Holly Street Bike Lane Pilot Project

Before & After Study Report

W Holly Street & E Holly Street - Ellis Street to Bay Street
Downtown

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City of Bellingham WASHINGTON

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Transportation Division

Overview

The City of Bellingham's Public Works Department implemented a pilot project to a test a new bicycle lane on Holly Street, a key downtown corridor. This project included a buffered bike lane from Ellis Street to N State Street and a parking protected lane from N State Street to Bay Street.

To minimize disruption and cost, the pilot utilized pavement markings, signage, and low-impact features, with only a minimal reduction in parking spaces. The project was completed in early May 2024.

Recognizing the importance of community input and the need for data-driven decision-making, the pilot project incorporated a comprehensive evaluation program. This included:

- **Community engagement:** Extensive public outreach and feedback collection.
- **Data collection:** Rigorous data collection on traffic volumes, travel times, bicycle usage, and safety.
- **Adaptive management:** Ongoing monitoring and adjustments based on data analysis and community feedback.

This evaluation will inform future decisions regarding a more permanent and substantive bike lane solution for Holly Street.

Background and Project Needs

Holly Street from Ellis Street to Bay Street serves as the primary east-west arterial for vehicles and bicycles through downtown Bellingham. It provides a critical network connection as local access to the downtown business district and facilitates intra-city travel.

An engineering evaluation of the existing conditions along this stretch of roadway identified a high level of traffic stress for bicyclists. This indicates a functional gap in the active transportation network and presents systemic safety issues that likely deter all but the most confident riders.

- **A 2016 engineering study,** conducted as part of the Holly Street Overlay project, found that a significant number of bicyclists use this section of Holly Street. Approximately 3.6% of the total traffic during the afternoon peak hour consisted of bicycles, translating to an estimated 400+ cyclists per day. This substantial bicycle use, despite the high level of traffic stress, illustrates the importance of this corridor to the bike network and highlights the needs for improved bicycle facilities to support the City's overarching mode shift goals.

- **Driven by Citywide goals,** over the past 15 years, downtown Bellingham has seen a steady progression of improved facilities for active transportation modes, including the construction of bike lanes along most downtown arterials. These projects have typically necessitated the removal of vehicle lanes. Holly Street is a notable exception.

- **The 2024 Bicycle Master Plan**, which is informed by a data-driven network analysis and input received from public and stakeholder engagement, identifies Holly Street from Ellis Street to Broadway Street as a high priority for bicycle improvements. As its primary goal, this project aims to fill a critical gap in the City's bike network by providing cycling infrastructure on Holly Street. Additionally, the project offers an opportunity to improve pedestrian safety and comfort in the downtown area, aligning with needs identified in the City's Local Road Safety Plan.

Project Scope, Recommendations, and Goals

To improve the safety, mobility, and accessibility of active transportation modes through downtown, City staff installed the following on Holly Street:

- **A buffered bike lane** from Ellis Street to State Street.
- **A parking protected separated bike lane** from State Street to Bay Street.
- **Leading Pedestrian Intervals (LPIs)** along the Holly Street corridor to improve pedestrian safety and comfort.
- **Signal timing and signing adjustments** to accommodate the new traffic configuration and optimize traffic flow.

➢ **Buffered bike lanes** include a bike lane with a marked buffer between the bike lane and adjacent motor vehicle traffic. The buffer treatment consists entirely of pavement markings with no vertical elements. This treatment provides greater offset distance between bicyclists and drivers. For this project, the separated bicycle lanes included a 3-foot painted buffer, similar to N State Street.

➢ **Parking protected bike lanes** are separated bike lanes with the added benefit of a parking lane with high parking utilization between the buffer and the travel lane, which further protects the bike lane from the travel lane and is expected to provide a higher level of comfort for cyclists. This type of bike facility was frequently requested from the community during recent BMP Update engagement. For this project, the parking protected bike lane included a painted buffer and tubular markers, as well as a 12-foot parking lane between the buffer and the vehicle travel lanes.

The decision to change from a typical buffered bike lane to a parking protected design was informed by several factors, including roadway context, traffic characteristics, and transit use. Community feedback on both lane types gathered during this pilot will be used to inform future design decisions for proposed capital projects along this section of Holly Street.

As a complement to the bike lanes, the downtown signal system was re-timed to accommodate the reduced vehicle capacity, as well as provide an opportunity to implement Leading Pedestrian Intervals (LPIs) along Holly Street. LPIs give pedestrians the opportunity to enter the crosswalk at an intersection 3-7 seconds before vehicles are given a green indication. Pedestrians can better establish their presence in the crosswalk before vehicles have priority to turn right or left, which has been shown to reduce pedestrian-vehicle crashes by an average of 13% nationwide. In addition to LPIs, pedestrian safety and comfort within this project will be improved through reduced crosswalk lengths and larger buffers between pedestrians and active vehicle traffic.

By implementing these recommended improvements, the City hoped to achieve the following:

- Provide improved bike connectivity and fill the existing gap in the downtown bike network.
- Evaluate the effectiveness of parking protected bike lanes by utilizing quantitative and qualitative data before and after implementation.
- Improve the overall safety and comfort of people walking and biking downtown.
- Reduce vehicle speeds along Holly Street.
- Continuously engage the community throughout the project to obtain feedback.
- Provide an immediate improvement at a low cost.
- Conduct a comprehensive before and after evaluation to inform future improvements.

Community Engagement

The Public Works Communications and Outreach group has actively engaged with local community groups, including Walk and Roll Bellingham, We Bike Downtown, and the Downtown Bellingham Partnership. Various outreach events were held to present the project to the public and solicit feedback from potential users of the new bike lane.

Public input was crucial in shaping the project's design and implementation. Community concerns regarding safety, traffic flow, and the overall design were carefully considered and informed several significant modifications to the pilot project. These modifications included:

- **Bend-ins:** The addition of "bend-ins" at the four parking-protected bike lane intersections to improve visibility and reduce the risk of right-hook collisions.
- **Rechannelization:** The rechannelization of Holly Street between Commercial Street and Bay Street to improve traffic flow and reduce congestion.
- **Signal timing adjustments:** Continuous monitoring and adjustments to signal timing were made to minimize traffic delays and address community concerns about congestion.

While public feedback was vital, it's important to note that the project's design and implementation also relied on a comprehensive data-driven approach. This included:

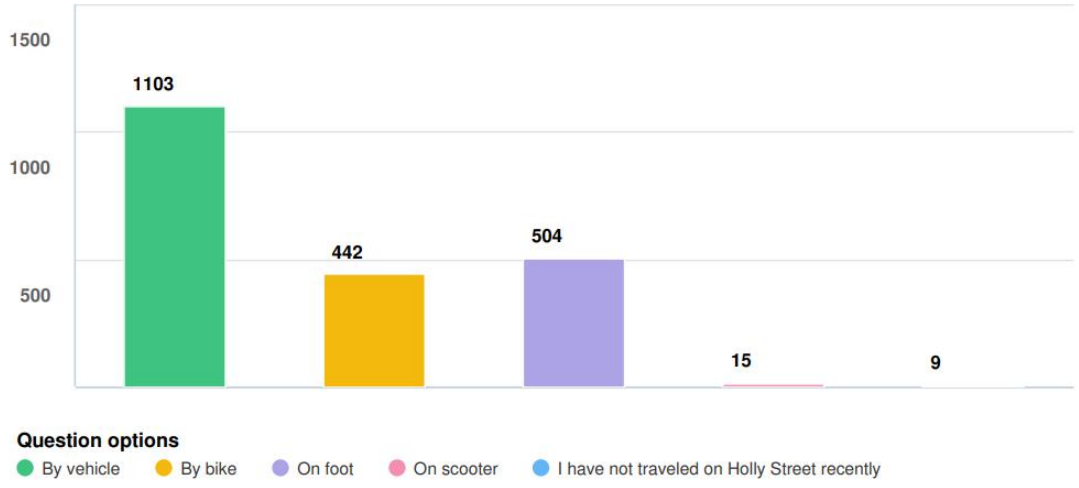
- **Traffic data collection:** Extensive data was collected before and after the pilot project, including traffic volumes, travel times, and bicycle usage patterns.
- **Engineering analysis:** Traffic modeling and engineering analysis were used to evaluate the potential impacts of the project on traffic flow and safety.
- **Safety assessments:** Near-miss analysis was conducted to identify and address potential safety concerns.

This multi-faceted approach ensured that the project's design and implementation were informed by both community perspectives and objective data.

Community Survey Data

A survey was available on EngageBellingham from May to October of 2024. There were 1,171 respondents to the survey, with a total of 1,120 comments left in the open comment field. An overwhelmingly majority (92%) of the responses were received within two months of the project's installation.

Q1 How have you traveled on Holly Street since the new bike lanes were installed?



Optional question (1172 response(s), 4 skipped)
Question type: Checkbox Question

Q2 How safe do you feel traveling on Holly Street since the pilot bike lanes have been installed?

Optional question (1173 response(s), 3 skipped)
Question type: Likert Question

Optional question (1171 response(s), 5 skipped)
Question type: Checkbox Question

Qualitative Feedback

In addition to the EngageBellingham survey responses, public comments were received by the project team from the sources listed in the table below. In total, the project received 1,310 comments as of October 2024.

Comment Source	Total Number of Comments
AskPW Emails	1
BikePed Improvement Request	17
Phone Calls	14
Customer Complaint Form	1
Email	53
EngageBellingham Question	99
SeeClickFix	5
Survey	1120
Total Comments	**1310**

The Holly Street Bike Lane Pilot Project has received significant negative feedback from the community. Key concerns raised include perceived safety hazards, increased traffic congestion, and ineffective design. A summary of major comment themes is provided in the table below.

Safety Concerns	• **Visibility issues:** Parked cars obstruct drivers' view of cyclists, leading to increased risk of accidents. • **Left turn difficulty:** Cyclists struggle to make left turns due to the current lane configuration. • **Pedestrian safety:** Increased traffic speeds and difficulty crossing streets pose risks to pedestrians.
Traffic congestion	• Removing a traffic lane has caused severe traffic congestion, increased travel times, and frustrated drivers. • The project has negatively impacted downtown businesses due to reduced traffic flow and accessibility.
Design Issues	• Many believe the bike lane is unnecessary due to low usage and contributes to congestion. • The current design, with parked cars separating the bike lane, is considered unsafe and inefficient.
Public Perception	• The project is widely perceived as a waste of taxpayer money. • Many question the decision-making process and lack of public input.
Alternative Solutions	• Relocating the bike lane next to traffic lanes for better visibility. • Removing parking lanes to create more space. • Implementing bike lanes on quieter streets. • Improving public transportation.

Overall Engagement Takeaway

Public feedback on the Holly Street Bike Lane Pilot Project revealed a range of perspectives, with significant concerns expressed regarding safety, traffic flow, and the overall design. These concerns, particularly regarding visibility issues at intersections with the parking-protected bike lane, were reflected in the data analysis, which showed a higher frequency of right-hook conflicts. This feedback, coupled with data analysis, informed several project modifications, as described further below, including the addition of "bend-ins" at intersections and rechannelization of a portion of the street. These iterative adjustments demonstrate the importance of ongoing community engagement and a data-driven approach to address public concerns and refine project design.

Data Collection and Analysis

A key component of this pilot was a rigorous data collection and analysis program. This approach aimed to provide objective evidence of the project's impact on various transportation modes, including cyclists, pedestrians, vehicles, and transit. By analyzing traffic volumes, travel times, bicycle usage patterns, and safety, the project sought to understand the true impacts of the new bike lanes and inform future decision-making.

Collecting Data

Extensive data collection was performed for the project, including pre- and post-project conditions to get a better understanding of the viability of bike lanes through this section of Downtown. Some of the questions the project team set out to answer utilizing the traffic data are:

- Will more cyclists use Holly Street if dedicated facilities are provided?
- Will current cyclists choose to switch over to a dedicated bike lane (a lower stress alternative)?
- Does a parking protected bike lane provide any measurable advantages over a simple buffered bike lane?
- What are the performance trade-offs for other modes of transportation as a result of removing a vehicle travel lane?

The types of data collected to try and answer these questions include the following.

Turning Movement Counts (TMCs)

TMCs were collected at each intersection on Holly Street from Ellis Street to Bay Street. These counts involve using a video recording unit which records the quantity and path of all vehicles, pedestrians, and bicycles using the intersection over a 24-hour period. This provides a snapshot of the volumes, mode shares, and travel patterns for each location. For this project, 24-hour TMCs were collected in mid-March and mid-August to compare the "before" and "after" volumes for the project, respectively. While the TMCs capture data for all legs of the intersection, this report will focus on westbound Holly Street movements alone.

In addition to the traditional TMC, the project team performed custom studies using the same August video footage to get bicycle counts solely within the bicycle lane, allowing the team to measure number of bicycles using the new lane vs. continuing to mix with vehicles in the traffic lanes.

Continuous Intersection Monitoring

A continuous traffic monitoring unit was installed at the intersection of Holly Street and Cornwall Avenue. This unit uses a fish-eye lens camera connected directly to the signal controller cabinet and records the volume, path, and type of all user modes (pedestrian, cars, trucks, bikes, etc.) entering and leaving the intersection. This data is available in real-time and provides the same information as a traditional TMC with the added benefit of recording data 24/7. This unit was provided by the manufacturer as a no-cost trial period for 60-days. The project team took advantage of the trial period to provide additional data for this project such as bicycle lane usage, volume trends, and near-miss collision information. The unit was installed in early September and collected data through mid-November.

Arterial Travel Time

One key metric for understanding the performance of an urban arterial corridor is travel time. This data is collected using video recordings of a test vehicle traveling between two fixed points along the corridor, and provides information about average speeds, congestion, and efficiency of the signal system. Travel time is also important in determining if real-world conditions reflect the traffic model used to develop the downtown signal timing strategy. For this project, travel time data was collected for weekday afternoon peak travel periods between June and October.

Analyzing Data

The data analysis revealed several key findings:

- **Increased Bicycle Ridership:** The data unequivocally demonstrated a significant increase in bicycle ridership on Holly Street following the installation of the bike lanes.
- **High Bike Lane Utilization:** With an average lane utilization rate of 87%, cyclists overwhelmingly chose to use the dedicated bike lanes, indicating a strong demand for this type of infrastructure.
- **Parking Protected Lane Performance:** While the parking protected bike lane encouraged higher ridership, the analysis revealed some challenges related to visibility and driver awareness, particularly regarding right-hook conflicts.
- **Impact on Other Modes:**
    - **Pedestrians:** The implementation of Leading Pedestrian Intervals (LPIs) improved pedestrian safety, but longer crossing times at some intersections were observed.
    - **Transit:** Increased congestion due to longer signal cycles negatively impacted the on-time performance of some transit routes.
    - **Vehicles:** While some increase in travel time was observed, the impact on overall traffic flow was manageable.

Volume Trends

The data show that overall vehicle and pedestrian volumes were lower in August compared to March, which is an unexpected result. This change could be attributed to several factors, including WWU not in normal session or people choosing to use alternative routes to Holly Street due to increased congestion. Subsequent monitoring during September and October indicate that volumes have increased since August but have not returned to the volumes observed back in March. A follow-up study in March 2025 should be conducted to compare year-over-year results.

The following table summarizes the before and after volumes for the corridor.

Holly Street Traffic Volumes by Mode

Daily Volumes - March 2024 vs. August 2024

Intersection of Holly Street &	Vehicles			Pedestrians			Bicycles		
	Before	After	% Change	Before	After	% Change	Before	After	% Change
Billy Frank Jr St	11983	11023	-8%	706	512	-27%	71	138	94%
N Garden St	12264	11232	-8%	1081	1023	-5%	168	178	6%
N Forest St	12352	10521	-15%	2251	1949	-13%	164	176	7%
N State St	14487	13410	-7%	2921	3204	10%	200	282	41%
Railroad Ave	12840	10821	-16%	4431	3598	-19%	163	222	36%
Cornwall Ave	11790	10008	-15%	3248	3784	17%	202	228	13%
Commercial St	10498	8969	-15%	3389	2879	-15%	142	189	33%
Bay St	8691	7698	-11%	2342	2654	13%	128	238	86%
Corridor Avg.	11863	10460	-12%	2546	2450	-4%	155	206	33%

Bicycle Analysis

When looking at bicycle usage, the data indicate that ridership on Holly Street has increased over 33% throughout the corridor after installing the bike lane. This is significant, considering that the other modes have generally decreased. This increase could be explained by the better weather in August; however, the project team also looked at the continuous data at Cornwall Ave and found that bicycle volumes have remained relatively constant through September and October, suggesting that the increase in volume is attributable to the bike lane itself, regardless of riding conditions.

The team took the bike volume analysis a further step and requested customized traffic studies that looked at the number of cyclists using the bike lane compared to cyclists mixing with vehicles in the traffic lanes. These results show the lane utilization (the proportion of cyclists that are choosing the bike lane) is over 87% for the corridor, which means that cyclists using Holly Street are overwhelmingly choosing the bike lane versus mixing in with cars and trucks.

A summary of the bike lane volume and utilization is shown in the following table.

Holly Street Bike Lane Volume & Utilization

Daily Volumes - March 2024 vs. August 2024

Updated 11/13/2024

	Intersection of Holly Street &	Total Bike Volume			Bike Lane Utilization		
		Before	After	% change	Bike Lane	Total	% in Bike Lane
Buffered Bike Lane	Billy Frank Jr St	71	138	94%	138	138	100%
	N Garden St	168	178	6%	174	178	98%
	N Forest St	164	176	7%	140	176	80%
	Section Average	*134*	*164*	*22%*	*151*	*164*	*92%*
Parking Protected Bike Lane	N State St	200	282	41%	198	282	70%
	Railroad Ave	163	222	36%	194	222	87%
	Cornwall Ave	202	222	10%	190	222	86%
	Commercial St	142	189	33%	189	189	100%
	Bay St	128	238	86%	212	238	89%
	Section Average	*167*	*231*	*38%*	*197*	*231*	*85%*
Corridor Average		**155**	**206**	**33%**	**179**	**206**	**87%**

Another question the project sought to answer was if there is a measurable difference between a buffered bike lane and a parking protected bike lane. In the data we see a more substantial increase in bike lane volumes in the parking protected bike lane when compared to the buffered bike lane. However, when looking at the lane utilization values, a larger portion of cyclists are choosing to mix with vehicles within the parking protected lane compared to the simple buffered bike lane east of N State Street, suggesting that more confident cyclists are choosing to exit the bike lane west of the buffered section to avoid entering the parking protected lane. This data supports much of the public feedback from cyclists who felt that the conspicuity at the intersection was low due to parked cars, which increased the perceived risk of collisions with right-turning vehicles or “right-hooks”. Still, over 84% of total bike volume in this section remains within the bike lane, which means cyclists overall are comfortable using the parking protected bike lane.

Given these data, it is not clear whether parking protected bike lanes provides a measurable improvement compared to standard buffered bike lanes. While the increase in volume may suggest that additional separation encourages higher bike use, the lower utilization rate suggests that parking protected lanes may not be the most appropriate form of separated bike lanes for this corridor specifically.

Finally, the project team compiled bicycle counts throughout downtown to understand how the ridership on Holly Street compared to other "bike corridors" where dedicated bike lanes have been available for many years with well-established users. The comparison is summarized in the table below.

Downtown Bike Corridor Volumes

Daily Volumes - June to September 2024

Rank	Corridor	Bike Lane Type	Average Volume (bikes/day)
1	Holly St	Buffered/Separated	206
2	York	Buffered	143
3	N State St	Buffered	132
4	Magnolia St	Buffered	121
5	Champion St	Standard	101
6	Chestnut St	Buffered	98
7	N Forest St	Standard	95

The volumes demonstrate that Holly Street is now the highest-traveled bike corridor in the downtown area, with ridership more than 44% higher than the next highest route. This suggests that Holly Street not only has the highest demand for bikes but is the most important bike connection for the larger bicycle network.

Bicycle-Vehicle Near Miss Analysis

In response to widespread feedback from both bicyclists and drivers concerned about the conflict between bicycles and right turning vehicles, also called "right hook" conflicts, the team implemented "bend-ins" at the four parking protected bike lane intersections (Railroad Ave, Cornwall Ave, Commercial St, and Bay St). These treatments are described in further detail later in this report.

In conjunction with the bend-ins, the team also conducted a near-miss evaluation to understand the frequency and severity of the right-hook conflict. This evaluation was the primary driver to choosing the Holly/Cornwall intersection as the trial location for the continuous intersection monitoring unit. This intersection has the highest combination of through bikes and right-turning vehicles within the parking protected section.

The evaluation focuses on 4 categories of near miss events between vehicles and bicycles, including:

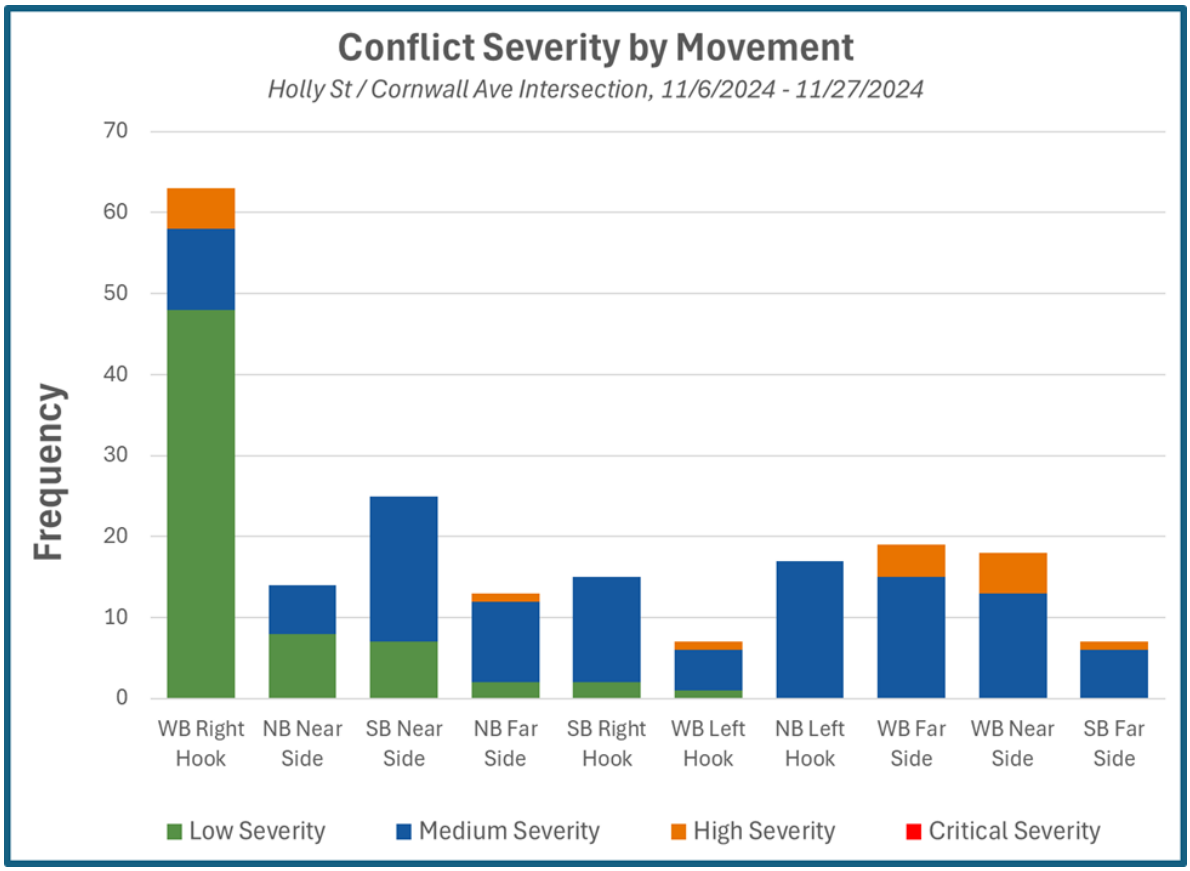
- **Low Severity** – incidents that were unlikely to result in injury or damage. These events include incidents where the time to impact or speeds were low, or where vehicles successfully identified bicycles in the bike lane and exhibited good yielding behavior.

- **Medium Severity** – incidents that had a minor risk of injury or damage. These events are characterized by increased discomfort from cyclists, resulting in minor adjustments to speed or path to maintain a comfortable buffer distance from vehicles. Drivers may have already initiated their turning maneuver but were unable to effectively identify approaching cyclists to yield.

- **High Severity** – incidents that had an elevated risk of injury or damage. These events occur when cyclists visibly changed their speed or path (braking/swerving) to avoid collisions, and vehicles had the ability to identify and yield to bicycles but did not.

- **Critical Severity** - incidents that would have resulted in injury or damage but did not. These events are characterized by heavy braking and swerving, higher vehicle and bicycle speeds, and lack of yielding behavior.

This type of evaluation is a proactive approach and captures the risk of collisions before they happen, rather than relying on reported collisions which typically is a reactive approach. The results of the evaluation are shown below.



The data show that there were no critical near-miss events at this intersection during the study period. While this result suggests that the current configuration is providing a minimum level of safety performance, it is not an indication of long-term viability of the design.

The data also show that the highest frequency conflict was the westbound “right-hook” movement, which constitute over 31% of the total recorded vehicle-bicycle conflicts at the intersection, nearly 3 times higher than any other conflict. While most of these conflicts are considered low severity, the high frequency confirms the concerns from public input, and indicates a need to pay special attention to this movement to reduce the potential for severe collisions.

Additionally, an estimated 58% of drivers were able to effectively identify bicycles in the bike lane and yield to cyclists in time to avoid a higher severity conflict. Care should be taken in future designs to increase this rate by improving the visibility between bicycles and vehicles and by reducing speeds for both modes, increasing the chances of yielding when conflicts arise.

Impact on other modes

As the primary arterial for the urban downtown core, Holly Street is used by all modes of transportation, including vehicles (cars & trucks), freight, transit, pedestrians, bicycles and other micro-mobility forms. While this project focused on improving accessibility and comfort for bikes, the project team also considered the impact to other transportation modes to understand the tradeoffs associated with removing a vehicle lane in favor of a bike lane.

Pedestrians

A key safety element of this project was to provide Leading Pedestrian Intervals (LPIs) at all the intersections along the corridor. While the main benefit of LPIs are to allow pedestrians to establish their presence in the crosswalk before vehicles have priority to turn, LPIs have the added benefit of turning vehicles having to wait for a shorter time before proceeding, reducing the impact on the overall vehicle movement when the proportion of turning vehicles is high. While the effectiveness of the LPIs on Holly Street needs more time before evaluation, public feedback throughout the project concerning the LPIs has been overwhelmingly positive while impacts to vehicular traffic are minimal.

One of the most significant tradeoffs for this long cycle length is that pedestrians are required to wait more than 90 seconds to cross Holly Street, which is roughly 3 times longer than in the pre-project conditions. Observations along the corridor showed an increase in pedestrians disregarding the pedestrian signal and entering live traffic instead of waiting for the protected crossing signal.

Transit

N State Street and N Forest Street are two key streets for several high frequency WTA transit routes. A recent report from the agency reported that Route 1, a high-frequency route which uses both of these streets, has seen a significant degradation of service because of the added congestion. This degradation is another direct consequence of the long cycle timing plan which sacrifices green time on N Forest St and N State St in favor of Holly Street, causing delay along these two side streets. A summary of the degradation is shown below.

WTA Route 1 Performance Metrics

85th Percentile Values - April 2023 to October 2024

	Intersection of Holly Street &	AM			PM		
		Apr 2023	Oct 2024	% change	Apr 2023	Oct 2024	% change
Runtime	Inbound	05:54	05:35	-5%	05:44	06:14	9%
	Outbound	08:07	08:35	6%	08:57	11:10	25%
On-Time Performance	Inbound - B'ham Station	98.9%	97.8%	-1.1%	99.4%	72.7%	-26.7%
	Inbound - 12th & McKenzie	97.8%	97.7%	-0.1%	98.9%	79.1%	-19.8%
	Outbound - B'ham Station	100%	100%	0%	95.0%	89.7%	-5.3%
	Outbound - 12th & McKenzie	100%	100%	0%	97.8%	69.8%	-28%

Route 1 had 6 dropped trips due to late busses in September, and the data show that both directions for this route are generally experiencing increased runtimes and decreased on-time performance, indicating that the long cycle strategy has had a negative impact on the quality of service for this transit route.

Vehicles

Prior to construction, the traffic engineering team developed a robust traffic analysis model to anticipate the expected congestion stemming from the single-lane bottleneck at the intersection of Holly Street and Bay Street. The team found that, depending on several driver behavior parameters, queueing along Holly Street had the potential to cause congestion through the I5/Lakeway Drive interchange, resulting in severe queuing of the I5 off ramps to Lakeway Drive. This condition creates a critical risk of high-speed, high severity rear-end collisions. To prevent this condition from developing, the traffic engineering team developed a series of signal timing strategies to mitigate the over-saturated

conditions, with each strategy geared toward minimizing the impacts to the other modes while still preventing congestion on Lakeway Drive.

After installation of the bike lanes, the team closely monitored conditions and incrementally adjusted the signal timing strategy until the over-saturated conditions were fully mitigated. This required increasing the total cycle length of the eastern five intersections of Holly Street (N State St, Railroad Ave, Cornwall Ave, Commercial St, and Bay St) from the pre-project 56 seconds to over 128 seconds.

To verify and update the model, as well as investigate public concerns about congestion, the traffic engineering team conducted regular travel time runs through the corridor during the PM peak period, approximately 5:00 PM during the work week. The results are shown in the following table.

Holly Street Travel Time & Speeds

PM Peak Hour - 6/17/2024 to 10/28/2024

Street Segment:			Avg. Travel Time	Avg. Speed
Ellis St	to	Billy Frank Jr St	12 sec	16.4 mph
Billy Frank Jr St	to	High St	14 sec	17.1 mph
High St	to	N Garden St	13 sec	18.6 mph
N Garden St	to	N Forest St	13 sec	18.8 mph
N Forest St	to	N State St	13 sec	18.8 mph
N State St	to	Railroad Ave	15 sec	15.6 mph
Railroad Ave	to	Cornwall Ave	16 sec	15.3 mph
Cornwall Ave	to	Commercial St	14 sec	16.6 mph
Commercial St	to	Bay St	14 sec	16.9 mph
Corridor Average			**02:33**	**17.1 mph***

**Note, average corridor speed excludes delay caused by waiting for red lights.*

While travel time data was not collected prior to installing the bike lanes, the calibrated traffic model estimates an average corridor travel time of 1 minute 54 seconds under pre-project conditions. The travel time analysis shows that the corridor is operating at an acceptable level of service, with an average PM peak travel time of 2 minutes and 33 seconds. This means that the average driver is experiencing an additional 39 seconds of travel time during the PM peak hour as a result of the project, which is considered low for a corridor that is over ½ mile long with 10 signalized intersections. Additionally, average speeds have reduced to between 15 and 19 mph, decreasing the risk of severe collisions of all types, in particular pedestrian collisions. Reduced speeds also have the added benefit of increasing the comfort for both pedestrians and bicycles, while making the downtown core feel like a more balanced facility for all modes.

A visual depiction of the travel time is shown on the following exhibit.

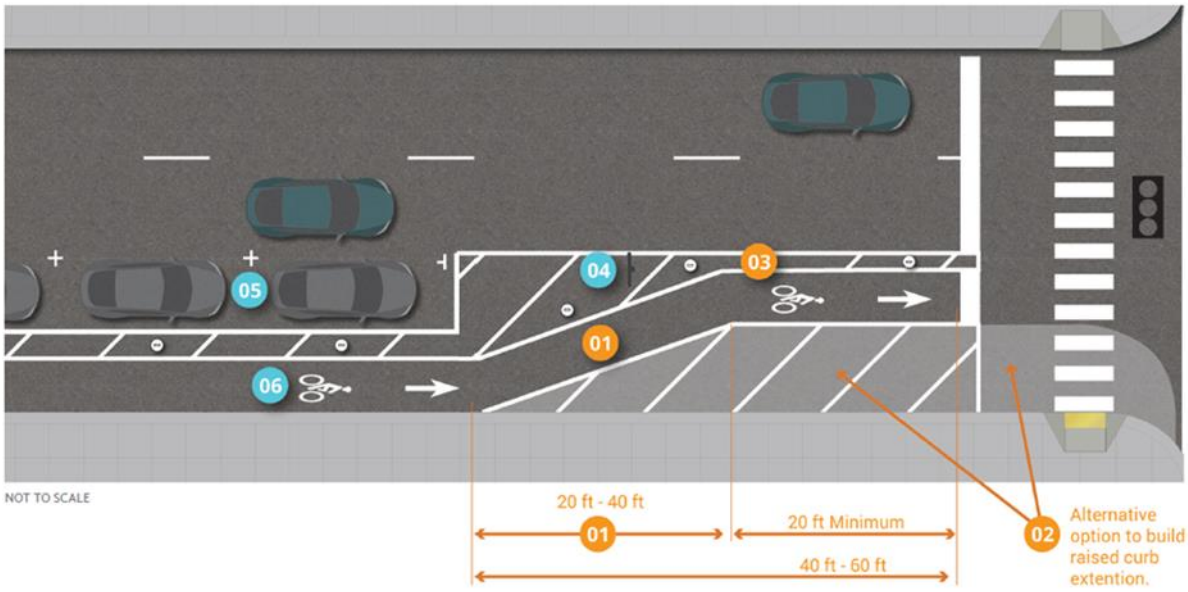
Design Changes

As a pilot project, the project team was committed to taking feedback and implementing minor adjustments throughout the life of the project. Several changes were made to mitigate collision risk and improve the overall operation of the street. Two of the more substantial changes include revising the protected bike lane approaches to include “bend-ins” and rechannelizing the entire 200 block of Holly Street to add vehicle turn lanes. The following is a summary of each.

Bike Lane Bend-Ins

Bike lane “bend-ins” are a treatment outlined in the FHWA Separated Bike Lane Planning and Design Guide which is specifically geared towards increasing the visibility of bicyclists for turning vehicles by re-positioning them adjacent to the vehicle lane or “bending them in” as shown in the diagram below.

Figure 25



In order to make this change, the project removed an additional parking space at each of the four parking protected bike lane intersections in order to provide bend-ins that are ~56 feet in total length. This change was made in response to widespread public feedback from both drivers and cyclists about limited visibility of bicycles at the parking protected intersections. Following this change, the concerns were reduced significantly, and recorded traffic footage confirmed improved yielding behavior between right turning vehicles and bicycles.

Commercial Street to Bay Street Rechannelization

One of the more significant traffic operations constraints for this project was a bottleneck created by the “streateries” constructed within the left-hand travel lane of Holly Street between Commercial Street and Bay Street. These streateries were allowed as part of a COVID-era program to help bolster economic activity in the downtown core. At the time, traffic volumes had fallen significantly, and it was not

expected to cause any significant delays to traffic. However, traffic volumes have since rebounded and exceeded pre-COVID levels, and by removing a travel lane for the bike lane, the project created a bottleneck at the Commercial Street intersection, that forced all vehicles to merge into a single lane. While the team was able to accommodate this condition, as discussed earlier, it required implementing a signal strategy that had significant trade-offs for other users of the roadway.

In early October, the streateries were removed from the travel lane, and the project team had the opportunity to remove the bottleneck by restoring the channelized turn lanes at the Holly/Bay intersection. This change allowed the traffic engineering team to reduce the cycle length back down to 64 seconds, which has alleviated the severe congestion on N State Street and N Forest Street and improved transit service. The shorter cycle length has also reduced pedestrian crossing wait times to 30-40 seconds, shortening the delay for the 4,000-8,000 daily pedestrians using roadway, as well as reducing the rates of pedestrians disregarding the walk signals. Currently, congestion has increased compared to the long cycle; however, the queueing has not caused operational issues into the Lakeway Drive interchange, and the team is closely monitoring the conditions to ensure this condition does not develop. As drivers learn to navigate the new channelization, the team expects operations to improve substantially.

As with all design elements, there are always tradeoffs to consider. The rechannelization of Holly Street along this block required the team to remove the parking protected bike lane in favor of a marked transition where the bike lane and travel lane cross over each other as shown in the diagram below.

This design was required based on standards found in the MUTCD, which prohibit a bike lane to be placed to the right of a right-turn lane. Instead, bicycles are shifted left while vehicles shift right within a transition area, similar to treatments found at several other intersections throughout the city.

What We Learned

When looking at all the data together, there is enough information to answer some of the key questions posed by this project.

Question	***Will more cyclists use Holly Street if dedicated facilities are provided?***
Answer	Yes. The volume data shows a 33% average increase in bike ridership compared to pre-project conditions, and the bike volumes have remained elevated through the early fall with worsening weather conditions.
Question	***Will current cyclists choose to switch over to a dedicated bike lane (a lower-stress alternative)?***
Answer	Yes. With an average lane utilization rate of 87% through the corridor, bicyclists are overwhelmingly choosing to ride in the bike lane versus mixing with vehicles in the traffic lanes.
Question	***Does a parking protected bike lane provide any measurable advantages over a simple buffered bike lane?***
Answer	No. The data suggests mixed results when comparing the simple buffered bike lane section compared to the protected bike lane section. Ridership in the protected lanes was higher, but the lane use proportion was lower. Some of the issues with bike-vehicle conflicts required intervention from the project team, and there was widespread concern from both bicyclists and drivers about visibility of bikes behind parked cars.

The answers to these questions provide enough justification to conclude that a dedicated bike lane on Holly Street is an indispensable component of the downtown bike network. This is particularly true considering the street's high bicycle demand and its crucial role in creating a citywide bike network. We have proven that there is a high demand for a separated bike facility, and that any permanent facility on Holly Street will enjoy heavy use. This project has also proven that the impacts to vehicle congestion because of removing a traffic lane can be effectively mitigated through signal timing strategies, with minimal increases to overall travel time. As an added benefit, reduced speeds create a lower-risk and more comfortable environment for all users and provide a feeling of a more balanced, truly multi-modal street context, which is desirable for a vibrant downtown core.

Conclusions and Next Steps

This pilot successfully demonstrated the effectiveness of a dedicated bike lane on Holly Street while providing valuable data to inform future improvements in bicycle infrastructure.

Main Conclusions

1. The bike lane on Holly Street served as an important piece of the city biking network, increasing bike ridership downtown and outperforming adjacent bike lanes in the downtown core.

2. The current design of the bike lane is unpopular with concerns primarily centered around perceived safety risks and increased traffic congestion.

3. Speed was decreased for drivers downtown, and overall travel time through the corridor increased by less than 40 seconds.

Putting It All Together

When looking at the project holistically, including both what the public has expressed and what the data tells us, two competing themes emerge from this project – bike lanes clearly belong on Holly Street, but the design cannot remain in its current form.

Initially, the bike lanes on Holly Street faced significant public backlash due to concerns over increased congestion. In response, the team implemented several engineering adjustments, including signal timing changes and rechannelizing Commercial Street to Bay Street. These changes effectively addressed operational issues, reducing congestion on side streets and improving travel times. Additionally, the project has successfully maintained pedestrian and transit accessibility. By demonstrating responsiveness to public feedback and achieving acceptable levels of service, the project has proven the feasibility of a protected bike lane on Holly Street within the downtown core.

One significant theme that emerged from public feedback was safety concerns expressed by both cyclists and drivers regarding the current design. Public concerns centered on visibility issues and the risk of “right hook” conflicts. A near-miss analysis supports these concerns, with over 31% of total vehicle-bicycle conflicts at the Holly St and Cornwall Ave intersection involving westbound “right hook” movements. Although most of these conflicts were low severity, their high frequency aligns with public feedback. To address these concerns, the project team must implement additional design changes in the interim.

Despite safety concerns, there was a substantial increase in bike lane usage since its implementation, with ridership levels remaining high into October. Holly Street has now become the most heavily used bike route in the downtown core, and the demand for this bike lane is so great that cyclists are willing to prioritize its use, even if it means compromising on perceived safety.

While the implementation of protected bike lanes on Holly Street has been successful in increasing cycling ridership and improving downtown connectivity, further design refinements are necessary to address public safety concerns and optimize the experience for all users. Moving forward, the project team will carefully consider public feedback and lessons learned to develop a more permanent solution.

Next Steps

Ongoing Stakeholder Work

Public Works will engage with the Transportation Commission and stakeholder groups such as Walk and Roll, We Bike Downtown, the Downtown Bellingham Partnership and WTA as we design an interim and final solution for the bike lane.

Interim Design

Public Works will work on a new design for Holly Street this Spring that reflects the concerns of residents- increasing visibility for bikers, decreasing right-turn conflicts and slowing bikers down through intersections.

Final Capital Project

Public Works will bring on a consultant to help design a final layout for Holly Street, implementing the lessons that we learned from both the data, and from the lived experience of the community.