Pedestrian Hybrid Beacons (PHB)
High-Intensity Activated CrossWalKs (HAWK)

Review and Education Efforts

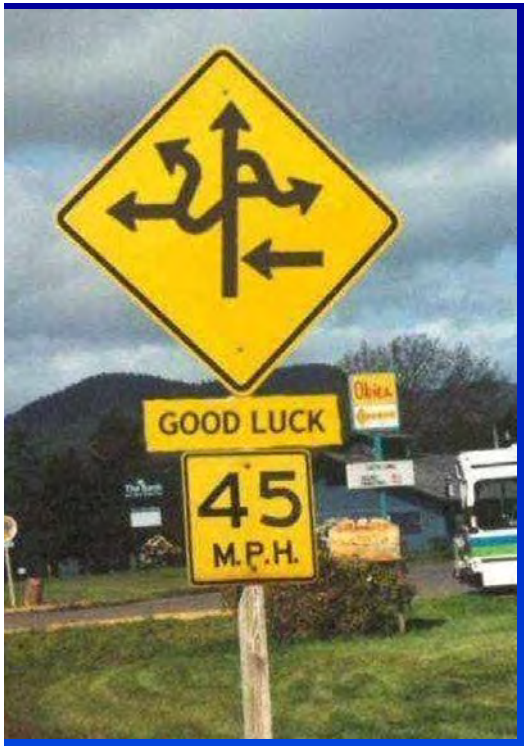
Introduction

- Review of Crash Modification (CMF or CRF%)
- Review of Policy and Guidance
- Present some Education Efforts


WARNING
HEAVY
PEDESTRIAN
TRAFFIC


Drive Carefully
Think of the Impact
You Could Make


STOP
DAMMIT I SAID STOP!
CARTOONSTOCK
VARTOS


GOOD LUCK
45
M.P.H.


SOUTH
SOUTH
BY-PASS
EAST
EAST
TRUCK
SOUTH
SOUTH
BY-PASS
SOUTH
TRUCK
WEST
TRUCK
WEST
73
29
601
73
73
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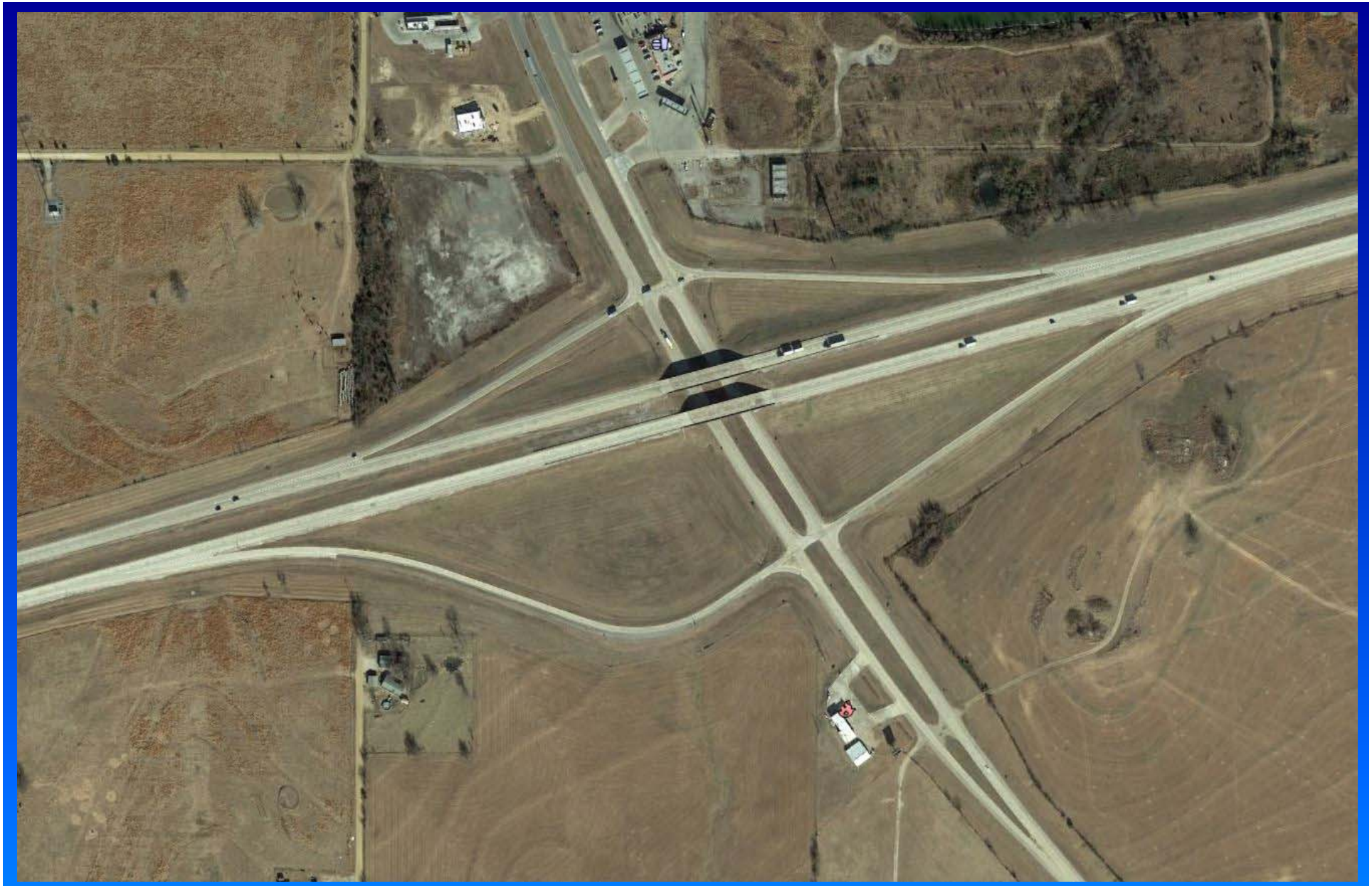
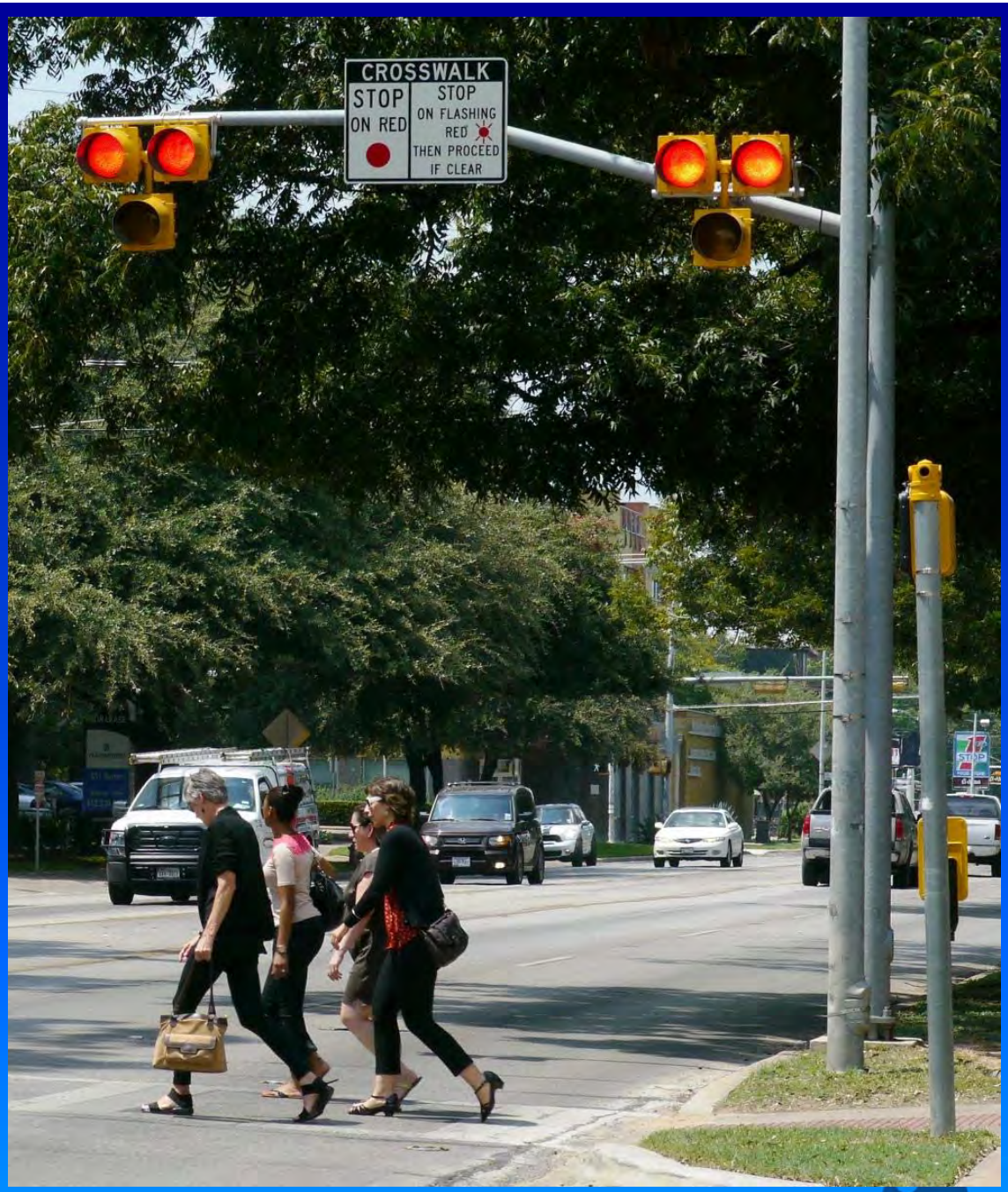
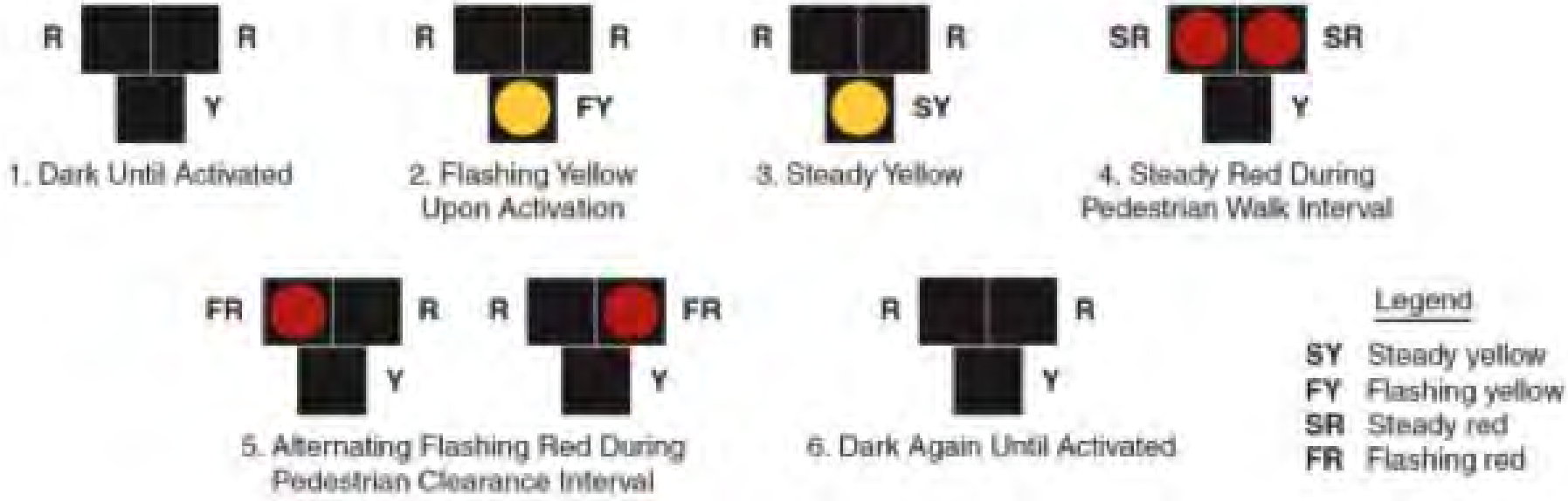
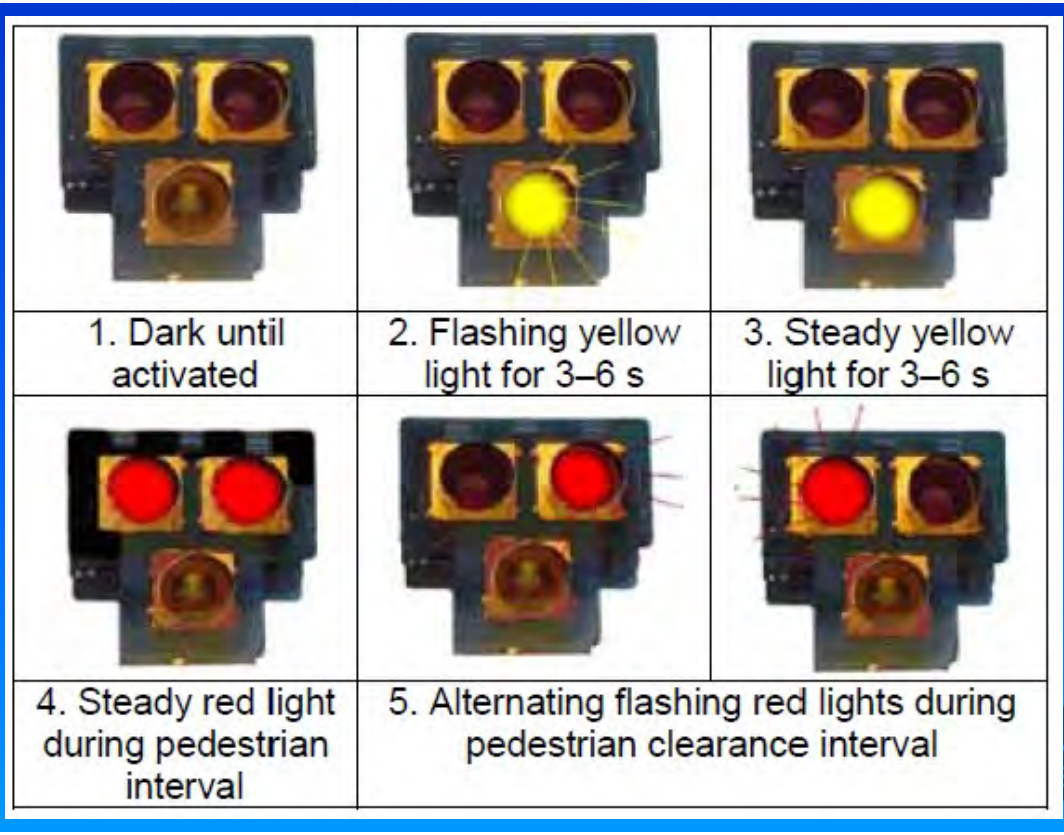
73


STOP
WRONG WAY
DO NOT ENTER




CROSSWALK
STOP
ON RED
STOP
ON FLASHING
RED
THEN PROCEED
IF CLEAR





1. Dark until activated	2. Flashing yellow light for 3–6 s	3. Steady yellow light for 3–6 s
4. Steady red light during pedestrian interval	5. Alternating flashing red lights during pedestrian clearance interval	

Crash Modification (CMF or CRF,%)

CMF / CRF(%)

- CMF is a decimal
  - It is a multiplicative factor
  - Known crashes x CMF = new expected crashes
  - Less than 1 is GOOD!
- CRF (%)
  - Expressed as a percent
  - Indicates a percent reduction of know crashes
  - Larger the better!

CMF / CRF(%)

- CRF (%) range from 15% to 69%
  - FHWA states it this way:
    - 69% in ped crashes
    - 29% in total crashes
    - 15% in serious injury and fatal crashes

U.S. Department of Transportation
Federal Highway Administration

PROVEN SAFETY COUNTERMEASURES

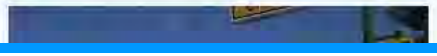
Pedestrian Hybrid Beacons

SAFETY BENEFITS:

69%
Reduction in pedestrian crashes

29%
Reduction in total crashes

15%
Reduction in serious injury and fatal crashes



The pedestrian hybrid beacon (PHB) is a traffic control device designed to help pedestrians safely cross busy or higher-speed roadways at midblock crossings and uncontrolled intersections. The beacon head consists of two red lenses above a single yellow lens. The lenses remain "dark" until a pedestrian desiring to cross the street pushes the call button to activate the beacon. The signal then initiates a yellow to red lighting sequence consisting of steady and flashing lights that directs motorists to slow and come to a stop. The pedestrian signal then flashes a WALK display to the pedestrian. Once the pedestrian has safely crossed, the hybrid beacon again goes dark.

Example of PHBs mounted on a mast arm.
Source: FHWA

More than 75 percent of pedestrian fatalities occur at non-intersection locations, and vehicle speeds are often a major contributing factor.[1] As a safety strategy to address this pedestrian crash risk, the PHB is an intermediate option between a flashing beacon and a full pedestrian signal because it assigns right of way and provides positive stop control. It also allows motorists to proceed once the pedestrian has cleared their side of the travel lane, reducing vehicle delay.


CMF
CRASH MODIFICATION FACTORS CLEARINGHOUSE
Skip to main content | Site Map | Notice | Sign Up for our e-Newsletter | Home
About the CMF Clearinghouse | Using CMFs | Developing CMFs | Additional Resources
Search for:
enter search term(s)
in
Countermeasure Name
Need Help?
Search CMFs
CMF User Guide
New resource to help learn about crash modification factor (CMF) basics and guidance on how to conduct searches on the CMF Clearinghouse.
1 2 3 4 5
A crash modification factor (CMF) is used to compute the expected number of crashes after implementing a countermeasure on a road or intersection. The Crash Modification Factors Clearinghouse provides a searchable online database of CMFs along with guidance and resources on using CMFs in road safety practice. It also provides guidance to researchers on best practices for developing high quality CMFs.
Recently Added CMFs
Provide a raised median
CMF: 0.49
CRF: 51
Crash type: Other
Crash severity: All
Install separated bicycle lane
CMF: 0.963
CRF: 3.7
Crash type: All
Crash severity: All
Install intersection conflict warning systems (ICWS) for two-lane at two-lane intersections
CMF: 0.7
CRF: 30
Crash type: All
Crash severity: Serious injury,Minor injury
U.S. Department of Transportation Federal Highway Administration
This site is funded by the U.S. Department of Transportation Federal Highway Administration and maintained by the University of North Carolina Highway Safety Research Center

▼ Countermeasure: Install a pedestrian hybrid beacon (PHB or HAWK)

Compare	CMF	CRF (%)	Quality	Crash Type	Crash Severity	Area Type	Reference	Comments
☐	0.712	29	★★★★☆	All	All	Urban and suburban	Fitzpatrick, K., and Park, E.S., 2010	The authors of this study ... [*read more*]
☐	0.453	54.7	★★★★☆	Vehicle/pedestrian	All	Urban and suburban	Zegeer et al., 2017	Methodology used was a combination ... [*read more*]
☐	0.849	15	★★★☆☆	All	K,A,B,C	Urban and suburban	Fitzpatrick, K., and Park, E.S., 2010	The authors of this study ... [*read more*]
☐	0.309	69	★★★☆☆	Vehicle/pedestrian	All	Urban and suburban	Fitzpatrick, K., and Park, E.S., 2010	The authors of this study ... [*read more*]

Compare | Reset Compare

**NOTE: You can compare CMFs across countermeasures, subcategories, and categories.*

http://www.cmfclearinghouse.org/

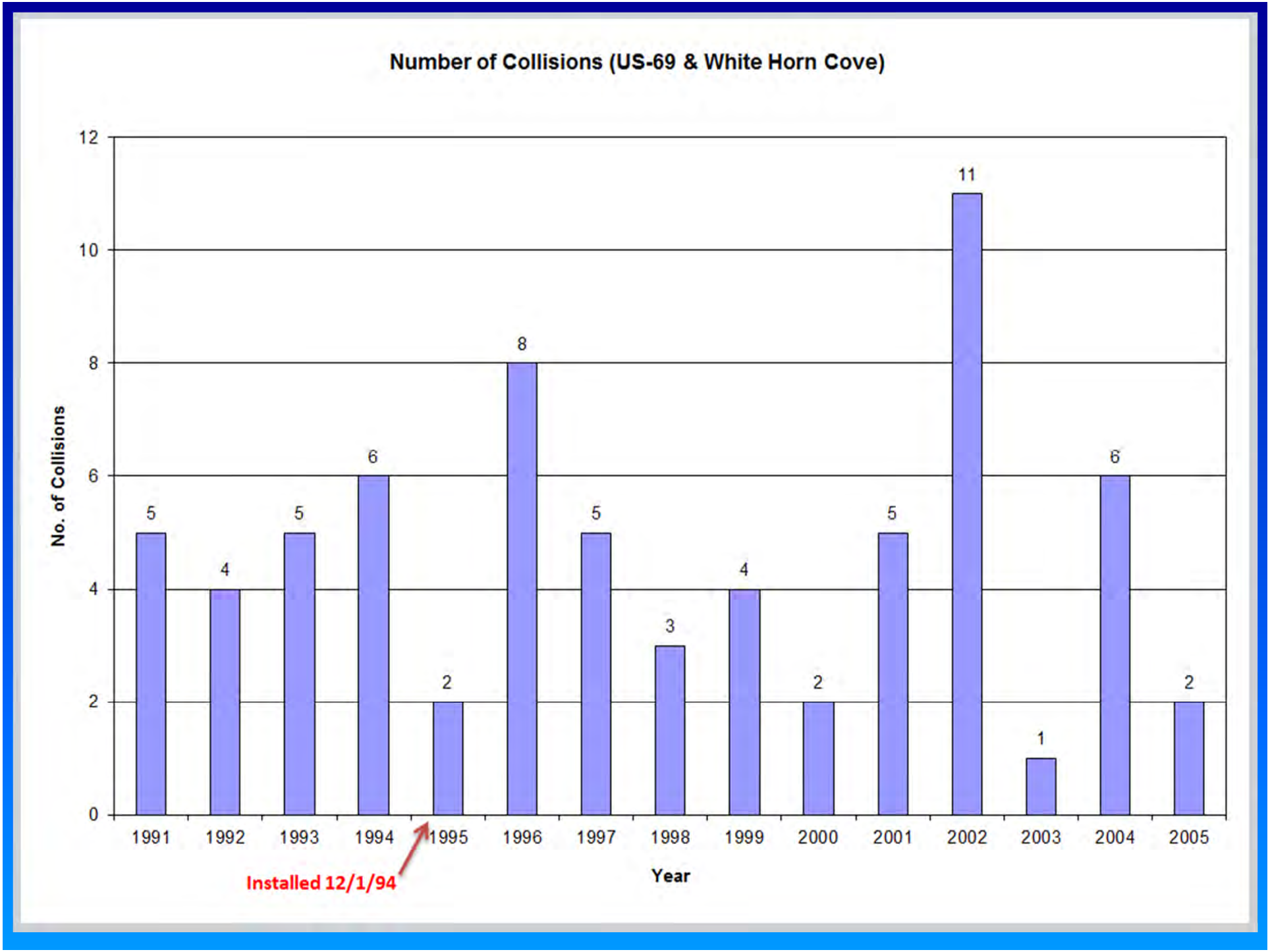
▼ Countermeasure: Install pedestrian hybrid beacon (PHB or HAWK) with advanced yield or stop markings and signs

Compare	CMF	CRF (%)	Quality	Crash Type	Crash Severity	Area Type	Reference	Comments
☐	0.82	18	★★★★★	All	All	Urban and suburban	Zegeer et al., 2017	Study sites were a combination ... [*read more*]
☐	0.432	56.8	★★★★☆	Vehicle/pedestrian	All	Urban and suburban	Zegeer et al., 2017	Methodology used was a combination ... [*read more*]
☐	0.876	12.4	★★★★☆	Rear end,Sideswipe	All	Urban and suburban	Zegeer et al., 2017	Study sites were a combination ... [*read more*]

Compare | Reset Compare

**NOTE: You can compare CMFs across countermeasures, subcategories, and categories.*

http://www.cmfclearinghouse.org/


Number of Collisions (US-69 & White Horn Cove)
No. of Collisions
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2
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8
5
3
4
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5
11
1
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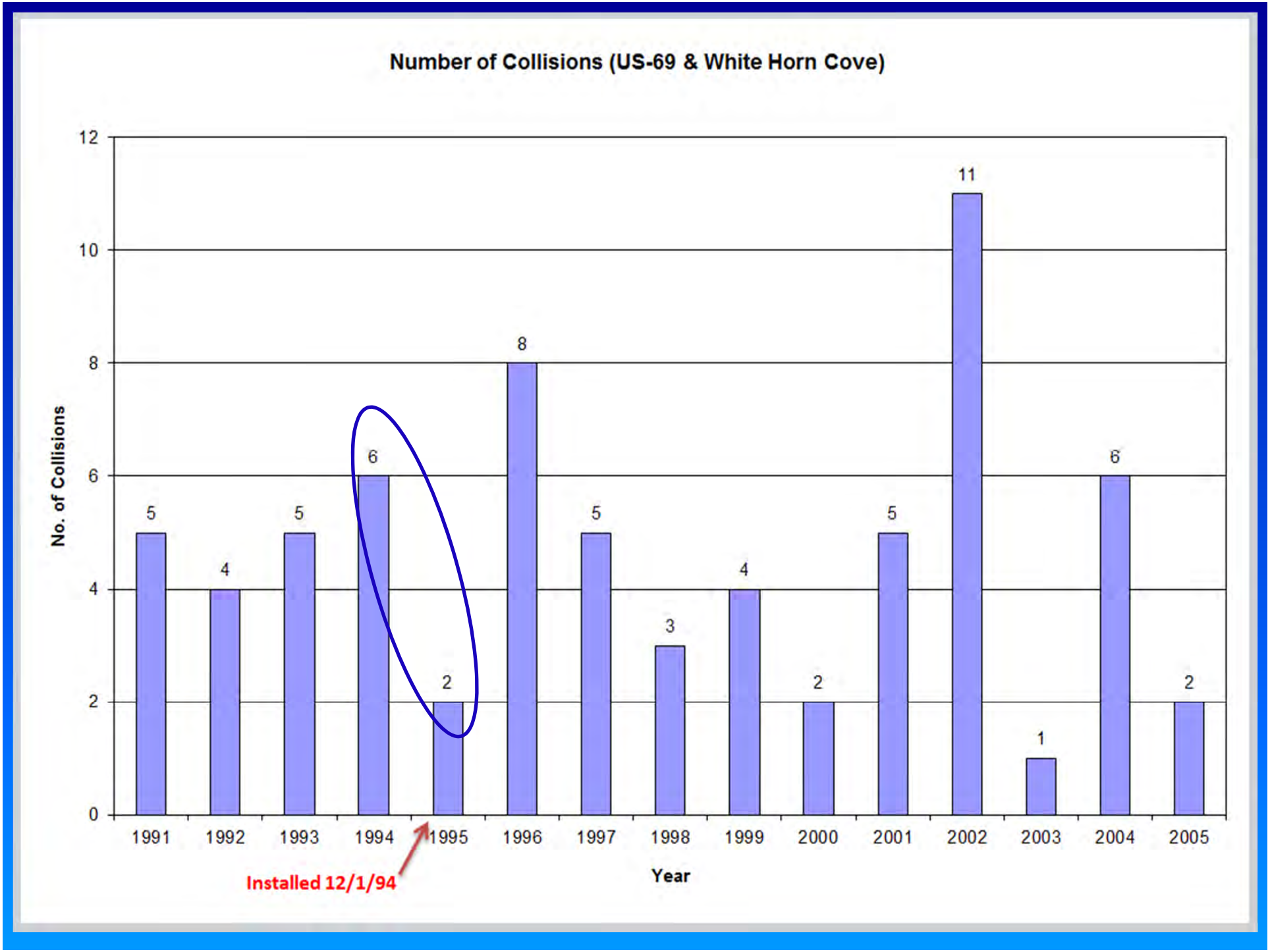
Installed 12/1/94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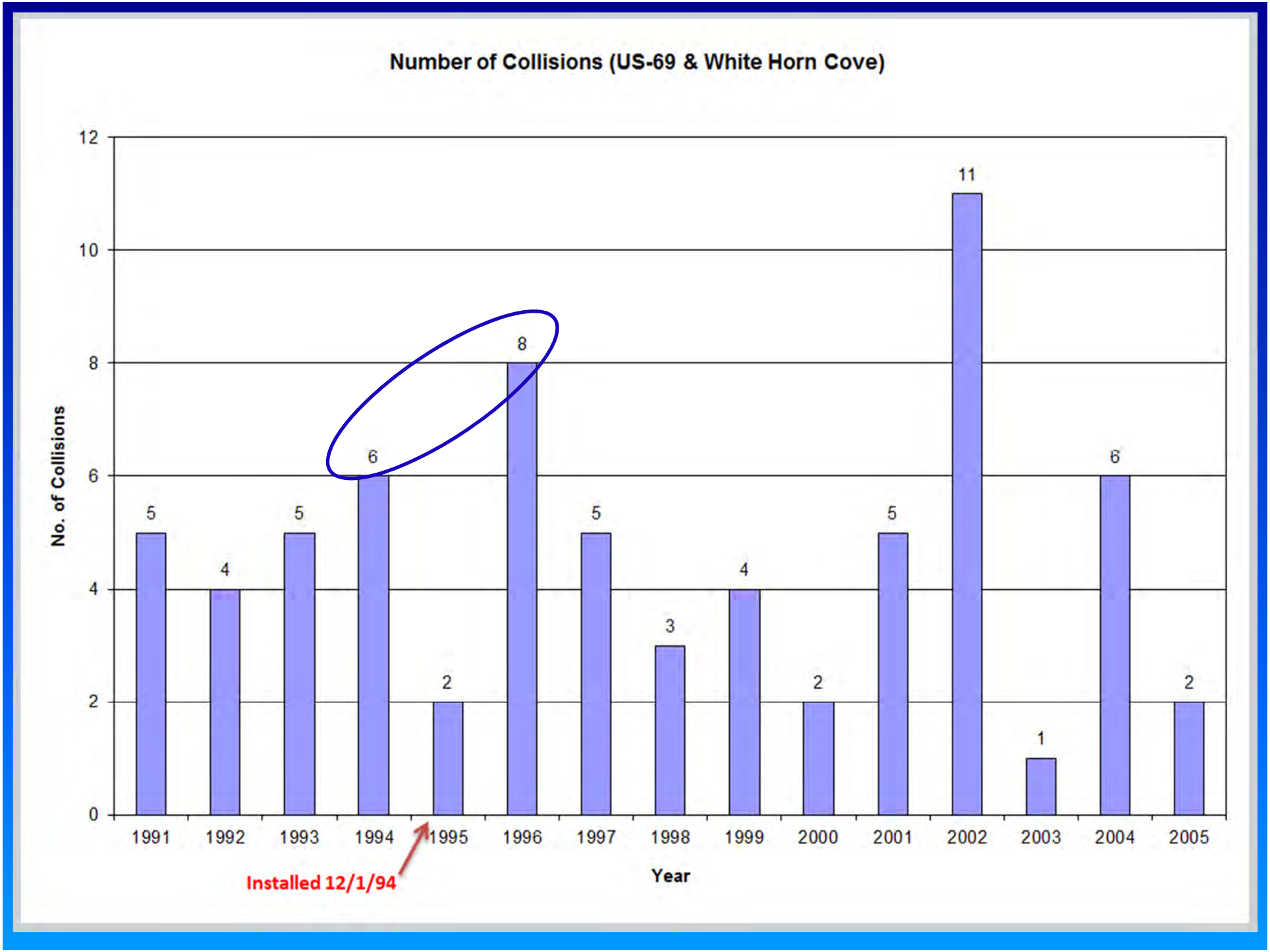
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No. of Collisions
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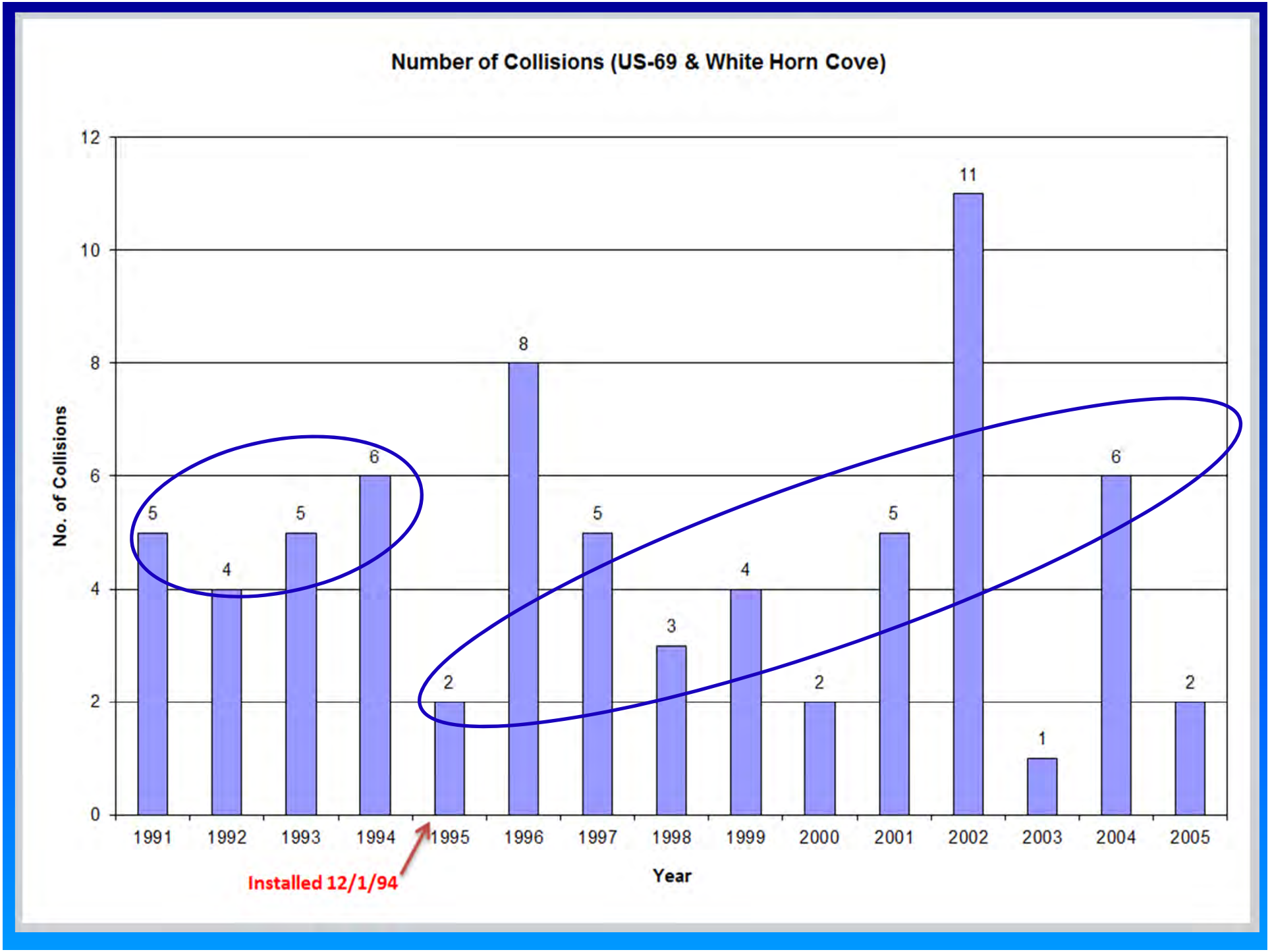
Installed 12/1/94


Number of Collisions (US-69 & White Horn Cove)
No. of Collisions
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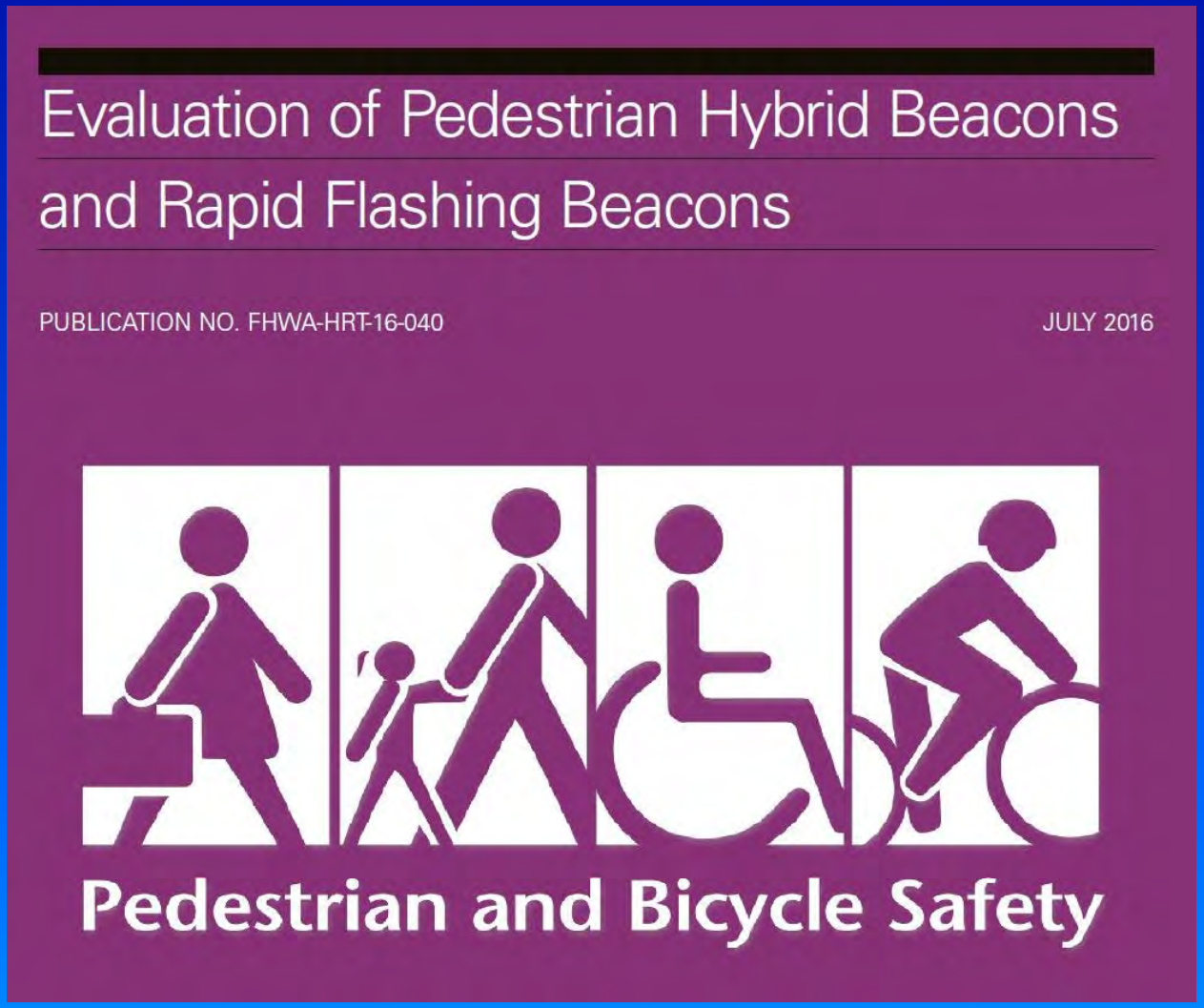
Policies / Guidance

Policies / Guidance



Policies / Guidance

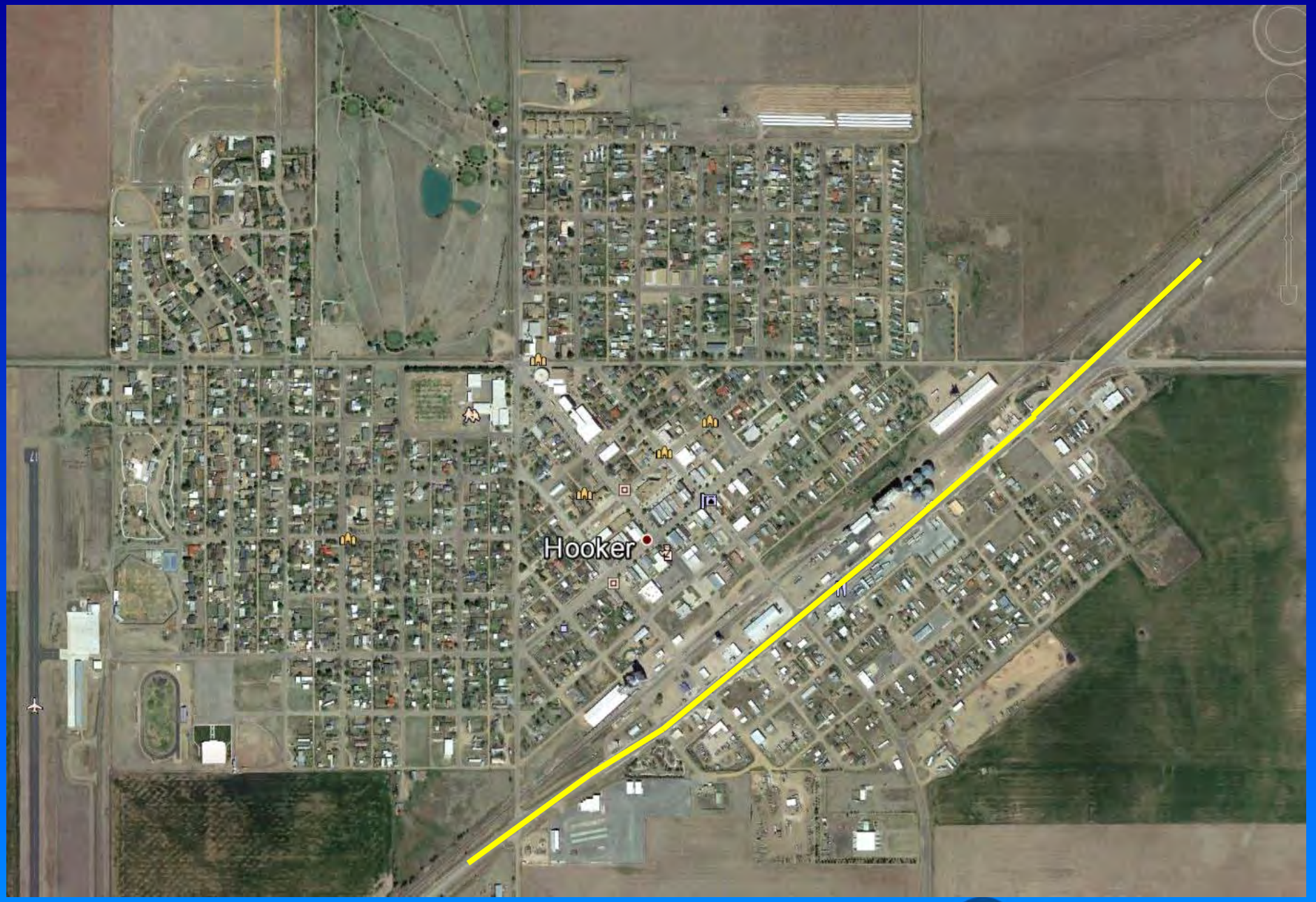
- 20 location in Tucson, AZ and Austin, TX
- 78 hours of video and 1979 peds
- When veh queuing and flashing red, ½ of the crossings had at least one driver who did not stop completely
- However, 96% yielding rate to peds
- 7% of peds departed on dark (majority had acceptable gap)
- Peds departing on dark is more likely at coordinated sites

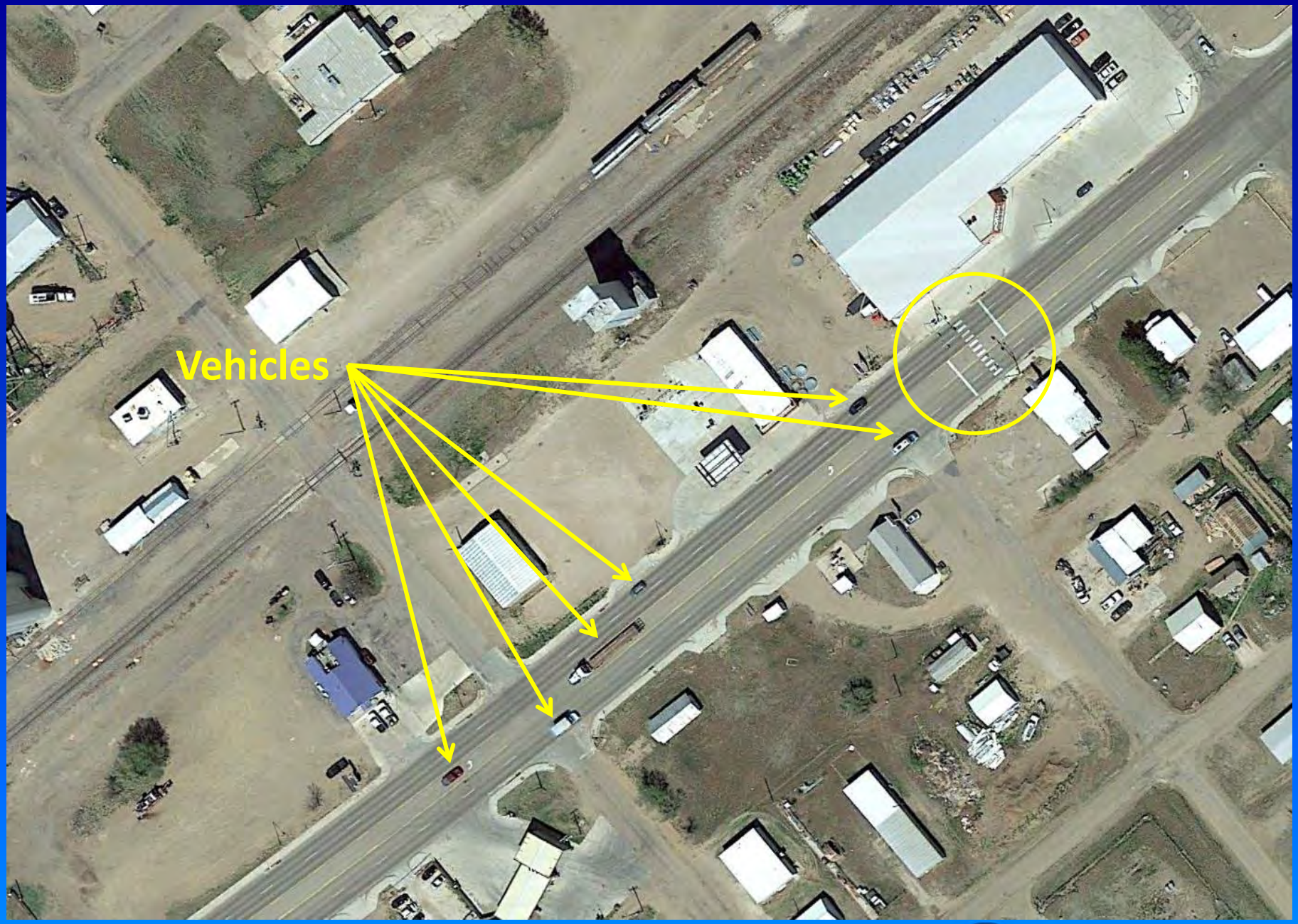
Policies / Guidance

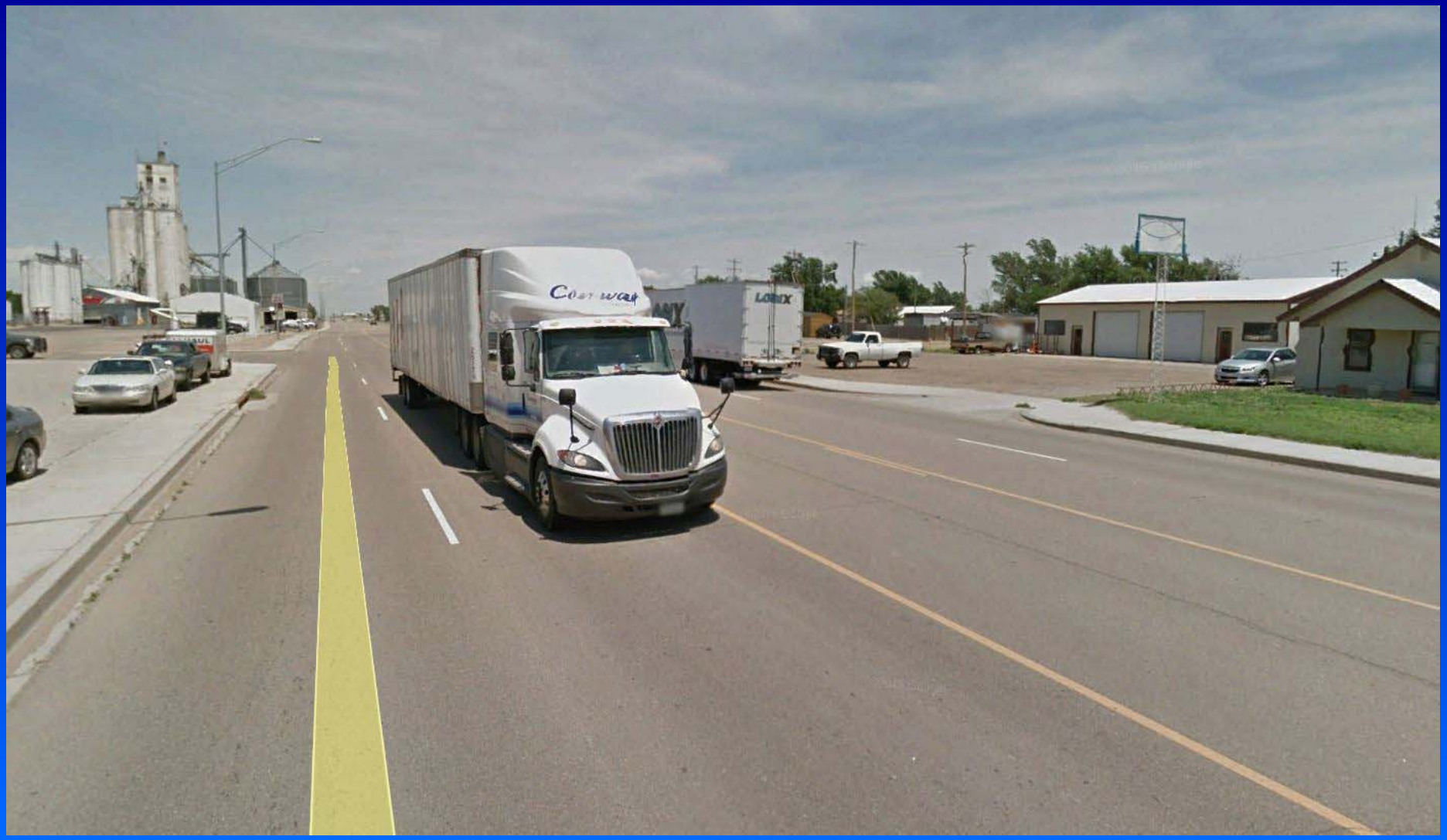
- If coordinated sites had red-illuminated button, peds more likely waited
- 91% peds pushed the button
  - Went up for 45mph (rather than 40mph)
  - Went up for increased veh volume
- The conflict rate was higher when non-compliant ped was involved
- It has shown to be a safety improvement
- Associated with less delay compared to TCS

Policies / Guidance

- MUTCD
  - Either does not meet traffic signal warrants, or
  - Meets but decision has been made not to install
- Low speed and high speed guidelines
  - Figures 4F-1 and 4F-2
  - Based on vehicles (VPH) compared to peds (PPH) to crossing lengths
  - Min. of 20 PPH
  - Got all the right variables. It's OK.
  - However ….


Hooker


Vehicles




HOOKER
Shamrock
345
24 HOURS / PAY THE PUMP

Policies / Guidance

- Traffic Engineer Division's current policy
  - Crosses a highway (ODOT's LG might have something different)
  - At least 3 lanes (back to the MUTCD and FHWA's philosophy)
  - More than 300 feet from signal or stop control

Policies / Guidance

- Traffic Engineer Division's current policy
  - We expected far more requests, but
  - $60k or so
  - 12 item points award system for ranking
    - Have not had to use yet
    - But as they become more popular we might

This matrix is only an evaluation tool. The existence of a location on this list or its ranking in comparison to other locations is not a guarantee of the construction of a beacon at that location.

Definition of Catchment Area

The catchment area in either direction of a proposed location is half the distance to the nearest stop-controlled or signalized crosswalk, or 1000 feet, whichever is less.

Point Assignments

	Criterion	Points	Max	Awarded Points	Notes
1	Distance 'd' from the requested beacon to the nearest signalized or stop-controlled crossing.*	0	10		if d =< 300 ft
		$\frac{d-300}{100}$			if 300 ft < d < 1300 ft
		10			if d >= 1300 ft
2	85th percentile speed, if known, or posted speed plus 7 mph of roadway being crossed.*	0	10		if v =< 30 mph
		$\frac{v-30}{2}$			if 30 < v < 50 mph
		10			if v >= 50 mph
3	Total of pedestrian crossing for 1 hour (any four consecutive 15-minute periods) of an average day.**	0	10		0 to 9 pedestrians per hour
		5			10 to 19 pedestrians per hour
		10			>= 20 pedestrians per hour
4	Median width. TWLTL counts as a median if proposed location is more than 150 ft from an intersection or a major driveway	-10	0		if w >= 9 ft
		-5			if 6ft =< W < 9 ft
		0			if w < 6 ft or no median
5	Pedestrian crash history	10 per crash	20		20 points maximum. Qualifying crashes occurred within catchment area in the most recent 5 complete years and may be any severity, including PDO, with pedestrian or pedal cycle as a harmful event.
6	Special needs pedestrian generators within catchment area	0	10		None
		5			Senior center, senior assisted living facility, nursing home, other elderly-related generators within catchment area
		10			Land uses for the blind within catchment area

* Round awarded points to nearest whole number.

** Count number of individual people (walking, biking, wheelchairing or other means on crosswalk) per hour, regardless of groups. Count as two people for assisted walking (pushed wheelchair, baby on a cart, or other means).

Policies / Guidance

1. Distance from signal or stop control
2. 85th percentile speed
3. Ped crossings
4. Median width or TWLTL
5. Ped crash history
6. Special need ped generators nearby

Policies / Guidance

7. Traffic volume
8. Catchment area for peds
9. Part of a area transportation plan?
10. School location
11. Some environment justice language
12. Documented engineering judgement

Education

- Why the need?
  - The need is always here.
  - Things are always changing.
  - Drivers are always changing.
  - It's our job. Whose job?
    - Traffic Engineers
    - Enforcement (Education and Tickets)
    - Public Safety / Highway Safety Offices
    - Driver Schools
    - Courts / Judges

Education

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  - It's our job. Whose job?
    - Traffic Engineers
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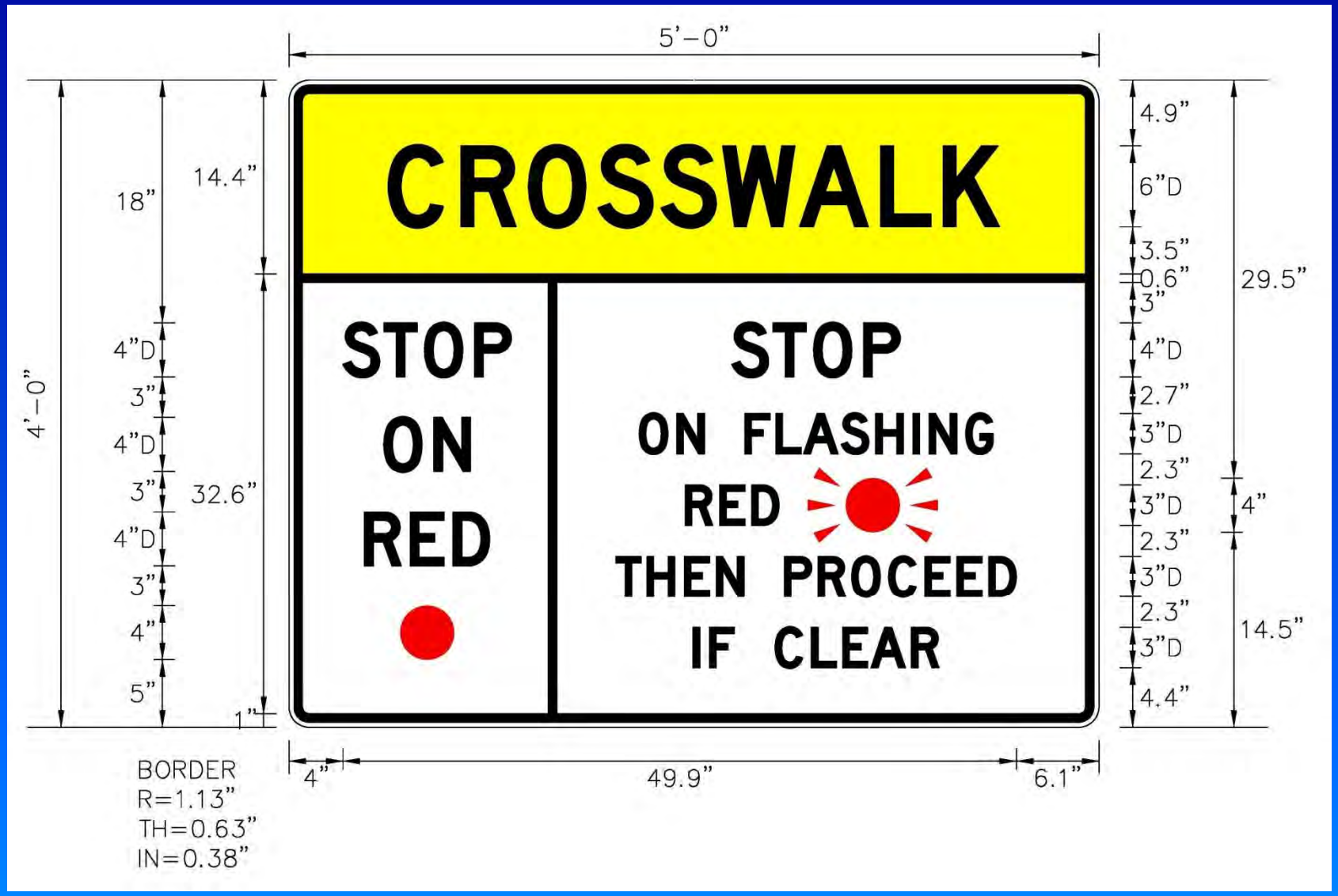
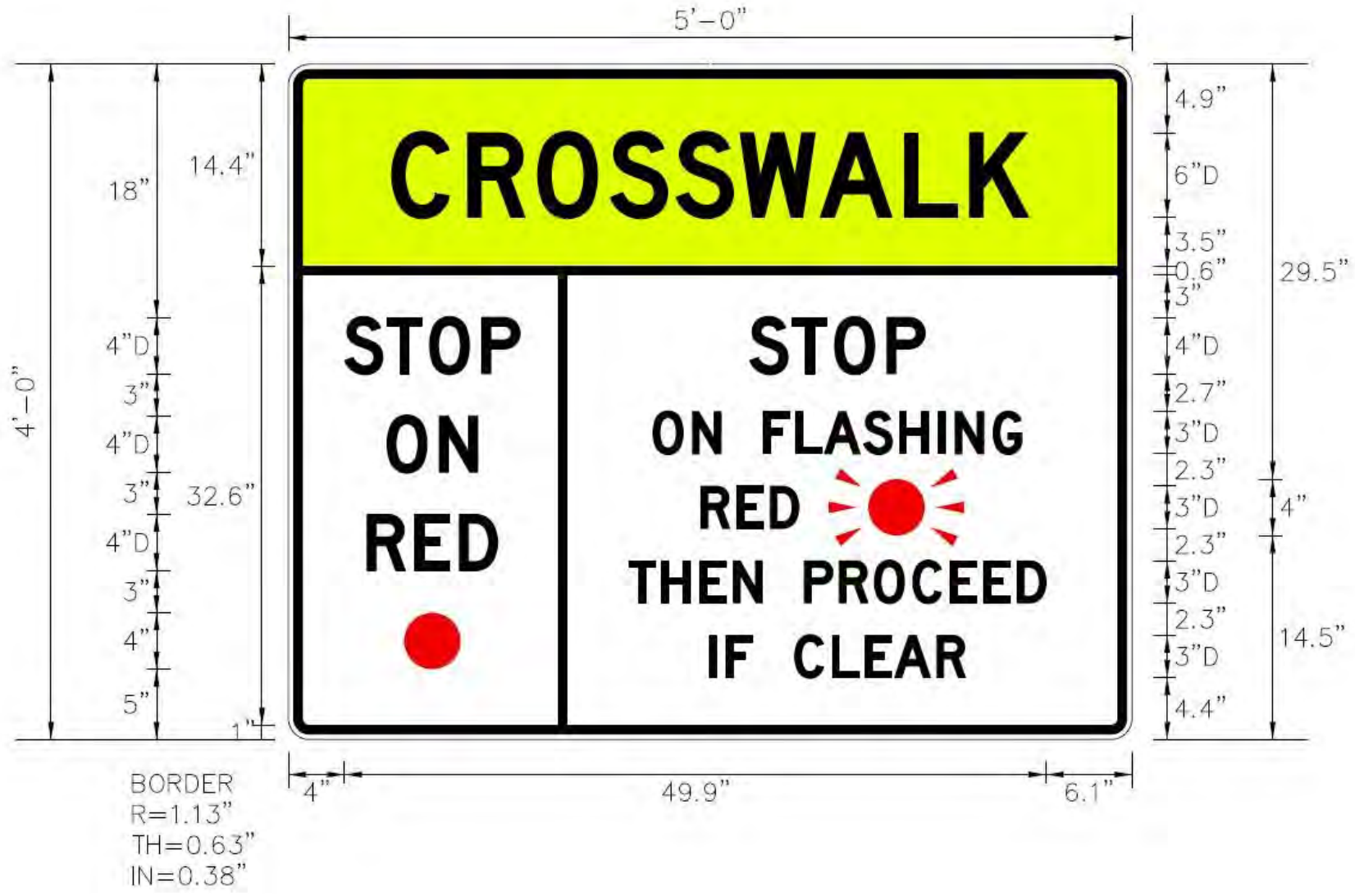
    - Driver Schools
    - Courts / Judges
    - BUT no spouses (let the above handle)

Education - ODOT



Education - ODOT



Policies / Guidance

- FHWA now recommends a new sign

Figure 58. Photo. Sign recommended by FHWA to address comprehension issues with the flashing red phase.

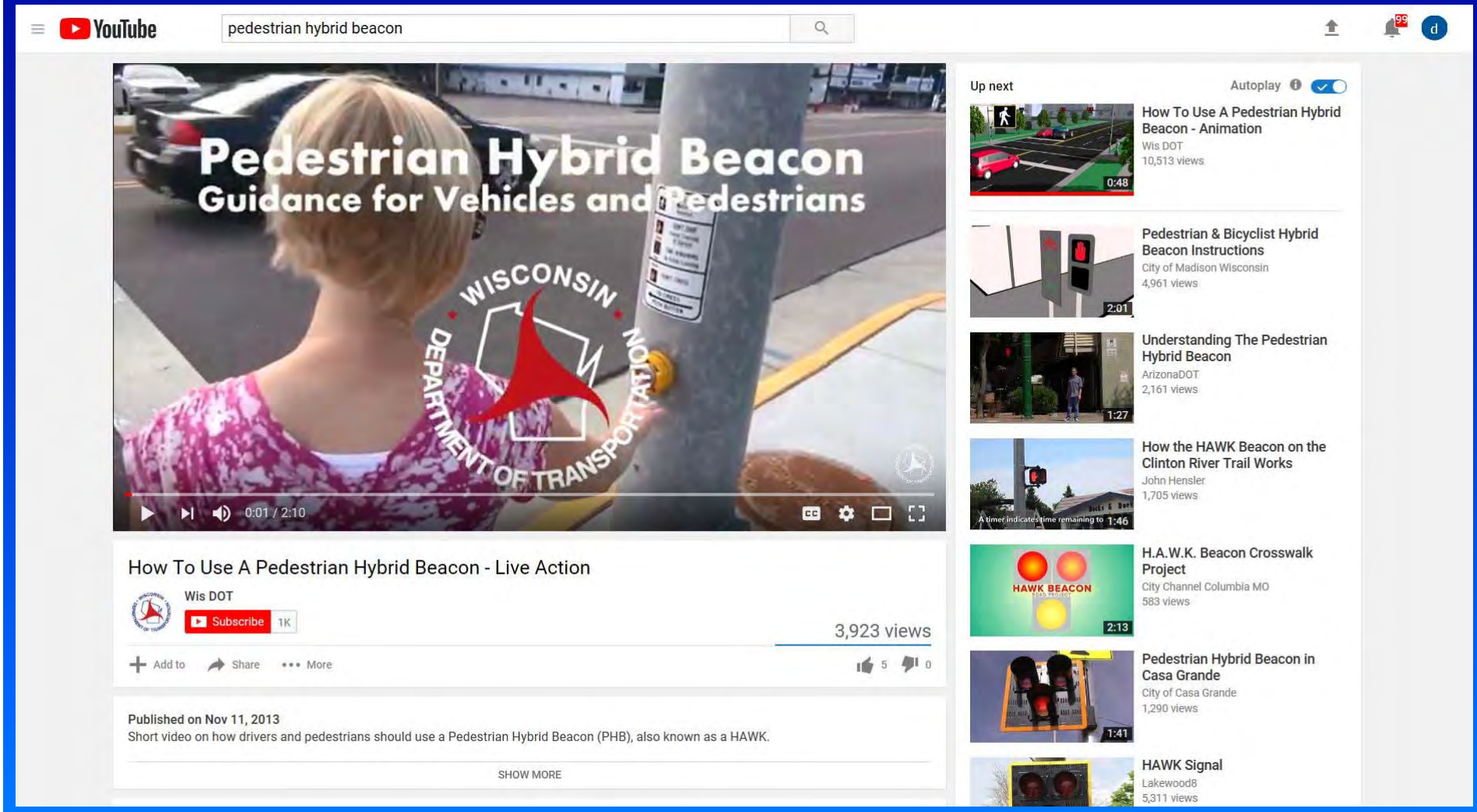
Education - ODOT

- Know the Road, Video Series
  - On ODOT's youtube channel and reocurring broadcasts on facebook
  - General Education to educate most drivers
    - Know your audience
    - Let's look at a couple of examples

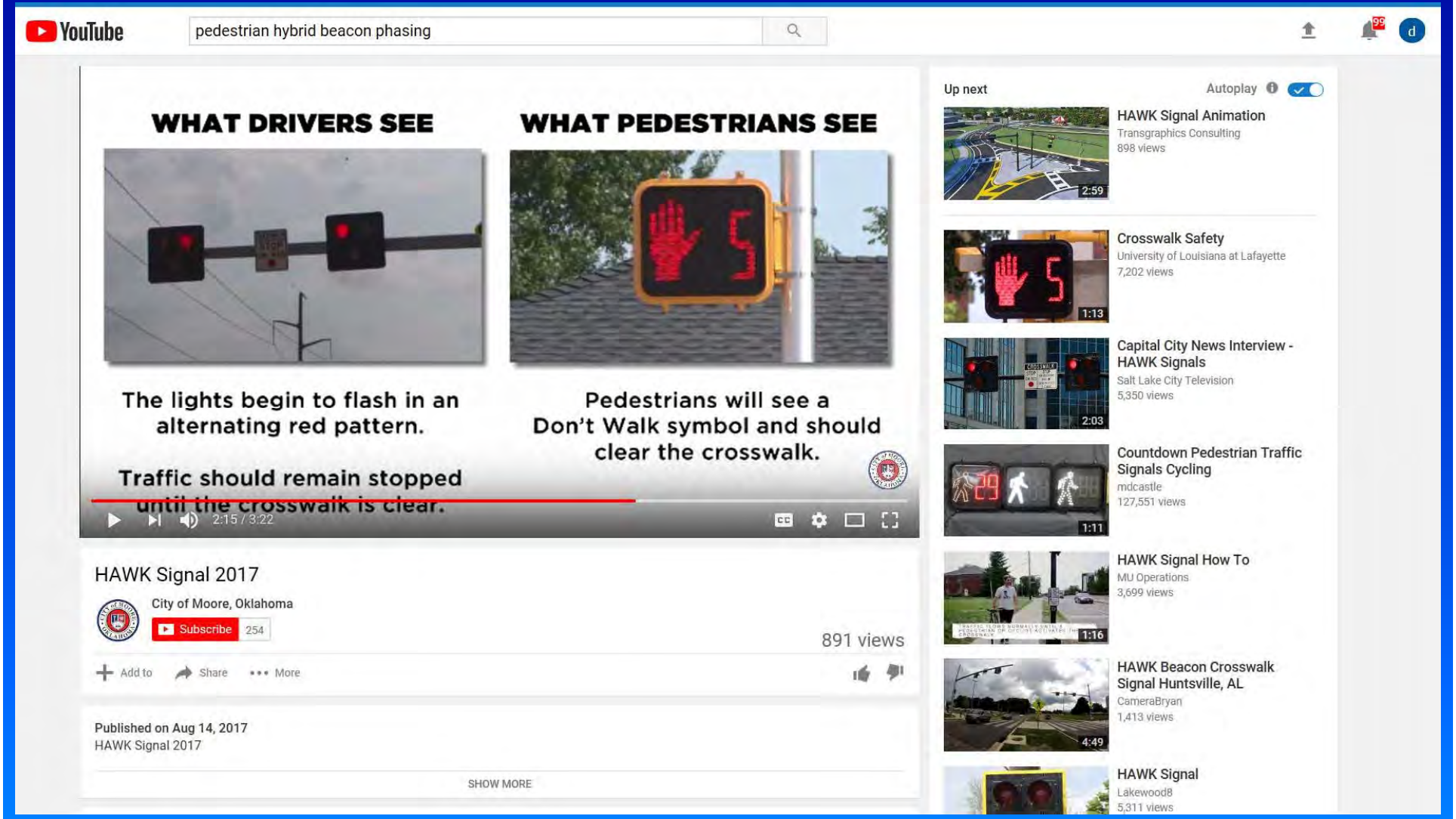
Education - ODOT

Education - ODOT

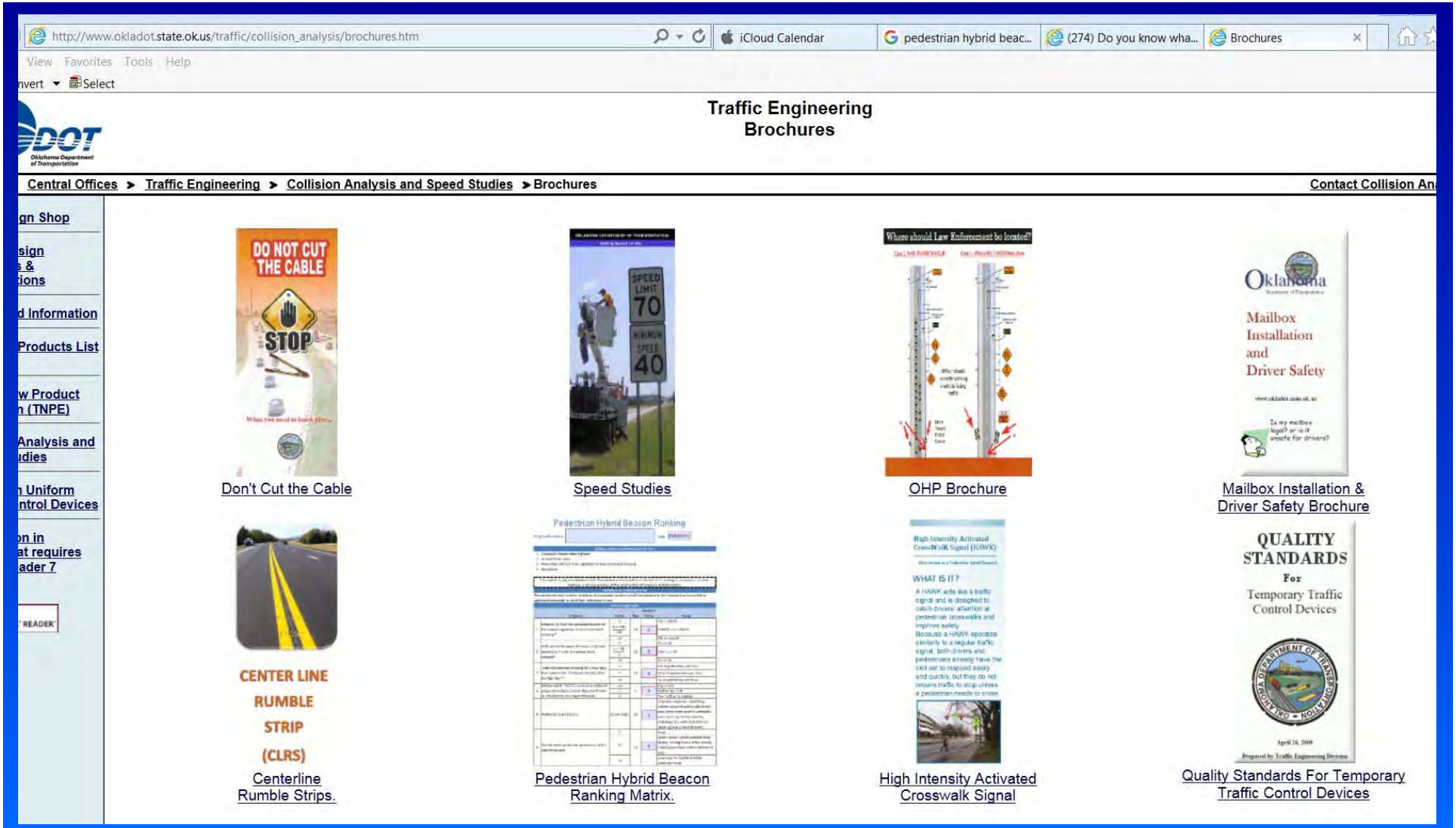
Education – WI DOT



Education - Moore



Education – New Jersey



http://www.okladot.state.ok.us/traffic/collision_analysis/brochures.htm

How do they work?

When a pedestrian activates the system by pressing a button, overhead flashing yellow lights alert the drivers that pedestrians have activated the signal. The yellow light then turns solid, preparing drivers to make a complete stop at the intersection. When the light turns red, pedestrians receive a white "walk" signal, and may proceed across the intersection. A flashing red appears when the pedestrian countdown starts, telling the driver that if the intersection is clear, they may proceed through it with caution. Under this flashing red phase, each vehicle still has to stop and then can proceed if clear. When the pedestrian countdown has expired, the beacon goes dark and traffic continues on its way.

How effective is a HAWK?

- Researchers for the Federal Highway Administration (FHWA) found a HAWK can reduce auto-pedestrian crashes by nearly 70%.
- Drivers correctly yield to pedestrians at a HAWK at much higher rates (over 90%) than at traditional crosswalks (about 30%).
- A HAWK can be used in locations where a traditional traffic signal cannot be justified or would present too great a disruption to automobile traffic; but there is a need for a higher level of pedestrian protection than regular crosswalks.

For more information:

There are several informative videos on the internet that show how HAWKs work. One example can be found at:
https://vimeo.com/223672024

High Intensity **A**ctivated Cross**W**al**K** Signal (HAWK)

(Also known as a Pedestrian Hybrid Beacon)

WHAT IS IT?

A HAWK acts like a traffic signal and is designed to catch drivers' attention at pedestrian crosswalks and improve safety.
Because a HAWK operates similarly to a regular traffic signal, both drivers and pedestrians already have the skill set to respond easily and quickly, but they do not require traffic to stop unless a pedestrian needs to cross.

DOT
Oklahoma Department of Transportation

http://www.okladot.state.ok.us/traffic/collision_analysis/brochures.htm

WHAT USERS SEE:

What the Driver sees:

All lights are off.
Drivers proceed normally.

Flashing yellow light.
Drivers approach with caution.
Pedestrian has activated the HAWK.

Steady yellow light.
Drivers prepare to stop.

Steady red lights.
Drivers stop like at a traffic signal.

Alternating flashing red lights. Drivers stop and then proceed like at a stop sign, yielding to pedestrians. All vehicles are in a stop and go situation under this phase.

All lights are off.
Drivers proceed normally.

What the Pedestrian sees:

Steady Don't Walk.
Pedestrians do not cross the street.

Steady Don't Walk.

Steady Don't Walk.
Pedestrians wait to cross the street.

Walk.
Pedestrians cross the street.

Flashing Don't Walk with Countdown Timer.
Pedestrians finish crossing the street.

Steady Don't Walk.
Pedestrians do not cross the street.

http://www.okladot.state.ok.us/traffic/collision_analysis/brochures.htm

Education – OK Drivers Manual

Crosswalks are intended to encourage people to cross only at certain locations. As you know, some people will cross when and where they want to, regardless of traffic signals, marked crossings, or even their own safety. As the person controlling a potentially dangerous machine, it's your job to "play it safe" where pedestrians are concerned and protect them when you see they may be in danger.

- Be alert to people entering the roadway or crosswalks any place where pedestrian traffic is heavy.
- Yield to blind pedestrians carrying a white or chrome cane or using a guide dog.
- Be especially careful in school zones, school crossings, or where children are playing.
- Yield to pedestrians using the sidewalk when you're entering or leaving a driveway or alley.
- Don't honk, gun your engine, or do anything to rush or scare a pedestrian crossing in front of your car, even if you have the legal right-of-way.

Education – OK Drivers Manual

WATCH OUT FOR "ACCIDENT MAKERS"

Good drivers think ahead. They not only watch the road but also the total traffic pattern. The smart driver is a defensive driver, looking out for "trouble in the making."

Watch out for:

- Exhaust fumes coming from a parked car, indicating it may pull out into traffic.
- An impatient driver ahead or behind, nosing out around a car and then cutting in sharply.
- A driver distracted by something and not watching the road.
- A bad driver who speeds up to beat changing signal lights or runs through stop signs or lights.
- A pedestrian crossing or about to cross the street in front of you.
- Children playing near the street.
- A slight movement at a street-side door of a parked car, indicating that someone may step out of the car.

Education – OK Drivers Manual

WATCH OUT FOR "ACCIDENT MAKERS"

Good drivers think ahead. They not only watch the road but also the total traffic pattern. The smart driver is a defensive driver, looking out for "trouble in the making."

Watch out for:

- Confusing traffic signs and signals.
- Exhaust fumes coming from a parked car, indicating it may pull out into traffic.
- An impatient driver ahead or behind, nosing out around a car and then cutting in sharply.
- A driver distracted by something and not watching the road.
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Questions