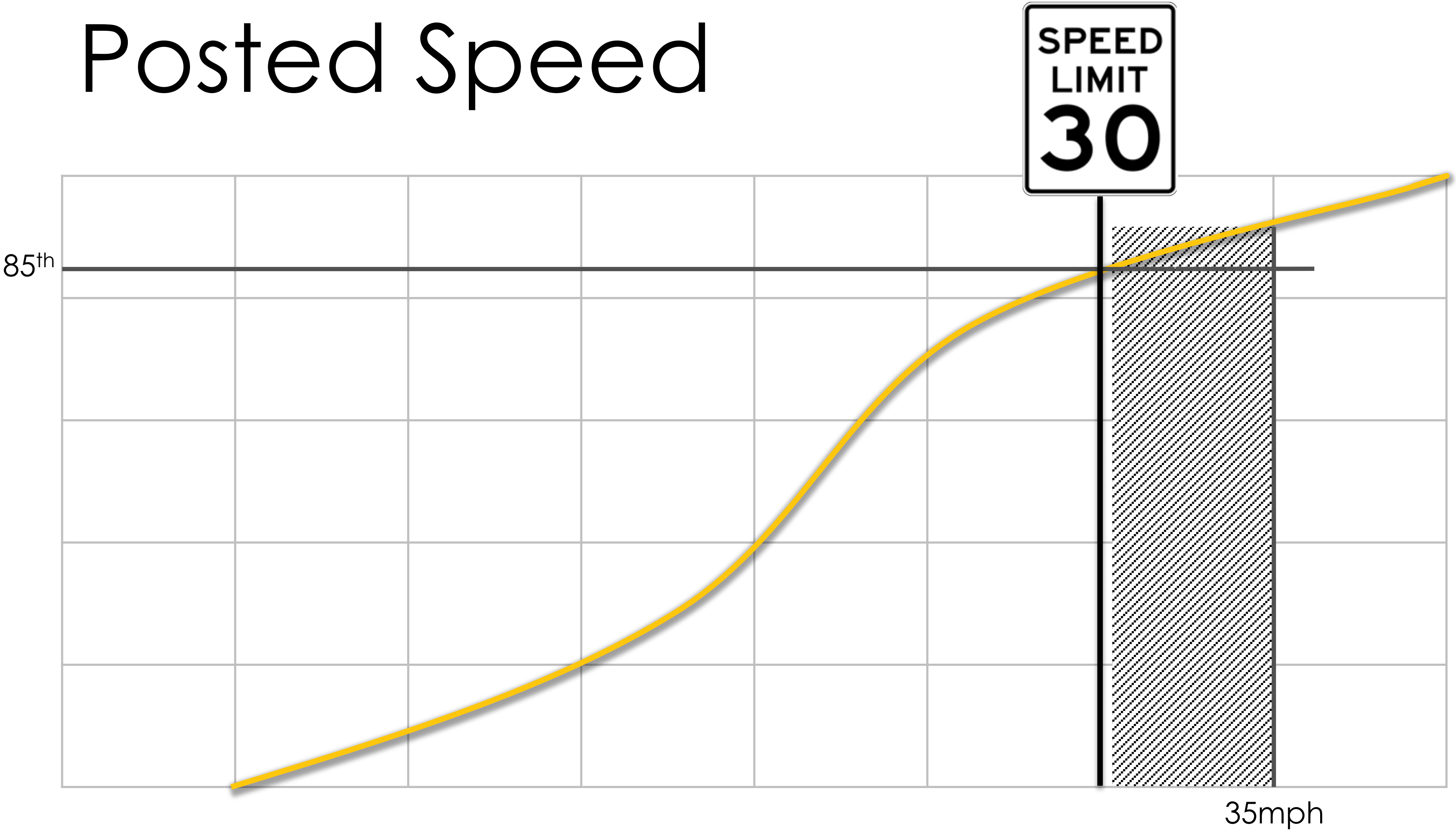
Observed Operating Speed



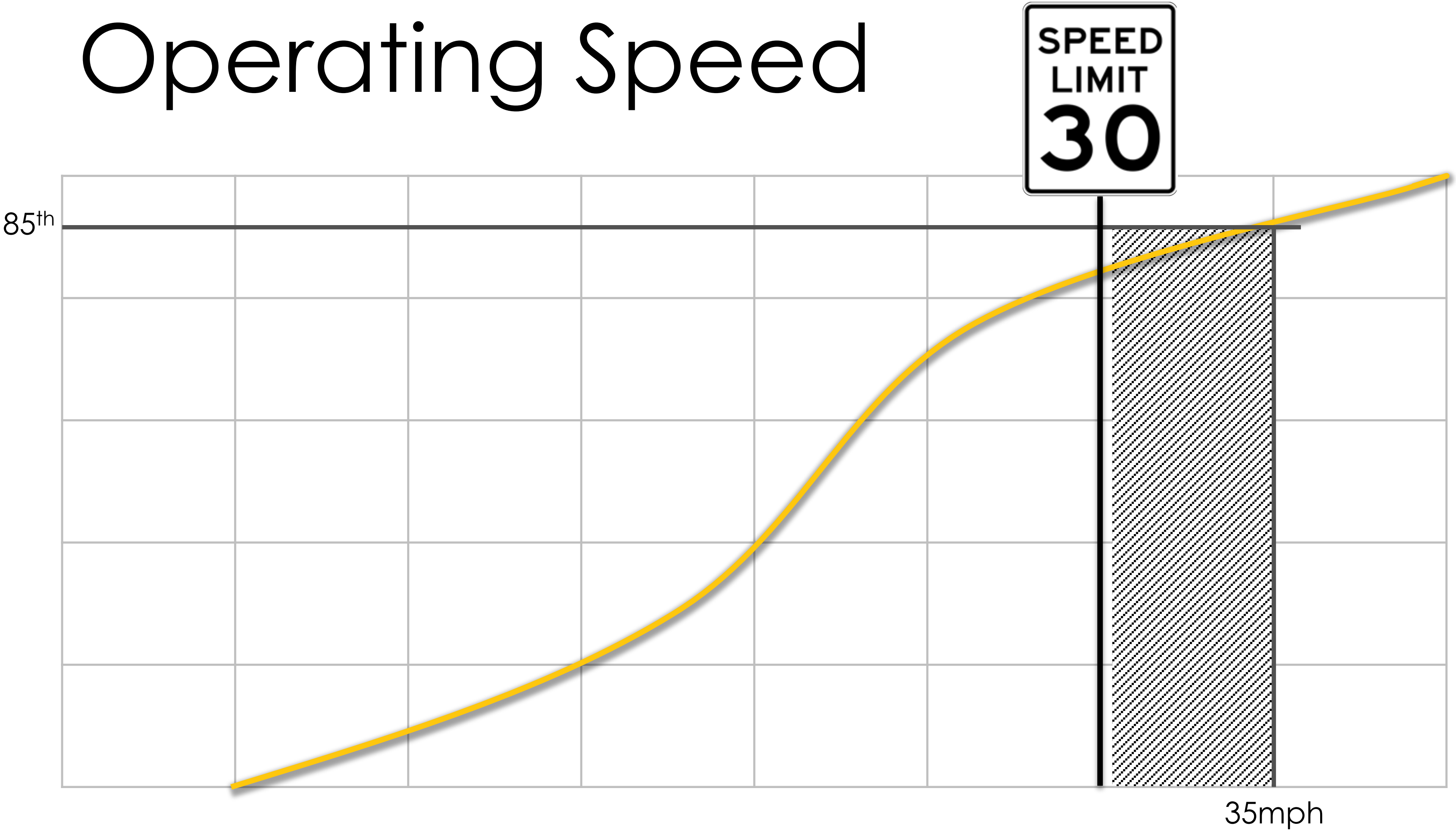
Design Speed



Posted Speed



Operating Speed



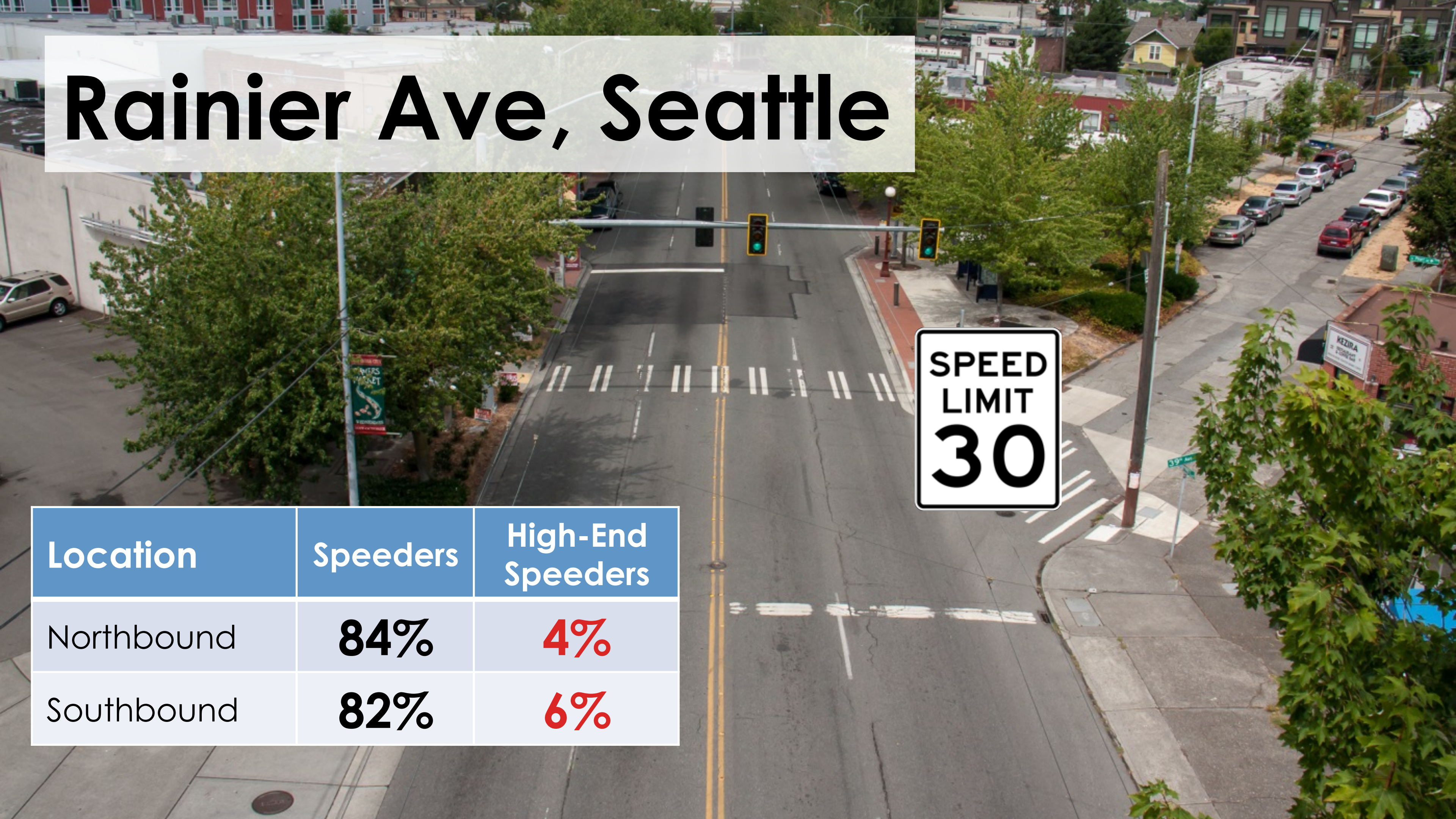
Passive Approach

Operating Speed →

Design Speed →

Posted Speed

Rainier Ave, Seattle



Location	Speeders	High-End Speeders
Northbound	84%	4%
Southbound	82%	6%

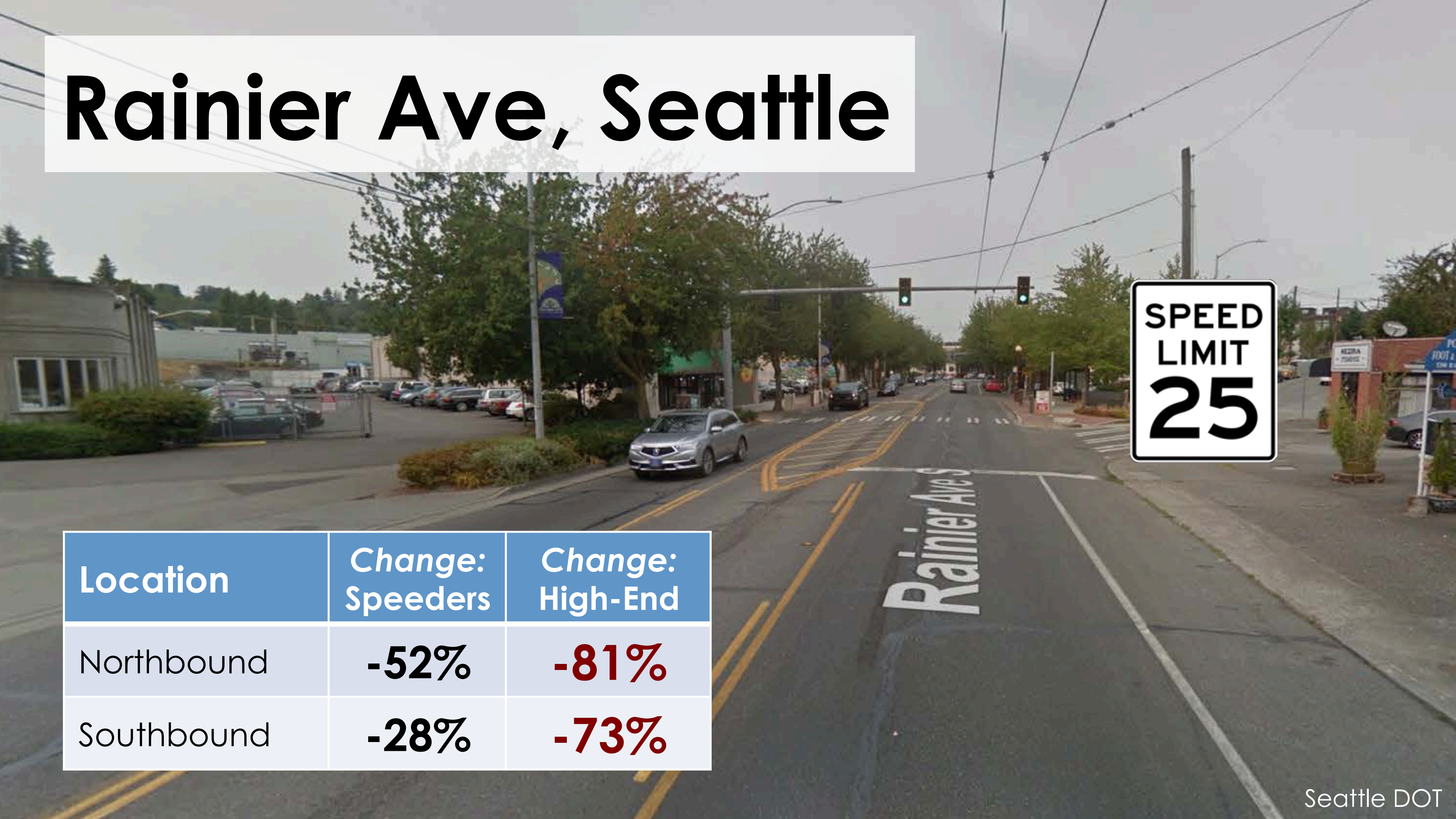
Proactive Approach

Target Speed =

Design Speed =

Posted Speed

Rainier Ave, Seattle



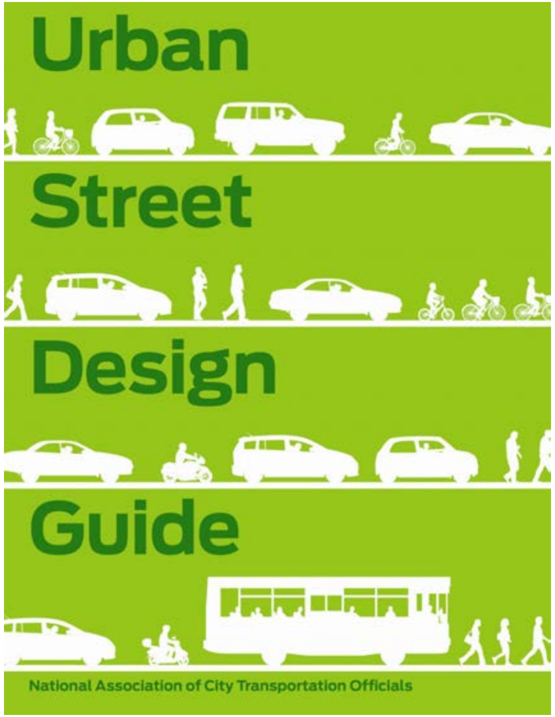
Location	*Change:* Speeders	*Change:* High-End
Northbound	**-52%**	**-81%**
Southbound	**-28%**	**-73%**

Seattle DOT


Rainier Ave, Seattle
Before:
9 injury crashes per year
After:
0 injury crashes in 2016
Seattle DOT

How can *proactive* street design reinforce safe speed?

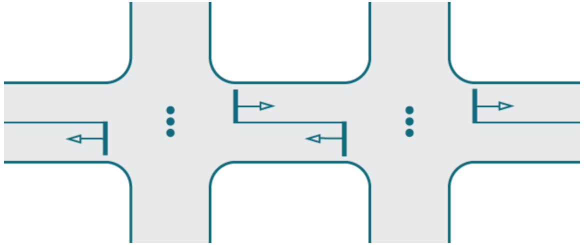
Design Toolbox



Design Toolbox

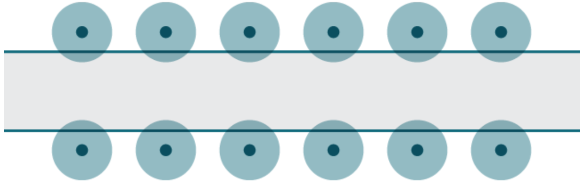
Building Lines

Medians



Signal Progression & Spacing

Street Parking



Street Trees

Reinforcing Target Speed

- Don't overbuild for vehicle capacity
- Don't overbuild for large, infrequent vehicles
- Use signals to manage speed(ing)
- Provide comfortable and efficient multi-modal facilities

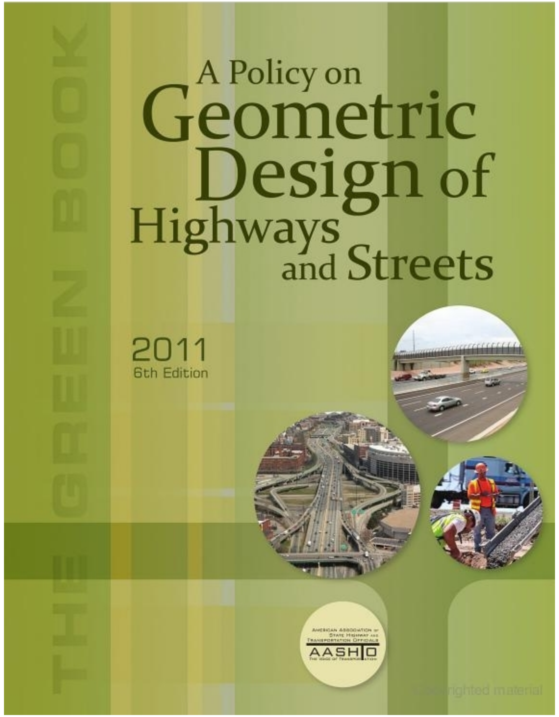
Design for all day,
not just peak hour.

Peak Hour Design

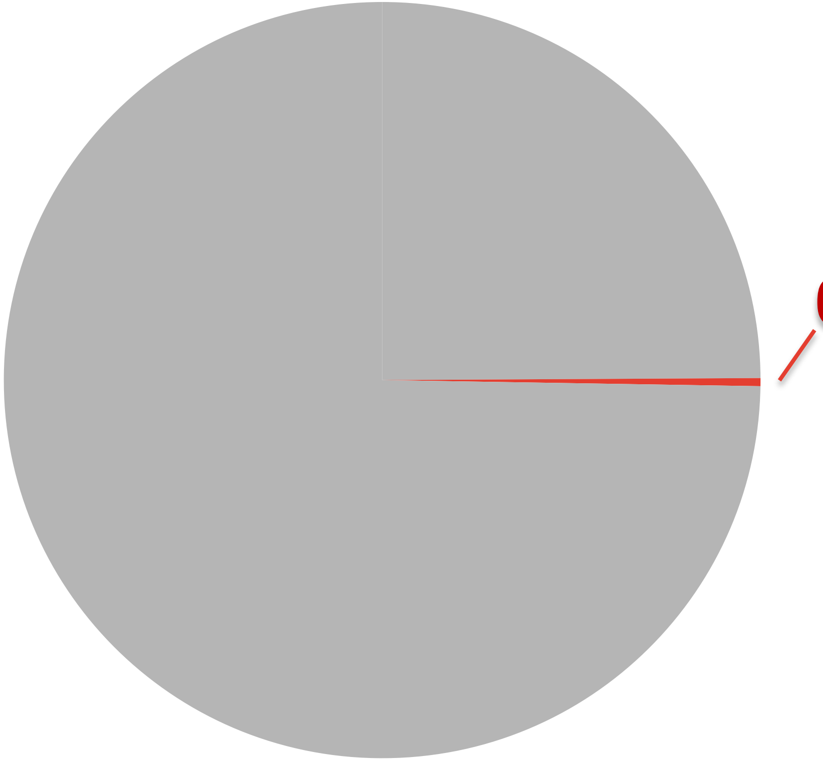
"in urban design, the 30th highest hourly volume can be a reasonable representation of daily peak hour"

"the use of average hourly traffic would result in an inadequate design"

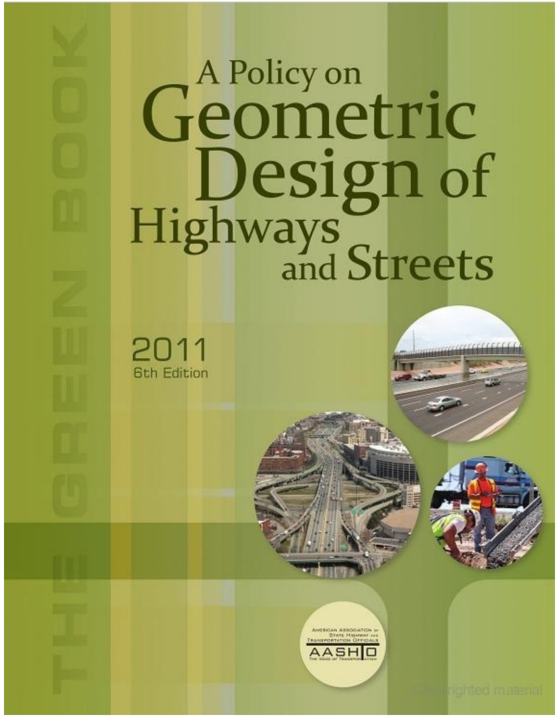
– AASHTO 2.3.2



Peak Hour Design



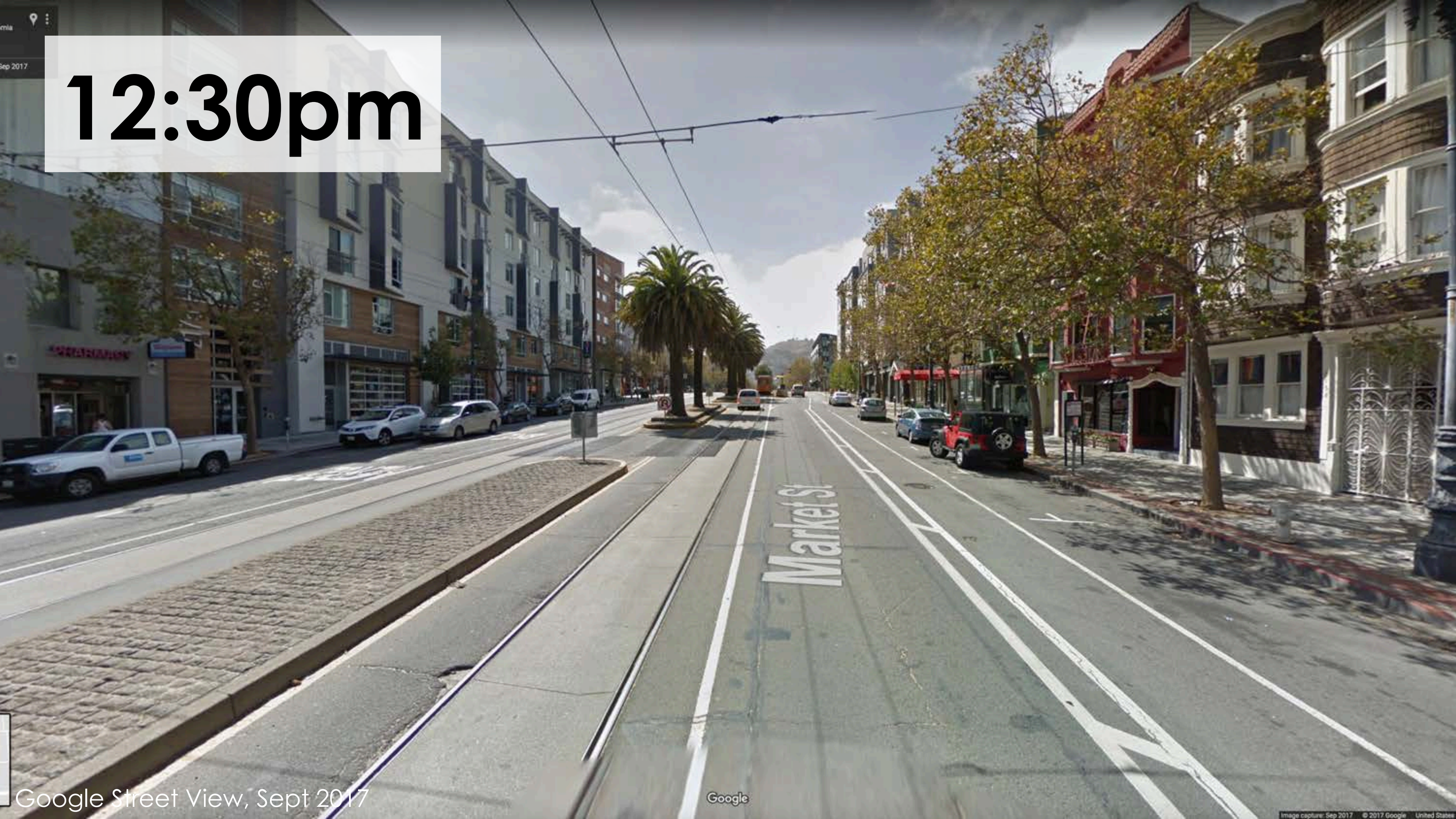
30th Peak Hour = 0.34% of year



9:30am

Google Street View, Oct 2016

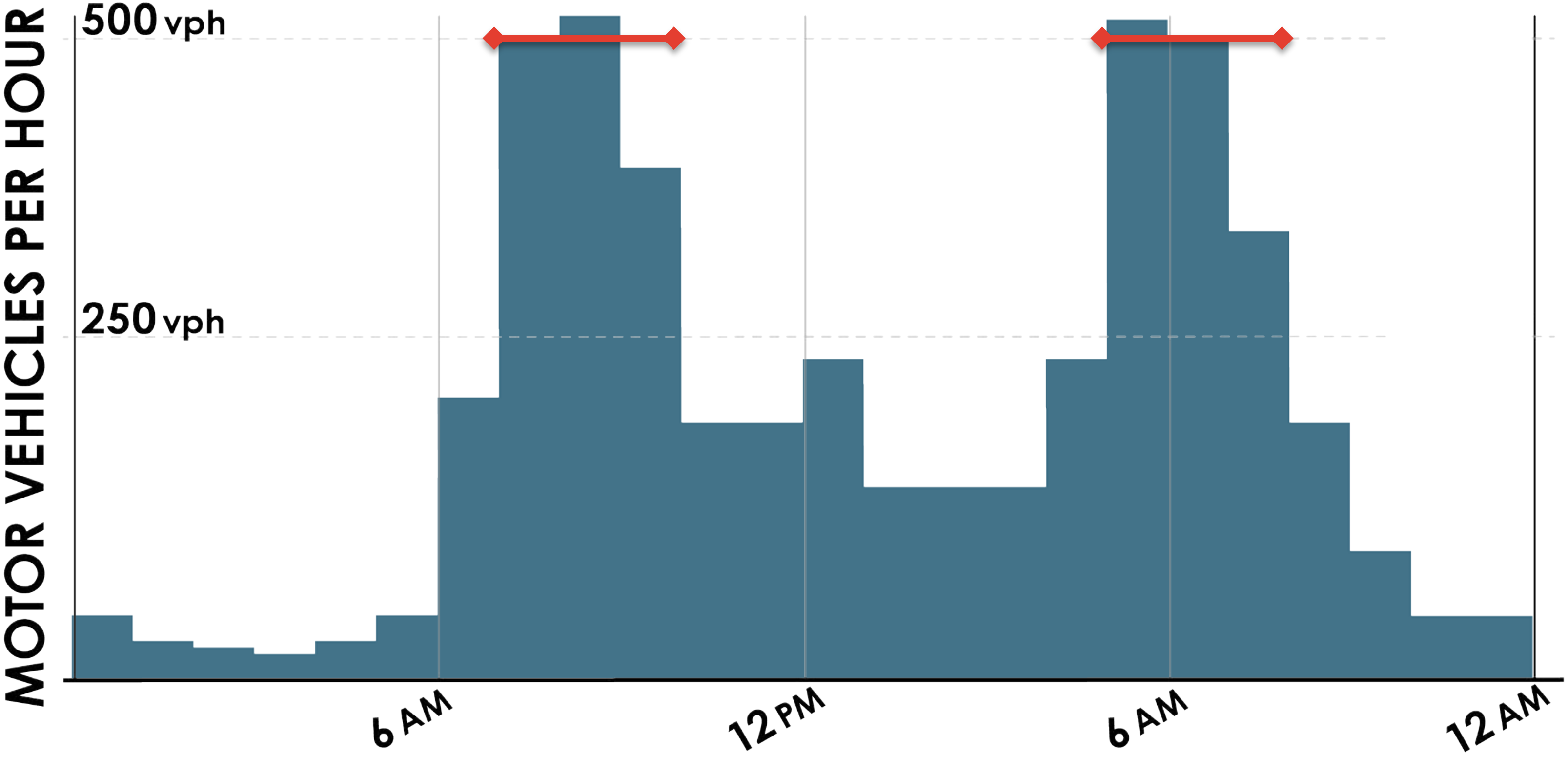
12:30pm



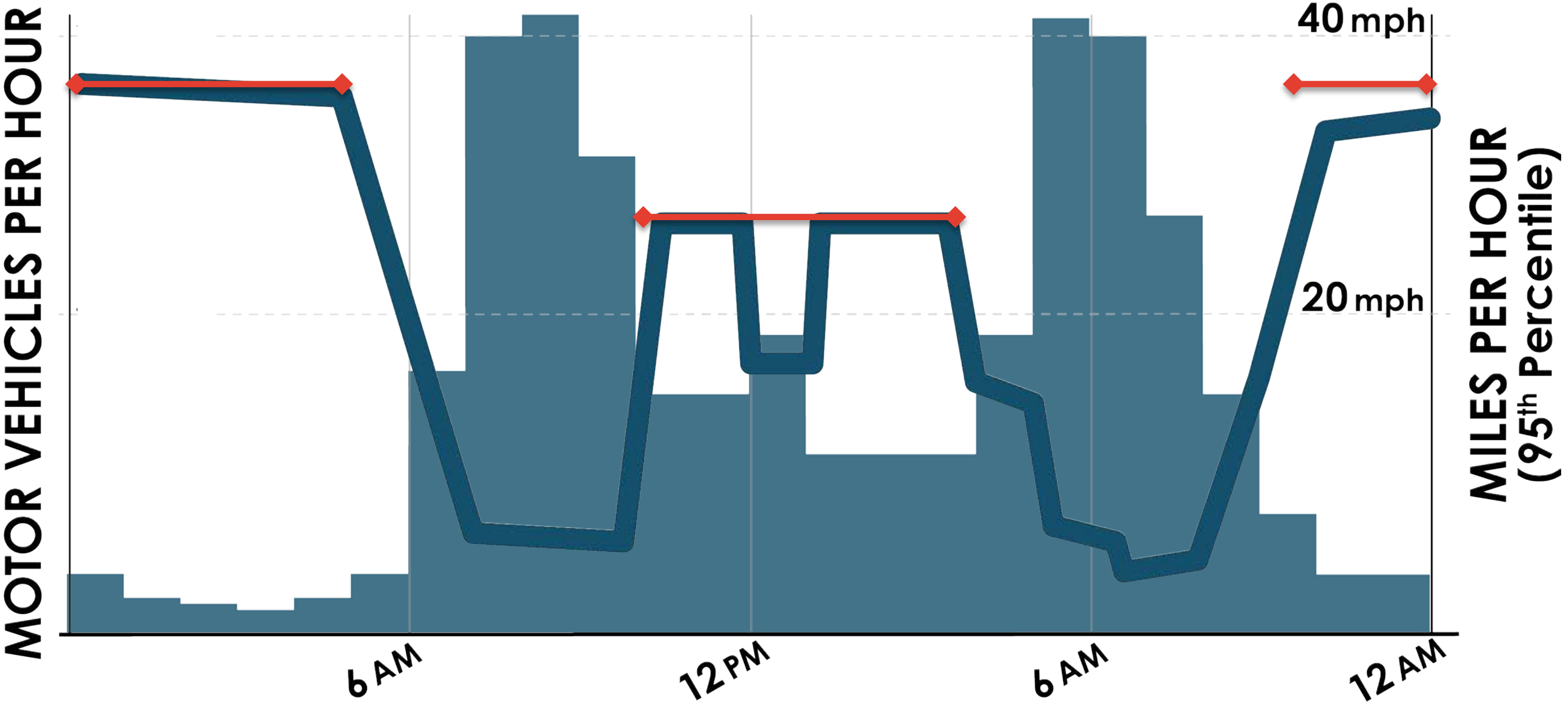
Google Street View, Sept 2017

Google Street View, Feb 2017

Streets change through the day



Streets change through the day



Fewer Good Lanes > More Bad Lanes

Fewer Good Lanes > More Bad Lanes

Travel Time:
Slight improvement

Traffic Volume:
No change

Speeding (>35):
75% decrease

Fewer Good Lanes > More Bad Lanes

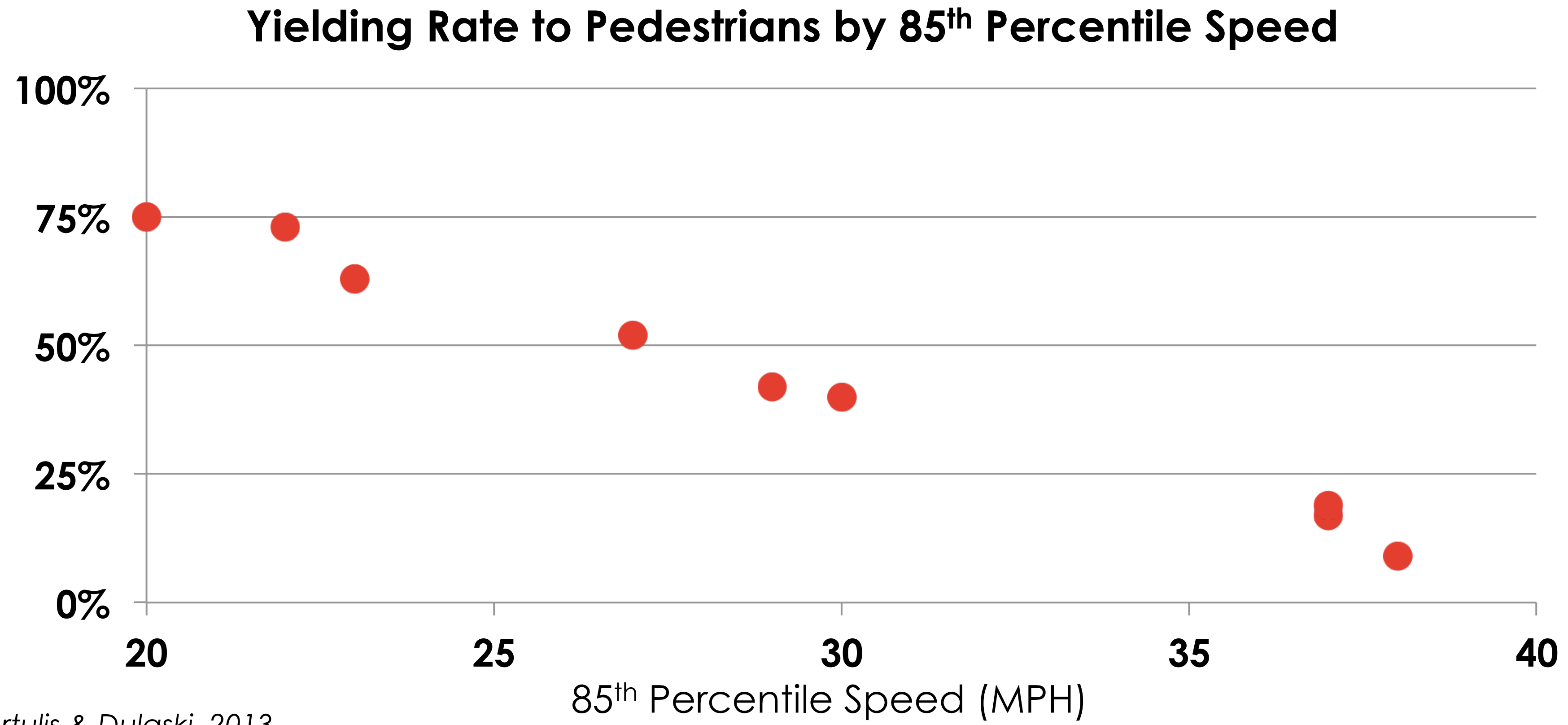
Total Crashes:
50% decrease

Ped. Injuries:
51% decrease

NYC DOT

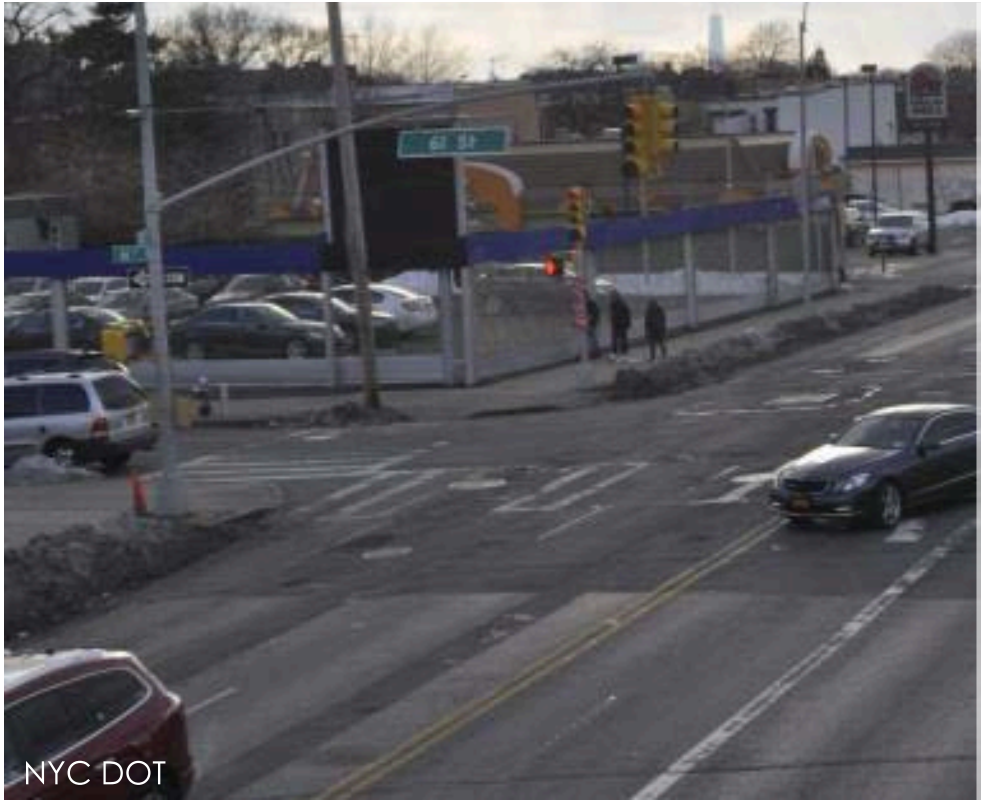
Design compact intersections.

Speed reduces yield rate



Bertulis & Dulaski, 2013

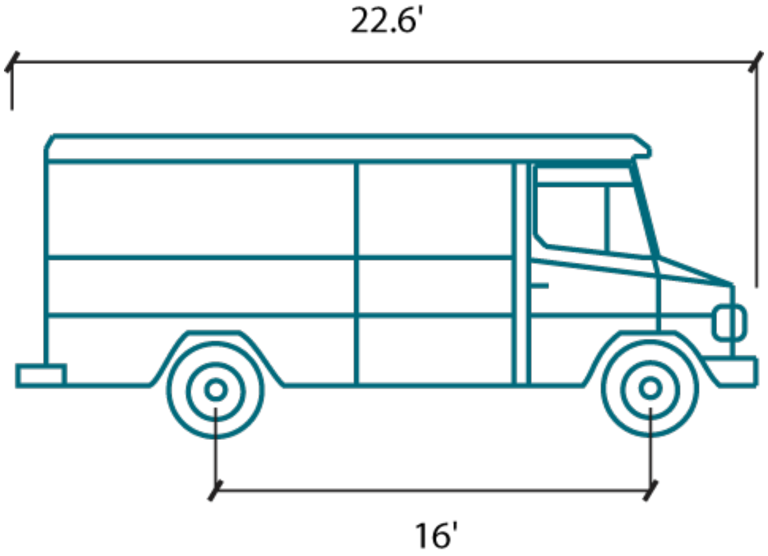
NYC Left Turn Study



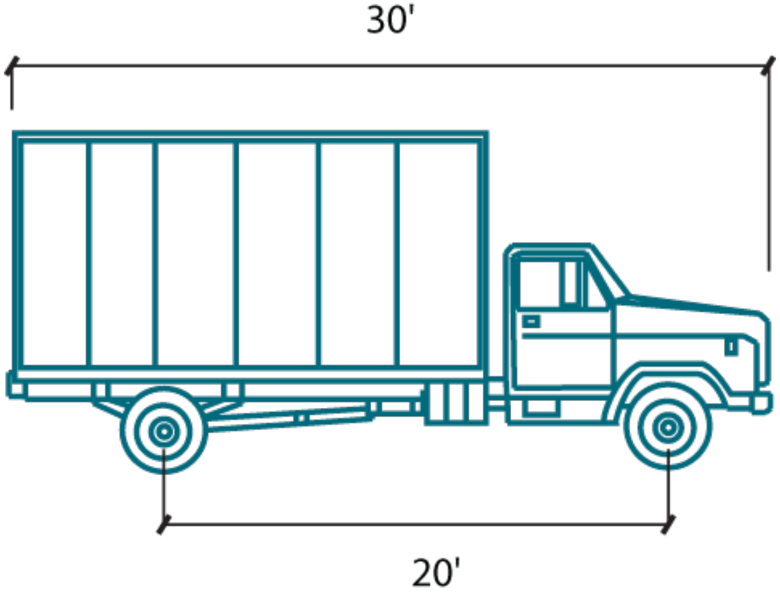
1 in 5 Ped / Bike KSIs were hit by left-turning vehicles

69% of those were on receiving streets >60ft wide.

Match Design Vehicles to Streets

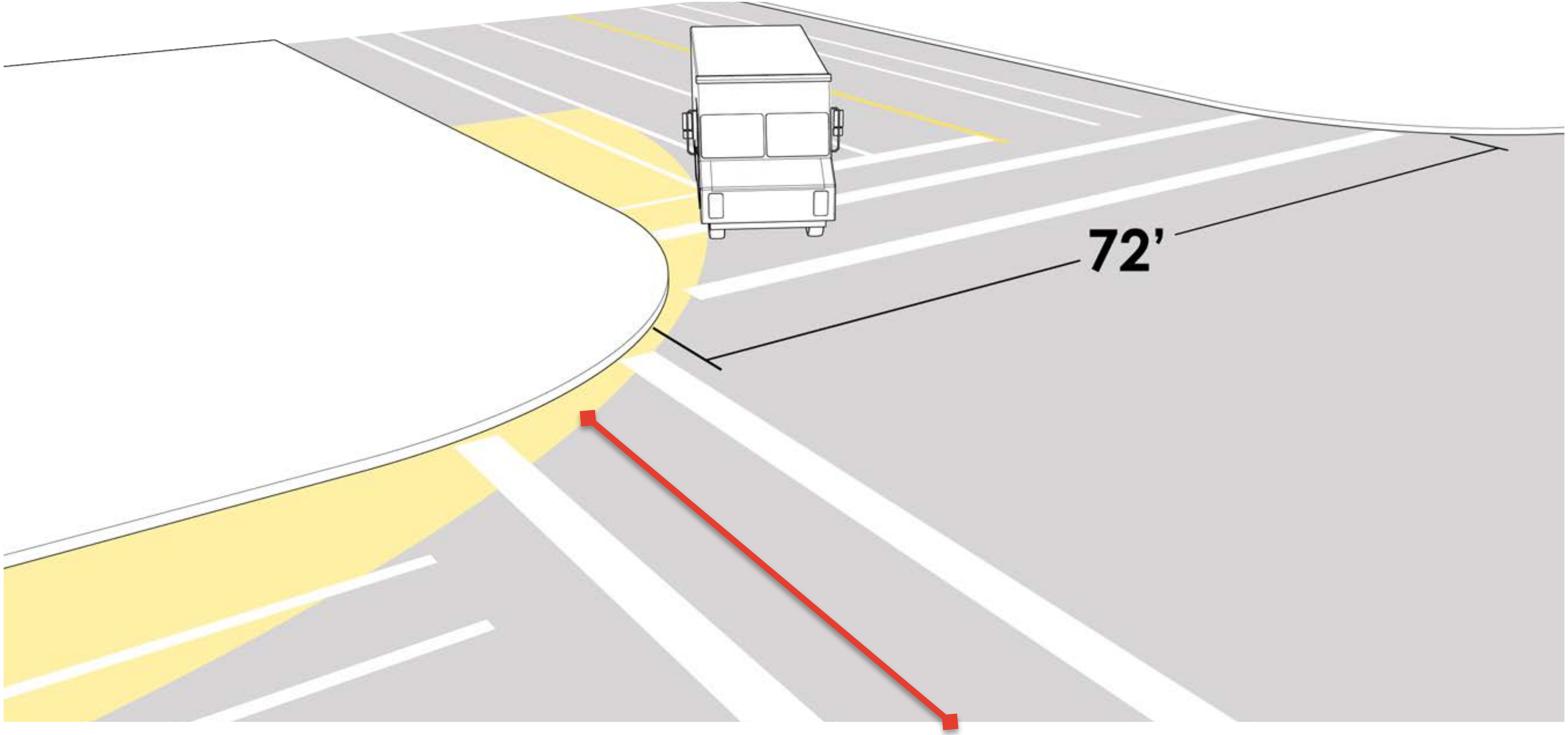


DL-23

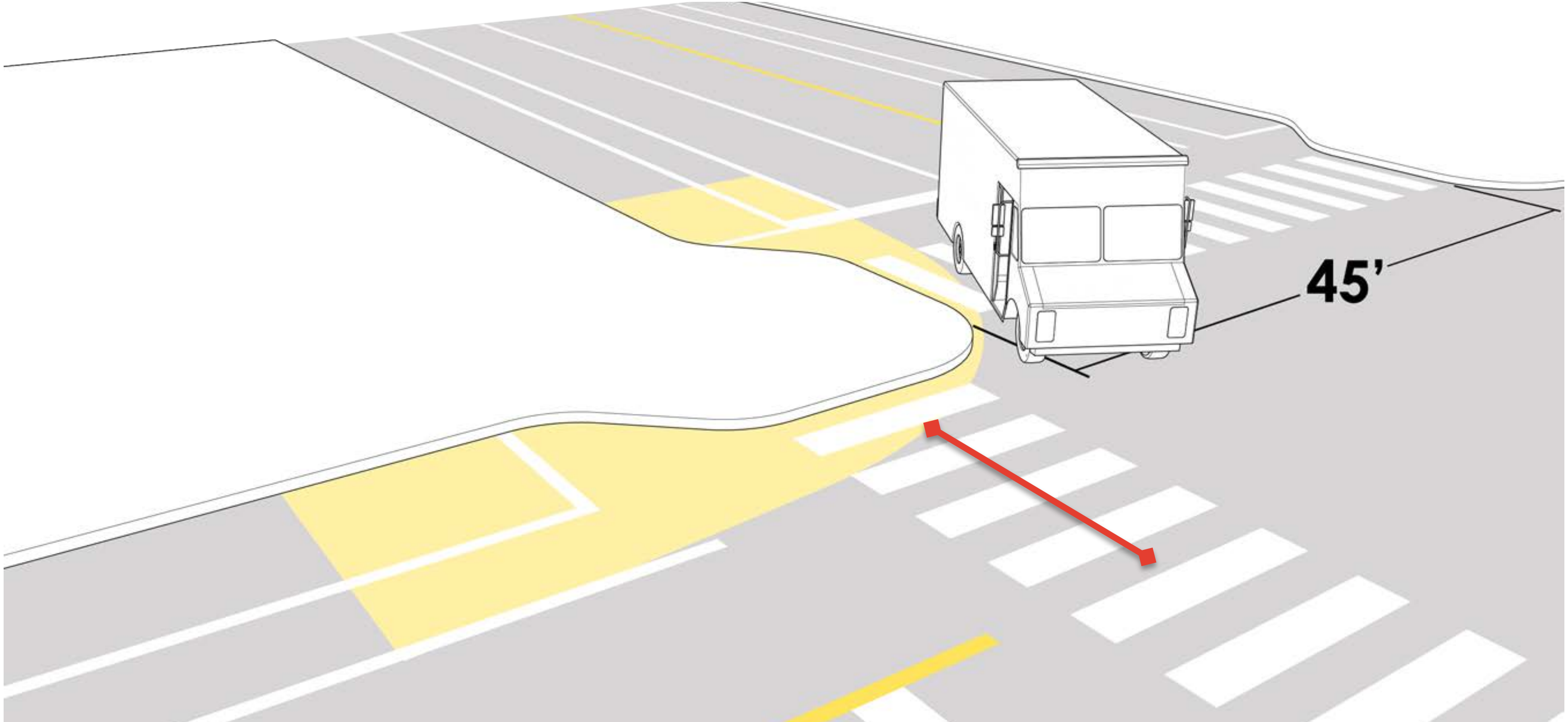


SU-30

Design for effective radius



Design for effective radius



Design for effective radius

Mountable aprons

SFMTA

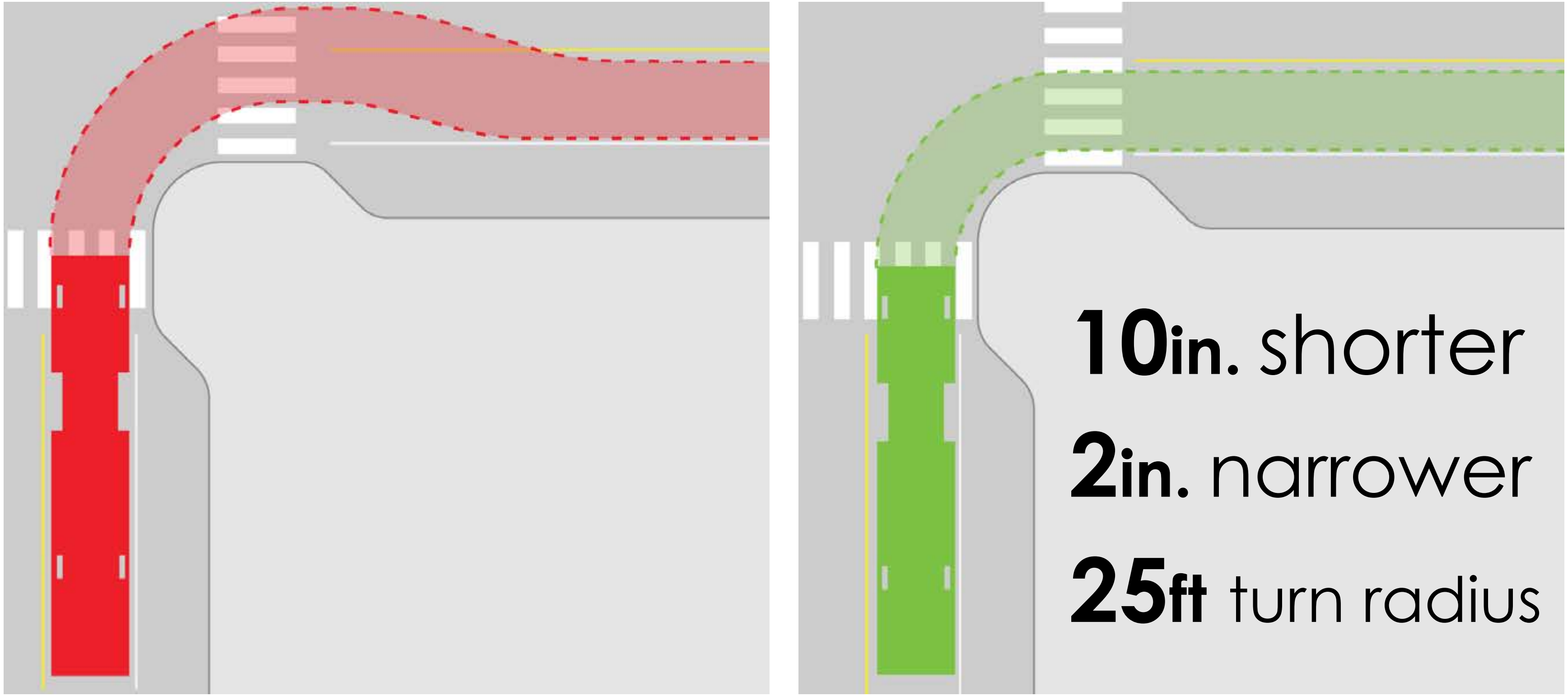
Test using interim materials

NYC DOT

Match Vehicles to Goals

Lt. Jonathan Baxter, SF Fire Dept.

Matching Vehicles to Goals



Use signals for efficient traffic, not fast traffic.

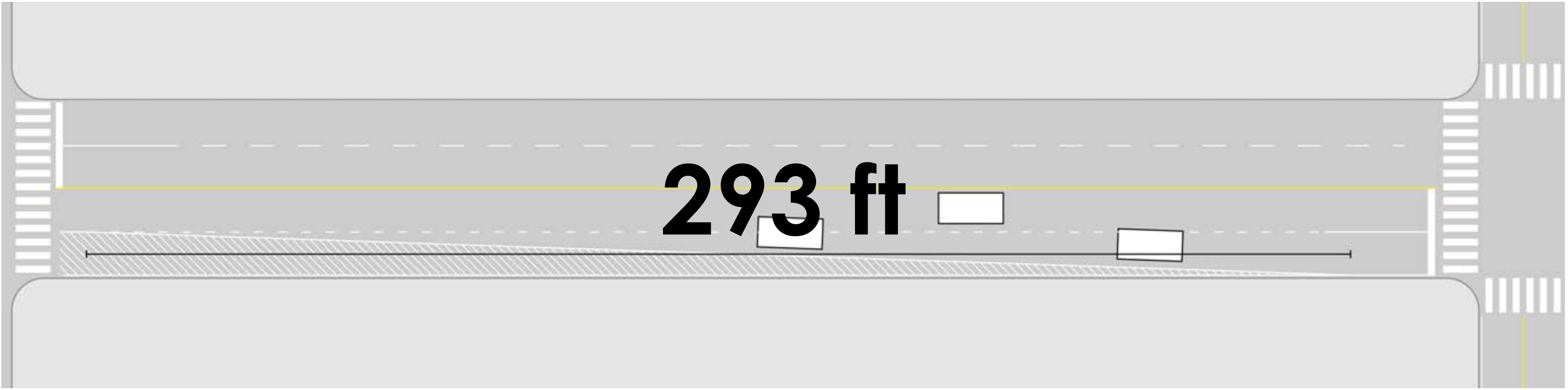
Use signals to manage speed

Use signals to manage speed

Slow streets unlock space.

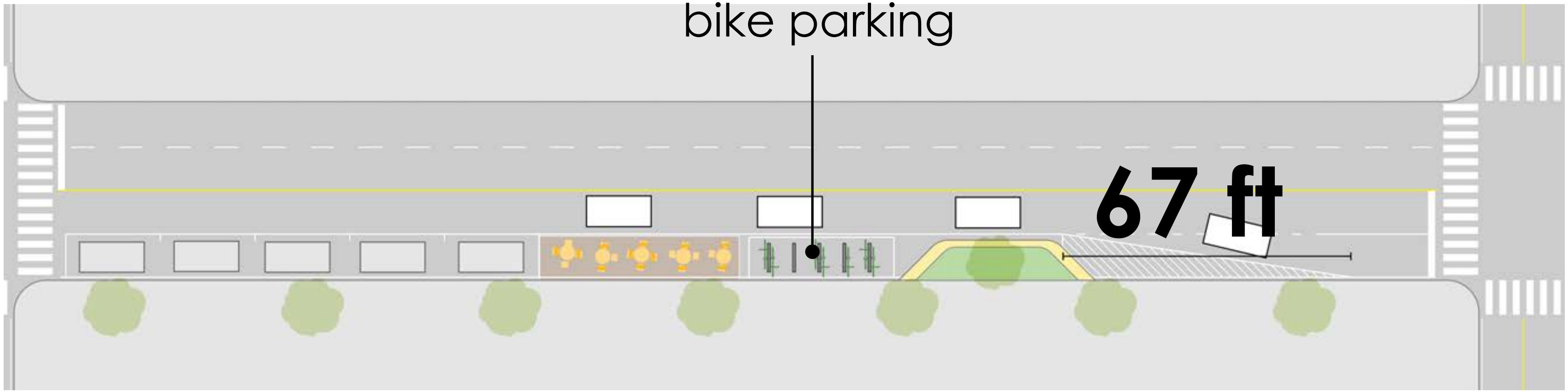
Speed consumes linear space

40mph



Slow streets unlock linear space

20mph



Safe Places to Bike

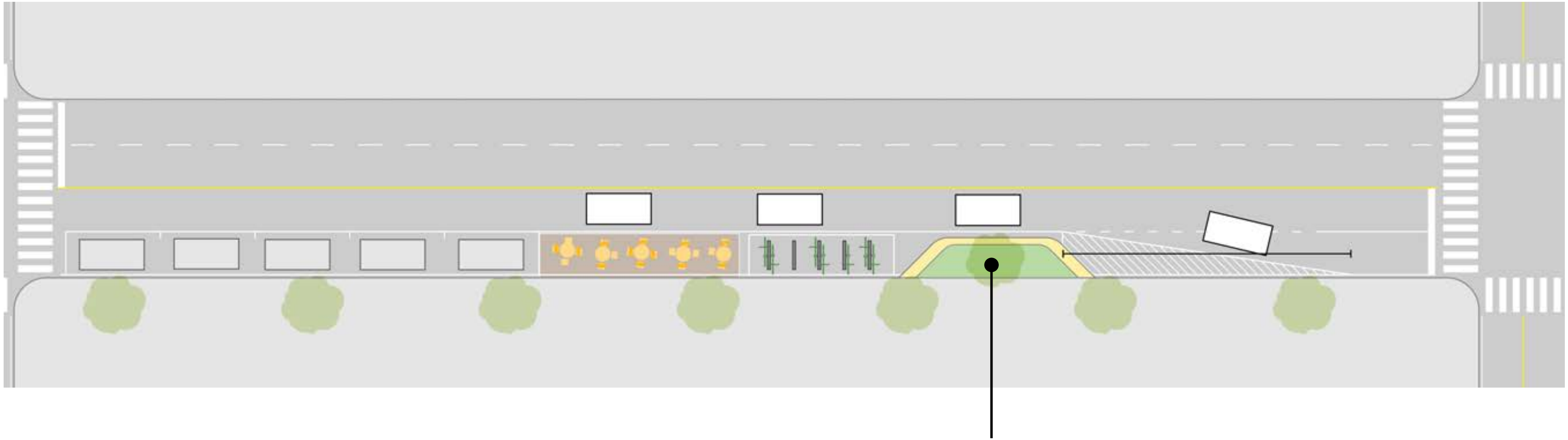
NYC DOT

Efficient & Accessible Transit

City of Austin

Slow streets unlock linear space

20mph

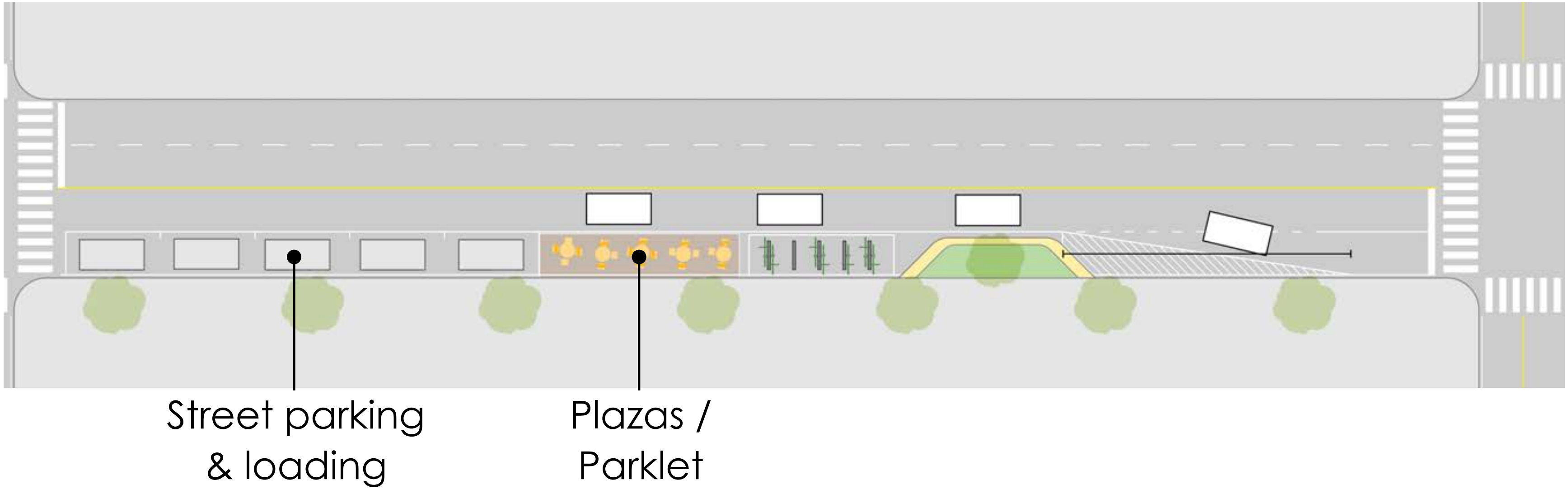


Unlock space for water

Philadelphia Water Dept.

Slow streets unlock linear space

20mph



Vibrant Spaces for People

LA DOT

nacto.org

Jan 16 – Webinar
Integrating Bike Share & Transit

May 31 – Training
Sister Cities Roadshow: Better Street & Bikeways, Columbus, OH

Thank you!

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