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TECHNICAL MEMORANDUM

July 2025 (revised October 30, 2025) Project# 274770.006

To: Andreas Wolfe, Street Design Project Manager
City of Cambridge Department of Transportation

From: Meredyth Sanders, Casey Auch, Alec Donowitz

CC: Jackie McLaughlin, Nick Schmidt, Leah Grodstein

RE: Cambridge Separated Bike Lane Concepts Feasibility Study

Contents

Appendices

Executive Summary

The Cycling Safety Ordinance (CSO) requires the City of Cambridge to build a network of separated bike lanes (SBL) throughout the City. In addition to the planned facilities on Massachusetts Avenue, Cambridge Street, and Broadway, the City needs to begin constructing 3.1 miles of separated bike lanes by November 2026 to meet the requirements of the CSO. To support this work, the consultant team developed concepts and evaluated the feasibility of separated bike lanes on six streets slated for greater separation in the 2020 Bicycle Network Vision. The goal of the feasibility study was to identify one preferred concept for each street. Of the preferred concepts, five were recommended for design and implementation by the November 2026 CSO deadline, summarized in **Table 1**.

Table 1. Concepts Recommended for Design and Implementation by November 2026

Street Name	Recommended Concept	SBL Facility Length
Huron Avenue	Two-way separated bike lane	0.51 miles
Kirkland Street	One-way separated bike lanes (eastbound and westbound)	0.14 miles
Quincy Street	One-way separated bike lane (northbound)	0.06 miles
Vassar Street	One-way separated bike lanes (eastbound and westbound)	0.4 miles
Mount Auburn Street	One way-separated bike lane (eastbound) and bicycle lane (westbound)	0.23 miles
Total Mileage Advanced		**1.34 miles**

The consultant team developed concepts for each corridor and assessed the effectiveness of each concept using four transportation factors:

1. **Traffic Operations**: The consultant team collected multimodal turning movement counts (TMC) and 72-hour speed, volume and vehicle classification counts and conducted traffic operations analysis using Synchro 11.
2. **Bicycle Level of Comfort:** The consultant team re-evaluated the existing bicycle level of comfort (BLC) on the study streets using the same criteria used in the 2020 Cambridge Bicycle Plan to capture any changes that may have occurred since the previous analysis**.**
3. **Crash History:** The consultant team reviewed crash patterns and crash-risk patterns at each separated bike lane location.
4. **Parking:** The consultant team documented the existing parking supply, occupancy, and curb regulation through field verification and calculated parking utilization by segment.

After assessing the design feasibility and multimodal effectiveness of each concept, City staff recommended a preferred design concept for each concept. City staff also recommended whether to advance the preferred concept for design and construction by the November 2026 CSO deadline.

The following sections provide further detail on each preferred concept, including concept dimensions and key outcomes from the feasibility study.

Granite Street

The design concept for Granite Street runs from Pearl Street to approximately 87 feet east of Rockingham Avenue. It includes one 6-foot separated bike lane with one 2-foot buffer, one 7-foot parking lane, and one 11-foot vehicle travel lane.

PREFERRED CONCEPT - GRANITE ST

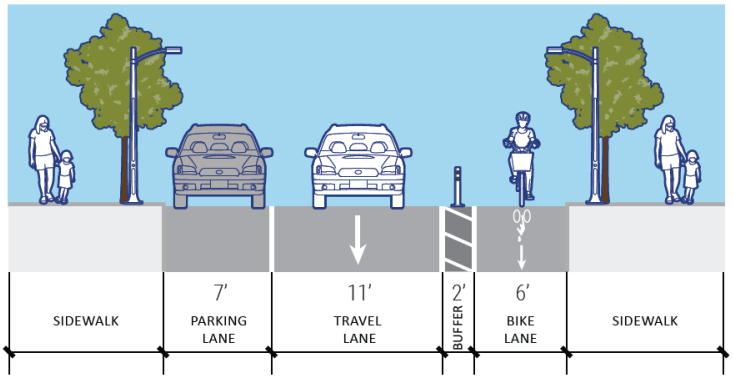


Table 2. Key Outcomes for Granite Street

Factor	Key Outcomes
Traffic Operations	▪ The design concept is not expected to affect traffic operations.
Bicycle Level of Comfort	▪ The design concept improves the bicycle level of comfort from 3 to 1, except for at the intersection where mixed traffic persists.
Crash History	▪ Granite Street does not have notable crash-patterns or crash-risk patterns when compared to other roads in the Boston MPO. ▪ On average, motorists travel at 18 mph on Granite Street.
Parking	▪ Parking occupancy on Granite Street is low on weekdays with a maximum occupancy of 56%. Parking occupancy is moderate on Saturdays, reaching 77% between 12:00 PM and 4:00 PM. ▪ The preferred design concept would reduce parking availability by 50%.
Recommendations	▪ The City of Cambridge did not recommend Granite Street for design and construction by the November 2026 CSO deadline.

Huron Avenue

The preferred design concept for Huron Avenue runs from Grove Street to Fresh Pond Place. It includes a two-way separated bike lane (between 8-15.5 feet) with one 2-foot buffer, one 7-foot parking lane, and two 11-foot vehicle travel lanes.

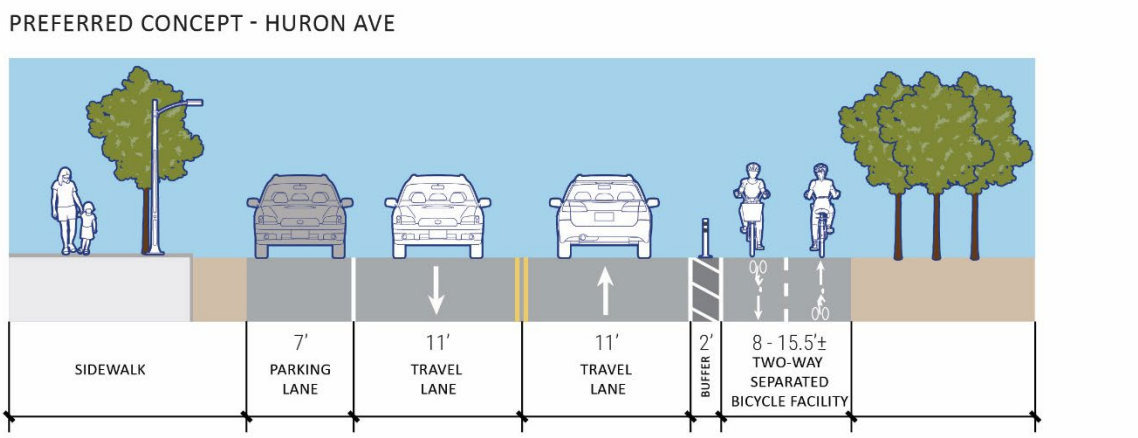


Table 3. Key Outcomes for Huron Avenue

Factor	Key Outcomes
Traffic Operations	▪ The preferred concept converts separate left- and right-turn lanes to a shared left-right turn lane on the Huron Avenue approach. ▪ AM peak hour delay for stop-controlled westbound motorists increases from 45.6 seconds per vehicle to 53.7 seconds per vehicle. PM peak hour delay for westbound motorists increases from 23.9 seconds per vehicle to 87.2 seconds per vehicle. ▪ Despite this increase in delay for the stop-controlled movement, 95th percentile queues are contained within the available storage facilities.
Bicycle Level of Comfort	▪ The preferred design concept improves the bicycle level of comfort from 4 to 1.
Crash History	▪ Huron Avenue has notable crash-patterns and crash-risk patterns when compared to other roads in the Boston MPO. The preferred concept addresses a Top 5% segment for fatal and injury crashes and secondary risk sites for bicyclists by providing a two-way separated bicycle facility. ▪ On average, motorists travel at 30 mph on Huron Avenue.
Parking	▪ Parking occupancy on Huron Avenue is low on weekdays with a maximum occupancy of 56% ▪ The preferred design concept would reduce parking availability by 67%.
Recommendations	▪ The City of Cambridge recommended Huron Avenue for design and construction by the November 2026 CSO deadline.

Kirkland Street

The preferred design concept for Kirkland Street runs from Oxford Street to Quincy Street. It includes two 5.5-foot separated bike lanes with 2-foot buffers and two 10.5-foot vehicle travel lanes. The extents of the Kirkland Street quick-build design were reduced from 0.29 miles (Oxford Street to Scott/Irving Street) to 0.07 miles (Oxford Street to Quincy Street). This is because the curb to curb width of Kirkland Street east of Quincy Street is too narrow to accommodate both MBTA buses and quick-build separated bike lanes. Bike lanes along Kirkland Street east of Quincy Street are not being advanced at this time.

PREFERRED CONCEPT - KIRKLAND ST

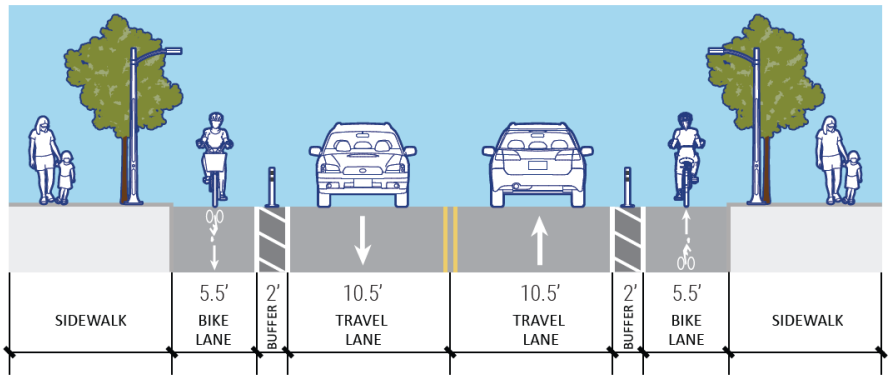


Table 4. Key Outcomes for Kirkland Street

Factor	Key Outcomes
Traffic Operations	▪ N/A – this concept design does not change signalized intersection operations
Bicycle Level of Comfort	▪ The preferred design concept improves the bicycle level of comfort from 3 to 1.
Crash History	▪ Kirkland Street has notable crash-risk patterns when compared to other roads in the Boston MPO. The preferred concept addresses a secondary risk site for bicyclists by providing separated bicycle facilities. ▪ On average, motorists travel at 23 mph on Kirkland Street.
Parking	▪ Parking occupancy on Kirkland Street is high on weekdays with maximum occupancies exceeding 80% between 8:00 AM and 10:00 PM. ▪ The preferred design concept would reduce parking availability between Oxford Street and Quincy Street by 15 spaces and maintain 43 spaces between Quincy Street and Irving Street/Scott Street (74% reduction).
Recommendations	▪ The City of Cambridge recommended Kirkland Street for design and construction by the November 2026 CSO deadline.

Quincy Street

The preferred design concept for Quincy Street runs from Cambridge Street to Kirkland Street. It includes one northbound 6-foot separated bike lane with a 2-foot buffer and two 11-foot vehicle travel lanes. A southbound separated bike lane was explored but is not being advanced at this time due to width constraints. Quincy Street is going to be fully rebuilt within the next five years as part of the City's capital construction plan, providing an additional opportunity to design the southbound connection.

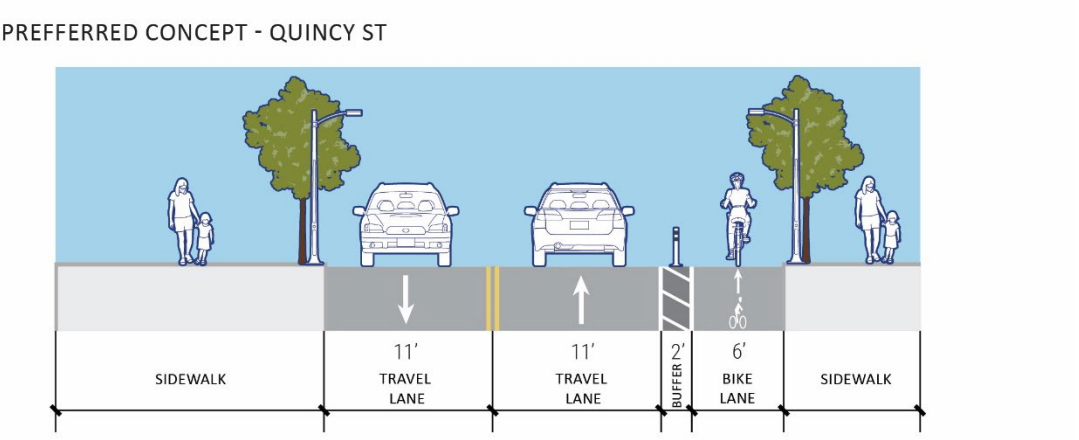


Table 5. Key Outcomes for Quincy Street

Factor	Key Outcomes
Traffic Operations	▪ To provide space for separated bike lanes, the preferred concept converts northbound left- and right-turn lanes to a shared left-right turn lane on the Quincy Street approach to the Quincy Street and Kirkland Street intersection. ▪ The preferred concept reduces AM peak hour delay for the intersection by 27.6 seconds and increases AM and PM peak hour delay for northbound motorists by 16.6 – 31.4 seconds. ▪ The preferred concept does not generate 95th percentile queues that spill back to upstream intersections or driveways.
Bicycle Level of Comfort	▪ The preferred design concept improves the bicycle level of comfort for northbound cyclists from 3 to 1. It does not improve bicycle level of comfort for southbound cyclists, so the BLC score for Quincy Street's preferred concept is 3.
Crash History	▪ Quincy Street has notable crash-patterns and crash-risk patterns when compared to other roads in the Boston MPO. The preferred concept addresses a Next 10% segment for fatal and injury crashes by providing a separated bicycle facility.
Parking	▪ N/A – this concept design does not change on-street parking.
Recommendations	▪ The City of Cambridge recommended Quincy Street for design and construction by the November 2026 CSO deadline.

Vassar Street

The preferred design concept for Vassar Street runs from Memorial Drive to approximately 275 feet east of Audrey Street. It includes two 6-foot separated bike lanes with a buffer between 2-3 feet, one 7-foot parking lane, and two 10.5-foot vehicle travel lanes.

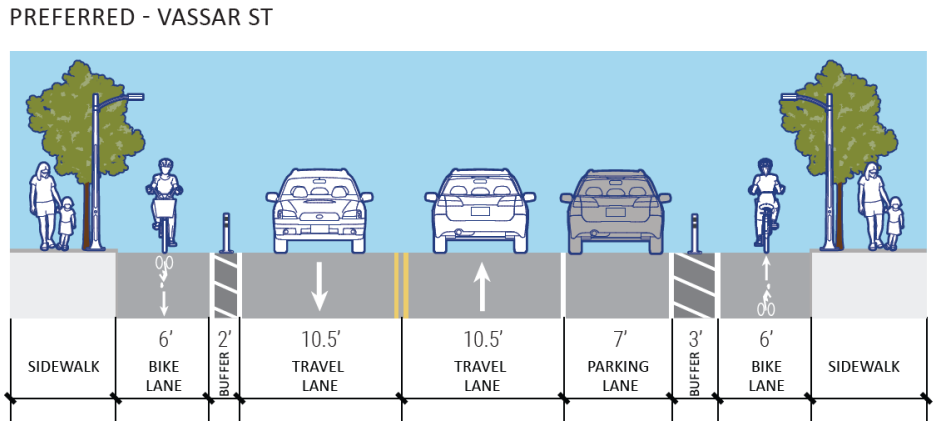


Table 6. Key Outcomes for Vassar Street

Factor	Key Outcomes
Traffic Operations	▪ N/A – this concept design does not change signalized intersection operations
Bicycle Level of Comfort	▪ The preferred design concept improves the bicycle level of comfort score from 2-3 to 1.
Crash History	▪ Vassar Street has notable crash-patterns when compared to other roads in the Boston MPO. The preferred concept addresses a Top 5% segment for fatal and injury crashes providing separated bicycle facilities. ▪ On average, motorists travel at 24 mph on Vassar Street.
Parking	▪ The preferred design concept reduces parking by 49%.
Recommendations	▪ The City of Cambridge recommended Vassar Street for design and construction by the November 2026 CSO deadline.

Mount Auburn Street

The preferred design concept for Mount Auburn Street runs from Brattle Street to Coolidge Avenue. It includes one westbound 6-foot separated bike lane with a 2-foot buffer, two 10-to-11-foot vehicle travel lanes, one 11-foot bus only lane, and one eastbound 6-foot bicycle lane.

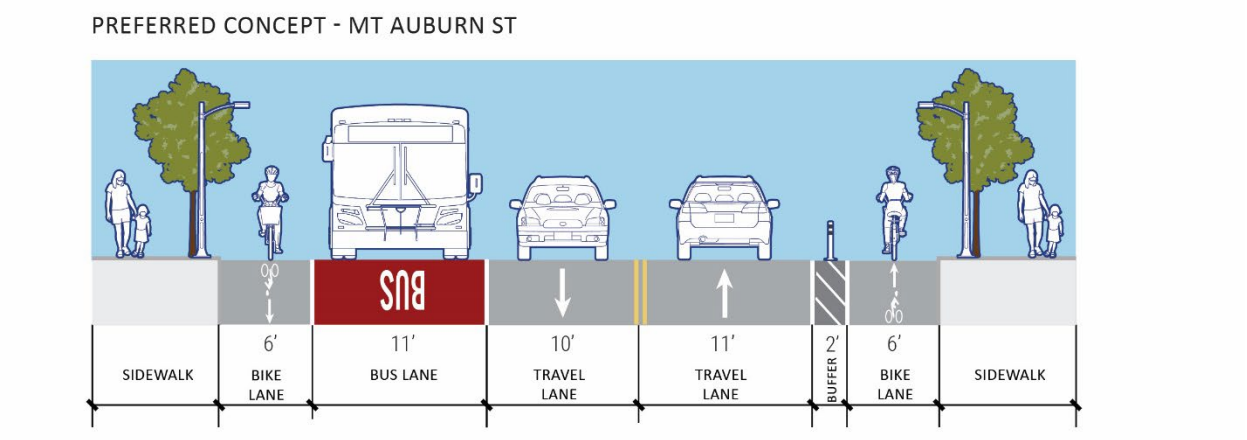


Table 7. Key Outcomes for Mount Auburn Street

Factor	Key Outcomes
Traffic Operations	▪ The preferred concept for Mount Auburn Street reallocates one westbound travel lane between Brattle Street and Aberdeen Avenue to provide a westbound separated bike lane on Mount Auburn Street. ▪ Compared to existing conditions, the preferred concept does not substantially increase or decrease corridor peak hour delay. ▪ The preferred concept generates maximum PM Peak hour queues for the eastbound left-turn from Mount Auburn Street to Brattle Street that spill back to Central Avenue. ▪ The preferred concept does not generate average queues that spill back to upstream intersections or driveways. ▪ A comparison of corridor average speeds in Simtraffic show that the proposed condition experiences a negligible reduction in corridor speeds (1 to 3 mph slower) compared to the existing condition.
Bicycle Level of Comfort	▪ The preferred concept improves the bicycle level of comfort for westbound cyclists from 5 to 1. It improves the BLC for eastbound cyclists from 5 to 2.
Crash History	▪ Mount Auburn Street has notable crash-risk patterns when compared to other roads in the Boston MPO. The preferred concept addresses a secondary risk site for bicyclists by providing separated bicycle facilities. ▪ On average, motorists travel at 32 mph on Mount Auburn Street.
Parking	▪ N/A – this concept design does not change on-street parking.
Recommendations	▪ The City of Cambridge recommended Mount Auburn Street for design and construction by the November 2026 CSO deadline.

Introduction

Cambridge conducted the Separated Bike Lane Concepts Feasibility Study to evaluate the design feasibility and multimodal outcomes associated with constructing separated bike lanes on six streets slated for greater separation in the 2020 Bicycle Network Vision. This memorandum presents the purpose and need for the Cambridge Separated Bike Lane Concepts Feasibility Study. It outlines the study's detailed analyses methods, initial concept sketches, analysis results, and preferred concepts for each corridor included in the study.

BACKGROUND

The Cycling Safety Ordinance (CSO) requires the City of Cambridge to build a network of separated bike lanes (SBL) throughout the City. In 2019, the Cambridge City Council first passed the Cycling Safety Ordinance, requiring the City to construct separated bike lanes when streets are reconstructed if the Bike Plan requires greater separation on those streets. In 2020, the Council passed amendments to the Cycling Safety Ordinance, which set ambitious requirements for the installation of approximately 25 miles of separated bike lanes by May 1, 2026. In 2024, the deadline was extended to November 1, 2026.

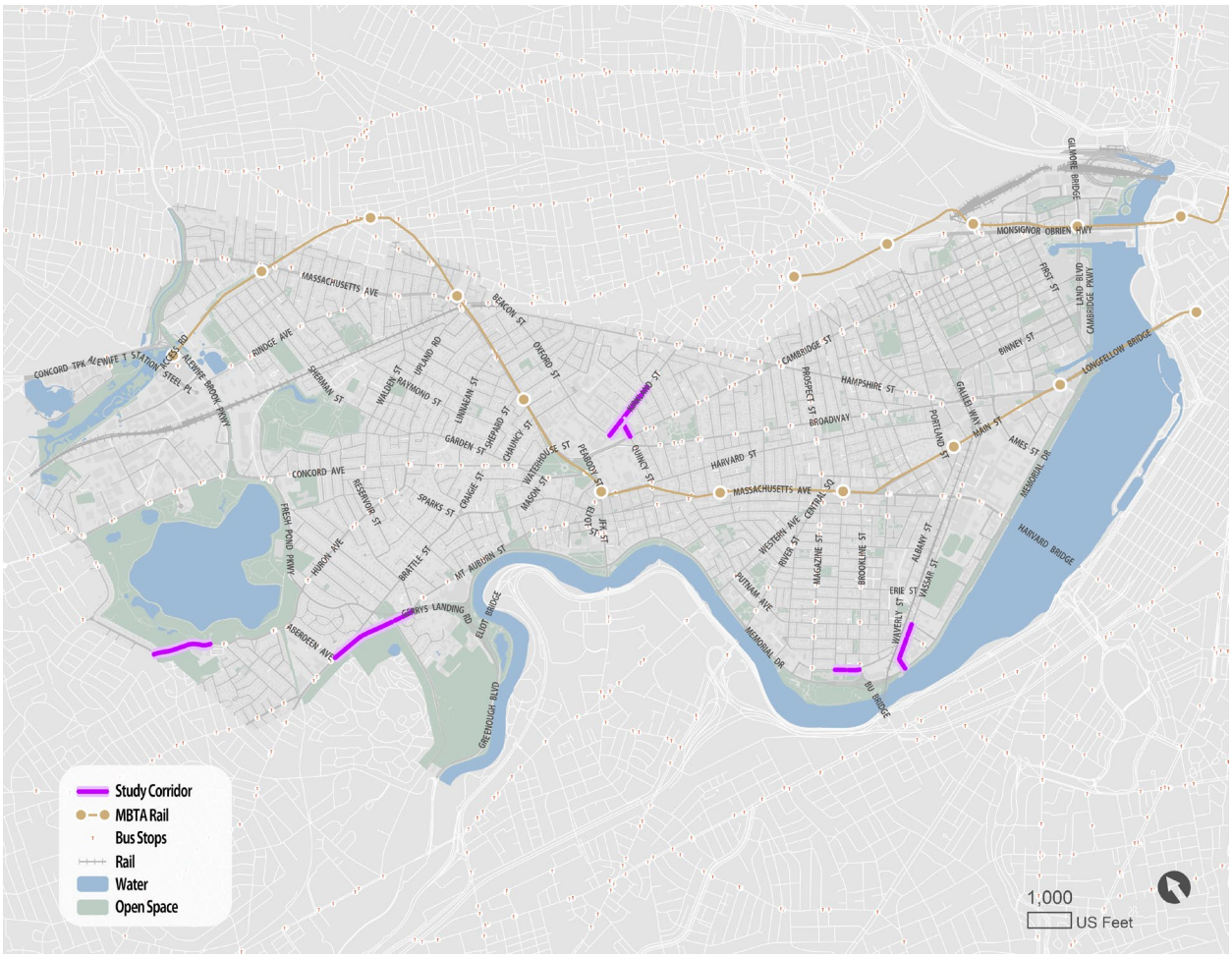
As of late 2024, the City had built 14.06 miles of separated bike lanes. In addition to the planned facilities on Massachusetts Avenue, Cambridge Street, and Broadway, the City needs to begin constructing 3.1 miles of separated bike lanes by November 2026 to meet the requirements of the CSO. To support this work, the consultant team developed concepts and evaluated the feasibility of separated bike lanes on six streets slated for greater separation in the 2020 Bicycle Network Vision (**Table 8, Figure 1**).[1]

Table 8. Study Locations and Potential SBL Facility Length

Street Name	Extents	Potential SBL Facility Length
Granite Street	Pearl Street to Brookline Street	0.20 miles
Huron Avenue	Grove Street to Fresh Pond Place	0.51 miles
Kirkland Street	Oxford Street to Scott/Irving Street	0.58 miles
Quincy Street	Kirkland Street to Cambridge Street	0.16 miles
Vassar Street	285 Vassar Street to Memorial Drive	0.4 miles
Mount Auburn Street	Coolidge Avenue to Brattle Street	0.50 miles
Total Potential Mileage		**2.46 miles**

[1] "2020 Bicycle Network Vision." *City of Cambridge*, 8 April 2025, www.cambridgema.gov/Departments/communitydevelopment/2020bikeplanupdate/2020bicyclenetworkvision.

Figure 1. Study Locations



The feasibility study included the following steps:

1. Develop concepts for each street to include separated bike lanes
2. Assess the effectiveness of each concept using four transportation factors:
    a. Traffic Operations
    b. Bicycle Level of Comfort
    c. Crash History
    d. Parking
3. Identify a preferred concept and recommend whether to advance each preferred concept to design and construction by the November 2026 CSO deadline

The following sections present the detailed analyses methods, initial concept sketches, analysis results, and preferred concepts for each corridor.

Analysis Methods

The consultant team used four transportation factors to assess the effectiveness of each separated bike lane concept. This section details the methodology for analyzing the four factors included in the Cambridge Separated Bike Lanes Concepts Feasibility Study:

1. Traffic Operations
2. Bicycle Level of Comfort
3. Crash History
4. Parking

TRAFFIC OPERATIONS

The consultant team conducted a traffic operations analysis for separated bike lane concept designs that would result in a change to signalized intersection operations. This traffic analysis was conducted at four locations:

- Granite Street and Brookline Street
- Huron Avenue and Grove Street
- Mount Auburn Street between Aberdeen Avenue and Coolidge Avenue
- Quincy Street and Kirkland Street

As part of the study, multimodal turning movement counts (TMC) were collected during weekday AM and PM peak periods, defined as 7:00 AM – 9:00 AM and 4:00 PM – 6:00 PM, on Tuesday, September 10, 2024 and Thursday, December 12, 2024.

The TMC were collected at the following locations:

- Kirkland Street and Quincy Street (December 12)
- Mount Auburn Street and Brattle Street (September 10)
- Mount Auburn Street and Coolidge Avenue (September 10)
- Huron Avenue and Grove Street (September 10)

In addition to the TMCs, 72-hour speed, volume and vehicle classification counts were collected between Tuesday, September 10 and Thursday, September 12, 2024 at the following locations:

- Kirkland Street west of Frisbie Place
- Kirkland Street east of Kirkland Road
- Mount Auburn Street midblock between Brattle Street and Coolidge Avenue
- Huron Avenue and Grove Street

The intersection of Mount Auburn Street and Aberdeen Avenue was included in the Mount Auburn Street model. The intersection was included to account for vehicle queuing and delay upstream of the proposed concept design. The team used Mount Auburn Street/Aberdeen Avenue TMCs collected on May 23, 2023.

Traffic operations for discrete intersections on Granite Street, Huron Avenue, Quincy Street, and Mount Auburn Street were analyzed using Synchro 11 and evaluated in accordance with the standards of the Highway Capacity Manual (HCM) 2000. This method was used because HCM 6th edition does not support exclusive pedestrian phase analysis.

Traffic operations for Mount Auburn Street were also analyzed using SimTraffic to understand the impacts of a proposed lane removal on the full Mount Auburn Street Corridor (Aberdeen Avenue to Coolidge Avenue).

The intersection turning movement counts and 72-hour speed, volume and vehicle classification counts collected in September and December 2024 are provided in **Appendix A**.

BICYCLE LEVEL OF COMFORT

The 2020 Cambridge Bicycle Plan includes an assessment of bicycling comfort on every city road using the Mineta Institute's pioneering ranking criteria for Level of Traffic Stress. In March 2025, the consultant team re-evaluated the existing bicycle level of comfort (BLC) on the study streets using the same criteria to capture any changes that may have occurred since the previous analysis. Consistent with the 2020 Bicycle Plan, road segments were scored on their most uncomfortable portion in either direction. While most BLC scores were unchanged, the following updates were made to Vassar Street:

- Segment between Audrey St and Amherst Alley to BLC 2 (bike lane, no parking)
- Segment between Amesbury St and Audrey St to BLC 3 (bike lane adjacent to parking)

The consultant team then applied the same methodology to evaluate how different design concepts may change the bicycle level of comfort on each street.

CRASH HISTORY

The consultant team reviewed crash patterns and crash-risk patterns at each separated bike lane location. The team used two MassDOT network screening tools to understand street-level crash and crash-risk patterns in the context of Cambridge and the broader Boston Region:

- **2013 – 2017 Excess Crashes MPO Ranking**: MassDOT dataset showing crash-based network screening data for roads in the state. The analysis used the latest available 5 years of closed geocoded crashes (2013-2017). There are two outputs for this analysis:
  - Excess Crashes MPO Ranking - All crashes
  - Excess Crashes MPO Ranking - Fatal and Injury Crashes

  The analysis identifies top crash locations based on segments exceeding the predicted number of crashes by severity on the MPO level. The datasets identify sites in the Top 5% and then Next 10% of all segments by MPO.
- **2013 – 2017 Strategic Highway Safety Plan Emphasis Area Safety Risk MPO Ranking**: MassDOT dataset showing risk-based network screening data for roads in the state. The risk-based network screening data is based on crash risk factors identified for many of the emphasis areas of the Strategic Highway Safety Plan, including:

- Distracted Driver
- Bicycle
- Impaired Driver
- Large Truck
- Motorcycle
- Occupant Protection
- Older Driver
- Roadway Departure
- Pedestrian
- Speed Aggressive Driving Young Driver

A variety of statistical methods were used to identify the crash risk factors for each of the emphasis areas. The datasets identify primary and secondary risk sites by emphasis area for all segments by MPO.

The Cambridge Separated Bike Lane Concepts Feasibility Study focuses on the effects of implementing separated bicycle lanes, a proven safety countermeasure for bicycle-involved crashes[2]. The study team selected three risk-based network screening datasets that are closely linked to bicycle safety for closer review:

- 2013 – 2017 Strategic Highway Safety Plan – Pedestrian Safety Risk MPO Ranking
- 2013 – 2017 Strategic Highway Safety Plan – Bicycle Safety Risk MPO Ranking
- 2013 – 2017 Strategic Highway Safety Plan – Speeding and Aggressive Driving Safety Risk MPO Ranking

In addition to these datasets, the study team reviewed Massachusetts **2020 Environmental Justice Populations** to understand the effects of crash patterns and crash-risk patterns on disadvantaged communities in Cambridge. The 2020 Environmental Justice Populations dataset is based upon demographic criteria developed by the state's Executive Office of Energy and Environmental Affairs.

Since high-speed crashes are more likely to result in fatal or serious injury crashes, particularly for people walking and biking, the study team concluded the safety review for each street with an assessment of the 72-hour speed counts collected in September and December 2024 (**Appendix A**).

PARKING

The consultant team conducted parking utilization inventories for all streets with on-street parking: Granite Street, Huron Avenue, Kirkland Street, and Vassar Street. Mount Auburn and Quincy Streets were not analyzed since neither street has on-street parking. Each inventory documented the existing parking supply and curb regulation, including accessible parking, metered parking, resident-permit parking, and loading zones, through field verification.

The consultant team collected parking utilization counts for every street every two hours from 8AM to 10PM Thursday, October 17, 2025, to Saturday, October 19, 2025, and from 8AM to 12PM Sunday, October 20, 2025 on Kirkland Street only. Parking along Vassar Street was prohibited on Friday and Saturday due to the 2024 Head of the Charles, an international rowing competition. In response, the

[2] "Bicycle Lanes." *U.S. Department of Transportation,* 8 April 2025, https:// highways.dot.gov/safety/ proven-safety-countermeasures/bicycle-lanes.

consultant team spot-checked parking occupancy on Vassar Street four times per day on October 29th-30th and collected new parking counts for each two-hour period on November 8th-9th.

To calculate parking occupancy by segment, the consultant team divided the number of occupied parking spaces by the number of available parking spaces per segment for every 2-hour period. This information was aggregated and mapped for the following time periods. **Appendix B** includes the parking occupancy maps.

- Weekday morning (Thursday & Friday, 8AM-12PM)
- Weekday afternoon (Thursday & Friday, 12PM-4PM)
- Weekday evening (Thursday & Friday, 4PM-8PM)
- Weekday night (Thursday & Friday, 8PM-10PM)
- Saturday morning (8AM-12PM)
- Saturday afternoon (12PM-4PM)
- Saturday evening (4PM-8PM)
- Saturday night (8PM-10PM)
- Sunday morning (8AM-12PM)

Parking occupancy rates were analyzed based on parking study guidance from the Metropolitan Area Planning Council (MAPC) of greater Boston. On-street parking occupancies of 85-90% are usually considered the highest acceptable target, since someone looking for a space will not find an empty one easily. Parking occupancy rates of 70% or lower highlight opportunities to reallocate underused curbside space to uses that better serve all users (e.g., shared use paths, separated bike lanes, floating bus stops).

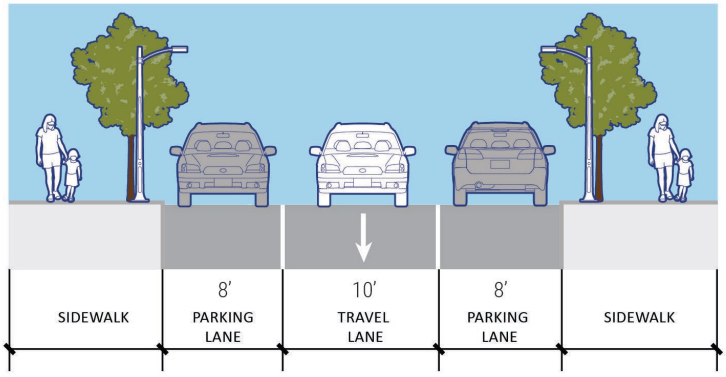
Concept Sketches and Analysis Results

This section describes the design concepts and analysis findings for each study street.

GRANITE STREET

Granite Street between Pearl Street and Brookline Street is a one-way collector road. Between Pearl Street and Rockingham Avenue, Granite Street has one travel lane and parking lanes on both sides of the street. Between Rockingham Avenue and Brookline Street, Granite Street widens out to two travel lanes with one parking lane on the south side of the street.

EXISTING - GRANITE ST

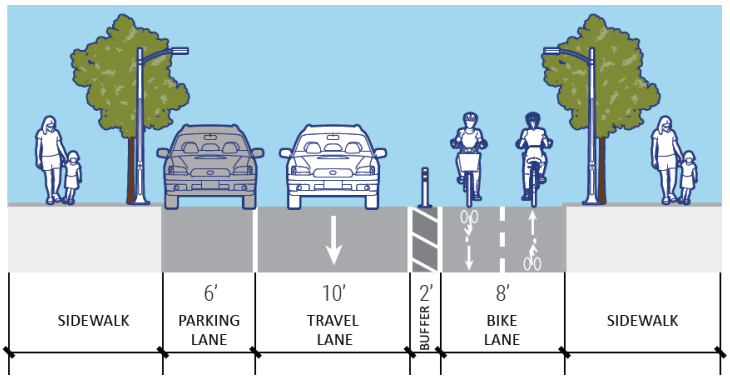


Design Concepts

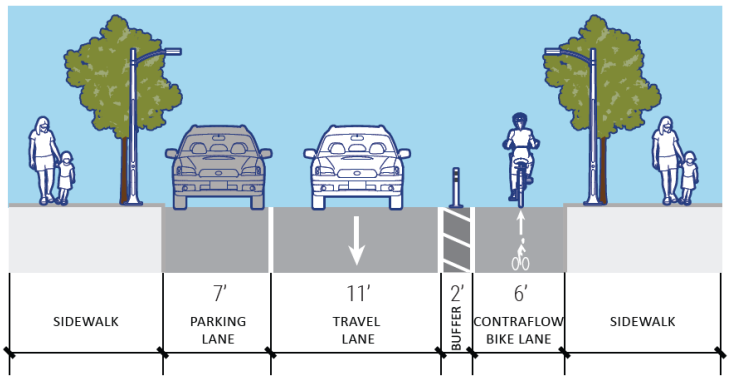
The consultant team developed two initial concepts for Granite Street:

- **Concept 1** includes one 8-foot two-way separated bike lane with one 2-foot buffer, one 6-foot parking lane, and one 10-foot travel lane.
- **Concept 2** includes one 6-foot contraflow separated bike lane with one 2-foot buffer, one 7-foot parking lane, and one 11-foot vehicle travel lane.

INITIAL CONCEPT - GRANITE ST (ALT 1)



INITIAL CONCEPT - GRANITE ST (ALT 2)



Appendix C includes the detailed concept sketches for Granite Street.

Traffic Operations

Traffic counts collected over three midweek weekdays on Granite Street east of Pearl Street captured an average of 1,400 vehicles traveling per day westbound on Granite Street. Most vehicles were cars (81.28%), followed by bicycles (12.73%), heavy vehicles (3.03%), buses (2%), and motorcycles (0.96%). In addition to eastbound vehicles, an average of 54 cyclists were observed biking contraflow (i.e., westbound) on Granite Street.

Two unsignalized intersections (Pearl Street, Rockingham Street) and one signalized intersection (Brookline Street) are located on the corridor. The initial concepts for Granite Street will impact traffic operations at the Granite Street and Brookline Street intersection. The following subsections present the results of the existing and proposed conditions operational analysis for this intersection.

EXISTING CONDITIONS OPERATIONAL ANALYSIS

The intersection of Granite Street and Brookline Street is an actuated uncoordinated three-phase intersection that is operated by the Department of Conservation and Recreation (DCR). The intersection operates with split phasing, with each main movement receiving a protected signal phase. Eastbound and westbound phases operate with a northbound right-turn overlap, and the northbound phase operates

with an eastbound right-turn overlap. There are two concurrent pedestrian phases that run with the westbound and northbound phases, respectively.

Table 9 shows the results of the existing conditions Synchro analyses for the AM and PM peak hours. The intersection operates at Level of Service B during the AM and PM peak hours. 95th percentile queues at the intersection are contained within the available storage facilities.

PROPOSED CONDITIONS OPERATIONAL ANALYSIS

The design concepts for Granite Street and Brookline Street consolidate the separated eastbound left- and right-turns into a single shared left-right lane. This configuration enables the creation of separated bicycle lanes for the full length of Granite Street. The concept includes adjustments to signal phasing splits to provide more efficient operations.

Table 10 shows the results of the proposed conditions Synchro analyses for the AM and PM peak hours. The intersection continues to operate at Level of Service B during the AM and PM peak hours. 95th percentile queues at the intersection are contained within the available storage facilities.

Table 9. Existing Condition Synchro Analysis Results for the Intersection of Granite Street and Brookline Street

Lane Group	AM Peak Hour Delay (sec/veh.)	AM Peak Hour Average Queue (ft)	AM Peak Hour 95th Percentile Queue (ft)	AM Peak Hour V/C ratio	PM Peak Hour Delay (sec/veh.)	PM Peak Hour Average Queue (ft)	PM Peak Hour 95th Percentile Queue (ft)	PM Peak Hour V/C ratio
EBL	33.7	25	41	0.64	20.7	8	27	0.22
EBR	7.5	36	60	0.29	5.1	10	29	0.12
WBL	13.5	28	50	0.24	12.7	21	50	0.26
NBT	12.5	51	96	0.34	11.6	57	122	0.48
NBR	12.1	109	198	0.65	6.9	24	57	0.25
Overall	13.0	---	---	0.60	10.5	---	---	

Peak Hour Delay (sec/veh): Peak hour delay cells highlighted in gold represent LOS E. Peak hour delay cells highlighted in red represent LOS F.
Queueing: The '#' indicates 95th percentile volume exceeds capacity; queue may be longer and the queue shown is the maximum after two cycles. The 'm' indicates the volume for the 95th percentile queue is metered by the upstream signal. Queue cells highlighted in blue and with an * indicate that the 95th percentile queue exceeds the storage length/link distance.

Table 10. Proposed Condition Synchro Analysis Results for the Intersection of Granite Street and Brookline Street

Lane Group	AM Peak Hour Delay (sec/veh.)	AM Peak Hour Average Queue (ft)	AM Peak Hour 95th Percentile Queue (ft)	AM Peak Hour V/C ratio	PM Peak Hour Delay (sec/veh.)	PM Peak Hour Average Queue (ft)	PM Peak Hour 95th Percentile Queue (ft)	PM Peak Hour V/C ratio
EBTR	35.3	131	135	0.84	17.6	39	74	0.31
WBL	20.2	40	69	0.32	19.1	32	63	0.33
NBT	18.2	71	127	0.41	18.3	87	160	0.57
NBR	9.2	109	185	0.55	5.9	27	53	0.21
Overall	19.8	---	---	0.61	15.7	---	---	0.41

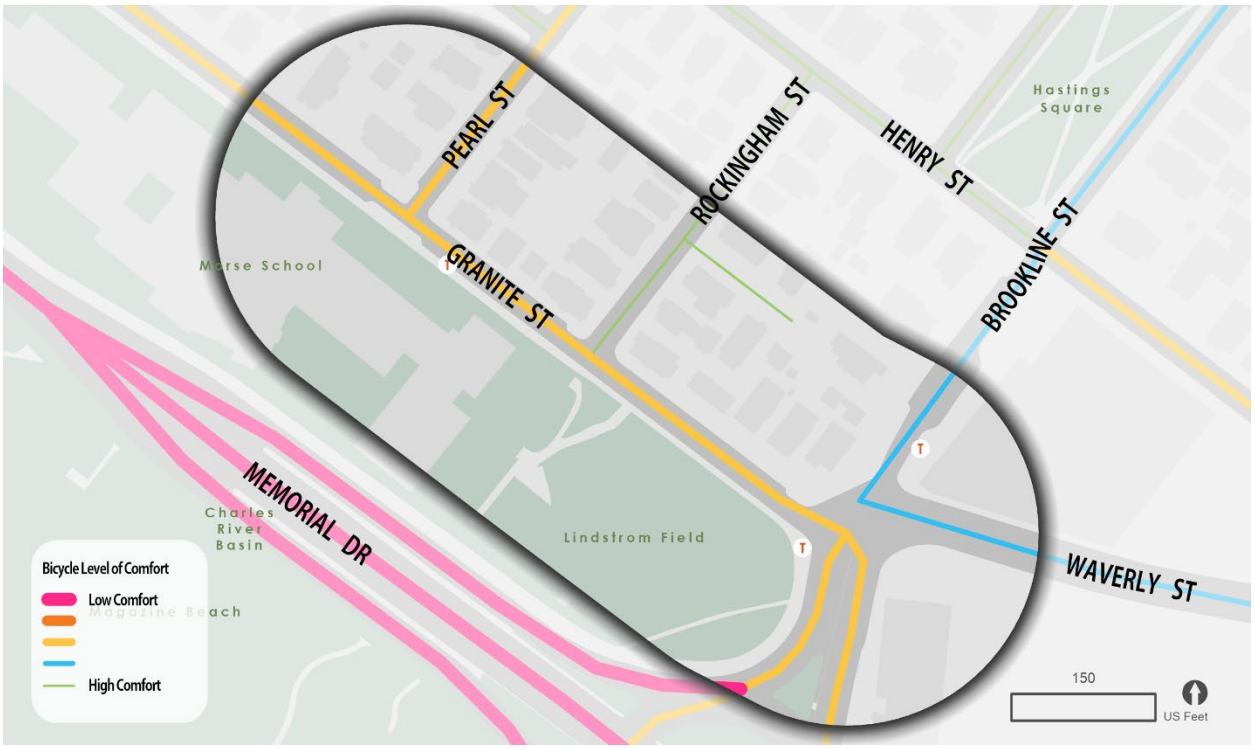
Peak Hour Delay (sec/veh): Peak hour delay cells highlighted in gold represent LOS E. Peak hour delay cells highlighted in red represent LOS F.
Queueing: The '#' indicates 95th percentile volume exceeds capacity; queue may be longer and the queue shown is the maximum after two cycles. The 'm' indicates the volume for the 95th percentile queue is metered by the upstream signal. Queue cells highlighted in blue and with an * indicate that the 95th percentile queue exceeds the storage length/link distance.

Appendix D includes synchro reports for existing and proposed conditions at the intersection of Granite Street and Brookline Street.

Bicycle Level of Comfort

Granite Street's existing BLC score is 3, representing a shared lane with Average Daily Traffic (ADT) volumes below 6,000 or speeds equal to or below 25 MPH (**Figure 2**). Granite Street's existing condition is a one-way street with one travel lane between Pearl Street and Rockingham Street and two travel lanes between Rockingham Street and Brookline Street and requires cyclists to negotiate space with motorists, potentially increasing the stress level and decreasing the comfort of cyclists.

Figure 2. Existing Bicycle Level of Comfort on Granite Street



The BLC score for Concept 1 is 1 because the 8-foot separated bike lanes allow for separated bidirectional travel (**Figure 3**).

The BLC score for Concept 2 is 3 because the contraflow bike lane only provides protection to cyclists traveling west and cyclists traveling east would continue to negotiate space with motorists (**Figure 4**). Since BLC scores are calculated based on the least comfortable portion, Concept 2 is scored based on the shared lane with vehicles.

Figure 3. Concept 1 - Bicycle Level of Comfort on Granite Street

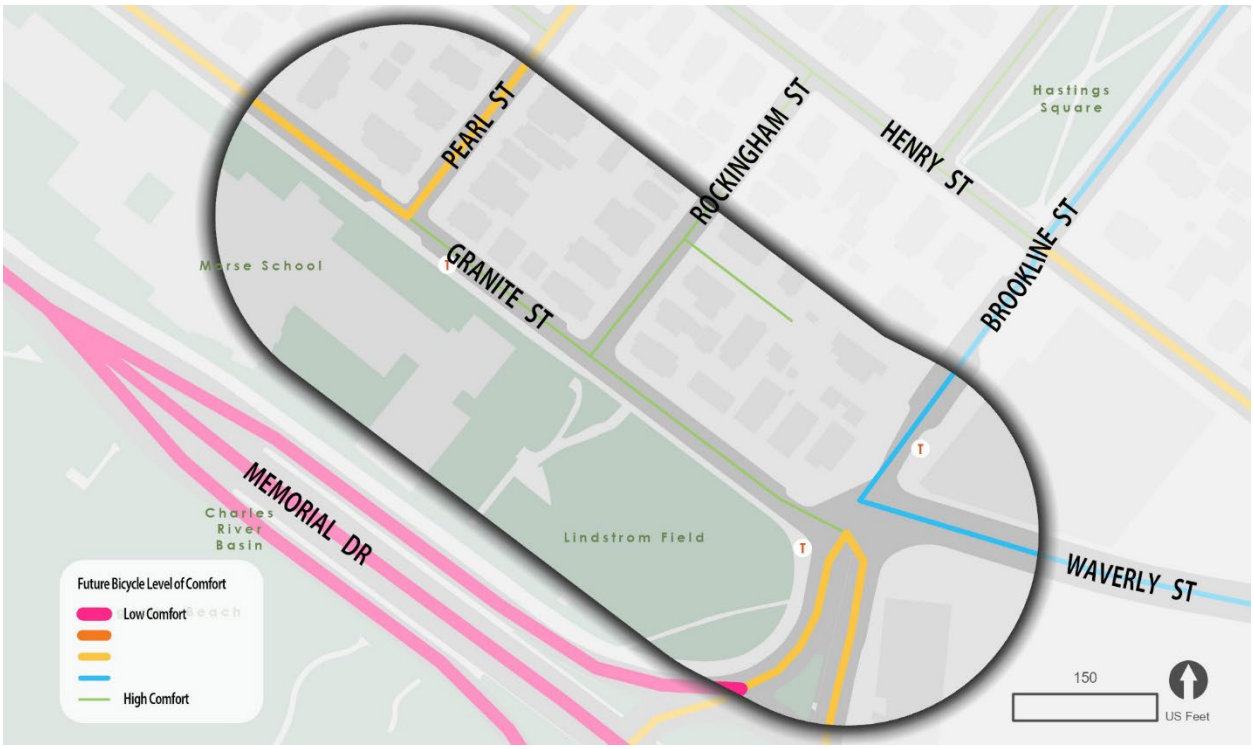
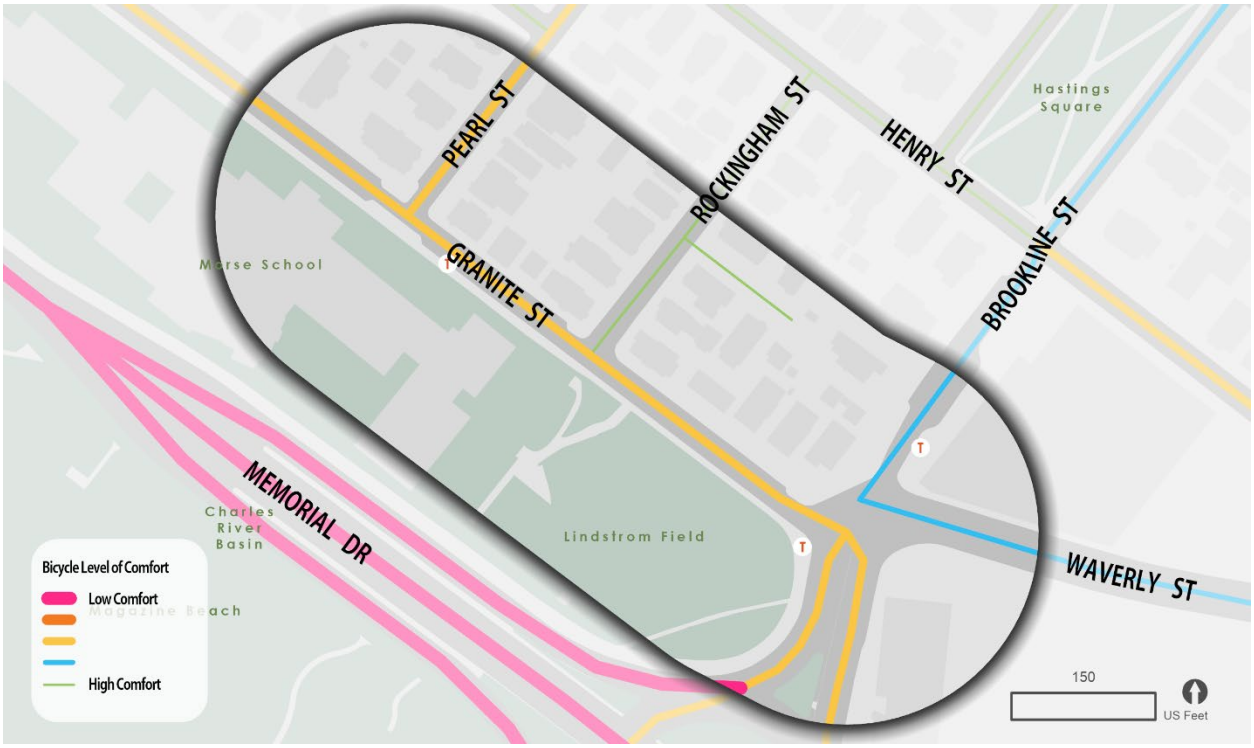


Figure 4. Concept 2 - Bicycle Level of Comfort on Granite Street



Crash History

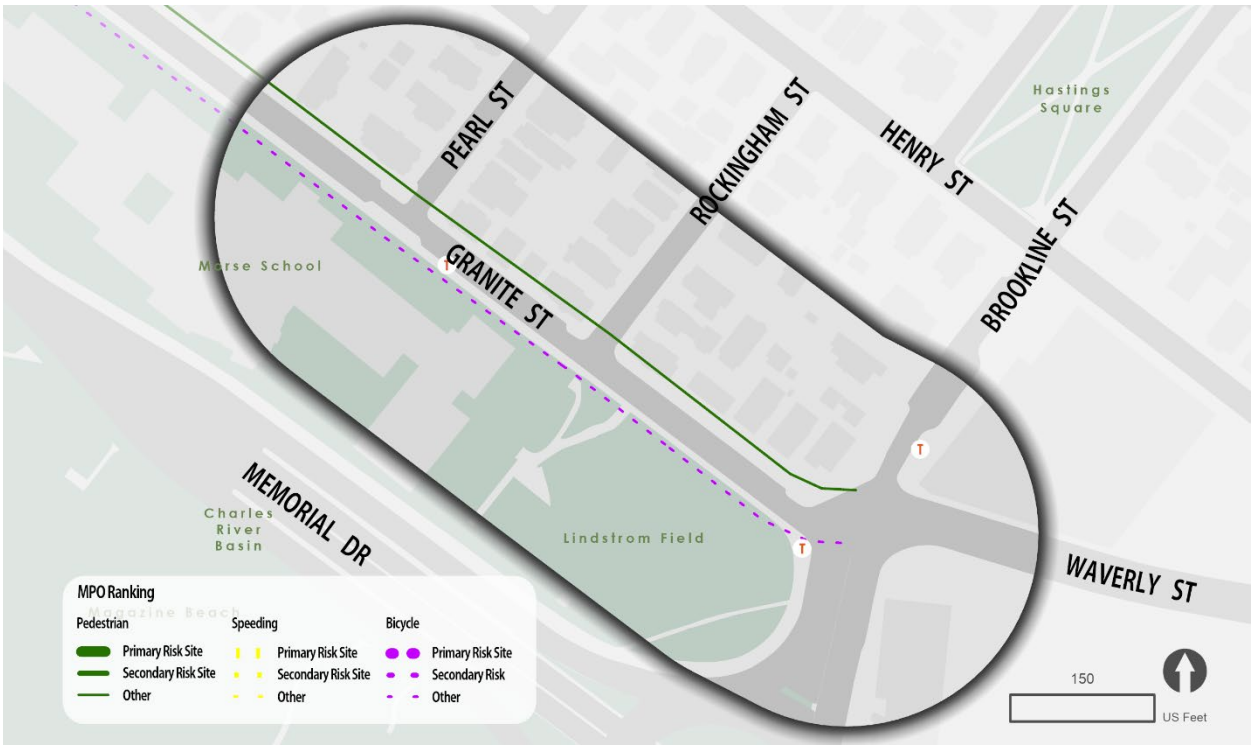
Granite Street does not have a significant crash history when compared to other roads in the Boston MPO (**Figure 5**). Granite Street is also not a primary or secondary risk site for pedestrians, bicyclists, or speeding when compared to other roads in the Boston MPO (**Figure 6**).

The block group encompassing Granite Street is an EJ population with the following criteria: Minority.

Based on 72-hour speed counts collected in September 2024, the average motorist speed on Granite Street was 18 mph, well below the Street's 25 mph speed limit.

Figure 5. Top Crash Segments by MPO on Granite Street

Figure 6. Top Risk Sites by MPO on Granite Street



Parking

Key highlights from the Granite Street parking analysis include:

- Parking occupancy on Granite Street is low on weekdays with a maximum occupancy of 56% (**Figure 7**).
- Parking occupancy is moderate on Saturdays, reaching 77% between 12:00 PM and 4:00 PM (**Figure 7**).
- The concepts would reduce on-street parking availability by 50% for a one-way separate bike lane and displace all on-street for a two-way facility (**Table 11**).
- Most parking on Granite Street is resident-permit parking except on Sundays (71%) (**Figure 8**).

Figure 7. Median Parking Occupancy on Granite Street

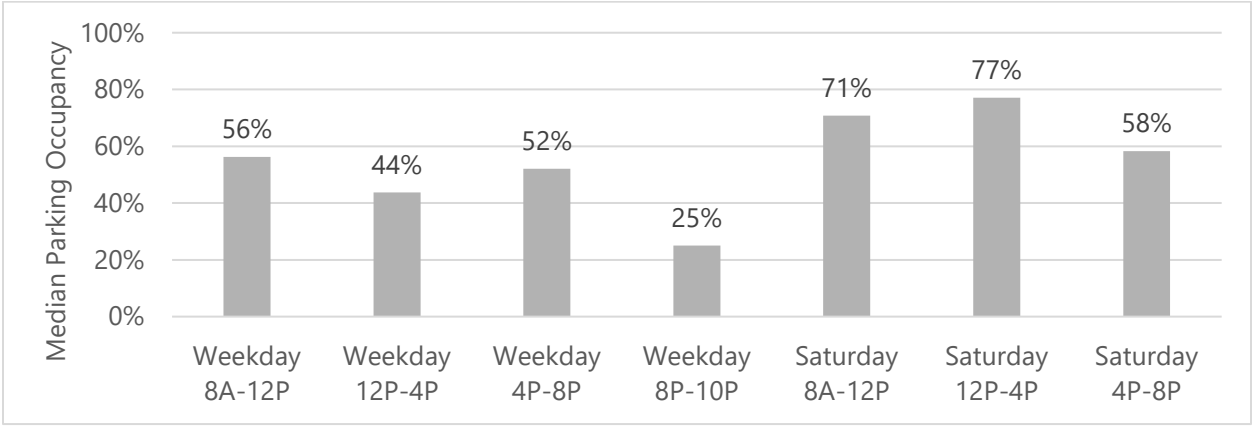
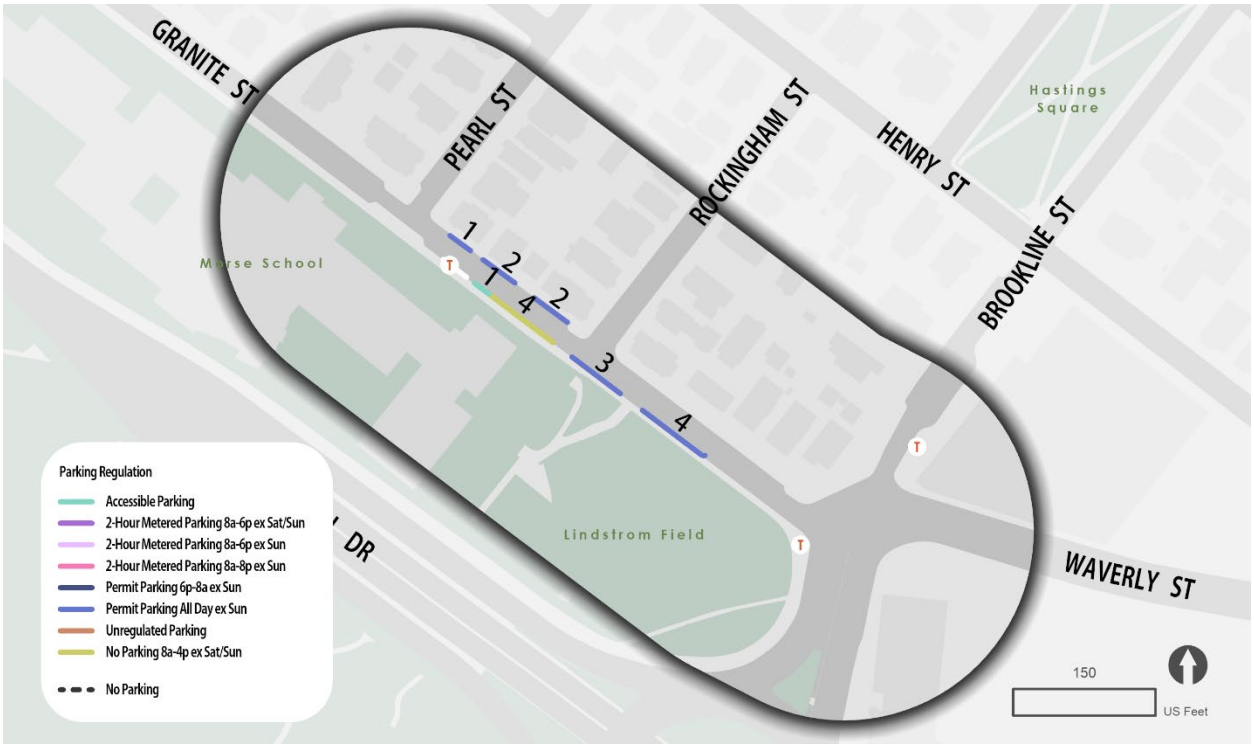


Table 11. Parking Impact of Granite Street Concepts

Design Concept	Existing	Proposed	Percent Decrease
Two-way SBL	12	0	100%
One-way SBL	12	6	50%

Figure 8. Parking Availability & Regulations on Granite Street

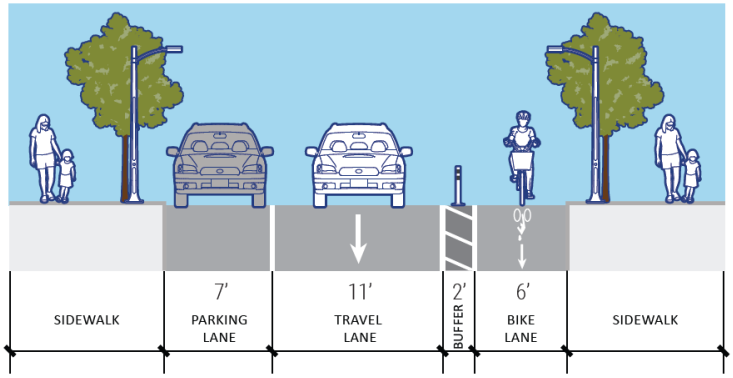


Preferred Concept

Following review and discussion of the design concepts, Cambridge recommended modifying Concept 1 to replace the contraflow westbound separated bike lane with an eastbound separated bike lane. The final preferred concept reallocates parking on the north side of Granite Street to build one 6-foot separated bike lane with one 2-foot buffer, one 7-foot parking lane, and one 11-foot vehicle travel lane.

This concept is paired with Henry Street, a parallel low-volume roadway, to provide comfortable bike facilities in either direction.

PREFERRED CONCEPT - GRANITE ST



TRAFFIC ANALYSIS IMPLICATIONS

Since DCR operates the intersection of Granite Street and Brookline Street, Cambridge has limited ability to change intersection turn lane configurations in the near-term. The preferred concept transitions from a one-way separated bike lane to shared lanes just east of Rockingham Avenue to avoid reconfiguring the eastbound left- and right-turn lanes at the intersection. The preferred concept is not expected to affect traffic operations.

BICYCLE LEVEL OF COMFORT IMPLICATIONS

The BLC score for Granite Street's preferred concept is 1 since the 6-foot separated bike lane provides one-way protection to cyclists consistent with the direction of vehicle traffic. This concept is paired with Henry Street, a low-volume roadway with a BLC of 1, to provide comfortable bike facilities in either direction.

CRASH HISTORY IMPLICATIONS

Granite Street does not have notable crash-patterns or crash-risk patterns when compared to other roads in the Boston MPO. On average, motorists travel at 18 mph on Granite Street. While a separated bike lane on Granite Street would increase comfort and safety for people biking, there is less urgency to implement this safety countermeasure on Granite Street compared to other Cambridge Streets.

PARKING IMPLICATIONS

Parking occupancy on Granite Street is low on weekdays with a maximum occupancy of 56%. Parking occupancy is moderate on Saturdays, reaching 77% between 12:00 PM and 4:00 PM. The preferred design concept would reduce parking availability by 50%.

RECOMMENDATIONS

The City of Cambridge did not recommend Granite Street for quick-build design and construction by the November 2026 CSO deadline. Factors that contributed to this decision included:

- Since DCR operates the intersection of Granite Street and Brookline Street, Cambridge has limited ability to change intersection turn lane configurations in the near-term. If implemented in the

short-term, the preferred concept would transition the eastbound separated bike lane to shared lanes just east of Rockingham Avenue, limiting its effectiveness.

- Granite Street does not have notable crash-patterns or crash-risk patterns when compared to other roads in the Boston MPO. While a separated bike lane on Granite Street would increase comfort and safety for people biking, there is less urgency to implement this safety countermeasure on Granite Street compared to other Cambridge Streets.

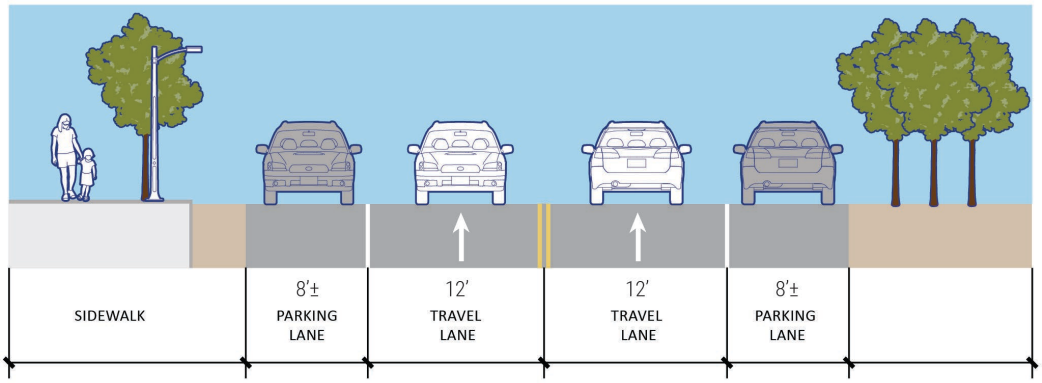
Granite Street is slated for greater separation in the 2020 Bicycle Network Vision, and long-term construction of separated bike lanes on Granite Street will improve Granite Street's bicycle level of comfort score from 3 to 1.

Appendix E includes the concept plan for the preferred concept for Granite Street.

HURON AVENUE

Huron Avenue between Grove Street and Fresh Pond Place is a two-way collector road. Between Grove Street and 700 Huron Avenue the corridor has a vehicle travel lane in both directions and parking on both sides of the street. Between 700 Huron Avenue and Fresh Pond Place the corridor has a vehicle travel lane and striped bike lane in both directions and parking on the north side of the street. It has a continuous sidewalk on the south side of the street, and a short stretch of sidewalk on the north side of street fronting the Fresh Pond Golf Course.

EXISTING - HURON AVE

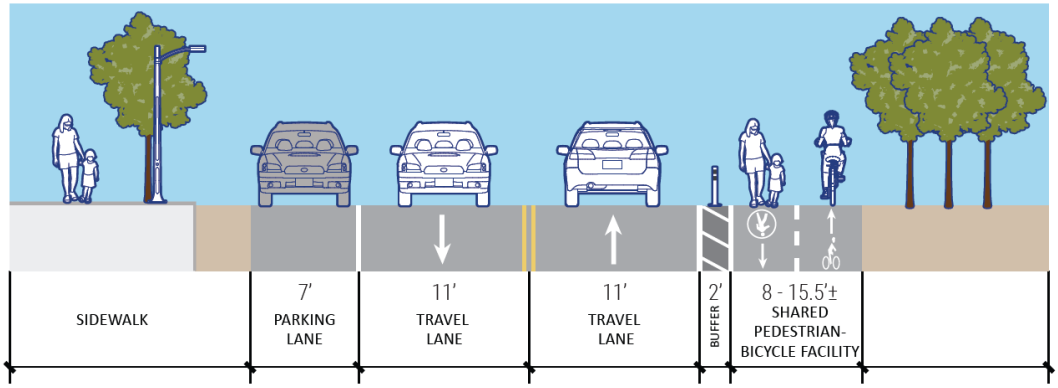


Design Concepts

The consultant team developed one initial concept for Huron Avenue:

- **Concept 1** includes a shared use path (between 8-15.5 feet) with one 2-foot buffer, one 7-foot parking lane, and two 11-foot vehicle travel lanes.

INITIAL CONCEPT - HURON AVE



Appendix F includes the detailed concept sketch for Huron Avenue.

Traffic Operations

Traffic counts collected over three midweek weekdays on Huron Avenue east of Grove Street captured an average of 9,300 vehicles traveling on Huron Avenue. Most vehicles were cars (95.9%), followed by bicycles (1.6%), buses (1.3%), heavy vehicles (0.93%), and motorcycles (0.3%).

One unsignalized intersection is located on the corridor: Huron Avenue and Grove Street. The initial concept for Huron Avenue will impact traffic operations at the Huron Avenue and Grove Street intersection. The following subsections present the results of the existing and proposed conditions operational analysis for this intersection.

EXISTING CONDITIONS OPERATIONAL ANALYSIS

The intersection of Huron Avenue and Grove Street is an unsignalized, three-leg intersection in the Strawberry Hill neighborhood. The westbound approach is stop-controlled, and the northbound and southbound approaches are free. A crosswalk is present across Huron Avenue; no crosswalk facilities are provided across Grove Street.

Table 12 shows the results of the existing conditions Synchro analyses for the AM and PM peak hours. All intersection movements operate between Level of Service A and Level of Service C during both the AM and PM peak hours with one exception. The westbound left turn operates at Level of Service E during the AM peak hour. 95th percentile queues at the intersection are contained within the available storage facilities.

PROPOSED CONDITIONS OPERATIONAL ANALYSIS

The proposed concept for Huron Avenue and Grove Street converts existing separate left- and right-turn lanes to a shared left-right turn lane on the stop-controlled Huron Avenue approach. This configuration enables the addition of a quick-build shared use path on the north side of Huron Avenue. It also creates a scenario where motorists waiting to turn left on to Grove Street will block motorists waiting to turn right.

Table 13 shows the results of the proposed conditions Synchro analyses for the AM and PM peak hours.

All intersection movements operate between Level of Service A and Level of Service C during both the AM and PM peak hours with two exceptions. The stop-controlled shared westbound left-right turn operates at Level of Service F with v/c ratios over 1.0 during both the AM and PM peak hour. Despite this increase in delay for the stop-controlled movement, 95th percentile queues at the intersection are contained within the available storage facilities.

Along with this quick-build design concept, the City of Cambridge, Town of Belmont, and MassDOT are actively collaborating on future redesigns for the intersection of Grove Street and Huron Avenue. The final redesign is unknown but is expected to impact traffic operations at Grove Street and Huron Avenue.

Table 12. Existing Condition Synchro Analysis Results for the Unsignalized Intersection of Huron Avenue and Grove Street

Lane Group	AM Peak Hour Delay (sec/veh.)	AM Peak Hour Average Queue (ft)	AM Peak Hour 95th Percentile Queue (ft)	AM Peak Hour V/C ratio	PM Peak Hour Delay (sec/veh.)	PM Peak Hour Average Queue (ft)	PM Peak Hour 95th Percentile Queue (ft)	PM Peak Hour V/C ratio
WBL	**45.6**	---	73	0.55	23.9	---	44	0.39
WBR	12.0	---	38	0.34	21.3	---	136	0.69
NBT	0.0	---	0	0.34	0.0	---	0	0.45
NBR	---	---	---	---	---	---	---	---
SBL	13.1	---	88	0.56	11.9	---	45	0.38
SBT	0.0	---	0	0.31	0.0	--	0	0.28

Peak Hour Delay (sec/veh): Peak hour delay cells highlighted in gold represent LOS E. Peak hour delay cells highlighted in red represent LOS F.
Queueing: The '#' indicates 95th percentile volume exceeds capacity; queue may be longer and the queue shown is the maximum after two cycles. The 'm' indicates the volume for the 95th percentile queue is metered by the upstream signal. Queue cells highlighted in blue and with an * indicate that the 95th percentile queue exceeds the storage length/link distance. Average peak hour queue results not are available for unsignalized intersections.

Table 13. Proposed Condition Synchro Analysis Results for the Unsignalized Intersection of Huron Avenue and Grove Street

Lane Group	AM Peak Hour Delay (sec/veh.)	AM Peak Hour Average Queue (ft)	AM Peak Hour 95th Percentile Queue (ft)	AM Peak Hour V/C ratio	PM Peak Hour Delay (sec/veh.)	PM Peak Hour Average Queue (ft)	PM Peak Hour 95th Percentile Queue (ft)	PM Peak Hour V/C ratio
WBLR	**53.7**	---	233	1.41	**87.2**	---	435	1.07
NBT	0.0	---	0	0.34	0.0	---	0	0.45
NBR	---	---	---	---	---	---	---	---
SBL	13.1	---	88	0.56	11.9	---	45	0.38
SBT	0.0	---	0	0.31	0.0	---	0	0.28

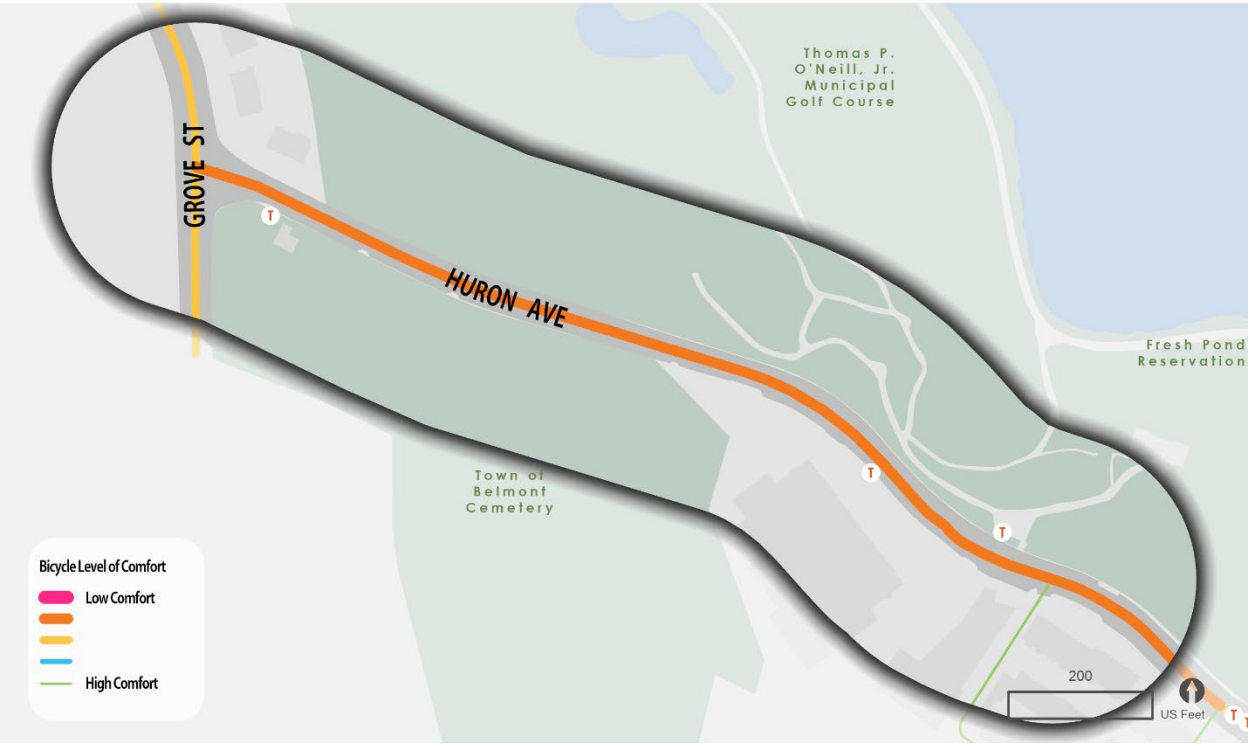
Peak Hour Delay (sec/veh): Peak hour delay cells highlighted in gold represent LOS E. Peak hour delay cells highlighted in red represent LOS F.
Queueing: The '#' indicates 95th percentile volume exceeds capacity; queue may be longer and the queue shown is the maximum after two cycles. The 'm' indicates the volume for the 95th percentile queue is metered by the upstream signal. Queue cells highlighted in blue and with an * indicate that the 95th percentile queue exceeds the storage length/link distance. Average peak hour queue results not are available for unsignalized intersections.

Appendix G includes Synchro reports for existing and proposed conditions at the intersection of Huron Avenue and Grove Street.

Bicycle Level of Comfort

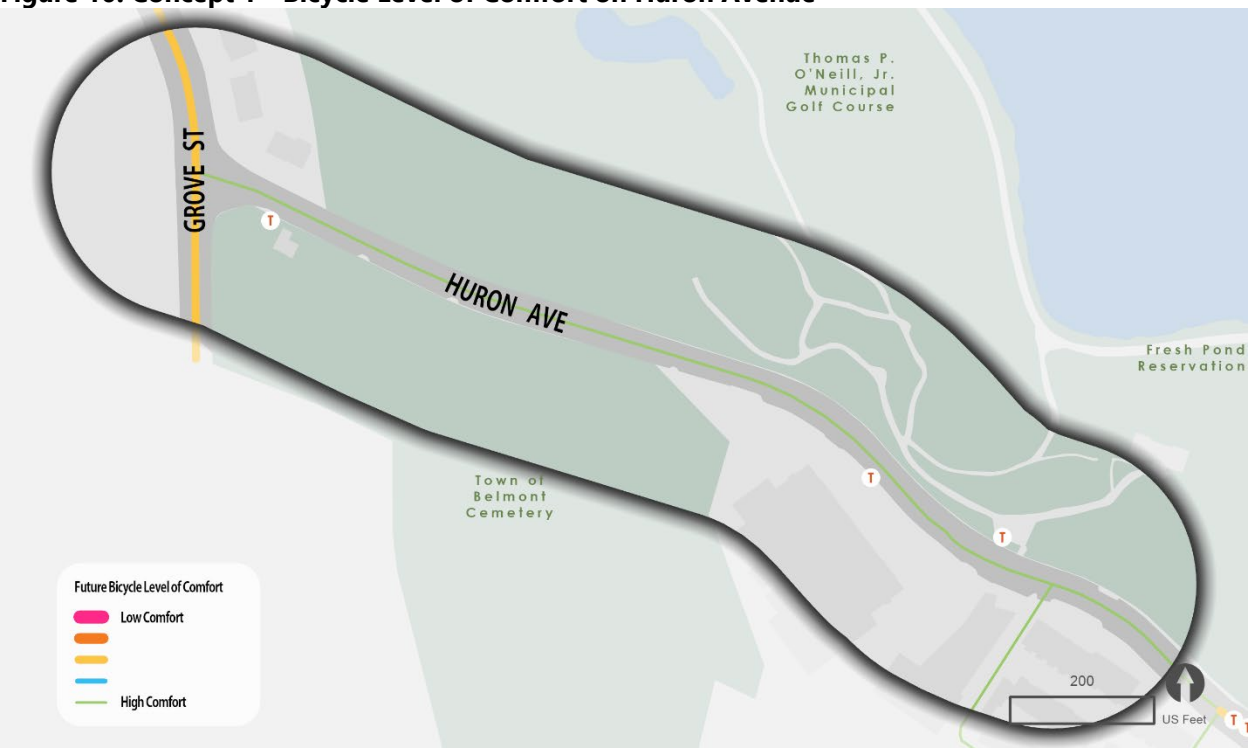
Huron Avenue's existing BLC score is 4, representing a shared lane with ADT volumes between 6,000 and 15,000 or speeds above 25 MPH (**Figure 9**). Huron Avenue's existing condition is two-way street and requires cyclists to negotiate space with motorists, potentially increasing the stress level and decreasing the comfort of cyclists.

Figure 9. Existing Bicycle Level of Comfort on Huron Avenue



The BLC score for Huron Avenue's design concept is 1 (**Figure 10**) because it includes a two-way shared-use path that offers physical protection to cyclists traveling in either direction.

Figure 10. Concept 1 - Bicycle Level of Comfort on Huron Avenue



Crash History

Huron Avenue has a history of fatal and injury crashes, scoring among the Top 5% of all segments in the Boston MPO for fatal and injury crashes (**Figure 11**). Injury crashes that occurred on Huron Avenue between 2013 and 2017 included rear end and sideswipe crashes. Portions of Huron Avenue are secondary risk sites for pedestrians and bicyclists; none are risk sites for speeding when compared to other roads in the Boston MPO (**Figure 12**).

The block group bounding the eastern half of Huron Avenue is an EJ population with the following criteria: Minority.

Based on 72-hour speed counts collected in September 2024, the average motorist speed on Huron Avenue was 30 mph, aligned with the Street's 30 mph speed limit.

Figure 11. Top Crash Segments by MPO on Huron Avenue

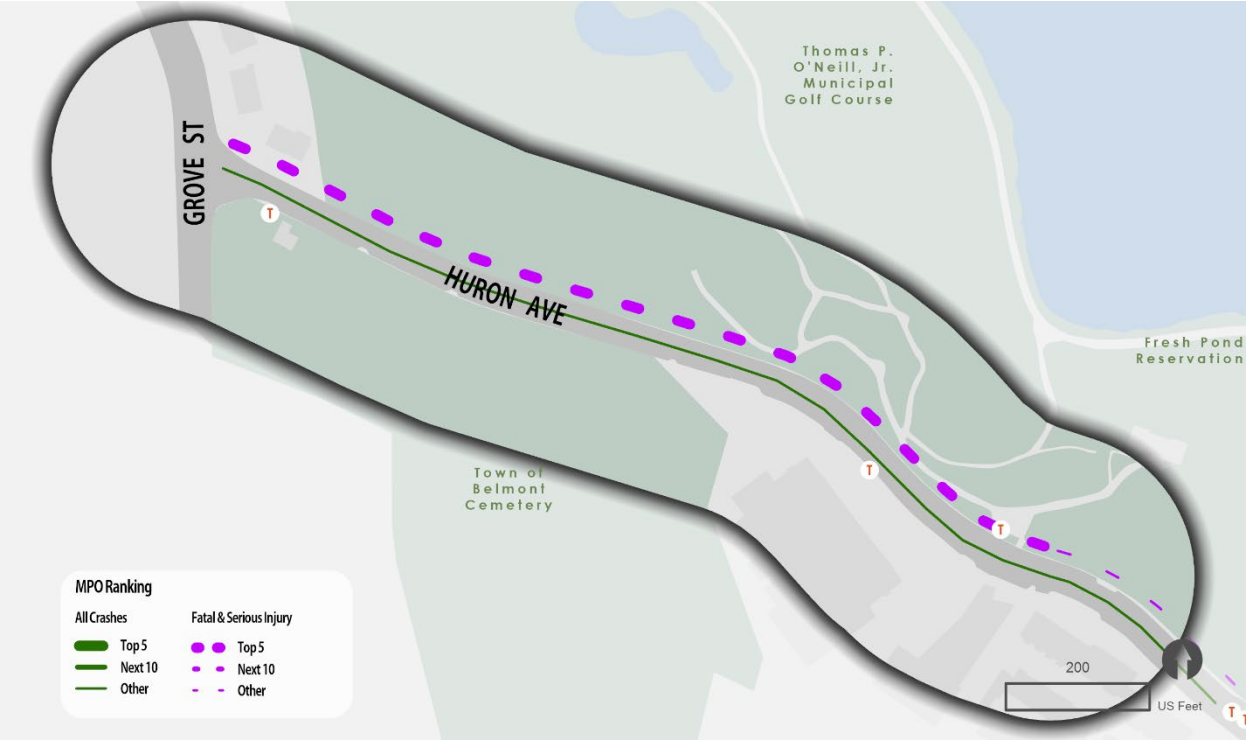
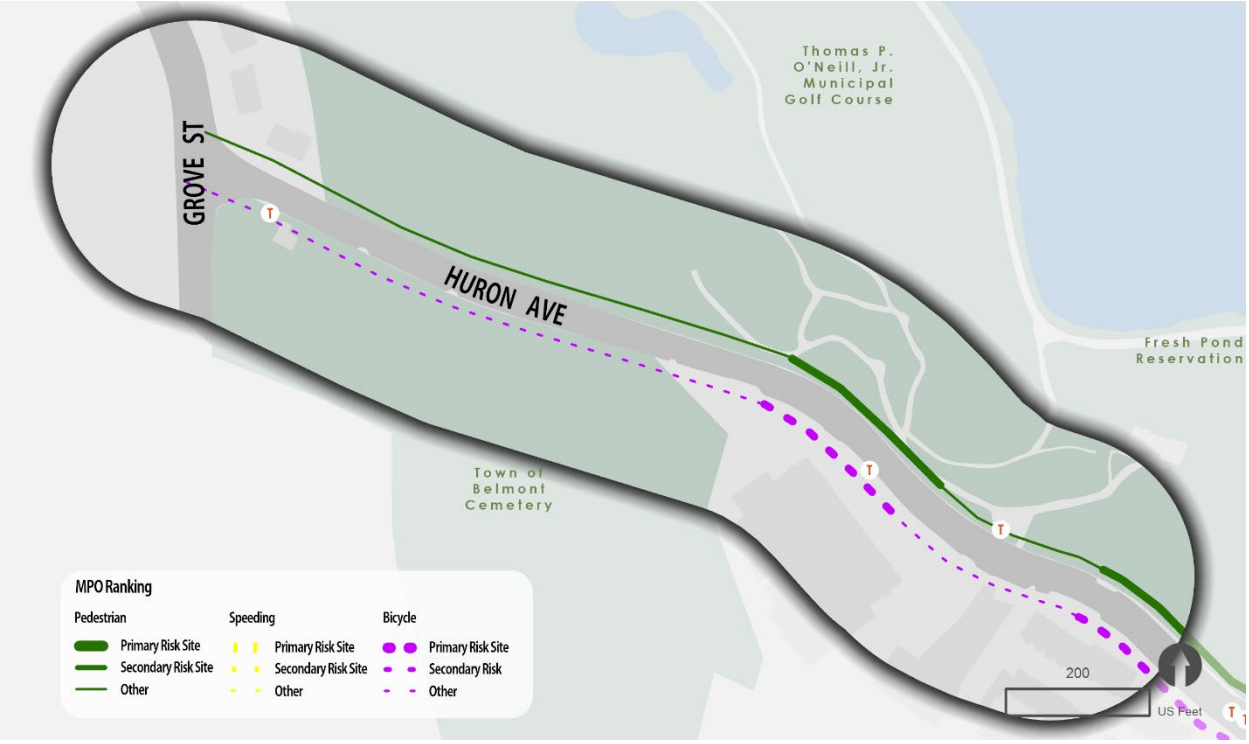


Figure 12. Top Risk Sites by MPO on Huron Avenue



Parking

Key highlights from the Huron Avenue parking analysis include:

- Parking occupancy on Huron Avenue is low with a maximum occupancy of 56% on weekdays between 8:00 AM and 12:00 PM (**Figure 13**).
- Most parking spaces on Huron Avenue are unregulated (66%) (**Figure 14)**.
- The design concept (two-way shared use path) would reduce parking by 67% (**Table 14**).

Figure 13. Median Parking Occupancy on Huron Avenue

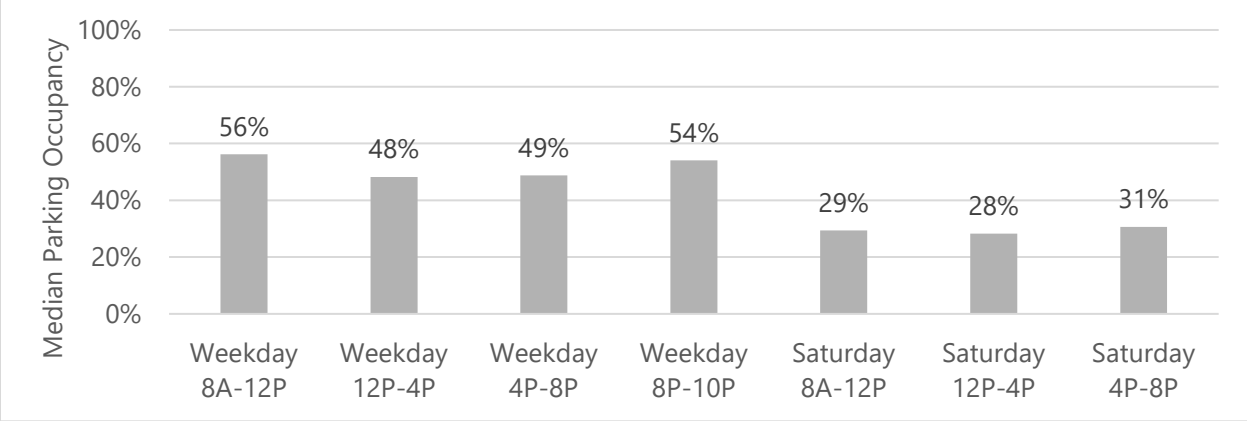


Figure 14. Parking Availability & Regulations on Huron Avenue

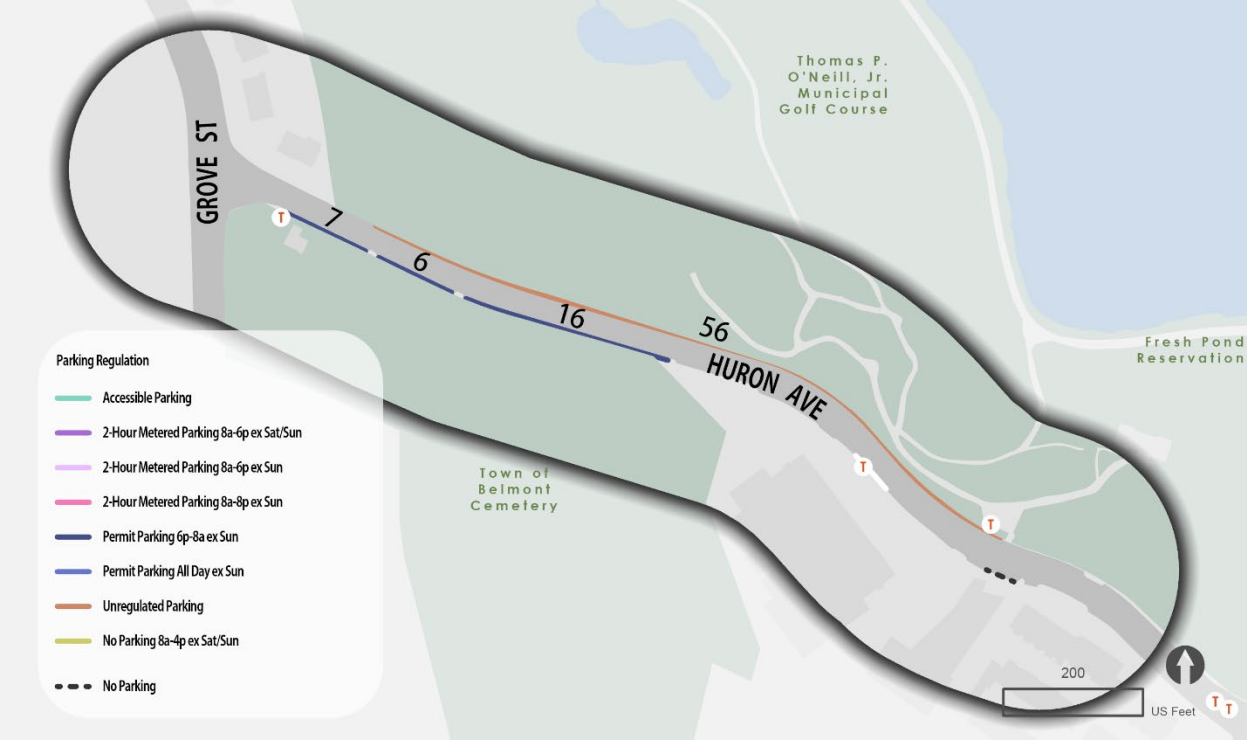
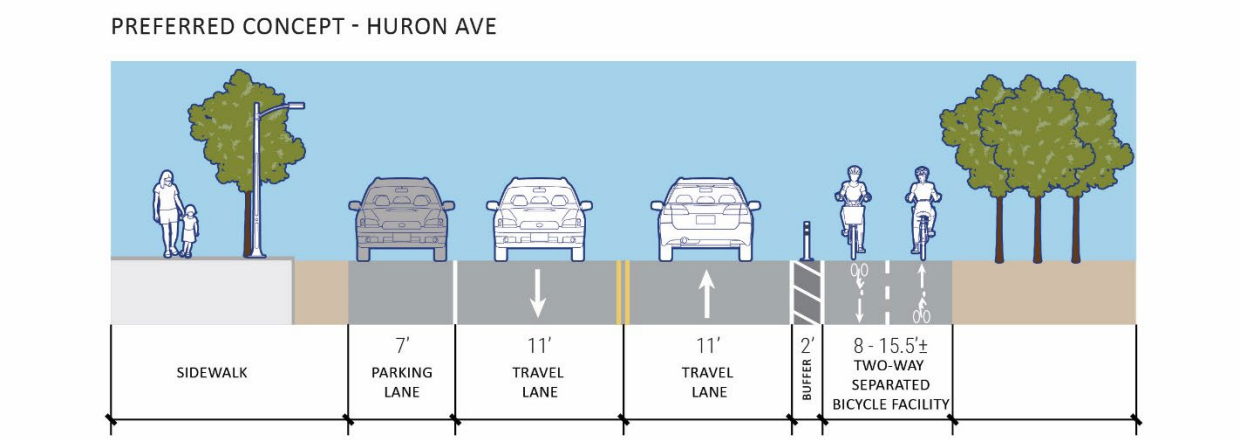


Table 14. Parking Impact of Huron Avenue Concept

Design Concept	Existing	Proposed	Percent Decrease
Two-way shared use path	85	28	67%

Preferred Concept

Following review and discussion of the design concepts, Cambridge recommended modifying Concept 1 to replace the shared use path with a two-way separated bicycle facility. This design change was recommended to separate faster-moving cyclists from people walking along Huron Avenue. In addition, most of the pedestrian-generating land uses on the corridor are located on the south side of Huron Avenue. People walking on Huron Avenue have access to these land uses via the existing sidewalk on the south side of Huron Avenue.



TRAFFIC ANALYSIS IMPLICATIONS

To provide a safe transition from the Huron Avenue two-way separated bicycle facility to Grove Street, the preferred concept increases AM and PM peak hour delay for stop-controlled westbound motorists at the Huron Avenue and Grove Street intersection. AM peak hour delay increases from 45.6 seconds per vehicle to 53.7 seconds per vehicle. PM peak hour delay increases from 23.9 seconds per vehicle to 87.2 seconds per vehicle. Despite this increase in delay for the stop-controlled westbound movement, 95th percentile queues at the intersection do not spill back to upstream intersections or driveways.

BICYCLE LEVEL OF COMFORT IMPLICATIONS

The BLC score for Huron Avenue's preferred concept is 1 because it includes a two-way separated-bicycle facility that offers physical protection to cyclists traveling in either direction.

CRASH HISTORY IMPLICATIONS

Huron Avenue has notable crash-patterns and crash-risk patterns when compared to other roads in the Boston MPO. On average, motorists travel at 30 mph on Huron Avenue. A two-way separated bicycle facility on Huron Avenue would increase comfort and safety for people walking and biking.

PARKING IMPLICATIONS

Parking occupancy on Huron Avenue is low on weekdays with a maximum occupancy of 56%. The preferred design concept would reduce parking availability by 67%.

RECOMMENDATIONS

The City of Cambridge recommended Huron Avenue for quick-build design and construction by the November 2026 CSO deadline. Factors that contributed to this decision included:

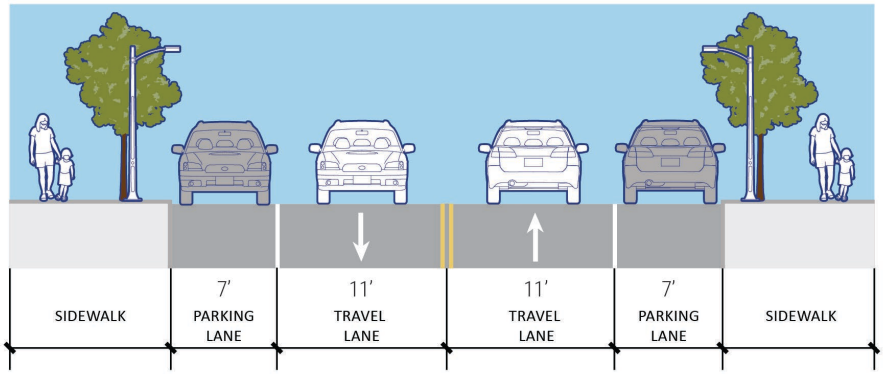
- Huron Avenue is slated for greater separation in the 2020 Bicycle Network Vision.
- AM and PM peak hour delay associated with the preferred concept is limited to the stop-controlled westbound approach of Huron Avenue, and 95th percentile westbound queues do not spill back to upstream intersections or driveways.
- The preferred concept will improve Huron Avenue's bicycle level of comfort score from 4 to 1.
- Huron Avenue has notable crash-patterns and crash-risk patterns when compared to other roads in the Boston MPO. The preferred concept addresses a Top 5% segment for fatal and injury crashes and secondary risk sites for bicyclists by providing a two-way separated bicycle facility.
- Parking occupancy on Huron Avenue is low on weekdays with a maximum occupancy of 56% and very low on weekends with a maximum occupancy of 31%.

Appendix H includes the concept plan for the preferred concept for Huron Avenue.

KIRKLAND STREET

Kirkland Street from Oxford Street to Scott/Irvine Street is a two-way collector road with two travel lanes and parking on both sides of the street. It also has sidewalks on both sides of the road with a landscaped buffer.

EXISTING - KIRKLAND ST

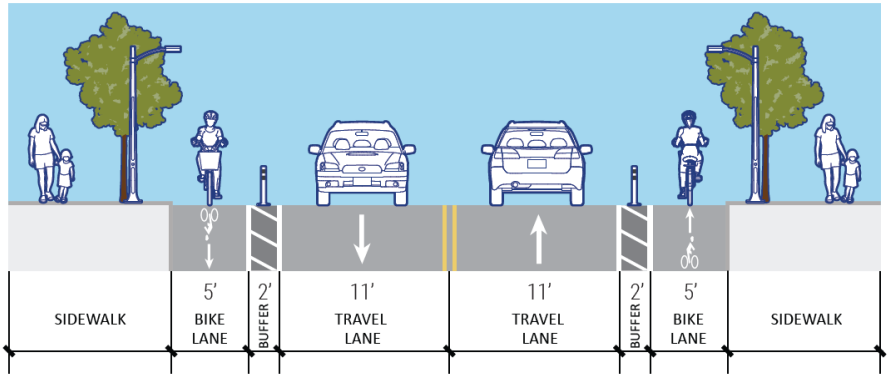


Design Concepts

The consultant team developed one initial concept for Kirkland Street:

- **Concept 1** includes two 5-foot separated bike lanes with 2-foot buffers and two 11-foot vehicle travel lanes.

INITIAL CONCEPT - KIRKLAND ST



Appendix I includes the detailed concept sketch for Kirkland Street.

Traffic Operations

Traffic counts collected over three midweek weekdays on Kirkland Street west of Irving Street captured an average of 10,900 vehicles traveling on Kirkland Street. Most vehicles were cars (83.63%), followed by bicycles (9.86%), heavy vehicles (3.13%), buses (2.35%), and motorcycles (1.03%).

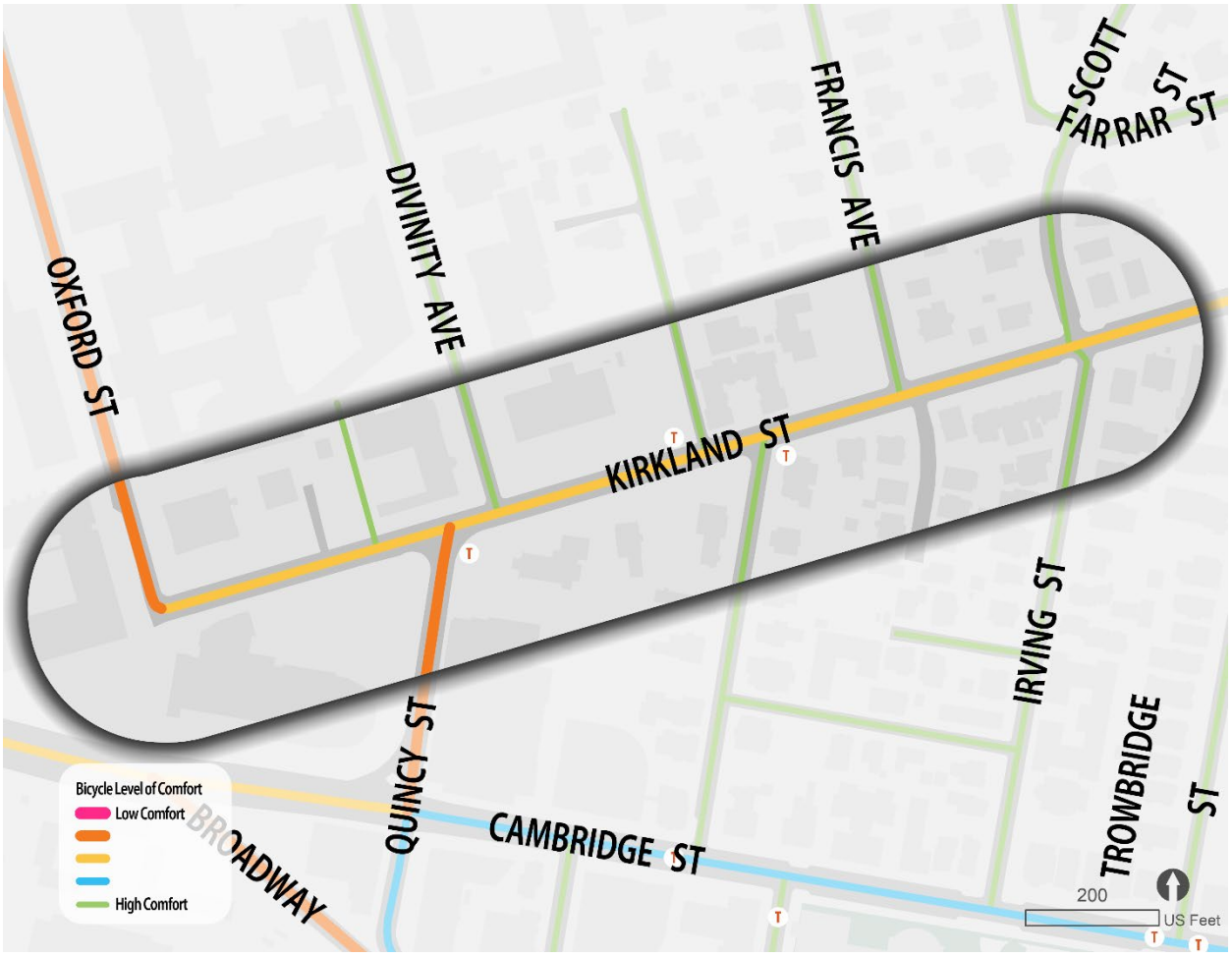
Traffic counts collected over three midweek weekdays on Kirkland Street east of Oxford Street captured an average of 7,200 vehicles traveling on Kirkland Street. Most vehicles were cars (75.67%), followed by bicycles (16.3%), heavy vehicles (2.68%), motorcycles (2.8%), and buses (2.55%).

Multiple unsignalized intersections (Frisbie Place, Divinity Avenue, Kirkland Place, Sumner Road, Francis Avenue/Kirkland Road, Irving Street/Scott Street) and one signalized intersection (Quincy Street) are located on the corridor. The initial concept for Kirkland Street will not impact traffic operations at any of these intersections.

Bicycle Level of Comfort

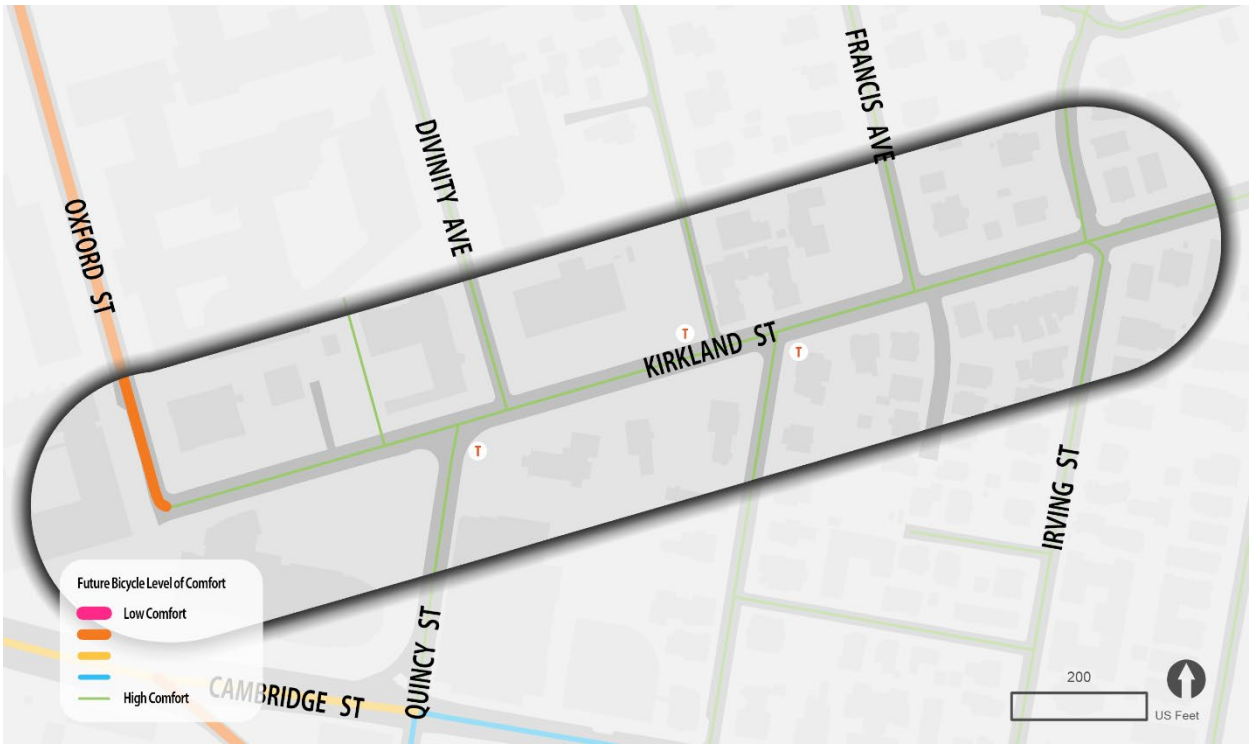
Kirkland Street's existing BLC score is 3, representing a shared lane with ADT volumes below 6,000 or speeds equal to or below 25 MPH (**Figure 15**). Kirkland Street's existing condition is a two-way, two-lane street and requires cyclists to negotiate space with motorists, potentially increasing the stress level and decreasing the comfort of cyclists.

Figure 15. Existing Bicycle Level of Comfort on Kirkland Street



The BLC score for Kirkland Street's design concept is 1 (**Figure 16**) because it includes separated bike lanes that provide a physically separated space for cyclists to travel in either direction.

Figure 16. Concept 1 - Bicycle Level of Comfort on Kirkland Street



Crash History

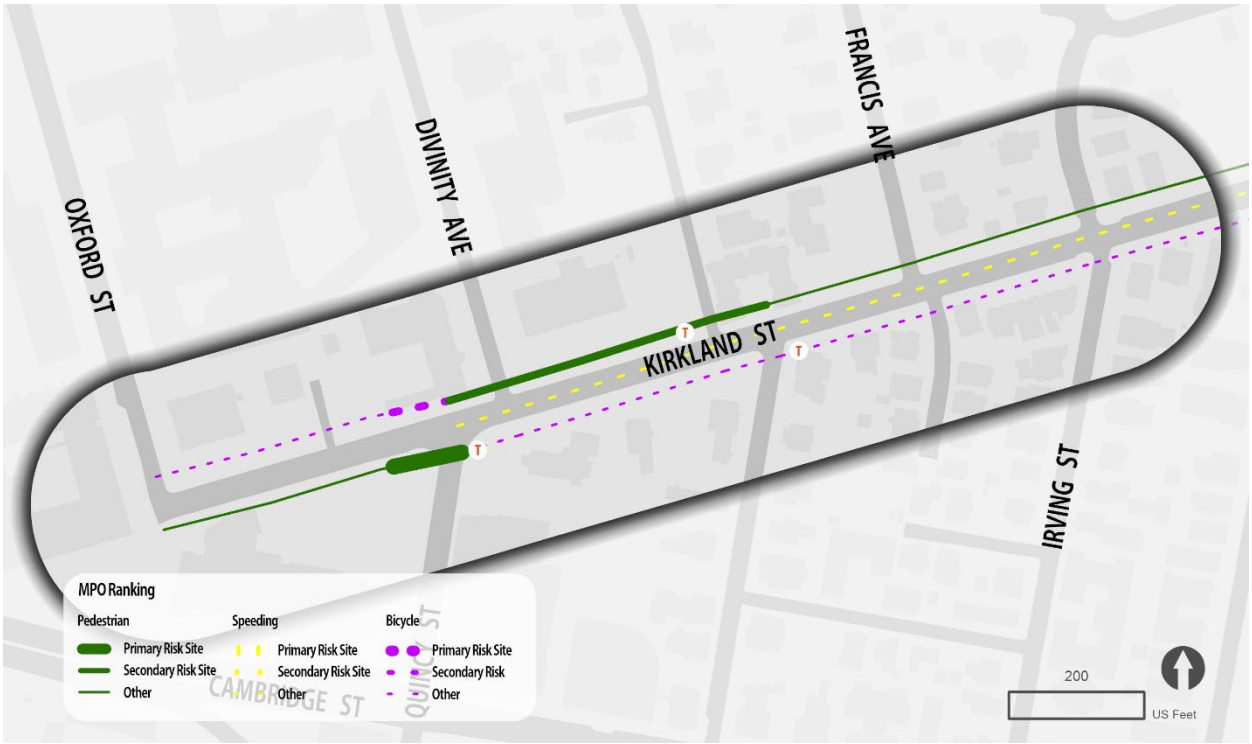
Kirkland Street does not have a notable crash history when compared to other roads in the Boston MPO (**Figure 17**). Portions of Kirkland Street are risk sites for pedestrians and bicyclists when compared to other roads in the Boston MPO (**Figure 18**). Specifically, Kirkland Street is a primary risk site for pedestrians between west of Divinity Avenue and Quincy Street, and a secondary risk site for pedestrians between Quincy Street and east of Frances Avenue. Kirkland Street is also a secondary risk site for bicyclists between west of Divinity Avenue and Quincy Street.

The block groups encompassing Kirkland Street include EJ populations with the following criteria: Minority and Income.

Based on 72-hour speed counts collected in September 2024, the average motorist speed on Kirkland Street was 23 mph, below the Street's 25 mph speed limit.

Figure 17. Top Crash Segments by MPO on Kirkland Street

Figure 18. Top Risk Sites by MPO on Kirkland Street



Parking

Key highlights from the Kirkland Street parking analysis include:

- Parking occupancy is highest (>80%) on Kirkland Street on weekdays (**Figure 19**)
- Parking occupancy is low Kirkland Street on Saturdays, reaching a maximum of 44% between 12:00 PM and 4:00 PM (**Figure 19**)
- About half of parking on Kirkland Street is resident-permit parking except on Sundays (**Figure 20**).
- The design concept (one-way separated bike lanes) would decrease parking by 100% on Kirkland Street (**Table 15**).

Figure 19. Median Parking Occupancy on Kirkland Street

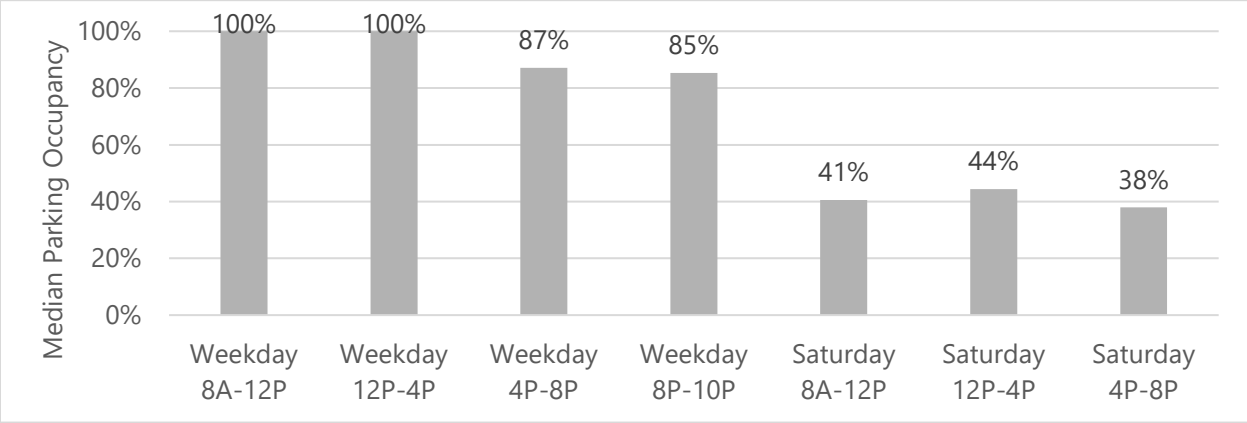


Figure 20. Parking Availability & Regulations on Kirkland Street

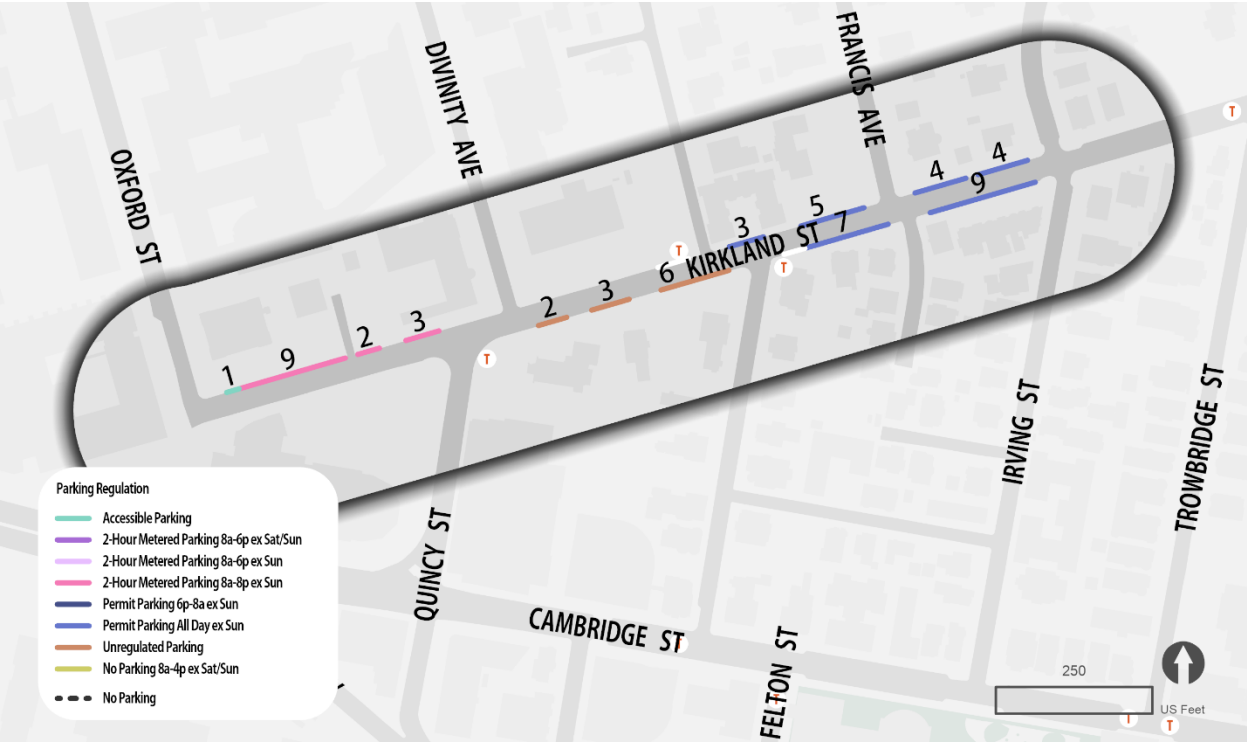


Table 15. Parking Impact of Kirkland Street Concepts

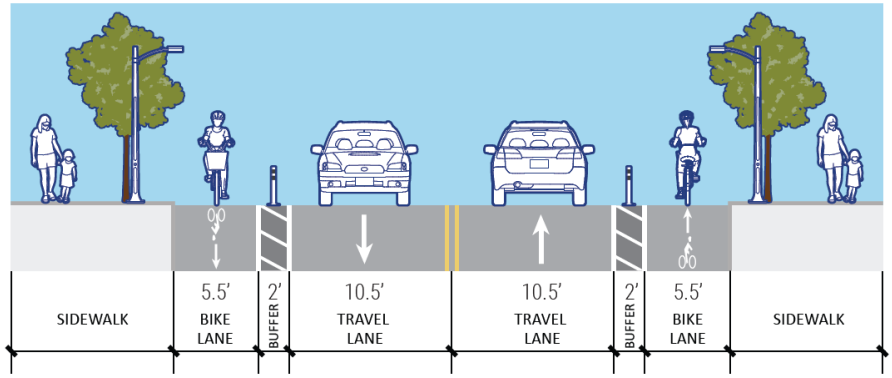
Design Concept	Existing	Proposed	Percent Decrease
One-way separated bike lanes	58	0	100%

Preferred Concept

Following review and discussion of the design concept, City staff agreed to advance the concept for Kirkland Street. The extents of the Kirkland Street quick-build design were reduced from 0.29 miles (Oxford Street to Scott/Irving Street) to 0.07 miles (Oxford Street to Quincy Street). This is because the curb to curb width of Kirkland Street east of Quincy Street is too narrow to accommodate both MBTA buses and quick-build separated bike lanes.

Separated bike lanes will be installed along Kirkland Street east of Quincy Street as part of the City's Five Year Sidewalk and Street Reconstruction Plan.

PREFERRED CONCEPT - KIRKLAND ST



TRAFFIC ANALYSIS IMPLICATIONS

The Kirkland Street concept is not expected to affect traffic operations.

BICYCLE LEVEL OF COMFORT IMPLICATIONS

The BLC score for Kirkland Street's preferred concept is 1 because it includes separated bike lanes that provide a physically separated space for cyclists to travel in either direction.

CRASH HISTORY IMPLICATIONS

Within the revised extents of the Kirkland Street quick-build design, Kirkland Street is a primary risk site for pedestrians and a secondary risk site for bicyclists between Frisbie Place and Quincy Street. On average, motorists travel at 23 mph on Kirkland Street. A separated bike lane on Kirkland Street will increase comfort and safety for people biking.

PARKING IMPLICATIONS

Parking occupancy on Kirkland Street is high on weekdays with maximum occupancies exceeding 80% between 8:00 AM and 10:00 PM. The preferred design concept would reduce parking availability between Oxford Street and Quincy Street by 15 spaces and maintain 43 spaces between Quincy Street and Irving Street/Scott Street (74% reduction).

RECOMMENDATIONS

The City of Cambridge recommended Kirkland Street between Oxford Street and Quincy Street for quick-build design and construction by the November 2026 CSO deadline. Factors that contributed to this decision included:

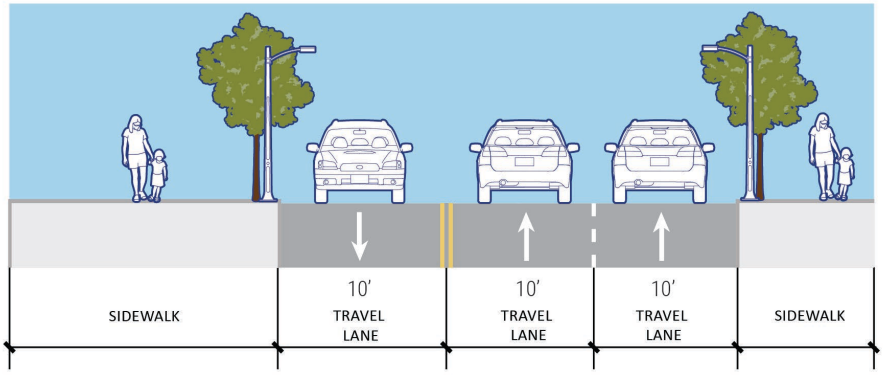
- Kirkland Street is slated for greater separation in the 2020 Bicycle Network Vision.
- The preferred concept will improve Kirkland Street's bicycle level of comfort score from 3 to 1.
- Kirkland Street has notable crash-risk patterns when compared to other roads in the Boston MPO. The preferred concept addresses a secondary risk site for bicyclists by providing separated bicycle facilities.

Appendix J includes the concept plan for the preferred concept for Kirkland Street.

QUINCY STREET

Quincy Street from Kirkland Street to Cambridge Street is a minor arterial roadway located near Harvard University. It has two northbound vehicle travel lanes and one southbound vehicle travel lane. Quincy Street has sidewalks on both sides of the road.

EXISTING - QUINCY ST

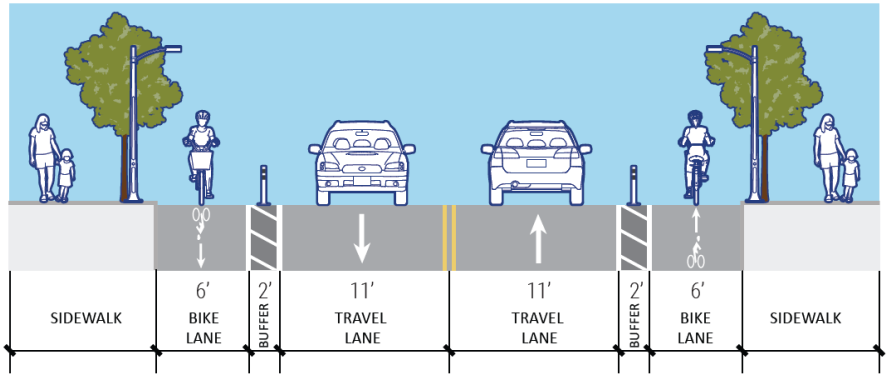


Design Concepts

At the time of concept development, the sidewalk on the west side of Quincy Street was temporarily narrowed to manage traffic flow during ongoing construction at Gund Hall on the east side of Quincy Street. The consultant team developed one initial concept for Quincy Street using the wider width afforded by the temporary construction zone.

- **Concept 1** includes two 6' separated bike lanes with one 2-foot buffer and two 11-foot vehicle travel lanes.

INITIAL CONCEPT - QUINCY ST



Appendix K includes the detailed concept sketch for Quincy Street.

Traffic Operations

Two signalized intersections (Cambridge Street, Kirkland Street) are located on the corridor. The initial concept for Quincy Street will impact traffic operations at the Quincy Street and Kirkland Street

intersection. The following subsections present the results of the existing and proposed conditions operational analysis for this intersection.

EXISTING CONDITIONS OPERATIONAL ANALYSIS

The intersection of Kirkland Street and Quincy Street is a pretimed three-phase intersection near Harvard University. Northbound left- and right-turning traffic from Quincy Street receives a protected signal phase, and both eastbound and westbound traffic on Kirkland Street operate on a permissive phase. An exclusive pedestrian phase accommodates high volumes of pedestrian traffic in the area.

Table 16 shows the results of the existing conditions Synchro analyses for the AM and PM peak hours.

The intersection operates at Level of Service E during the AM peak hour and Level of Service C during the PM peak hour. 95th percentile queues at the intersection are contained within the available storage facilities.

PROPOSED CONDITIONS OPERATIONAL ANALYSIS

The proposed concept for Kirkland Street and Quincy Street includes a shared left-right turn lane on the Quincy Street approach. This configuration enables the creation of separated bicycle lanes on Quincy Street. The concept includes adjustments to signal phasing splits to provide more efficient operations.

Table 17 shows the results of the proposed conditions Synchro analyses for the AM and PM peak hours.

The intersection operates at Level of Service D during the AM peak hour and Level of Service D during the PM peak hour. Maximum queues at the intersection are contained within the available storage facilities.

Table 16. Existing Condition Synchro Analysis Results for the Intersection of Kirkland Street and Quincy Street

Lane Group	AM Peak Hour Delay (sec/veh.)	AM Peak Hour Average Queue (ft)	AM Peak Hour 95th Percentile Queue (ft)	AM Peak Hour V/C ratio	PM Peak Hour Delay (sec/veh.)	PM Peak Hour Average Queue (ft)	PM Peak Hour 95th Percentile Queue (ft)	PM Peak Hour V/C ratio
EBT	26.6	295	269	0.79	15.1	104	153	0.37
EBR	---	---	---	---	---	---	---	---
WBL	---	---	---	---	---	---	---	---
WBT	**210.5**	207	#302	1.35	21.8	128	219	0.62
NBL	32.4	33	71	0.22	36.8	67	86	0.42
NBR	36.6	60	113	0.42	47.2	102	#179	0.68
Overall	**73.5**	---	---	0.85	26.7	---	---	0.50

Peak Hour Delay (sec/veh): Peak hour delay cells highlighted in gold represent LOS E. Peak hour delay cells highlighted in red represent LOS F.

Queueing: The '#' indicates 95th percentile volume exceeds capacity; queue may be longer and the queue shown is the maximum after two cycles. The 'm' indicates the volume for the 95th percentile queue is metered by the upstream signal. Queue cells highlighted in blue and with an * indicate that the 95th percentile queue exceeds the storage length/link distance.

Table 17. Proposed Condition Synchro Analysis Results for the Intersection of Kirkland Street and Quincy Street

Lane Group	AM Peak Hour Delay (sec/veh.)	AM Peak Hour Average Queue (ft)	AM Peak Hour 95th Percentile Queue (ft)	AM Peak Hour V/C ratio	PM Peak Hour Delay (sec/veh.)	PM Peak Hour Average Queue (ft)	PM Peak Hour 95th Percentile Queue (ft)	PM Peak Hour V/C ratio
EBT	20.9	266	242	0.72	17.2	112	165	0.40
EBR	---	---	---	---	---	---	---	---
WBL	---	---	---	---	---	---	---	---
WBT	**92.7**	174	#268	1.06	26.5	139	241	0.68
NBLR	**63.8**	104	#217	0.82	**63.8**	179	189	0.91
Overall	45.9	---	---	0.79	36.0	---	---	0.59

Peak Hour Delay (sec/veh): Peak hour delay cells highlighted in **gold** represent LOS E. Peak hour delay cells highlighted in **red** represent LOS F.

Queueing: The '#' indicates 95th percentile volume exceeds capacity; queue may be longer and the queue shown is the maximum after two cycles. The 'm' indicates the volume for the 95th percentile queue is metered by the upstream signal. Queue cells highlighted in **blue** and with an * indicate that the 95th percentile queue exceeds the storage length/link distance.

Appendix L includes synchro reports for existing and proposed conditions at the intersection of Kirkland Street and Quincy Street.

Bicycle Level of Comfort

Quincy Street's existing BLC score is 4, representing a shared lane with ADT volumes between 6,000 and 15,000 or speeds above 25 MPH (**Figure 21**). Quincy Street's existing condition is a two-way, two-lane street and requires cyclists to negotiate space with motorists, potentially increasing the stress level and decreasing the comfort of cyclists.

Figure 21. Existing Bicycle Level of Comfort on Quincy Street

The BLC score for Quincy Street's preferred concept is 3 (**Figure 22**). The future conditions include separated bike lanes for cyclists traveling in the northbound direction (BLC 1) but does not include separated bike lanes for cyclists traveling in the southbound direction (BLC 3).

Figure 22. Future Bicycle Level of Comfort on Quincy Street

Crash History

Quincy Street has a history of fatal and injury crashes, scoring among the Next 10% of all segments in the Boston MPO for all crashes and for fatal and injury crashes (**Figure 23**). Injury crashes that occurred on Quincy Street between 2013 and 2017 included bicycle-involved, sideswipe, angle, rear end, and head on crashes. Quincy Street between Kirkland Street and Gund Hall is a secondary risk site for pedestrians when compared to other roads in the Boston MPO (**Figure 24**).

The block groups encompassing Quincy Street include EJ populations with the following criteria: Minority and Income.

Figure 23. Top Crash Segments by MPO on Quincy Street

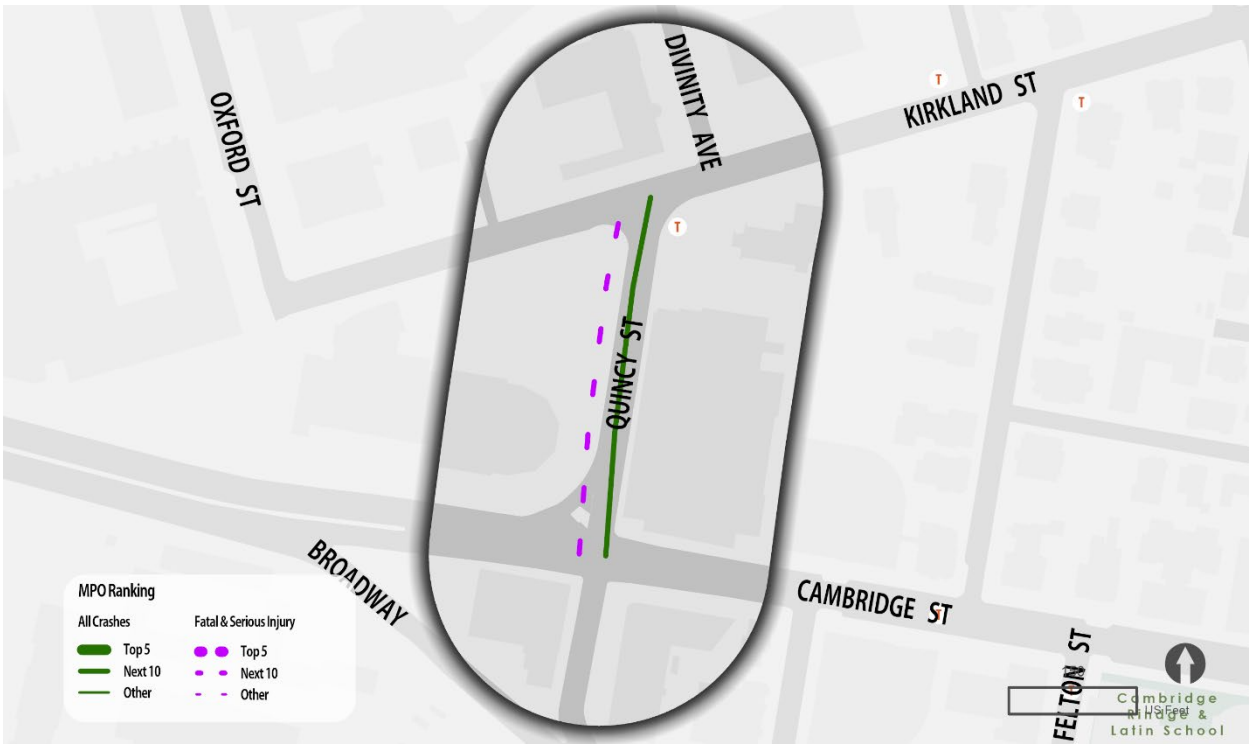
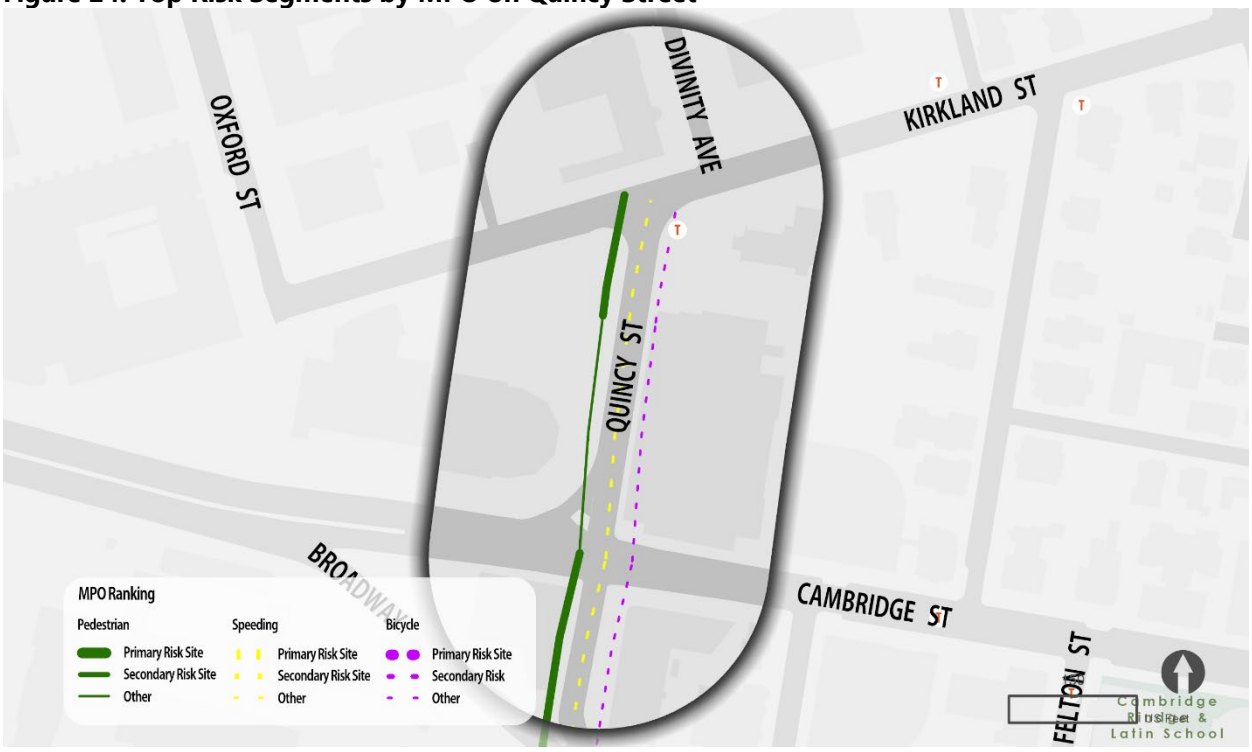


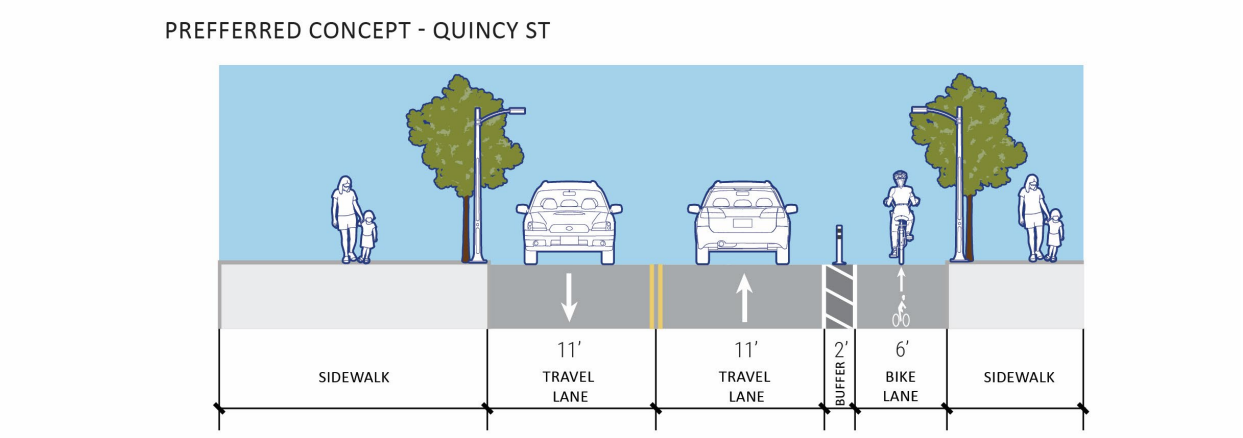
Figure 24. Top Risk Segments by MPO on Quincy Street



Preferred Concept

Following review and discussion of the design concept, City staff recommended a modified concept for Quincy Street. The preferred concept will only include one northbound 6-foot separated bike lane with a +/- 2-foot buffer and two 11-foot vehicle travel lanes.

Southbound separated bike lanes will be installed along Quincy Street as part of the City's Five Year Sidewalk and Street Reconstruction Plan.



TRAFFIC ANALYSIS IMPLICATIONS

To provide space for separated bike lanes, the preferred concept converts northbound left- and right-turn lanes to a shared left-right turn lane on the Quincy Street approach to the Quincy Street and Kirkland Street intersection. The preferred concept reduces AM peak hour delay for the intersection and increases AM and PM peak hour delay for northbound motorists. The preferred concept does not generate 95th percentile queues that spill back to upstream intersections or driveways.

BICYCLE LEVEL OF COMFORT IMPLICATIONS

The BLC score for Quincy Street's preferred concept is 3 because it includes separated bike lane for cyclists traveling in the northbound direction (BLC 1) but not in the southbound direction (BLC 3).

CRASH HISTORY IMPLICATIONS

Quincy Street is a Next 10% segment for fatal and injury crashes in the Boston MPO. It is also a secondary risk site for pedestrians when compared to other roads in the Boston MPO. A separated bike lane on Quincy Street will increase comfort and safety for people biking.

PARKING IMPLICATIONS

The Quincy Street concept is not expected to affect parking. The corridor includes one loading zone on the east side of the street which will be maintained.

RECOMMENDATIONS

The City of Cambridge recommended Quincy Street for quick-build design and construction by the November 2026 CSO deadline. Factors that contributed to this decision included:

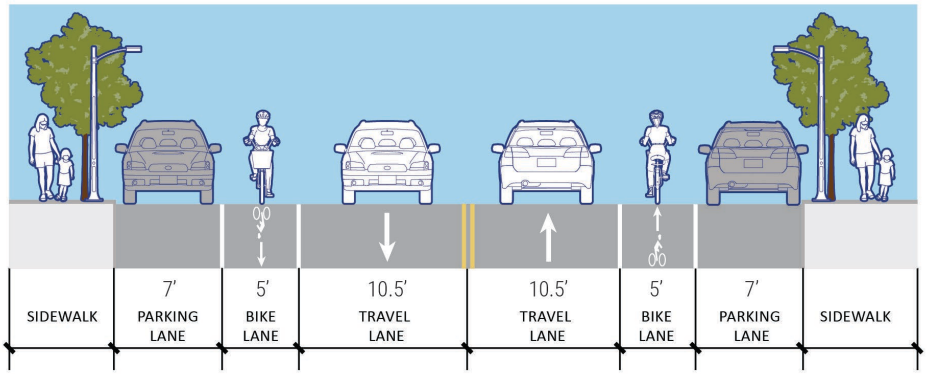
- Quincy Street is slated for greater separation in the 2020 Bicycle Network Vision.
- The preferred concept reduces AM peak hour delay for the intersection by 27.6 seconds and increases AM and PM peak hour delay for northbound motorists by 16.6 – 31.4 seconds.
- The preferred concept does not generate 95th percentile queues that spill back to upstream intersections or driveways.
- The preferred concept will improve Quincy Street's bicycle level of comfort score from 3 to 1 for northbound cyclists.
- Quincy Street has notable crash-patterns and crash-risk patterns when compared to other roads in the Boston MPO. The preferred concept addresses a Next 10% segment for fatal and injury crashes by providing a separated bicycle facility.

Appendix M includes the concept plan for the preferred concept for Quincy Street.

VASSAR STREET

Vassar Street from 285 Vassar Street to Memorial Drive is a minor arterial roadway with a travel lane, a parking lane, and a striped bike lane in each direction. The westbound striped bike lanes on Vassar Street transition from a raised separated bike lane at 301 Vassar Street, and the eastbound striped bike lanes transition to a raised separated bike lane at 286 Vassar Street.

EXISTING - VASSAR ST

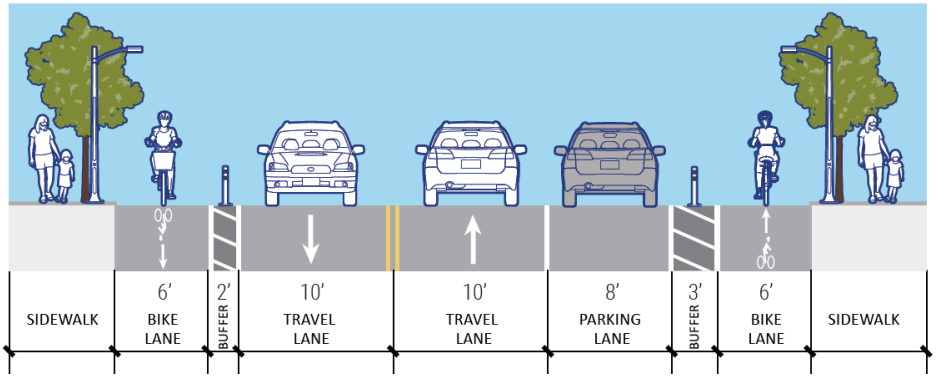


Design Concepts

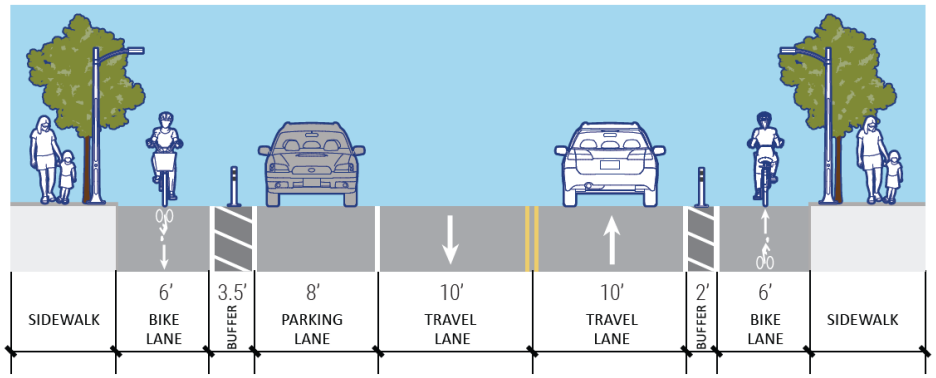
The consultant team developed two initial concepts for Vassar Street:

- **Concept 1** includes two 6-foot separated bike lanes with a buffer between 2-3 feet, one northside 8-foot parking lane, and two 10-foot vehicle travel lanes.
- **Concept 2** includes two 6-foot separated bike lanes with a buffer between 2-3.5 feet, one southside 8-foot parking lane, and two 10-foot vehicle travel lanes.

INITIAL - VASSAR ST (ALT 1)



INITIAL - VASSAR ST (ALT 2)



Appendix N includes the detailed concept sketches for Vassar Street.

Traffic Operations

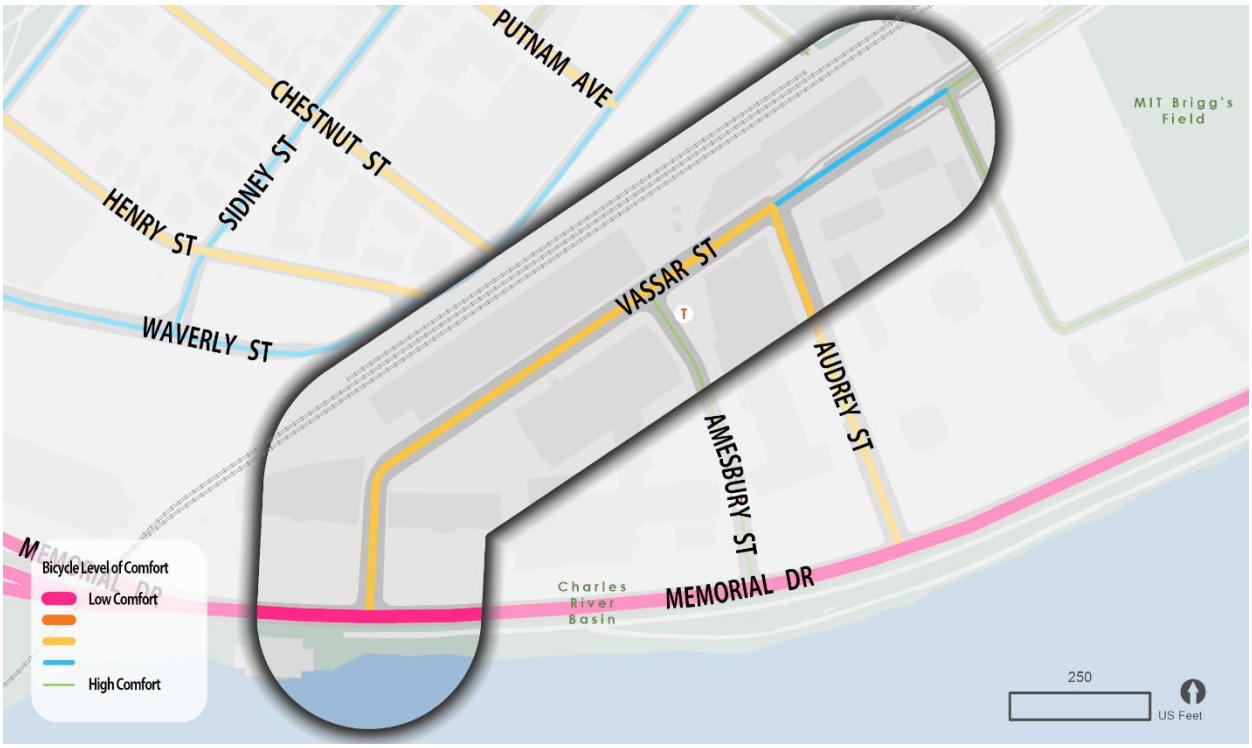
Traffic counts collected over three midweek weekdays on Vassar Street west of Amesbury Street captured an average of 5,100 vehicles traveling on Vassar Street. Most vehicles were cars (87.4%), followed by bicycles (5.28%), buses (4.02%), heavy vehicles (2.58%), and motorcycles (0.72).

Multiple unsignalized intersections (Memorial Drive, Amesbury Street, Audrey Street, Amherst Alley) are located on the corridor. The initial concepts for Vassar Street will not impact traffic operations at any of these intersections.

Bicycle Level of Comfort

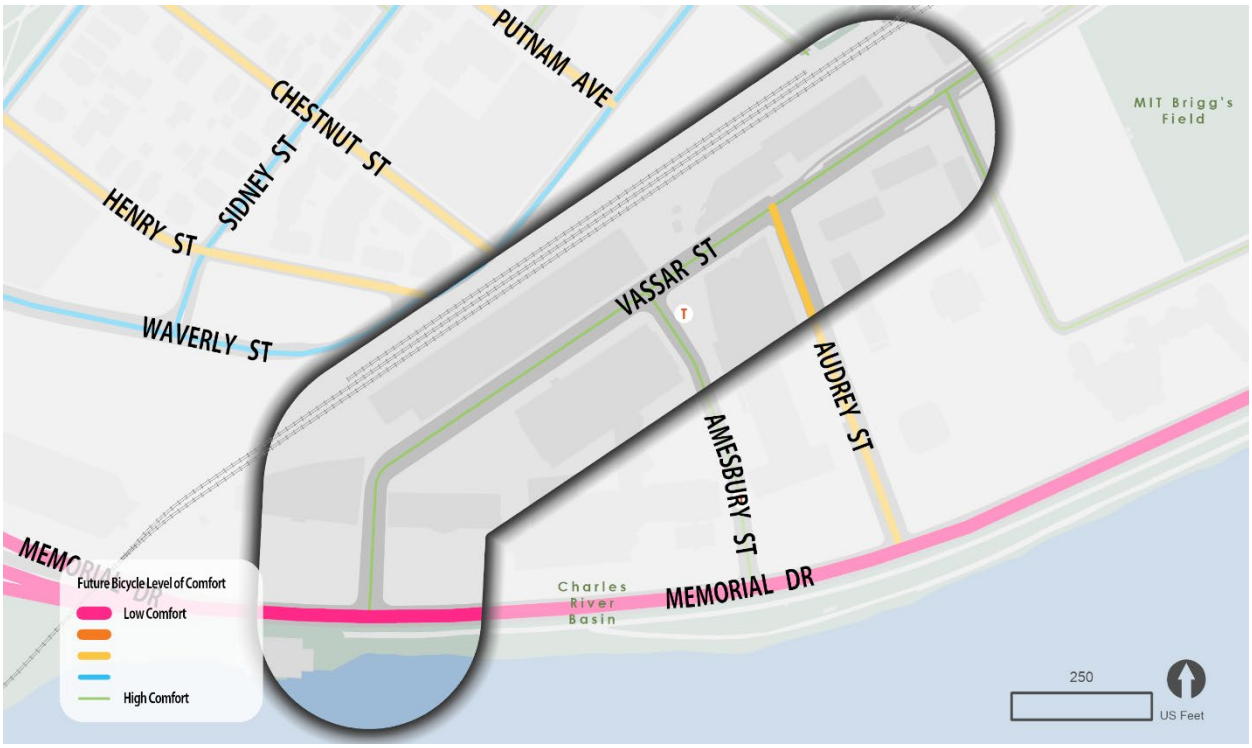
The BLC score of Vassar Street fluctuates between 2 and 3 due to the presence of parking adjacent to bike lanes (**Figure 25**). The portion between Amherst Alley and Audrey Street has a BLC score of 2 since cyclists do not have to contend with conflicts with parked vehicles.

Figure 25. Existing Bicycle Level of Comfort on Vassar Street



The BLC score for both Vassar Street concepts is 1 (**Figure 26**). The future conditions include separated bike lanes for cyclists traveling in either direction, continuing the level of protection cyclists experience east of the study's extents.

Figure 26. Concept 1 and 2 - Bicycle Level of Comfort on Vassar Street



Crash History

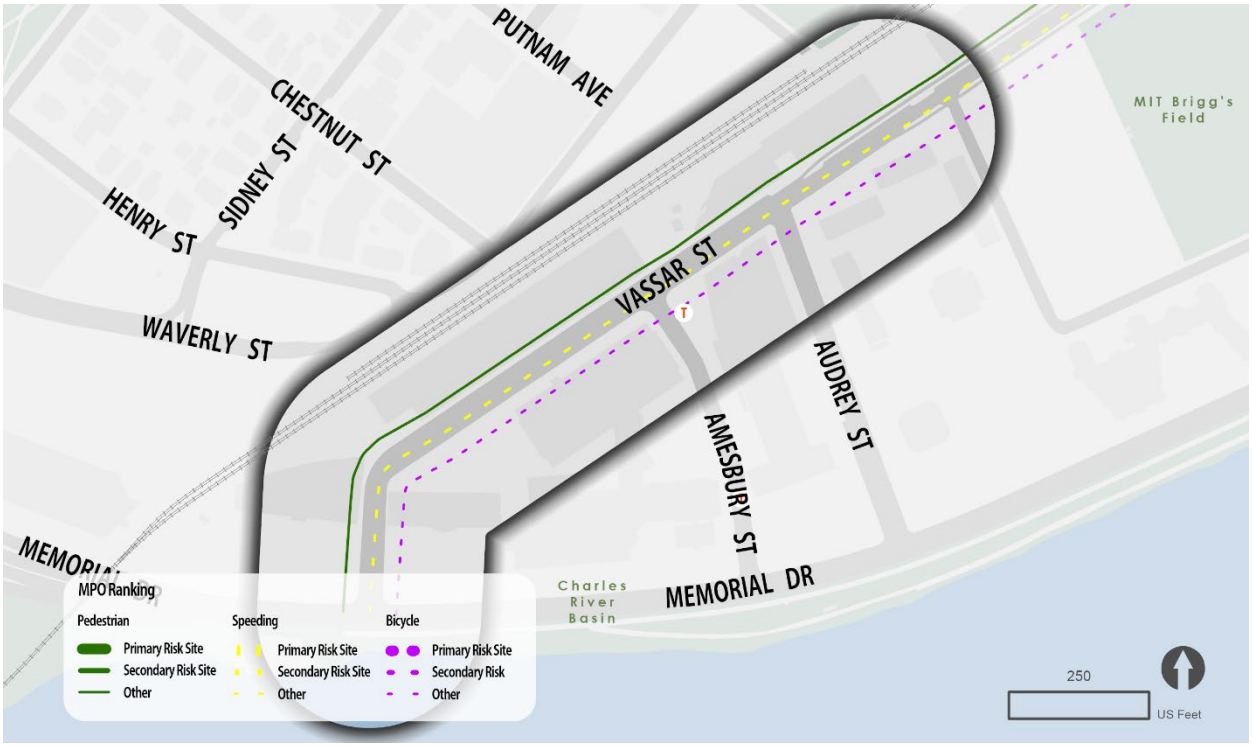
Vassar Street has a history of fatal and injury crashes, scoring among the Top 5% of all segments in the Boston MPO for all crashes and for fatal and injury crashes (**Figure 27**). Injury crashes that occurred on Vassar Street between 2013 and 2017 included bicycle-involved, sideswipe, angle, rear end, head on, and single vehicle crashes. Vassar Street is not a primary or secondary risk site for pedestrians, bicyclists, or speeding when compared to other roads in the Boston MPO (**Figure 28**).

The block groups encompassing Vassar Street include EJ populations with the following criteria: Minority and English Isolation.

Based on 72-hour speed counts collected in September 2024, the average motorist speed on Vassar Street was 24 mph, below the Street's 25 mph speed limit.

Figure 27. Top Crash Segments by MPO on Vassar Street

Figure 28. Top Risk Segments by MPO on Vassar Street



Parking

Key highlights from the Vassar Street parking analysis include:

- Parking occupancy is low on Vassar Street, reaching a maximum of 41% on weekdays between 8:00 PM and 10:00 PM (**Figure 29**).
- Most parking on Vassar Street is 2-hour metered parking (79%) (**Figure 30**).
- Concept 1 (one-way separated bike lanes) would decrease parking by 49%, preserving on-street parking on the north side (**Table 18**).
- Concept 2 (one-way separated bike lanes) would decrease parking by 58%, preserving on-street parking on the south side (**Table 18**).

Figure 29. Median Parking Occupancy on Vassar Street

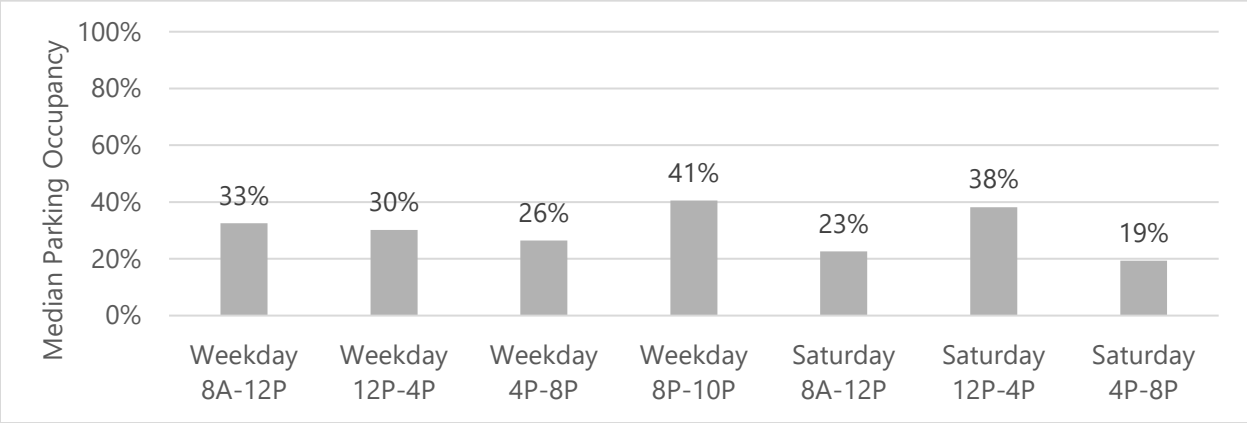


Figure 30. Parking Availability & Regulations on Vassar Street

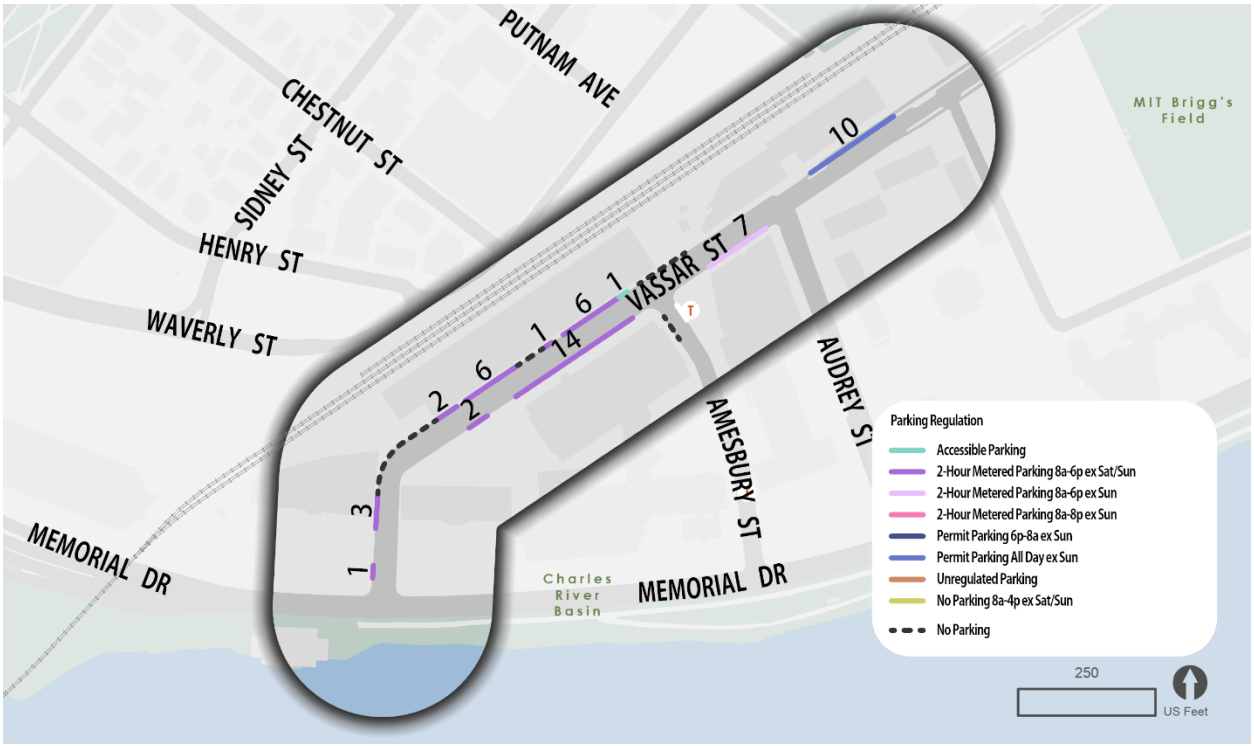


Table 18. Parking Impact of Vassar Street Concepts

Design Concept	Existing	Proposed	Percent Decrease
One-way separated bike lanes (retaining north side parking)	53	27	49%
One-way separated bike lanes (retaining south side parking)	53	22	58%

Preferred Concept

Following review and discussion of the design concepts, Cambridge recommended advancing Concept 1 as the preferred concept for Vassar Street.

TRAFFIC ANALYSIS IMPLICATIONS

The Vassar Street concept is not expected to affect traffic operations.

BICYCLE LEVEL OF COMFORT IMPLICATIONS

The BLC score for Vassar Street's preferred concept is 1 because it includes separated bike lanes that provide a physically separated space for cyclists to travel in either direction.

CRASH HISTORY IMPLICATIONS

Vassar Street has notable crash-patterns when compared to other roads in the Boston MPO. On average, motorists travel at 24 mph on Vassar Street. A separated bike lane on Vassar Street will increase comfort and safety for people biking.

PARKING IMPLICATIONS

Parking occupancy is low on Vassar Street, reaching a maximum of 41% on weekdays between 8:00 PM and 10:00 PM. The preferred design concept (one-way separated bike lanes) would decrease parking by 49%, preserving on-street parking on the north side.

RECOMMENDATIONS

The City of Cambridge recommended Vassar Street for quick-build design and construction by the November 2026 CSO deadline. Factors that contributed to this decision included:

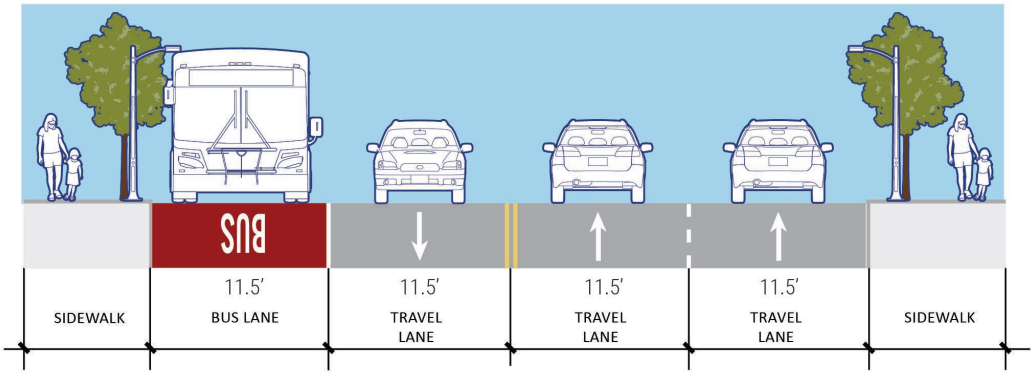
- Vassar Street is slated for greater separation in the 2020 Bicycle Network Vision.
- The preferred concept will improve Vassar Street's bicycle level of comfort score from 2-3 to 1.
- Vassar Street has notable crash-patterns when compared to other roads in the Boston MPO. The preferred concept addresses a Top 5% segment for fatal and injury crashes providing separated bicycle facilities.
- Parking occupancy is low on Vassar Street, reaching a maximum of 41% on weekdays between 8:00 PM and 10:00 PM.

Appendix O includes the concept plan for the preferred concept for Vassar Street.

MOUNT AUBURN STREET

Mount Auburn Street from Brattle Street to Coolidge Avenue is a two-way principal arterial road with two westbound shared travel lanes, one eastbound travel lane, and one eastbound bus lane. It has sidewalks on both sides of the road with a landscaped buffer.

EXISTING - MT AUBURN ST

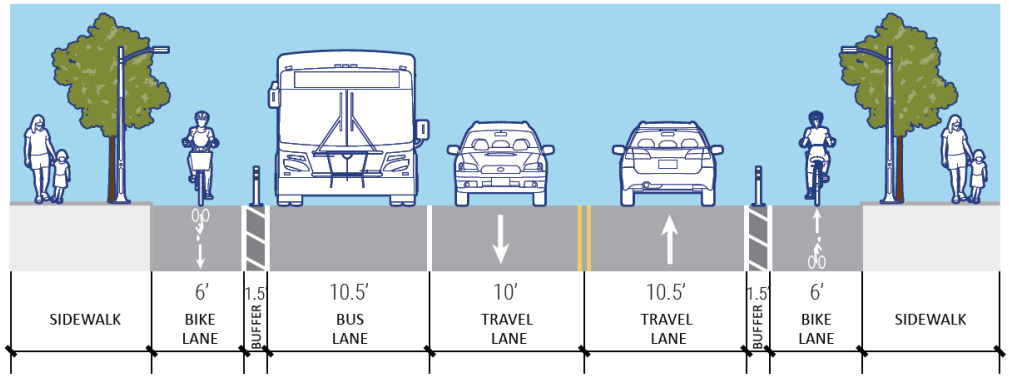


Design Concepts

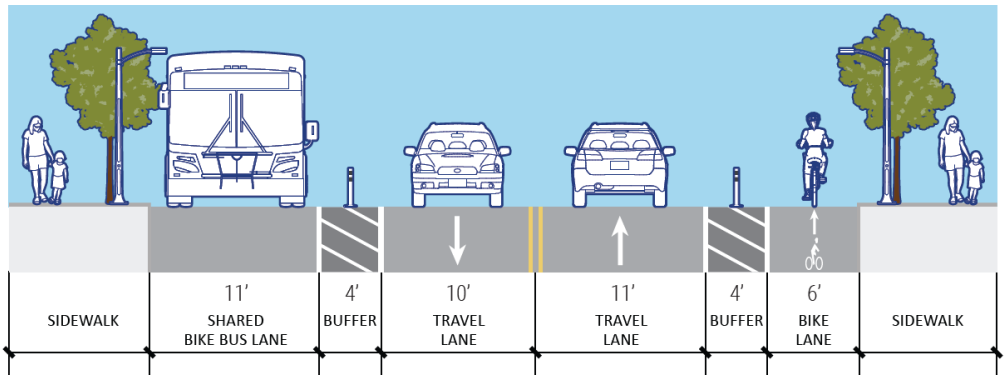
The consultant team developed two initial concepts for Mount Auburn Street:

- **Concept 1** includes two 6-foot separated bike lanes with one 1.5-foot buffer, one 10.5-foot bus lane, and two 10-10.5-foot vehicle travel lanes.
- **Concept 2** includes one 6-foot separated bike lane with 4-foot buffer, one 10.5-foot shared bike bus lane with one 4-foot buffer and two 10-11-foot vehicle travel lanes.

INITIAL CONCEPT - MT AUBURN ST (ALT 1)



INITIAL CONCEPT - MT AUBURN ST (ALT 2)



Appendix P includes the detailed concept sketches for Mount Auburn Street.

Traffic Analysis

Traffic counts collected over three midweek weekdays on Mount Auburn Street east of Brattle Street captured an average of 16,400 vehicles traveling on Mount Auburn Street. Most vehicles were cars (94.1%), followed by buses (3.31%), heavy vehicles (1.2%), bicycles (0.92%), and motorcycles (0.47%).

One unsignalized intersection (Brattle Street) and one signalized intersection (Coolidge Avenue) is located on the corridor. The initial concepts for Mount Auburn Street will impact traffic operations on the corridor by reallocating one westbound travel lane between Brattle Street and Coolidge Avenue to provide a westbound separated bike lane. This proposed change could impact multiple corridor intersections west of Coolidge Avenue, including the signalized intersection of Mount Auburn Street and Aberdeen Avenue. The following subsections present the results of the existing and proposed conditions operational Synchro/SimTraffic analysis for the corridor and its intersections.

EXISTING CONDITIONS OPERATIONAL ANALYSIS

The Synchro/SimTraffic analysis for Mount Auburn Street included three key intersections:

- Mount Auburn Street and Aberdeen Avenue
- Mount Auburn Street and Brattle Street
- Mount Auburn Street and Coolidge Avenue

The intersection of **Mount Auburn Street and Aberdeen Avenue** is a three-leg, actuated-coordinated intersection with a two-way separated bicycle lane on the north side of Mount Auburn Street. The east leg crosswalk runs concurrently with the eastbound left-turn exclusive movement and southbound right-turn overlap. The north leg crosswalk runs concurrently with eastbound and westbound through movements, and westbound right-turns operate on a separate phase in the cycle. Southbound movements on Aberdeen Avenue operate with a protected signal phase and westbound right-turn overlap. All pedestrian phases rest in walk.

The intersection of **Mount Auburn Street and Brattle Street** is a complex unsignalized intersection consisting of two paired intersections where Brattle Street westbound and Brattle Street eastbound intersect Mount Auburn Street. The western intersection is located where westbound Brattle Street intersects Mount Auburn Street. It is a four-leg unsignalized intersection with two-way stop control on the intersecting side streets: Brattle Street (north leg) and Garden Avenue/Mt. Auburn Cemetery Driveway (south leg). A driveway entrance for 575 Mount Auburn Street is located within the intersection. The eastern intersection is located where eastbound Brattle Street intersects Mount Auburn Street. It is a three-leg unsignalized intersection with a dedicated eastbound left-turn from Mount Auburn Street on to eastbound Brattle Street and an uncontrolled pedestrian crossing of Mount Auburn Street.

The intersection of **Mount Auburn Street and Coolidge Avenue** is a three-leg, actuated-coordinated intersection with an eastbound queue jump for the Mount Auburn Street bus only lane. The south and west leg crosswalks run exclusively as an actuated phase. Westbound left-turns operate with protected-permissive signal phases, Flashing Yellow Arrows (FYA), and northbound left-turn overlap. Northbound left- and right-turns operate with a protected phase. When the eastbound queue jump is activated by a bus, eastbound right-turn movements are permitted and westbound through movements are protected.

Table 19 shows the results of the Mount Auburn Street existing conditions Synchro/SimTraffic analyses for the AM and PM peak hours.

All three intersections operate between Level of Service A and D during the AM and PM peak hours with one exception. The intersection of Mount Auburn Street and Coolidge Avenue operates at Level of Service E during the AM peak hour. This is primarily due to high delay associated with the eastbound through movement.

Maximum queues are contained within the available storage facilities for all approaches with the following exceptions:

- Mount Auburn Street and Aberdeen Avenue
    - Westbound through (AM/PM)
    - Westbound right (AM/PM)
    - Southbound left (PM)
- Mount Auburn Street and Brattle Street West
    - Westbound left-through (PM)
    - Southwest right (PM)
- Mount Auburn Street and Coolidge Avenue
    - Westbound left (AM/PM)
    - Northbound left (AM)

Average queues are contained within the available storage facilities for all approaches.

Table 19. Existing Condition Synchro/SimTraffic Analysis Results for Mount Auburn Street

Intersection	Lane Group	AM Peak Hour Delay (sec/veh.)	AM Peak Hour Average Queue (ft)	AM Peak Hour Maximum Queue (ft)	AM Peak Hour V/C ratio	PM Peak Hour Delay (sec/veh.)	PM Peak Hour Average Queue (ft)	PM Peak Hour Maximum Queue (ft)	PM Peak Hour V/C ratio
Mount Auburn Street and Aberdeen Avenue	**EBL**	**66.9**	130	294	0.83	**107.2**	157	320	1.02
	EBT	19.2	205	377	0.66	17.6	175	342	0.65
	WBT	18.3	169	**230***	0.63	17.9	180	**228***	0.67
	WBR	23.5	92	**212***	0.34	36.6	171	**228***	0.75
	SBL	**147.9**	306	532	1.12	**210.8**	364	**554***	1.24
	SBR	30.1	114	125	0.47	29.8	102	125	0.31
	Overall	38.1	---	---	0.80	43.2	---	---	0.86
Mount Auburn Street and Brattle Street West	**EBTR**	0.0	2	20	0.56	0.0	---	---	0.45
	WBLT	0.0	18	134	---	0.4	35	**179***	0.01
	WBT	0.0	0	12	0.24	0.0	15	120	0.32
	NBL	0.0	---	---	---	**106.9**	5	38	0.26
	SWR	13.4	69	172	0.39	14.7	93	**228***	0.39
	Overall	1.9	---	---	---	2.6	---	---	---
Mount Auburn Street and Brattle Street East	**EBL**	10.3	42	103	0.27	10.7	57	144	0.25
	EBT	0.0	---	---	0.40	0.0	---	---	0.34
	WBT	0.0	6	42	0.23	0.0	0.0	10	0.32
	WBR	0.0	1	20	0.16	0.0	2	24	0.21
	Overall	1.6	---	---	---	1.3	---	---	---
Mount Auburn Street and Coolidge Ave	**EBT**	**113.5**	144	171	1.13	**60.1**	143	170	0.94
	EBR	20.1	---	---	0.05	23.7	---	---	0.03
	WBL	42.8	116	**166***	0.77	25.0	102	**167***	0.58
	WBT	8.0	109	201	0.26	9.8	111	194	0.44
	NBL	52.4	57	**143***	0.64	44.7	40	101	0.35
	NBR	25.0	71	169	0.33	23.5	64	164	0.31
	Overall	**55.3**	---	---	0.77	28.3	---	---	0.63

Peak Hour Delay (sec/veh): Peak hour delay cells highlighted in **gold** represent LOS E. Peak hour delay cells highlighted in **red** represent LOS F.

Queueing: Queue cells highlighted in **blue** and with an * indicate that the queue exceeds the storage length/link distance.

PROPOSED CONDITIONS OPERATIONAL ANALYSIS

The proposed concept for Mount Auburn Street reallocates one westbound travel lane between Brattle Street and Coolidge Avenue to provide a westbound separated bike lane on Mount Auburn Street. The concept maintains existing signal timing.

Table 20 shows the results of the Mount Auburn Street proposed conditions Synchro/SimTraffic analyses for the AM and PM peak hours.

Compared to existing conditions, the proposed condition does not substantially increase or decrease corridor peak hour delay. All three intersections continue to operate between Level of Service A and D during the AM and PM peak hours with one exception. The intersection of Mount Auburn Street and Coolidge Avenue continues to operate at Level of Service E during the AM peak hour.

Compared to existing conditions, the proposed condition does not result in substantial changes to maximum queues. However, the proposed condition does generate maximum PM Peak hour queues for the eastbound left-turn from Mount Auburn Street to Brattle Street that spill back to Central Avenue.

Average queues are contained within the available storage facilities for all approaches.

Table 20. Proposed Condition Synchro/SimTraffic Analysis Results for Mount Auburn Street

Intersection	Lane Group	AM Peak Hour Delay (sec/veh.)	AM Peak Hour Average Queue (ft)	AM Peak Hour Maximum Queue (ft)	AM Peak Hour V/C ratio	PM Peak Hour Delay (sec/veh.)	PM Peak Hour Average Queue (ft)	PM Peak Hour Maximum Queue (ft)	PM Peak Hour V/C ratio
Mount Auburn Street and Aberdeen Avenue	**EBL**	**66.9**	129	288	0.83	**107.2**	156	302	0.87
	EBT	19.2	217	376	0.66	17.6	175	344	0.59
	WBT	18.3	160	**230***	0.63	17.9	179	**228***	0.80
	WBR	23.5	87	184	0.34	36.6	162	**229***	0.58
	SBL	**147.9**	274	520	1.12	**210.8**	387	**561***	0.77
	SBR	30.1	112	125	0.47	29.8	109	125	0.31
	Overall	38.1	---	---	0.80	43.2	---	---	0.81
Mount Auburn Street and Brattle Street West	**EBTR**	0.0	15	37	0.56	0.0	---	---	0.45
	WBLT	0.0	18	135	---	0.4	37	**161***	0.01
	WBT	0.0	0	4	0.24	0.0	14	123	0.32
	NBL	0.0	---	---	---	**106.9**	4	31	0.26
	SWR	13.4	63	150	0.39	14.7	88	**214***	0.39
	Overall	1.9	---	---	---	2.6	---	---	---
Mount Auburn Street and Brattle Street East	**EBL**	10.5	49	128	0.28	12.6	66	**162***	0.31
	EBT	0.0	31	111	0.40	0.0	---	---	0.34
	WBTR	0.0	4	33	0.39	0.0	5	46	0.52
	Overall	1.6	---	---	---	1.6	---	---	---
Mount Auburn Street and Coolidge Ave	**EBT**	**113.5**	146	174	1.13	**60.1**	142	169	0.94
	EBR	20.1	--	--	0.05	23.7	---	---	0.03
	WBL	42.8	119	**167***	0.77	25.0	134	**167***	0.58
	WBT	8.0	137	205	0.26	9.8	166	216	0.44
	NBL	52.4	60	**148***	0.64	44.7	40	**109***	0.35
	NBR	25.0	66	171	0.33	23.5	67	180	0.31
	Overall	**55.3**	---	---	0.77	28.3	---	---	0.63

Peak Hour Delay (sec/veh): Peak hour delay cells highlighted in gold represent LOS E. Peak hour delay cells highlighted in red represent LOS F.

Queueing: Queue cells highlighted in blue and with an * indicate that the queue exceeds the storage length/link distance.

CORRIDOR AVERAGE SPEEDS

Table 21 and **Table 22** compare SimTraffic average speeds (mph) for Mount Auburn Street between Aberdeen Avenue and Coolidge Avenue.

In the eastbound direction, the proposed condition experiences a negligible reduction in corridor speeds (3 mph slower) during the AM Peak hour compared to the existing condition. The proposed condition does not experience a reduction in corridor speeds compared to the existing condition during the PM Peak Hour.

In the westbound direction, the proposed condition experiences a negligible reduction in corridor speeds (1 mph slower) during the PM Peak hour compared to the existing condition. The proposed condition does not experience a reduction in corridor speeds compared to the existing condition during the AM Peak Hour.

Table 21. Eastbound Mount Auburn Street Corridor Average Speeds – SimTraffic

Segment	Existing AM EB Average Speed (mph)	Proposed AM EB Average Speed (mph)	Existing PM EB Average Speed (mph)	Proposed PM EB Average Speed (mph)
Aberdeen Avenue to Brattle Street West	12	11	13	13
Brattle Street West to Brattle Street East	23	20	24	24
Brattle Street East to Coolidge Avenue	25	18	27	27
Corridor Average	17	14	18	18

Table 22. Mount Auburn Street Westbound Corridor Average Speeds – SimTraffic

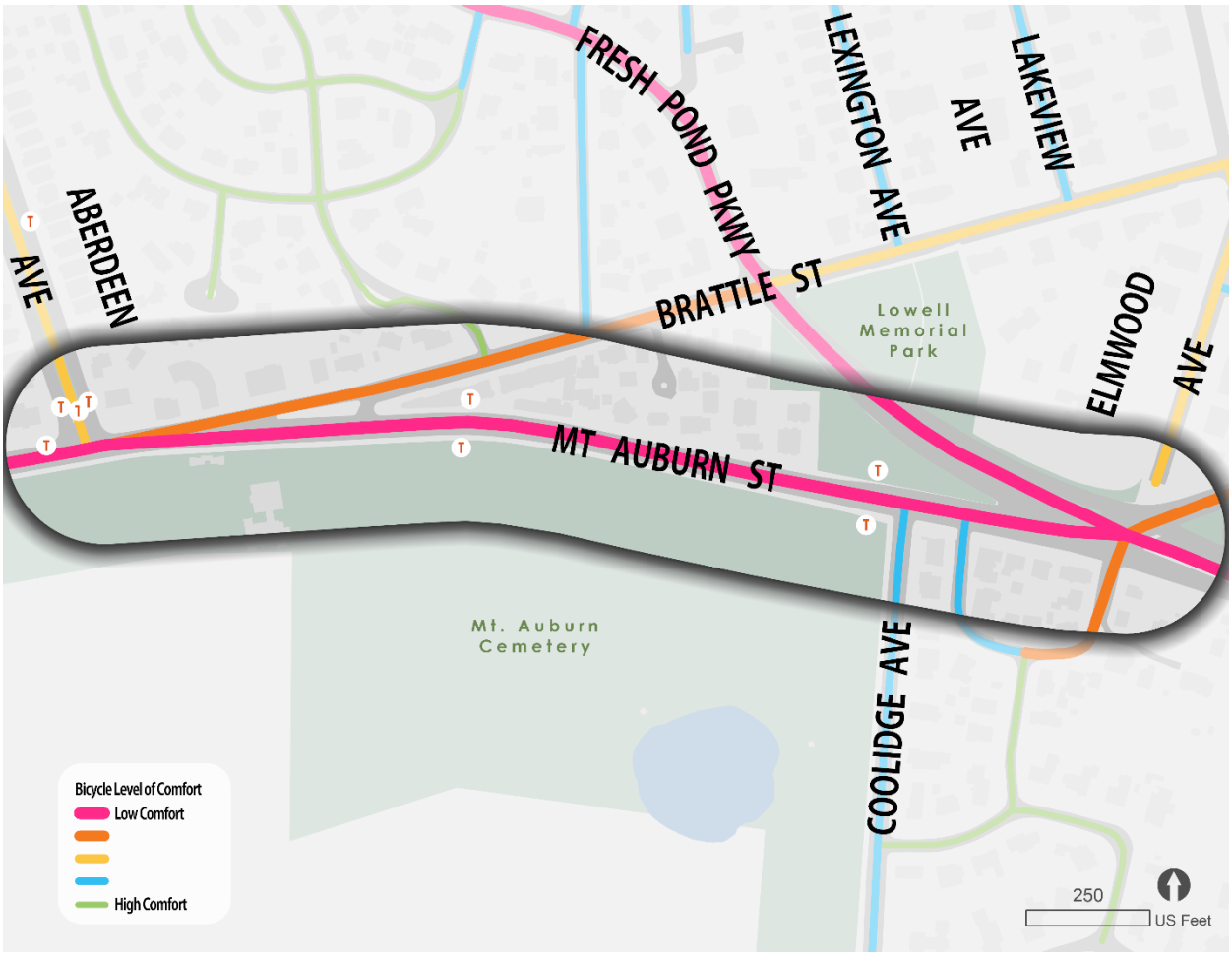
Segment	Existing AM WB Average Speed (mph)	Proposed AM WB Average Speed (mph)	Existing PM WB Average Speed (mph)	Proposed PM WB Average Speed (mph)
Coolidge Avenue to Brattle Street East	29	28	29	27
Brattle Street East to Brattle Street West	25	25	23	22
Brattle Street West to Aberdeen Avenue	11	11	10	10
Corridor Average	22	22	21	20

Appendix Q includes Synchro and SimTraffic reports for existing and proposed conditions at the Mount Auburn Street intersections.

Bicycle Level of Comfort

Mount Auburn Street's existing BLC score is 5, representing a shared lane with ADT volumes above 16,000 or speeds above 30 MPH (**Figure 31**). Mount Auburn Street's existing condition requires cyclists to negotiate space with motorists, potentially increasing the stress level and decreasing the comfort of cyclists.

Figure 31. Existing Bicycle Level of Comfort on Mount Auburn Street



Concept 1's BLC score is 1 because separated bike lanes provide protection to cyclists traveling in either direction. The BLC criteria do not differentiate between a shared lane with private vehicles and a shared lane with buses. As a result, Concept 2, which includes an eastbound shared bus/bike lane, would only have a BLC score of 4.

Crash History

Mount Auburn Street does not have a notable crash history when compared to other roads in the Boston MPO (**Figure 32**). Mount Auburn Street between Brattle Street and Coolidge Avenue is a secondary risk sites for bicyclists when compared to other roads in the Boston MPO (**Figure 33**). Mount Auburn Street at Brattle Street is a secondary risk site for pedestrians when compared to other roads in the Boston MPO (**Figure 33**). Mount Auburn Street does not fall within an EJ Population.

Based on 72-hour speed counts collected in September 2024, the average motorist speed on Mount Auburn Street was 32 mph, below the Street's 35 mph speed limit.

Figure 32. Top Crash Segments by MPO on Mount Auburn Street

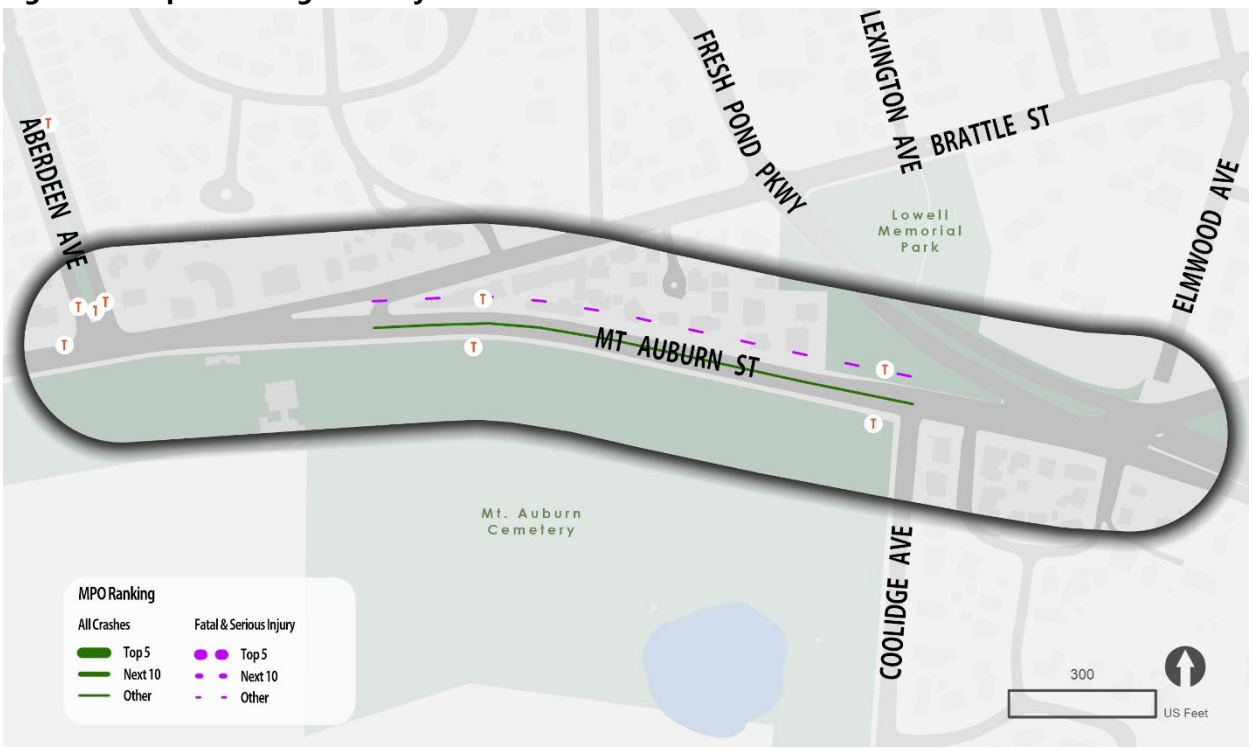
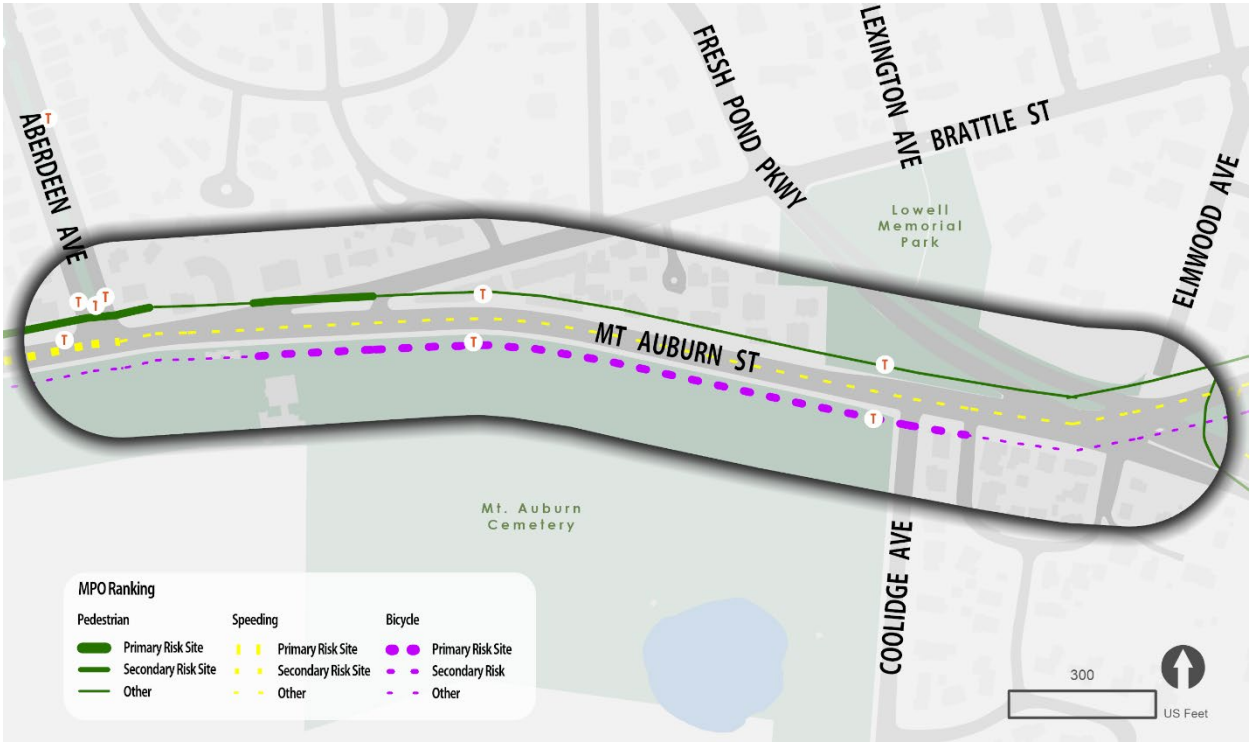
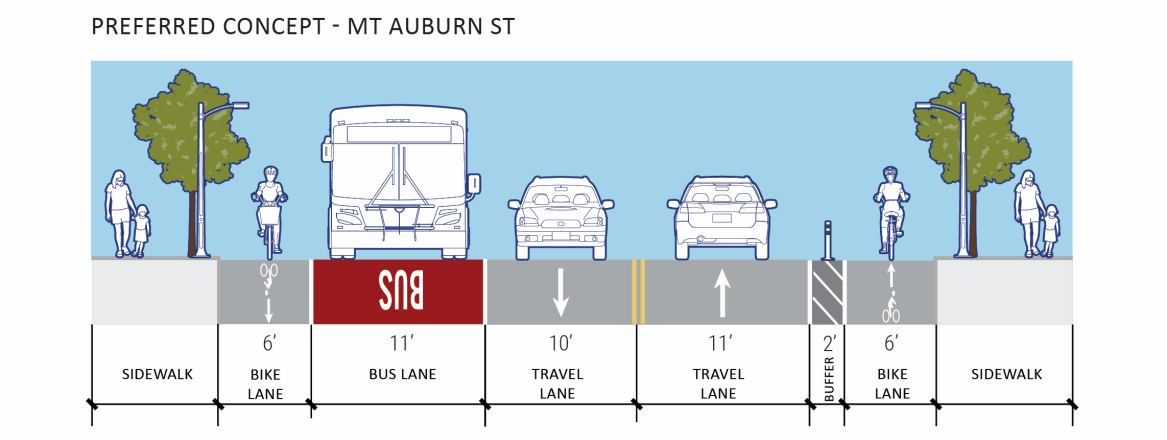


Figure 33. Top Risk Sites by MPO on Mount Auburn Street



Preferred Concept

Following review and discussion of the design concept, City staff recommended a modified concept for Mount Auburn Street. The preferred concept for Mount Auburn Street includes one westbound 6-foot separated bike lane with a 2-foot buffer, two 10-to-11-foot vehicle travel lanes, one 11-foot bus only lane, and one eastbound 6-foot bicycle lane.



TRAFFIC ANALYSIS IMPLICATIONS

The preferred concept for Mount Auburn Street reallocates one westbound travel lane between Brattle Street and Aberdeen Avenue to provide a westbound separated bike lane on Mount Auburn Street. Compared to existing conditions, the preferred concept does not substantially increase or decrease corridor peak hour delay.

Compared to existing conditions, the proposed condition does not result in substantial changes to maximum queues. However, the preferred concept generates maximum PM Peak hour queues for the eastbound left-turn from Mount Auburn Street to Brattle Street that spill back to Central Avenue. The preferred concept does not generate average queues that spill back to upstream intersections or driveways.

A comparison of corridor average speeds in Simtraffic show that the proposed condition experiences a negligible reduction in corridor speeds (1 to 3 mph slower) compared to the existing condition.

BICYCLE LEVEL OF COMFORT IMPLICATIONS

The BLC score for Mount Auburn Street's preferred concept is 2 because it includes separated bike lane for cyclists traveling in the westbound direction (BLC 1) and a standard bicycle lane for cyclists traveling in the eastbound direction (BLC 2).

CRASH HISTORY IMPLICATIONS

Mount Auburn Street is a secondary risk site for bicyclists when compared to other roads in the Boston MPO. A separated bike lane on Mount Auburn Street will increase comfort and safety for people biking.

PARKING IMPLICATIONS

The Mount Auburn Street concept is not expected to affect parking. The corridor does not include any on-street parking.

RECOMMENDATIONS

The City of Cambridge recommended Mount Auburn Street for quick-build design and construction by the November 2026 CSO deadline. Factors that contributed to this decision included:

- Mount Auburn Street is slated for greater separation in the 2020 Bicycle Network Vision.
- The preferred concept does not substantially increase or decrease corridor peak hour delay.
- A comparison of corridor average speeds in Simtraffic show that the proposed condition experiences a negligible reduction in corridor speeds (1 to 3 mph slower) compared to the existing condition.
- The preferred concept will improve Mount Auburn Street's bicycle level of comfort score for westbound cyclists from 5 to 1. It improves the BLC for eastbound cyclists from 5 to 2.
- Mount Auburn Street has notable crash-risk patterns when compared to other roads in the Boston MPO. The preferred concept addresses a secondary risk site for bicyclists by providing separated bicycle facilities.

Appendix R includes the concept plan for the preferred concept for Mount Auburn Street.

CONCLUSION

The preferred concepts identified through this feasibility study advance the City's Bicycle Network Vision while balancing traffic, access, and safety outcomes for everyone who travels on Cambridge's streets. The five concepts selected for design and construction will help the City meet the November 2026 Cycling Safety Ordinance deadline.

Appendix A: Traffic Counts

Appendix B: Parking Occupancy Maps

Appendix C: Granite Street Concept Sketches

Appendix D: Granite Street Synchro

Appendix E: Granite Street Preferred Concept

Appendix F: Huron Avenue Concept Sketch

Appendix G: Huron Avenue Synchro

Appendix H: Huron Avenue Preferred Concept

Appendix I: Kirkland Street Concept Sketch

Appendix J: Kirkland Street Preferred Concept

Appendix K: Quincy Street Concept Sketch

Appendix L Quincy Street Synchro

Appendix M: Quincy Street Preferred Concept

Appendix N: Vassar Street Concept Sketches

Appendix O: Vassar Street Preferred Concept

Appendix P: Mount Auburn Street Concept Sketches

Appendix Q: Mount Auburn Street Synchro/SimTraffic

Appendix R: Mount Auburn Street Preferred Concept