

Date: September 2, 2015

To: Kathleen Bracke
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From: Bill Fox
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RE: Summary of Living Labs Phase I Project Findings – Before and After

As part of the Transportation Master Plan (TMP), the city launched a ‘Living Laboratory’ (LL) to test new transportation facilities and to evaluate their long-term application around the city. A series of LL projects have been active since September 2013. The LL projects provide an opportunity to better understand how pedestrians, bicycles, and drivers interact with these new transportation facilities.

Evaluation of the Living Laboratory demonstration projects has included community feedback, field observations, and in most cases “before” and “after” comparison. The Fox Tuttle Hernandez Transportation Group (FTH) has been assisting city staff with field observations and data analysis for the following LL projects:

- Spruce Street Buffered Bike Lanes
- University Avenue Buffered Bike Lanes
- University Avenue Protected Bike Lanes
- Baseline Road Protected Bike Lanes
- Harvard Lane Dashed Bike Lanes
- University Avenue Back In Angled Parking
- Folsom Street Bicycle Box

In most cases “after” has been collected in 2013 and again in 2015. To date FTH has completed 59 hours of before and after study, during which time approximately 2,600 bicycles, 7,100 motor vehicle interactions, and 840 parked cars have been observed. Using this data, 10 performance measures have been evaluated.

FTH completed a before and after summary memorandum of the LL project status in August of 2014 using the initial set of after data collection. This memorandum builds on those findings, adds new after data, and provides observations and recommendations regarding the on-going use of these new LL project treatments as we look to the future.

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This memorandum is organized as follows for each of the Living Lab Phase I projects:

- Project Description
- Evaluation Measures
- Summary of Before and After data collection
- Summary of analysis
- Key findings

Buffered Bike Lanes: Spruce Street

▪ **Project Description**

Buffered bike lanes were installed in September of 2013 on a ten block segment of Spruce Street between 15th Street and Folsom Avenue. On-street parallel parking exists along both sides of Spruce Street throughout this project area. A painted buffer was installed between the bike lane and the adjacent vehicle travel lane for the entire project. In the eastern three blocks, between 21st Street and Folsom Avenue where the street is a few feet wider, a narrow painted buffer was also installed between the bike lane and the parked cars along the outside edge of the bike lane.

▪ **Evaluation Measures**

- Bicycles riding in the intended zones
- Motor vehicle driving position
- Parking space utilization
- Snow plowing and storage

▪ **Summary of Before and After data collection**

Spruce Buffered Bike Lane

Field Observation of Living Labs Treatment	Before	After	After
Date(s) of Observations	8/28/2013	11/19/2013	8/26/2015
Person Hours of Observation	6	6	6
Cyclist Observations at LL Treatment	478	327	566
Vehicle Observations at LL Treatment	--	2,473	2,710

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▪ **Summary of analysis**

Spruce 1: Bicycles riding in intended zones, "before" vs "after"

Cyclist Position	Single Buffer (15th to 21st)			Double Buffer (21st to Folsom)		
	Before '13	After '13	After '15	Before '13	After '13	After '15
Outside BL (near parking)	57%	62%	65%	47%	76%	70%
Middle BL						
Inside BL (near buffer)	42%	34%	35%	50%	21%	29%
Buffer						
Travel Lane	1%	4%	0%	3%	1%	0%

Spruce 2: Bicycles riding in intended zones, detailed positions

Cyclist Position	Single Buffer (15th to 21st)			Double Buffer (21st to Folsom)		
	Before '13	After '13	After '15	Before '13	After '13	After '15
Outside BL (near parking)	57%	3%	2%	47%	9%	13%
Middle BL		59%	64%		67%	57%
Inside BL (near buffer)	42%	22%	26%	50%	17%	18%
Buffer		12%	9%		4%	11%
Travel Lane	1%	4%	0%	3%	4%	1%
Total	100%	100%	100%	100%	100%	100%

Spruce 3: Parking space utilization

Utilization	Before 2013	After 2013	After 2015
17th-18th	95%	70%	95%
18th-19th	90%	70%	95%
19th-20th	90%	70%	95%
22nd-23rd	90%	90%	95%
23rd-Folsom	90%	85%	95%

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Spruce 4: Motor vehicle position

Vehicle Wheel Position	After 2013	After 2015
Buffer	2%	4%
Travel Lane	98%	94%
Center Line	0%	3%

▪ Key findings

- Automobile travel lanes were reduced to 9.5 to 10 feet in the after condition.
- The number of bicycles observed was higher during both August observation periods than during the November period observed. This appears to be related to seasonal factors, but there were also 18% more bicycles observed during the August after period than the August before period.
- 4% or less of the bicycles observed in the after condition traveled in the automobile lane.
- Between 84% and 92% of the bicyclists observed traveled in the bike lane area after they were installed.
- Between 4% and 12% of the bicyclists were observed traveling in the buffer area in the after condition.
- Only 2 to 3% of the automobiles encroached into the buffer area in the after condition.
- Between 2% and 4% of automobiles were observed crossing the centerline at some point while traveling along Spruce Street.
- No clear cut trend in bicyclist position within the bike lane area was observed in the before or after data.
- Similarly, no clear pattern in vehicle positioning within the travel lane emerged, however it should be noted that vehicles were observed to have no trouble staying within the vehicular lane and avoiding the buffer area, even when considering the trucks observed.
- Parking space utilization was higher during both August observation periods than during the November period. This may be in part related to the Spruce Pool access during the summer and pedestrian activity along Pearl Street.
- During a snowstorm, if snow is windrowed in the center of Spruce Street, it will result in automobiles traveling in the buffer areas. This will necessitate the removal of the windrows as quickly as possible.

Buffered Bike Lanes: University Avenue

▪ **Project Description**

Double buffered bike lanes were installed on University Avenue between 9th Street and Broadway as a first step in the Living Lab implementation on University Avenue. The width of University Avenue allowed the striping of buffers between the bike lane and the automobile travel lane, and between the bike lane and the on-street parallel parking lane. Prior to the Living Lab, University Avenue had wide parking lanes, on-street bike lanes, and wide automobile travel lanes. The double buffered bike lanes were tested between August of 2013 and October of 2014 after which this stretch of University Avenue was then converted to a protected bike lane (see below).

▪ **Evaluation Measures**

- Bicycles riding in the intended zones
- Motor vehicle and bicycle interactions at intersections
- Motor vehicle stop bar compliance
- Motor vehicle driving position
- Snow plowing and storage

▪ **Summary of Before and After data collection**

University Buffered Bike Lane

Field Observation of Living Labs Treatment	Before	After	After
Date(s) of Observations	7/24/2013	11/15/2013	10/15 & 10/16/2014
Person Hours of Observation	2	3	2
Cyclist Observations at LL Treatment	26	140	--
Vehicle Observations at LL Treatment	0	586	208

▪ **Summary of analysis**

University BBL 1: Bicyclists riding in the intended zone

Cyclist Position	Before	After
Outer BL (closest to parking)	23%	21%
Middle BL	50%	58%
Inside BL (closest to travel lane)	27%	19%
Buffer (btwn BL & travel lane)		2%
Vehicle Travel Lane	0%	0%
Total	100%	100%

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University BBL 2: Bicyclists riding in the intended zone

Cyclist Position	Total	Westbound			Eastbound		
		AM	Noon	PM	AM	Noon	PM
Outside BL	21%	11%	24%	28%	7%	36%	0%
Middle BL	58%	44%	55%	67%	74%	56%	10%
Inner BL	19%	44%	18%	6%	11%	8%	90%
Buffer	2%	0%	3%	0%	7%	0%	0%
Vehicle Travel Lane	0%	0%	0%	0%	0%	0%	0%
Total	100%	100%	100%	100%	100%	100%	100%

University BBL 3: Motor vehicle position (After Nov 2013)

Vehicle Wheel Position	Total	Westbound			Eastbound		
		AM	Noon	PM	AM	Noon	PM
Bike Lane Buffer	6%	0%	7%	3%	10%	3%	11%
Travel Lane	93%	100%	93%	97%	86%	97%	89%
Center Line	1%	0%	0%	0%	3%	0%	0%
Total	100%	100%	100%	100%	100%	100%	100%

University BBL 4: Side street stop bar compliance

Vehicle First Stop Position	Nov 2013	Nov 2014
Stop Bar	10%	10%
Parking Lane	26%	33%
Bike Lane	48%	18%
Rolling Stop	16%	39%
Total	100%	100%

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University BBL 5: Motor vehicle speed and volume

Date	October 2012	August 2014	April 2015
Bike Lane	Standard	Buffered	Protected
ADT	5770 vpd	4970 vpd	4570 vpd
Average Speed	26 mph	25 mph	23 mph
85th Percentile Speed	29 mph	29 mph	26 mph

▪ Key findings

- In the before condition all cyclists observed were in the bike lane, but the sample size was small with only 26 bikes tallied by a group of CU students.
- In the after condition, the bicyclists lane position was similar to the before condition, with slightly more bikes centered in the bike lane area and maximizing their separation from both moving and parked automobiles.
- In the after condition, 93% of automobiles traveled within the automobile lane, while 6% encroached into the bike lane buffer, and 1% traveled with a wheel across the centerline.
- Motorists approaching University on a side street are regulated by stop signs. Of these, only 10% actually stopped at the stop bar in both after periods observed.
- In the first after condition another 26% of side street approaching motorists stopped in alignment with the parking lane and nearly half of approaching motorists did not stop until they were encroaching into the bike lane or the bike lane buffer. 16% of the motorists never did stop, and continued rolling into University Avenue.
- During the second after condition, a year later, more vehicles (33%) were observed stopping in the parking lane and significantly less vehicles (18% down from 48%) were observed stopping in the bike lane. Unfortunately, the number of vehicles that didn't stop at all (rolling stop) increased from 16% to 39%.
- 64% of motorists approaching on a side street did not stop before entering the bicycle lane during the first after period, and 57% did not stop before entering the bike lane a year later. This is a significant safety concern because the on-street parking along University Avenue is highly occupied, and the parked vehicles present a sight distance obstruction for approaching motorists.
- Speeds remained approximately the same with the buffered bike lanes, which was to be expected as the buffering had limited effect of narrowing the perceived travel lane.
- Observations during a snow storm indicate that motorists generally stay toward the middle of the street and avoid most of the buffers and bike lanes. It appears that snowplows windrow the snow toward the middle of University Avenue. If windrows are not removed quickly motorists will have no choice but to encroach into the buffered bike lane area.

Protected Bike Lanes: University Avenue

▪ **Project Description**

In November of 2014 the double buffered bike lanes on University Avenue were converted to protected bike lanes where the on-street parking was moved away from the curb lines toward the center of the street and the bike lanes were created against the curb lines, outside of the parking lane. A door zone buffer was created between the bike lanes and the parking lanes, and a row of flexible delineators was installed along the inside edge of each door zone buffer adjacent to the parking lanes. Signs were placed in the street at the beginning of each block to orient automobiles and bicyclists, and areas were striped out adjacent to intersections to make adequate sight distance available.

▪ **Evaluation Measures**

- Bicycles riding in the intended zones
- Parking space utilization
- Vehicle parking relative to bike lane
- Vehicle volume and speed
- Motor vehicle driving position
- Motor vehicle stop bar compliance
- Snow plowing and storage

▪ **Summary of Before and After data collection**

University Protected Bike Lane

Field Observation of Living Labs Treatment	After	After	After	After
Date(s) of Observations	2/4/2015	3/5/2015	4/22/2015	8/26/2015
Person Hours of Observation	4	5.5	6	1.5
Cyclist Observations at LL Treatment	26	68	241	157
Vehicle Observations at LL Treatment	85	85	624	401

The February and March after data collection periods were during snow events, specifically intended to monitor the performance of the facility under snow conditions.

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Summary of analysis

University PBL 1: Bicyclists riding in the intended zone

User Position	Total	Feb 2015	March 2015	April 2015	Aug 2015
Protected Bike Lane	77%	77%	40%	86%	78%
Travel Lane	10%	19%	57%	1%	2%
Wrong Way in PBL	5.5%	4%	0%	4%	11%
Skateboarders in PBL	5.5%	0%	0%	7%	7%
Cyclist on Sidewalk	2%	0%	3%	0%	2%
Total	100%	100%	100%	100%	100%

University PBL 2: Bicyclists riding in the intended zone, snow conditions

User Position	Total	Feb 2015 - before plow	Feb 2015 - after plow	March 2015 - accumulated snow
Protected Bike Lane	50%	64%	100%	40%
Travel Lane	47%	36%	0%	57%
Wrong Way in PBL	1%	0%	8%	0%
Skateboarders in PBL	0%	0%	0%	0%
Cyclist on Sidewalk	2%	0%	0%	3%
Total	100%	100%	100%	100%

University PBL 3: Bicyclists riding in the intended zone, non-snow conditions

User Position	Total	April 2015	August 2015
Protected Bike Lane	83%	99%	95%
Travel Lane	1%	1%	2%
Wrong Way in PBL	7%	4%	11%
Skateboarders in PBL	7%	7%	7%
Cyclist on Sidewalk	1%	0%	2%
Total	100%	100%	100%

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University PBL 4: Bicyclists riding in the intended zone, by direction

User Position	Feb 2015		March 2015		April 2015		August 2015	
	Ebd	Wbd	Ebd	Wbd	Ebd	Wbd	Ebd	Wbd
Protected Bike Lane	75%	100%	23%	58%	87%	86%	83%	54%
Travel Lane	21%	0%	77%	36%	1%	0%	2%	4%
Wrong Way in PBL	4%	0%	0%	0%	2%	8%	8%	25%
Skateboarders in PBL	0%	0%	0%	0%	9%	4%	6%	13%
Cyclist on Sidewalk	0%	0%	0%	6%	1%	2%	2%	4%
Total	100%							

University PBL 5: Demographics of bicyclists riding in the protected bike lane

Demographics	Total	Feb 2015	March 2015	April 2015	Aug 2015
Male	77%	92%	82%	74%	75%
Female	23%	8%	18%	26%	25%
Total	100%	100%	100%	100%	100%

University PBL 6: Motor vehicle position

Vehicle Wheel Position	Total	April 2015	Aug 2015
Travel Lane	92%	94%	90%
Center Line	8%	6%	10%
Total	100%	100%	100%

University PBL 7: Motor vehicle stop bar compliance

Vehicle First Stop Position	April 2015
Stop Bar	5%
Curbline	17%
Protected Bike Lane	26%
Parking Lane	24%
Travel Lane	3%
Rolling Stop	25%
Total	100%

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University PBL 8: Motor vehicle speed and volume

Date	October 2012	August 2014	April 2015
Bike Lane	Standard	Buffered	Protected
ADT	5770 vpd	4970 vpd	4570 vpd
Average Speed	26 mph	25 mph	23 mph
85th Percentile Speed	29 mph	29 mph	26 mph

Key findings

- When snow was not a factor, 98% of bicyclists traveled in the protected bike lanes. 1% used the sidewalk, and 1% used the adjacent vehicle lane.
- Snow events resulted in approximately half of the bicyclists using the travel lane and half using the protected bike lane.
- Bicyclist's decision to travel in the bike lane or the vehicle lane during snow events was influenced by the condition of the pavement in each, and the amount of time since the plow had cleared each.
- Plows that cleared the protected bike lanes sometimes left snow deposits in the lane at the ends of the blocks. This influenced the use of the bike lane by bicyclists.

Snow Plow Operations on University Protected Bike Lanes



- Bicyclists traveling in the wrong direction in the protected bike lanes accounted for approximately 5.5% of the bike lane users. It is our understanding that the City has received a number of complaints and concerns about wrong way bicyclists in the protected bike lanes.
- Skateboarders accounted for another 5.5% of the users in the protected bike lanes.
- Under fair weather conditions, male cyclists accounted for approximately 75% of the bicyclists in the protected bike lane. On snowy days, the male user percentage increased to approximately 80% or 90%.
- Occasionally pedestrians were observed walking in the protected bike lanes.
- 92% of motorists stayed within the automobile lanes on University Avenue, and 8% allowed a wheel to touch but not cross the centerline of the roadway.
- Parking occupancy along the protected bike lanes was high, ranging between 85% and 100% consistently.

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- During fair weather conditions parked vehicles typically stayed within the designated parking areas. However, during snowy conditions when the pavement markings were covered, parked vehicles did not always stay within the parking area, and often were not parked in a straight line.
 - Only 22% of the motorists approaching University Avenue on a stop sign controlled side street stopped before entering the protected bike lane. Another 26% of the motorists stopped within the bike lane. 27% of the motorists stopped in the parking lane or vehicular travel lane, and 25% of the side street vehicles rolled through the intersection without stopping at all.
 - There were not enough observations of bicycle interaction with turning vehicles at intersections to observe if there were conflicts, such as “right hooks” between turning motorists and through bicyclists.
 - Speeds were reduced by 2-3 miles an hour with the installation of the protected bike lanes as a result of parking being moved closer to the moving traffic, which effectively narrowed the travel lane.

Baseline Road Protected Bike Lanes

▪ **Project Description**

Existing buffered bike lanes on Baseline Road were converted to protected bike lanes between 30th Street and 37th Street. The conversion consisted of adding concrete bumper blocks and flexible delineators along the inside edge of the existing painted buffer on each side of Baseline Road. There is an existing multi-use path running along the south side of Baseline in this project area adjacent to the CU Williams Village student housing site. A frontage road exists along the north side of Baseline Road, separated by a wide landscaped median.

▪ **Evaluation Measures**

- Bicycles riding in the intended zones
- Motor vehicle and bicycle interactions at intersections
- Motor vehicle stop bar compliance
- Motor vehicle travel speeds and volumes
- Snow plowing

▪ **Summary of Before and After data collection**

The only before data collected for this project was historic traffic volume and speed information. After data was collected as follows:

Baseline Protected Bike Lane

Field Observation of Living Labs Treatment	After Fall 2013	After Summer 2015
Date of Observations	11/13/2013	8/25 & 8/26/2015
Person Hours of Observation	6	6
Cyclist Observations at LL Treatment	168	325
Vehicle Turning Movements Observed	191	89

▪ **Summary of analysis**

The after analysis focused on which facility was utilized by east-west bicyclists, and automobile stop bar compliance as they approached Baseline Road from a side street. The two periods of after data collection are summarized as follows (with additional detail provided in the Appendix):

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Baseline 1: Bicyclists riding in the intended zone

Cyclist Position	Total (Nov 2013)	Total (Aug 2015)	WB 2013	WB 2015	EB 2013	EB 2015
Southside Multi-Use Path	23%	38%	22%	40%	24%	33%
Protected Bike Lane	77%	62%	78%	60%	76%	67%
Vehicle Travel Lane	0%	0%	0%	0%	0%	0%
Total	100%	100%	100%	100%	100%	100%

Baseline 2: Motor vehicle stop bar compliance from side street

First Stop Location	Nov 2013		Aug 2015	
	SBD	NBD	SBD	NBD
Stop Bar	9%	14%	8%	11%
Just Past Stop Bar	38%	46%	50%	57%
Bike Lane	28%	24%	25%	13%
Rolling Stop	24%	16%	17%	19%
Total	100%	100%	100%	100%

▪ **Key findings**

- In both after time periods all bicyclists were observed using either the protected bicycle lane or the multi-use path, with no bicyclists occupying the automobile travel lanes.
- Almost twice as many bicyclists were observed in August 2015 than in November 2013. This may have as much to do with the warmer weather conditions as the presence of the protected bike lanes.
- The percentage of bicyclists using the multi-use path increased between November 2013 and August 2015. Again, it is not clear if this related to the presence of the protected bike lane. It may have more to do with the path's location adjacent to the CU site and the easy access to the Bear Creek multi-use path undercrossing of Baseline Road just east of 37th Street.
- A high percentage of automobiles accessing Baseline from side streets roll through the stop bars. Most stop just past the stop bar before reaching the bike lane, but some proceed all the way into the bike lane before stopping. The visibility and sight lines at intersections within the study area are generally good, and may contribute to this level of stop bar non-compliance.
- Only a small number of interactions between bicycles in the bike lanes or on the multi-use path and automobiles entering Baseline Road were observed. In most cases the automobiles yielded

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to bicyclists in the protected bike lanes, but some bikes on the multi-use path had to yield to motorists at the path crossing.

- In 2013 three cars were observed using the westbound bus lane at 35th Street as an acceleration lane. No vehicles were observed doing this in 2015.
- It is our observation, and our understanding that City staff has received comments from bicyclists using the protected bike lanes, that the bumper blocks can be restrictive to bicyclists trying to access the automobile lanes on Baseline in order to turn left.
- Observations during a snow storm in 2013 indicated that large tandem axle snowplows are able to effectively remove snow from the protected bike lanes, and the project had minimal impact on effective snow removal.

Snow Plow Operations on the Baseline Protected Bike Lane



- In summary, this protected bike lane treatment on Baseline Road is effective in allowing bicyclists to travel outside of the automobile travel lanes. No significant negative operational issues were observed.

Dashed Bike Lane: Harvard Lane

▪ **Project Description**

Dashed bike lanes were installed on 0.3 miles of Harvard Lane between Dartmouth Avenue and the Bear Creek Greenway multi-use path at Table Mesa Drive. Dashed bike lanes are an experimental treatment that provide bike lanes (dashed) on a roadway that is not wide enough to provide conventional bike lanes and two-directional automobile lanes between them. One or both of two on-coming motorists that approach each other on Harvard will need to move laterally to bypass each other, and in doing so will need to move partially into the dashed bike lane area.

The Federal Highway Administration (FHWA) has issued permission to experiment with dashed bike lanes on Harvard to the City of Boulder. As part of that process, the City is compiling before and after data to comply with the requirements of FHWA. A progress report is currently being prepared for submittal to FHWA. When completed, that report will also serve as a detailed before and after summary as part of the Living Lab process in the City of Boulder.

▪ **Evaluation Measures**

- Bicycles riding in the intended zones
- Motor vehicle-motor vehicle interactions and driving position
- Motor vehicle-bicycle interactions and positions
- Motor vehicle travel speeds and volumes

▪ **Summary of Before and After data collection**

Harvard Dashed Bike Lane

Field Observation of Living Labs Treatment	Before	After	After
Date(s) of Observations	10/14/2014	4/28/2015	Fall 2015
Person Hours of Observation	6	6	
Cyclist Observations at LL Treatment	275	240	
Vehicle Observations at LL Treatment	50	75	

- **Summary of analysis – see FHWA Progress Report when available**
- **Key findings – see FHWA Progress Report when available**

Back In Angle Parking: University Avenue

▪ **Project Description**

On-street head-in diagonal parking has existed historically along the south side of University Avenue between Broadway and the entrance to the CU campus on 17th Street. There are also on-street bicycle lanes along University in this area, which have raised concerns about the visibility between motorists backing out of diagonal or angled parking spaces and approaching bicyclists in the bike lane located behind the parked cars. Back in angled parking allows motorists to access the parking stalls from a position of good visibility, and also provides significantly better visibility between drivers and bicyclists as vehicles exit the parking stalls in the forward direction. As part of the Living Lab, the head in angled parking stalls were converted to back in angled stalls.

▪ **Evaluation Measures**

- Bicycles riding in the intended zones
- Parking space utilization
- Back in parking compliance
- Parked vehicle position
- Parking motor vehicle and bicycle interactions

▪ **Summary of Before and After data collection**

University Back In Angled Parking

Field Observation of Living Labs Treatment	Before	After	After
Date(s) of Observations	7/23 & 7/24/2013	11/15 & 11/20/2013	8/26/2015
Person Hours of Observation	3	4	3
Cyclist Observations at LL Treatment	27	92	55
Observations of Parked Vehicles	0	307	209

▪ Summary of analysis

Univ. Back In Parking 1: Bicyclists riding in the intended zones

Cyclist Position	Before - July 2013	After - Nov 2013	After - Aug 2015
Outer BL	22%	13%	9%
Middle BL	41%	60%	55%
Inside BL	37%	16%	25%
Vehicle Travel Lane	0%	11%	11%

Univ. Back In Parking 2: Average Parking Space Utilization (Percent Occupied)

Time of Day	After - Nov 2013	After - Aug 2015
AM	9%	--
Noon	64%	73%
Afternoon	--	78%
PM	66%	--

Univ. Back In Parking 3: Back in parking compliance and position

Time of Day	After - Nov 2013	After - Aug 2015
Parked Correctly	77%	81%
Parked in BL	3%	0%
Parked On or Across Line	7%	9%
Parked Head In	13%	9%
Total	100%	100%

▪ Key findings

- No clear trend in bicycle positioning within the bike lane emerged with the data that was collected, in part because the before data was collected by CU students and there is some question as to the described orientation of riders within the lane. This evaluation measure had been included to help determine if bicyclist would rider closer to the parked cars (and farther away from moving traffic) if there was better visibility between bicyclists and parked motorists about to exit the parking spaces.
- It was observed that eastbound bicyclists tend to stay within the bike lane between Broadway and 15th Street where the roadway grade is relatively flat. The downhill grade steepens east of 15th toward the steep hill and curve onto 17th Street. In this area some bicyclists were observed taking the automobile lane on the approach to the steep downhill. It is not clear which block the before data was collected in.
- When the back in parking was first implemented many motorists continued to park head in despite the signs that were posted illustrating the correct parking orientation. Police issued warnings for a period of time and eventually started writing tickets to influence correct parking behavior. Tickets were being issued during November of 2013 when the original before data was collected.
- It was observed that many motorists were not comfortable backing their vehicle into the angled parking stalls.
- All of the vehicles that we actually observed entering the parking stalls in the head in direction during the after studies were traveling westbound before cutting across eastbound traffic to enter an angle stall.
- Over time the amount of head in parking has decreased from 13% in 2013 to 9% in August of this year.
- The issuance of back in parking tickets has decreased by approx. 48% (see appendix) from 2,049/year to 1,072/year over the past two years, while the percentage of vehicles that park correctly has increased from 77% to 81% since the original after study.
- Between 5 and 10% of the parked vehicles continue to park across the stall lines, but the latest after data shows that no parked vehicles encroached into the bike lane.
- Observations during a snow event indicated that some vehicles did not back all the way to the curb, and some were parked encroaching into the bike lane area.
- The few vehicles that we observed exiting a parking stall while a bicycle was approaching actually yielded to the bicycle before pulling out into traffic on University Avenue.

Bicycle Box: Southbound Folsom at Arapahoe

▪ **Project Description**

A bicycle box was installed in July of 2015 in the southbound lane of Folsom Street at the intersection of Arapahoe Road. The bicycle box is an experimental treatment that provides additional reserved space between the pedestrian crosswalk and the motor vehicle stop line for bicyclists to queue during a red signal phase. The bicycle box is marked by green colored pavement treatment and extends from the bike lane across the adjacent through lane, preceded by an advanced stop line for motor vehicles. Motor vehicles are not permitted to “turn on red” at the improved intersection. Bicyclists waiting for the signal will have the choice to queue in the bicycle lane or the bicycle box. The bicycle box provides additional space for bicyclists to move to the front of the vehicle queue, increasing visibility and priority for the high volume of through cyclists at this intersection.

The Federal Highway Administration (FHWA) has issued permission to experiment with the bicycle box on Folsom to the City of Boulder. As part of that process, the City is compiling before and after data to comply with the requirements of FHWA. Progress reports will be prepared for submittal to FHWA in early and mid-2016. When completed, the reports will also serve as a detailed before and after summary as part of the Living Lab process in the City of Boulder.

▪ **Evaluation Measures**

- Bicycle volume
- Bicycle location at intersection on red signal
- Bicycle riding position south of intersection
- Motor vehicle turning movements at intersection
- Motor vehicle-bicycle interactions at intersection
- Motor vehicle right turn compliance to traffic control

▪ **Summary of Before and After data collection**

Before data collection includes daily bicycle volumes from a permanent 24-hour bicycle counter south of the intersection, video of vehicles and bicycles traveling through the intersection, and vehicle turning movement counts. After data collection is in process and will continue through the summer of 2016.

▪ **Summary of analysis – see *FHWA Progress Report when available***

▪ **Key findings – see *FHWA Progress Report when available***

Summary of Living Labs Phase 1 Project Findings
Appendix

Buffered Bike Lane -- Spruce (15th to Folsom)

Field Observation of Living Labs Treatment	Before	After	After
Date(s) of Observations	8/28/2013	11/19/2013	8/26/2015
Person Hours of Observation	6	6	6
Cyclist Observations at LL Treatment	478	327	566
Vehicle Observations at LL Treatment	--	2,473	2,710

Spruce 1: Bicycles riding in intended zones, "before" vs "after"

Cyclist Position	Single Buffer (15th to 21st)			Double Buffer (21st to Folsom)		
	Before '13	After '13	After '15	Before '13	After '13	After '15
Outside BL (near parking)	57%	62%	65%	47%	76%	70%
Middle BL						
Inside BL (near buffer)	42%	34%	35%	50%	21%	29%
Buffer						
Travel Lane	1%	4%	0%	3%	1%	0%

Spruce 2: Bicycles riding in intended zones, detailed positions

Cyclist Position	Single Buffer (15th to 21st)			Double Buffer (21st to Folsom)		
	Before '13	After '13	After '15	Before '13	After '13	After '15
Outside BL (near parking)	57%	3%	2%	47%	9%	13%
Middle BL		59%	64%		67%	57%
Inside BL (near buffer)	42%	22%	26%	50%	17%	18%
Buffer		12%	9%		4%	11%
Travel Lane	1%	4%	0%	3%	4%	1%
Total	100%	100%	100%	100%	100%	100%

Spruce 3: Parking space utilization

Utilization	Before 2013	After 2013	After 2015
17th-18th	95%	70%	95%
18th-19th	90%	70%	95%
19th-20th	90%	70%	95%
22nd-23rd	90%	90%	95%
23rd-Folsom	90%	85%	95%

Spruce 4: Motor vehicle position

Vehicle Wheel Position	After 2013	After 2015
Buffer	2%	4%
Travel Lane	98%	94%
Center Line	0%	3%

Spruce 5: Bicycles riding in intended zones (Before Aug 2013)

Cyclist Position	15th to 21st			21st to Folsom		
	Total	Wbd	Ebd	Total	Wbd	Ebd
Outside/Middle Bike Lane	57%	77%	37%	47%	53%	41%
Inside BL/Buffer	42%	23%	60%	50%	45%	55%
Travel Lane	1%	0%	2%	3%	2%	4%
Total	100%	100%	100%	100%	100%	100%

Spruce 5A: Bicycles riding in intended zones (Before Aug 2013)

Cyclist Position	15th to 21st			21st to Folsom		
	Total	Wbd	Ebd	Total	Wbd	Ebd
Bike Lane	151	99	52	99	56	43
Buffer	113	29	84	106	48	58
Travel Lane	3	0	3	6	2	4
Total	267	128	139	211	106	105

Spruce 6: Bicycles riding in intended zones (After Nov 2013)

Cyclist Position	Single Buffer (15th to 21st)			Double Buffer (21st to Folsom)		
	Total	Wbd	Ebd	Total	Wbd	Ebd
Outside BL (near parking)	3%	1%	4%	9%	0%	16%
Middle BL	59%	63%	55%	67%	77%	58%
Inside BL (near buffer)	22%	16%	29%	17%	18%	16%
Buffer	12%	19%	4%	4%	2%	5%
Travel Lane	4%	2%	7%	4%	3%	4%
Total	100%	100%	100%	100%	100%	100%

Spruce 7: Bicycles riding in intended zones (After Aug 2015)

Cyclist Position	Single Buffer (15th to 21st)			Double Buffer (21st to Folsom)		
	Total	Wbd	Ebd	Total	Wbd	Ebd
Outside BL (near parking)	2%	0%	3%	13%	17%	9%
Middle BL	64%	65%	63%	57%	55%	59%
Inside BL (near buffer)	26%	26%	27%	18%	18%	19%
Buffer	9%	9%	8%	11%	9%	12%
Travel Lane	0%	0%	0%	1%	0%	1%
Total	100%	100%	100%	100%	100%	100%

Spruce 8: Motor vehicle driving position (After Nov 2013)

Vehicle Wheel Position	Single Buffer (15th to 21st)			Double Buffer (21st to Folsom)		
	Total	Wbd	Ebd	Total	Wbd	Ebd
Buffer	2%	3%	1%	2%	2%	2%
Travel Lane	97%	97%	98%	98%	98%	98%
Center Line	1%	1%	0%	0%	0%	0%
Total	100%	100%	100%	100%	100%	100%

Spruce 9: Motor vehicle driving position (After Aug 2015)

Vehicle Wheel Position	Single Buffer (15th to 21st)			Double Buffer (21st to Folsom)		
	Total	Wbd	Ebd	Total	Wbd	Ebd
Buffer	2%	2%	2%	5%	5%	4%
Travel Lane	97%	96%	97%	90%	91%	89%
Center Line	1%	1%	1%	5%	3%	6%
Total	100%	100%	100%	100%	100%	100%

Spruce 6A: Bicycles riding in intended zones (After Nov 2013)

Cyclist Position	Single Buffer (15th to 21st)			Double Buffer (21st to Folsom)		
	Total	Wbd	Ebd	Total	Wbd	Ebd
Outside BL (near parking)	5	1	4	12	0	12
Middle BL	113	64	49	91	48	43
Inside BL (near buffer)	42	16	26	23	11	12
Buffer	23	19	4	5	1	4
Travel Lane	8	2	6	5	2	3
Total	191	102	89	136	62	74

Spruce 7A: Bicycles riding in intended zones (After Aug 2015)

Cyclist Position	Single Buffer (15th to 21st)			Double Buffer (21st to Folsom)		
	Total	Wbd	Ebd	Total	Wbd	Ebd
Outside BL (near parking)	5	0	5	32	20	12
Middle BL	201	86	115	143	64	79
Inside BL (near buffer)	83	34	49	46	21	25
Buffer	27	12	15	27	11	16
Travel Lane	0	0	0	2	0	2
Total	316	132	184	250	116	134

Spruce 8A: Motor vehicle driving position (After Nov 2013)

Wheel Position	Single Buffer (15th to 21st)			Double Buffer (21st to Folsom)		
	Total	Wbd	Ebd	Total	Wbd	Ebd
Buffer	25	17	8	26	10	16
Travel Lane	1,160	567	593	1,257	627	630
Center Line	5	3	2	0	0	0
Total	1,190	587	603	1,283	637	646

Spruce 9A: Motor vehicle driving position (After Aug 2015)

Wheel Position	Single Buffer (15th to 21st)			Double Buffer (21st to Folsom)		
	Total	Wbd	Ebd	Total	Wbd	Ebd
Buffer	33	16	17	64	37	27
Travel Lane	1,355	631	724	1,181	614	567
Center Line	14	7	7	63	23	40
Total	1,402	654	748	1,308	674	634

Buffered Bike Lane -- University Avenue (9th to Broadway)

Field Observation of Living Labs Treatment	Before	After	After
Date(s) of Observations	7/24/2013	11/15/2013	10/15 & 10/16/2014
Person Hours of Observation	2	3	2
Cyclist Observations at LL Treatment	26	140	--
Vehicle Observations at LL Treatment	0	586	208

University BBL 1: Bicyclists riding in the intended zone

Cyclist Position	Before	After
Outer BL (closest to parking)	23%	21%
Middle BL	50%	58%
Inside BL (closest to travel lane)	27%	19%
Buffer (btwn BL & travel lane)	0%	2%
Vehicle Travel Lane	0%	0%
Total	100%	100%

University BBL 2: Bicyclists riding in the intended zone

Cyclist Position	Total	Westbound			Eastbound		
		AM	Noon	PM	AM	Noon	PM
Outside BL	21%	11%	24%	28%	7%	36%	0%
Middle BL	58%	44%	55%	67%	74%	56%	10%
Inner BL	19%	44%	18%	6%	11%	8%	90%
Buffer	2%	0%	3%	0%	7%	0%	0%
Vehicle Travel Lane	0%	0%	0%	0%	0%	0%	0%
Total	100%						

University BBL 3: Motor vehicle position (After Nov 2013)

Vehicle Wheel Position	Total	Westbound			Eastbound		
		AM	Noon	PM	AM	Noon	PM
Bike Lane Buffer	6%	0%	7%	3%	10%	3%	11%
Travel Lane	93%	100%	93%	97%	86%	97%	89%
Center Line	1%	0%	0%	0%	3%	0%	0%
Total	100%						

University BBL 4: Side street stop bar compliance

Vehicle First Stop Position	Nov 2013	Nov 2014
Stop Bar	10%	10%
Parking Lane	26%	33%
Bike Lane	48%	18%
Rolling Stop	16%	39%
Total	100%	100%

University BBL 5: Motor vehicle speed and volume

Date	October 2012	August 2014	April 2015
Bike Lane	Standard	Buffered	Protected
ADT	5770 vpd	4970 vpd	4570 vpd
Average Speed	26 mph	25 mph	23 mph
85th Percentile Speed	29 mph	29 mph	26 mph

University BBL 2A: Bicyclists riding in the intended zone

Cyclist Position	Total	Westbound			Eastbound		
		AM	Noon	PM	AM	Noon	PM
Outside BL	30	1	8	10	2	9	0
Middle BL	81	4	18	24	20	14	1
Inner BL	26	4	6	2	3	2	9
Buffer	3	0	1	0	2	0	0
Vehicle Travel Lane	0	0	0	0	0	0	0
Total	140	9	33	36	27	25	10

University BBL 3A: Motor vehicle position (After Nov 2013)

Vehicle Wheel Position	Total	Westbound			Eastbound		
		AM	Noon	PM	AM	Noon	PM
Bike Lane Buffer	34	0	10	2	13	4	5
Travel Lane	498	45	131	64	107	111	40
Center Line	4	0	0	0	4	0	0
Total	536	45	141	66	124	115	45

University BBL 4A: Side street stop bar compliance

Vehicle First Stop Position	Nov 2013	Nov 2014
Stop Bar	5	21
Parking Lane	13	68
Bike Lane	24	37
Rolling Stop	8	82
Total	50	208

Protected Bike Lane -- University Avenue (9th to Broadway)

Field Observation of Living Labs Treatment	After	After	After	After
Date(s) of Observations	2/4/2015	3/5/2015	4/22/2015	8/26/2015
Person Hours of Observation	4	5.5	6	1.5
Cyclist Observations at LL Treatment	26	68	241	157
Vehicle Observations at LL Treatment	85	85	624	401

University PBL 1: Bicyclists riding in the intended zone

User Position	Total	Feb 2015	March 2015	April 2015	Aug 2015
Protected Bike Lane	77.0%	77%	40%	86%	78%
Travel Lane	10.0%	19%	57%	1%	2%
Wrong Way in PBL	5.5%	4%	0%	4%	11%
Skateboarders in PBL	5.5%	0%	0%	7%	7%
Cyclist on Sidewalk	2.0%	0%	3%	2%	2%
Total	100%	100%	100%	100%	100%

University PBL 2: Bicyclists riding position in snow conditions

User Position	Total	Feb 2015 before plow	Feb 2015 after plow	March 2015 - accumulated snow
Protected Bike Lane	50%	64%	92%	40%
Travel Lane	47%	36%	0%	57%
Wrong Way in PBL	1%	0%	8%	0%
Skateboarders in PBL	0%	0%	0%	0%
Cyclist on Sidewalk	2%	0%	0%	3%
Total	100%	100%	100%	100%

University PBL 3: Bicyclists riding position in non-snow conditions

User Position	Total	April 2015	August 2015
Protected Bike Lane	83%	86%	78%
Travel Lane	1%	1%	2%
Wrong Way in PBL	7%	4%	11%
Skateboarders in PBL	7%	7%	7%
Cyclist on Sidewalk	2%	2%	2%
Total	100%	100%	100%

University PBL 4: Bicyclists riding in the intended zone, by direction

User Position	Feb 2015		March 2015		April 2015		August 2015	
	Ebd	Wbd	Ebd	Wbd	Ebd	Wbd	Ebd	Wbd
Protected Bike Lane	75%	100%	23%	58%	87%	86%	83%	54%
Travel Lane	21%	0%	77%	36%	1%	0%	2%	4%
Wrong Way in PBL	4%	0%	0%	0%	2%	8%	8%	25%
Skateboarders in PBL	0%	0%	0%	0%	9%	4%	6%	13%
Cyclist on Sidewalk	0%	0%	0%	6%	1%	2%	2%	4%
Total	100%							

University PBL 5: Demographics of bicyclists riding in the cycletrack

Demographics	Total	Feb 2015	March 2015	April 2015	Aug 2015
Male	77%	92%	82%	74%	75%
Female	23%	8%	18%	26%	25%
Total	100%	100%	100%	100%	100%

University PBL 1A: Bicyclists riding in the intended zone

User Position	Total	Feb 2015	March 2015	April 2015	Aug 2015
Protected Bike Lane	378	20	27	208	123
Travel Lane	49	5	39	2	3
Wrong Way in PBL	28	1	0	10	17
Skateboarders in PBL	28	0	0	17	11
Cyclist on Sidewalk	9	0	2	4	3
Total	492	26	68	241	157

University PBL 2A: Bicyclists riding position in snow conditions

User Position	Total	Feb 2015 - before plow	Feb 2015 - after plow	March 2015 - accumulated snow
Protected Bike Lane	47	9	11	27
Travel Lane	44	5	0	39
Wrong Way in PBL	1	0	1	0
Skateboarders in PBL	0	0	0	0
Cyclist on Sidewalk	2	0	0	2
Total	94	14	12	68

University PBL 3A: Bicyclists riding position in non-snow conditions

User Position	Total	April 2015	August 2015
Protected Bike Lane	331	208	123
Travel Lane	5	2	3
Wrong Way in PBL	27	10	17
Skateboarders in PBL	28	17	11
Cyclist on Sidewalk	7	4	3
Total	398	241	157

University PBL 4A: Bicyclists riding in the intended zone, by direction

User Position	Feb 2015		March 2015		April 2015		August 2015	
	Ebd	Wbd	Ebd	Wbd	Ebd	Wbd	Ebd	Wbd
Protected Bike Lane	18	2	8	19	137	71	110	13
Travel Lane	5	0	27	12	2	0	2	1
Wrong Way in PBL	1	0	0	0	3	7	11	6
Skateboarders in PBL	0	0	0	0	14	3	8	3
Cyclist on Sidewalk	0	0	0	2	2	2	2	1
Total	24	2	35	33	158	83	133	24
Pedestrians in PBL				7			3	

University PBL 5A: Demographics of bicyclists riding in the cycletrack

Demographics	Total	Feb 2015	March 2015	April 2015	Aug 2015
Male	333	23	54	159	97
Female	101	2	12	55	32
Total	434	25	66	214	129

University PBL 6: Motor vehicle position

Vehicle Wheel Position	Total	April 2015	Aug 2015
Travel Lane	92%	94%	90%
Center Line	8%	6%	10%
Total	100%	100%	100%

University PBL 7: Motor vehicle stop bar compliance

Vehicle First Stop Position	April 2015
Stop Bar	5%
Curbline	17%
Protected Bike Lane	26%
Parking Lane	24%
Travel Lane	3%
Rolling Stop	25%
Total	100%

University PBL 8: Motor vehicle speed and volume

Date	Oct-12	Aug-14	Apr-15
Bike Lane	Standard	Buffered	Protected
ADT	5770 vpd	4970 vpd	4570 vpd
Average Speed	26 mph	25 mph	23 mph
85th Percentile Speed	29 mph	29 mph	26 mph

University PBL 6A: Motor vehicle position

Vehicle Wheel Position	Total	April 2015	Aug 2015
Travel Lane	585	301	284
Center Line	52	20	32
Total	637	321	316

University PBL 7A: Motor vehicle stop bar compliance

Vehicle First Stop Position	April 2015
Stop Bar	11
Curbline	36
Protected Bike Lane	57
Parking Lane	53
Travel Lane	6
Rolling Stop	55
Total	218

Protected Bike Lane -- Baseline

Field Observation of Living Labs Treatment	After Fall 2013	After Summer 2015
Date of Observations	11/13/2013	8/25 & 8/26/2015
Person Hours of Observation	6	6
Cyclist Observations at LL Treatment	168	325
Vehicle Turning Movements Observed	191	89

Baseline 1: Bicyclists riding in the intended zone

Cyclist Position	Total (Nov 2013)	Total (Aug 2015)	WB 2013	WB 2015	EB 2013	EB 2015
Southside Multi-Use Path	23%	38%	22%	40%	24%	33%
Protected Bike Lane	77%	62%	78%	60%	76%	67%
Vehicle Travel Lane	0%	0%	0%	0%	0%	0%
Total	100%	100%	100%	100%	100%	100%

Baseline 2: Motor vehicle stop bar compliance from side street

First Stop Location	Nov 2013		Aug 2015	
	SBD	NBD	SBD	NBD
Stop Bar	9%	14%	8%	11%
Just Past Stop Bar	38%	46%	50%	57%
Bike Lane	28%	24%	25%	13%
Rolling Stop	24%	16%	17%	19%
Total	100%	100%	100%	100%

Baseline 3: Bicyclists riding in the intended zone (After Nov 2013)

Cyclist Position	Total	Westbound			Eastbound		
		AM	Noon	PM	AM	Noon	PM
Southside Multi-Use Path	23%	15%	25%	35%	22%	22%	26%
Protected Bike Lane	77%	85%	75%	65%	78%	78%	74%
Vehicle Travel Lane	0%	0%	0%	0%	0%	0%	0%
Total	100%						

Baseline 4: Bicyclists riding in the intended zone (After Aug 2015)

Cyclist Position	Total	Westbound			Eastbound		
		AM	Noon	PM	AM	Noon	PM
Southside Multi-Use Path	38%	36%	40%	50%	33%	38%	31%
Protected Bike Lane	62%	64%	60%	50%	67%	63%	69%
Vehicle Travel Lane	0%	0%	0%	0%	0%	0%	0%
Total	100%						

Baseline 5: Vehicle Stop Bar Compliance (Nov 2013, Southbound 35th Street)

First Stop Location	Total	Right Turn			Left Turn		
		AM	Noon	PM	AM	Noon	PM
Stop Bar	9%	16%	20%	5%	8%	33%	0%
Just Past Stop Bar	38%	40%	80%	50%	50%	67%	40%
Bike Lane	28%	44%	0%	45%	42%	0%	60%
Rolling Stop	24%	--	--	--	--	--	--
Total	100%						

Baseline 3A: Bicyclists riding in the intended zone (After Nov 2013)

Cyclist Position	Total	Westbound			Eastbound		
		AM	Noon	PM	AM	Noon	PM
Southside Multi-Use Path	38	8	7	7	2	6	8
Protected Bike Lane	130	45	21	13	7	21	23
Vehicle Travel Lane	0	0	0	0	0	0	0
Total	168	53	28	20	9	27	31

Baseline 4A: Bicyclists riding in the intended zone (After Aug 2015)

Cyclist Position	Total	Westbound			Eastbound		
		AM	Noon	PM	AM	Noon	PM
Southside Multi-Use Path	122	39	18	25	11	9	20
Protected Bike Lane	203	70	27	25	22	15	44
Vehicle Travel Lane	0	0	0	0	0	0	0
Total	325	109	45	50	33	24	64

Baseline 5A: Vehicle Stop Bar Compliance (Nov 2013, Southbound 35th Street)

First Stop Location	Total	Right Turn			Left Turn		
		AM	Noon	PM	AM	Noon	PM
Stop Bar	9	4	2	1	1	1	0
Just Past Stop Bar	38	10	8	10	6	2	2
Bike Lane	28	11	0	9	5	0	3
Rolling Stop	24	--	--	--	--	--	--
Total	99	25	10	20	12	3	5

Baseline 6: Vehicle Stop Bar Compliance (Nov 2013, Northbound 35th Street)

First Stop Location	Total	Right Turn			Left Turn		
		AM	Noon	PM	AM	Noon	PM
Stop Bar	14%	25%	0%	14%	8%	45%	15%
Just Past Stop Bar (MUP)	46%	75%	36%	43%	58%	36%	48%
Bike Lane	24%	0%	90%	10%	33%	0%	140%
Rolling Stop	16%	0%	28%	14%	0%	18%	15%
Total	100%						

Baseline 6A: Vehicle Stop Bar Compliance (Nov 2013, Northbound 35th Street)

First Stop Location	Total	Right Turn			Left Turn		
		AM	Noon	PM	AM	Noon	PM
Stop Bar	13	1	0	1	1	5	5
Just Past Stop Bar	42	3	9	3	7	4	16
Bike Lane	22	0	9	2	4	0	7
Rolling Stop	15	0	7	1	0	2	5
Total	92	4	25	7	12	11	33

Baseline 7: Vehicle Stop Bar Compliance (Aug 2015, Southbound 35th Street)

First Stop Location	Total	Right Turn			Left Turn		
		AM	Noon	PM	AM	Noon	PM
Stop Bar	9%	10%	0%	13%	33%	0%	0%
Just Past Stop Bar	53%	70%	50%	50%	33%	25%	33%
Bike Lane	24%	10%	13%	13%	33%	75%	67%
Rolling Stop	13%	10%	38%	25%	0%	0%	0%
Total	100%						

Baseline 7A: Vehicle Stop Bar Compliance (Aug 2015, Southbound 35th Street)

First Stop Location	Total	Right Turn			Left Turn		
		AM	Noon	PM	AM	Noon	PM
Stop Bar	4	1	0	1	1	0	0
Just Past Stop Bar	24	7	4	4	1	1	1
Bike Lane	11	1	1	1	1	3	2
Rolling Stop	6	1	3	2	0	0	0
Total	45	10	8	8	3	4	3

Baseline 8: Vehicle Stop Bar Compliance (Aug 2015, Northbound 35th Street)

First Stop Location	Total	Right Turn			Left Turn		
		AM	Noon	PM	AM	Noon	PM
Stop Bar	11%	0%	0%	33%	18%	18%	5%
Just Past Stop Bar (MUP)	57%	0%	67%	0%	55%	55%	64%
Bike Lane	13%	0%	0%	33%	18%	9%	14%
Rolling Stop	19%	0%	33%	33%	9%	18%	18%
Total	100%	0%	100%	100%	100%	100%	100%

Baseline 8A: Vehicle Stop Bar Compliance (Aug 2015, Northbound 35th Street)

First Stop Location	Total	Right Turn			Left Turn		
		AM	Noon	PM	AM	Noon	PM
Stop Bar	6	0	0	1	2	2	1
Just Past Stop Bar	30	0	4	0	6	6	14
Bike Lane	7	0	0	1	2	1	3
Rolling Stop	10	0	2	1	1	2	4
Total	53	0	6	3	11	11	22

Baseline 9: Motor vehicle stop bar compliance from side street, by turning direction

First Stop Location	SBD Nov 2013		SBD Aug 2015		NBD Nov 2013		NBD Aug 2015	
	Right Turn	Left Turn						
Stop Bar	13%	10%	8%	10%	6%	20%	11%	11%
Just Past Stop Bar	51%	50%	58%	30%	42%	48%	44%	59%
Bike Lane	36%	40%	12%	60%	31%	20%	11%	14%
Rolling Stop	--	--	23%	0%	22%	13%	33%	16%
Total	100%	100%	100%	100%	100%	100%	100%	100%

Back In Angle Parking -- University Avenue (Broadway to 17th)

Field Observation of Living Labs Treatment	Before	After	After
Date(s) of Observations	7/23 & 7/24/2013	11/15 & 11/20/2013	8/26/2015
Person Hours of Observation	3	4	3
Cyclist Observations at LL Treatment	27	92	55
Observations of Parked Vehicles	0	307	209

Univ. Back In Parking 1: Bicyclists riding in the intended zones

Cyclist Position	Before - July 2013	After - Nov 2013	After - Aug 2015
Outer BL	22%	13%	9%
Middle BL	41%	60%	55%
Inside BL	37%	16%	25%
Vehicle Travel Lane	0%	11%	11%
Total	100%	100%	100%

Univ. Back In Parking 1A: Bicyclists riding in the intended zones

Cyclist Position	Before - July 2013	After - Nov 2013	After - Aug 2015
Outer BL	6	12	5
Middle BL	11	55	30
Inside BL	10	15	14
Vehicle Travel Lane	0	10	6
Total	27	92	55

Univ. Back In Parking 2: Average parking space utilization (percent occupied)

Time of Day	After - Nov 2013	After - Aug 2015
AM	9%	--
Noon	64%	73%
Afternoon	--	78%
PM	66%	--

Univ. Back In Parking 2A: Average parking space utilization

Time of Day	Avg. Occupied	Avg. Unoccupied	Avg. Occupied Aug	Avg. Unoccupied
AM	5	50	--	--
Noon	35	20	40	15
Afternoon	--	--	43	12
PM	36	19	--	--

Total Parking Supply = 55 spaces

Univ. Back In Parking 3: Back in parking compliance and position

Time of Day	After - Nov 2013	After - Aug 2015
Parked Correctly	77%	81%
Parked in BL	3%	0%
Parked On or Across Line	7%	9%
Parked Head In	13%	9%
Total	100%	100%

Univ. Back In Parking 4: University back in parking vs. city violations

Parking Tickets	8/1/13 to 8/1/14	8/1/14 to 8/24/15	Change
1300 University-All Tickets	1,499	946	-36.90%
1300 University-Angled Parking	706	328	-53.50%
1500 University-All Tickets	2,309	1,662	-28.00%
1500 University-Angled Parking	1,343	744	-44.60%
Whole City-All Tickets	92,652	91,973	-0.70%
Total University Back In Parking	2,049	1,072	-47.70%
Percent of All City Tickets	2.20%	1.20%	

Univ. Back In Parking 5: Back in parking compliance and position (Nov 2013)

Time of Day	Parked Correctly	Parked in BL	Parked On or Across	Parked Head In	Total
AM	95%	0%	5%	0%	100%
Noon	78%	0%	5%	17%	100%
Afternoon	--	--	--	--	--
PM	72%	6%	10%	12%	100%
Total	77%	3%	7%	13%	100%

Univ. Back In Parking 5A: Back in parking compliance and position (Nov 2013)

Time of Day	Parked Correctly	Parked in BL	Parked On or Across Line	Parked Head In	Total
AM	19	0	1	0	20
Noon	111	0	7	24	142
Afternoon	--	--	--	--	--
PM	105	8	15	17	145
Total	235	8	23	41	307

Univ. Back In Parking 6: Back in parking compliance and position (Aug 2015)

Time of Day	Parked Correctly	Parked in BL	Parked On or Across	Parked Head In	Total
AM	--	--	--	--	--
Noon	74%	1%	11%	14%	100%
Afternoon	86%	0%	8%	6%	100%
PM	--	--	--	--	--
Total	81%	0%	9%	9%	100%

Univ. Back In Parking 6A: Back in parking compliance and position (Aug 2015)

Time of Day	Parked Correctly	Parked in BL	Parked On or Across Line	Parked Head In	Total
AM	--	--	--	--	--
Noon	59	1	9	11	80
Afternoon	111	0	10	8	129
PM	--	--	--	--	--
Total	170	1	19	19	209