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Effect of Green Bike Lane Markings on Fell Street near Arco Gas Station and Divisadero Street

SUMMARY

In order to reduce conflicts between cyclists and motorists entering the Arco gas station on Fell Street between Scott and Divisadero Street, the SFMTA painted the bike lane green. Observations taken after the addition of color showed that cars queuing to enter the gas stations were approximately 40% less likely to block the bike lane.

BACKGROUND

Fell Street is a high-volume, three-lane, one-way arterial heading west. A Class 2 bike facility (bike lane) exists to the left of the left-most through vehicle lane on Fell Street. An Arco gas station popular for its low prices is located at the southeast intersection of Fell and Divisadero Streets and has two driveways on Fell Street. In order to enter the driveways, vehicles must pass through the bike lane. Queuing cars sometimes block the bike lane as they wait to enter the gas station. When cars queue in the cycle lane, cyclists are often forced into the busy through lanes to the right of the bike lane. In addition to queues entering Arco, vehicles also cross the bike lane when turning onto Divisadero Street.

The San Francisco Municipal Transportation Agency (SFMTA) has made multiple attempts to discourage motorists from blocking the bike lane and reduce the conflicts at this location. The gas station owner has been unresponsive to repeated requests from SFMTA staff to cooperate in the effort to help customers reach his business in a manner safe for everyone. In late June 2010, the SFMTA removed parking to create a queuing lane for the gas station on the left of the bike lane. Additional outreach was done to motorists on site throughout July 2010. Finally, on August 3, 2010 the SFMTA painted the bike lane green (dashed where the solid white lines are dashed), in order to improve motorist awareness of the bicycle facility. Observations of motorist behavior were recorded during the evening peak period, before and after the application of the green paint.

DATA COLLECTION

SFMTA staff observed motorist and bicycle behavior from 5-6pm on each of three days (Tuesday, Wednesday, and Thursday) during two different weeks. Observations were conducted the week of July 25, 2010, four weeks after the parking restriction and evening queuing lane were first installed and one week after its borders were changed from solid to dashed white lanes, but before the green paint was applied. Follow-up observations were conducted the week of August 22, three weeks after the green paint was applied.

Observers stood midblock on the south side of Fell Street and counted occurrences of the following:

- (1) Vehicles turning in the Arco station using either of the driveways on Fell Street
- (2) Vehicles stopped blocking the dashed portion of the bike lane¹
- (3) Vehicles positioned fully in the queuing lane (moving or stopped)²
- (4) Vehicles stopped or moving through the solid portion of the bike lane³

Staff also tried to note the overall number of times a queue formed, as well as any other notable vehicle or bicyclist behavior.

RESULTS

In general, queues of (2 or more) vehicles waiting to enter Arco formed from three to five times per hour. When queues formed, the actions of the first car in the queue affected the following cars entering the queue. That is, if the first queuing car stopped while partially blocking the bike lane, then subsequent queuing cars would stop while partially blocking the lane.

The number of vehicles entering the Arco driveways ranged between 41 and 72 per hour (5-6pm). (See Table 1.) As a percentage of the vehicles turning into Arco, the number stopped while blocking the bike lane decreased from 25 percent during the first week (39 blocking of 154 vehicles entering) to 15 percent in the second week (25 blocking of 166 total vehicles entering).⁴ This is a 41-percent reduction in vehicles blocking the bike lane. Put another way, the number of vehicles blocking the bike lane decreased from 1 for every 3.9 entering Arco to 1 for every 6.6 vehicles entering Arco.

The number of vehicles utilizing the new queuing lane, either to enter Arco or to turn left onto Divisadero, ranged between 18 and 25 per hour. Relative to the number of vehicles entering Arco, this figure was unchanged across the two sets of observations.

Vehicles entered the solid portion of the bike lane infrequently, just 1 to 4 times per hour, mostly to enter or exit residential driveways.

¹ The portion from the parking restriction west to the first Arco driveway; moving vehicles not counted.

² From the the parking restriction west to the first Arco driveway. Vehicles were counted as positioned in the queuing lane if their front and rear right-side wheels were fully to the left of the bike lane, that is, on or outside of the white line bordering the bike lane. (This count includes any vehicles that traveled through the queuing lane in this way, whether their final destination was a left into Arco or onto Divisadero.)

³ The portion from Scott Street west to the start of the parking restriction. This includes vehicles crossing the bike lane to enter or exit driveways, double-parked delivery vehicles, vehicles drifting into the bike lane as they travel westbound, or any other encroachment. Vehicles were counted as encroaching if any wheels crossed into the inside of the white line bordering the bike lane (that is, in the would-be green-painted area).

⁴ Based on a chi-squared test for independence, this is statistically significant change ($p=0.021$).

Table 1. Fell Street bike lane vehicle encroachment counts, July-August 2010

Day	(1)	(2)		(3)			(4)
	Total turning into Arco	Total	Ratio to (1)	Total	Ratio to (1)	Ratio to (2)	Total
1 st week total	154	39	0.253	62	0.403	1.590	6
Tues, July 27	55	7	0.127	22	0.400	3.143	4
Wed, July 28	46	13	0.283	22	0.478	1.692	1
Thu, July 29	53	19	0.358	18	0.340	0.947	1
2 nd week total	166	25	0.151	67	0.404	2.680	8
Tues, Aug 24	72	10	0.139	20	0.278	2.000	4
Wed, Aug 25	53	7	0.132	22	0.415	3.143	3
Thu, Aug 26	41	8	0.195	25	0.610	3.125	1

All counts conducted for one hour from 5-6pm each day. Motorcycles were counted as vehicles.

Other occurrences noted during the study included the following:

- Some vehicles jumped the queue from the travel lane, seeming not to realize that the cars in the queuing lane were waiting to enter Arco. On at least one occasion, this resulted in a double-width queue (in the queuing lane and in the sidewalk and bike lane).
- Some vehicles queued blocking the sidewalk, despite the signs discouraging it.
- In spite of signs prohibiting it, some vehicles exit the gas station from the upstream driveway (farther from Divisadero Street), which increased the probability and/or length of queuing.
- Bicyclists would sometimes occupy the queuing lane, meaning that both the queuing lane and the bike lane might be occupied by cyclists. This caused vehicles to either creep behind the cyclists or to pass the cyclists using either the bike lane or the first travel lane.

Conclusions

Observations from before and after the addition of the colored treatment show that the number of vehicles stopped while blocking the bike lane to enter Arco decreased from 25 percent of vehicles entering Arco to 15 percent, a 41-percent reduction. While the most notable change between the two sets of observations was the application of green paint, other factors may have contributed to the decrease. Since the queuing lanes was relatively new before the first set of observations, drivers may have subsequently become accustomed to the lane arrangement. Also, the synthesis of the different treatments (queuing lane, outreach and green paint) may have contributed to the reduced encroachment more than any individual factor.

While the treatment seemed to reduce the frequency that vehicles blocked the bike lane, a notable share of vehicles turning into Arco still blocked the bike lane after addition of the colored treatment. In addition, the duration of time that queues lasted was not recorded. The duration of queues could be as relevant to cyclists as the number of cars that block the bike lane. Also, there may be times when the volume of customers waiting to enter Arco is higher than those observed.

Finally, this analysis was limited to considering vehicles stopped blocking the bike lane in queues for Arco. This study did not measure the overall volumes of bicyclists and vehicles crossing paths over the course of this block nor the percentage of cars entering the gas station that was forced to queue on the street.