

**CITY OF BOULDER  
TRANSPORTATION ADVISORY BOARD  
AGENDA ITEM**

**MEETING DATE:** October 12, 2015

**AGENDA TITLE:** Staff briefing and TAB input regarding Phase II Living Laboratory evaluation update, corridor refinements, and upcoming community engagement events.

**PRESENTERS:** Michael Gardner-Sweeney, Interim Director of Public Works for Transportation  
Bill Cowern, Transportation Operations Engineer  
Kathleen Bracke, GO Boulder Manager  
Marni Ratzel, Senior Transportation Planner  
Dave “DK” Kemp, Senior Transportation Planner

**EXECUTIVE SUMMARY**

This memo provides an update on the Living Lab Phase II evaluation, corridor refinements, and upcoming community engagement events for the Folsom Street corridor project.

Following the Sept. 14 TAB meeting, staff developed a recommendation for City Council consideration at the Sept 29<sup>th</sup> City Council special meeting. The staff recommendation is more in alignment with Option 3 presented at the Aug. 10 TAB meeting and Aug. 25 Council study session. At the Sept 29 meeting, Council supported the staff recommendation. In response, staff has scheduled work to restore Folsom Street to its pre-Living Lab lane configuration from Canyon Boulevard to Spruce Street, returning it to a four-lane street with standard bike lanes.

Staff continues to monitor and evaluate the Folsom Street project on a daily and weekly basis. Additionally, staff has scheduled several community outreach and listening events in the coming weeks to continue gathering public feedback regarding how the corridor is functioning from a multimodal user perspective.

**TAB ACTION REQUESTED**

Please review and provide feedback regarding the Living Lab Phase II Folsom corridor evaluation results from weeks 1-9 and planned community outreach activities. Staff also would like input from TAB on their interest in participating in an opportunity to debrief the Living Lab phase II program to-date with staff.

## **BACKGROUND**

The Folsom Street pilot project was installed in July 2015. Based upon the early data and community comments received on the Folsom Street pilot project, staff developed options for how to proceed with the Folsom Street pilot project, including staying the course, making different levels of corridor refinement/modifications, and removing the project. These are detailed below and were presented for council feedback at the Aug. 25 study session.

1. Continue the Living Lab Phase II project as planned with monthly check-ins with TAB and council with in-depth evaluation at one-, three-, six-, and 12-month milestones.
2. Based on initial feedback and evaluation, refine/modify the Folsom corridor and/or intersections, particularly in the segment between Pearl Street and Canyon Boulevard. Continue evaluation weekly, with more frequent updates to TAB and council. Revisit Folsom in fall 2015.
3. Make more substantial modifications to corridor/intersections, including the potential removal of individual segments.
4. Remove the Folsom corridor Living Lab project.

Council on Aug. 25 supported “Option 2,” which included refinements to the corridor and/or intersections, particularly in the segment between Pearl Street and Canyon Boulevard, and continuing with weekly evaluations and updates to TAB and City Council. Additionally, council received a staff briefing at the Sept. 8 meeting.

Since the Aug. 25 study session, the Transportation Division has continued to evaluate the corridor and provide weekly updates to City Council. Several [refinements along the Folsom Street corridor](#) were completed the week of Sept. 8 to improve the operation of the Folsom Street pilot project in response to community concerns.

### Council Feedback from September 29 Council Meeting

In response to continuing community sentiment and emerging information regarding upcoming, interrelated conditions, staff developed a recommendation to make more substantial modifications to the corridor. These modifications include restoring the section of the Folsom Street corridor back to the four lane configuration with standard bike lanes from Spruce to Canyon. This approach is more in alignment with Option 3 presented at the Aug. 25 study session. City council supported this staff recommendation at the special council meeting on Sept. 29.

Input from the Transportation Advisory Board Sept. 14 meeting was shared with council. Staff also shared that the staff recommendation on additional suggested refinements presented to council for consideration was not presented to the board.

In supporting the corridor modifications between Spruce and Canyon, several council members expressed their continued commitment to the Transportation Master Plan mobility, mode share

and safety goals as well as the spirit of innovation. Additionally, council members directed staff to apply lessons learned through the ongoing Folsom Street pilot project and use this experience to inform planned project such as the East Arapahoe, 30<sup>th</sup> Street, Colorado, and Canyon corridor studies, and to continue efforts to identify system-wide gaps and enhancements based on new ideas that come forward in the community. Additionally, council requested more information on peer communities who have completed street repurposing projects and whether they have experienced similar results and community feedback as Boulder. Council emphasized their continued interest in robust data collection and analysis, particularly with respect to potential traffic diversion impacts of the Folsom corridor pilot and a summary of traffic collisions over time showing crash type and location, relative to the before condition as well as the new treatments along Folsom.

Since the installation of the Folsom Street project, staff has been collecting and reporting data on a weekly basis. The data consists of the following primary evaluation criteria:

- Vehicle weekday volume
- Vehicle speed
- Vehicle travel time (north and southbound evening/PM peak)
- Bicycle weekday volume
- Collisions

Additional data is being collected for secondary evaluation criteria, such as, bicycle demographics, transit ridership, pedestrian crossings, and diverted traffic. This information will be reported when sufficient data has been collected and synthesized as part of the three month evaluation of the Living Lab Phase II project.

## **STAFF ANALYSIS**

Staff has developed an infographic in order to provide an ‘at-a-glance’ perspective of the data collected since the installation of the project. Data from weeks 1-9 is detailed in the latest infographic in **Attachment A**, and in the full after data summary in **Attachment B**. This information is also available on the project website: [www.boulderlivinglab.net](http://www.boulderlivinglab.net). Vehicle volume, speed, and travel time were not collected during week 4 due to that being the CU “Move-In” week and data collected would not be representative of typical travel patterns.

Below is brief summation of the week 1-9 data:

#### Vehicle Volume (measured north of Canyon Boulevard)

Since installation, vehicle volume has fluctuated +/- 500 vehicles per day each week, from a high of 16,590 to a low of 15,750. In comparison, there were approximately 18,970 vehicles per day recorded along the corridor before the pilot project was installed. This before data was collected the week of June 30, 2015 along Folsom Street, north of Canyon Boulevard. Weekday vehicle volume decreased from approximately 16,200 vehicles per day during Week 8 to 15,750 vehicles per day during Week 9.

#### Vehicle Speed (measured at Bluff Street)

The 85th percentile speed in the section of Folsom north of Pine remained constant at 36 mph from Weeks 5 to 9. Since installation, the 85th percentile weekday speed in this section has been reduced by 3 mph compared to the before data. The posted speed is 30 mph.

#### Bicycle Volume

Bicycle volume north of Pine Street slightly decreased compared to Week 8 data. Week 9 data represents a 58 percent increase from the before data. This increase is consistent with the increase that the city typically experiences when school is back in session. The before bike volumes were collected at Pine and South streets from 6 a.m. – to 9 p.m. on June 30, 2015, and converted to daily volumes using the average hourly distribution from the permanent counter data.

#### Vehicle Travel Times

During Week 9, the average travel time for northbound vehicles during the evening peak hour was 4 minutes. This is 47 seconds faster than the modeled average travel time and 52 seconds faster than the before condition. The average travel time for southbound vehicles during evening peak hour was 3 minutes 55 seconds. This is 35 seconds faster than the modeled average travel time and 35 seconds slower than the before condition.

#### Collisions

During Week 9, three collisions occurred along the Folsom Street corridor between Valmont Road and Colorado Boulevard. All three involved a vehicle colliding with another vehicle. Since installation, 11 collisions have occurred: eight involving vehicles colliding with vehicles and three involving vehicles colliding with bicycles. Since the experiment began, collisions are averaging 1.2 collisions per week, compared with 1.6 per week between 2012 and 2014. Staff is working to create a map of the collisions by location and type per Council request at the Sept. 29 meeting.

#### Corridor Modifications

In response to City Council direction from the Sept. 29 meeting, staff has scheduled work to restore Folsom Street to its pre-Living Lab lane configuration from Canyon Boulevard to Spruce Street, returning it to a four-lane street. The change is intended to improve vehicular traffic

operations along this portion of the Folsom corridor, including at its intersections with Pearl Street and Canyon Boulevard.

Starting the evening of Sunday, Oct. 4, road crews began making the adjustments to the Folsom Street Living Lab. Work is expected to take two weeks as crews remove the plastic delineator bollards and pavement markings and restripe the pavement on the roadway.

The adjustments will remove the center turn lane in that segment of Folsom Street and the temporary delineators along the widened bicycle lanes. The bicycle lanes will remain in place but will be reduced to the width they were prior to the Living Lab installation in July. The city will maintain green pavement markings at the intersections and could add additional striping, if necessary, to provide adequate transitions between the sections. **Attachment C** is a map of the corridor modifications.

Some work might require temporary lane closures, and drivers may want to consider taking alternate routes until the project is complete. No daytime closures are expected.

The protected bicycle lanes installed as part of the Living Lab on Folsom Street south of Valmont Road to around Pine Street will remain in place. There will be a transition between Pine and Spruce streets to link the segments together. The buffered bike lanes south of Arapahoe Avenue to Taft Drive also will remain unchanged.

#### Upcoming community engagement activities

In response to community input received to date, the city developed a [Folsom Street User Guide](#) to raise awareness of the bicycle lane treatments being testing along Folsom. This guide demonstrates the intended operations and use by motor vehicle drivers and cyclists. A **Folsom Street User Guide video** is being produced to complement the print edition of the Folsom Street User Guide, raise awareness on the different types of design treatments being tested along the Folsom Street pilot project and demonstrate how to safely travel through intersections. It also will feature guidance on how yield to approaching emergency vehicles, safely pull out of driveways, and answer questions regarding how the city will be handling snow removal this winter. These informational materials are posted on the project web page and will be distributed at upcoming public engagement events. Several events are planned throughout October. A brief summary is provided below.

- A **Community Transportation Fair** will be hosted on Oct. 14 in partnership with McGuckin Hardware, Boulder Transportation Connections and US 36 Commuting Solutions at the Village Shopping Center. The event will take place from 3 to 6 p.m. in the parking lot area of McGuckin Hardware at the west entrance facing Folsom. It will offer employees and customers information on transportation options including the ECO pass, transit schedules and routes, bicycling routes, Boulder Walks activities and the Living Lab Folsom Street pilot project
- Additional **Folsom Street Audits** throughout October. On Oct. 2 a Bike Audit invites community members to participate in a group ride along the corridor, share their individual observations and experience with one another and provide recorded input that

is shared with the City. On Oct. 10, *A Pedestrian Experience Storytelling Walk Audit* will include a guided walk along Folsom that documents participants' experience through photos, short narratives and journey mapping. Expanded outreach to publicize the Folsom Street Audits includes posters for distribution to retail, business and multi-family residential locations along the corridor and additional cross-promotion through community partners.

- **Pop Up events** are being scheduled throughout October along the Folsom corridor to provide project information and request community input and feedback.
- Planning for **targeted meetings with specific stakeholders** also is underway. The Living Lab project team is contacting larger individual businesses as well as retail centers, the Horizon West senior living residential developments, and area schools including Naropa University, Whittier and Columbine Elementary and Centennial Middle School to schedule engagement activities and discuss the project, answer questions and receive feedback.

More detailed schedule of events, technical information, and community feedback to date is available at: [www.boulderlivinglab.net](http://www.boulderlivinglab.net)

### **Key Questions for TAB:**

- 1) Does TAB have input and/or questions regarding the results of weeks 1-9 evaluation and corridor refinements?
- 2) Does the TAB have input and/or questions upcoming community engagement events?
- 3) Is TAB interested in participating in a debrief with staff regarding the Living Lab Phase II program to-date?

### **NEXT STEPS**

The Transportation Division will continue collecting and reporting data on a weekly basis.

### **ATTACHMENTS:**

- Attachment A: Infographic (weeks 1-9)
- Attachment B: Folsom Data Summary (weeks 1-9)
- Attachment C: Folsom Street refinements map



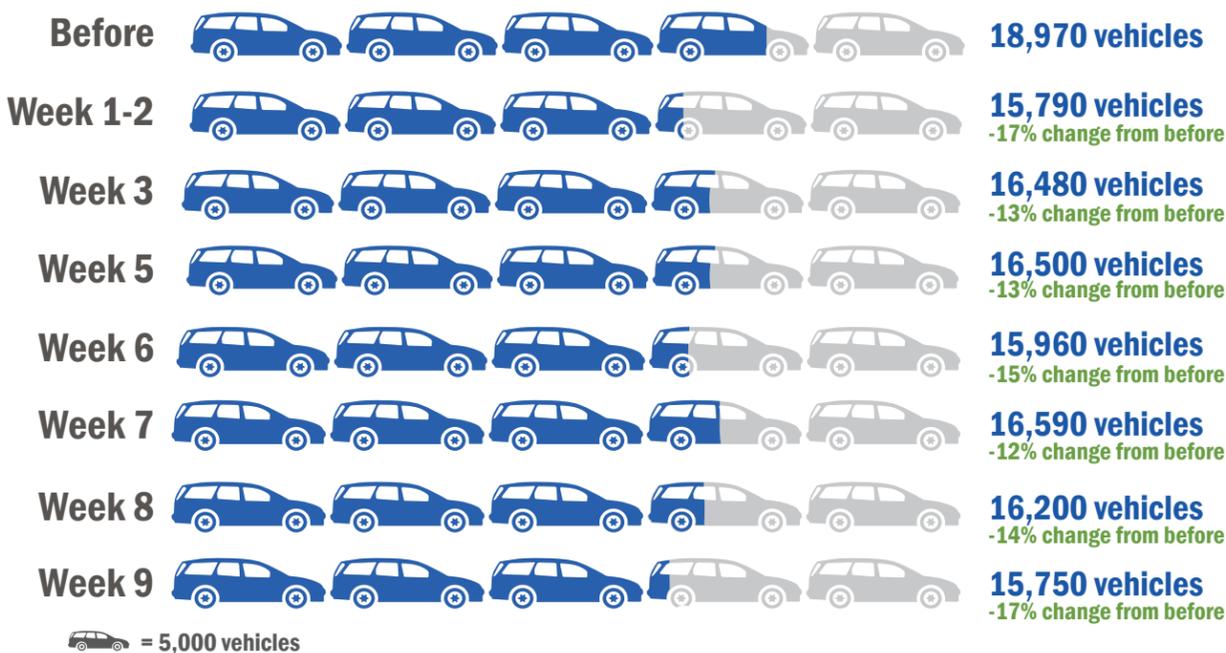
# Living Lab - Phase II Corridor Evaluation

## FOLSOM STREET



Updated: 10/1/2015

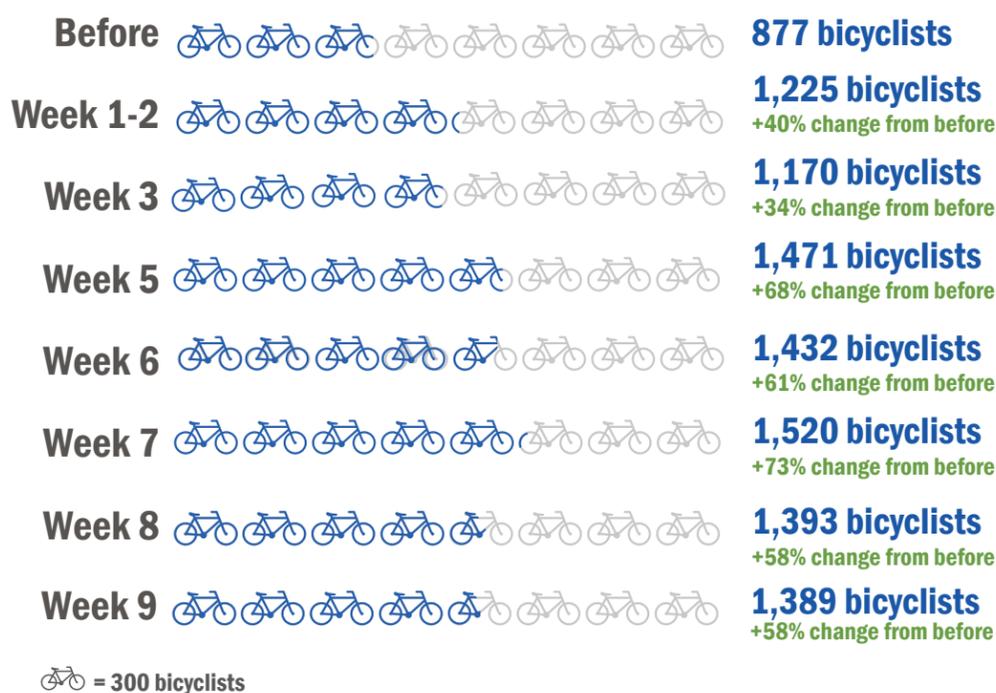
### Weekday Vehicle Volume



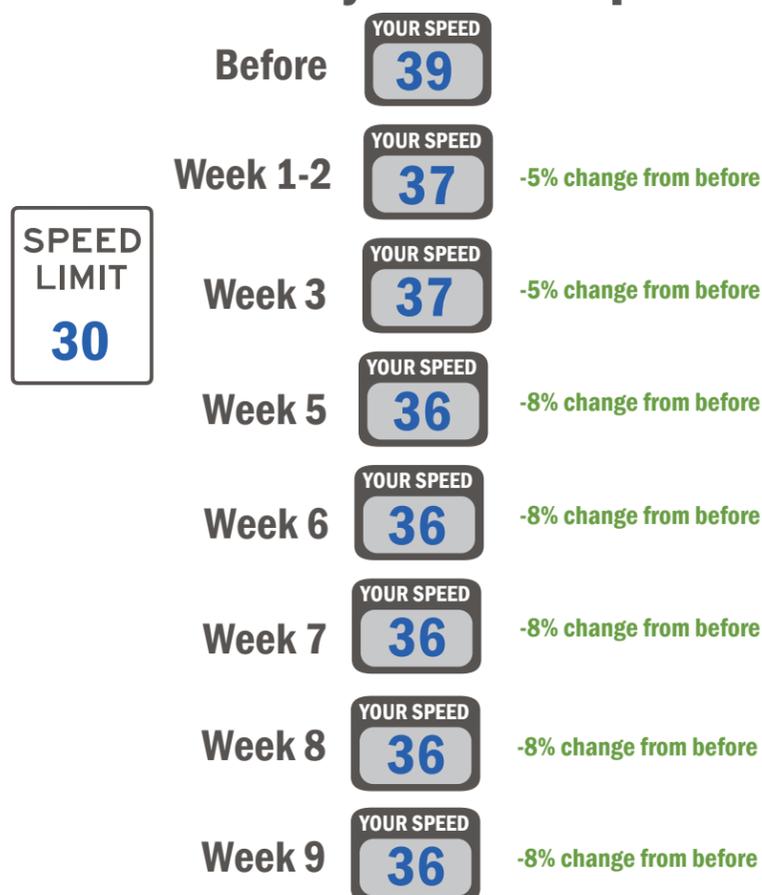
### P.M. Vehicle Travel Time



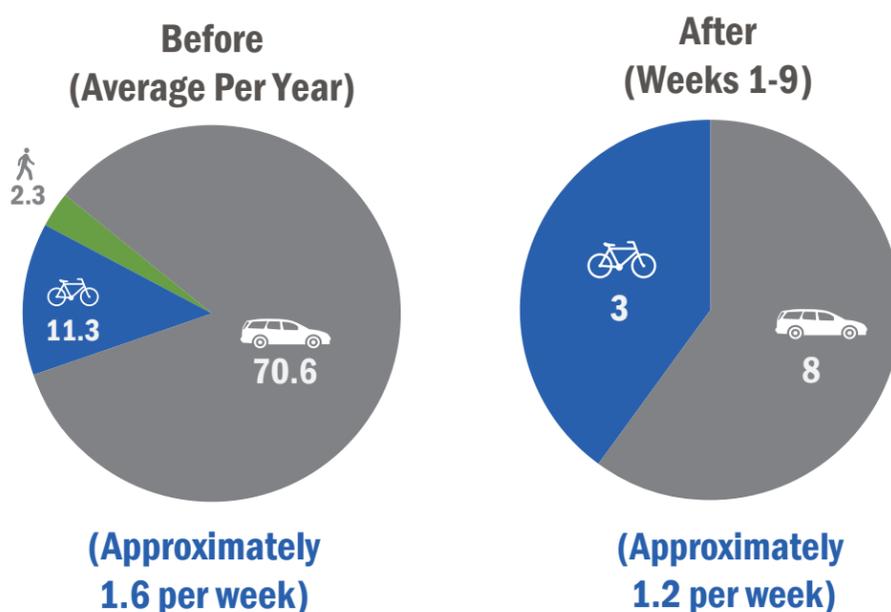
### Weekday Bicycle Volume



### Weekday Vehicle Speed



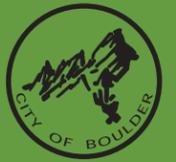
### Collisions





# Living Lab - Phase II Corridor Evaluation

# FOLSOM STREET



Updated: 10/01/2015

## NOTES

- Week four data: vehicle volume, vehicle speed, and travel time data were not collected during the University of Colorado Boulder (CU) move-in, as traffic patterns during that week do not represent normal conditions.
- “After” data collection timeframes:
  - Week 1-2 is July 27 to August 9.
  - Week 3 is August 10 to August 16.
  - Week 4 is August 17 to August 23.
  - Week 5 is August 24 to August 30.
  - Week 6 is August 31 to September 6.
  - Week 7 is September 7 to September 13.
  - Week 8 is September 14 to September 20.
  - Week 9 is September 21 to September 27.
- Weekday vehicle volume is measured at Folsom north of Canyon. Before data collected the week of June 30, 2015 along Folsom Street north of Canyon.
- Weekday bicycle volume is measured at Folsom north of Pine. The bike volumes were collected at Pine from 6 a.m. to 9 p.m. on June 30, 2015, and converted to daily volumes using the average hourly distribution from the permanent counter data.
- The bicycle volume increase along the corridor from Week 4 to Week 5 is consistent with the increase the city typically sees when school is back in session.
- Weekday vehicle speed is the 85th percentile at Bluff.
- “Before” collisions are the average frequency per year from 2012 to 2014.
- Weekday P.M. vehicle travel time is measured between Arapahoe and Valmont.
- Additional data on the secondary evaluation criteria, including demographics, pedestrians, vehicle traffic diversions and transit will be added as more data is available to report.



Date: October 2, 2015

# Folsom Street Living Lab

## Weeks 1-9 – Primary Evaluation Criteria



As part of the Living Laboratory Phase II Folsom Street project, data on vehicle and bicycle volumes, vehicle speed, vehicle travel time, collisions, and bicyclist demographics was collected before the installation of protected bicycle lanes, during weeks 1-9 after the installation, and will continue to be collected as part of the ongoing evaluation process. While the after data from these early weeks is valuable, it is important to note that it is still considered preliminary; ongoing data collection and analysis in the coming weeks will continue to inform the evaluation of the project.

Secondary evaluation data is also being collected as part of the evaluation process. This summary includes preliminary bicycle demographic data. Additional details about the secondary evaluation criteria and the collection time periods for each can be found at [www.BoulderLivingLab.net](http://www.BoulderLivingLab.net).

Before data collection time periods vary by criteria and are noted in the individual tables below. After data collection time frames are:

- **Weeks 1-2:** July 27 to August 9, 2015
- **Week 3:** August 10 to August 16, 2015
- **Week 4:** August 17 to August 23, 2015
- **Week 5:** August 24 to August 30, 2015
- **Week 6:** August 31 to September 6, 2015
- **Week 7:** September 7 to September 13, 2015
- **Week 8:** September 14 to September 20, 2015
- **Week 9:** September 21 to September 27, 2015

## Vehicle Volume and Speed

The city has been collecting average weekday traffic volume and speed at two locations along Folsom Street, north of Bluff and north of Canyon. The data is collected using Miovision technology and is recorded for a three-day period, and reported as the average of the three days, or average daily traffic (ADT). Note that Boulder Valley School District (BVSD), University of Colorado –Boulder (CU) and Naropa schools have been in session during some, but not all, of the before and after data collection periods (noted in the tables below).

### Folsom Street north of Bluff Street – Posted Speed Limit = 30 mph

Evaluation Period	Date Collected	ADT-Weekday (vpd)	Average Speed (mph)	85th Percentile Speed (mph)	School In Session
Before	4/27-5/1/15	15,780	35	39	Yes
After-Week 2	8/5-8/7/15	13,790	33	37	No
After-Week 3	8/12-8/14/15	13,930	33	37	No
After-Week 5	8/26-8/28/15	14,310	32	36	Yes
After-Week 6	9/2/15-9/4/15	14,100	32	36	Yes
After-Week 7	9/8/15-9/11/15	14,210	32	36	Yes
After-Week 8	9/15/15-9/17/15	13,570	33	36	Yes
After-Week 9	9/22/15-9/24/15	13,750	33	36	Yes

### Folsom Street north of Canyon Blvd. – Posted Speed Limit = 30 mph

Evaluation Period	Date Collected	ADT-Weekday (vpd)	Average Speed (mph)	85th Percentile Speed (mph)	School in Session
Before	6/30-7/2/15	18,970	29	34	No
After-Week 2	8/3-8/5/15	15,790	25	30	No
After-Week 3	8/10-8/12/15	16,480	24	29	No
After-Week 5	8/25-8/26/15	16,500	24	29	Yes
After-Week 6	9/2/15-9/4/15	15,960	24	29	Yes
After-Week 7	9/9/15-9/11/15	16,590	26	30	Yes
After Week 8	9/16/15-9/17/15	16,200	26	30	Yes
After Week 9	9/22/15-9/24/15	15,750	26	30	Yes

- ADT = Average Daily Traffic
- VPD = Vehicles per Day
- MPH = Miles per Hour

## Corridor Travel Time

The travel time it takes to drive the Folsom corridor end-to-end from Valmont to Arapahoe in the northbound and southbound directions was measured by driving the corridor before and after the installation of the protected bike lanes. The project team used the before travel time measurements to help calibrate the VISSIM modeling software, and then to forecast the expected travel time after the installation.

### **Average PM Peak Hour Travel Times (in minutes: seconds)**

<b>Evaluation Period</b>	<b>PM Northbound</b>	<b>PM Southbound</b>
Before (Nov. 2014)	3:32	3:20
Modeled	4:47 <sup>1</sup>	4:30
Week 1-2	4:15	5:36
Week 3	4:02	4:41
Week 5	4:37	4:52
Week 6	4:13	5:19
Week 7	4:13	4:52
Week 8	3:05	4:36
Week 9	4:00	3:55

### **Northbound PM Peak Hour Travel Time Variability (in minutes:seconds)**

<b>Evaluation Period</b>	<b>Average</b>	<b>High</b>	<b>Low</b>	<b>Variability</b>
Before	3:32	4:52	2:46	2:06
Week 1-2	4:15	6:48	2:40	4:08
Week 3	4:02	5:15	2:49	2:26
Week 5	4:37	6:33	2:57	3:36
Week 6	4:13	6:47	2:38	4:07
Week 7	4:13	5:25	3:03	2:22
Week 8	3:05	5:01	2:40	2:39
Week 9	4:00	4:57	2:39	2:36

### **Southbound PM Peak Hour Travel Time Variability (in minutes:seconds)**

<b>Evaluation Period</b>	<b>Average</b>	<b>High</b>	<b>Low</b>	<b>Variability</b>
Before	3:20	3:44	2:13	1:31
Week 1-2	5:36	8:14	3:53	4:21
Week 3	4:41	5:58	3:35	2:23
Week 5	4:52	6:15	3:53	2:22
Week 6	5:19	7:50	3:52	3:58
Week 7	4:52	7:31	3:43	4:12
Week 8	4:36	7:28	3:33	3:55
Week 9	3:55	5:29	2:08	3:21

## Collisions

Collision data for the Folsom corridor from Valmont to Colorado is being compiled from police reports. The totals include all crashes at the intersections and in segments along the corridor. The following summarizes the average collision frequency (1.6 per week) from 2012 to 2014 for vehicle-vehicle, vehicle-bicycle, and vehicle-pedestrian collisions. The collisions reported for Weeks 1-9 are also summarized below by mode.

### Summary of Before Collisions Along Folsom Street from Valmont to Colorado from 2012-2014

Before Time Period	Vehicle-Vehicle	Vehicle-Bike	Vehicle - Pedestrian	Total
2012-2014	212	34	7	253
Average per Year	70.6	11.3	2.3	84.3

### After Collisions Along Folsom Street from Valmont to Colorado

After Evaluation Period	Vehicle-Vehicle	Vehicle-Bike	Vehicle-Pedestrian	Total
Week 1-2	1	1	0	2
Week 3	1	0	0	1
Week 4	1	1	0	2
Week 5	0	0	0	0
Week 6	0	0	0	0
Week 7	1	0	0	1
Week 8	1	1	0	2
Week 9	3	0	0	3
<b>Total</b>	<b>8</b>	<b>3</b>	<b>0</b>	<b>11</b>

## **Bicycle Volume**

Daily bicycle volumes are being collected at three locations along Folsom using permanent 24-hour counters: Boulder Creek, South Street, and Pine Street. BVSD, CU and Naropa were not in session during the before data collection period. Before and after volumes at Boulder Creek were collected by a permanent 24-hour counter. The before volumes at South and Pine streets were collected from 6 a.m. to 9 p.m. on June 30, 2015, and after volumes are being collected by permanent 24-hour counters installed in late July 2015. The after data includes bicycle volumes while BVSD, CU and Naropa were both in and out of session. Note that the validation of the counters is currently in progress, and volumes may later be adjusted to account for potential variances.

Bicycle volumes at all three locations increased during Weeks 4 and 5 from before conditions and Week 3 volumes. As noted previously, BVSD classes started during Week 4 and CU and Naropa classes started during Week 5, likely influencing the bicycle volumes.

**Daily Weekday Average Bicycle Volumes Along Folsom Street at Pine Street**

<b>Evaluation Period</b>	<b>Northbound</b>	<b>Southbound</b>	<b>Total</b>	<b>School in Session</b>
Before	437	440	877	No
Week 1	620	655	1,275	No
Week 2	551	625	1,176	No
Week 3	554	616	1,170	No
Week 4	603	651	1,254	No
Week 5	705	766	1,471	Yes
Week 6	684	748	1,432	Yes
Week 7	754	766	1,520	Yes
Week 8	681	713	1,393	Yes
Week 9	676	713	1,389	Yes

**Daily Weekday Average Bicycle Volumes Along Folsom Street at South Street**

Evaluation Period	Northbound	Southbound	Total	School in Session
Before	388	389	777	No
Week 1	497	578	1,075	No
Week 2	512	556	1,068	No
Week 3	406	500	906	No
Week 4	570	600	1,169	No
Week 5	706	791	1,497	Yes
Week 6	725	799	1,524	Yes
Week 7	730	813	1,543	Yes
Week 8	692	769	1,461	Yes
Week 9	695	761	1456	Yes

**Daily Weekday Average Bicycle Volumes Along Folsom Street at Boulder Creek**

Evaluation Period	Northbound - Adjusted	Southbound - Adjusted	Total - Adjusted	School in Session
Before	592	483	1,076	No
Week 1	683	521	1,204	No
Week 2	607	497	1,104	No
Week 3	603	478	1,081	No
Week 4	782	602	1,384	No
Week 5	1,060	880	1,940	Yes
Week 6	1,226	855	2,081	Yes
Week 7	1,212	945	2,157	Yes
Week 8	1,248	926	2,174	Yes
Week 9	1,096	904	2,000	Yes

**Notes:**

- “Before” volumes at Pine and South were collected from 6 a.m. – to 9 p.m. on June 30, 2015, and converted to daily volumes using the average hourly distribution from the permanent counter data.
- “Before” volumes at Boulder Creek are an average of weekday volumes from the last week of July and first two weeks of August from 2012 to 2014.
- “After” volumes are an average of daily volumes on Tuesday, Wednesday, and Thursday during the corresponding week.
- Volumes from Folsom at Boulder Creek have been adjusted using previously determined adjustment factors. Volumes from Pine and South have not yet been adjusted.
- The increase in bike volume from Week 4 to Week 5 is attributed to school in session. The increases in this volume along this corridor so far are consistent with the increases the city typically sees when school is back in session.

## **Bicycle Demographics**

Bicycle demographic data has been observed and recorded along the Folsom corridor before and after the installation of pilot project. The before data was collected on April 28, 2015, for two hours. After data was collected on July 29, August 3, August 12-13, August 25-27, Sept. 1-3, Sept. 8-10, Sept. 15-17, and Sept. 23-25 for a total of 20 hours. Observations have been taken during weekday AM, noon, and PM rush hours. Observers record the total number of male and female bicycle riders on the roadways. In addition, the number of children and adults riding with children is recorded and comprises the “family” category (see table below).

**Bicycle Weekday Demographic Along Folsom Street**

<b>Evaluation Period</b>	<b>Male</b>	<b>Female</b>	<b>Family</b>
Before	72%	28%	4%
Week 1-2	78%	22%	6%
Week 3	67%	33%	5%
Week 5	66%	34%	4%
Week 6	66%	34%	4%
Week 7	67%	33%	2%
Week 8	70%	30%	1%
Week 9	69%	31%	2%

# Folsom Street Bike Lane Modifications

