THIS WEBINAR WILL BE RECORDED
BIKE DETECTION

PRESENTED BY:

MATT ZINN
APPLICATIONS SALES & TECHNICAL SERVICES MANAGER

WEBINAR 05/12/2015
WHAT TO EXPECT

• Discussion on Safety for Bicyclists
• Loop detection technology used for bicyclists
• Discussion of inductive loop detection as a system
• Proper loop installation using prober material

• IMSA Tarp points available – information at the end.
BIKES AND TRAFFIC

HISTORY

• First Bicycle invented in 1817 [1]
• 1896 first automobile accident vs. bike [3]
• Bikes considered “second class citizens” [2]
• 2007 study suggest 700 bicyclists die annually [4] with over 44,000 bike/car accidents occurring each year.

SERIOUS PROBLEM

NHTSA STUDY

Pedalcyclists Killed, by Related Factors | Number | Percent*
---|---|---
Failure to yield right of way | 117 | 18.6
Under the influence of alcohol, drugs or medication | 67 | 10.6
Failure to obey (e.g., signs, control devices, officers) | 60 | 9.5
Walking, playing, working etc., in roadway | 51 | 8.1
Improper crossing of roadway or intersection | 44 | 7.0
Operating without required equipment | 38 | 6.0
Not visible | 34 | 5.4
Darting into road | 32 | 5.1
Riding on wrong side of road | 25 | 4.0
Making improper turn | 19 | 3.0
Improper lane changing | 18 | 2.9
Failure to keep in proper lane or running off road | 17 | 2.7
Inattentive (talking, eating, etc.) | 11 | 1.7
Improper entry to or exit from traffic way | 4 | 0.6
Failing to have lights on when required | 2 | 0.3
Portable electronic devices | 2 | 0.3
Other factors | 25 | 4.0
None reported | 239 | 37.9
Unknown | 19 | 3.0
Total Pedalcyclists | 630 | 100.0

43.8%


*Note: The sum of the numbers and percentages is greater than total pedalcyclists killed as more than one factor may be present for the same pedalcyclist.
WHAT IS EXPECTED

WHERE IS SAFETY FOR BIKES GOING?

• Continued focus on safety for bicyclists
  – Requires education and public awareness programs
  – Change behavior of bicyclist to obey traffic laws
• Bicyclists considered in designs of intersection and timing, as part of mainstream traffic.
• New controller software with bike timing as additional parameter, just like vehicle and pedestrian timing.
• MUTCD changes to reflect changing environment
  – Signal heads and signage
ASPECTS OF BIKE SAFETY

WHAT IS BEING DONE?

- Designated Bike Lanes
- Manual Bike detection
  - Push Buttons
- Laws and regulation changes as well as enforcement
- Designated timing in Controllers
  - Bike discrimination for separate timing
- Automatic bike detection
  - Loops, Video, Microwave, etc.
NEW REGULATIONS

AB1581

TOPD 09-06 / California AB1581

The Traffic Operations Policy Directive (TOPD) 09-06 was issued August 27, 2009, since Assembly Bill 1581 became law (California Vehicle Code 21450.5) on January 1, 2008. This TOPD states that "All new limit line detector installations and modifications to the existing limit line detection on a public or private road or driveway intersecting a public road shall either provide limit line bicycle/motorcycle detection in which a Reference Bicycle-Rider is detected or be placed on permanent recall or fixed time operation." If more than 50 percent of the limit line detectors need to be replaced at a signalized intersection, then the entire intersection should be upgraded so that every lane has a limit line bicycle/motorcycle detection zone. Whether using detection, recall or fixed timing, the minimum bicycle timing must be according to Table 4D-109(CA) "Signal Operations Minimum Bicycle Timing" in the attached TOPD 09-06 (See Attachment 1). Limit line bicycle/motorcycle detection zones, as defined by the TOPD 09-06 and this memorandum, are not applicable to freeway ramp meter signals.

IMPLEMENTATION OPTIONS: Currently, there are three types of technology approved for use for bicycle detection in Caltrans "Bicycle/Motorcycle Detection Installation Notes." (See Attachment 2):

- In-pavement detection (Type D inductive loop)
- Video detection
- Bicycle Push button
WHY BIKE TIMING?
(WITH ANY TECHNOLOGY)

• More efficient intersection timing
• Bike Riders need their own timing
• Timing ensures enough time to get through intersection but not too much time

Intersection Width
Guidance:

Where a Limit Line Detection Zone that detects the Reference Bicycle-Rider has been provided, minimum bicycle timing should be provided as follows:

For all phases, the sum of the minimum green, plus the yellow change interval, plus any red clearance interval should be sufficient to allow a bicyclist riding a bicycle 6 ft long to clear the last conflicting lane at a speed of 14.7 ft/sec plus an additional effective start-up time of 6 seconds, according to the formula:

\[ T = G_{\text{min}} + Y + R_{\text{clear}} + W \]

where

- \( G_{\text{min}} \) = Length of minimum green interval (sec)
- \( Y \) = Length of yellow interval (sec)
- \( R_{\text{clear}} \) = Length of red clearance interval (sec)
- \( W \) = Distance from limit line to far side of last conflicting lane (ft)
The First ½ of the system
REQUIREMENTS

WHAT WE SAW AS NECESSARY

• Discrimination between Bikes and other vehicles.
  – Discriminates against Motorcycles / Scooters / Mopeds
• Provides bike timing for older controllers
  – “Minimum Bike” and “bike extension” timing
• Provides calls for vehicles on separate channel outputs
• Counts bicycles
SPECIFICS

BASIC FUNCTIONALITY

• 2 channel detector with four outputs
• Bike detection comes out on channels 3 and 4
• Bike Timing relies on field green inputs getting to the detector
• Requires a specific loop design.
Loop design for bike detection is a rectangle at 45° of direction of travel.

- 45° is required for discrimination
- Additional loop is required for presence and vehicle detection if needed.
LOOP CONFIGURATION

FOR DIFFERENTIATION

• Loop can be across a whole lane or it can be on the lane line
  – Set up configurations in the detector for both designs
• Loop is installed 45° to the direction of travel
• Loop leading edge to trailing edge is approximately 42”
IS IT COMPLICATED?

DOESN’T HAVE TO BE!

- It’s not Rocket Surgery (somewhere between rocket science and brain surgery)
  - Install the loop (Prefabricated loops should be used)
  - Configure the detection settings
  - Walk away
HOW DOES THE DETECTOR KNOW ABOUT THE GREEN INDICATION.

- In some cabinets it is already wired into the detector rack. TS1
- In other cabinets a PGI is installed
- Capable of inputs to two cards
- Outputs from two cards

Phase Green Interface Module PGI
12FT WIDE, 4 TURN, 45 DEGREE LOOP W/ 50FT OF FEEDER CABLE (TYPICAL THRU LANE INSTALLATION)
THE DETECTION

WON’T DETECT ANY OTHER VEHICLE

12ft wide, 4 turn, 45 degree
Loop 50ft of Feeder Cable
12FT WIDE, 4 TURN, 45 DEGREE LOOP 50FT OF FEEDER CABLE
THE DETECTION

DEMO TO FOLLOW PRESENTATION

Scale = 1:24
Loops, car, bicycle

Crosswalk

Bicycle
THE DETECTION

Will it pick up the bike in the presence loop too?

6ft Round Loop

12ft 45 degree Loop
Another example of the Presence detection capabilities
BICYCLE THROUGH MIDDLE OF LOOPS

- Bicycle through center of 1 turn Round Loop
- Bicycle through center of 2 turn Round Loop
- Bicycle through center of 4 turn 45 degree Loop
Will it pick up the car in the presence loop too?
THE LOOPS

THE SECOND ½ OF THE SYSTEM

• Detection is ONLY as good as the detector.
  – Doesn’t matter what the technology is
  – All detection methods have some problems
  – Correct installation is important
  – Correct maintenance is key
• When installed correctly, loops have the least amount of maintenance needs.
• Loop Myths
  – Loops only detect ferrous metals.
    • Wrong, they pick up any metal that is conductive (copper, aluminum, titanium, etc.)
  – Loop wire has to be big (#12 - #16 AWG)
    • Wrong, today’s technology in wire manufacturing allows for smaller gauge wire.
  – Loops fail.
    • Roads fail, back hoes happen, installations are done incorrectly, but loops rarely fail on their own, if done correctly.
PREFABRICATED LOOPS

THE SECOND ½ OF THE SYSTEM

- Built to last
- Easy to install
- Ready made for any installation
- New technology materials
- Saves money in the long run
  - No maintenance!
  - Less need to repair
PREFABRICATED LOOPS - BENEFITS

THE SECOND ½ OF THE SYSTEM

• Wires never move in reference to the other wires in the sheath.
• Quality is insured and warranted with Prefabricated loops.
  – Meg’d to 999 Megaohms prior to leaving the factory
  – Normal standards of 20 Megs would fail.
  – Salt bath for three days before testing
• Ready made for any installation
• Material Costs are offset by performance, maintenance, and lower installation costs
PREFABRICATED LOOPS - TYPES

THE SECOND ½ OF THE SYSTEM

• Two methods
  – Saw Cut installations
  – Underlay
    • Milling
    • New installations
• Sized to fit any need
  – Homerun and loop can be any size
  – No need to splice
  – “Adjustable” installations

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Author: Matt Zinn
PREFABRICATED LOOPS

THE SECOND ½ OF THE SYSTEM

- Adjustment of slack in loop is easy
  - Measure out excess and bore a 1” hole
  - Install the connection tube into the hole and seal.
  - No more slack wire
PREFABRICATED LOOPS

THE SECOND ½ OF THE SYSTEM

Adjustment technique

Splice Box
PREFABRICATED LOOPS

THE SECOND ½ OF THE SYSTEM

Advantages

– Loops are quality constructed in a controlled environment—no need to worry about splicing or waterproofing.
– Loops are tested—salt bathed for 3 days, then Meg’d at 999 Meg-ohms or greater.
– Pavement shifting does not affect the Prefabricated loops because all wires move together and will not move independently.
– Warranted against failure due to manufacturer defect for 10 years.
Prefabricated Loop Installation
Asphalt Roadway
THE SECOND ½ OF THE SYSTEM

Prefab 8500 Loop Installation on Asphalt Roadway
Prefabricated Loop Installation
Asphalt Roadway

Pretty Road
No Saw Cuts!
IMSA TARP POINTS

1 HOUR = 4 TARP POINTS

If you are interested in TARP points please submit the following:

• First and Last Name
• IMSA Certificate Number
• Phone Number
• Address
• Email Address
• Agency or company you work for
• City in which you work

I will process the TARP points by this Friday, please have your information to me by Thursday. You can send the information to: mzinn@edittraffic.com
THANK YOU!

THIS HAS BEEN A PLEASURE!

Thank you for your attention
Any Questions?
For more information contact:

Matt Zinn
Application Sales and Technical Services Manager
EDI / Reno A&E
Cell – (602) 321-2969
mzinn@editraffic.com
www.editraffic.com
www.renoae.com