

W. Mulberry Street Redesign & Protected Bike Lane Pilot Project:  
One-Year Evaluation (2018-2019)

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Figure 1: W. Mulberry St. before conditions



Figure 2: W. Mulberry St. after conditions – flex posts



Figure 3: W. Mulberry St. after conditions – new signal at Impala



Figure 4: W. Mulberry St. after conditions – bike rail

## PROJECT OVERVIEW

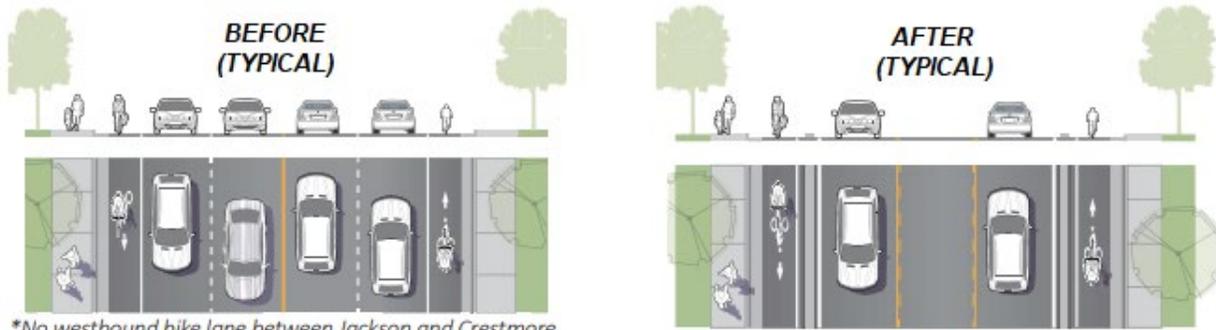
In 2018, the City completed a redesign of the W. Mulberry Street corridor (corridor redesign), which added a center turn lane, protected bike lanes, crossing improvements, and reduced travel lanes to one lane in each direction to improve safety and accessibility for roadway users. The addition of protected bike lanes (pilot project) were funded through the City’s 2017-2018 budget process (Budgeting for Outcomes) as part of a protected bike lane pilot program. Fort Collins’ 2014 Bicycle Master Plan recommended implementation of protected bike lane pilot program with the goal of installing and evaluating a series of protected bike lane pilot projects to develop best practices for this type of infrastructure in Fort Collins. The Mulberry pilot project is the second protected bike lane pilot project implemented in Fort Collins following the Laurel St. protected bike lane pilot project in 2015.

The City has collected data and feedback to evaluate both the pilot project as well as the corridor redesign to develop recommendations to improve the safety and functionality of the corridor, and to help inform future protected bike lane infrastructure design.



The corridor redesign included W. Mulberry Street between Jackson Avenue and Taft Hill, and included the following primary elements:

- Conversion from a four-lane street (with two lanes in each direction) to a three-lane street with one travel lane in each direction and center turn lanes.
- Addition of protected bike lanes (bike lanes were previously intermittent along the corridor)
- To evaluate different protected bike lane barrier types, the pilot project included sections with concrete curb barrier, steel rail barrier (“bike rail”), flexible delineator posts, painted buffers (with no physical barrier), as well as parking protected bike lanes.
- Resurfacing W. Mulberry Street and Impala Drive testing a different resurfacing product (HA5)
- A new signal at the intersection of W. Mulberry Street and Ponderosa / Impala Drive as part of the north-south Hampshire low-stress bikeway
- Additional intersection improvements at W. Mulberry Street and Bryan and at City Park Ave.



The four primary goals of the implementation of the corridor redesign and pilot project were:

1. Improve safety along the corridor
2. Improve perceived safety and comfort along the corridor
3. Increase bike ridership along the corridor
4. Incorporate and evaluate innovative, consistent, and dedicated bicycle infrastructure designs along a higher speed and traffic volume corridor to develop best practices for design, maintenance and operations.

The project was completed in September of 2018. Over the course of the following year, the City collected public feedback, traffic data, crash data, and tracked maintenance processes to evaluate the project. This information has and will continue to be used to make refinements to the design of the corridor and will inform project design for future protected bike lanes in Fort Collins.

The corridor redesign leveraged the protected bike lane pilot project and associated funding to implement other corridor improvements and upgrades. The primary project costs are summarized below:

SUMMARY OF CORRIDOR REDESIGN COSTS	
Corridor Resurfacing	\$ 184,052.20
Striping	\$ 90,000.00
Striping Removal	\$ 27,000.00
Traffic Control	\$ 30,000.00
Intersection Concrete Work (City Park, Bryan, Ponderosa & Impala)	\$ 124,644.59
Concrete curb protected bike lanes	\$ 52,350.73
Curb Stops (parking protected bike lanes)	\$ 11,943.64
New Traffic Signal at Impala / Mulberry	\$ 94,465.21
Bike Rail protected bike lanes	\$ 62,815.79
Design contract	\$ 49,451.72
Misc. Cost Estimate	\$ 10,000.00
<b>TOTAL ESTIMATE</b>	<b>\$ 736,723.88</b>

## EVALUATION

### SAFETY

#### CRASHES

To analyze differences in crash patterns, crash data from one year (Sept 1, 2017 to Aug 30, 2018) and five years (2013 to 2017) prior to the corridor redesign was compared with crash data from the first year after installation (Sept 1, 2018 to Aug 30, 2019).

Overall both the total number of crashes and crashes involving some level of injury decreased in the year following the corridor redesign. Total crashes decreased by 4 to 10 crashes per year (15-20%) and injury crashes decreased by 0.4 to 3 crashes per year (5-20%).

Crash Summary	Before		After	Percent Change
	5 years	1 year	1 year	
	2013-2017	Sep 1-Aug 30	Sep 1-Aug 30	
Total Crashes / year	44.8	42.0	36	Down 15-20%
Some Level of Injury/yr	10.4	13.0	10	Down 5-20%

Looking at the type and location of crashes, driveway access, approach turn, rear ends, and right-angle crashes are all down. While bike crashes, and fixed object crashes increased in the year following the project installation.

Location of the Crash	Before		After	Percent Change
	5 years	1 year	1 year	
	2013-2017	Sep 1-Aug 30	Sep 1-Aug 30	
Crashes / year				
Driveway Access	4.4	3.0	0	Down 100%
Non-Intersection	10.8	6.0	11	Up 0 - 80%
Signalized Intersection	11.0	16.0	11	Down 0-31%
Unsignalized Intersection	18.4	17.0	14	Down 20-25%

Type of Crash	Before		After	Percent Change
	5 years 2013-2017	1 year Sep 1-Aug 30	1 year Sep 1-Aug 30	
Crashes / year				
Approach Turn	4.8	4.0	2	Down 50-60%
Bicycle	1.0	2.0	3	Up 50-200%
Fixed Object	6.0	3.0	9	Up 50-200%
Overtaking Turn	1.2	1.0	0	Down 100%
Parking related	0.8	1.0	0	Down 100%
Pedestrian	0.8	1.0	0	Down 100%
Rear End	15.2	20.0	12	Down 20-40%
Right Angle	6.6	5.0	3	Down 40-55%
Side to Side Opposite Direction	1.2	1.0	1	Down 0-20%
Side to Side Same Direction	5.4	3.0	4	Mixed
Other / No info	1.8	1.0	2	Up 10-100%

The substantial decrease in driveway-related crashes are likely due to the addition of the center turn lane in the corridor which provides a location for left turning vehicles to wait.

The increase in non-intersection and fixed object crashes can be attributed to the new protection barriers (bike rail, flex posts, and concrete curb) that have been added on the corridor, and in some cases the placement of bike rail very close to the travel lanes. (Because single vehicle minor collisions are not always reported to Police Services, there may be additional unreported minor collisions not captured in the data above).

The increase in bike crashes may be related to a 50% increase in bike ridership along the corridor since the protected bike lane installation, which will be discussed further later in this report.

In general, the crash data from the first year following the installation of W. Mulberry Street redesign suggests that, to date, the project has achieved one of the primary project goals to increase safety along the corridor overall. Additional improvements, especially to address the increase in fixed object crashes related to the bike rail and its placement can be made along the corridor to further increase overall safety,

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## SPEEDS

While motor vehicle volumes and travel times have mostly remained unchanged as a result of the project, point speed data shows that motor vehicle speeds have decreased 1 to 7 mph along the project corridor, depending on the segment and direction. The table below shows directional average, and 85<sup>th</sup> percentile speeds along the corridor before and after the project installation.

VEHICLE SPEEDS	Before (Feb 2018) Average Speed, 85% Speed	After (April 2019) Average Speed, 85% Speed	Change Avg Speed, % Change
<b>W. Mulberry Street: Ponderosa to Taft Hill</b>			
EB	36 mph, 40 mph	35 mph, 39 mph	<b>-1.5 mph, 4% decrease</b>
WB	33 mph, 36 mph	31 mph, 33 mph	
Weighted Average	34.5 mph, 38 mph	33 mph, 36 mph	
<b>W. Mulberry Street: Taft Hill to Bryan</b>			
EB	40 mph, 43 mph	38 mph, 41 mph	<b>-4.5 mph, 11% decrease</b>
WB	39 mph, 43 mph	32 mph, 37 mph	
Weighted Average	39.5 mph, 43 mph	35 mph, 39 mph	

## PERCEPTION OF SAFETY

In addition to crash and speed data, the City collected public feedback through online surveys to assess perceptions of the project, including how safe people feel traveling the corridor:

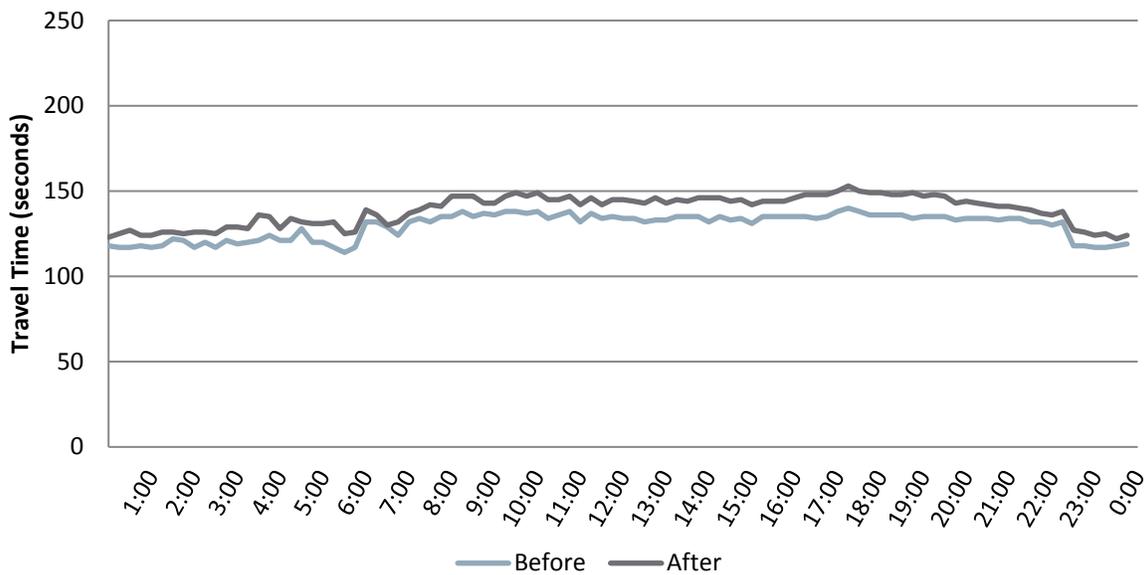
- Two similar surveys were conducted following the project installation – one in 2018 and one in 2020. Results from both surveys showed 53-54% of survey respondents reporting their sense of safety driving along W. Mulberry St. had increased somewhat or a lot.
- 91% of survey respondents reported feeling somewhat or very safe and comfortable bicycling along W. Mulberry St. since the project was installed. When asked how safe people felt bicycling the corridor before the project was installed, only 30% reported feeling somewhat or very safe.
- 80% of survey respondents who had bicycled the corridor prior to and following the project installation indicated their sense of comfort and safety had increased when bicycling along W. Mulberry St. following the project installation.
- 85–87% of survey respondents reported feeling somewhat or very safe and comfortable walking along W. Mulberry St. since the project was installed.

MOBILITY

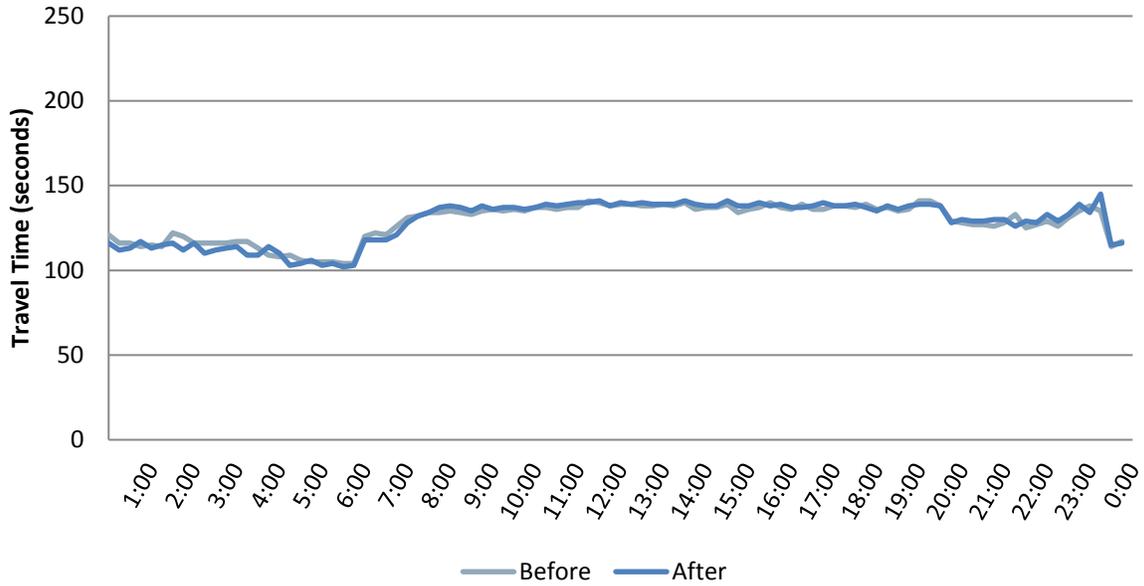
TRAVEL TIMES

Travel times for motor vehicles have also seen little change after the project. Westbound travel times in the corridor increased slightly by 10 to 12 seconds from Shields to Taft (about a 9% increase), while eastbound travel times have had no change. Travel times on approaches to the corridor (westbound and northbound) have also seen no change after installation of the project.

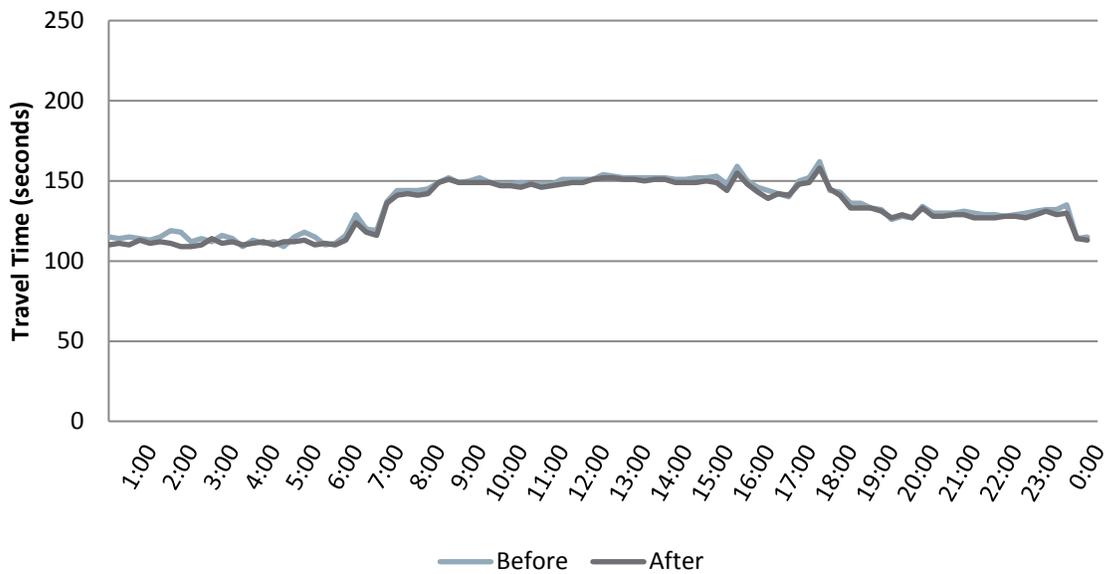
WESTBOUND - SHIELDS TO TAFT HILL: GENERALLY 10-12 SECONDS SLOWER IN AFTER CONDITION



EASTBOUND – TAFT HILL TO SHIELDS: GENERALLY NO CHANGE



WESTBOUND - COLLEGE TO SHIELDS: GENERALLY NO CHANGE



## TRAFFIC VOLUMES

Motor vehicle volume data has shown that motor vehicle volumes increased slightly between 2018 and 2019 (between 1.4% and 8% increase depending on the location).

Vehicle Volume Pneumatic Tube Counts	Before (Feb 2018)	After (April 2019)	Percent Change
Ponderosa to Taft Hill	6,875	7,425	8% Increase
Taft Hill to Bryan	13,660	13,855	1% Increase

## BICYCLE RIDERSHIP

Bicycle volume counts have shown an increase in bicycle ridership along the W. Mulberry St. since implementation of the project. Pneumatic tube counts were taken before and after the corridor redesign, and results showed a 50% increase in average daily bicycle ridership. Recent counts collected in September 2019 showed a daily average of 224 bikes per day, with a daily high of 332 bicyclists.

Bicycle Volume Pneumatic Tube Counts	Before (March - June 2018)	After (March - June 2019)	Percent Change
Average Daily Bike Volume	85	128	50% Increase

Video data also showed that the percentage of people bicycling on the sidewalk has decreased by over 80% since the completion of the project.

Bicycle Sidewalk Ridership	Before (May 2018)	After (May 2018)	Percent Change
Video Data (Peak Hour)	16%	3%	81% Decrease

## OPERATIONS

### MAINTENANCE

A goal of the protected bike lane pilot program is to develop best practices and determine associated with maintaining protected bike lanes. For the Mulberry pilot project, the City's Streets Department

maintains the protected bike lanes using specialized equipment, except for a short section around Sheldon Lake, which is maintained by the Parks Department. While challenges remain with clearing protected bike lanes, the pilot project has helped the City develop and improve its methods for maintaining protected bike lane infrastructure and develop favorable design strategies. The Streets Department continues to play an active role in the design process for future protected bike lanes to ensure projects are designed for successful maintenance and operations.

With different protected bike lane barriers included in the project design, the City was able to identify preferred designs from a maintenance standpoint. Of the different barriers, the concrete curbs were preferred from a maintenance perspective.

During the first full year of operation the estimated maintenance costs to maintain the protected bike lanes along the corridor were estimated at \$5,000. This included winter operations, sweeping, and replacing damaged bike rail. However, the year following the project installation was considered to be a light winter and data may not be representative of typical winter operations. Data from 2019-2020 will be evaluated to develop an average estimate for protected bike lane maintenance costs.

## GENERAL FEEDBACK:

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### PUBLIC

Following the completion of the project, two online surveys (2018, 2020) were distributed to Mulberry residents and the general public to seek input on the project. Similar questions were asked in each survey, and the results across surveys were similar. The first survey, conducted shortly after the project was installed, had 739 complete responses and 179 partial responses. Of the respondents, 60% live within ½ mile of W. Mulberry Street. The second survey, conducted in early 2020, had 324 responses and 47 partial responses. Of the respondents, 62% live within ½ mile of W. Mulberry Street. A complete summary of the survey results can be found here: [www.fcgov.com/bicycling/west-mulberry-street-improvements](http://www.fcgov.com/bicycling/west-mulberry-street-improvements)

- Overall, survey results showed most respondents feel the project has improved travel conditions on W. Mulberry St. with 61-65% of respondents indicating that “How well Mulberry works for all people traveling along it has” increased a lot or somewhat.”
- Responses to the 2020 survey indicated that 63% feel satisfied or very satisfied with the changes to the W. Mulberry St. corridor.
- 50-52% of survey respondents feel drivers’ speeds have decreased along the corridor.
- 65-67% of survey respondents indicated that the likelihood they will bicycle on W. Mulberry as opposed to other streets has increased.

While the majority of survey respondents indicated an improvement in travel conditions on W. Mulberry St. and survey results highlighted safety and comfort improvements, feedback has also included some negative responses and concerns about the project:

- 33-37% indicated a negative impact on traffic congestion after the project.
- 19-24% indicated it is more difficult to pull onto W. Mulberry St from driveways as a result.
- 34-40% indicated the aesthetic appeal of W. Mulberry Street has decreased.

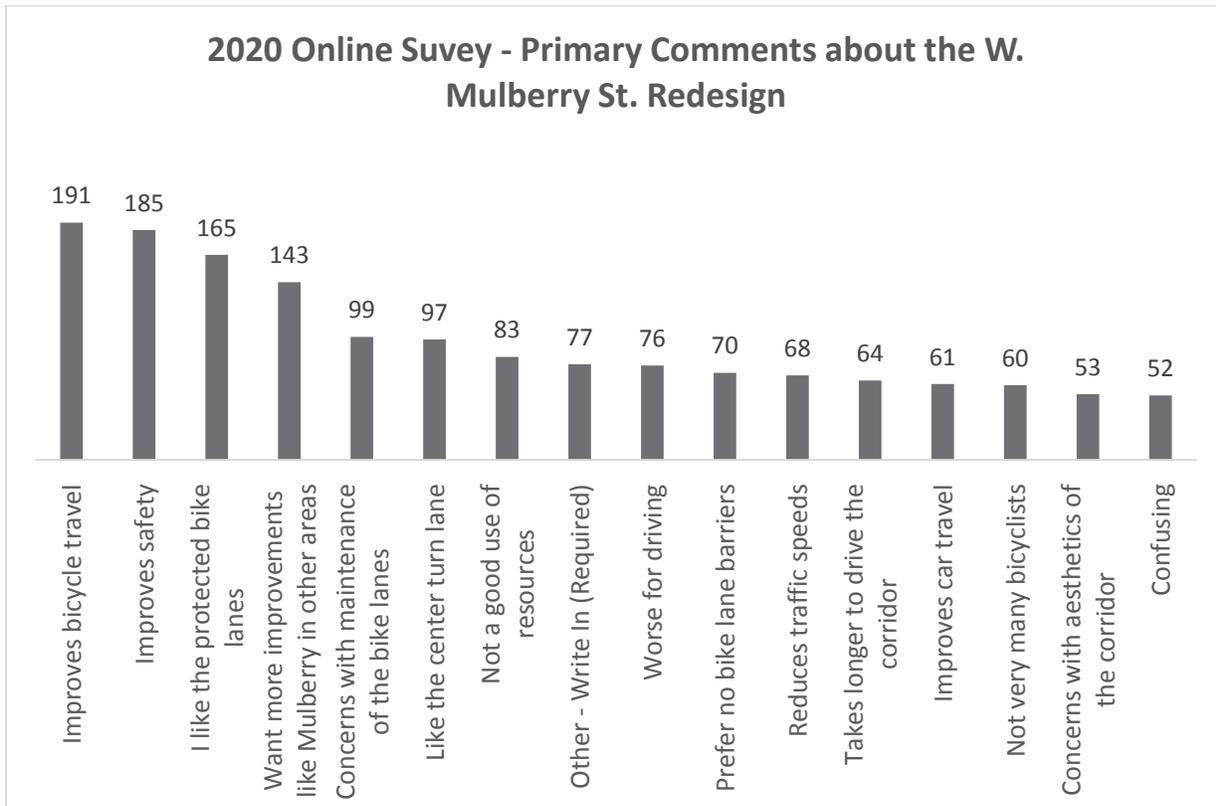
In the 2018 survey, when asked about preferences for barrier type, results varied by the travel mode. The preferred type of barrier for bicyclists was the concrete curbs followed by flex posts. For motorists, the preferred barrier was flex posts followed by painted buffers. For pedestrians, the preferred barrier was painted buffers followed by concrete curbs. However, when asked “which protected bike lane barrier type is preferred the least”, all modes indicated the painted buffers as the top response.

In the 2020 survey, 70% of respondents indicated a preference for some type of physical bike lane protection and the remaining 30% identified painted buffers as preferred. The most preferred type of barrier was flex posts. When asked what the least preferred type of protection was, 42% indicated painted buffers, 35% indicated concrete curbs, 20% indicated bike rail, and only 3% indicated flex posts.

Survey respondents were also able to write open-ended comments about the project. Comments were similar in both surveys. For the 2018 survey, a summary of over 500 hundred responses showed the following top categories for write-in comments:

- Improves bike travel (126 comments)
- Detriment to car travel (100)
- Improves safety (81)
- Concerns with maintenance (67)
- Concerns with aesthetics (44)

The following chart outlines the primary comments regarding the W. Mulberry Street project as reported in the 2020 survey. For both surveys, the top comment was related to “improves bicycle travel”.



## BUSINESS FEEDBACK

In August 2019, the City reached out to local businesses along the corridor to seek feedback about the project. A survey was provided for businesses to return, and a drop-in on-site meeting was hosted to provide an opportunity for feedback. The primary concerns and comments heard during this outreach were:

- High traffic speeds around curve adjacent to Sheldon Lake/City Park
- Exiting City Park business park takes longer due to the travel lane reduction
- Concern about aesthetics and maintenance of the protected bike lanes
- Some businesses commented that they preferred the design of Mulberry prior to the project installation
- Concern that people are using the neighborhood streets to avoid exiting onto Mulberry

## SERVICE PROVIDERS

The Poudre Fire Authority (Fire Station 2), Transfort, United States Postal Service, and Waste pick-up all service West Mulberry Street on a consistent basis.

Feedback from the Poudre Fire Authority indicated that the project has increased response times as it is more difficult to find gaps and turn onto Mulberry and drivers have difficulty pulling to the right to provide space for engines to pass safely. They also indicated that they have had to park further away to when accessing patients on Mulberry.

City staff have been working to contact the other service providers listed here to solicit their feedback as well.

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## BOARDS AND COMMISSIONS

City staff presented the results of the project evaluation to the Bicycle Advisory Committee and the Transportation Board. Both indicated support for the addition of protected bicycle lanes along the corridor, and interest in seeing similar improvements elsewhere. While opinions differed slightly, most Transportation Board members indicated a preference for the concrete curbs over other barrier types. There was interest from one Transportation Board member in seeing additional information regarding the total and differential cost to maintain the corridor with the addition of protected bike lanes. Another common concern among Transportation Board and Bicycle Advisory Committee members was speed along the corridor – it was requested to look at reducing the posted speed limit.

## DESIGN RECOMMENDATIONS (MULBERRY):

Based on data collected and public feedback several recommendations for further changes in the design of the Mulberry corridor have been made.

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### BIKE RAIL

The steel rail barrier or “bike rail” protection type was found to require more maintenance relative to the other protection types, and its placement very close to travel lanes was problematic (the bike rails were near the lake were moved closer to the curb to address this). In addition, it did not receive strong support among corridor users and survey respondents.

**Recommendation:** replace the sections of bike rail barrier with flex posts or concrete curb, depending on the location. Changes will be made as funding is available, and the section of bike rail near Sheldon Lake will be prioritized first.



These changes are intended to address some of the increase in non-intersection and fixed object crashes.

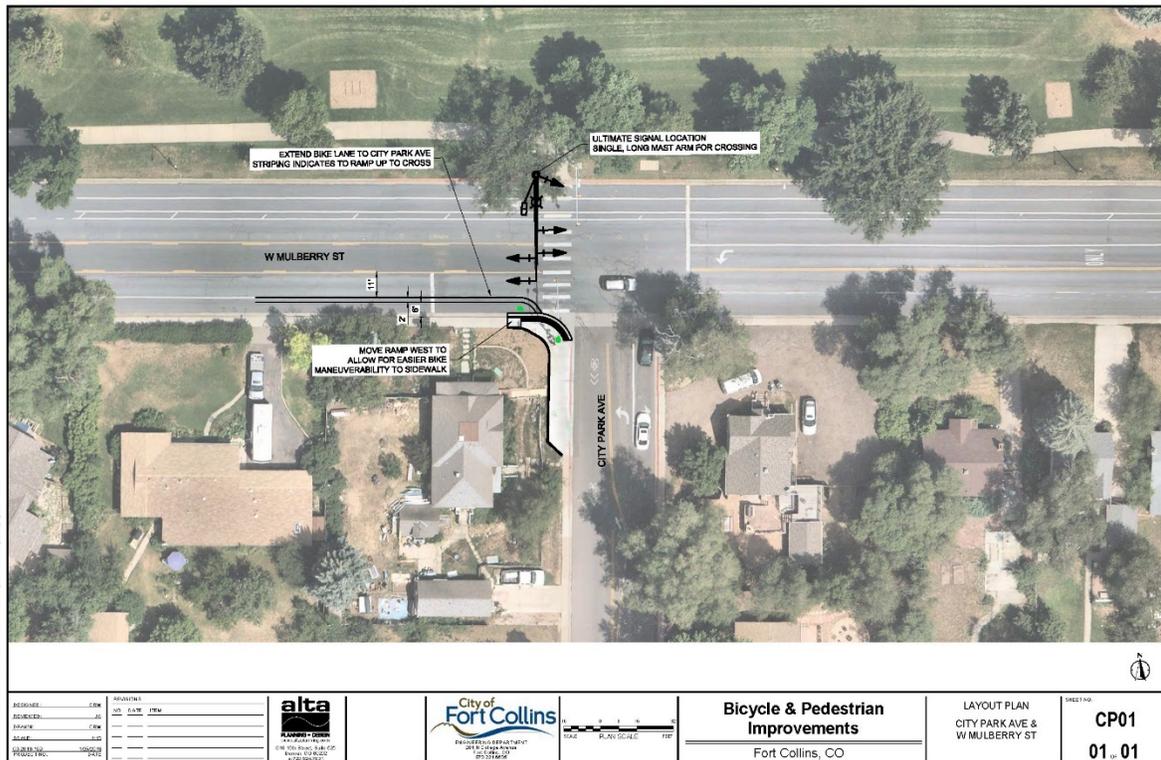
## CITY PARK BIKE CROSSING

At the intersection of City Park Ave. and W. Mulberry St., there is a shared bicycle and pedestrian crossing. It was found that the push button on the southwest corner for the crossing is difficult to access for eastbound bicyclists trying to cross.



**Recommendation:** develop and implement a new design which improves bicyclist access to this push button and crossing, while also improving wayfinding. In the long term, the City plans to upgrade the pedestrian signal in order to remove the pole from the southwest corner of the intersection and place a new single pole on the north side of the intersection.

**Draft concept design:**



## TWO-WAY PROTECTED BIKE LANE (CITY PARK TO JACKSON)

Just to the east of this crossing bicyclists and pedestrians share a path on the north side of W. Mulberry St. in City Park that connects to Jackson Ave. and W. Magnolia St. bikeway. Since bicyclists have to share the path with pedestrians there is some concern about amount of space for both users and conflicts between users. Additionally, this path is not especially direct or obvious to first time users of the facility.



**Recommendation:** evaluate benefits / tradeoffs of introducing an in-street two-way protected bike lane on the north side of W. Mulberry St. between City Park Ave. and Jackson Ave., which would be more direct, improve wayfinding, and reduce potential pedestrian/bike conflicts on the path. This design would require parking removal in this section so this will need to be further evaluated.

## ADDITIONAL BIKE LANE SECTIONS WITH PROTECTION

Through the course of implementing and evaluating the pilot project, it was found that there are a few sections of bike lane in the corridor with painted buffers only that could potentially include further protection barriers.



**Recommendation:** install additional flex post barriers along the corridor where possible given the driveways. One example is the section for westbound bicyclists west of Bryan Ave.

## SPEED MITIGATION

While speed data has shown that speeds have decreased along the corridor overall since installation of the pilot, speed remains a primary concern for residents and businesses, with 85<sup>th</sup> percentile speeds still as high as 41 mph.

**Recommendation:** consider installation of speed radar feedback sign and evaluate other speed mitigation strategies.

## PROTECTION UP TO INTERSECTIONS

The pilot project tested a couple of different methods of how to treat the bike lane protection at intersections. Primarily, bike lane barriers were dropped 100' in advance of intersections, while another treatment which carried the protection up to the intersection was tested at Tyler St. The treatment at Tyler St. was found to be mostly successful, with no conflicts observed, but requires some design modifications to meet the desired set-back objective for right-turning vehicles.



**Recommendation:** modify the treatment at Tyler St, further review results and consider piloting at other intersections.

## LEFT TURN BOX SIGNAGE

At the intersection of Taft Hill Rd. and W. Mulberry St. the pilot project installed the City's first two stage left turn box. Through implementation and evaluation of the project it was determined that additional education is needed for corridor users on how to use this infrastructure.



**Recommendation:** add educational signage and conduct user education.

## ADJUST PARKING CURB STOPS

In the section of angled parking protected bike lane on the north side of W. Mulberry St. adjacent to City Park, the effective bike lane width is often narrowed by parked cars who hang over the bike lane.



**Recommendation:** adjust the location of the parking curb stops to widen the bike lane in this section and improve vehicle compliance.

## IMPROVE VISIBILITY AT JACKSON 2-WAY BIKE RAMP

Where the shared use path in City Park (on north side of W. Mulberry St.) meets up with Jackson Ave. to connect to the W. Magnolia St. bikeway, there is a two-way bike ramp which transitions users from the City Park path onto Jackson Ave. Adjacent to this ramp there is angled parking which limits visibility for southbound Jackson Ave. traffic to see eastbound cyclists transitioning to Jackson Ave. from the ramp, and vice versa.



**Recommendation:** assess additional parking removal of some of the angled parking on Jackson Ave. to improve visibility in this location.

## IMPROVE AESTHETICS

Public feedback indicated concerns over the impact of the protected bike lanes on the aesthetics of the corridor, including feedback about the appearance of the flex posts following winter conditions and operations.

**Recommendation:** continue cleaning of the delineators at least a couple times per year, and upgrade bike lane protection as funding is available in areas where aesthetics, safety and functionality, and design consistency are of concern.



## DESIGN RECOMMENDATIONS (PROTECTED BIKE LANES):

### TYPE OF PROTECTION

As mentioned previously in this report, one of the goals of the pilot project was to evaluate different types of bike lane protection to determine pros and cons of each barrier type, and the scenarios where each type may be best suited.

Based specifically on evaluation of W. Mulberry St., the matrix below was created to show the benefits and drawbacks of each protection type used. Overall concrete curb protection, and flex posts were found to have the highest scores in most areas, while bike rail was found to score lower. As such, as stated earlier it is recommended that the sections of W. Mulberry St. with bike rail (primarily where the bike rail is used around a curve) be replaced with concrete curb and flex posts as funding is available.

**High level evaluation of different protected bike lane barriers (based on W. Mulberry St. pilot project)**

	Safety	Comfort	Aesthetics	Maintenance	Bicyclist preference	Driver Preference	Cost	Durability	Installation
<b>Concrete curb</b>	Green	Green	Green	Green	Green	Yellow	Yellow	Green	Red
<b>Flex posts</b>	Yellow	Yellow	Yellow	Yellow	Green	Green	Green	Yellow	Green
<b>Bike rail</b>	Yellow	Green	Red	Red	Yellow	Red	Yellow	Red	Yellow

Despite this finding, there may still be some other cases Citywide in which bike rail protection may be the preferred protection type, such as in a flood plain where concrete curbs are not a suitable option. Also, despite survey respondents not indicating a preference for the bike rail, when asked about perceived comfort and safety, respondents indicated feeling safer and more comfortable bicycling with the bike rail as compared to flex posts. See results below.

**Survey question: How safe and comfortable do you feel when bicycling in different sections of the W. Mulberry St. protected bike lanes?**

	<i>Very safe and comfortable</i>		<i>Somewhat safe and comfortable</i>		<i>Somewhat unsafe and uncomfortable</i>		<i>Very unsafe and uncomfortable</i>		<i>Not applicable to me, I haven't ridden this section</i>		<i>Responses</i>
	<i>Count</i>	<i>Row %</i>	<i>Count</i>	<i>Row %</i>	<i>Count</i>	<i>Row %</i>	<i>Count</i>	<i>Row %</i>	<i>Count</i>	<i>Row %</i>	
<b>Sections with concrete curbs</b>	272	62.7%	93	21.4%	38	8.8%	19	4.4%	12	2.8%	434
<b>Sections with</b>	158	36.7%	215	49.9%	44	10.2%	9	2.1%	5	1.2%	431

<i>only flexible posts</i>											
<b>Sections with "bike rail" (white metal rail)</b>	<b>241</b>	<b>55.4%</b>	<b>123</b>	<b>28.3%</b>	<b>44</b>	<b>10.1%</b>	<b>20</b>	<b>4.6%</b>	<b>7</b>	<b>1.6%</b>	<b>435</b>
<b>Section behind parked cars by Sheldon Lake</b>	<b>82</b>	<b>18.9%</b>	<b>170</b>	<b>39.2%</b>	<b>104</b>	<b>24.0%</b>	<b>43</b>	<b>9.9%</b>	<b>35</b>	<b>8.1%</b>	<b>434</b>
<b>Sections with only a buffered bike lane (just paint)</b>	<b>67</b>	<b>15.4%</b>	<b>204</b>	<b>46.9%</b>	<b>123</b>	<b>28.3%</b>	<b>38</b>	<b>8.7%</b>	<b>3</b>	<b>0.7%</b>	<b>435</b>

## DESIGN OF PROTECTED BIKE LANES

The pilot project also evaluated the ideal width for protected bike lanes for maintenance purposes and found that 6 feet is the recommended minimum width for maintenance equipment used by the City.

Additionally, the project evaluated three different designs for the protected bike lanes at intersections. As stated earlier, the recommendation is to make further changes to the design at Tyler St. and continue this evaluation.

Results from the online survey further indicate level of comfort associated with the different intersection designs demonstrated along W. Mulberry St. The results suggest a higher percentage of people feel very safe and comfortable bicycling through the concrete-separated intersection (located westbound at Bryan) than traveling through intersections with a dashed bike lane approach. Results from this question are included below:

**Survey question: *Pertaining to the intersection treatments shown in the previous images: How safe and comfortable do you feel when bicycling through the different types of intersections along the W. Mulberry St. protected bike lanes?***

	Very safe and comfortable		Somewhat safe and comfortable		Somewhat unsafe and uncomfortable		Very unsafe and uncomfortable		Not applicable to me, I haven't ridden this section		Responses
	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count
Image 1. Green painted bike lanes indicating merge or conflict areas	141	32.5%	229	52.8%	49	11.3%	9	2.1%	6	1.4%	434
Image 2. Concrete-separated intersection (westbound at Bryan)	261	60.0%	102	23.4%	43	9.9%	16	3.7%	13	3.0%	435
Image 3. Dashed bike lane approaching intersections	52	12.0%	188	43.3%	132	30.4%	57	13.1%	5	1.2%	434

## CONCLUSIONS

While there is still room for further improvement along the W. Mulberry St. corridor, the pilot project has achieved each of its four primary goals to at least some degree.

1. The project improved safety metrics in the first year with a 15-20% decrease in crashes, a 5-20% decrease in injury crashes, and a 4-11% decrease in vehicles speeds along the corridor.
2. The project also improved perceived safety and comfort for users along the corridor, with 52% of survey respondents indicating “my sense of safety of driving on Mulberry” has increased somewhat or a lot, and 80% indicating their sense of comfort and safety had increased when bicycling on the street.
3. Further, the project increased bike ridership along the corridor with 50% increase in average daily bike volume in the first year following the project.
4. Finally, the project demonstrated and piloted several protected bike lane designs along a high speed and traffic volume corridor, and highlighted benefits and negatives of each design.

With further targeted improvements including the recommendations for design modifications listed within this report, the goal is to continue to further improve safety, user comfort, bike ridership, and best design practices on W. Mulberry St.

An additional key takeaway from the project has also been the impact on making W. Mulberry St. more family friendly to travel. Survey results showed that 56% of respondents would bike on W. Mulberry St. with children with the new protected bike lanes, and several respondents commented on the family friendly design.

The survey results also highlighted resident interest in building more protected bike lane projects around the City. 66-67% of respondents indicated they support building more protected bike lanes citywide after experiencing them on W. Mulberry St.

Overall, the results of the pilot project have been successful and as such the City plans to maintain and further improve the pilot project design with protected bike lanes on W. Mulberry St. The successful results and the resident interest in additional similar projects citywide suggest that the approach taken on W. Mulberry St. and the lessons learned can be applied elsewhere in the City and inform the design and construction of more protected bike lanes and family friendly projects on City roadways and arterials.