

++Request for Experimentation

Request for experimentation with modified 4-section traffic control, 3-section bicycle traffic control, and modified R10-15b Sign

Recommendation: Request CTCDC to grant approval to the request for experimentation

Agency Making Request/Sponsor: City of Imperial Beach / Doug Bilse, CTCDC Alternate member, City of Carlsbad

Project Background

The Border to Bayshore (B2B) Bikeway is an approximately 6.5 mile bikeway that will provide safe biking connections within and between Imperial Beach, the San Ysidro community of San Diego, and the world's busiest land border crossing – the San Ysidro Port of Entry. The B2B Bikeway will provide an active and healthy option for people to travel between Tijuana and San Diego. It will also make it safer and easier for people of all ages and comfort levels to bike to local shops, parks, schools, transit stations, and other community destinations within San Ysidro and Imperial Beach; including the Imperial Beach Pier and the Bayshore Bikeway. Figure 1 highlights the proposed B2B alignment along with the two proposed experimental locations.

The full alignment of the B2B Bikeway spans from the southern terminus of the Bayshore Bikeway in northeast Imperial Beach to the San Ysidro Port of Entry and functions as an extension of the Bayshore Bikeway, a regional corridor that will eventually extend 24 miles around San Diego Bay. The project will help fulfill the vision laid out in the San Diego Regional Bike Plan to make riding a bike a more convenient and safer choice for every day travel. It is a vital part of the Regional Bike Network, GO by BIKE, and a high priority project funded through the SANDAG Regional Bike Plan Early Action Program.

The B2B Bikeway project is currently in the final design phase and is expected to go to construction in Spring of 2021.



Figure 1. Proposed B2B Project Area & Proposed Experiment Locations
 (Image courtesy of Border to Bayshore Bikeway Traffic Impact Assessment)

Source: SANDAG/WSP

A. Statement indicating the nature of the problem.

Like many jurisdictions throughout the State and nation, the City of Imperial Beach is concerned with the non-compliance of motorists yielding right-of-way to pedestrians and bicyclists at signal-controlled intersections. To address this motorist non-compliance, the City of Imperial Beach is pursuing an experimental application of a 4-section traffic control signal (CIRCULAR RED, CIRCULAR YELLOW, CIRCULAR GREEN, and flashing right-turn YELLOW ARROW), a 3-section traffic control signal (BICYCLE SIGNAL RED, BICYCLE SIGNAL YELLOW, BICYCLE SIGNAL GREEN), and a modified R10-15 sign that includes both a pedestrian and bicyclist symbol. The purpose of these experimental treatments is to alert permissive right-turn motorists of bicyclists traveling on the adjacent buffered Class II bike lane and to remind them to yield right-of-way.

B. Description of the proposed change to the traffic control device or application of the traffic control device, how it was developed, the manner in which it deviates from the standard, and how it is expected to be an improvement over existing standard.

Overview

The City of Imperial Beach wishes to experiment with:

1. The modified application of a 4-section traffic control signal capable of displaying: CIRCULAR RED, CIRCULAR YELLOW, CIRCULAR GREEN, and flashing right-turn YELLOW ARROW to be used as a “shared signal”.
2. The application of a 3-section traffic control signal capable of displaying: BICYCLE SIGNAL RED, BICYCLE SIGNAL YELLOW, and BICYCLE SIGNAL GREEN.
3. A modified R10-15 sign that includes both a pedestrian and bicyclist symbol.

These new traffic control devices are proposed at the following locations within the City:

1. 13th Street and Palm Avenue
2. 13th Street and Imperial Beach Boulevard

4-Section Traffic Control Signal (R,Y,G,YA)

Per Section 4D.22, Paragraph 1, Section C of the 2014 Revision 4 CA MUTCD, “a permissive only **shared signal face**... shall always simultaneously display the same color of circular indication that the adjacent through signal face or faces display.”

For through-right lanes with permissive only right-turn movements, the shared signal face capable of displaying CIRCULAR RED, CIRCULAR YELLOW, and CIRCULAR GREEN will be modified to also include a flashing right-turn YELLOW ARROW. This additional flashing right-turn YELLOW ARROW will be simultaneously active when the CIRCULAR GREEN of the adjacent/shared through signal faces are activated.

This modification seeks to mimic the flashing right-turn YELLOW ARROW provided for right-turn only lanes with permissive only right-turns using **separate signal faces** as shown in Figure 4D-14 of the 2014 Revision 3 CA MUTCD.

The addition of a flashing right-turn YELLOW ARROW on a **shared signal face** reinforces that right-turn movements are **permissive**, and that motorists must be aware of, and yield to, pedestrian and bicycles movements, despite the CIRCULAR GREEN given to the adjacent shared through lane.

3-Section Traffic Control Signal (B-R, B-Y, B-G)

Per Section 4D.104, Paragraph 3 of the 2014 Revision 4 CA MUTCD, “If used, bicycle signal faces shall only be

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used at signalized locations. Signal phasing shall be such that while bicycles are moving on a green or yellow bicycle indication, they are not in conflict with any simultaneous motor vehicle movements at the signalized location, including right (or left) turns on red.” The use of the bicycle signal head infers to the user that there are no conflicting movements. However, this experimental approval request intends to run both the 3-Section Bicycle Signal Head concurrently with the 4 Section Traffic Control Signal with Flashing Yellow Arrow (FYA) operation above. **This standard conflict represents the basis for the experimentation request.** Discussion of the process that led to this experimental request is elaborated on in section D.

The signal face will direct through movements for bicyclists along the class II buffered bicycle lanes and be capable of displaying BICYCLE SIGNAL RED, BICYCLE SIGNAL YELLOW, and BICYCLE SIGNAL GREEN. Use of the 3-Section Bicycle Traffic Control Signal (B-R, B-Y, B-G) concurrently with the 4 Section Traffic Control Signal with FA operation would necessitate changing language in the existing Section 4D.104, Paragraph 3 of the 2014 Revision 4 CA MUTCD, “If used, bicycle signal faces shall only be used at signalized locations. Signal phasing shall be such that while bicycles are moving on a green or yellow bicycle indication, they have the right-of-way over any simultaneous conflicting motor vehicle movements at the signalized location, including right (or left) turns on red.”

Modified R10-15 Sign

Per the 2014 Revision 4 CA MUTCD Sign Charts, an R10-15 sign shows “Turning Vehicles Yield to Pedestrians.” The proposed experimental modification will revise the R10-15 sign to show “Turning Vehicles Yield to Bicycles/Pedestrians.” The addition of “Bicycles” to the R10-15 sign will alert drivers that not only pedestrians, but also bicyclists, should be looked for before executing a right-turn.

C. Any illustration that would be helpful to understand the traffic control device or use of the traffic control device



Figure 2. Modified R10-15

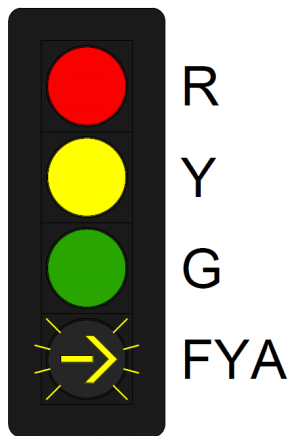


Figure 3. Shared Traffic Control Signal (R,Y,G,YA)

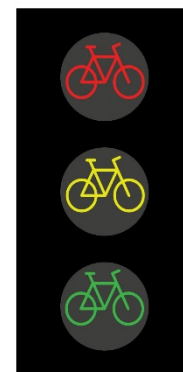


Figure 4. 3-Section Bicycle Signal
(w/ Programmed Visibility)

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<p>1.) Leading bicycle and pedestrian interval with illumination of NO TURN ON RED EMS for right turning motor vehicle.</p>	<p>2.) Permissive turns across protected bikeway with flashing yellow arrow for motor vehicles and solid green bicycle indication for bicyclists. Extinguish NO TURN ON RED EMS.</p>	<p>3.) Solid yellow change interval warning for all modes.</p>	<p>4.) All modes stopped for cross traffic.</p>

Figure 5. Proposed Signal Operations for Permissive Right-Turn Vehicle Movements Across Buffered Bike Lanes

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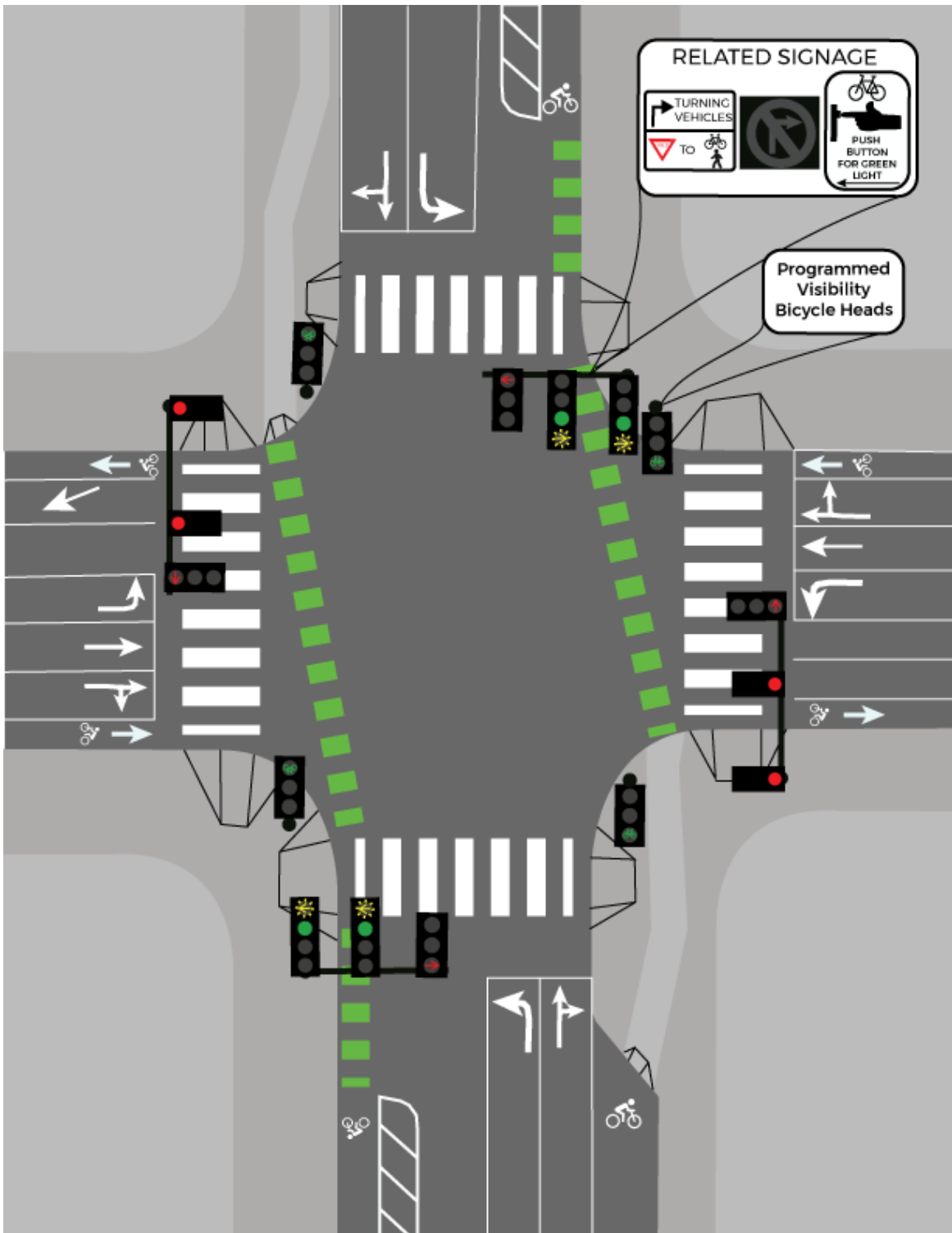


Figure 6. Proposed Layout of Experimental Traffic Control Devices

D. Any supporting data explaining how the traffic control device was developed, if it has been tried, in what ways it was found to be adequate or inadequate, and how this choice of device or application was derived.

4-Section Vehicle Signal Head (R, Y, G, YA)

The modified application of a 4-section traffic control signal (R, Y, G, YA) to be used as a shared signal concurrently with a 3-section bicycle signal head (B-R, B-Y, B-G) is consistent with a similar application with FHWA by the City of Spartanburg, South Carolina, which was approved for experimentation in December of 2016. It is also consistent with a similar application by the City of San Diego, California, which was approved for experimentation by the CTCDC in August of 2018.

3-Section Bicycle Signal Head (B-R, B-Y, B-G)

Examples of the use of bicycle signal heads can be seen in many locations throughout Europe, China, and the United States, including some of the following cities:

- Austin, TX
- Portland, OR
- New York, NY
- San Diego, CA
- San Luis Obispo, CA
- Washington, DC

It is also consistent with a similar application by the City of San Diego, California, which was approved for experimentation by the CTCDC in August of 2018.

Modified R10-15 Sign

This application of a modified R10-15 sign to include both bicycles and pedestrians is consistent with similar applications of a modified R10-15 sign, where conflicting motor vehicles movements cross separated pedestrian/bicycle facilities. Examples can be seen in many locations throughout the United States, including the following cities:

- Cambridge, MA
- Seattle, WA
- New York, NY
- Pittsburgh, PA
- Washington, DC

It is also consistent with a similar application by the City of San Diego, California, which was approved for experimentation by the CTCDC in August of 2018.

Existing MUTCD Interim Approval Guidance on Bicycle Signals

The existing MUTCD – Interim Approval for Option Use of a Bicycle Signal Face (IA-16), states that *“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)…”*.

While the flashing arrow treatment does conflict with this IA-16 guidance, there is supporting guidance and developed reasoning for how this treatment was derived.

1. This particular phasing and treatment is found in the **2013 FHWA Separated Bike Lane Planning and Design Guide**. The specific signal phasing example is “Signal Phase Example 4” found on page 121 of the document, and is reproduced as Figure 7 below.
2. The use of the flashing arrow follows the intent and purpose of the flashing left turn arrow, in that the turning movement is permissive and must yield to another conflicting movement. The right turn yield to bikes and peds sign makes clear which movement right turning vehicles are yielding to.
3. The flashing arrow clearly defines which mode of travel has the right of way, such that vehicles are required to yield to pedestrians and bicycles. This treatment is clearer than a standard green ball as described in the

implementation of the “Signal Phase Example 4” from the **2013 FHWA Separated Bike Lane Planning and Design Guide**.

4. The bicycle signal phase will only turn green on actuation (both passive and active). The intent for this is to bring bicyclists to a stop at these intersections before proceeding into the intersection with a leading indication for both the pedestrians and cyclists. This will enhance visibility for cyclists crossing the intersection.
5. The signal phasing concept is only applied in conjunction with the Bend-Out design feature. The Bend-Out design feature:
 - a. Increases visibility for bicycle and pedestrians
 - b. Reduces turning speed for vehicles
 - c. Provides space for vehicles to yield to crossing bicycles and pedestrians without blocking through traffic on the main street.
 - d. Provides optimal queueing area for bicycles due to high vehicular volumes along the cross streets

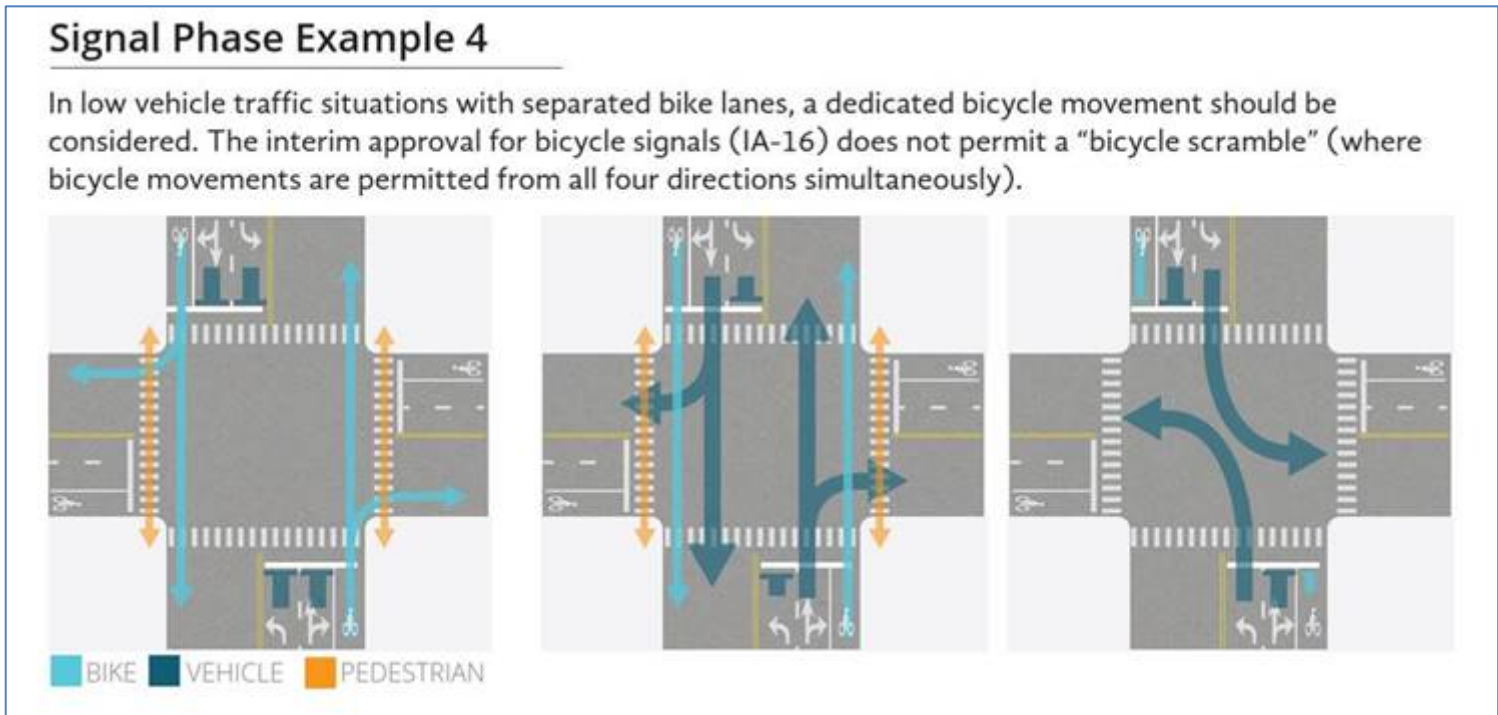


Figure 7. Signal Phase Example 4 from the 2013 FHWA Separated Bike Lane Design and Planning Guide

E. A legally binding statement certifying that the concept of the traffic control device is not protected by a patent or copyright.

To the best of the City of Imperial Beach’s knowledge, the modified application of a 4-section traffic control signal (R, Y, G, YA) to be used as shared signal, the application of a 3-section traffic control signal (B-R, B-Y, B-G), and a modified R10-15 sign that includes both a pedestrian and bicycle symbol are not protected by patents or copyrights.

F. The time period of the experiment.

Installation of Equipment	Oct 2022
Experimentation Period.....	Nov 2022 to Nov 2023
Evaluation of Results.....	Jan 2024
Draft of Final Report.....	March 2024
Final Report.....	May 2024

G. A detailed research or evaluation plan that must provide for close monitoring of the experimentation, especially in the early stages of its field implementation. The evaluation plan should include before and after studies as well as quantitative data describing the performance of the experimental device.

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Overview

The proposed experimental devices and applications will be installed and implemented during the construction of B2B Bikeway.

Prior to this construction, the City of Imperial Beach staff will conduct video observations at similar intersections that feature Class II bike lanes and conflicting right-turn movements along the already constructed segments of the 13th Street Bikeway in the City of Imperial Beach. These observations will be used to determine baseline trends for comparison to the intersections where experimentation will be conducted. The City will also review crash histories and historic traffic counts.

Evaluation metrics are anticipated to include:

- Changes in Bicycle Volume from the City Average and the calculated baseline
- Crash data at the experiment locations
- Motorist and bicyclist behavior and compliance with the devices
 - o Yielding behavior
- Motorist and bicyclist interactions
 - o Crashes
 - o Near misses

As these metrics are evaluated, the City of Imperial Beach will closely monitor conflicts between motorists and bicyclists, with extra emphasis placed in the first month of operation. If a substantial number of conflicts are observed at any time during the experimentation, the City will take appropriate steps to remedy the safety issues.

H. An agreement to restore the site of the experiment to a condition that complies with the provisions of the CA MUTCD within 3 months following the end of the time period of the experiment, provided there are significant safety concerns directly or indirectly attributable to the experimentation. This agreement must also provide that the agency sponsoring the experimentation will terminate the experimentation at any time that it determines significant safety concerns are directly or indirectly attributable to the experimentation. The FHWA's Office of Transportation Operations has the right to terminate approval of the experimentation at any time if there is an indication of safety concerns. If, as a result of the experimentation, a request is made that the CA MUTCD be changed to include the device or application being experimented with, the device or application will be permitted to remain in place until an official rulemaking action has occurred.

The City of Imperial Beach agrees to the above conditions.

I. An agreement to provide semi-annual progress reports for the duration of the experimentation, and an agreement to provide a copy of the final results of the experimentation to the FHWA's Office of Transportation Operations within 3 months following completion of the experimentation. The FHWA's Office of Transportation Operations has the right to terminate approval of the experimentation if reports are not provided in accordance with this schedule.

The City of Imperial Beach agrees to the above conditions.