FOX TUTTLE HERNANDEZ
TRANSPORTATION GROUP

MEMORANDUM

To: David Kemp

From: Bill Fox
Jessica Hernandez

Date: August 18, 2015

Project: Folsom Street Living Laboratory

Subject: Week 1-3 After Data Early Observations

As part of the Folsom Street Living Laboratory, data on vehicle and bicycle volumes, vehicle speed, and collisions was collected before the installation of protected bicycle lanes, during weeks 1-3 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 core criteria and summarize early observations from the Weeks 1 to 3 after the installation of the protected bicycle lanes on Folsom Street. While the after data from these early weeks is important, it is preliminary and ongoing data collection and analysis in the coming weeks will continue to inform the evaluation of the project.

Additional evaluation data, including multimodal criteria such as bicycle demographics, pedestrian crossing counts, and transit ridership, 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.

Unless otherwise noted, Weeks 1-2 refers to July 27th to August 9, 2015 and Week 3 refers to August 10th to August 16th, 2015. Before data collection time periods vary and are noted in the individual tables below.

Vehicle Volume and Speed

Total 24-hour daily vehicle volume and speed was collected at two locations along Folsom Street before the installation of the protected bike lanes and two and three weeks after the installation. The before vehicle data was collected in late April, 2015 while both Boulder Valley School District (BVSD) and Colorado University (CU) were in session. Some portion of the higher vehicle volumes recorded before the installation are likely due to CU and BVSD-related trips. CU and BVSD have not been in session during the after data collection time periods to this point.

Vehicle volumes on Folsom north of Bluff and north of Canyon decreased during Week 2 as compared to the volumes before the installation. Week 3 vehicle volume remained fairly steady on Folsom Street north of Bluff as compared to Week 2, increasing by about 140 vehicles per day (vpd). Week 3 vehicle volume increased slightly more north of Canyon as compared to Week 2, by about 690 vpd.

Average vehicle speed and 85th percentile speed has decreased compared to the before installation speed at both locations along Folsom. The average vehicle speed and 85th percentile speed remained the same on Folsom north of Bluff during Weeks 2 and 3 after installation. The average vehicle speed decreased 2 mph from 35 to 33 mph and the 85th percentile speed decreased from 39 to 37 mph on Folsom north of Bluff. Both speeds remain above the posted speed limit of 30 mph.

Average vehicle speed on Folsom north of Canyon decreased from 29 mph to 25 mph during Week 2 and again to 24 mph during Week 3. The 85th percentile speed decreased from 34 mph to 30 mph during Week 2 and to 29 mph during Week 3. Average vehicle speeds and 85th percentile speeds north of Canyon are now both below the posted speed limit of 30 mph. It is interesting to note that in the southern end of the corridor, the travel times are decreasing even as the average and 85th percentile speeds are decreasing as well. There are many variables at play in each metric, but it does appear that motorists driving through the corridor at slower speeds can actually help lower the overall travel time as well.

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)
Before	4/27/15-5/1/15	15,780	35	39
After-Week 2	8/5/15-8/7/15	13,790	33	37
After-Week 3	8/12/15-8/14/15	13,930	33	37

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)
Before	6/30/15-7/2/15	18,970	29	34
After-Week 2	8/3/15-8/5/15	15,790	25	30
After-Week 3	8/10/15-8/12/15	16,480	24	29

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).

Travel times have been collected during the AM peak hour (8-9am), midday/early afternoon (noon to 4:30), and PM peak hour (4:30-6pm). The travel times vary throughout the day, with the shortest travel times in the morning and increasing throughout the day. The following table summarizes the average travel times for the morning and midday/early afternoon time periods. The AM peak hour and midday/early afternoon travel times have remained fairly consistent during Weeks 1-3 after installation. The Week 3 average AM peak hour travel times are similar to the model forecasted travel times. The project team did not model the midday/early afternoon travel times.

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

Evaluation Period	AM Peak	Afternoon
Before (Nov. 2014)	2:18	n/a
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

In the PM peak hour, the model forecast an increase of about 58 seconds during the PM peak hour for northbound traffic and an increase of about 1 minute and 10 seconds for southbound traffic. 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 would have expected this "learning curve" or "settling period" to take at least a month after the project was fully implemented and CU was back in session.

Travel time measurements taken in weeks 1-4, immediately 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.

The average Week 1-2 PM peak hour travel times varied by over 4 minutes in both directions. The longest travel time, over 8 minutes, was recorded in the southbound direction. Factors that may have influenced these earliest observations include:

- SB trips have more travel time variation than NB. It appears that this is influenced by the location of the flashing pedestrian crossings at Spruce Street and Walnut Street in relation to the adjacent traffic signals.
- Non-typical travel patterns during Week 2
    - Pre-Ironman Boulder visitors
    - Final installation small changes were still being made
    - August 1st student "move in" (leases begin)
    - Horizon West lot repaving

Average northbound PM peak hour travel times recorded during Week 3 were slightly shorter than those recorded during Weeks 1-2 and showed less variability. The longest travel time recorded in the northbound direction was about 1 minute 30 seconds shorter than the time recorded during Weeks 1-2. Average southbound PM peak hour travel time was over a minute shorter than during Weeks 1-2. The variability in travel time also decreased, by almost 2 minutes, with the longest travel time recorded at just under 6 minutes.

The Week 3 northbound average travel time is about 28 seconds shorter than the model forecast travel time. The Week 3 southbound average travel time is about 11 seconds longer than the model forecast travel time.

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

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

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

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	3:35	4:21
Week 3	4:41	5:58	3:35	2:23

Collisions

Collision data for the Folsom corridor from Valmont to Colorado is being compiled from police reports. The following summarizes the average collision frequency per year from 2012 to 2014 for vehicle-vehicle, vehicle-bicycle, and vehicle-pedestrian collisions. The totals include all crashes at the intersections and in segments along the corridor. The collisions reported for Weeks 1-3 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 Weeks 1-3 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
Total	2	1	0	3

Bicycle Volume

Daily bicycle volumes are being collected at three locations along Folsom: 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. As noted above in the Travel Time section, there were non-typical travel patterns during Weeks 1-2 after installation, including the Boulder Ironman, and these may have influenced the bicycle volumes recorded during this time period.

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
Average Weeks 1-3	472	545	1,016

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
Average Weeks 1-3	575	632	1,207

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
Average Weeks 1-3	631	498	1,129

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.