

**CALIFORNIA TRAFFIC CONTROL DEVICES COMMITTEE (CTCDC) AGENDA**

**June 4, 2015 Meeting (9:00 am to 4:00pm)**

**Caltrans Headquarters  
(Enter from N Street)  
1120 N Steet  
Sacramento, CA 95814  
Caltrans Board Room**

**The Meeting is open, and public/local agencies are invited to attend. For further information regarding this meeting, please contact Devinder Singh at (916) 654-4715, or at [Devinder.Singh@dot.ca.gov](mailto:Devinder.Singh@dot.ca.gov). Electronic copies of this meeting Agenda and minutes of the previous meetings are available at <http://www.dot.ca.gov/hq/traffops/engineering/ctcdc/index.htm>**

**Organization Items**

- 1. Introduction**
- 2. Approval of Minutes of the March 5, 2015 Meeting**
- 3. Membership**
  - a. John Ciccarelli
  - b. Michael Kenney

**4. Public Comments**

At this time, members of the public may comment on any item not appearing on the agenda. Matters presented under this item cannot be discussed or acted upon by the Committee at this time. For items appearing on the agenda, the public is invited to make comments at the time the item is considered by the Committee. Any person addressing the Committee will be limited to a maximum of five (5) minutes so that all interested parties have an opportunity to speak. When addressing the Committee, please state your name, address, and business or organization you are representing for the record.

**Agenda Items**

**5. Public Hearing**

Prior to adopting rules and regulations prescribing uniform standards and specifications for all official traffic control devices placed pursuant to Section 21400 of the California Vehicle Code (CVC), the Department of Transportation is required to consult with local agencies and hold public hearings.

**Consent Items (minor discussion with vote expected)**

<u>Agenda Item</u>	<u>Description</u>	<u>Submitted by:</u>	<u>Lead</u>	<u>Page #s</u>
	None			

**Information Items (New items that may be voted on or brought back as an Action Item in a future meeting)**

<u>Agenda Item</u>	<u>Description</u>	<u>Submitted by:</u>	<u>Lead</u>	<u>Page #s</u>
15-10	EMERGENCY SCENE AHEAD (W90(CA)) sign proposal	Caltrans	Duper Tong	9 - 10

15-11	Proposed Near-Term Revisions to Existing CA MUTCD - Guidance on Bicycle Signals	Caltrans	John Ciccarelli	11 - 22
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**Action Items (Continuing discussion from prior meetings with vote expected)**

None

**6. Request for Experimentation**

<u>Agenda Item</u>	<u>Description</u>	<u>Submitted by:</u>	<u>Lead</u>	<u>Page #s</u>
15-12	Evaluation of Traffic Calming Treatments in Princeton, CA	Colusa County	Tong	23 - 33

**7. Discussion Items**

<u>Agenda Item</u>	<u>Description</u>	<u>Submitted by:</u>	<u>Lead</u>	<u>Page #s</u>
15-13	Use of CMS to promote voter turnout	Secretary of State Padilla	Duper Tong	34 - 35
15-14	Copyright State Highway Shields	Caltrans	Duper Tong	36

**8. Next Meeting**

September 3, 2015  
Caltrans District 11  
4050 Taylor St  
San Diego

**9. Adjourn**

ITEMS UNDER EXPERIMENTATION

- 09-9 Experiment with Steady Red Stop Line Light (Greenwood)  
 Status: No new update  
 See report on the following website.  
<http://www.dot.ca.gov/hq/traffops/engineering/ctcdc/status.htm>
- 09-21 Experiment with Separated/Protected Bikeway On the Left Side of (Greenwood)  
 Two One-Way Streets in the City of Long Beach (Rte 9-112E)  
 Status: No new update. See report on the following website.  
<http://www.dot.ca.gov/hq/traffops/engineering/ctcdc/status.htm>
- 10-3 Experiment with Second Train Warning Sign “Additional Train May (Greenwood)  
 Approach” with a Symbol Sign (Submitted by City of Riverside)  
 Status: No new update. See report on the following website:  
<http://www.dot.ca.gov/hq/traffops/engineering/ctcdc/reports/Final%20Report%20Additional%20Train%20May%20Approach%20Sign.pdf>
- 11-3 Experiment with Buffered Bicycle Lanes on 2<sup>nd</sup> St.between Bayshore (Greenwood)  
 & PCH in Naples  
 Status: No update.
- 11-12 Experiment with Circular Rapid Flashing Beacon and RRFB (Greenwood)  
 Status: No update.
- 11-13 Experiment with a Sign “RECKLESS DRIVING PROHIBITED” (Winter)  
 Status: (04-09-14) The County of Los Angeles Department of Public Works recently completed its experimental phase of the “Reckless Driving Prohibited” sign and is currently in the process of gathering data from the local law enforcement agencies (United States Forest Service, Los Angeles County Sheriff’s Department, and the California Highway Patrol). This data is needed in order to prepare the final report, which is tentatively scheduled to be completed by June 5, 2014. Please forward any future correspondences regarding the experimental sign directly to me. Thank you.  
 Update (11-5-2014) The County has requested an additional year of collecting data in order to determine the impact of increased enforcement, number of citations issued, and reduction in collisions.
- Arnel G. Dulay, P.E., T.E.  
 Head, Traffic Investigations II Section  
 Traffic and Lighting Division  
 (626) 300-4748; Dulay, Arnel [ADULAY@dpw.lacounty.gov]
- 11-19 Experiment with 2<sup>nd</sup> advance California Welcome Center Destination Sign (Benton)  
 Status: No update.
- 12-9 Request to Experiment with Yellow LED Border on Pedestrian Signal (Benton)  
 Status: (12-4-2014) Experiment has been completed. Pending review by FHWA and Signals Technical Committee (STC) before a final presentation is made to the CTCDC.

**Items Under Experimentation**

## EXECUTIVE SUMMARY

At most signalized intersections, there is a potential for conflict between pedestrians using a crosswalk and turning traffic. Many times, pedestrians are not noticed by motorists because they are out of their direct line of sight. Low light and/or inclement weather conditions can also contribute to poor pedestrian visibility. The purpose of this experiment was to determine the effectiveness of adding an actuated yellow LED border to a standard pedestrian signal head. The intent of the modification was to advise vehicular and pedestrian traffic that the signal has received a call to serve a specific crosswalk. To measure its effectiveness, the study examined before and after-treatment video data to determine the percent change in the following areas:

1. Pedestrian-vehicle conflicts
  2. Pedestrian crossing violations
  3. Repeated pedestrian button pushes
- Sixteen prototype pedestrian signal modules were manufactured to conduct the evaluations at five intersections in the City of Redding, CA. Each location was reviewed in the before and after-treatment condition for 5-7 consecutive days, 14-16 hours each day. The Yellow Pedestrian Border (YPB) modules were installed at each location for 24 to 67 days prior to collecting the after-treatment data. The average results for all five locations show a modest reduction in pedestrian-vehicle conflicts of 17.1%. Considering the limited deployment of the device during the evaluation, the conflict results are likely conservative. Pedestrian violations showed a more significant decrease at 28.4%. Although not counted as accurately as the other categories, the largest reduction was for the repeated button pushes. For the 12 crosswalks studied in this experiment, the number of extra button pushes was reduced by an average of 60.2%. The standard deviations for these results were fairly large due to the range of outcomes between the different locations.

This experiment demonstrated that the yellow LED border is a positive enhancement to a standard pedestrian signal and has no apparent downside. The border does not distract motorists, nor does it adversely affect their driving behavior. It provides supplemental information to vehicular traffic while giving pedestrians reassurance that the signal will provide a WALK indication soon. Lastly, the border is most visible, providing the greatest benefit, to pedestrians and motorists during low light or inclement weather conditions when the potential for conflict is greatest. It is recommended that the yellow LED border be approved as an optional feature on standard countdown pedestrian signals. Additionally, guidance should be provided so that the device is applied at locations similar to the ones studied in this experiment. The suggested intersection criteria are as follows:

- The traffic signal is located in an urbanized area with regular pedestrian activity
- The pedestrian signals are pushbutton actuated
- The posted speed limit is 40-mph or less
- One or more crosswalks operate concurrently with vehicular traffic

The complete report is posted on the following website:  
<http://www.dot.ca.gov/hq/traffops/engineering/ctcdc/reports.htm>

Rob Stinger, P.E.  
 Chief - Traffic Engineering & Operations  
 Caltrans District 2  
 530-225-3229

12-18 Request to experiment with Red Colored Transit-only Lanes (SF) (Patterson)  
 Status: (1-8-15)

Update on CTCDC item 12-18: A request to experiment with red colored transit-only lanes that was originally approved by the CTCDC and FHWA in 2012. The attached fact sheet provides an overview of the treatment and its purpose.

## Items Under Experimentation

Our original timeline for implementing the red transit lanes was somewhat delayed, primarily by the need to coordinate pavement and utility repairs before installing the red treatments. Below is a summary of corridors in San Francisco completed in 2013-2014:

- 3<sup>rd</sup> Street between Market and Townsend (preformed thermoplastic)
- Church Street between 16<sup>th</sup> and Duboce (epoxy-modified acrylic spray coating)
- Geary Street between Gough and Market (preformed thermoplastic)
- Haight Street between Laguna and Market (epoxy-modified acrylic spray coating)
- Market Street between 5<sup>th</sup> and 12<sup>th</sup> (preformed thermoplastic)
- O'Farrell Street between Gough and Market (preformed thermoplastic)

We completed “before” data collection along several of these corridors in March/April 2014, and plan to wait until the same months this year to collect “after” data in order to minimize potential seasonal variations before submitting an evaluation report.

If you have any questions or concerns, please contact me.

Best,

Dustin White  
Transportation Planner  
 SFMTA | Municipal Transportation Agency  
One South Van Ness Avenue, 7th Floor  
San Francisco, CA 94103  
415.701.4603



*Geary Street*

## Background

- One of numerous SFMTA initiatives focused on improving the speed, reliability and safety of transit service.
- SFMTA operates ~18 miles of transit-only lanes, with up to 40 additional miles currently planned.
- In 2012 the SFMTA received approval to experiment with red transit-only lanes from the Federal Highway Administration and California Traffic Control Devices Committee.
- Before/after evaluation focused on transit travel times and variability, illegal motorist behavior (driving and double parking), and legal motorist behavior (entering lanes to make turns or access curbside parking). Evaluation will also compare performance of two material types: thermoplastic tiles and epoxy- modified acrylic spray coatings.

## Items Under Experimentation

- Corridors completed 2013-2014:

Corridor	Primary Muni Routes
3 <sup>rd</sup> between Jessie and Townsend	8X, 30, 45
Church between 16 <sup>th</sup> and Duboce	J, 22
Geary/O'Farrell between Gough and Powell	38/38L
Haight between Laguna and Market	6, 71
Market between 5 <sup>th</sup> and 12 <sup>th</sup>	F, 6, 9/9L, 71

**Expected Benefits**

- Better compliance through enhanced visibility
- Reduced transit travel times
- Reduced transit travel time variability that leads to bunching and gaps
- Improved safety when buses don't have to change lanes to avoid double parked vehicles



• 3rd Street

**Design and Implementation Considerations**

- The SFMTA developed design guidelines for dashing transit-only lanes approaching intersections where right-turns are permitted to discourage right-hook collisions.
- Per the experiment approved by the CTCDC, red treatments can only be used with full-time transit-only lanes and cannot be used with peak-hour only lanes.
- Importance of pavement quality assessment/repairs and underground utility work prior to installation.

**Items Under Experimentation**

**Installation Details**



*Thermoplastic tiles are cut to size and applied to roadway using epoxy and heat, and can be opened to traffic in less than an hour.*

*Spray coating requires longer lane closures to apply multiple coats with drying time between.*



*O'Farrell Street (thermoplastic) lane on (spray coating)*



*Church Street - San Francisco's first red transit-only*

**Related Projects**

*Transit Signal Priority* – SFMTA is upgrading to a GPS-based system which communicates between traffic signals and transit vehicles to extend green signals along transit corridors or shorten green signals for cross-streets. Installation at 60 traffic signals along Mission Street resulted in 15% transit travel time savings and 10% improvement in travel time variability. SFMTA plans to add TSP at 600 intersections along high-ridership transit corridors by 2016 (San Francisco has 1,200 total signalized intersections).

*Double Parking Enforcement* – SFMTA sponsored legislation amending the California Vehicle Code to use cameras on buses to issue citations for double parking violations within transit-only lanes. Pilot program authorized through 2015.

**Items Under Experimentation**

- 12-19 Request to Experiment with Highlighted Shared Lane Markings (LA City) (Bahadori)  
Status: No new update.
- 12-21 Request to Experiment with In-Roadway Warning Lights (IRWL) System that would supplement existing traffic signals along the Metro Gold Line (LA Metro) (Winter)  
Status: No new update.
- 12-25 Request for permission to experiment with various Bicycle Treatments (Winter)  
(Santa Monica)  
Status: No new update. See report on the following website:  
<http://www.dot.ca.gov/hq/traffops/engineering/ctcdc/exp/city-of-santa-monica-update-bike-ctcdc-buffered-lanes-04-09-2014.pdf>
- 13-01 Request to Experiment with Green & Shared Roadway Bicycle Markings – Proposed by the City of Oakland (Patterson)  
Status: No new update

**Jason Patton, PhD****Bicycle & Pedestrian Program Manager**

Transportation Planning &amp; Funding Division

Department of Engineering &amp; Construction

City of Oakland | Public Works Agency | APWA Accredited Agency

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- 13-02 Request to Experiment with Bike Boxes and Wide Bike Strip Stripe (Patterson)  
-Proposed by the City of Davis  
Status: (12/1/2014) City of Davis installed experimental bike boxes in September 2014. Experimentation is ongoing.

**5. Public Hearing****Item 15-10 TTC warning sign for “EMERGENCY SCENE AHEAD”****Recommendation:**

Adopt a word message warning sign “EMERGENCY SCENE AHEAD”

**Agency Making Request/Sponsor:** Caltrans/ Duper Tong, voting member

**Background:**

Prior to adopting the National MUTCD, Caltrans had the ACCIDENT AHEAD C39(CA) sign (see picture below).

This sign was deleted during the 2010 CA MUTCD adoption process.

Currently there are no warning signs to warn traffic of an incident management scene ahead. Caltrans has completely depleted their stock of ACCIDENT AHEAD C39(CA) signs and needs a sign to implement during incident management.

Caltrans senior engineer Lawrence Wooster, Chief of the Incident Management Branch in the Division of Traffic Operations has suggested a warning sign with the word message “EMERGENCY SCENE AHEAD”.

**Proposal:**

Add the following text in the CA MUTCD, Chapter 6I:

[Section 6I.102\(CA\) EMERGENCY SCENE AHEAD W90\(CA\) Sign](#)

Support:

**Item 15-10 TTC warning sign for “EMERGENCY SCENE AHEAD”**

<sup>01</sup> The Federal Highway Administration has encouraged use of the phrase EMERGENCY SCENE AHEAD as an official incident management sign.

Option:

<sup>02</sup> The EMERGENCY SCENE AHEAD (W90(CA)) sign (see Figure 6I-1(CA)) may be deployed to warn of an incident management scene ahead.

**Standard:**

<sup>03</sup> **If used, W90(CA) sign shall be mounted on temporary sign holders, not on barricades.**

*Guidance:*

<sup>04</sup> *The W90(CA) sign should be deployed at locations where a downstream traffic queue has formed due to incident management.*

Add W90 (CA) in Figure 6I-1(CA) Examples of Traffic Incident Management Area Signs



W90 (CA)

**Item 15-11 Proposed Near-Term Revisions to Existing CA MUTCD  
Guidance on Bicycle Signals**

**Recommendation:**

CTCDC non-motorized member John Ciccarelli requests that the Committee makes recommendations to adopt the proposed policy for guidance on bicycle signals.

**Agency Making Request/Sponsor:** John Ciccarelli, Caltrans non-motorized voting member

**Background:**

The CTCDC has previously received a proposal, sponsored by CTCDC member Ciccarelli, to develop California MUTCD guidance for bicycle signal faces incorporating existing guidance from the federal interim approval for bicycle signal faces (IA-16) and from proposed guidance developed jointly by the Signals Technical Committee and Bicycle Technical Committee of the National Committee on Uniform Traffic Control Devices (NCUTCD). That new California-specific guidance would have replaced the California-specific guidance for bicycle signals already in the California MUTCD.

This item is a more modest proposal, as a near-term measure, to revise the bicycle signal guidance already in the California MUTCD. The reason for this more modest proposal is to expedite approval of guidance revisions to meet the immediate needs of the State and Caltrans. Other, more comprehensive revisions, as a continuation of previous work by Ciccarelli, can still be considered separately and at subsequent CTCDC meetings under Agenda Item 14-05.

**An alternative to adopting this California-specific guidance would be to recommend that Caltrans seek blanket approval from FHWA for optional use of bicycle signal faces in California based on the guidance in IA-16.**

**History:**

CTCDC first addressed Bicycle Signals in 1990 (Item 90-7) in a proposed experiment by the City of Davis. Davis has several locations where high volumes of bicycle traffic enter and leave signalized intersections as the fourth leg of what is otherwise a T intersection. In 1996 Davis reported successful outcomes, and CTCDC asked the City, with assistance from CBAC, to develop proposed warrants, standards and draft legislation for the device. In 1999, warrants were recommended for use when a separate (exclusive) bicycle signal phase is needed. In 2000, Caltrans developed a Standard Plan. By 2002, the Caltrans Traffic Manual had incorporated Bicycle Signal Heads in Chapter 9, Traffic Signals and Lighting. Traffic Manual content was incorporated into the California MUTCD in the 2006 edition, in Sections 4C.102(CA) Bicycle Signal Warrant and 4D.104(CA) Bicycle Signals.

The federal (FHWA) MUTCD previously did not address Bicycle Signal Faces. In December 2013, FHWA issued Interim Approval #16 for Bicycle Signal Faces, with many more configurations and operational choices than in the CA MUTCD. In response, the NCUTCD Signals Technical Committee and Bicycle Technical Committee began working jointly on an MUTCD proposal covering the layout, meaning and operation of Bicycle Signal Faces. That proposal was reviewed by NCUTCD sponsor organizations, and at its June 2014 meeting, the NCUTCD Council approved the proposal, which was forwarded to FHWA the following month. As described above, the CTCDC has previously reviewed proposed CA MUTCD content for Bicycle Signal Faces based in large part on the NCUTCD proposal likely to appear in the next (2016 or 2017) FHWA MUTCD, with certain California exceptions and additions. Due to the complexity of the CA MUTCD proposal, it is not likely to be approved until the September 2015 CTCDC meeting or later. This agenda item therefore proposes

more modest changes to the existing CA MUTCD guidance to address some critical areas in need of immediate revision. They are described below.

### **Description of Proposed Revisions:**

#### Section 4C.102(CA)

- Replace the bicycle volume and geometric warrants with language from IA-16 referring readers to the general signal warrants in Section 4C.01 for locations not yet signalized, and explaining that retrofitting existing traffic signals with bicycle signal faces is analogous to retrofitting existing traffic signals with pedestrian signals, which do not require meeting a separate set of warrants.

Justification: the existing bicycle volume warrants can impede the ability to implement bicycle signals for safety reasons and can create a Catch-22 situation in which the project that would increase the bicycling volume cannot be constructed because the location does not yet have the bicycling volume. The proposed support and standard language in Section 4C.102(CA) is copied from Section 6 of IA-16.

- Also replace the geometric warrants with the support language in Section 4D.104(CA), which is from the joint Signals Technical Committee-Bicycle Technical Committee proposal to the NCUTCD, explaining the geometric and operational situations where a bicycle signal face may be used to provide separate control of the bicycle movement.

Justification: these revisions would cover the geometric and operational situations for which a bicycle signal can be considered to provide separate control of the bicycle movement. These are the situations that were identified as appropriate for use of bicycle signal faces in IA-16 and in guidance for bicycle signal faces developed jointly by the NCUTCD Signals Technical Committee and Bicycle Technical Committee and approved by the NCUTCD Council in June 2014 before being submitted to FHWA in July 2014.

#### Section 4D.104(CA)

- As described above, provide support language covering the geometric and operational situations where a bicycle signal face may be used to provide separate control of the bicycle movement

Justification: see second justification above.

- Replace the reference to bicycle signal warrants with a reference to Sections 4C.102(CA) and Section 4C.01 for information about signal warrants and their applicability to bicycle signal faces.

Justification: see first justification above.

- Replace the standard requiring that bicycle signals only be used to provide a separate (exclusive) phase for bicyclists with the support language in Section 4D.104(CA)(02) describing the geometric and operational situations for which a bicycle signal can be considered to provide separate control of the bicycle movement.

Justification: see second justification above.

- Delete the guidance indicating that bicycle signals should only be used after other measures have been subjected to a trial with enforcement that demonstrates that collision frequency has not been reduced.

Justification: the existing guidance is not reasonable, as a jurisdiction may not have the budget for constant enforcement, which could reduce safety at other locations due to competition for attention from

law enforcement, and as it can take years to determine that collisions have not been reduced, with a human toll, in terms of injuries, in the meantime.

### **Proposed Revisions to the CA MUTCD:**

#### **Section 4C.102(CA) Bicycle Signal Warrant**

##### Guidance:

~~*01 A bicycle signal should be considered for use only when the volume and collision or volume and geometric warrants have been met:*~~

~~*1. Volume; When  $W = B \times V$  and  $W > 50,000$  and  $B > 50$ .*~~

~~*Where: W is the volume warrant. B is the number of bicycles at the peak hour entering the intersection. V is the number of vehicles at the peak hour entering the intersection. B and V shall use the same peak hour.*~~

~~*2. Collision; When 2 or more bicycle/vehicle collisions of types susceptible to correction by a bicycle signal have occurred over a 12-month period and the responsible public works official determines that a bicycle signal will reduce the number of collisions.*~~

~~*3. Geometric;*~~

~~*(a) Where a separate bicycle/multi-use path intersects a roadway.*~~

~~*(b) At other locations to facilitate a bicycle movement that is not permitted for a motor vehicle.*~~

##### Support:

No new traffic signal warrant(s) specific to bicycle signal faces or in addition to those already provided in Chapter 4C are established. Retrofitting existing traffic signals with bicycle signal faces is analogous to retrofitting existing traffic signals with pedestrian signals where such a determination is not required through an engineering study.

##### Standard:

**New designs or installations for any traffic control signal shall be based on an engineering study in accordance with Paragraph 1 of Section 4C.01. For the purposes of an engineering study, the appropriate warrant(s) provided in Chapter 4C shall be followed.**

##### Guidance:

The need to incorporate bicycle signal faces into a new location or design should be established through the engineering study performed in accordance with Paragraph 1 of Section 4C.01 to determine that the installation of a traffic control signal is justified.

Engineering judgment should be exercised in determining whether or not it would be advantageous or beneficial to install a bicycle signal face(s) or pedestrian signals at an existing traffic control signal.

##### Support:

For the purpose of warrant analyses, provisions for classifying bicycles are provided in Paragraph 15 of Section 4C.01 and Paragraph 2 of Section 9D.01.

#### **Section 4D.104(CA) Bicycle Signals Faces**

##### Support:

01 A bicycle signal face (see Figure 4D-112(CA)) is an electrically powered traffic control device that may only be used in combination with an existing traffic signal. Bicycle signals faces shall direct bicyclists to take specific actions and may be used to improve an identified safety or operational problem involving bicycles. Refer to CVC 21450.

02 A bicycle signal face may be used to provide separate control of the bicycle movement for various situations such as the following:

A. Bicyclist non-compliance with the previous traffic control.

B. Provide a leading or lagging bicycle interval.

C. Continue the bicycle lane on the right-hand side of an exclusive turn lane that would otherwise be in non-compliance with Paragraph 6 of Section 9C.04.

- D. Augment the design of a contra-flow bicycle facility.
- E. Provide for unusual or unexpected arrangements of the bicycle movement through complex intersections, conflict areas, or signal control.

**Standard:**

~~0203~~ **Only green, yellow and red lighted bicycle symbols; shall be used to implement bicycle movement at a signalized intersection when a bicycle signal face is used. The application of bicycle signals shall be implemented only at locations that meet Caltrans Bicycle Signal Warrants (see Section 4C.102(CA)). Sections 4C.102(CA) and 4C.01 contain information and guidance on signal warrants and their applicability to bicycle signal faces.**

~~03~~ **A separate signal phase for bicycle movement shall be used**

~~04~~ **Bicycle signal faces shall not be used for controlling any bicycle movement that is sharing a lane with motor vehicle traffic.**

*Guidance:*

~~0405~~ *Alternative means of handling conflicts between bicycles and motor vehicles should be considered first.*

~~0506~~ *Two alternatives that should be considered are:*

- A. *Striping to direct a bicyclist to a lane adjacent to a traffic lane such as a bike lane to left of a right-turn-only lane.*
- B. *Redesigning the intersection to direct a bicyclist from an off-street path to a bicycle lane at a point removed from the signalized intersection.*

~~06~~ *A bicycle signal phase should be considered only after these and other less restrictive remedies have had an adequate trial with enforcement and with the result that the collision frequency has not been reduced.*

**Information on IA-16 – Interim Approval for Optional Use of a Bicycle Signal Face (IA-16)**

[http://mutcd.fhwa.dot.gov/resources/interim\\_approval/ia16/index.htm](http://mutcd.fhwa.dot.gov/resources/interim_approval/ia16/index.htm)



U.S. Department of Transportation  
**Federal Highway Administration**

**Memorandum**

<p>Subject: <b>INFORMATION:</b> MUTCD – Interim Approval for Optional Use of a Bicycle Signal Face (IA-16)</p>	<p>Date: December 24, 2013</p>
<p>From: Jeffrey A. Lindley                  Associate Administrator for Operations</p>	<p>In Reply                  Refer To: HOTO-1</p>
<p>To: Federal Lands Highway Division Engineers                  Division Administrators</p>	

**Purpose:** The purpose of this memorandum is to issue an Interim Approval for the optional use of bicycle signal faces. Interim Approval allows interim use, pending official rulemaking, of a new traffic control device, a revision to the application or manner of use of an existing traffic control device, or a provision not specifically described in the *Manual on Uniform Traffic Control Devices for Streets and Highways* (MUTCD).

All numerical or alpha-numeric references to Figures, Groups, Paragraphs, Parts, or Sections herein refer to the 2009 edition of the MUTCD.

**Item 15-11 Proposed Near-Term Revisions to Existing CA MUTCD Guidance on Bicycle Signals**

**Background:** Part 9, Traffic Control for Bicycle Facilities, does not provide for bicycle signal faces. Part 4, Highway Traffic Signals, contains provisions to provide circular signal indications to control bikeways or bicycle movements (see Item F in Paragraph 3 of Section 4D.07). There are no provisions in the 2009 MUTCD that prohibit arrow signal indications from also being used to control bikeways or bicycle movements. However, bicycle signal faces that contain bicycle symbols are not mentioned in the 2009 MUTCD, and Paragraph 1 of Section 4D.06 provides that each signal indication (except for pedestrian signal heads and lane-use control signals) shall be circular or arrow.

The bicycle signal face described in this Interim Approval memorandum is a new traffic control device to the MUTCD and has only been used in the United States on an experimental basis through the MUTCD's experimentation process, which is described in Section 1A.10.

**Research on Bicycle Signal Faces:** Agencies across the United States are showing an increased interest in bicycle signal faces, and many of them have submitted requests to the Federal Highway Administration (FHWA) to experiment with bicycle signal faces. During the past 5 years, the FHWA has approved experiments with bicycle signal faces for a variety of State, county and local governmental agencies, including the following: the City of Denver, CO; the City of Long Beach, CA; the City of Washington, D.C.; the City of Minneapolis, MN; the City of Alexandria, VA; the County of Arlington, VA; the City of Madison, WI; the Oregon Department of Transportation; the County of Clackamas, OR; the City of Canton, OH; the City of Sparks, NV; the City of Chicago, IL; the City of Lakeland, FL; and the City of Ithaca, NY.

In these experiments, the bicycle signal face is a traffic control device that is being used to provide for separate control of the bicycle movement and address one or more of the following situations:

1. Bicyclist non-compliance with the previous traffic control;
2. Provide a leading or lagging bicycle interval;
3. Continue the bicycle lane on the right-hand side of an exclusive turn lane that would otherwise be in non-compliance with Paragraph 6 of Section 9C.04;
4. Augment the design of a segregated counter-flow bicycle facility;
5. Provide an increased level of safety by facilitating unusual or unexpected arrangements of the bicycle movement through complex intersections, conflict areas, or signal control.

Research by governmental agencies internationally and also by academic institutions in the United States has also been performed on the operation of bicycle signal faces. These efforts include the Transportation Association of Canada, the Oregon Transportation Research and Education Consortium, and the City of Toronto, Ontario. Results by these organizations have been consistent with the findings of official experiments approved by the FHWA.

**FHWA Evaluation of Results:** The Office of Transportation Operations has reviewed the available data and considers the experimental bicycle signal face to be satisfactorily successful for the bicycle applications that were tested. Positive operational effects have been documented in the experiments such as a discernible and earlier behavioral adjustment(s) to newly installed bicycle traffic signals and traffic patterns as opposed to other devices, thereby resulting in an increased compliance by bicyclists with the traffic control. Additionally, depending on the specific application of the bicycle signal face, the research and experiments have shown that bicycle signal faces can provide an opportunity to either reduce the overall number of bicycle crashes, or reduce the bicycle crash rate up to 45 percent where bicycle volumes concurrently increase.

The design of the experimental bicycle signal face is not proprietary and can be used by any jurisdiction that requests and obtains approval from the FHWA to use bicycle signal faces in accordance with Paragraphs 14 through 22 of Section 1A.10. The FHWA believes that the experimental bicycle signal face has a low risk of safety or operational concerns.

This Interim Approval does not create a new mandate compelling the use of bicycle signal faces, but will allow agencies to install bicycle signal faces, pending official MUTCD rulemaking, to control bicycle movements at various locations and conditions.

While circular traffic signal indications can be used to control and facilitate bicycle movements as provided in Part 4, consideration should be given to any policy that uses the bicycle signal face to control specific bicycle movements. Agencies should exercise consistency with the decision to introduce bicycle signal faces to a roadway or bikeway network and use caution with any non-systematic policy to use bicycle signal faces because the intermixing of bicycle traffic signal faces and circular traffic signal indications to control bicycle movements in the same corridor or jurisdiction could create comprehension issues by the roadway user or violate bicyclist expectation.

**Conditions of Interim Approval:** The FHWA will grant permission for the optional use of bicycle signal faces under this Interim Approval to any jurisdiction that submits a written request to the Office of Transportation Operations. A State may request Interim Approval for all jurisdictions in that State. Jurisdictions seeking permission to use bicycle signal faces under this Interim Approval must agree to:

- Comply with the technical conditions detailed below, and
- Maintain an inventory list of all locations where bicycle signal faces are installed, and
- Comply with Item D in Paragraph 18 of Section 1A.10.

1. General Conditions:

The use of a bicycle signal face is optional. However, if an agency opts to use bicycle signal faces under this Interim Approval, such use shall be limited to situations where bicycles moving on a green or yellow signal indication in a bicycle signal face are not in conflict with any simultaneous motor vehicle movement at the signalized location, including right (or left) turns on red.

2. Meaning of Bicycle Signal Indications

Steady and flashing RED BICYCLE, YELLOW BICYCLE, and GREEN BICYCLE signal indications shall have the same meanings as described in Paragraph 3 of Section 4D.04 for steady and flashing CIRCULAR RED, CIRCULAR YELLOW, and CIRCULAR GREEN signal indications for motor vehicles, respectively, except that the bicycle signal indications shall only be applicable to bicyclists.

3. Application of Steady Bicycle Signal Indications:

Steady bicycle signal indications shall be applied as follows:

- a. A steady RED BICYCLE signal indication shall be displayed when it is intended to prohibit bicycle traffic from entering the intersection or other controlled area. Turning after stopping is permitted as stated in Item C.1 in Paragraph 3 of Section 4D.04, except that bicyclists positioned to the left of adjacent motor vehicle traffic on the same approach shall be prohibited from turning right on red, and bicyclists positioned to the right of adjacent motor vehicle traffic on the same approach shall be prohibited from turning left on red.
- b. A steady YELLOW BICYCLE signal indication shall be displayed following a GREEN BICYCLE signal indication or a GREEN ARROW in the same signal face. It shall not be displayed in conjunction with the change from the RED BICYCLE signal indication to a green signal indication. The YELLOW BICYCLE indication shall be followed by a RED BICYCLE signal indication.
- c. A steady GREEN BICYCLE signal indication shall be displayed only when it is intended to permit bicyclists to proceed in any direction that is lawful and practical, provided that the bicyclists are not in conflict with any simultaneous motor vehicle movements at the signalized location, including right (or left) turns on red, and further provided that the bicycle movement is not modified by lane-use signs, turn prohibition signs, pavement markings, separate turn signal indications, or other traffic control devices.

## 4. Design of Bicycle Signal Faces:

- a. Layout: The layouts and arrangements of the bicycle signal face (see Attachment IA-16-1) shall be in accordance with the following provisions:
  - i. Only the bicycle symbol shown on Page 6-7 in the 2004 Standard Highway Signs book is to be used for bicycle signal indications. The symbol shall only be positioned horizontally and shall face to the left.
  - ii. Bicycle signal faces may be oriented vertically or horizontally. The RED BICYCLE, YELLOW BICYCLE, and GREEN BICYCLE signal indications shall be in the same relative position to each other as specified for the CIRCULAR RED, CIRCULAR YELLOW, and CIRCULAR GREEN signal indications for motor vehicles, respectively, in Sections 4D.09 and 4D.10.
  - iii. Circular signal indications and bicycle signal indications shall not be used on the same traffic signal face.
  - iv. Arrow signal indications and bicycle signal indications may be used on the same traffic signal face.
  - v. As a specific exception to Paragraph 5 of Section 4D.09, two YELLOW BICYCLE signal indications or two GREEN BICYCLE signal indications shall not be arranged horizontally adjacent to each other at right angles to the basic vertical arrangement to form a clustered signal face.
  - vi. Single sections for continuous movements that would implement the bicycle symbol as illustrated in Group C of Figure 4D-2 shall not be used.
- b. Size: The provisions of Section 4D.07 apply to the sizes of bicycle signal faces except as follows:
  - i. There shall be three nominal diameter sizes for bicycle signal indications: 4 inches, 8 inches, and 12 inches. The bicycle symbol used for bicycle signal indications shall be proportioned to fit within the signal lens.
  - ii. All signal indications in a bicycle signal face shall be of the same size, including both signal indications that display arrows and signal indications that display bicycle symbols. As a specific exception to Paragraph 2 in Section 4D.07, 4-inch and 8-inch arrow signal indications may be used in bicycle signal faces.
  - iii. Four-inch signal indications shall only be used in supplemental, post-mounted, near-side bicycle signal faces. If used, 4-inch signal indications may exclude the accompanying visor(s) and backplate. Near-side bicycle signal faces may alternatively be either 8-inch or 12-inch.
- c. Placement: The provisions of Sections 4D.13 through 4D.16 apply to the placement of the bicycle signal faces except as follows:
  - i. As a specific exception to Item A in Paragraph 1 of Section 4D.11, a minimum of one primary bicycle signal face shall be provided traffic control for the bicycle movement, even if a bicycle through movement exists.
  - ii. The primary bicycle signal face shall have either 8-inch or 12-inch signal indications, even if it is located at the near side of the signal-controlled location.
  - iii. When the primary bicycle signal face is located more than 120 feet from beyond the stop line, a supplemental near-side bicycle signal face shall be provided.
  - iv. When the primary bicycle signal face is located more than 80 feet from beyond the stop line, a supplemental near-side bicycle signal face should be provided.
  - v. Bicycle signal faces should be placed such that visibility is maximized for bicyclists and minimized for adjacent or conflicting motor vehicle movements. In cases where motor vehicle drivers might be confused by viewing the bicycle signal indications, such as when the start or end of a green bicycle signal indication occurs at a different time than the start or end of a green signal indication for a concurrent adjacent motor vehicle movement, consideration should be

given to using visibility-limited bicycle signal faces. If visibility-limited bicycle signal faces are used, the signal faces shall be adjusted so that bicyclists for whom the indications are intended can see the signal indications.

- vi. A bicycle signal face should be separated vertically or horizontally from the nearest motor vehicle traffic signal face for the same approach by at least 3 feet.
- d. Mounting Height: The provisions of Section 4D.15 apply to the mounting height of bicycle signal faces except as follows:
  - i. The bottom of the signal housing (including brackets) of a bicycle signal face that is not located over a roadway shall be a minimum of 7 feet above the sidewalk or ground, except where supplemental signing is installed below the bicycle signal face. If supplemental signing is installed below the bicycle signal face, the minimum mounting height to the bottom of the supplemental sign shall be 6 feet. If the bottom of the supplemental sign is mounted less than 7 feet above a pedestrian sidewalk or pathway, the supplemental sign shall not project more than 4 inches into the pedestrian facility.
  - ii. If 4-inch signal indications are used in a supplemental, post-mounted, near-side bicycle signal face, the bottom of the signal housing (including brackets) shall be a minimum of 4 feet and a maximum of 8 feet above the sidewalk or ground.
- e. Intensity and Light Distribution: Except for the 4-inch nominal size of the lens diameter, the intensity and distribution of light from each illuminated bicycle signal face should be similar to that recommended for vehicular traffic signal faces in accordance with Paragraph 10 of Section 4D.06 to the extent practicable.
- f. Backplates: Backplates may be used with bicycle signal faces. If used, ancillary legends of any kind that identify the purpose or operation of the bicycle signal face shall not be placed on the backplate.
5. Operation of Bicycle Signal Faces:

The provisions of Part 4 apply to the operation of bicycle signal faces except as follows:

- a. Mode: The mode of operation of the bicycle signal faces shall be the same as the mode for the operation traffic signal faces for motor vehicle traffic. Bicycle signal faces shall operate in the steady (stop-and-go) mode when traffic signal faces for motor vehicle traffic are operating in the steady (stop-and-go) mode. Bicycle signal faces shall operate in the flashing mode when the signal faces for motor vehicles are operating in the flashing mode, whether programmed or due to a malfunction. Bicycle signal faces shall not be placed in a dark mode when the traffic signal faces for motor vehicle traffic are operating in the flashing mode.
- b. Timing: The provisions of Section 4D.26 apply to the duration of the yellow change and the red clearance intervals of a bicycle signal phase except as follows:
  - i. The minimum duration of the yellow change interval shall be 3 seconds.
  - ii. The maximum duration of the yellow change interval should be 6 seconds. The exclusive function of the yellow change interval shall be to warn bicyclists approaching a signalized location that their permission to proceed is being terminated after which they will be directed to stop. Providing enough clearance time for a bicyclist to travel through the intersection or conflict area is the purpose of the red clearance interval, not of the yellow change interval.
  - iii. If discernible non-concurrent activations or terminations of phases for motorized vehicular traffic and bicycle signal indications are necessary, visibility-limiting devices should be used on the bicycle signal face.
- c. Turning Movements: The following provisions apply to turning movements for bicyclists:
  - i. In cases where it is necessary to prohibit certain turning movements by bicyclists because of a conflict with motor vehicles moving concurrently from an adjacent lane(s), the bicycle signal

face shall use a combination of red and yellow bicycle symbol (or arrow) signal indications and green arrow signal indications. Examples of typical bicycle signal face arrangements for accomplishing turn prohibitions are shown in Attachment IA-16-2.

In the presence of a bicycle signal face, the prohibition of bicycle turning movements shall not solely be through the use of movement prohibition signs (see Section 2B.18), modifications thereof, or through the use of plaques that supplement movement prohibition signs.

- ii. As a specific exception to Paragraph 11 of Section 4D.05, the simultaneous display of a straight-through GREEN ARROW signal indication in a bicycle signal face and a CIRCULAR RED signal indication in a motor vehicle signal face for the same approach shall be permitted. If the green arrows in the bicycle signal face can be seen by motor vehicle drivers in the adjacent lane(s), consideration should be given to using visibility-limited bicycle signal faces.

#### 6. Warrants for Bicycle Signal Faces

No new traffic signal warrant(s) specific to bicycle signal faces or in addition to those already provided in Chapter 4C are associated with this Interim Approval. Retrofitting existing traffic signals with bicycle signal faces is analogous to retrofitting existing traffic signals with pedestrian signals where such a determination is not required through an engineering study. Rather, engineering judgment is to be exercised in determining whether or not it would be advantageous or beneficial to have an existing location implement a bicycle signal face(s) or pedestrian signals.

New designs or installations for any traffic signal require an engineering study in accordance with Paragraph 1 of Section 4C.01. The need to incorporate bicycle signal faces into a new location or design would be established through this engineering study. For the purposes of an engineering study the appropriate warrant(s) provided in Chapter 4C shall be followed.

For the purpose of warrant analyses, provisions for classifying bicycles are provided in Paragraph 15 of Section 4C.01 and Paragraph 2 of Section 9D.01.

#### 7. Regulatory Signing:

A Bicycle SIGNAL (R10-10b) sign (see Attachment IA-16-3) shall be installed immediately adjacent to every bicycle signal face that is intended to control only bicyclists, including signal faces that are comprised of all bicycle symbol signal indications, all arrow signal indications, and every combination thereof. The purpose of the sign is to inform any motor vehicle drivers who can also see the signal face that these signal indications are intended only for bicyclists.

Traffic signal designs are to minimize other signing and rely on the fact that bicycles are legally considered vehicles and their responsibility to comply with traffic control devices and yield to other vehicles and pedestrians is part of the bicycling task.

#### 8. Prohibited Uses:

The design, use, and operation of the bicycle signal face through this Interim Approval shall be in accordance with Items 1 through 7 above. If a specific use, application, or design element for bicycle signal faces has not been described in Items 1 through 7 above, and if the specific use, application, or design element would not otherwise be in compliance with the 2009 MUTCD, then the specific use, application, or design element is not permitted under this Interim Approval.

The following are among the applications of bicycle signal faces that shall not be permitted under this Interim Approval:

### **Item 15-11 Proposed Near-Term Revisions to Existing CA MUTCD Guidance on Bicycle Signals**

- a. Pedestrian Hybrid Beacons: Bicycle signal faces shall not be used in any manner with respect to the design and operation of a pedestrian hybrid beacon.
- b. Shared Lane Markings Only: Bicycle signal faces shall not be used for controlling any bicycle movement that is sharing a lane with motor vehicle traffic.
- c. Exclusive Bicycle Phases that permit "Scramble" Phases: Bicycle signal faces shall not be used to provide a bicycle phase that stops all motorized vehicles and pedestrians at the signalized location in order to allow multiple bicycle movements from multiple conflicting directions.

Any questions concerning this Interim Approval should be directed to Mr. Kevin Dunn at [kevin.dunn@dot.gov](mailto:kevin.dunn@dot.gov).

Attachment(s)

cc:

- Associate Administrators
- Chief Counsel
- Chief Financial Officer
- Directors of Field Services
- Director of Technical Services

[Attachment\(s\) PDF Version](#), 379KB

**Attachment IA-16-1**

**Typical Arrangements of Signal Sections in Bicycle Signal Faces**

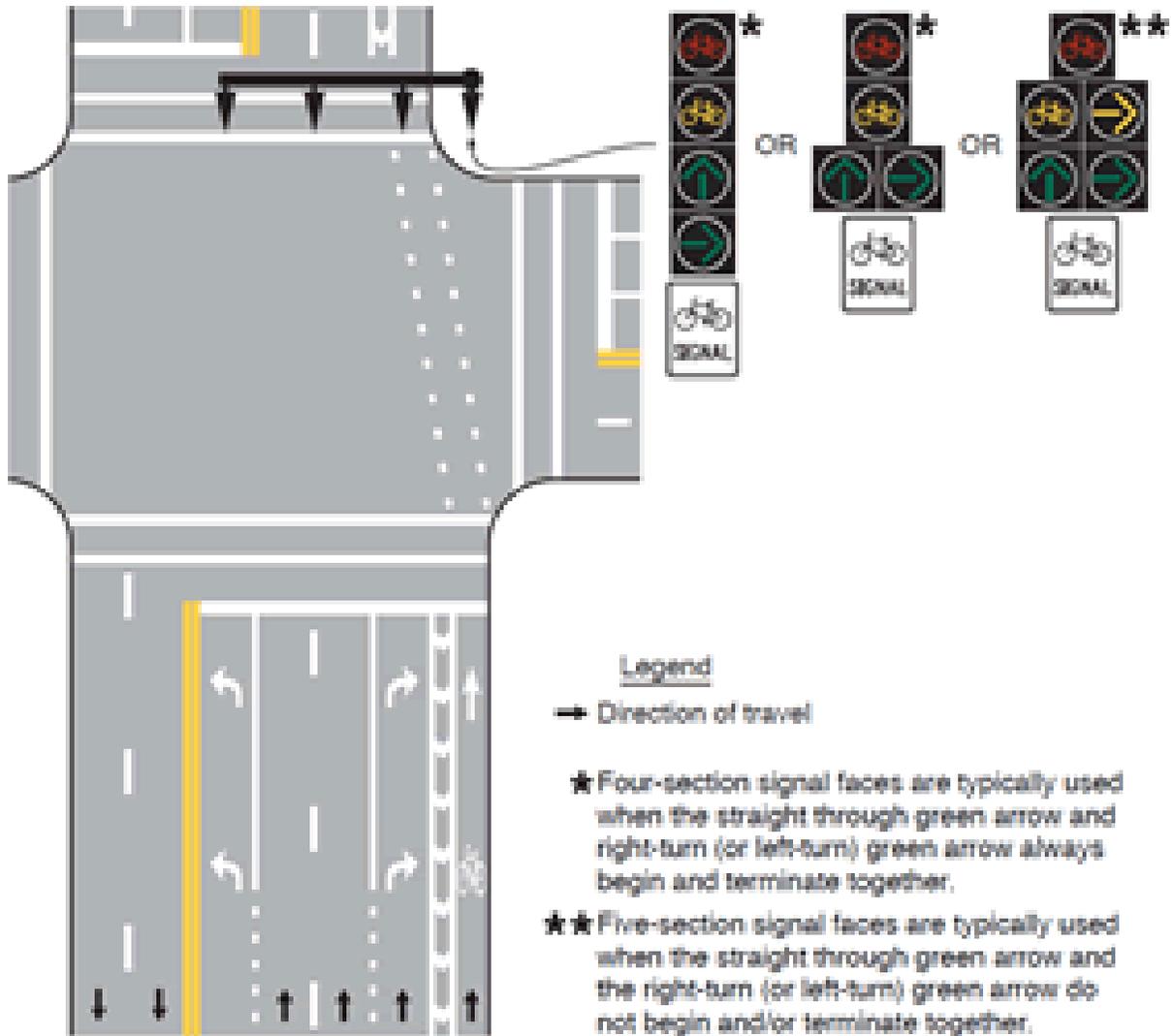
**A - Vertical signal faces**



**B - Horizontal signal faces**



### Attachment IA-16-2 Example of How to Prohibit a Left-Turning Bike Movement



ATTACHMENT 15-11-3  
Issued 12/23/2013



R10-10b  
Bicycle SIGNAL

• Reduce character spacing 20%.

A	B	C	D	E	F	G	H	J	K	L
12	18	0.375	0.375	4	5	2.5	2.5 C*	4.564	4.564	1.5
18	24	0.375	0.625	4.25	8	3.5	4 C*	7.300	7.300	1.5

COLORS: LEGEND, BORDER – BLACK  
BACKGROUND – WHITE (RETROREFLECTIVE)

**Item 15-11 Proposed Near-Term Revisions to Existing CA MUTCD Guidance on Bicycle Signals**

**15-12 Evaluation of Traffic Calming Treatments in Princeton, CA**

**Recommendations:** Approve request to conduct experimentation on traffic calming measures

**Requesting Agency/ Sponsor :** Colusa County Dept of Public Works/Duper Tong, Caltrans, Voting Member

**Background:** This memo is to request MUTCD approval for a traffic calming treatment which will be implemented in Princeton, CA. The traffic calming is being implemented as part of a joint effort between the California Department of Transportation (Caltrans), District 3 Traffic Operations Branch and the Colusa County Department of Public Works. The team will be evaluating the effectiveness of low-cost traffic calming strategies on reducing speeds along a major road through a small northern California community. The project will be initially funded by the County of Colusa in order to determine its effectiveness on speed reduction. If approved, and deemed to be effective, a joint maintenance agreement will be developed for long term upkeep on the traffic calming measures.

**Proposal:**

The proposed striping patterns have been previously approved for experimental study in various other states. The following table includes studies referenced in the development of the proposed traffic calming measures in this study.

<a href="#">3-172</a>	Experiment	Georgia DOT	GA	8/13/2004	Transverse Speed Reduction Markings – Converging Chevrons	Final Report Received	Pavement Markings
<a href="#">3-154</a>	Experiment	Illinois DOT	IL	4/12/2002	Transverse Speed Reduction Markings – Converging Chevrons	Active	Pavement Markings
<a href="#">3(09)-11</a>	Experiment	Iowa State University	IA	8/29/2011	Transverse Bar Speed Reduction Markings	Active	Pavement Markings
<a href="#">3(09)-10</a>	Experiment	Iowa State University	IA	8/29/2011	Red Message Background and White Dragon’s Teeth Markings at Speed Reduction Location	Active	Colored Pavements  Pavement Markings
<a href="#">3(09)-2</a>	Experiment	Iowa	IA	5/12/2010	Advance	Final	Pavement

		State University (on behalf of Des Moines County and Harrison County)			Curve Marking	Report Received	Markings  Symbols
<a href="#">3-192</a>	Experiment	Iowa State University (on behalf of towns of Gilbert, Dexter, and Slater)	IA	6/10/2006	Transverse Speed Reduction Markings and Colored Speed Limit Markings	Inactive	Colored Pavements  Pavement Markings
<a href="#">3-190</a>	Experiment	Iowa State University (on behalf of towns of Roland and Union)	IA	5/4/2006	Transverse Speed Reduction Markings - Converging Chevrons	Active	Pavement Markings

The elements selected from the above studies, and combined into this proposal include:

- 1) Optical Speed Chevrons
- 2) Lateral Optical Speed Bars
- 3) Red Background Color for Pavement Speed Limit Designations

Results from studies indicate that each of the above techniques has some measureable effect on speed reduction, though the variance between locations suggests geography, topography, and driver demographics may also play a key role in their effectiveness.

This proposal intends to study the effectiveness of all three of the above items implemented simultaneously, and in a repetitive fashion. Data will be collected prior to and after installation.

**Description of Community**

The study location is within the town of Princeton, CA, located on the Glenn/Colusa county line on CA State Route 45 (SR 45) as shown in Figure 1. The location of Princeton is: 39°24'11.59" N 122°00'35.91" W. The population based on the 2010 Census is approximately 303 residents.



**Figure 1: Location of Proposed Study**

SR-45 is a rural, two-lane highway roughly paralleling the Sacramento River. Posted speed limits on SR 45 vary from 55mph in non populated areas, to 25mph through heavily populated areas. In the Town of Princeton, the posted speed limit is 35 mph. Vehicular speeds on SR 45 in Princeton were obtained in the spring of 2014 by way of a radar speed study and are shown in Attachment A.

Average daily traffic within the town is approximately 2,250 vehicles per day, with a peak hour volume of 220 vehicles per hour. Truck percentages are near 9% with the dominant size (greater than 50%) 5-axle or greater. The section of highway is 0.70-mile long and traverses mostly commercial and residential areas. The highway is a two-lane conventional in flat valley terrain. Speeds were tabulated at five locations through the town and are summarized below (actual speed data located in Attachment A).

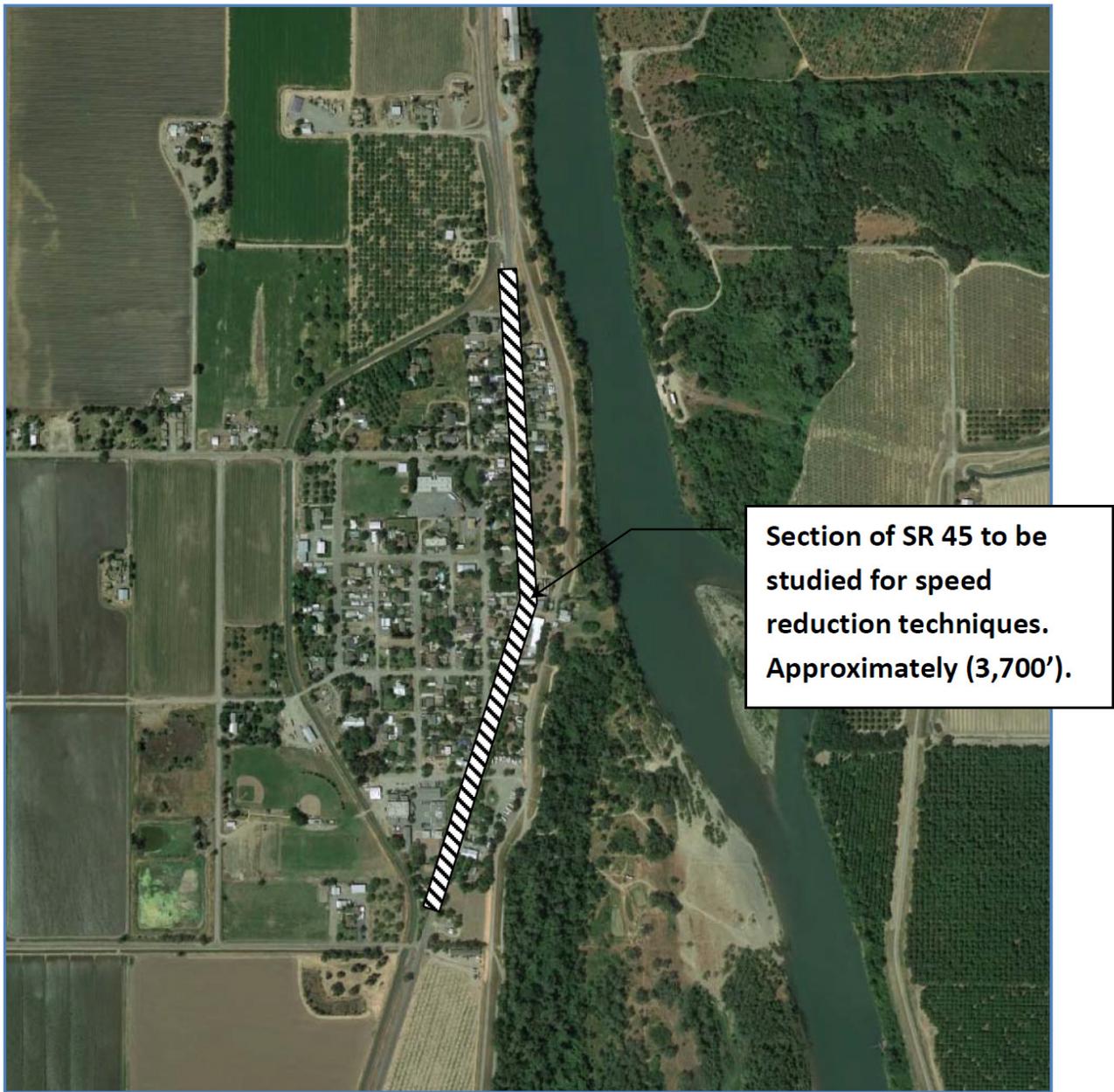


Figure 2: Limits of Proposed Study

**Nature of the Problem (Step 1)**

Traffic entering and traversing through Princeton, CA does not slow down appropriately. As a result, residents are subject to faster than normal traffic for a small, rural community.

An innovative cost effective solution is needed to help reduce transitional speeds to a more acceptable level. This application proposes to use novel striping techniques as a part of a more comprehensive speed reduction project.

**Description of the Treatment (Step 2)**

There are two elements to this proposal. The first includes “optical speed chevrons/bars” which consist of 8” white thermoplastic striping in the shape of a chevron with partial transverse bars adjacent to each chevron. A series of chevrons/bars are placed such that they gradually converge over the course of 153’.

The second element includes a white thermoplastic striped speed limit designation on a red background box. Figure A shows the proposed layout and dimensions of the proposed chevron sets.

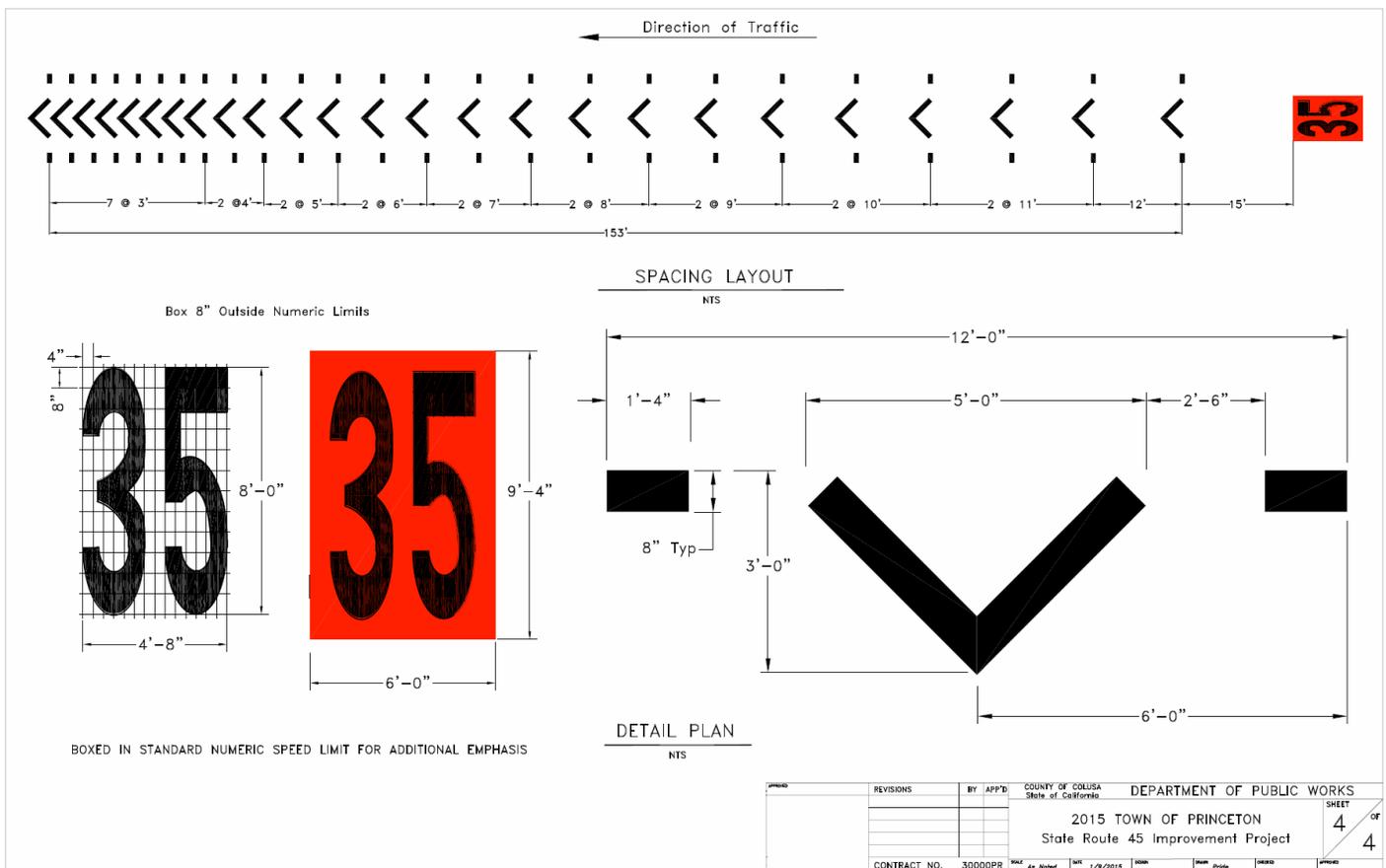


Figure 2 Layout and Dimensions of Proposal (note striping will be white thermoplastic)

**Development of the Treatment**

The treatments outlined in this study proposal were derived from various studies as outlined in the Background section of this application. In general, they were selected as having among the highest effectiveness towards reducing speed. The three primary sources of the elements chosen for this study are outlined below.



**Figure 3 FHWA Publication No.: FHWA-HRT-08-067**

Partial, transverse optical speed bars were taken from FHWA Publication No.: FHWA-HRT-08-067 as evaluated in Union, IA.



**Figure 4: FHWA Publication No.: FHWA-HRT-08-**

Optical Speed Chevrons from FHWA Publication No.: FHWA-HRT-08-067 and evaluated in Roland, IA. It is expected that the combination of the two striping patterns proposed will yield a higher reduction in speed than their individual effects, by combining the effects of two concepts into one. Also, the pattern was designed such that the striping is outside of most vehicle wheel tracks.



Figure 5: FHWA Publication No.: FHWA-HRT-08-

Red background paint below speed limit designations was studied in Dexter, IA. The inclusion of the red background speed limit designations is intended to provide additional visual effect to drivers approaching the reduced speed limit zone in town.

#### **Design and Placement**

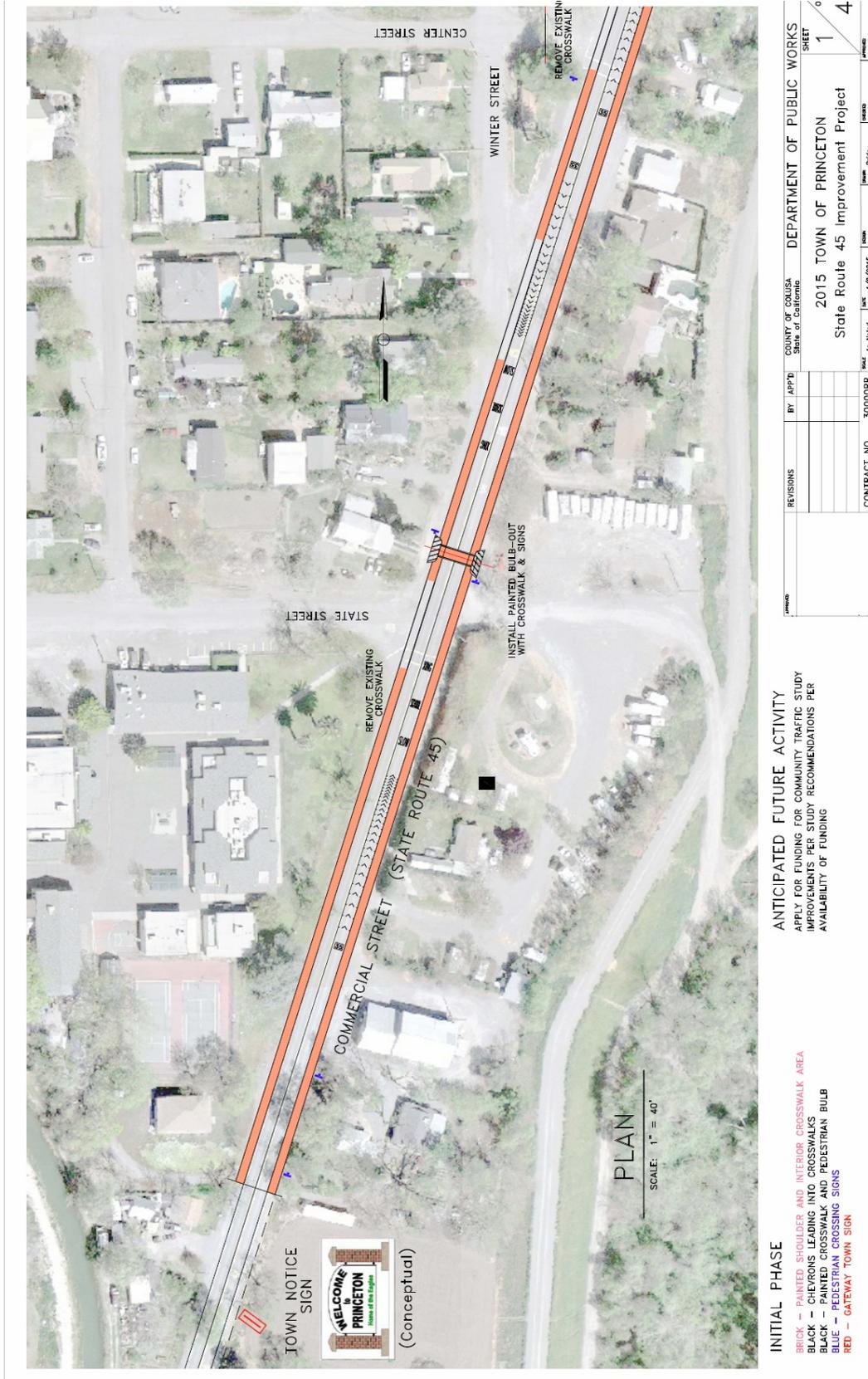
The treatment design is shown in Figure 3, and the placement is shown graphically in the next section with three plan sheets that layout the proposed treatments to a rough scale. The design is intended to communicate to the driver the following visual cues:

- 1) The driving environment is changing from a rural two lane roadway to a populated two-lane “main street”.
- 2) The sensation that the vehicle is speeding up, as the converging chevrons get closer together.
- 3) Lane width appears to be slightly reduced, providing a virtual “choke” effect.

#### **Illustration of the Traffic Control Device (Step 3)**

The following three pages layout the location and placement of the proposed speed reduction treatments. In addition, Figure 3 shows the dimensional layout of the proposed treatment.

As shown in the design sheets, there are three sets of chevrons and speed limit designations proposed. Each set leads up to a high-visibility crosswalk with appropriate high-visibility signing. In addition, painted shoulders (to simulate stamped concrete) and gateway signs are also proposed to further provide visual cues of a changed driving environment to drivers approaching and driving through town.



**INITIAL PHASE**

- BRICK - PAINTED SHOULDER AND INTERIOR CROSSWALK AREA
- BLACK - CHEVRONS LEADING INTO CROSSWALKS
- BLUE - PAINTED CROSSWALK AND PEDESTRIAN BULB
- RED - PEDESTRIAN CROSSING SIGNS
- RED - GATEWAY TOWN SIGN

**ANTICIPATED FUTURE ACTIVITY**

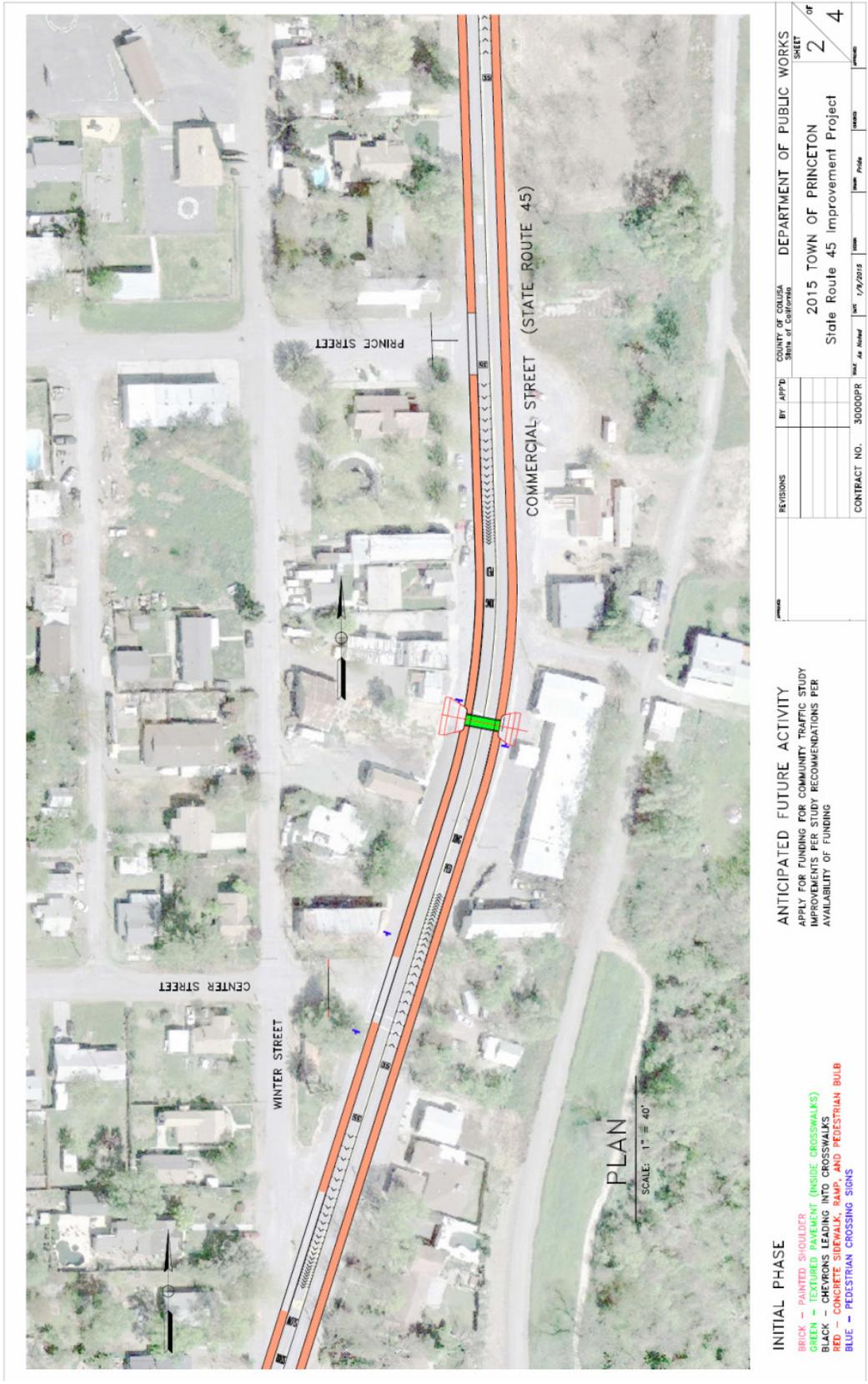
APPLY FOR FUNDING FOR COMMUNITY TRAFFIC STUDY IMPROVEMENTS PER STUDY RECOMMENDATIONS PER AVAILABILITY OF FUNDING

REVISIONS	BY	DATE	DESCRIPTION

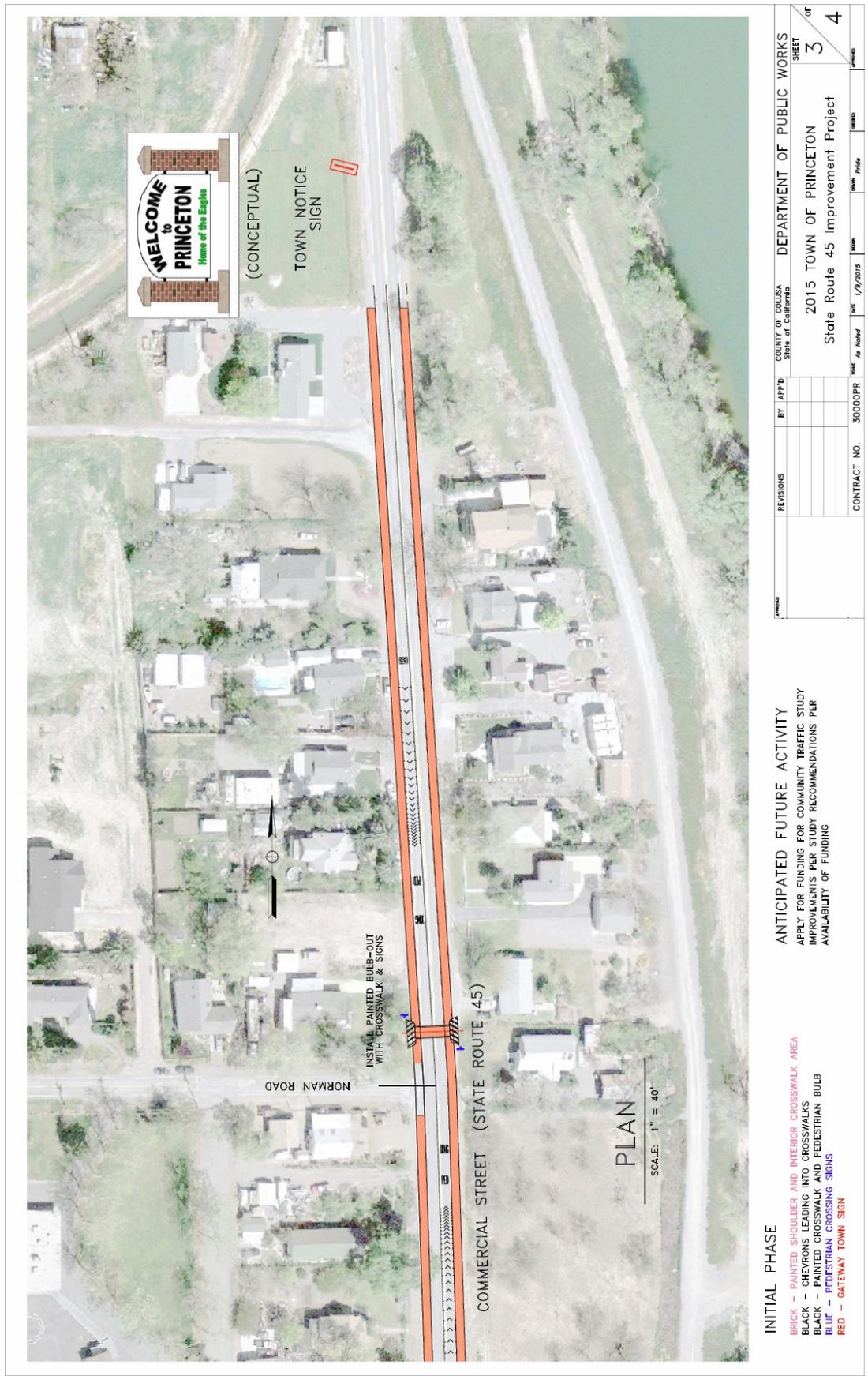
CONTRACT NO.	30000PR	DATE	1/9/2015
BY	APP'D	COUNTY OF COLUSA	STATE OF CALIFORNIA

DEPARTMENT OF PUBLIC WORKS	
2015 TOWN OF PRINCETON	
State Route 45 Improvement Project	
SHEET	1 of 4

Item 15-12 Evaluation of Traffic Calming Treatments in Princeton, CA



Item 15-12 Evaluation of Traffic Calming Treatments in Princeton, CA



ANTICIPATED FUTURE ACTIVITY  
 APPLY FOR FUNDING FOR COMMUNITY TRAFFIC STUDY  
 IMPROVEMENTS PER STUDY RECOMMENDATIONS PER  
 AVAILABILITY OF FUNDING

REVISIONS	BY / APP'D	COUNTY OF COLUSA State of California	DEPARTMENT OF PUBLIC WORKS
		2015 TOWN OF PRINCETON	SHEET 3 OF 4
		State Route 45 Improvement Project	
CONTRACT NO. 30000PP	DATE 1/9/2015	ISSUE	DATE

Item 15-12 Evaluation of Traffic Calming Treatments in Princeton, CA

**Effectiveness (Step 4)**

The following is from prior studies in Iowa. Speed reduction markings were used at the entrance to Union, Iowa along State Highway 215 and D-65. The treatment resulted in a reduction in mean speeds up to 1.9 mph and reductions in 85th percentile speeds up to 2 mph. The percentage of vehicles traveling 5 or more mph over the posted speed limit was reduced by up to 5% and the percentage of vehicles traveling 10 or more mph over the posted speed limit was reduced by up to 8.5 % (Hallmark et al, 2007).

**Copyright (Step 5)**

The elements of the proposed treatments were developed by others. However, Colusa County Public Works developed the assembly of the individual components to form the “combined” chevrons/speed bars. As all of the previous studies did not reference any copyright, it is assumed there are no copyrights. The assembly of the chevrons with the partial transverse bars in a converging pattern did not yield any results in an internet-wide search.

**Proposed Time and Location of Experiment (Step 6)**

The treatments will be installed by the fall of 2015. Previous data has been collected to use as a baseline. Additional data will be collected shortly after installation, as well as several months after installation. A full report with data from both baseline, and post-installation conditions will be prepared and submitted.

**Evaluation Plan (Step 7)**

We plan to install the treatments in the fall 2015. A full scale speed study has already been performed and will be used as a “baseline” condition without any treatments. Data will be collected within one month after the devices are installed and at one year. “After” data will be compared with “before” data and across time to determine effectiveness over a given amount of time. Data will be collected for at least 12-hours, over three consecutive days, using inconspicuous radar speed guns.

We will use tests similar to the t-test, F-test, or tests of proportionality to compare speed data. A 95% level of confidence will be used for statistical tests. If data are not normally distributed, the appropriate non-parametric test, such as the Wilcoxon signed rank test will be used.

We anticipate comparing the following data in order to determine whether the treatments were effective:

- Average speed
- 85th percentile speed
- % vehicles 5, 10, 15, and 20 mph over speed limit
- Volume

The after period will only be one year. This is not sufficient time to conduct a crash analysis so study results will be based on the assumption that reducing speeds will have a safety impact in the community.

**Removal of Treatment (Step 8)**

Without refreshing the pavement markings during the study, we expect California’s hot summers and rainy winters to fade the striping within 24 months. If the team, Caltrans, or FHWA determines that the treatment constitutes a safety hazard, the treatment will be removed before the end of the study.

**Agreement to Provide Semiannual Progress Reports (Step 9)**

A final project report and tech brief will be provided to the Office of Transportation Operations at the conclusion of the project.

**References**

Hallmark, Shauna L., Eric Peterson, Eric Fitzsimmons, Neal Hawkins, Jon Resler, and Tom Welch. Evaluation of Gateway and Low-Cost Traffic-Calming Treatments for Major Routes in Small Rural Communities. Nov. 2007. <http://www.intrans.iastate.edu/research/detail.cfm?projectID=-226410767>

**Item 15-13 Use of CMS to promote voter turnout****Recommendation:**

Provide an opinion on whether or not electronic changeable message signs along highways are appropriate to promote voter registration and voting.

**Agency Making Request/Sponsor:** Secretary of State Alex Padilla/ Caltrans, Duper Tong voting member

**Background:**

Problem: California is facing a crisis in civic engagement and voter participation. In 2014, with nearly 7 million Californians eligible to vote but not registered, California ranked 38th among the 50 states in voter registration. In the 2014 elections, voter turnout nationwide was the lowest since World War II, with California ranking 43rd in voter participation. Reasons cited for not voting is lack of awareness of voter registration deadlines and election days.

Recommendation: Authorize use of California's electronic changeable message signs along highways to raise awareness of voter registration deadlines and election dates. These messages would be part of a comprehensive statewide media and education campaign to promote voter registration and voting. Voting and election-related messages would be activated only when there are no critical emergency or traffic safety messages or Amber Alerts and during limited times in connection with voter registration deadlines and election days. The wording, timing, and placement of these messages would be designed to avoid driver distraction and any negative impact on public safety.



**ALEX PADILLA** | SECRETARY OF STATE | STATE OF CALIFORNIA  
1500 11<sup>th</sup> Street | Sacramento, CA 95814 | Tel 916.653.7244 | Fax 916.653.4620 | www.sos.ca.gov

April 17, 2015

Brian Alconcel  
Acting Executive Secretary  
California Traffic Control Devices Committee  
CALTRANS  
1120 N Street  
Sacramento, CA 95814

Dear Mr. Alconcel:

Please accept this request for an agenda item for the June 4, 2015, meeting of the California Traffic Control Devices Committee. As discussed with staff, I am submitting the agenda item described below as a placeholder for the June 4 agenda with a commitment to submit a more detailed request in the near future.

**Recommendation for Experimentation**

Problem: California is facing a crisis in civic engagement and voter participation. In 2014, with nearly 7 million Californians eligible to vote but not registered, California ranked 38th among the 50 states in voter registration. In the 2014 elections, voter turnout nationwide was the lowest since World War II, with California ranking 43rd in voter participation. Reasons cited for not voting is lack of awareness of voter registration deadlines and election days.

Recommendation: Authorize use of California's electronic changeable message signs along highways to raise awareness of voter registration deadlines and election dates. These messages would be part of a comprehensive statewide media and education campaign to promote voter registration and voting. Voting and election-related messages would be activated only when there are no critical emergency or traffic safety messages or Amber Alerts and during limited times in connection with voter registration deadlines and election days. The wording, timing, and placement of these messages would be designed to avoid driver distraction and any negative impact on public safety.

In conjunction with this request, I am seeking similar authorization from the Federal Highway Administration.

Thank you for including this item on the June 4 meeting agenda.

Sincerely,

A handwritten signature in black ink that reads "Alex Padilla".

ALEX PADILLA  
California Secretary of State

**Item 15-14 Copyright State Highway Shields****Recommendation:**

Provide an opinion on whether or not State highway shields or their images can be copyrighted.

**Agency Making Request/Sponsor:** Caltrans, Duper Tong voting member

**Background:**

Similar to how the Interstate Shields are copyright protected by FHWA, Caltrans is considering a similar proposal for State highway shields. Concerns have been raised about the images of State highway shields being misused in public and commercial situations.



The Introduction in the CA MUTCD states that,

**<sup>04</sup> Any traffic control device design or application provision contained in this Manual shall be considered to be in the public domain. Traffic control devices contained in this Manual shall not be protected by a patent, trademark, or copyright, except for the Interstate Shield and any items owned by FHWA.**