

MEMORANDUM

To: David Kemp

From: Bill Fox
Jessica Hernandez

Date: September 2, 2015

Project: Folsom Street Living Laboratory

Subject: Week 4-5 After Data Early Observations

As part of the Folsom Street Living Laboratory, 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 1-5 after the installation, and will continue to be collected as part of the ongoing evaluation process. Fox Tuttle Hernandez was asked to compile the after data available for these primary criteria and summarize early observations through Week 5 after the installation of the protected bicycle lanes on Folsom Street. While the after data from these early weeks is important, it is important to note that it is still considered preliminary, and ongoing data collection and analysis in the coming weeks will continue to inform the evaluation of the project.

Secondary evaluation data is being collected as part of the evaluation process. Details about additional evaluation criteria and the collection time periods for each can be found at 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 27th to August 9, 2015
- Week 3: August 10th to August 16th, 2015
- Week 4: August 17th to August 23rd, 2015
- Week 5: August 24th to August 30th, 2015

Vehicle Volume and Speed

The City has been collecting 24-hour vehicle volume and speed using Miovision cameras 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 3-day period, and reported as the average of the three days, or average daily traffic (ADT). Note that Boulder Valley School District (BVSD) and Colorado University (CU) schools have been in session during some but not all of the before and after data collection periods (noted in the tables below). For example, before vehicle data north of Bluff was collected in late April, 2015 while both schools were in session. CU and BVSD were not in session during Weeks 1-3.

CU “Move-In” occurred during Week 4 evaluation efforts and most BVSD schools began classes during that week. City and FTH staff determined the vehicle data collection samples would not represent regular (or normal) conditions due to increased visitor traffic during Week 4 when the CU move-in process is on-going, so vehicle volume, speed, and travel time were not collected and/or reported. [Note that traffic studies such as this attempt to document “normal” traffic flow conditions and therefore typically avoid unusual traffic events such as the CU move-in week, or the Thanksgiving or Christmas weeks, etc.] That said, collision data was collected and reported during Week 4 because it relates directly to safety, which may require more immediate attention if issues are noted. As of Week 5 and future data collection efforts, both schools are back in session and all data is being collected and reported.

Vehicle volumes on Folsom north of Bluff and north of Canyon have decreased from “before” volumes. Week 5 volumes north of Bluff increased just under 400 vehicles per day (vpd) from Week 3. Week 5 volumes north of Canyon remained the same as Week 3 volumes at 16,500, a reduction of about 2,500 vpd from June of 2015.

The posted speed on Folsom is 30 mph. Average vehicle speed and 85th percentile speed has decreased compared to the before installation speed at both locations along Folsom. North of Bluff, the average vehicle speed has decreased 3 mph from 35 to 32 mph and the 85th percentile speed has also decreased 3 mph from 39 to 36 mph. North of Canyon, average and 85th percentile speed has decreased 5 mph, from 34 to 29 mph and 29 to 24 mph, respectively.

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)	CU & BVSD 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

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)	CU & BVSD 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

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. During Weeks 1-2 after the installation, the project team drove the corridor 65 times (34 times during the PM commute/peak hour) and 60 times during Week 3 (23 times during the PM peak hour). As discussed in the previous section, City and FTH staff determined the vehicle data collection samples would not represent regular (or normal) conditions due to increased visitor traffic during Week 4 when the CU move-in process is on-going, so travel time data was not collected or reported. During Week 5, the project team drove the corridor 24 times over two days during the PM peak hour.

During Weeks 1-3, travel times were collected during the AM peak hour (8-9am), midday/early afternoon (noon to 4:30). During Weeks 1-3 and Week 5, travel times were collected during the PM peak hour (4:30-6pm). The travel times recorded during Weeks 1-3 vary throughout the day, with the shortest travel times in the morning and increasing throughout the day. The AM peak hour and midday/early afternoon travel times remained fairly consistent during Weeks 1-3 after installation (see tables below). Starting in Week 5, the travel times were collected for the PM peak only based on the less variable AM and afternoon travel times observed during Weeks 1-3.

The Week 5 average PM peak hour travel time increased about 35 seconds in the northbound direction and about 11 seconds in the southbound direction compared to the Week 3 average travel time (see tables below). There is variation in travel times through the PM peak hour in both directions. The Week 5 variation in travel times in the southbound direction remained at about 2 minutes and 22 seconds. The variation in northbound travel times increased in Week 5 by about a minute to 3 minutes and 36 seconds, with the longest travel time recorded at 6 minutes and 33 seconds.

Northbound Week 5 average travel time is about 10 seconds shorter than the model forecast average travel time¹, and the southbound Week 5 average travel time is about 22 seconds longer than the model forecast travel time. These projected increases in travel time represent projected conditions after the traffic patterns have settled down and travelers are familiar with the changes in the corridor. We expect this “learning curve” or “settling period” to take at least a month after the project is fully implemented and CU was back in session. Travel time measurements taken in Weeks 1-5 after implementation have not had the benefit of this “learning curve”, but are being offered as immediate or “early” observations, and they should be considered in this context.

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

Evaluation Period	PM Northbound	PM Southbound
Before (Nov. 2014)	3:32	3:20
Modeled	4:47 ¹	4:30
Week 1-2	4:15	5:36
Week 3	4:02	4:41
Week 5	4:37	4:52

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

Evaluation Period	Average	High	Low	Variability
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

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

Evaluation Period	Average	High	Low	Variability
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

¹ The northbound modeled PM peak travel time is corrected to reflect the projected travel times as reported in the Multimodal Technical Analysis (4-29-15).

Northbound Average Morning and Afternoon Travel Times (in minutes:seconds)

Evaluation Period	AM Peak	Afternoon
Before (Nov. 2014)	2:18	n/a ²
Modeled	2:45	n/a
Week 1-2	2:32	3:29
Week 3	2:31	3:10

Southbound Average Morning and Afternoon Travel Times (in minutes:seconds)

Evaluation Period	AM Peak	Afternoon
Before (Nov. 2014)	3:03	n/a
Modeled	3:01	n/a
Week 1-2	3:23	4:13
Week 3	3:05	4:09

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 per year from 2012 to 2014 for vehicle-vehicle, vehicle-bicycle, and vehicle-pedestrian collisions. The collisions reported for Weeks 1-5 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	70.7	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
Total	3	2	0	5

² Midday and afternoon travel times were not modeled.

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 and CU were not in session during the before or after data collection periods. Before and after volumes at Boulder Creek have been collected by a permanent 24-hour counter. The before volumes at South and Pine Street were collected from 6am to 9pm on June 30th, 2015 and after volumes are being collected by permanent 24-hour counters installed in late July, 2015. 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 classes started during Week 5, likely influencing the bicycle volumes.

Daily Weekday Average Bicycle Volumes Along Folsom Street at Pine Street

Evaluation Period	Northbound	Southbound	Total
Before	437	440	877
Week 1	620	655	1,275
Week 2	551	625	1,176
Week 3	554	616	1,170
Week 4	603	651	1,254
Week 5	705	766	1,471

Daily Weekday Average Bicycle Volumes Along Folsom Street at South Street

Evaluation Period	Northbound	Southbound	Total
Before	388	389	777
Week 1	497	578	1,075
Week 2	512	556	1,068
Week 3	406	500	906
Week 4	570	600	1,169
Week 5	706	791	1,497

Daily Weekday Average Bicycle Volumes Along Folsom Street at Boulder Creek

Evaluation Period	Northbound - Adjusted	Southbound - Adjusted	Total - Adjusted
Before	592	483	1,076
Week 1	683	521	1,204
Week 2	607	497	1,104
Week 3	603	478	1,081
Week 4	782	602	1,384
Week 5	1,060	880	1,940

Notes:

- “Before” volumes at Pine and South were collected from 6am – 9pm on June 30th, 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 2012-14.
- “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.

Bicycle Demographics

Bicycle demographic data has been observed and recorded along the Folsom corridor before and after the installation of protected bike lanes. The before data was collected on April 28, 2015 for 2 hours. After data was collected on July 29, August 3, August 12-13, and August 25-27 for a total of 12 hours. Observations have been taken during weekday AM, noon, and PM 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

Evaluation Period	Male	Female	Family
Before	72%	28%	4%
Week 1-2	78%	22%	6%
Week 3	67%	33%	5%
Week 5	66%	34%	4%