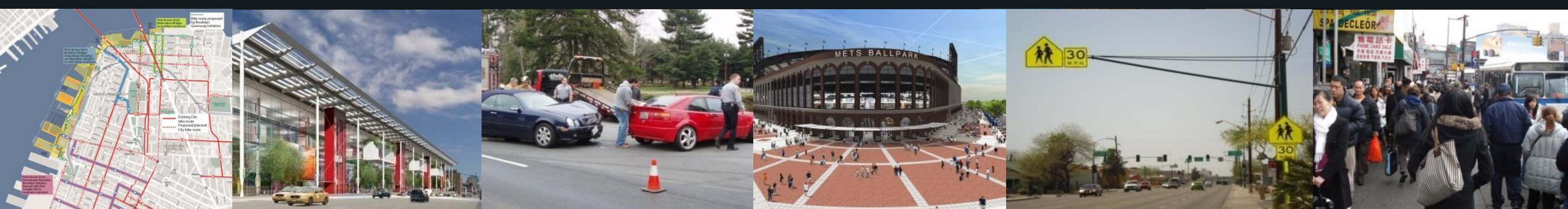
Two Decades of Photo Enforcement: Experiences and Lessons Learned

Richard Retting



TRAFFIC | TRANSPORTATION | PLANNING | DESIGN | CONSTRUCTION

Pennsylvania Safety Symposium
June 10, 2014

SAM SCHWARTZ ENGINEERING

Why Photo Enforcement?

Limitations of Conventional Enforcement

- Time consuming
- Other priorities such as violent crime and homeland security limit resources for traffic enforcement
- Difficult to observe and stop violators at the worst places and times
- High-speed pursuit can be dangerous for police and civilians
- Reductions in violations achieved through conventional enforcement may be temporary

Photo Enforcement Supports the Vision of an Emerging "Toward Zero Deaths" Policy

- National transportation organizations, including AASHTO, ITE, and USDOT actively pursuing the goal of a transportation system that produces zero fatalities

Annual Red Light Running Toll, 2012

- 150,000 crashes
- 133,000 injuries
- 683 deaths

In 2012, More Than 10,000 People Died in Speeding-Related Crashes

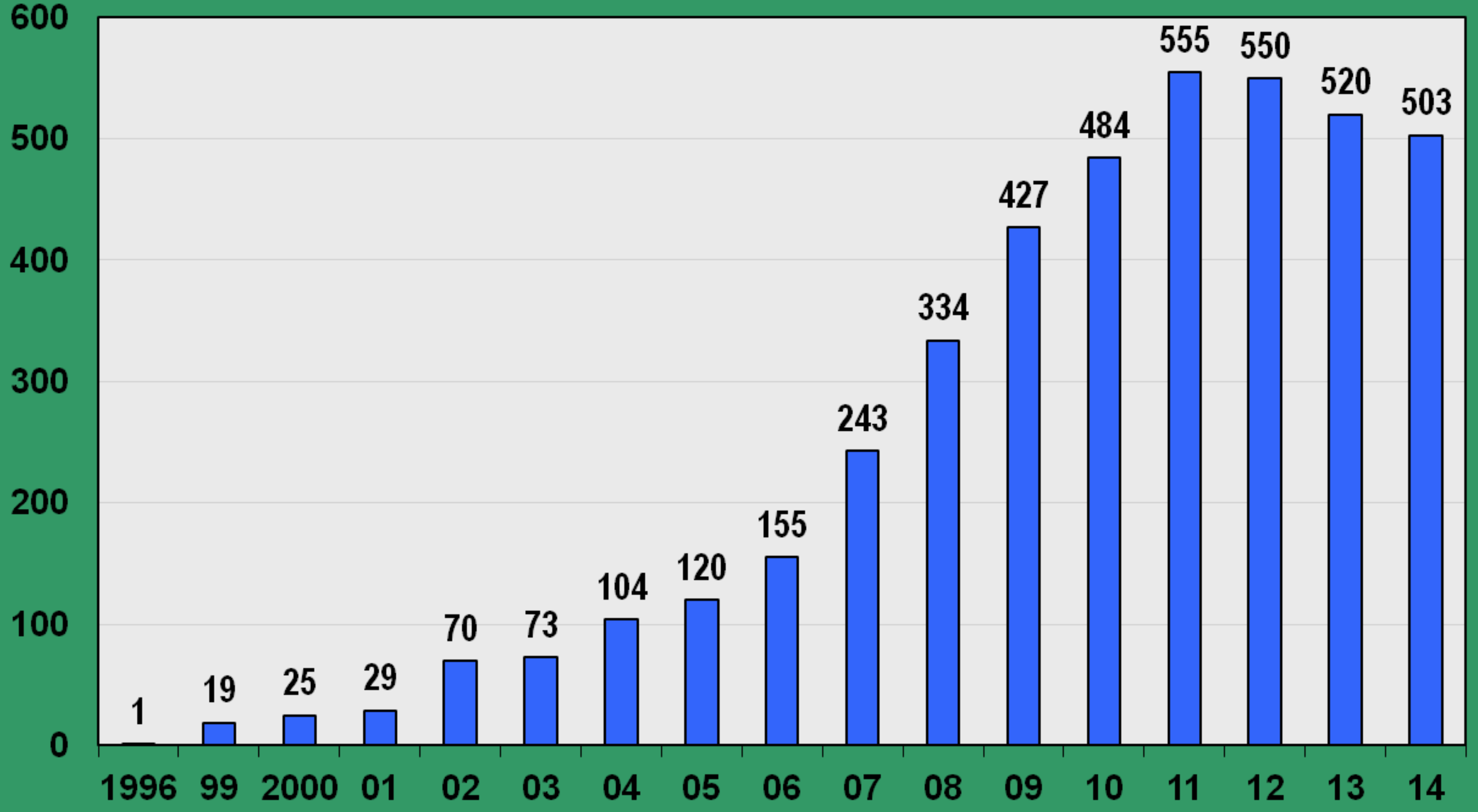
Nearly 1/3 of all motor vehicle fatalities

History of Photo Enforcement in US
Red Light Cameras

- First application: New York City, 1991
- Several years before a second program began, in San Francisco, following enactment of a statewide RLC law in 1996
- Many other States followed. As of June 2014 an estimated 503 RLC programs operating in 24 States and DC
- More than half of these programs located in just 4 States – California, Florida, Illinois, and Texas

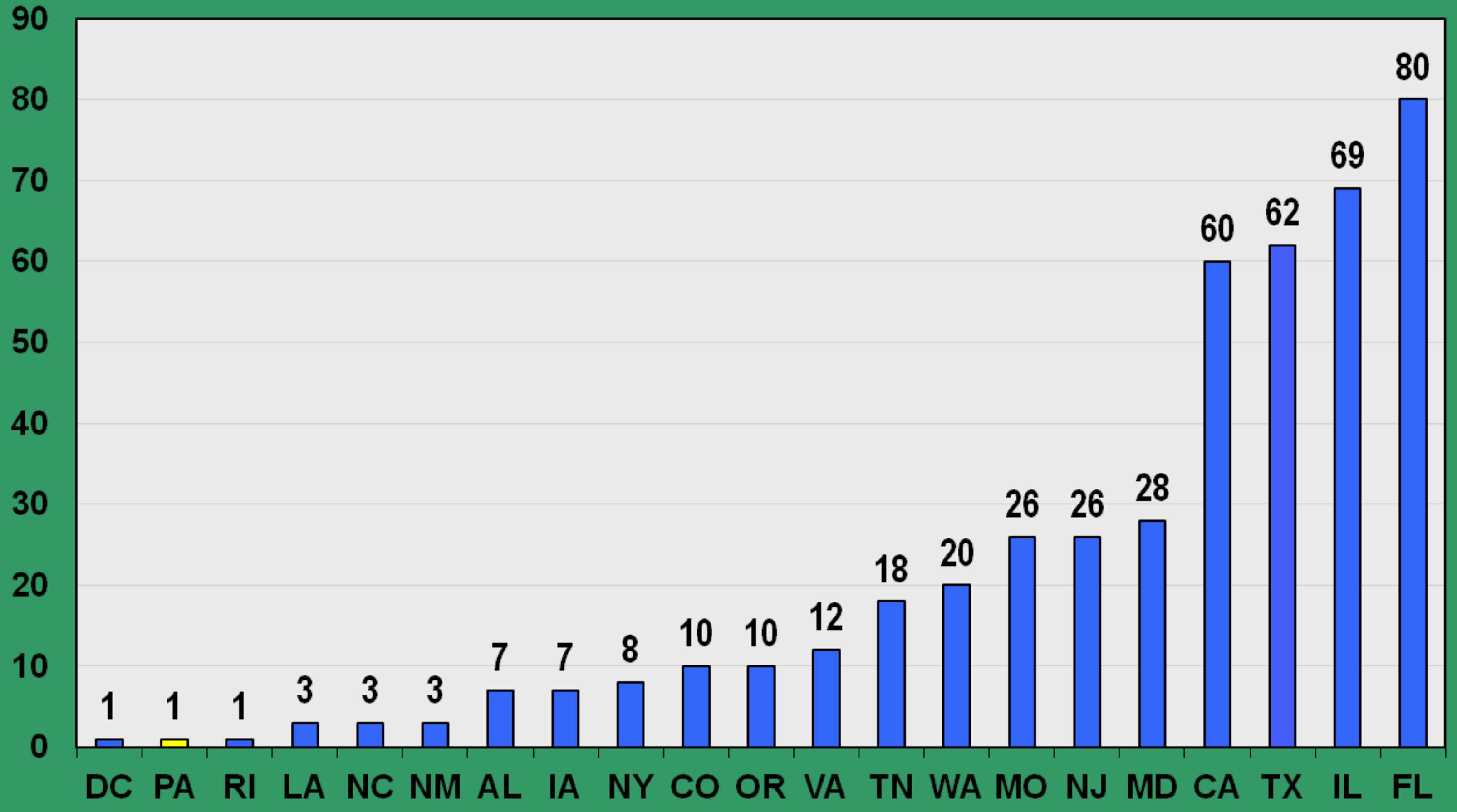
of US Communities with Red Light Cameras

1996-2014



of Communities with Red Light Cameras

By State – June 2014



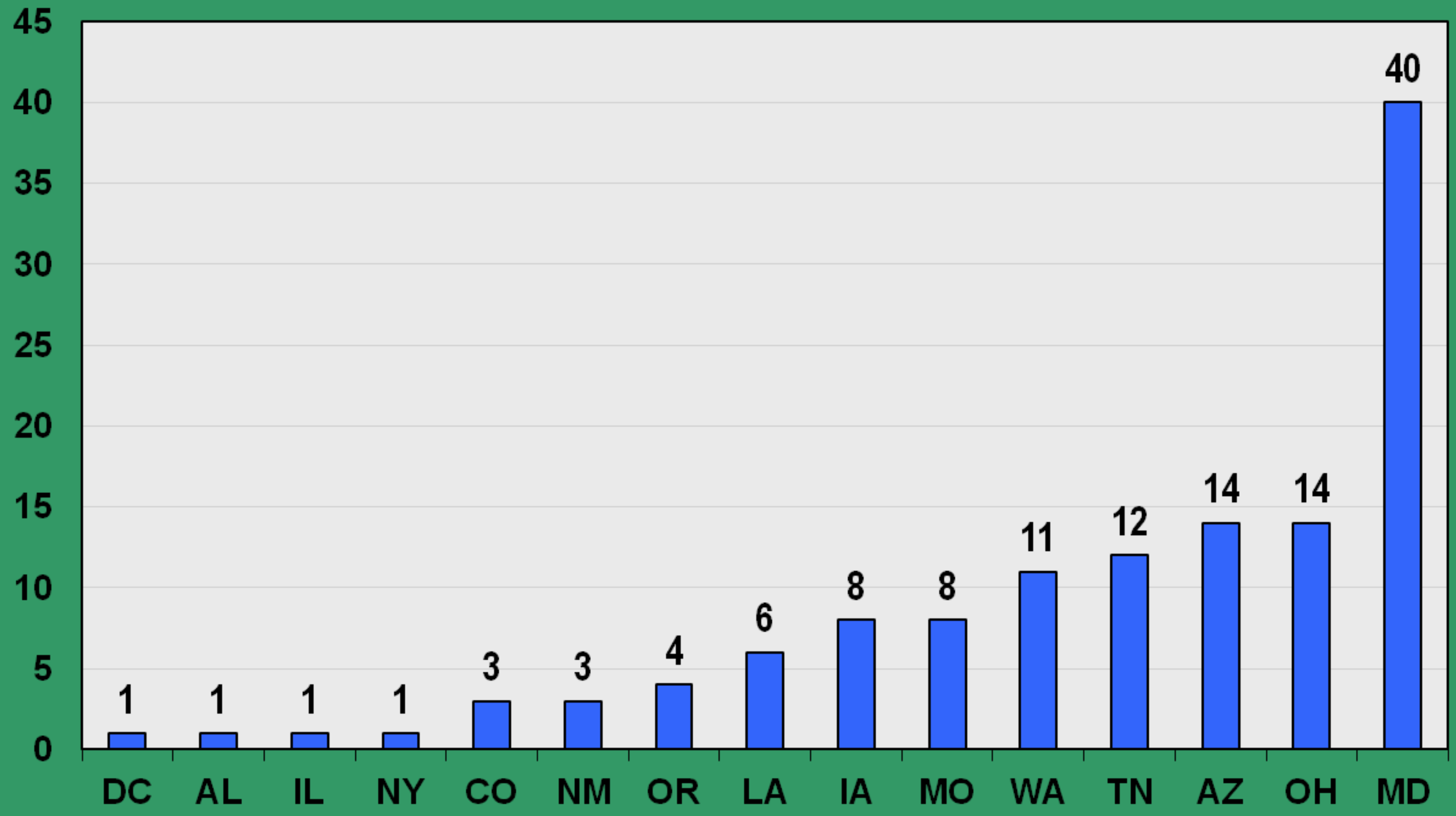
History of Photo Enforcement in US

Speed Cameras

- The first use of speed cameras implemented in 1987 in Paradise Valley, AZ
- Since then, the number of US communities using speed cameras has grown to 127 located in 14 States, plus DC
- In addition to community use, 4 States use speed cameras statewide in work zones – IL, MD, OR, WA

of Communities with Speed Cameras

By State – June 2014



Effects on Violations

Red Light Cameras

- Evaluations in Fairfax, VA, and Oxnard, CA, reported reductions in red light running of about 40% at camera-enforced sites and nearby noncamera sites
- Camera enforcement in Virginia Beach, VA associated with a 78% reduction in violations
- Clive,IA: approaches without RLCs experienced 25 times more violations than approaches with cameras
- Philadelphia PA: after accounting for effects of increased yellow timing, camera enforcement associated with 96% reduction in red light running

Speed Cameras – Local Roads

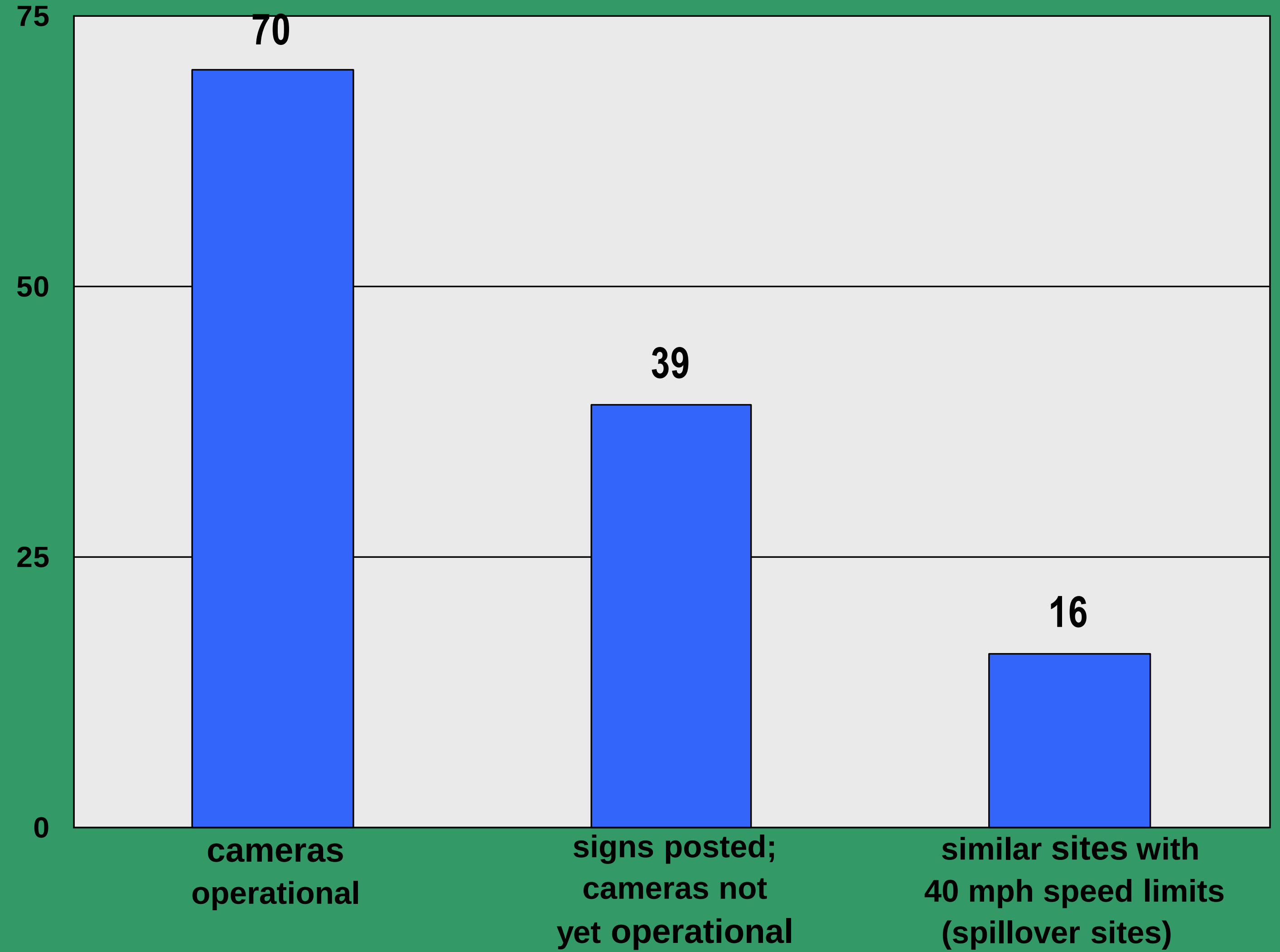
- Citywide evaluation in DC: proportion of vehicles exceeding speed limits by >10 mph declined 82%
- Residential streets and school zones in Montgomery County, MD: 70% decrease in drivers exceeding speed limits by >10 mph
- Charlotte, NC: percent of drivers traveling >10 mph above speed limit was 1.55 times higher in before period than one month after start of enforcement

Montgomery County, MD

2008

- First Maryland community to use speed cameras
- Camera enforcement limited to school zones and residential streets with speed limits 35 mph or less
- $40 civil penalty issued to registered vehicle owner; no driver license points

Percent Reduction in Odds of Exceeding Speed Limit by More than 10 mph Associated with Camera Enforcement



Speed Cameras - Freeways

- Freeway in Scottsdale, AZ: reductions in average speeds of about 9 mph and up to a 95% decrease in the odds that drivers would travel >10 mph above the 65 mph speed limit

Scottsdale Loop 101

Speed Camera Program

Loop 101, Scottsdale, Arizona

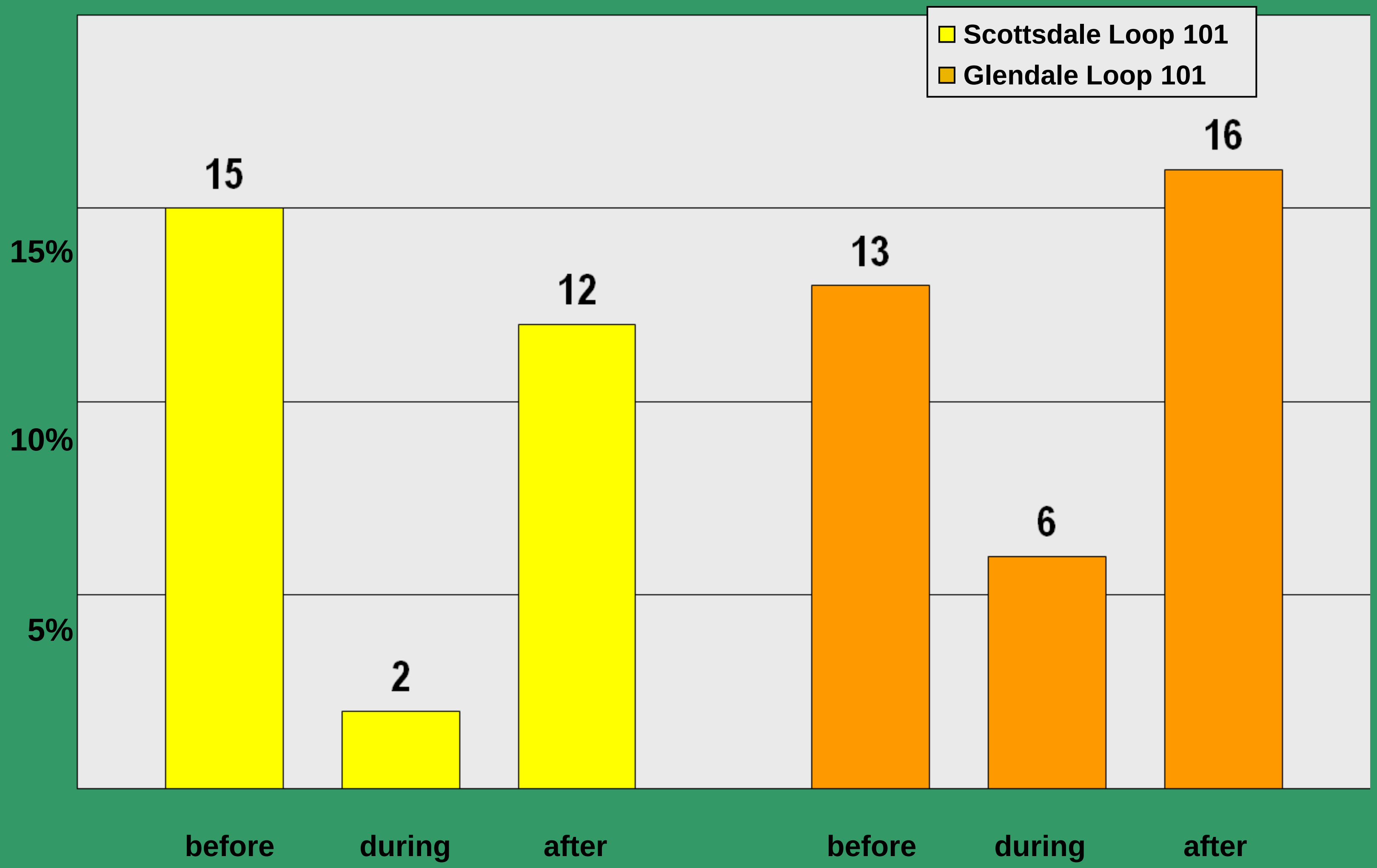
- 9-month pilot program on 7.8 miles of Loop 101
- First fixed speed cameras on US controlled access highway
- 65 mph speed limit
- 150,000 vehicles per day
- Camera enforcement February-October 2006

Vehicle Traveling 101 mph

Scottsdale Loop 101

Percent Exceeding 75 mph

Before, during, and after speed camera enforcement



Speed Cameras – Work Zones
Illinois Interstates

- For free flowing cars, reduced speeding by 40-51% in the median and by 7-57% in the shoulder lane
- For free flowing truck, reduced speeding by 10-53% in the median lane and by 0-56% in the shoulder lane

Speed Cameras – Work Zones
Maryland Interstates

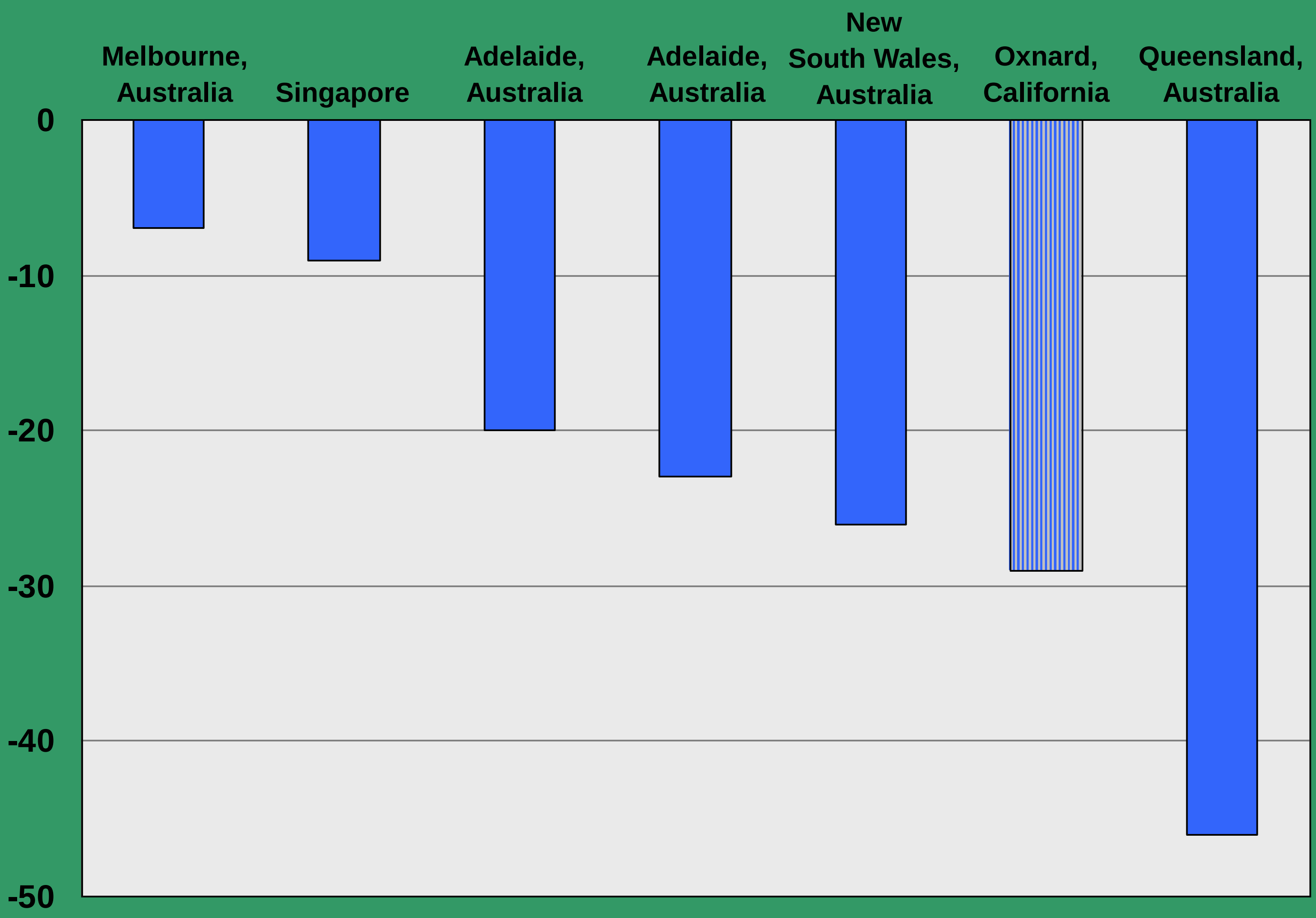
- Two data sets compared before versus during analysis periods
- Enforcement period displayed general reduction in aggressive motorists while creating more stable spatial speed distribution through work zone
- Two of three data sets comparing during vs. after periods showed drivers may learn where enforcement is taking place and adjust speeds accordingly

Effects on Crashes

Red Light Cameras

- RLC programs have been subject to numerous crash-based evaluations, which vary widely in terms of study quality and research methods
- Due in part to diversity of research methods, the studies provide mixed findings of crash effects
- Some evaluations include valid comparisons with external controls; others compare camera sites with non-camera locations in the same community
- Some studies control, or attempt to control, for regression-to-mean effects; others do not

Percent Reductions in Red Light Running Crashes with Injuries



Rear-End Crashes

- Reported effects of red light cameras on rear-end crashes are inconsistent
- Studies show:
  - increases
  - decreases
  - no significant change

- Increases in rear-end crashes are offset by reductions in more injury-producing angle crashes (like traffic signals themselves)

IIHS Fatality Study

- Examined crash trends in large US cities with and without RLCs: 1992-96 vs. 2004-08
- Average annual rate of <u>all</u> fatal crashes at signalized intersections decreased 14% for cities with camera programs; increased 2% for cities without cameras
- After controlling for population density and land area, the rate of fatal <u>red light running</u> crashes during 2004-08 for cities with camera programs was 24% lower than what would have been expected without cameras

Systematic Reviews of Crash Effects
Red Light Cameras

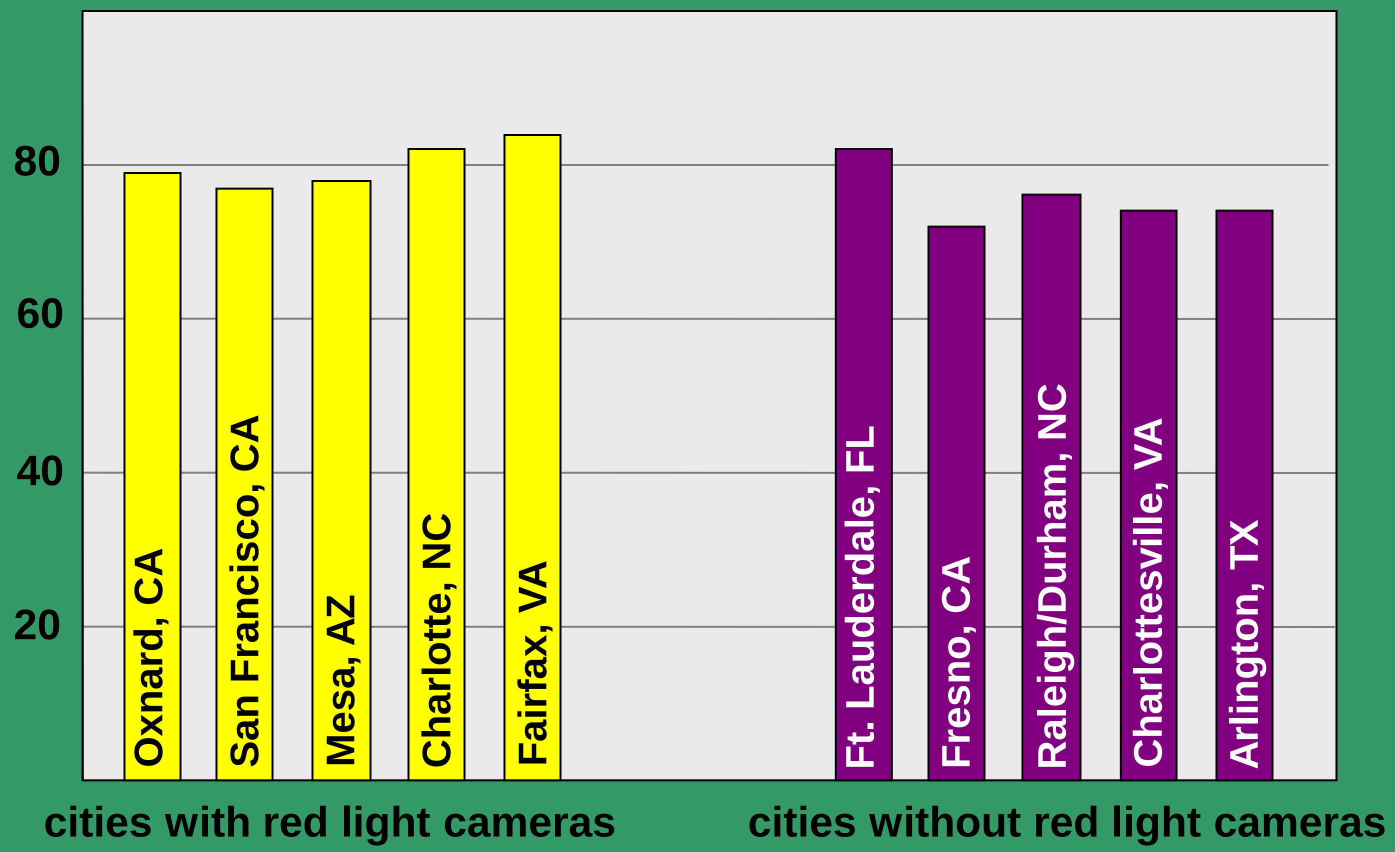
McGee and Eccles, 2003 (NCHRP Synthesis) 13 studies	▪ In general, red light cameras can reduce more severe injury crashes and, at worst, slightly increase less severe rear-end crashes
Retting et al., 2003 (Traffic Injury Prevention) 8 studies	▪ 25-30% reduction in injury crashes
Aeron-Thomas and Hess, 2005 (Cochrane Review) 10 studies	▪ 16% reduction in injury crashes ▪ 24% reduction in right-angle injury crashes ▪ 13% reduction in rear-end injury crashes

Systematic Reviews of Crash Effects
Speed Cameras

Pilkington and Kinra, 2005 (British Medical Journal) 14 studies	▪ 12-65% reduction in injuries ▪ 17-71% reduction in deaths
Willis et al., 2006 (Cochrane Review) 21 studies	▪ 8-46% reduction in injury crashes ▪ 40-45% reduction in crashes resulting in deaths or serious injuries
Decina et al., 2007 (NHTSA) 13 studies	▪ 20-25% reduction in injury crashes at fixed camera sites ▪ 21-51% reduction in injury crashes with mobile speed cameras

Public Opinion

Percent of Drivers who Support Red Light Cameras



Views of Montgomery County Drivers Regarding Speeding and Speed Cameras

6 months after start of enforcement

think speeding is a problem	74%
aware of speed cameras	60%
favor speed cameras	62%

Views of Scottsdale Drivers Regarding Speeding and Speed Cameras

8 months after start of enforcement

think speeding is a problem on Loop 101	79%
aware of speed cameras	90%
favor speed cameras	77%

Despite its Effectiveness, Photo Enforcement Often is Controversial

USA TODAY, June 20, 2001, editorial

Camera tricks

Red-Light Camera Causes Confusion

Police have stopped issuing fines for the city's most active red-light camera. The camera, which monitors a non-conventional traffic light, has generated about 20,000 tickets in the last six months.

WASHINGTON POST, May 18, 1999

AAA Questions Traffic Camera Contract in D.C.

By Michael H. Cottman
Washington Post Staff Writer

for AAA, said the District's arrangement with Lockheed is the only ticket-for-commission contract in the area, although other jurisdictions have contracts with Lockheed for detection cameras.

He said that AAA strongly supports using red-light camera technology to deter motorists from running red lights but that the District's current contract with Lockheed Martin "taints the system."

Lawmakers Predict Demise of Red-Light Traffic Cameras

by BRIAN TROMPETER
Staff Writer

Photo-red light cameras were supposed to be the scourge of bad drivers.

But since their implementation five years ago, the remote-controlled video or film cameras have not produced profits and have drawn fire from privacy advocates.

WASHINGTON POST, May 19, 2000

Seeing Red Over 'Gotcha' Camera

Motorists Now Spared Fines For Running Light on H St.

By Arthur Santana
Washington Post Staff Writer

At one point, it generated $10,000 a day in fines, snapping pictures of dozens of drivers who were caught in the act. But now it turns out that the most active camera in the District's war against red-light runners—billing $1.5 million in just over six months—is a high-tech trap for motorists.

Perched on the H Street bridge in Northeast Washington, just off the busy North Capitol Street corridor, the camera set up by Lockheed Martin IMS patrols an

WASHINGTON TIMES, August 22, 2001, editorial

Automated ticket factories

Lockheed Martin's for-profit enforcement of traffic regulations was dealt a small but hopeful setback last week when a San

USA TODAY, July 6, 2001

Motorists race to court to challenge red-light cameras

Photos called privacy threat

Tait became the guru of red-light camera law after he helped represent a San Diego man who had the money to mount a legal defense against a ticket last year. Publicity from winning that case brought in hundreds of referrals, he says. He and Cusack then ran an ad in a local free newspaper offering classes on how to defend citations. Some students became clients.

All of the clients are fighting the tickets with similar legal arguments, in-

Camera Enforcement Controversies

- Fine revenue - money, not safety
- Fairness (e.g., yellow timing, speed limit)
- Locations selected for camera enforcement
- Right-Turn-On-Red
- Speeding not perceived as safety problem
- Accuracy/reliability of equipment
- Inability to face accuser
- Privacy - “Big Brother”

Elements of Well-Designed Camera Enforcement Program

- Get the engineering right
  - validate posted speed limits
  - avoid unwarranted signals
  - signal visibility & conspicuity
  - corridor timing
  - yellow timing

ITE *Proposed Recommended Practice* for Calculating Change Interval

$$CP = t + \frac{V}{2a + 64.4g} + \frac{W + L}{V}$$

CP = change period (seconds)

t = perception-reaction time (usually 1 second)

V = approach speed (ft/s)

a = deceleration rate (ft/s^2)

g = percent of grade divided by 100 (+ for up, - for down)

W = width of intersection (ft)

L = length of vehicle (ft)

Change Interval Timing

- Studies have found that increasing undertimed yellow intervals by one (1) second can decrease the number of red light violations by 36 to 50 percent

Site Selection: Critical for Program Success

- Criteria include
  - Violations
  - Crashes
  - Citations
  - Intersection characteristics
  - Difficulty of traditional enforcement
- Target locations with history of crashes

Elements of Well-Designed Camera Enforcement Program

- Think carefully about RTOR enforcement
- Conduct highly visible PI&E campaigns to raise awareness of camera enforcement and the justification for it
- Post warning signs at entry points to community and on roads with camera enforcement
- Limit responsibility of camera vendors to <u>supporting role</u>

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