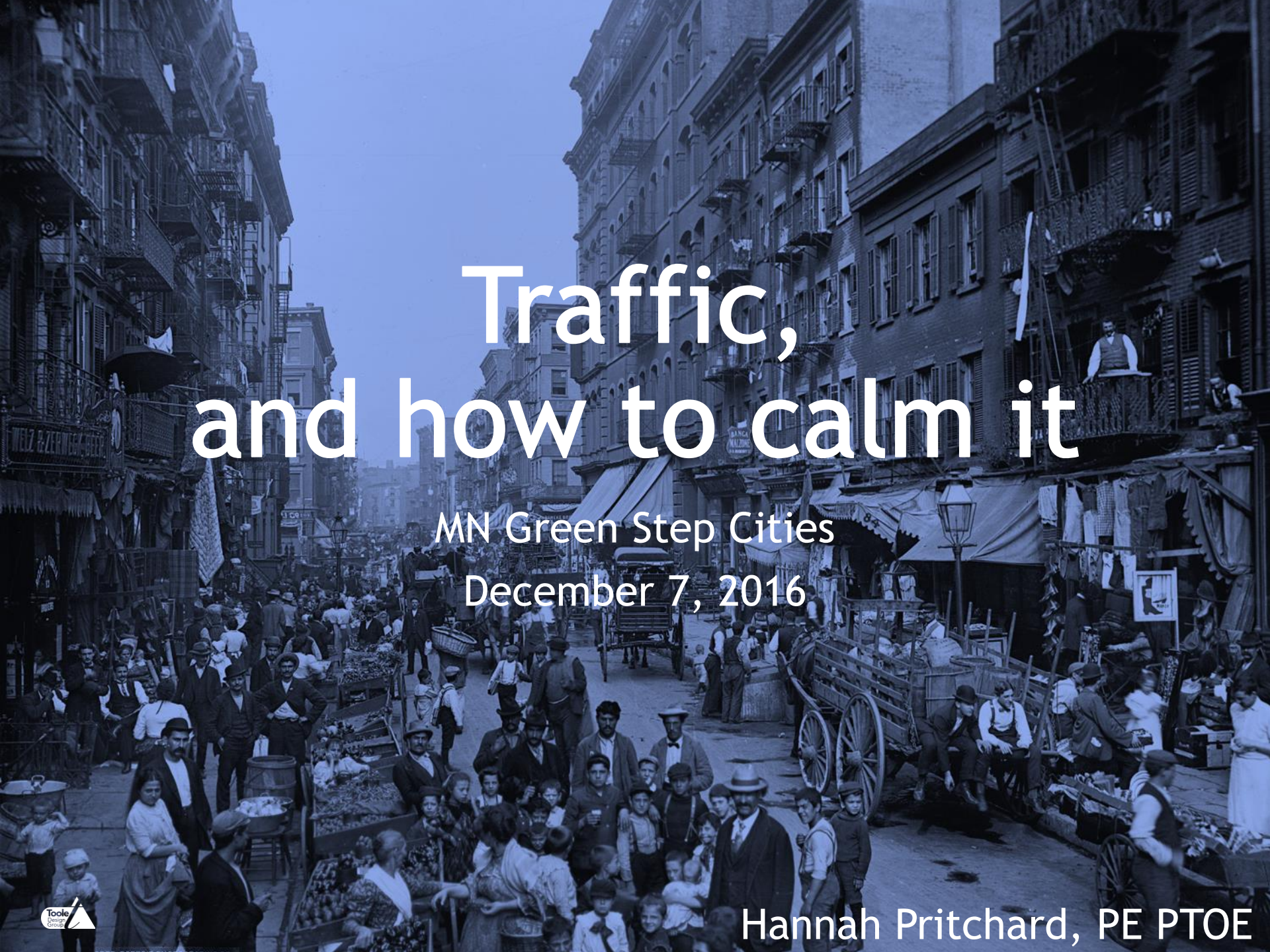


Traffic, and how to calm it

MN Green Step Cities

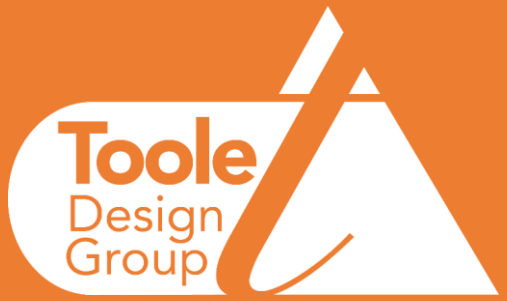
December 7, 2016

Hannah Pritchard, PE PTOE

Hannah Pritchard
PE PTOE

@bicyclehannah

hpritchard@tooledesign.com




Minnesota
Wisconsin
Michigan
Iowa
Illinois
Indiana
Missouri

Choose your own adventure

- How we got here – the history of traffic engineering
- The impact of travel demand forecasting
- The impact of traffic engineering assumptions
- Traffic calming toolbox
- The case for traffic calming & “alternative modes”

How we got here

History of traffic engineering

Cities

The purpose of cities is to advance **efficient** and effective **exchange**

The “transportation purpose” of cities is to **minimize long-distance travel**.

The “land use purpose” of cities is to **concentrate** the components for civic life.

Cities + Automobiles

U. S. DEPARTMENT OF COMMERCE

ROY D. CHAPIN, SECRETARY

BUREAU OF THE CENSUS

W. M. STEUART, *Director*

MORTALITY STATISTICS

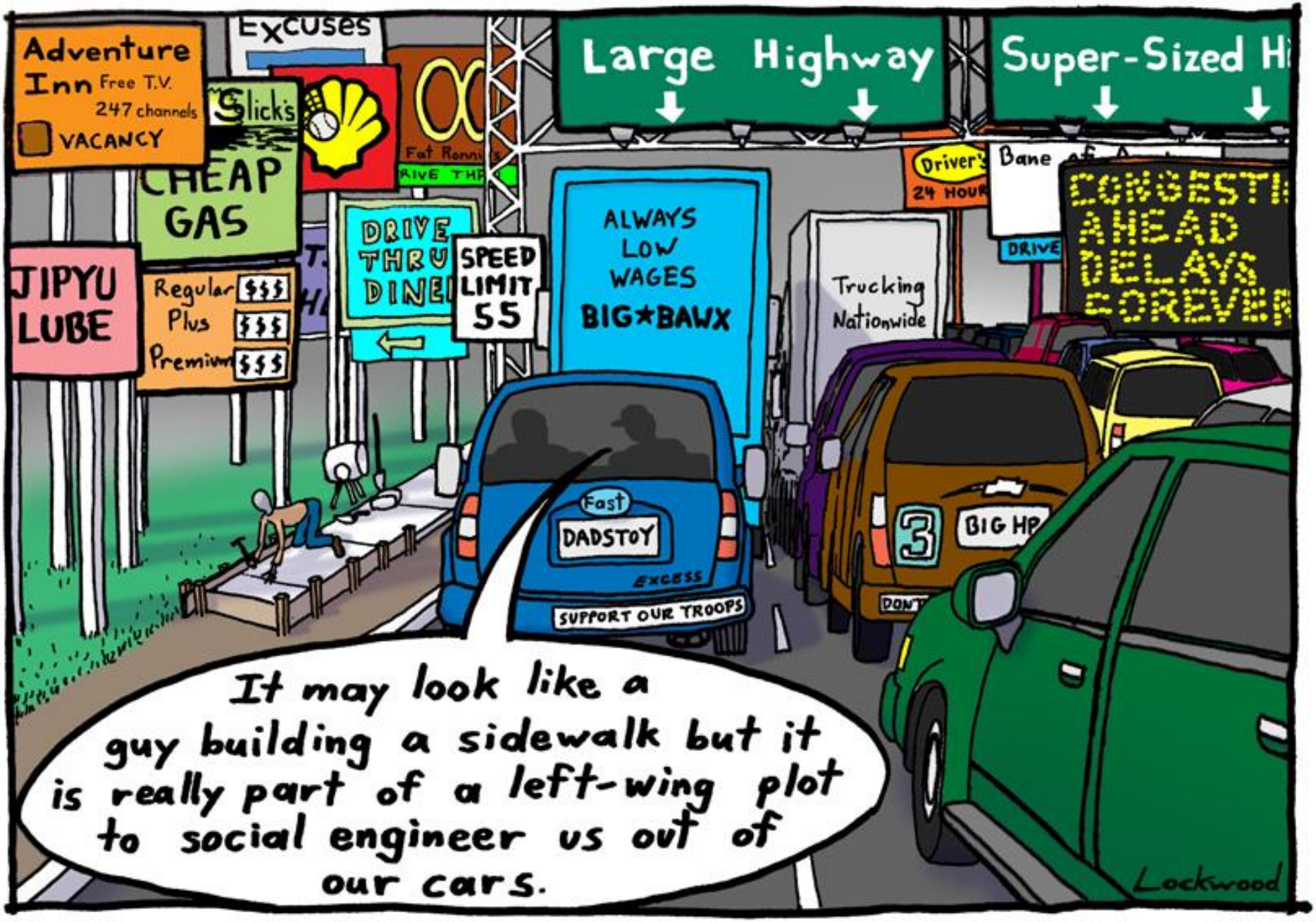
1929

From 1924 to 1929 there was a continuous increase in the death rate from motor-vehicle accidents in the registration States of 1900, the rates ranging from 19.8 in 1924 to 27.4 in 1929; in the States of 1910, the rates ranged from 19.8 to 28.8 and in the States of 1920, from 17.5 to 26.5. The District of Columbia is always included in the groups "States of 1900, 1910, or 1920."

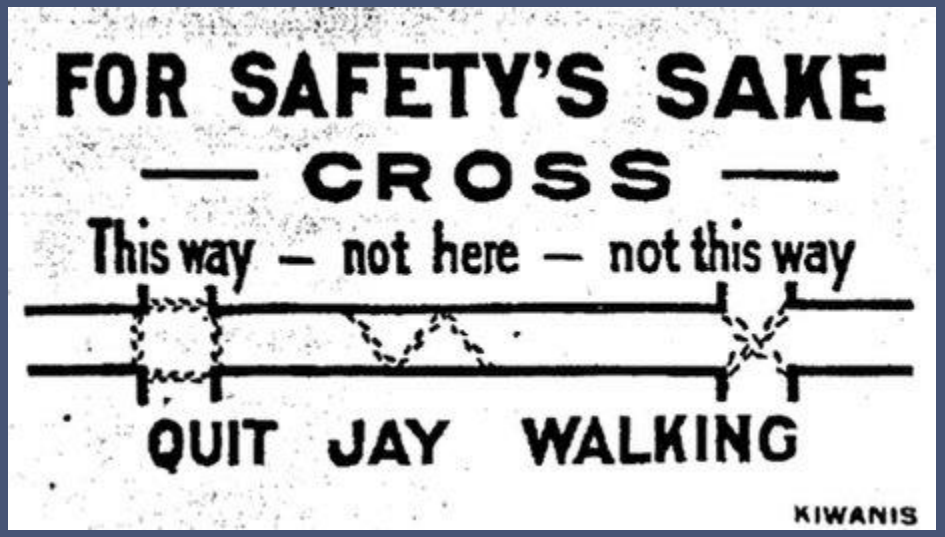
Today's rate?

10 per 100,000

32,000 fatalities per year


Adventure Inn Free T.V. 247 channels VACANCY
Excuses
Slick's
CHEAP GAS
JIPYU LUBE
Regular $$$
Plus $$$
Premium $$$
DRIVE THRU DINE
SPEED LIMIT 55
Large Highway
Super-Sized Hi
ALWAYS LOW WAGES BIG★BAWX
Trucking Nationwide
Driver's
24 HOUR
DRIVE
CONGESTI
AHEAD
DELAYS
FOREVER
Fast
DADSTOY
EXCESS
SUPPORT OUR TROOPS
3
BIG HP
It may look like a guy building a sidewalk but it is really part of a left-wing plot to social engineer us out of our cars.
Lockwood

Social Engineering



Jaywalking in the dictionary - 1924

1961: A love affair?

Merrily We Roll Along: The Early Days of the Automobile NR

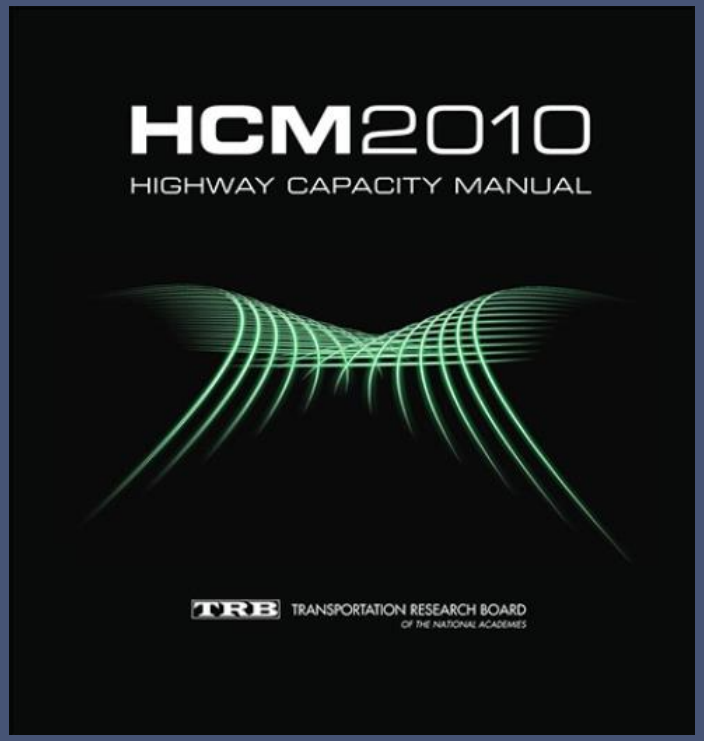
★★★★★ 7 | IMDb 6.8/10

Groucho Marx narrates this episode of NBC News' "Project Twenty" series detailing the explosive social changes brought about by the introduction of the automobile in the early 1900s.

Starring: Groucho Marx
Runtime: 52 minutes
Available to watch on suppo

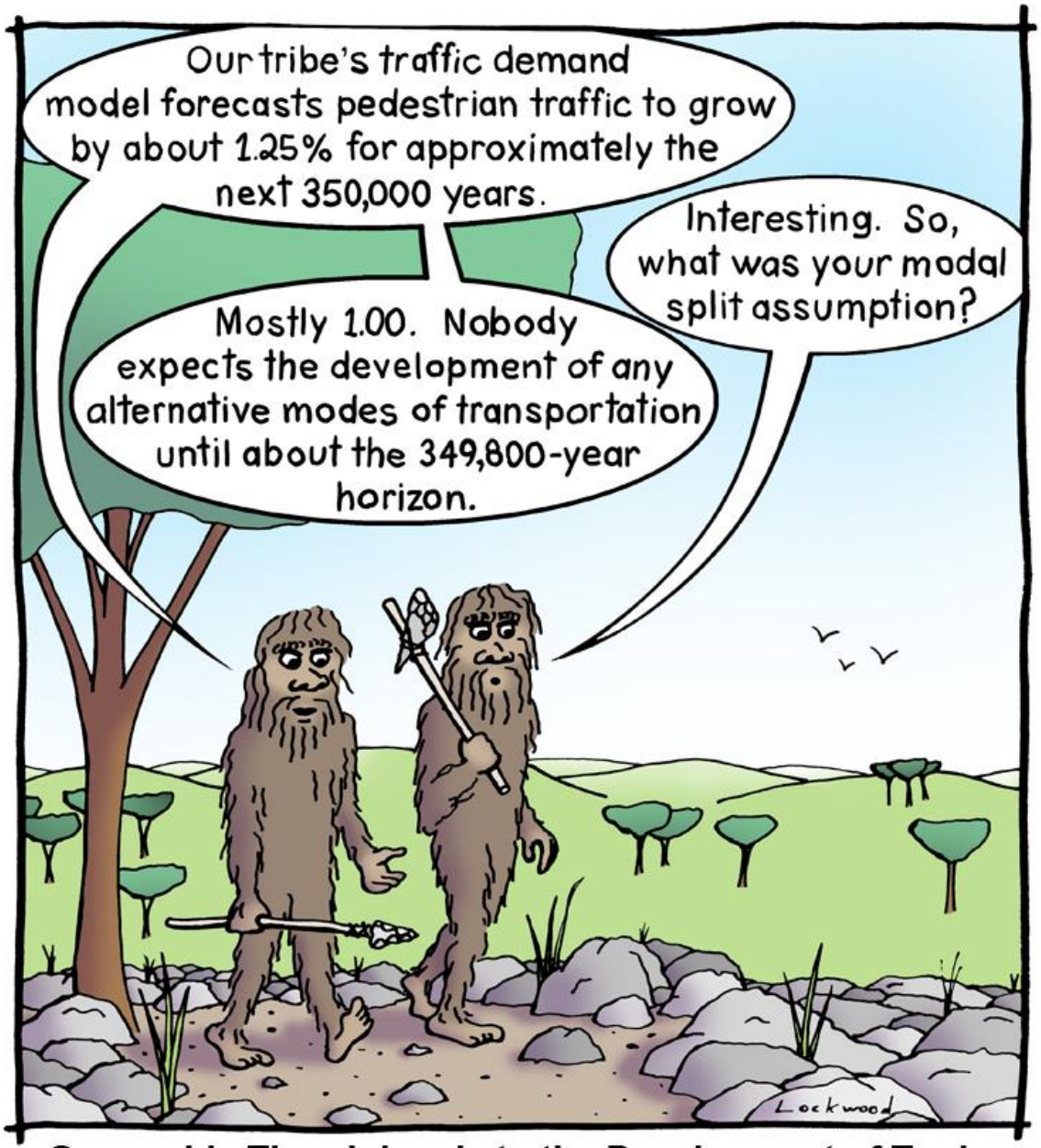
Highway Capacity Manual (HCM)

- First Edition (1950)
  - 147 pages
  - 8 chapters
- Third Edition (1985)
  - 500+ pages
  - 14 chapters
- Fifth Edition (2010)
  - 1,189 pages
  - 23 chapters
  - 3 volumes
  - $5 Million research since 2000 edition



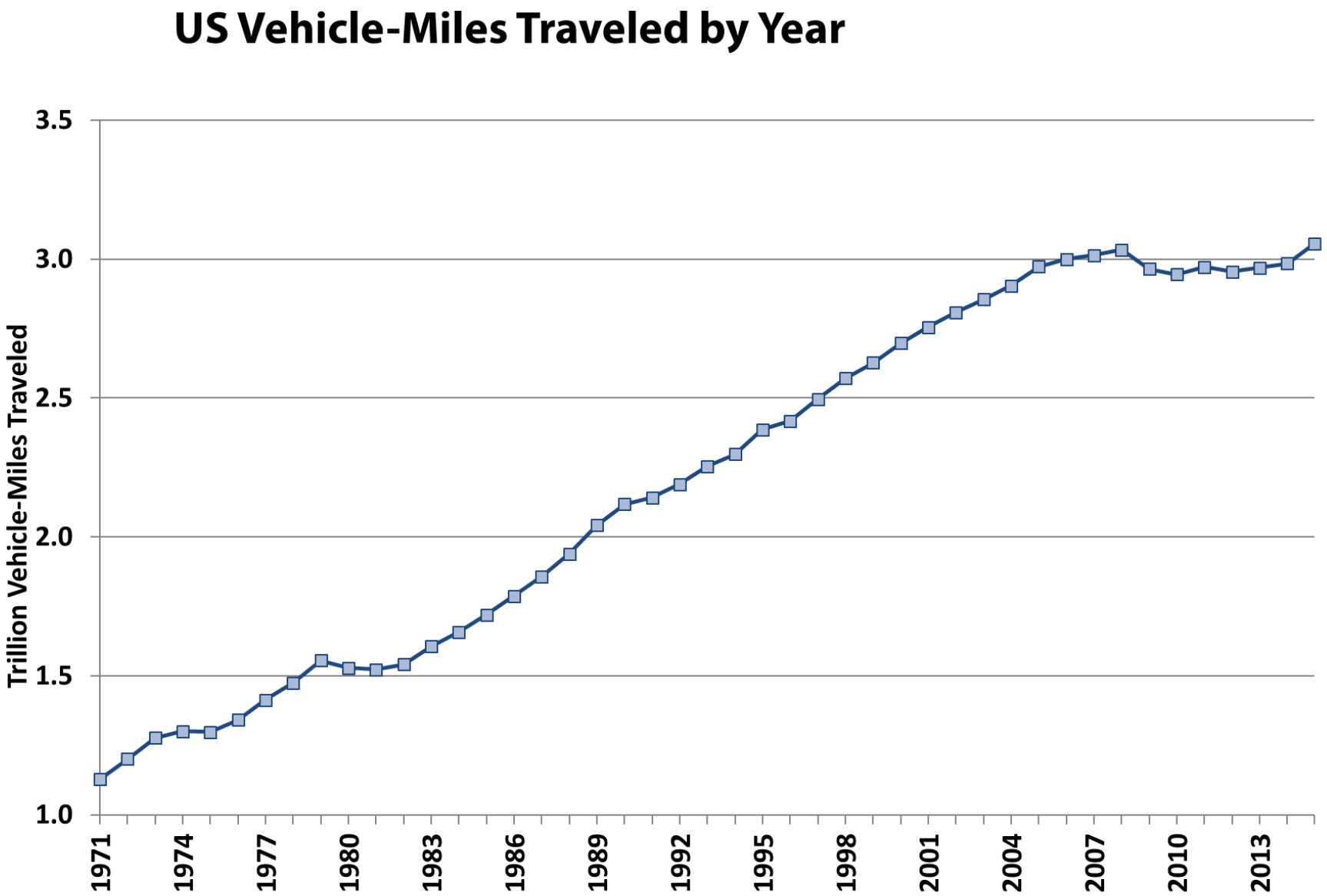
Travel demand forecasting

How it shapes our cities

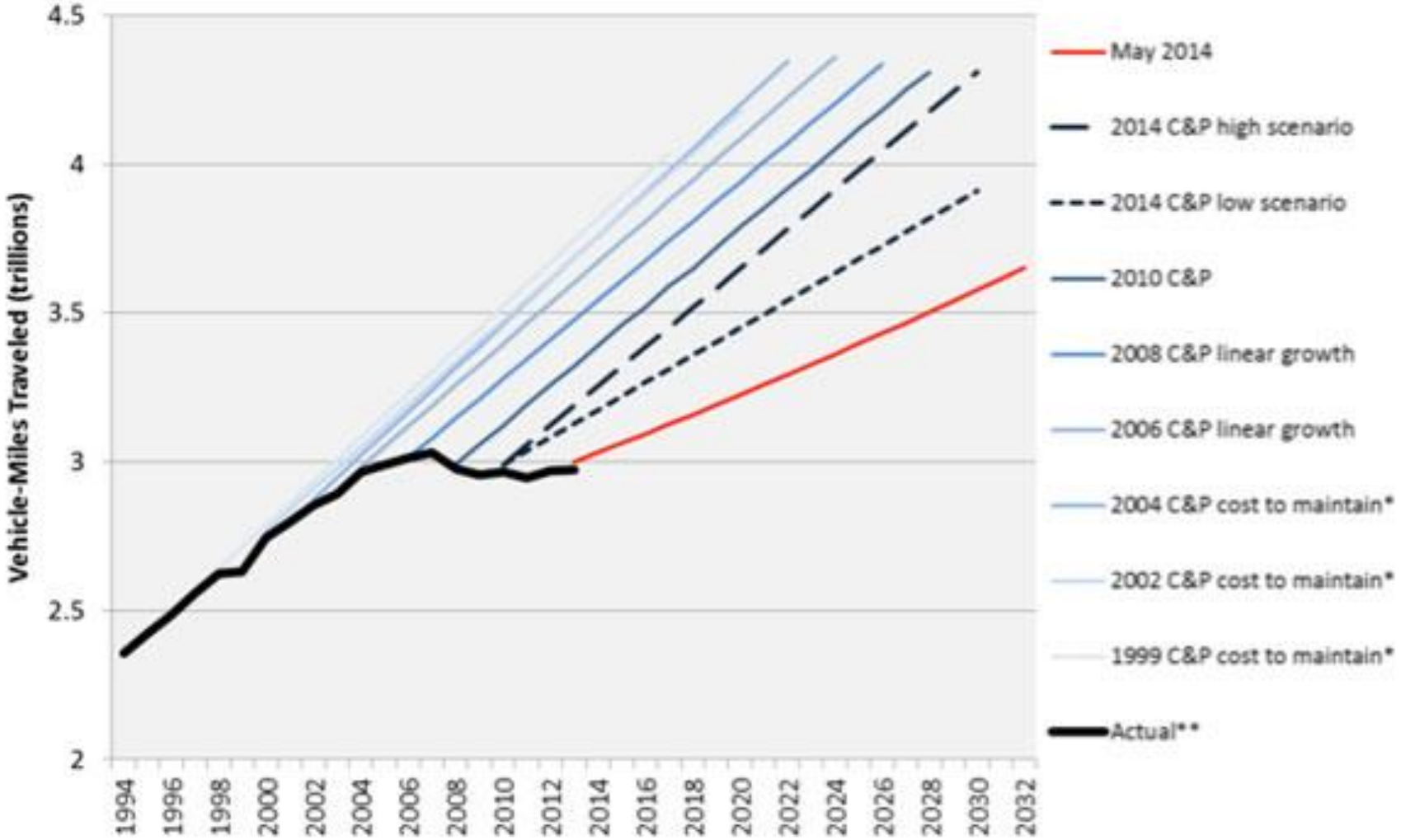


Opposable Thumb Leads to the Development of Tools

Vehicle Miles Traveled



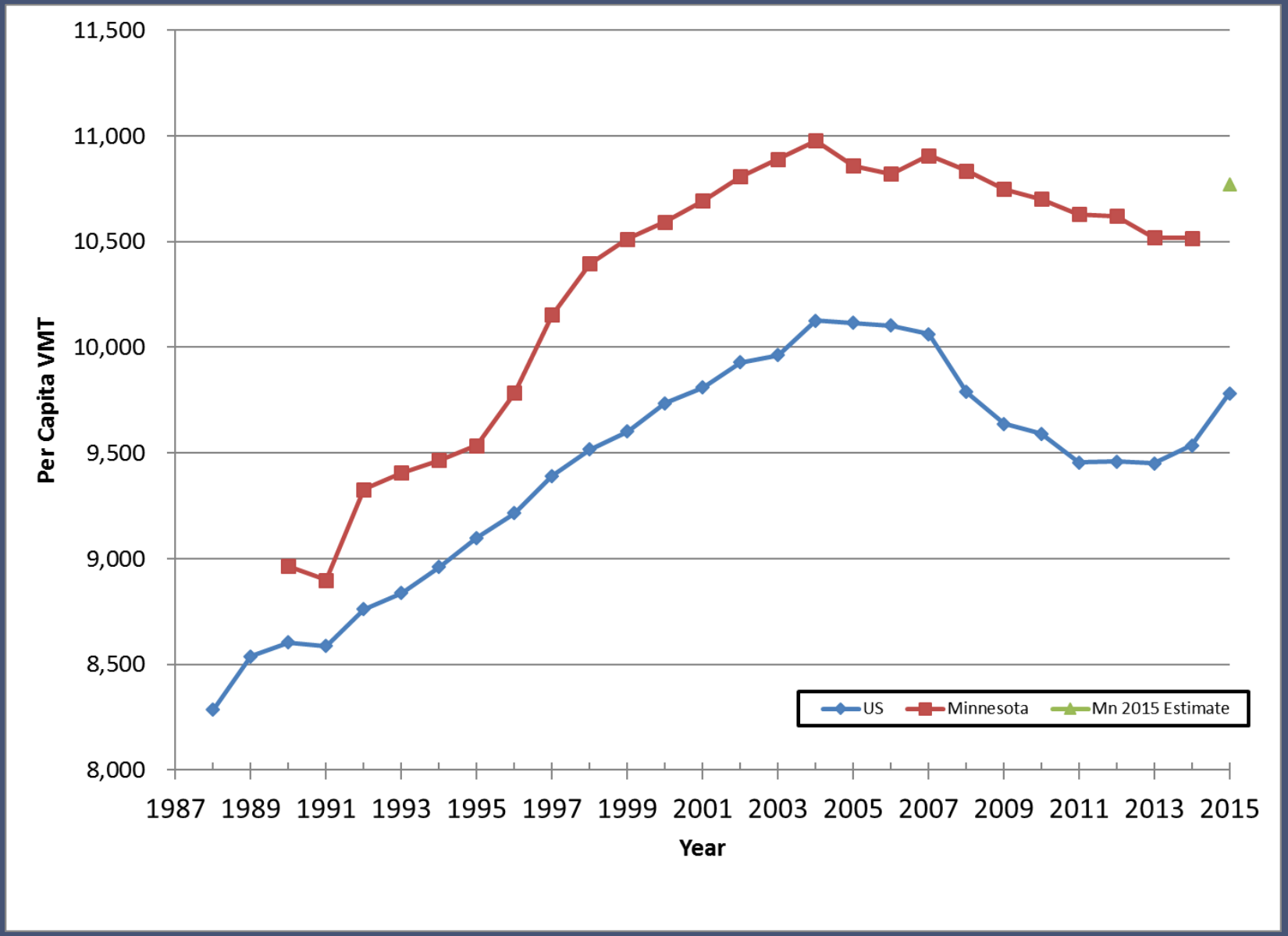
U.S. Dept of Transportation Forecasts of Future Driving vs. Reality



C&P scenarios depicted based on linear growth; FHWA May 2014 forecast on compound growth.
* Based on "Cost to Maintain" scenario.
** Data through 2012 from FHWA Highway Statistics; 2013 data from FHWA Traffic Volume Trends
FHWA: Federal Highway Administration; C&P: Conditions & Performance report.

Frontier Group

Minnesota VMT



Traffic Analysis Zones are too big

If you plan cities for cars and traffic, you get cars and traffic…

Project for Public Spaces

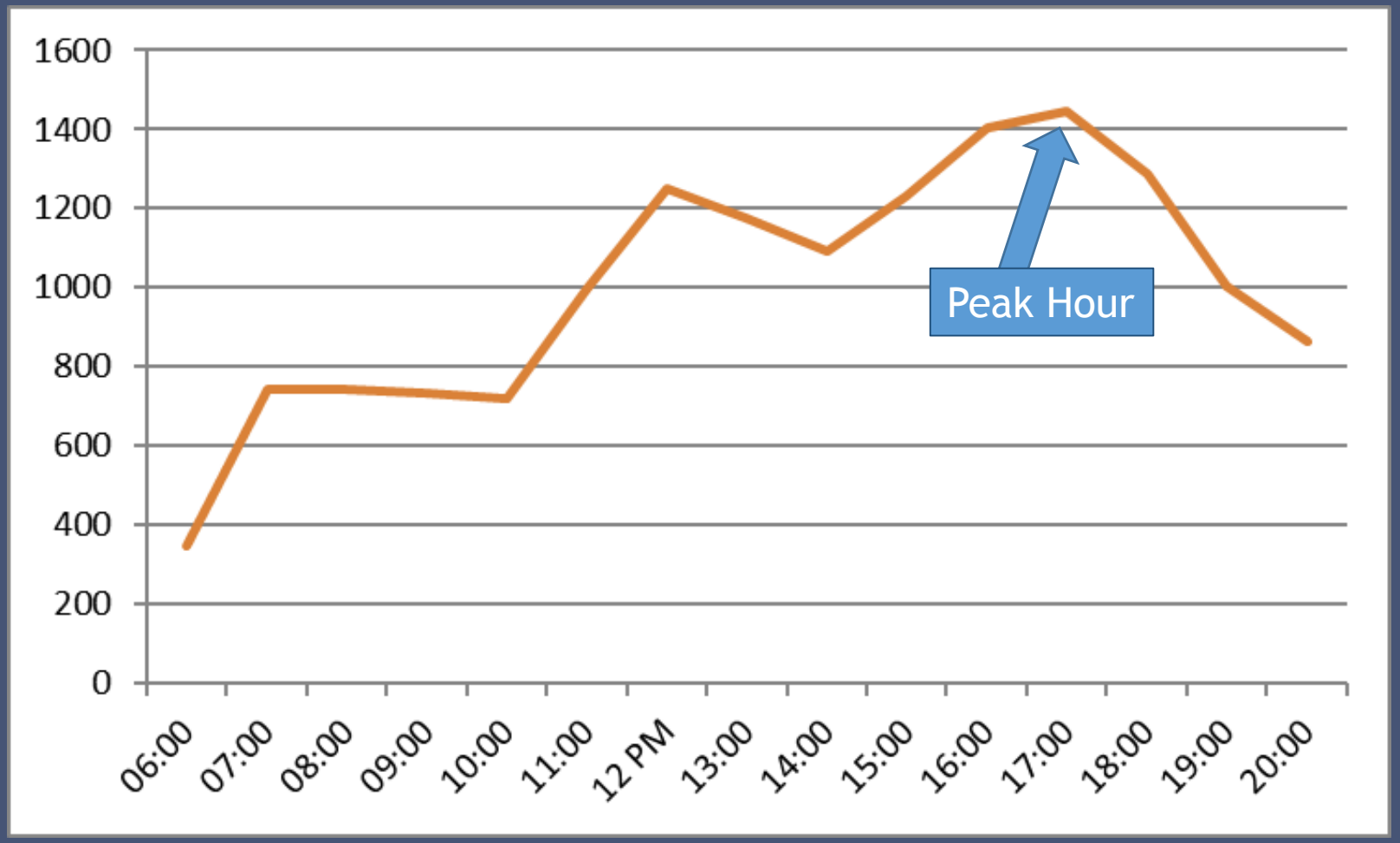
Traffic engineering assumptions

How they impact our cities

Assumptions

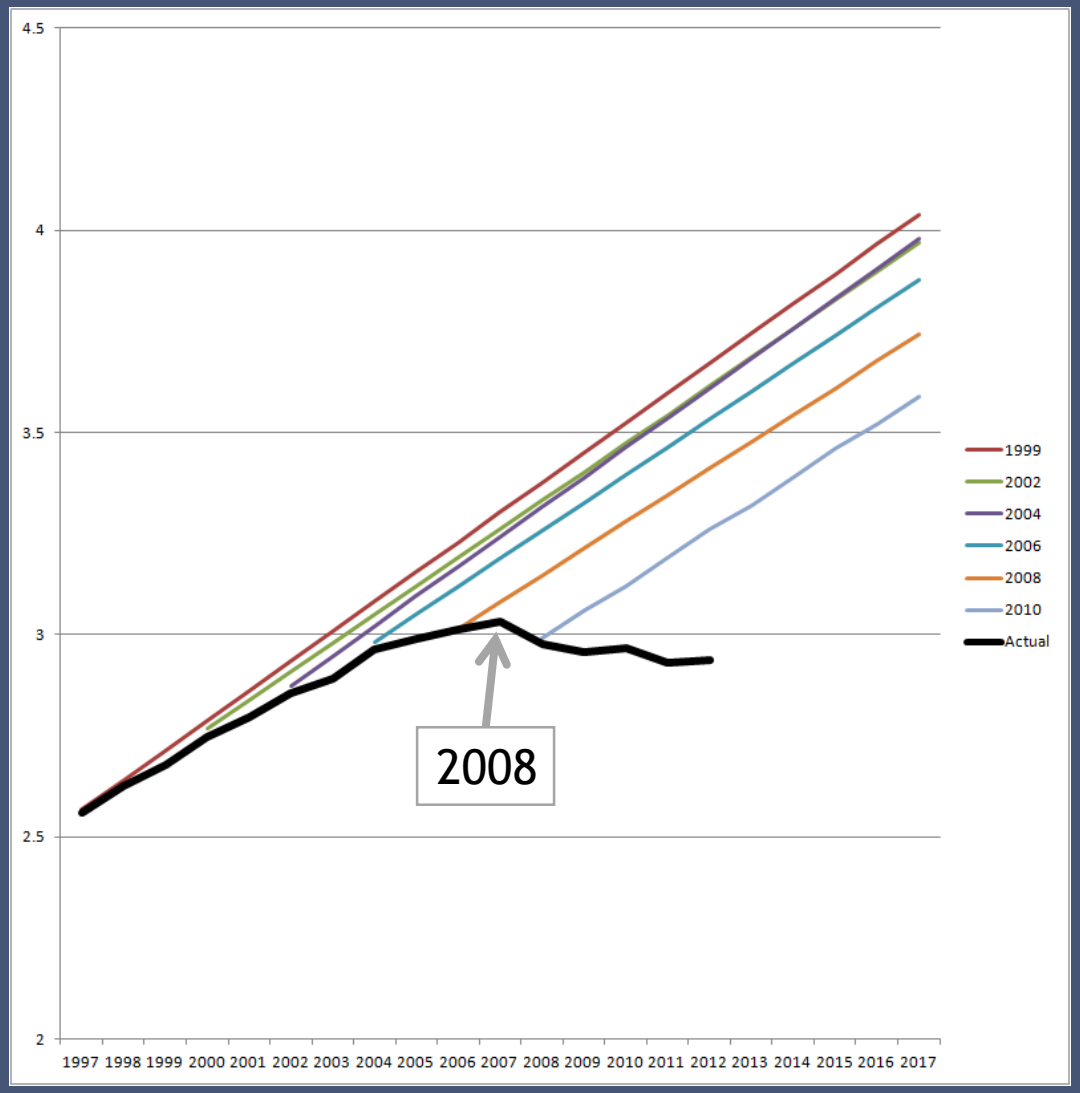
- Use of the “peak hour”
- Future year and growth rates
- Trip generation
- Level of service & delay

What about the other 23 hours?

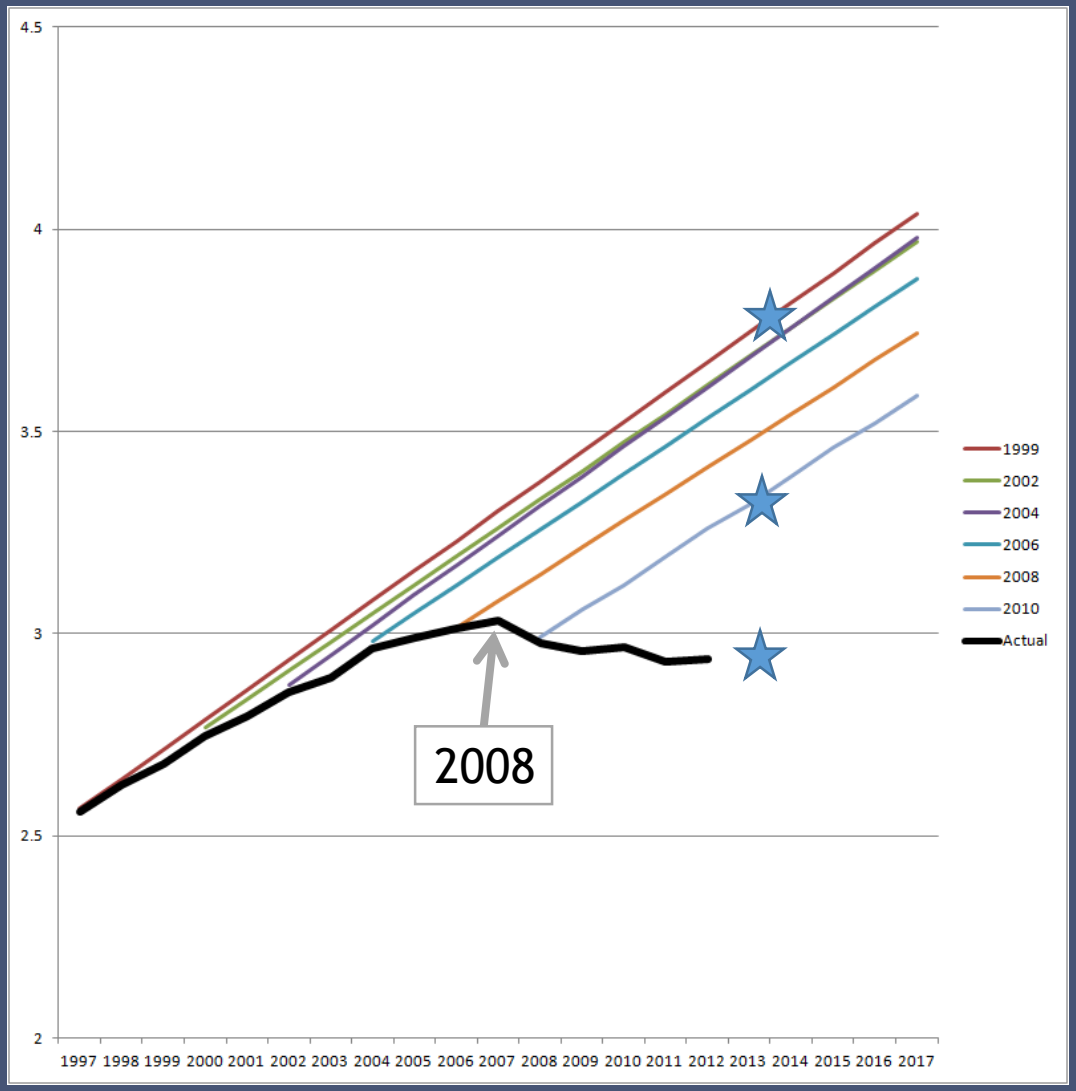


Do you even need to consider future traffic volumes at all?

Growth Rate: does it match reality?

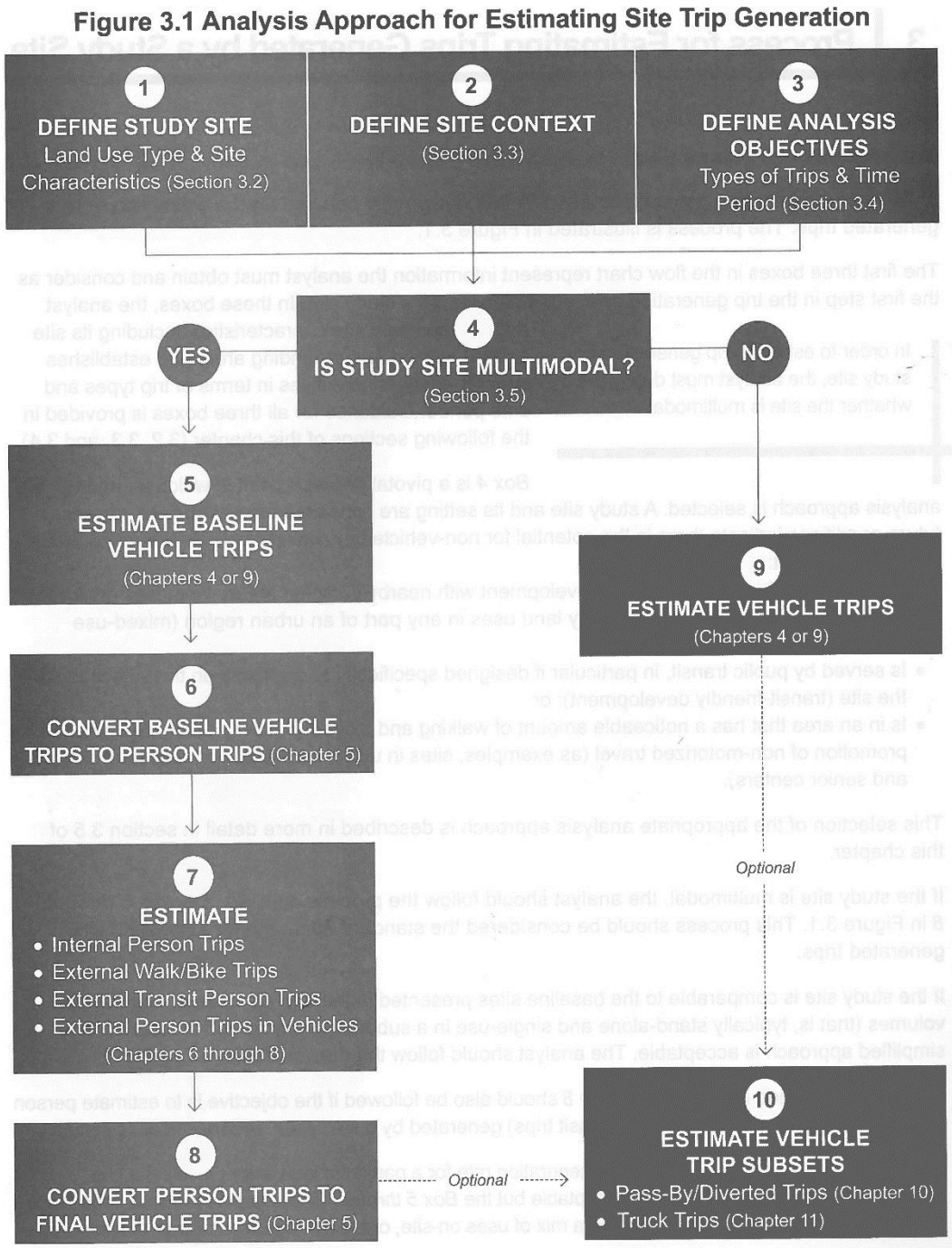


Growth Rate: does it match reality?



Conventional trip generation process

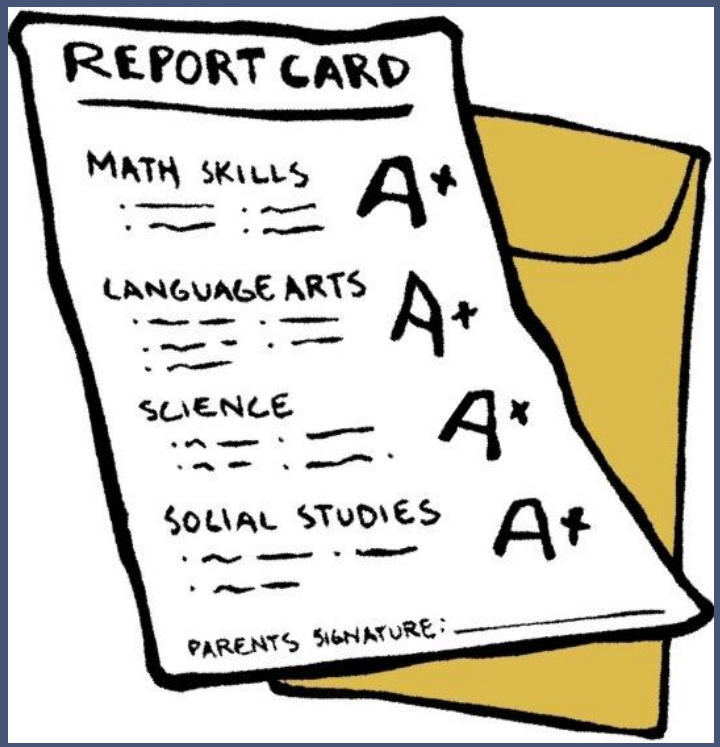
- Geared towards single use greenfield, suburban developments
- Data collected over 53 years by volunteers
- Collection sites
  - low density, single use, urban/suburban, no transit, no pedestrian access
- Vehicle trips only
- Overestimates vehicles for mixed use/infill

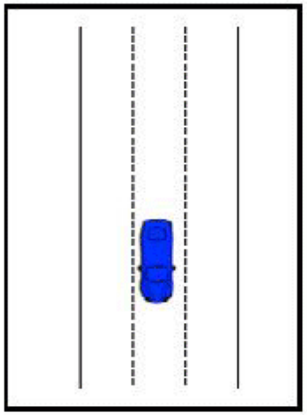


Multimodal approach to trip generation

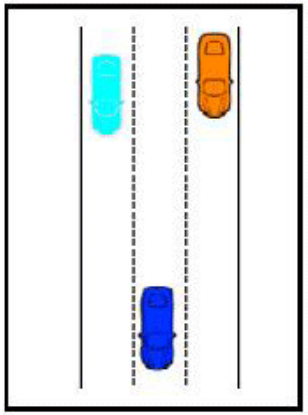
Trip Generation Handbook
Third Edition
August 2014

Vehicle Level of Service (LOS)

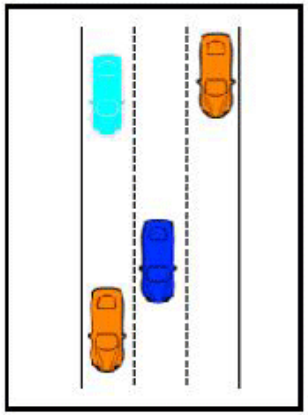




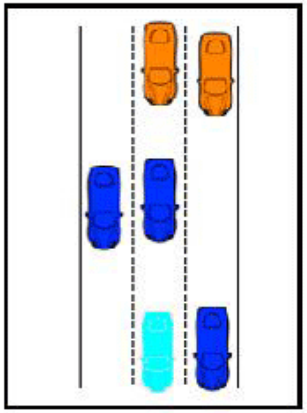
Level of Service A: Free-flow traffic with individual users virtually unaffected by the presence of others in the traffic stream.



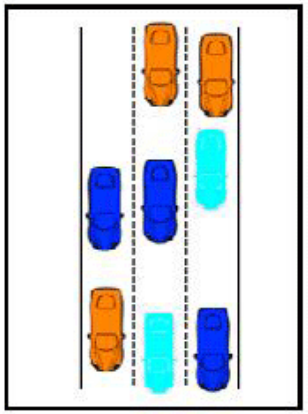
Level of Service B: Stable traffic flow with high degree of freedom to select speed and operating conditions but with some influence from other users.



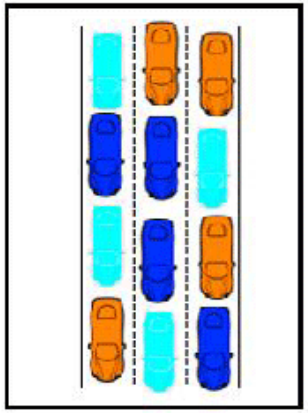
Level of Service C: Restricted flow that remains stable but with significant interactions with others in the traffic stream. The general level of comfort and convenience declines noticeable at this level.



Level of Service D: High-density flow in which speed and freedom to maneuver are severely restricted and comfort and convenience have declined even though flow remains stable.



Level of Service E: Unstable flow at or near capacity levels with poor levels of comfort and convenience.



Level of Service F: Forced traffic in which the amount of traffic approaching a point exceeds the amount that can be served. LOS F is characterized by the stop-and-go waves, poor travel times, low comfort and convenience, and increased accident exposure.

Level of Service A

Level of Service F

Precision implies accuracy

Level of Service	Delay* Signalized	Unsignalized
A	≤ 10	≤10
B	>10-20	>10-15
C	>20-35	>15-25
D	>35-55	>25-35
E	>55-80	>35-50
F	>80	>50

*seconds per vehicle

LOS doesn’t work for everyone

- Drivers tend to see other cars as obstacles
- Pedestrians prefer to walk where other people are walking
- Cyclists experience a safety in numbers effect

New measures of “service”

- Bicycle level of service
- Pedestrian level of service
- Shared use path level of service
- Bicycle level of traffic stress
- Pedestrian level of traffic stress

Traffic calming toolbox

How to fix it tomorrow

Toolbox

- Trees
- Medians / boulevards
- Curb extensions
- Number of lanes
- Lane widths
- Curb reaction / shy distance
- Parking
- Site design
- Furniture
- Art

Trees, trees, trees, trees

Medians

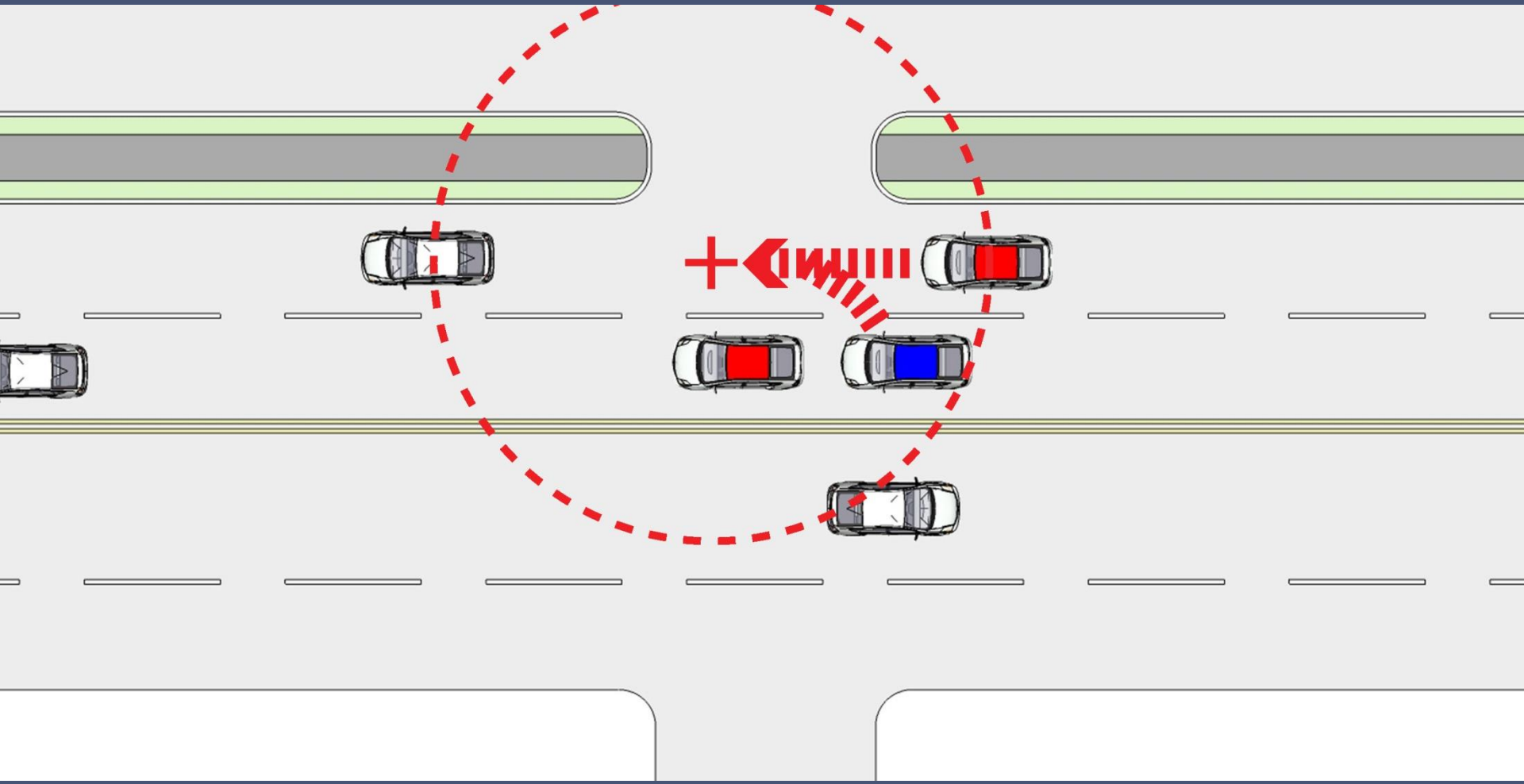
St Louis Park, MN

Curb Extension

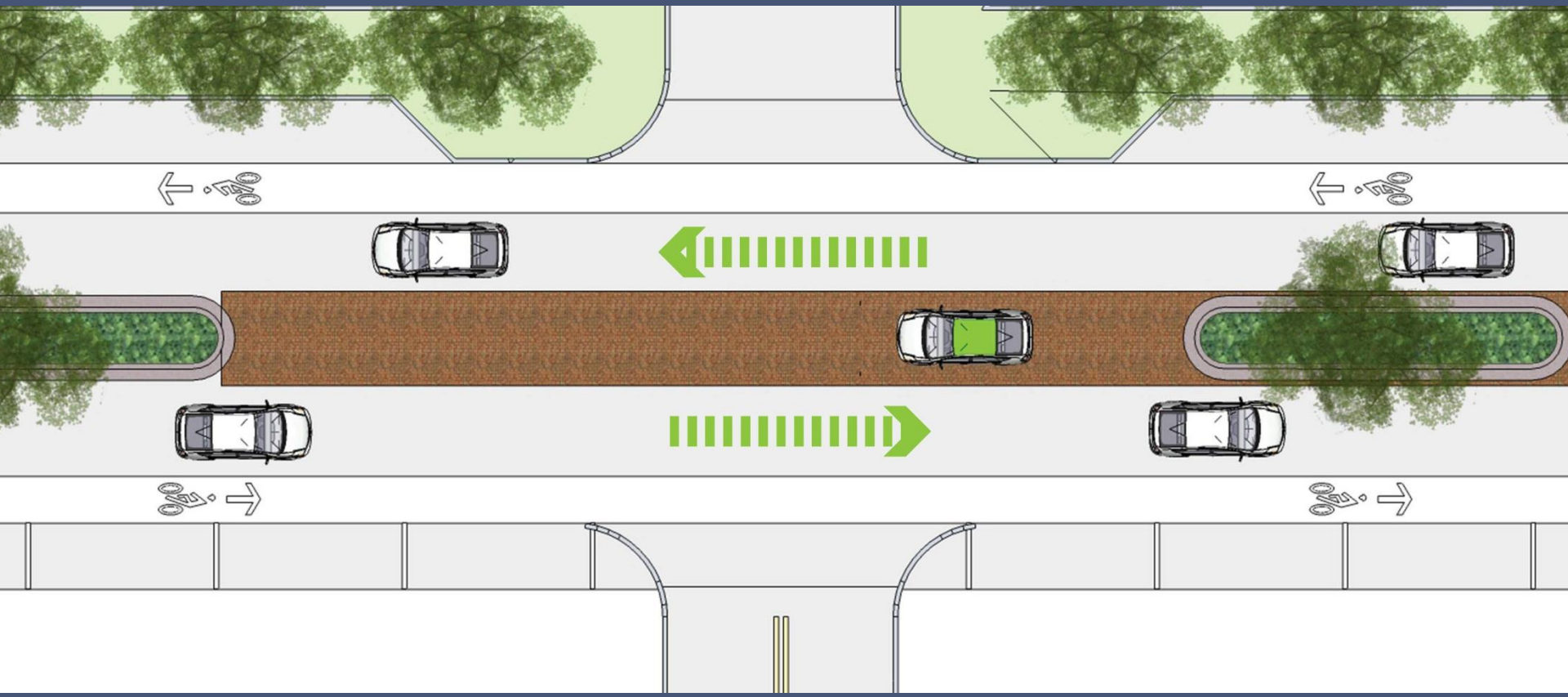
Seattle, WA


Alexandria, VA

Number of lanes – 4-to-3 conversion



Number of lanes – 4-to-3 conversion



Lane widths

Curb reaction & shy distance

MINNESOTA DEPARTMENT OF TRANSPORTATION
Engineering Services Division
Technical Memorandum No. 12-12-TS-06
November 28, 2012

TABLE 4
Standard Curb Reaction Dimensions

Design Speed	Curb Reaction Width for Indicated Curb Types (feet)	
	B, V or vertical monolithic	D, S or sloped monolithic
≤ 45 mph	1-2	0-2
> 45 mph	2-3	1-3

On-Street Parking

- Creates friction
- Provides buffer
- Supports certain types of retail

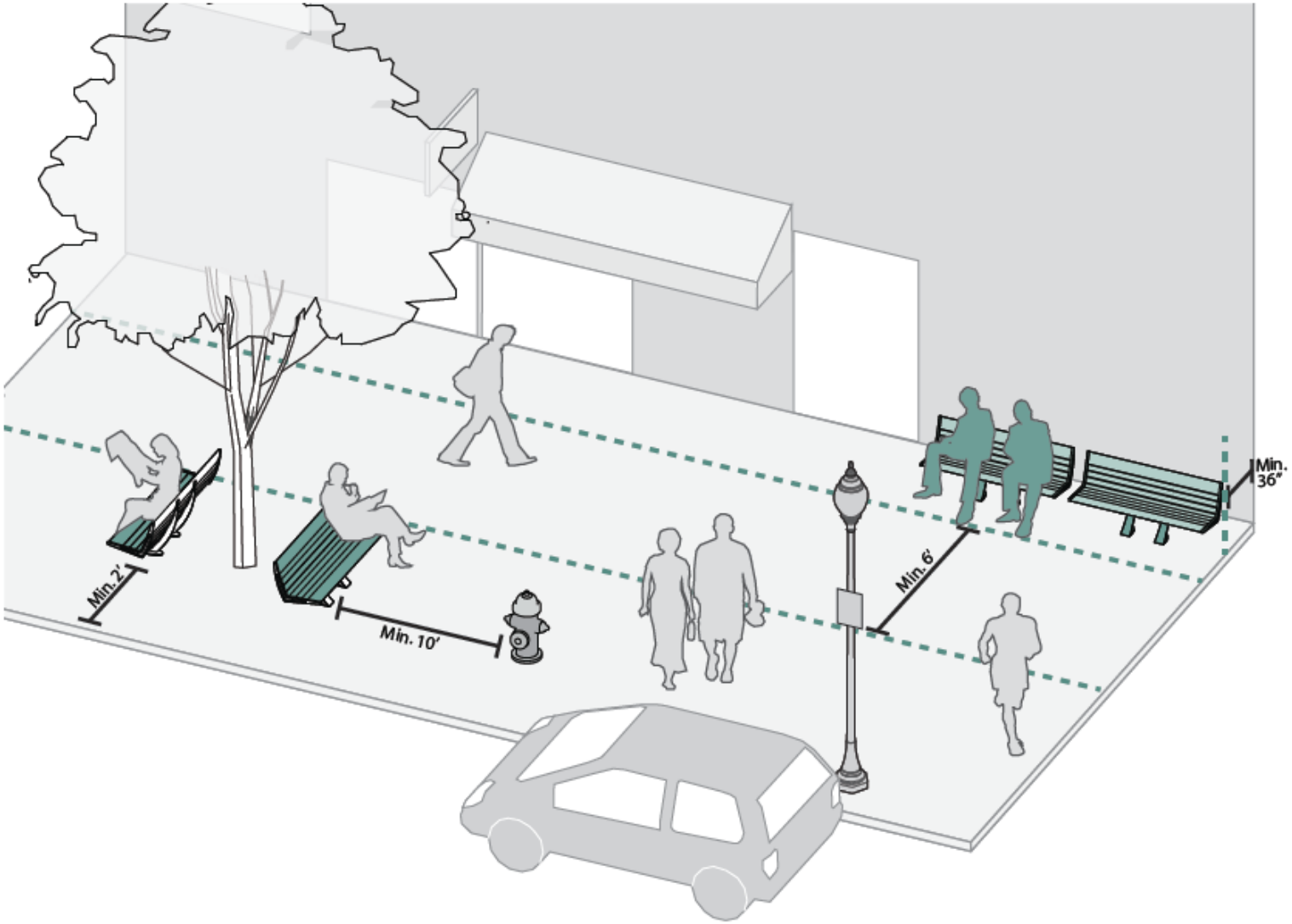
Site design – bring buildings closer to the street

- Improves the streetscape for pedestrians and drivers
- Increases visibility of pedestrians to drivers

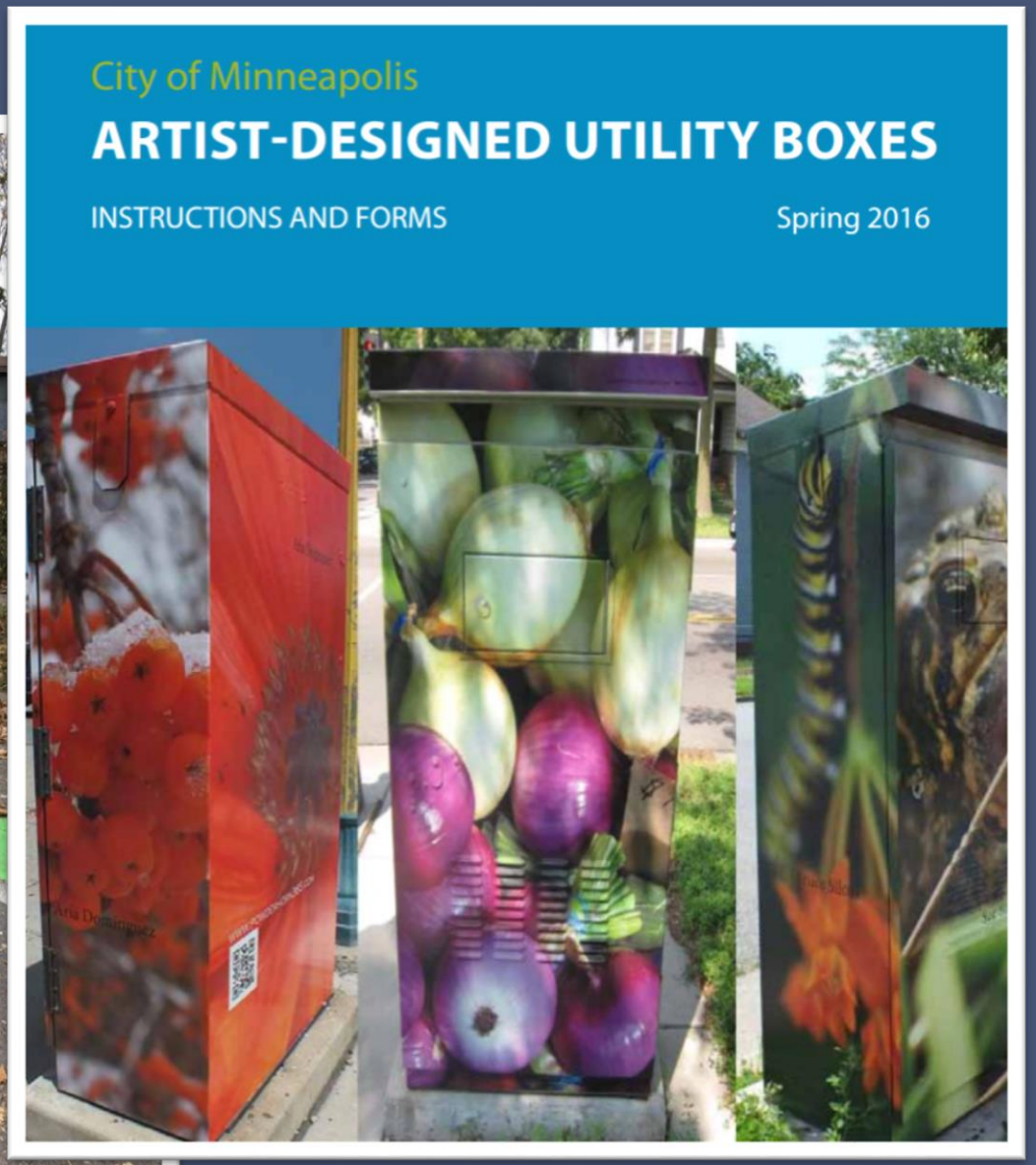

Large setbacks
contribute to
wide open feeling


Building closer to roadway contributes to narrow feeling

Furniture that attracts people



Public Art

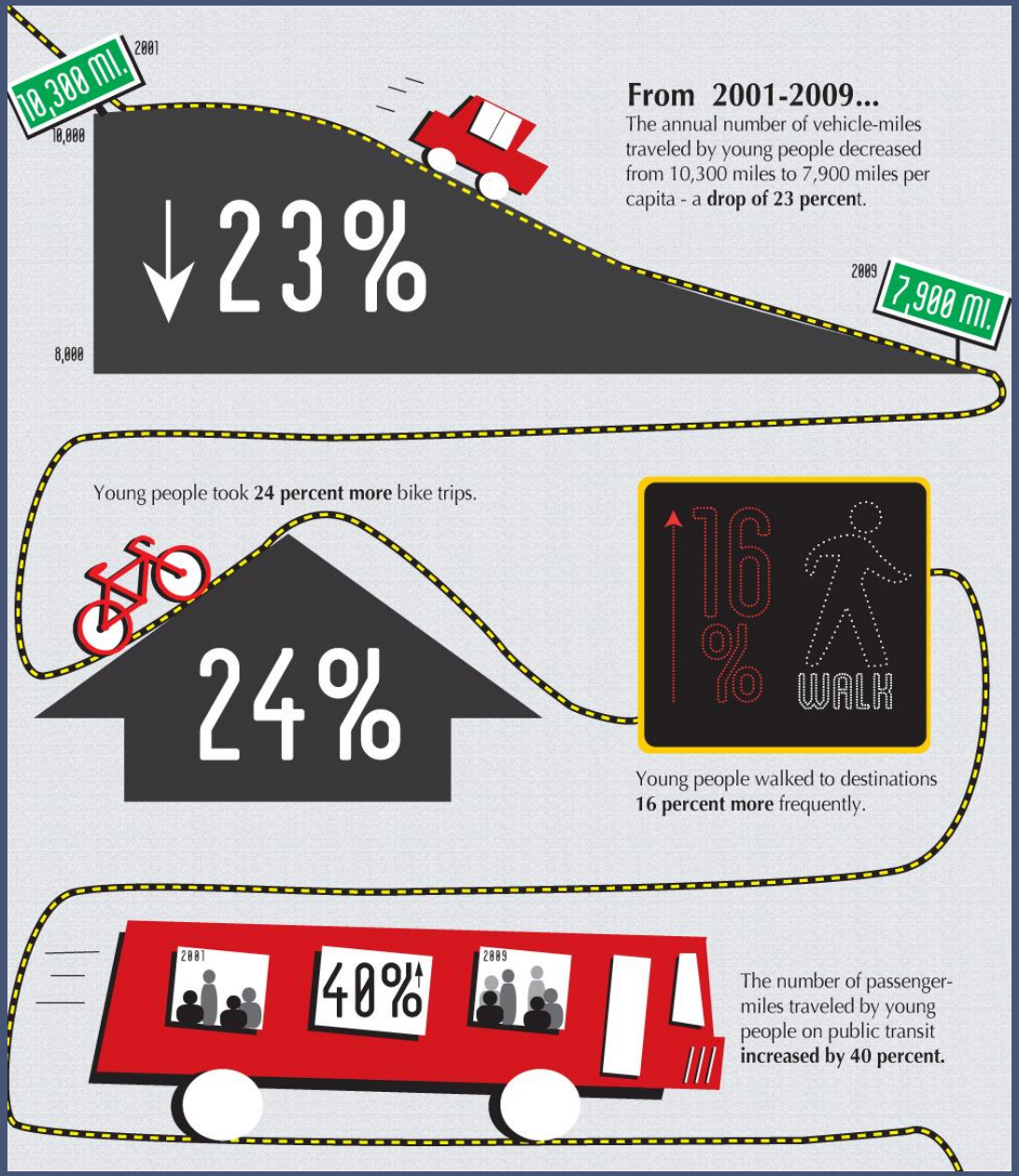

City of Minneapolis
ARTIST-DESIGNED UTILITY BOXES
INSTRUCTIONS AND FORMS
Spring 2016

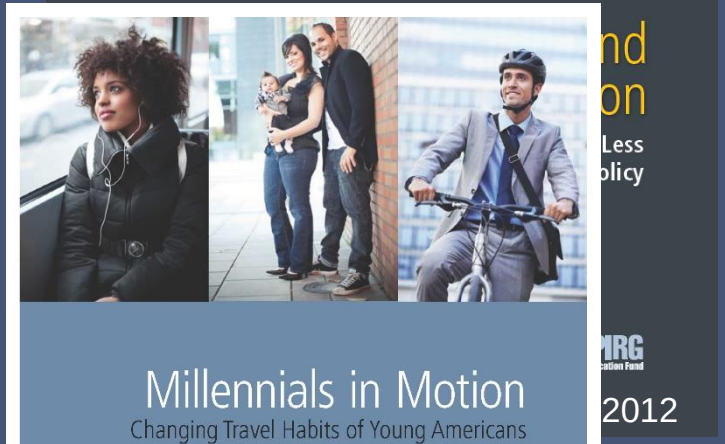
The case for traffic calming and “alternative modes”

If you plan cities for cars and traffic, you get cars and traffic…

Project for Public Spaces

Transportation & the New Generation





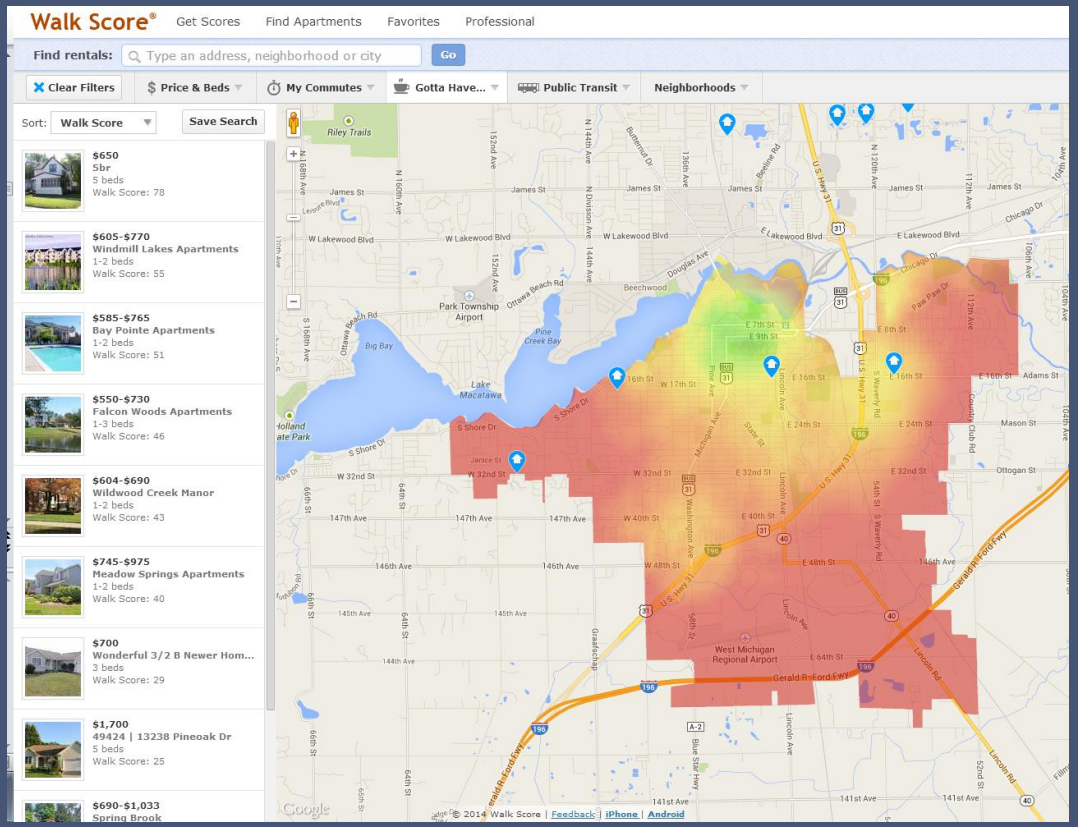
The 4 types of millennial travelers

Figure 16 Prevalence of the traveler types in 2009, United States (Age 16 to 36)

Note: Population estimates based on the weighted values from the NHTS. Source: 2009 NHTS, weighted values.

Walkscore.com

Property values have shown increases of $700 to $3,000 for each additional point on WalkScore



Cities (and people) thrive on designs that support short trips

Get back to traditional urban design principals

N.Y. / REGION

Bill to Reduce Speed Limit to 25 M.P.H. Gains Favor

By MATT FLEGENHEIMER JUNE 17, 2014

Email
Share
Tweet
Save
More

A proposal to lower the
cleared a critical hurdle
support of the de Blasio a
safety advocates.

If passed before the legisla
late Monday by Senator Je
State Assembly would deli
Mayor Bill de Blasio's Visio
by 2024.

« Video: European Space Agency Lands...

City of Trees: Boise's Christmas T... »

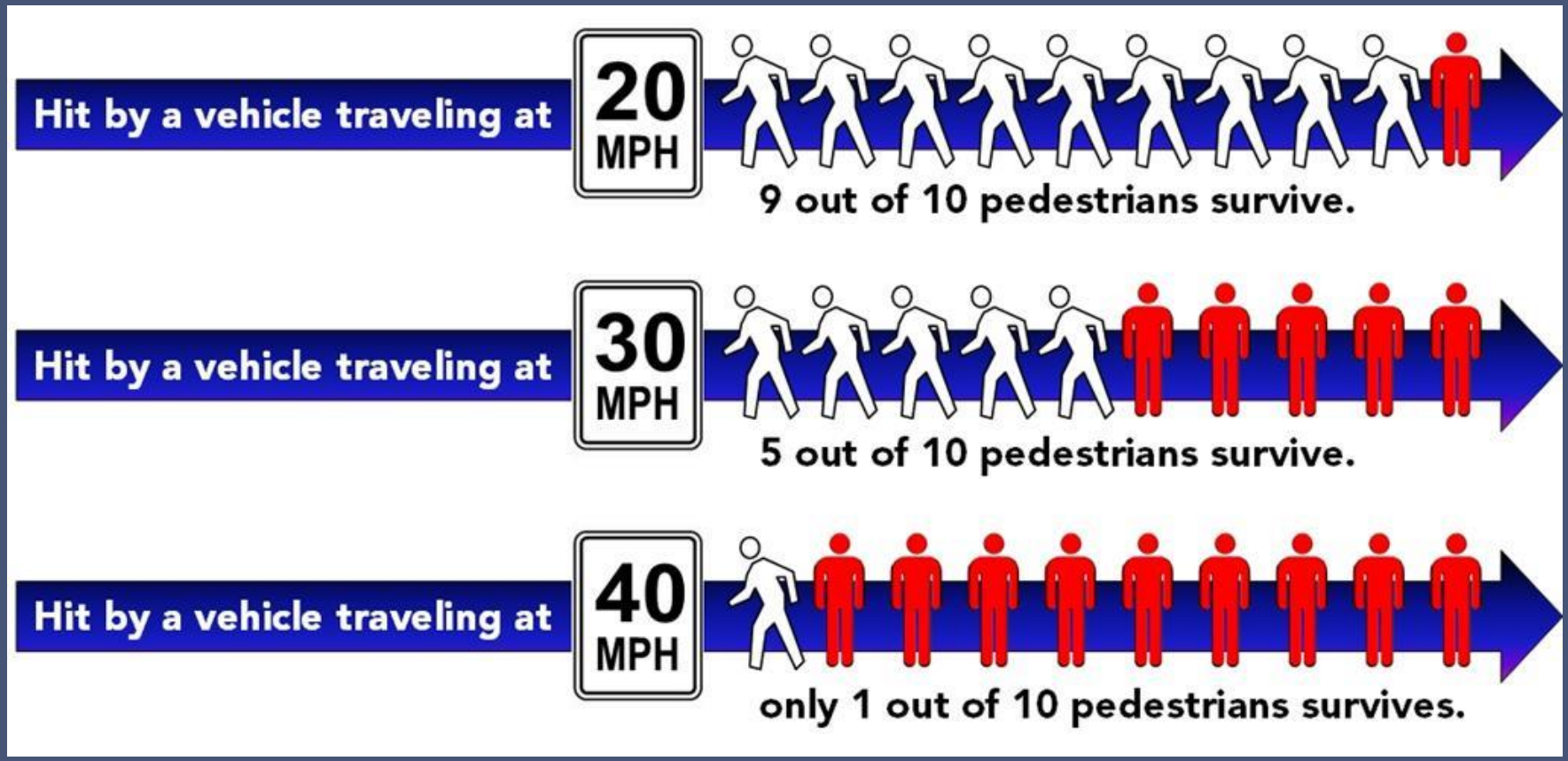
WEDNESDAY, NOVEMBER 12, 2014

ACHD One-Way to Two-Way Conversion Under Way on Boise's Third Street

POSTED BY HARRISON BERRY ON WED, NOV 12, 2014 AT 3:06 PM

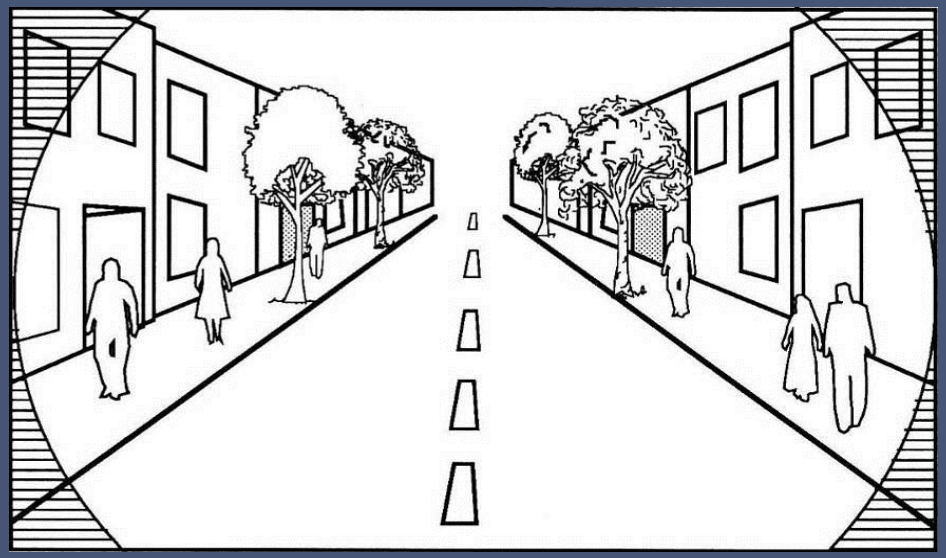
click to enlarge

Speed and death/serious injury

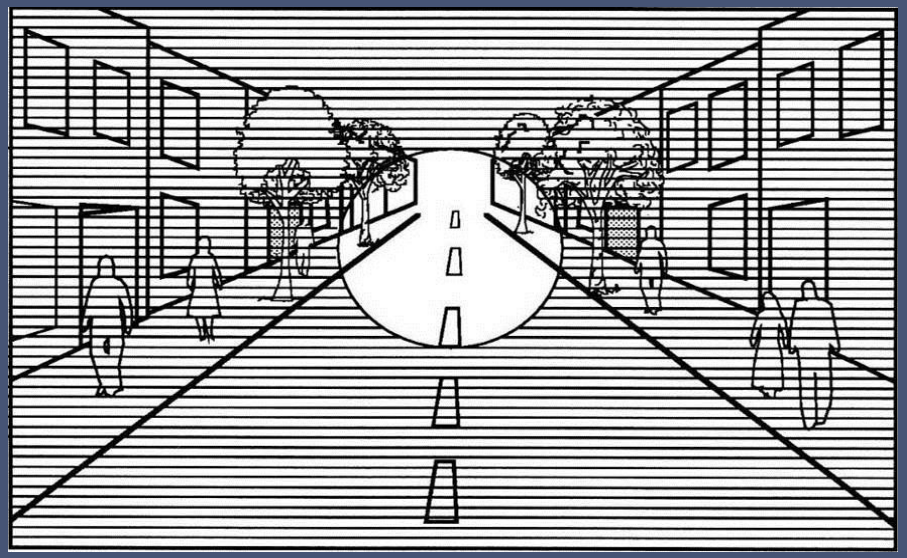


Travel Speed

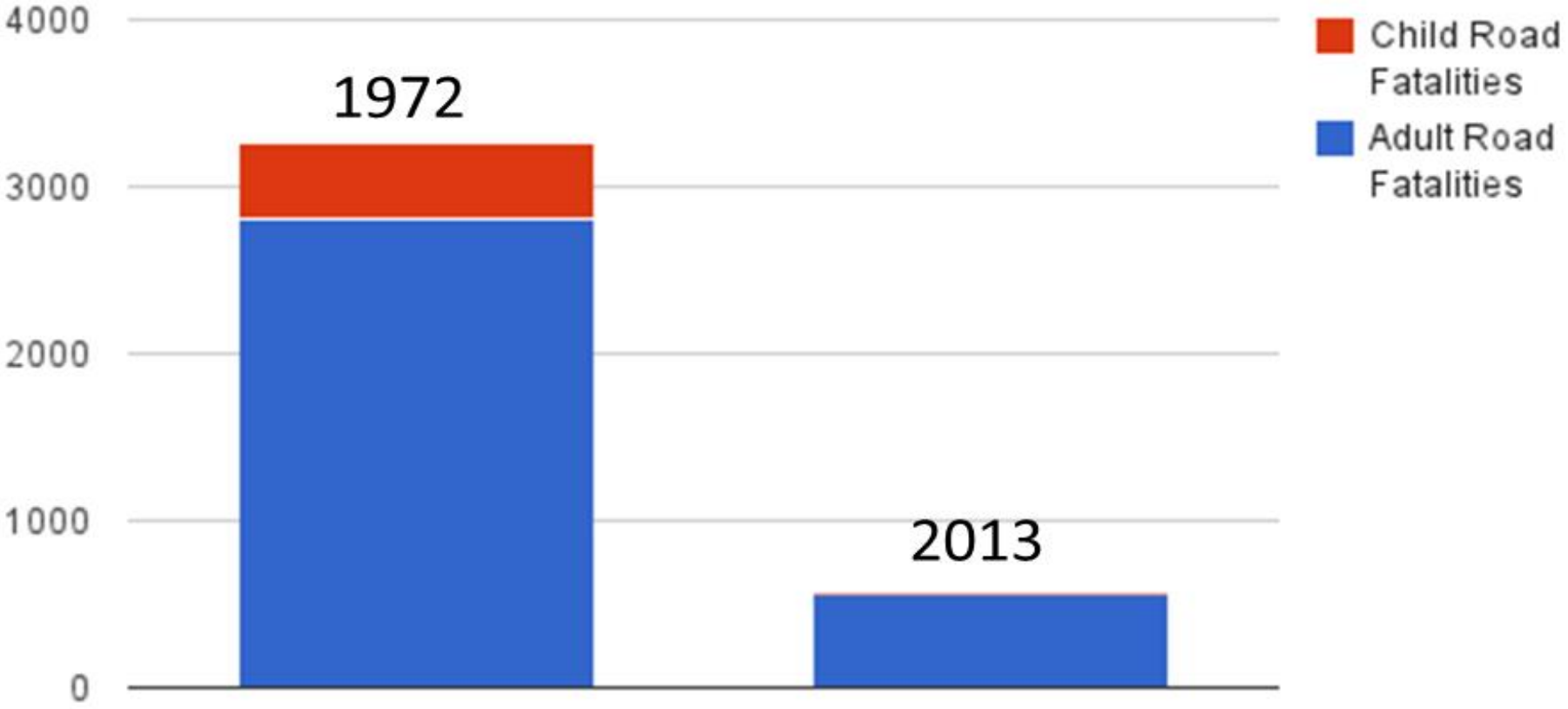
15 MPH



30 MPH

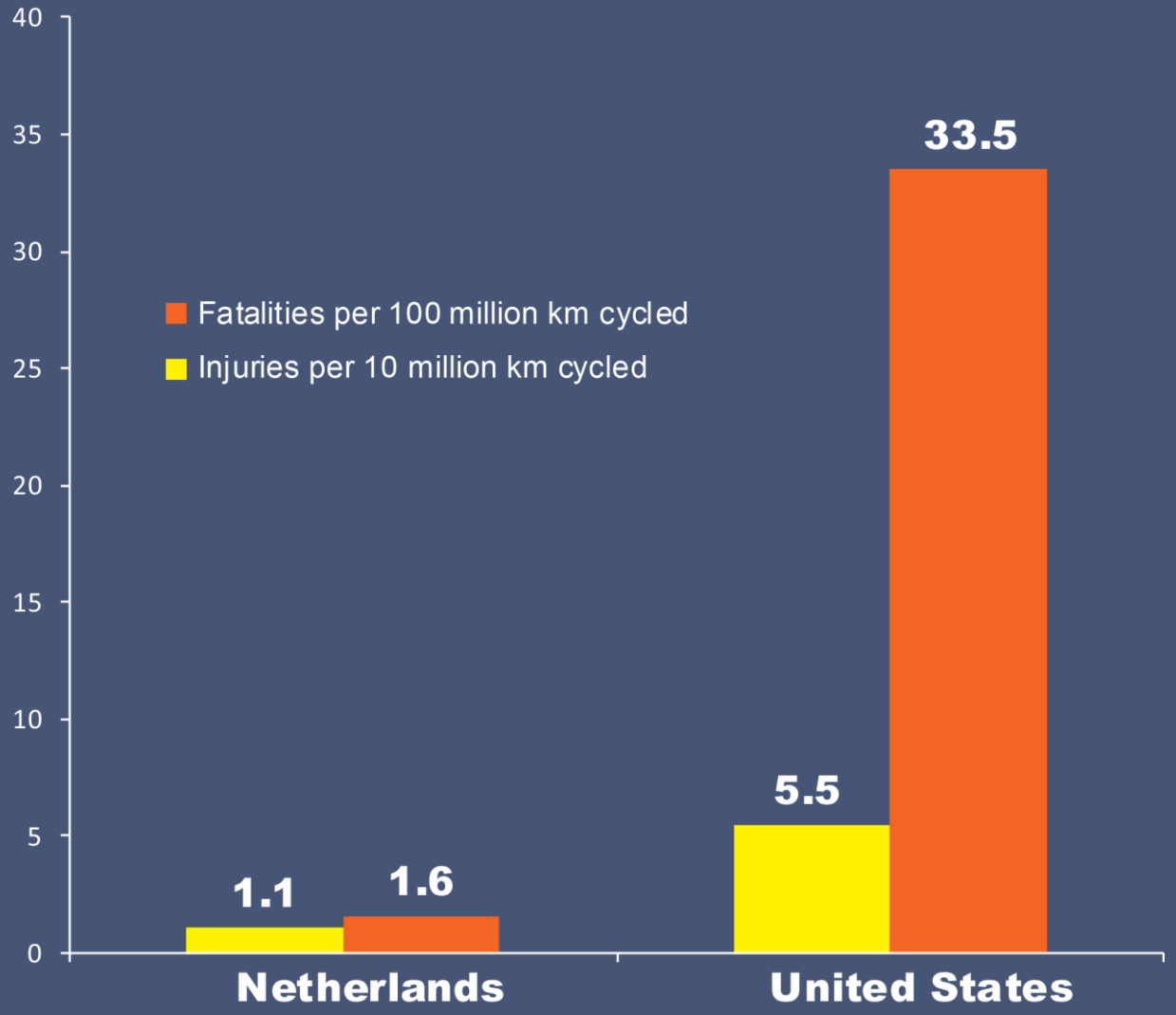


Road Fatalities in the Netherlands



Credit: http://www.aviewfromthecyclepath.com/

Bicycle Fatalities and Injuries

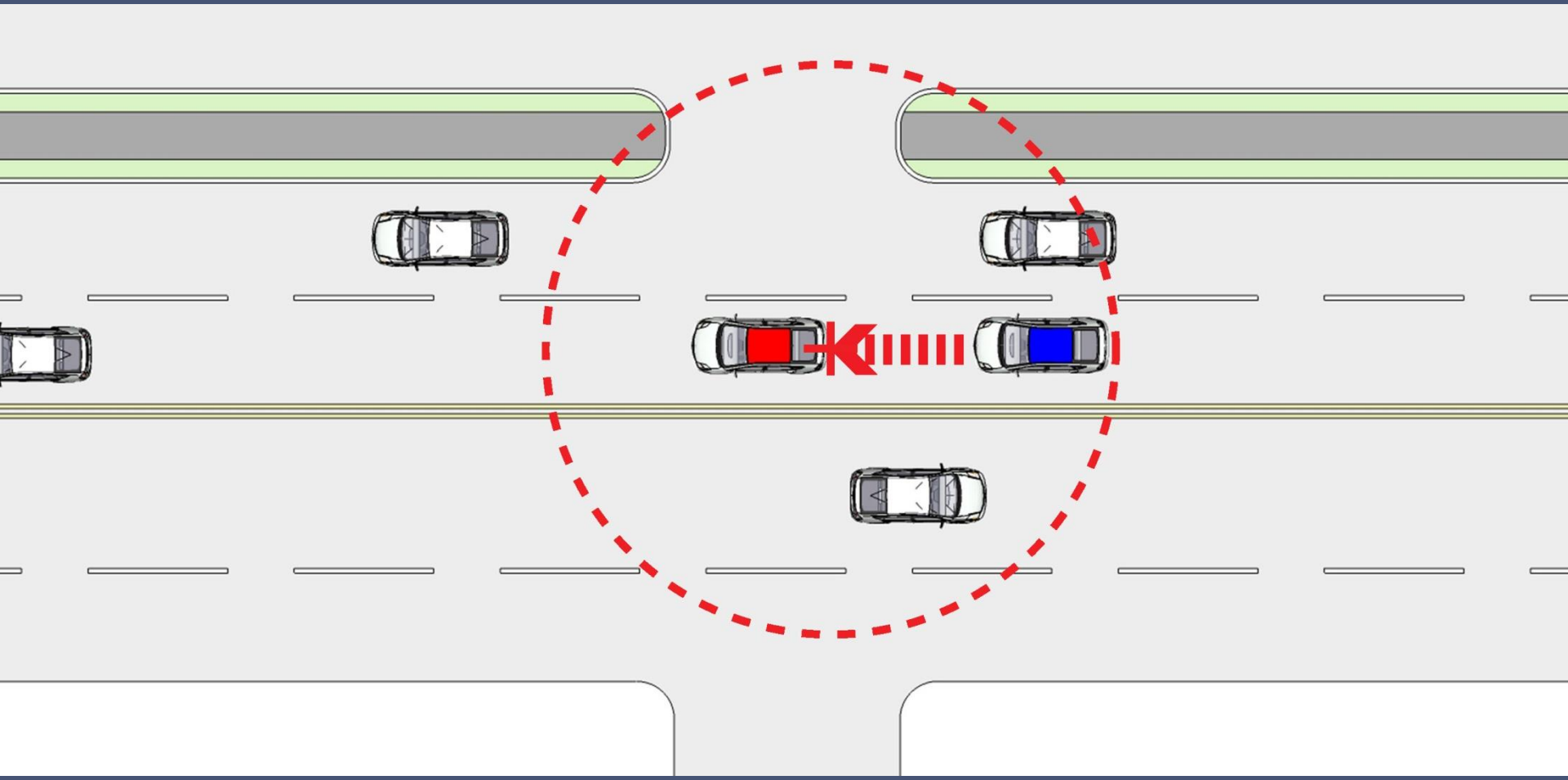


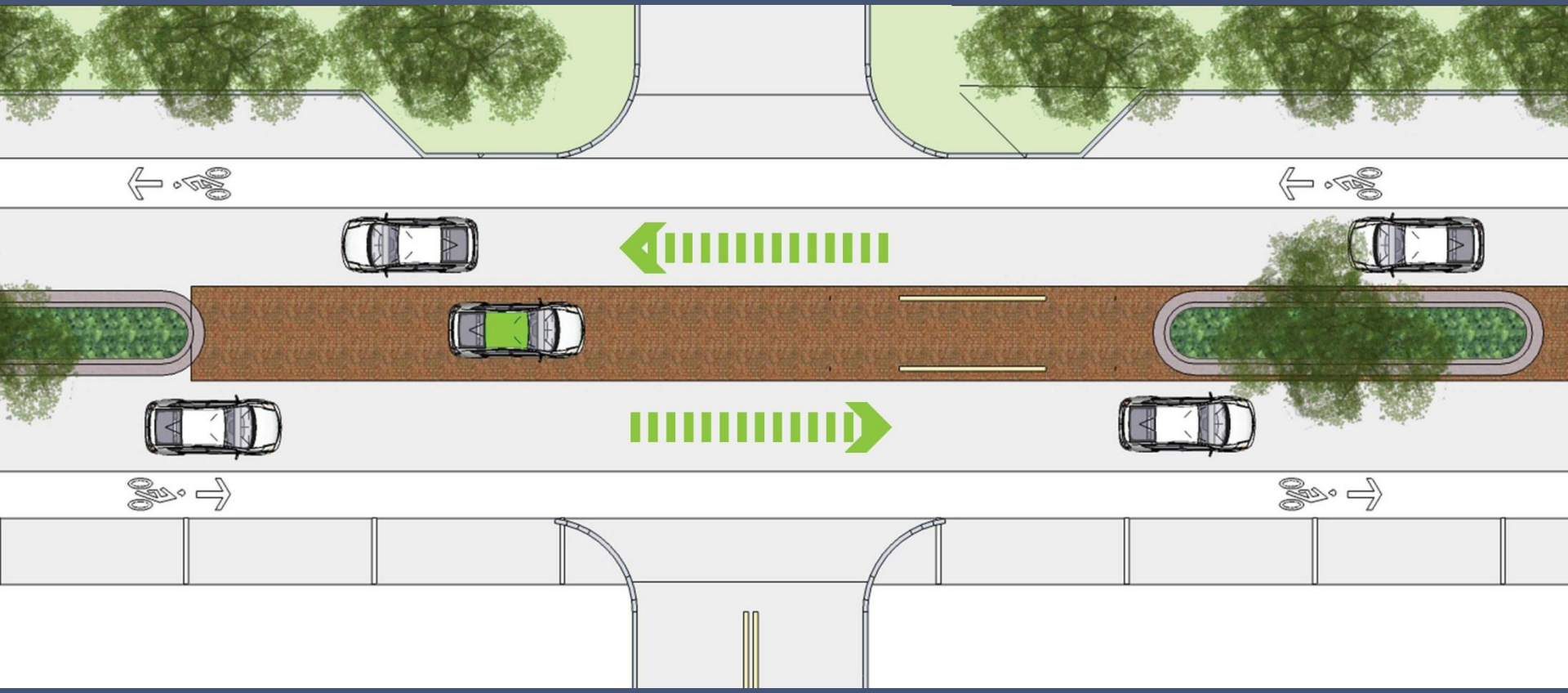
Source: Pucher and Buehler (eds.) *City Cycling,* Cambridge, MA. MIT Press, 2012.


Dutch
ComFortable

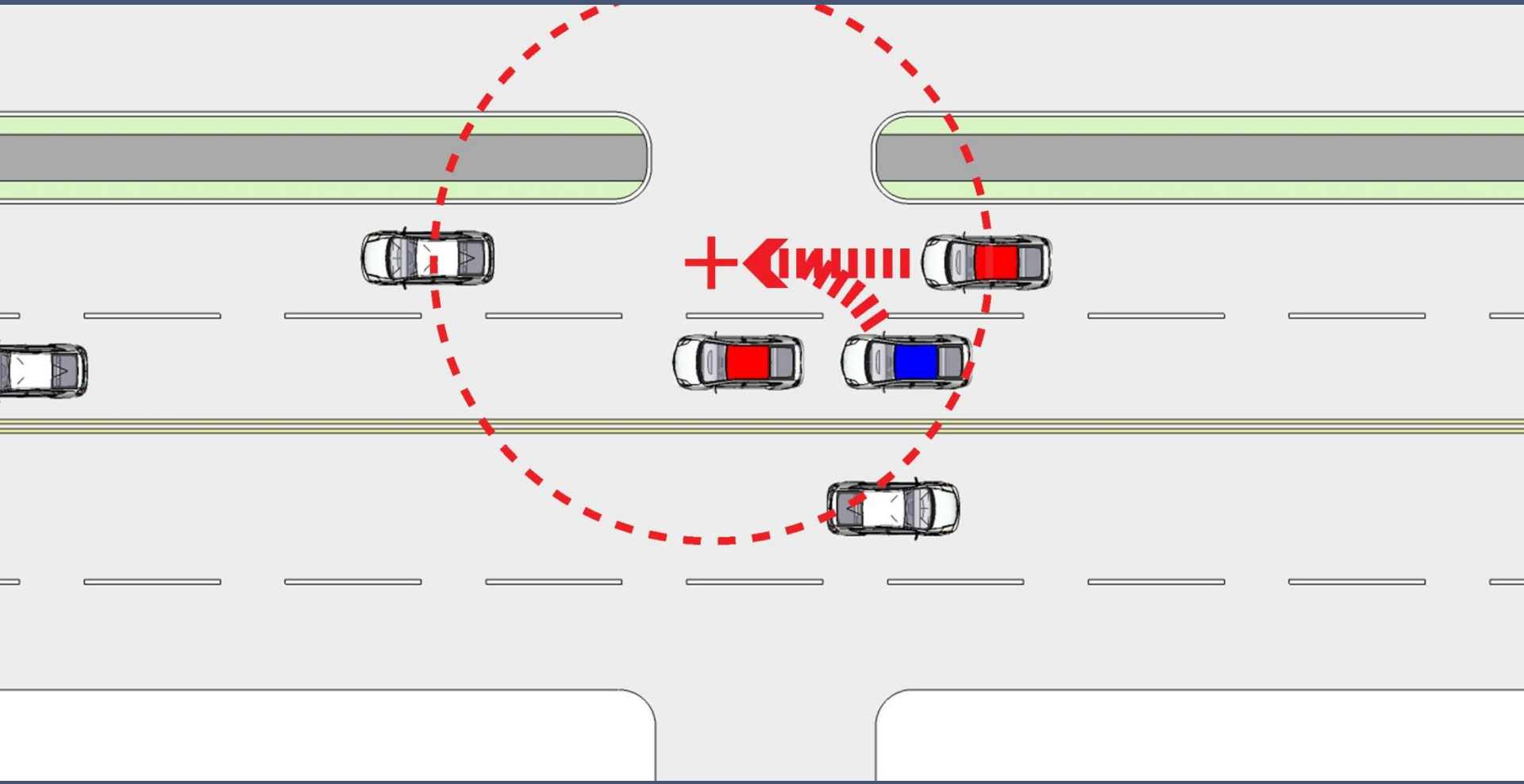

Americans
Nervous

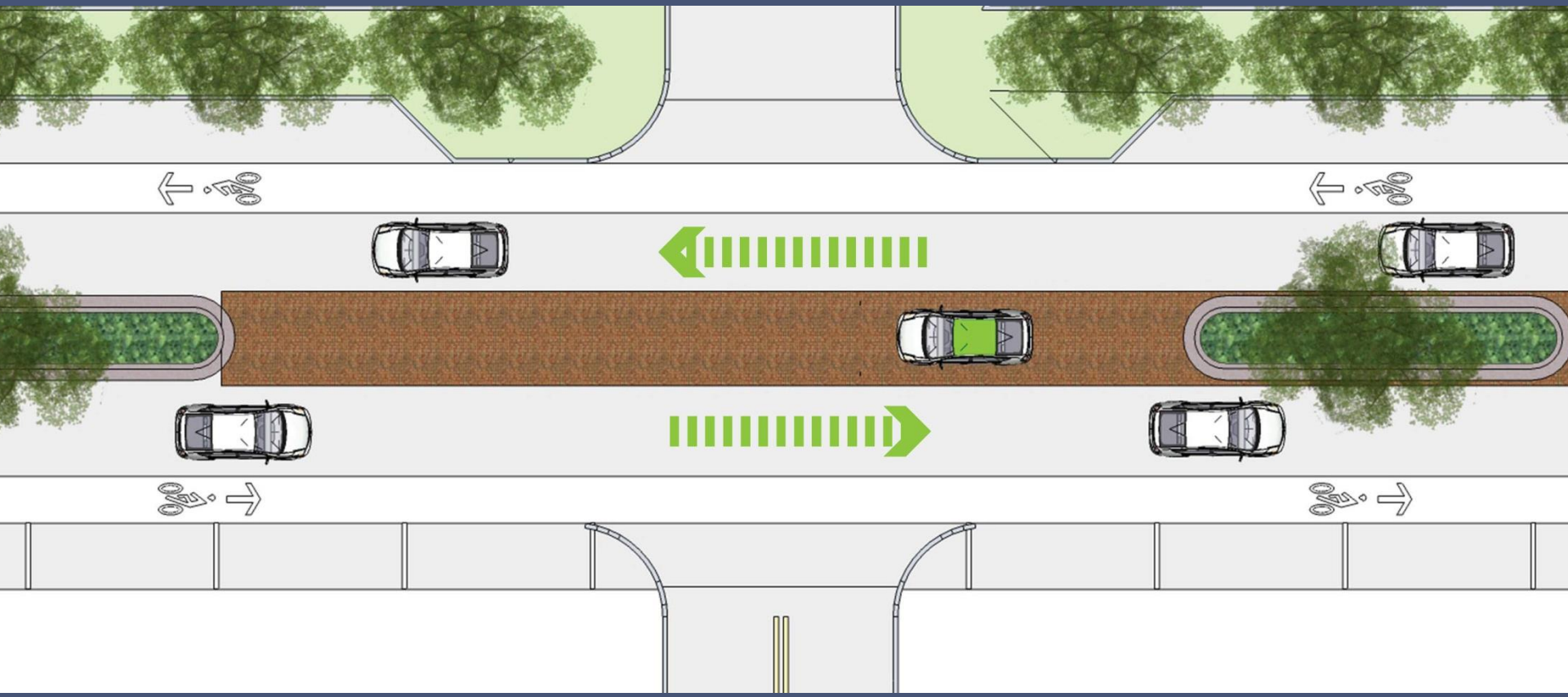
3 crash types can be reduced by going from 4 to 3 lanes: 1 – rear end



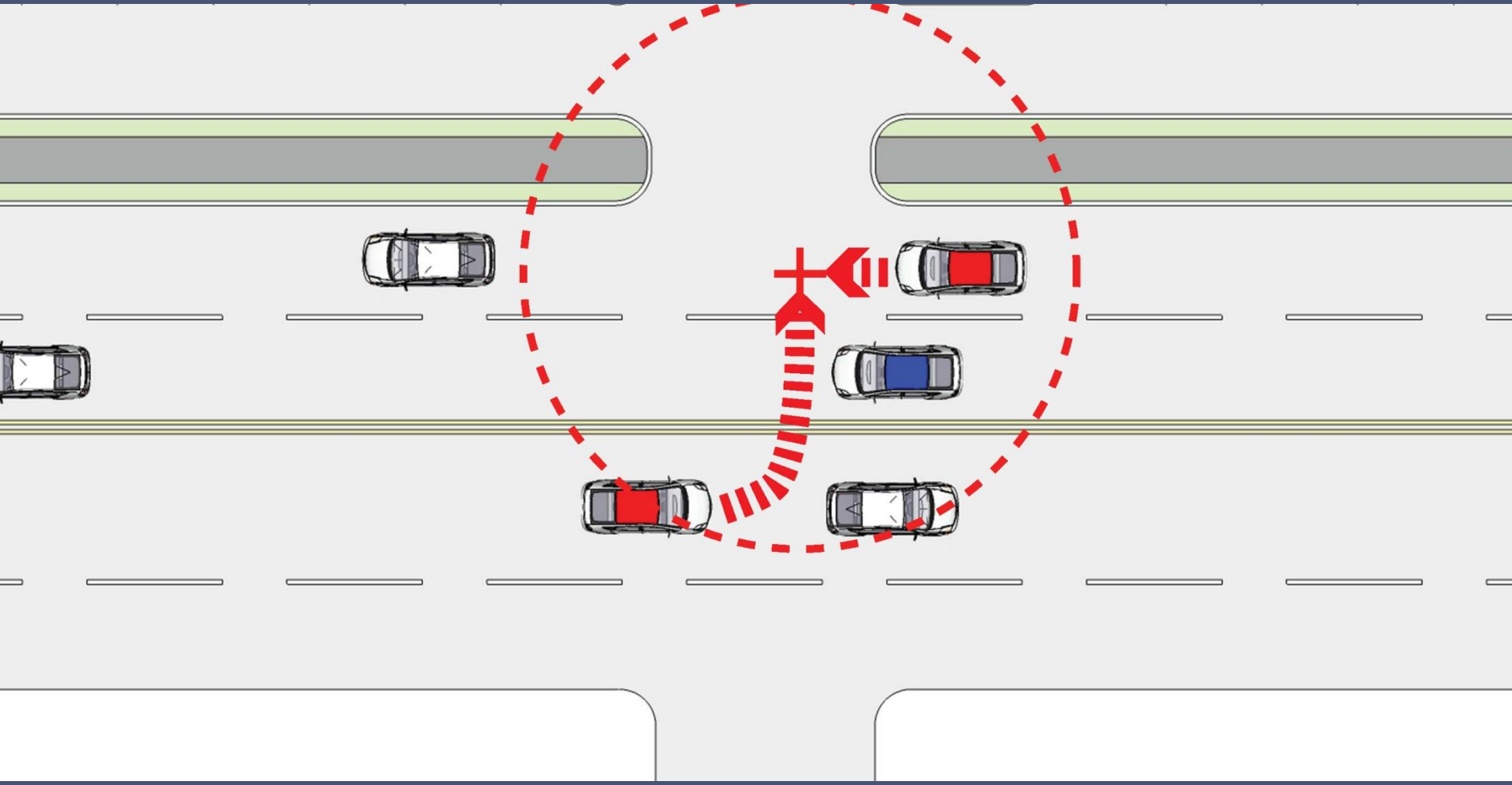


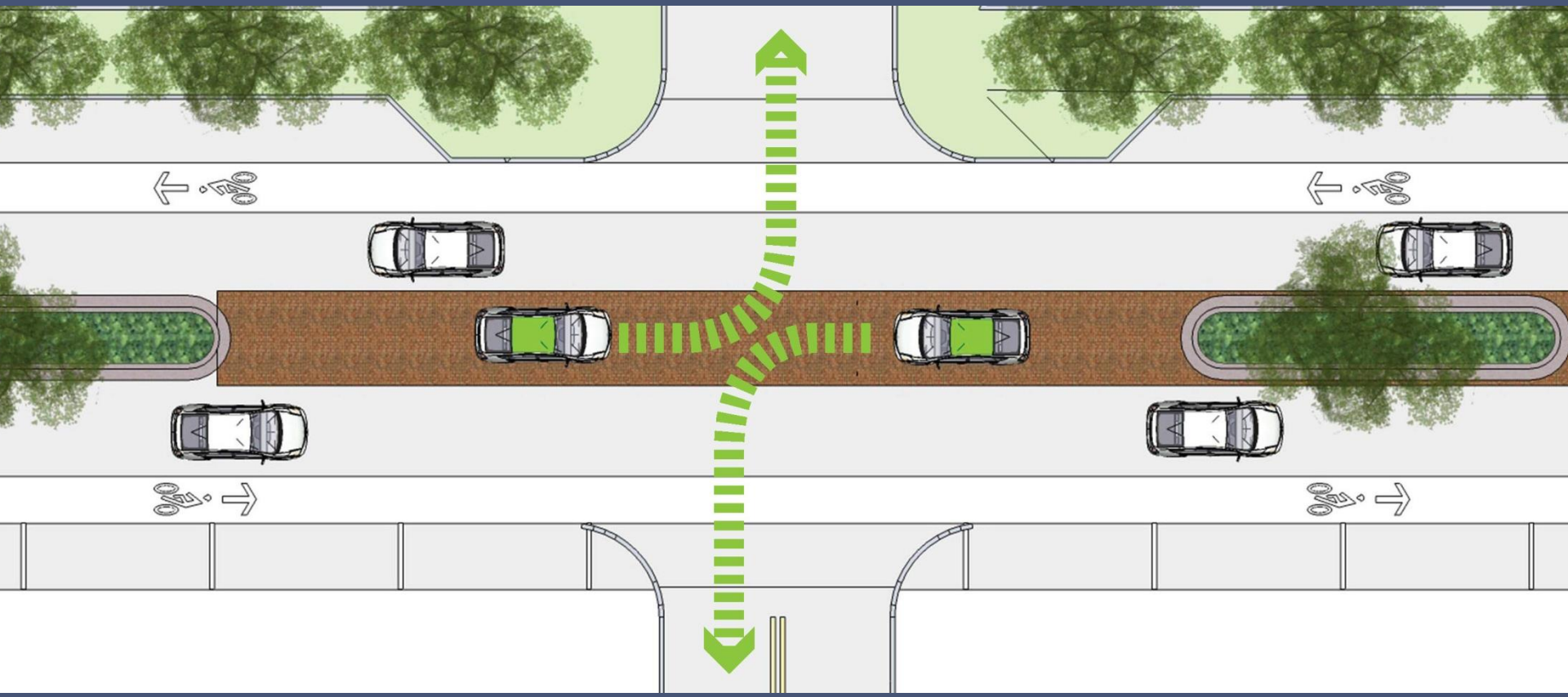
3 crash types can be reduced by going from 4 to 3 lanes: 2 – side swipes



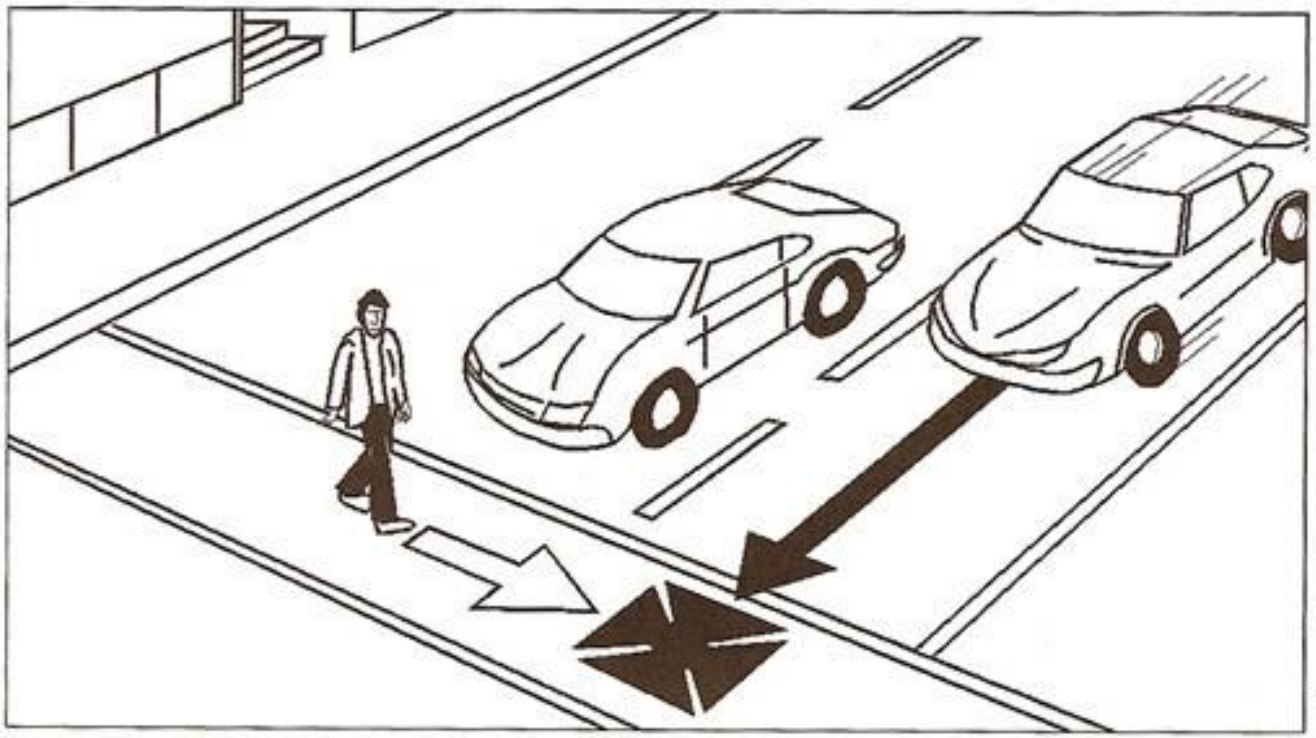


3 crash types can be reduced by going from 4 to 3 lanes: 3 – left turn/broadside





Reduces risk of “multiple threat” crashes



Example of a Multiple-Threat Collision


@bicyclehannah
hpritchard@tooledesign.com