



Cambridge Roadway Safety Audit Program: Report to City Council

December 2025

Introduction

The City Council requested that the Cambridge Department of Transportation (CDOT) take a systematic approach to improving safety at City-owned intersections. Since that time, CDOT created and began implementation of a comprehensive new program. This report will explain the two major components of the Roadway Safety Audit Program – Higher Crash Locations Protocol and Rapid Response Protocol – along with a summary of completed and planned work at intersections with the greatest need. To date, CDOT staff have completed crash summaries of over 350 intersections and as a result we now know the areas of most significant concern, especially for bicycles and pedestrians.

Context

Since the adoption of Vision Zero, the City has had a protocol in place to respond to fatal crashes. Shortly after a fatality, a multi-disciplinary team of staff from departments across the City conduct a site visit to evaluate the location of the fatal crash for opportunities for short- and long-term improvements. For example, after fatal crashes occurred in Harvard Square, short-term improvements included the accelerated installation of quick build separated bicycle lanes on Mass Ave between Harvard Yard and the Out of Town News Kiosk, and the elimination of a travel lane on Mass Ave in front of the COOP in advance of capital construction projects. A fatal crash in Inman Square accelerated a redesign and reconstruction of the entire square.

We have now developed an enhanced Roadway Safety Audit program that will formalize the Rapid Response protocol to evaluate locations where fatal or serious crashes occur and established the Higher Crash Location protocol to proactively identify, assess, and mitigate higher crash intersections in need of safety improvements.

Framework

The Roadway Safety Audit program has two major components: Fatal Crash Rapid Response and the proactive Higher Crash Locations protocols. These components are discussed in detail below.

Fatal Crash Rapid Response Protocol

Immediately following a fatal crash on a City-owned street, CDOT will lead and mobilize staff across several Departments, including DPW, Fire, and Police. The first step is a site visit, briefing on the facts of the crash, and a full inventory of the layout of the intersection and its elements (including signs, pavement markings, traffic signal equipment and operation, street lighting, and anything else that may have been a factor in the crash.)

CDOT staff will then research a full crash history of the intersection and partner with the police to gather and examine the written reports on file for each crash. Using this information, Engineering staff will generate a crash diagram. CDOT will also catalog any intersection improvements made within the last several years at that location. A sample Crash Diagram, along with samples of other documents used for our analysis, is available in **Appendix D**.

Next, the inter-departmental group of City staff will meet to discuss updated crash information and the information produced by CDOT. The group will use this information to brainstorm possible improvements.

Finally, CDOT will determine which ideas to prioritize and assign them each to short-, medium-, and long-term horizons. Short-term work will be completed immediately. Medium-term work will be programmed for implementation as soon as possible. CDOT will identify possible funding sources and mechanisms for long-term improvements and assign the project to staff.

If a fatal crash occurs on a state-owned intersection or roadway, CDOT will assist and be involved with the investigation conducted by the appropriate agency.

A more detailed description of the Rapid Response protocol is in **Appendix A**.

Higher Crash Location Protocol

We have created a new program to identify the highest crash locations at City-owned intersections. The objective is to prevent serious crashes before they occur. We do this by finding the intersections with the highest need based on the crash history at each location.

We limit our scope to city-owned intersections where we can make necessary changes ourselves. State-owned intersections are among the highest crash locations within our borders and we will work closely with state agencies as a parallel effort to address safety on state-owned roads.

Generating a list of intersections with the highest need begins with the examination of reported crash data. Raw data, without refinement, show a simplistic view of how many crashes are reported, but does not account for a variety of important factors. Accordingly, we established a methodology to filter and apply weighting criteria to the data based on our priorities.

Factors in our ranking and weighting criteria are:

- Involvement and/or injury of vulnerable road users, e.g. people walking and people riding bikes or other micromobility devices.
- Crashes involving injury, including fatalities.

“Near miss” crashes and crashes not reported to police are extremely difficult to quantify and are not factored into the rankings. Intersections with a high number of reported crashes tend to have a higher number of near misses, so capturing the reported crashes is sufficient for our purposes. At a future date, improvements in technology may allow for better identification of “near miss” crashes, and we continue to investigate and consider this as a future improvement to our methodology.

Higher Crash Location (HCL) analysis includes all crashes over the previous 10-year period and uses the fully comprehensive and publicly available MassDOT IMPACT crash database. Additionally, written police crash reports will help us understand the safety deficiencies of the highest crash locations. While databases such the MassDOT IMPACT have some detail, it is essential to review complete crash reports to properly evaluate crashes and evaluate an intersection for improvements. The reports contain information not available in the database summaries and will help us determine any recurring causes of crashes.

CDOT evaluated every City-owned intersection that met at least one of the following conditions:

- At least one vulnerable user crash in the study period
- A request on file for a Rectangular Rapid Flashing Beacon
- Any safety complaint on file from the past 3 years
- Controlled by a traffic signal

To date we have evaluated 350 intersections and we add new ones to the lists when we have new data or receive new complaints. Using the methodology outlined above, we scored and then ranked the list. Detail on this process is provided in **Appendix B**.

With the ten higher crash locations identified, staff assembled lists of potential improvements for each. These items were chosen to match improvements made at intersections of similar type proven to increase comfort and reduce confusion and crashes.

Top 10 Higher Crash Locations

Higher Crash Location	Higher Crash Score
Mass Ave at Albany Street	HCL Score: 146
Mass Ave at Vassar Street	HCL Score: 137
Mass Ave at Main Street and Sidney Street	HCL Score: 108
Cambridge Street at Cardinal Medeiros Avenue	HCL Score: 88
Broadway at Prospect Street	HCL Score: 83
Cambridge Street at Windsor Street	HCL Score: 78
Mass Ave at Mt. Auburn Street and Putnam Ave	HCL Score: 68
Cambridge Street at Prospect Street	HCL Score: 67
Mass Ave at Windsor Street	HCL Score: 65
Mass Ave at Norfolk Street	HCL Score: 65

The list of the top 75 Higher Crash Locations and Crash Scores is available in Appendix C. The full ranking of all evaluated locations will be available on the Vision Zero Website.

Mass Ave at Albany Street

HCL Score: 146

Mass Ave at Vassar Street

HCL Score: 137

The intersections of Albany and Vassar Streets with Mass Ave are about 350 feet apart and are among the most heavily-used by vulnerable users in Cambridge. They are first and second on our list. The short block between them is bisected by the Grand Junction (GJ) railway corridor. Both intersections are included in the GJ Path design project, which will include significant capital improvements at the intersections. In the interim, CDOT staff are actively evaluating crash reports and identifying engineering solutions that can be implemented faster than the Grand Junction Path project timeline.

Staff have already made minor adjustments to traffic signal timing, such as the duration of the yellow and the “all-red” interval, the time between the end of the yellow and the start of the next green light. Another improvement that we are strongly considering at both locations is “protecting” the left turns. This would allow left turns only on a green left arrow, and bikes and pedestrians would be held during that time. “Protected lefts” are commonly used when a left-only lane is available and is a method proven to reduce hook crashes. There are operational tradeoffs, so we are modeling the change on the desktop first to ensure it will work before implementation.

Mass Ave at Albany Street

<i>Improvement</i>	<i>Timeline</i>	<i>Status</i>
Check/Upgrade clearance times	Short	Complete
Check condition of pavement markings	Short	Complete
Check condition of signal equipment	Short	Complete
Refresh pavement markings	Medium	Next Step
Replace/Upgrade/Repair signal heads	Medium	Next Step
Explore left turn protection	Medium	Next Step

Mass Ave at Vassar Street

<i>Improvement</i>	<i>Timeline</i>	<i>Status</i>
Check/Upgrade clearance times	Short	Complete
Check condition of pavement markings	Short	Complete
Check condition of signal equipment	Short	Complete
Refresh pavement markings	Medium	Next Step
Replace/Upgrade/Repair signal heads	Medium	Next Step
Explore left turn protection	Medium	Next Step

Mass Ave at Main Street and Sidney Street

HCL Score: 108

Also known as Lafayette Square, the intersection was completely reconstructed in 2007 to create Jill Brown-Rhone Park. The resulting geometry is unusual, but left turns are already protected at Mass Ave. Bus lanes were added to Mass Ave in 2022. We will move the southbound bike lane of Sidney St Extension to the curb (it is currently between the through lane and the right turn lane, a treatment that we have moved away from in the City). Additionally, we changed traffic signal operation so the southbound right turn only occurs during a right arrow which should reduce bike crashes and eliminate vehicle conflict points for both pedestrians and cyclists crossing Mass Ave.

<i>Improvement</i>	<i>Timeline</i>	<i>Status</i>
Check/Upgrade clearance times	Short	Complete
Check condition of pavement markings	Short	Complete
Check condition of signal equipment	Short	Complete
Refresh/upgrade pavement markings	Medium	Next step
Replace/upgrade/repair signal heads	Medium	Next step
Protect southbound bike lane	Medium	Next step

Cambridge Street at Cardinal Medeiros Avenue HCL Score: 88

At this currently unsignalized intersection, commuting traffic is heavy on both Cambridge Street and Cardinal Medeiros Avenue. The movement from Cardinal Medeiros to Warren Street is awkward and conflicts with through traffic on Cambridge Street. Traffic signal control for this intersection is already approved and design is underway. We anticipate construction to begin in Fiscal Year '27.

<i>Improvement</i>	<i>Timeline</i>	<i>Status</i>
Check condition of pavement markings	Short	Complete
Refresh pavement markings	Medium	Next step
Design and construct traffic signal	Long	Next step

Broadway at Prospect Street

HCL Score: 83

DOT secured a grant from the Massachusetts Gaming Commission to perform a small study of the intersections on the Prospect Street corridor between Cambridge Street and Bishop Allen Drive, including the Broadway intersection. The study included a crash summary, traffic counts, and a full inventory of all traffic signal equipment, signs, and pavement markings. As a result of this study, we have a fuller understanding of the intersections' deficiencies and needs. We discovered that hook-type crashes are common, especially left hook, so we are investigating how to protect left turns.

Protecting vehicle left turns is an established and proven method of substantially reducing left look crashes. Protection allows a dedicated time in the traffic signal cycle for cars to make turns when no conflicting vehicle, pedestrian, or bike movements happen. Protected turns improve pedestrian and bicycle safety because pedestrians and cyclists will not be crossing at the same time as the vehicle turn.

We secured a second Gaming Commission grant for construction of sidewalk-level bike lanes for a short section of Broadway approaching the intersections. This will allow us to create greater separation as required by the CSO and retain the left-turn lanes on Broadway.

Finally, this intersection is part of the Broadway Safety Improvement Project, which is currently under design.

<i>Improvement</i>	<i>Timeline</i>	<i>Status</i>
Check/Upgrade clearance times	Short	Complete
Check condition of pavement markings	Short	Complete
Check condition of signal equipment	Short	Complete
Refresh pavement markings	Medium	Next step
Replace/Upgrade/Repair signal heads	Medium	Next step

Explore left turn protection	Medium	Next step
Broadway Safety Improvement project	Long	Next Step

Cambridge Street at Windsor Street

HCL Score: 78

Similar to Cardinal Medeiros Ave, this intersection is not controlled by a traffic signal. Windsor Street is used as a commuter route and Cambridge Street is frequently backed up through this intersection due to its proximity to the traffic signal at Columbia Street, which is about 300 feet to the west. The line of stopped cars obscures the safe line of sight from Windsor Street, likely causing crashes.

DOT is planning an improvement at this intersection which will prohibit vehicles from turning left onto Cambridge Street or going straight across Cambridge Street to continue on Windsor Street. Instead, all traffic exiting Windsor Street would have to turn right onto Cambridge Street. We will treat the improvement as a pilot, which will include an evaluation of its effectiveness on safety, impacts on circulation, and negative impacts on other streets in the neighborhood before a permanent implementation is completed.

<i>Improvement</i>	<i>Timeline</i>	<i>Status</i>
Perform signal warrant analysis	Short	Next step
Check condition of pavement markings	Short	Complete
Refresh pavement markings	Medium	Next step
Turn restriction pilot improvement	Medium	Next Step

Mass Ave at Mt. Auburn Street and Putnam Ave HCL Score: 68

This intersection on the edge of the Harvard Square neighborhood has five approaches and two large islands. The bus lane on Mt. Auburn was installed in 2020.

Further study is needed, which will recommend a set of improvements to the layout and operation of the intersection, which we will subsequently program for implementation.

<i>Improvement</i>	<i>Timeline</i>	<i>Status</i>
Check/Upgrade clearance times	Short	Complete
Check condition of pavement markings	Short	Complete
Check condition of signal equipment	Short	Complete
Refresh pavement markings	Medium	Next step
Replace/Upgrade/Repair signal heads	Medium	Next step
Safety/capacity study	Medium	Next step

Cambridge Street at Prospect Street

HCL Score: 67

Cambridge at Prospect is part of the initial Gaming Commission grant project, which is complete. We have a set of suggested medium-term improvements summarized below. Additionally, this location is part of the Cambridge Street Safety Improvement Project. The project proposes a floating bus stop on the southeast corner.

Early phases of the Cambridge Street Safety Improvement Project resulted in separated bike lanes on both the north and south sides of Cambridge Street west of Prospect Street.

<i>Improvement</i>	<i>Timeline</i>	<i>Status</i>
Check/Upgrade clearance times	Short	Complete
Check condition of pavement markings	Short	Complete
Check condition of signal equipment	Short	Complete
Refresh pavement markings	Medium	Next step
Replace/Upgrade/Repair signal heads	Medium	Next step
Explore left turn protection	Medium	Next step
Cambridge Street Safety Improvement project	Long	Next step

Mass Ave at Windsor Street

HCL Score: 65

Windsor Street attracts commuting trips through this uncontrolled intersection. The separated bike lanes and bus lane were installed in 2018. The crosswalk, crossing islands, and Rectangular Rapid Flashing Beacons (RRFBs) were installed in 2021.

Vehicles stopped at the signal at Mass Ave and Albany Street back up through this intersection, especially in the morning rush period, which makes left turns from Windsor Street onto Mass Ave difficult. We will investigate changes to traffic control, including evaluating the possibility of adding a traffic signal.

<i>Improvement</i>	<i>Timeline</i>	<i>Status</i>
Perform signal warrant	Short	Next step
Check condition of pavement markings	Short	Complete
Refresh pavement markings	Medium	Next step
Safety/capacity study	Medium	Next step

Mass Ave at Norfolk Street

HCL Score: 65

While Norfolk Street does carry some commuting trips, it is a T-intersection and it is somewhat unusual to see it this high on the list. It has the second-highest number of pedestrian crashes (10,

the same as Cambridge Street at Prospect Street and Hampshire Street at Prospect Street), which comprise a third of all reported crashes. There were also 3 bike crashes. Norfolk Street is closed on Mondays when the Farmer’s Market is operating.

Pedestrian movement is a focus of this investigation. There is one crosswalk across Mass Ave, which is controlled by an RRFB. The device was installed in 2019. In 2020, one of the three vehicular travel lanes on Mass Ave was removed to facilitate on-street dining patios, resulting in a shorter crossing distance. Although the study period covers 10 years, total reported crashes have been declining in the past 5, especially after installation of the device. Still, there have been 4 crashes involving pedestrians since 2023 so this locations of concern.

We will complete a signal warrant analysis here, but as a T-intersection this location is unlikely to meet any of warrants, so we will consider other engineering remedies. A warrant analysis is set of engineering criteria that determines whether or not a location is appropriate for a particular type of traffic control. Signal warrants look at traffic volumes, crash history and other factors.

<i>Improvement</i>	<i>Timeline</i>	<i>Status</i>
Perform signal warrant	Short	Next Step
Check condition of pavement markings	Short	Complete
Refresh pavement markings	Medium	Next Step
Safety/capacity study	Medium	Next Step

Updates on Other Locations of Interest

The ten-year time frame for our analysis means that several locations where we have recently made significant safety improvements still have a high HCL Score. We have excluded these from the top-ten list, but continue to monitor the locations.

Hampshire Street at Prospect Street (HCL Score: 144)

- Separated Bike Lane improvements on Hampshire Street completed Fall 2023
- Included in the active Gaming Commission Grant Prospect Street corridor study

Inman Square (HCL Score: 108)

- Intersection reconstruction completed Summer 2023

Evaluation of Intersections for Improvements

As detailed above, we have evaluated intersections for improvements using a toolbox of interventions, pulled from a variety of best practices such as the NACTO guide “Don’t Give Up at the Intersection” and MassDOT's Complete Streets design guidelines. Ultimately each intersection

will be evaluated to determine the set of interventions needed based on the specific geometry, crash history, and patterns of that particular intersection.

For each intersection evaluated, we will prepare a technical memorandum explaining the audit process, findings, proposed improvements, and timelines for implementation. The final report will be published to the City's Vision Zero web site, along with the information and appendices from this report.

Update on Fatal Crash Rapid Response Protocol

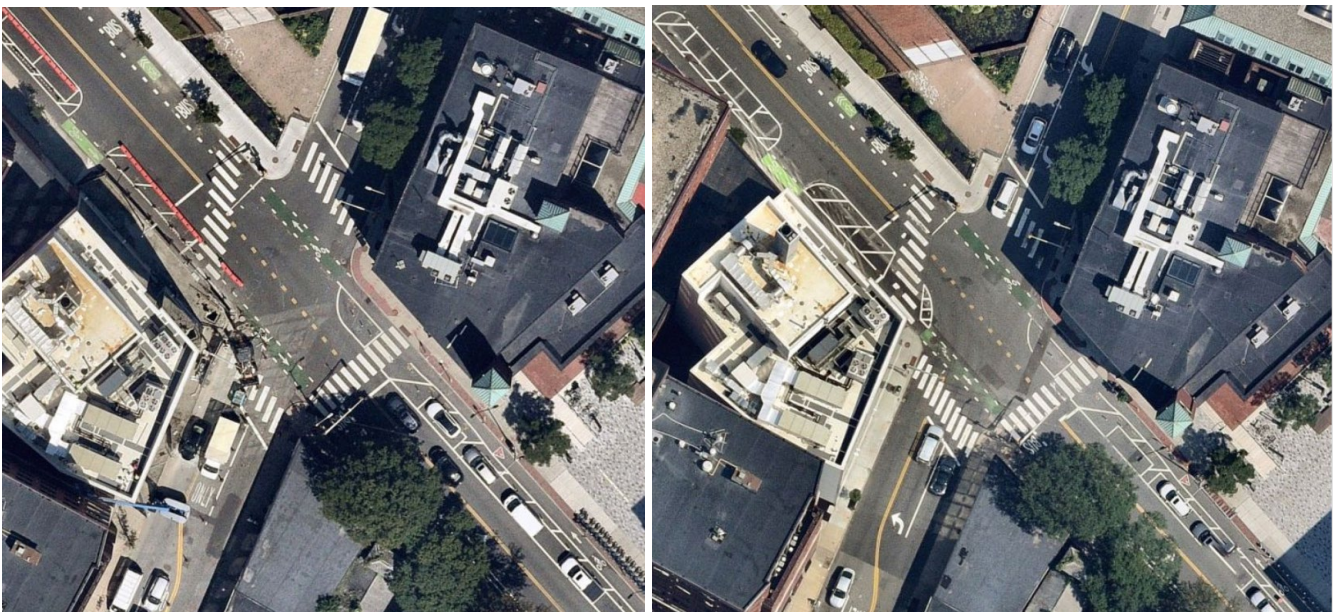
CDOT and related Departments have completed Rapid Response and short-term improvements for two locations when fatal crashes occurred in 2024.

Hampshire Street at Portland Street

- Crash Date: June 21, 2024, at 8:22AM
- Crash Type: Right hook
- Vehicles Involved: Box truck, bicycle

Events: Cyclist traveling inbound on Hampshire Street in the bike lane. Truck driver made a right turn onto Portland Street and struck the cyclist.

Context: Hampshire Street has a separated bike lane in each direction, protected by a painted buffer and flex posts. Before the crash, construction on the southeast corner precluded installation of posts within the southbound right turn area. The planned treatment was similar to the northeast corner.



Left: Construction on the southeast corner of Hampshire and Portland Streets. August 2024.

Right: Buffer and posts installed on the southwest corner of Hampshire at Portland Streets. July 2025.

CDOT also considered changing the operation of the traffic signal so that vehicle traffic and bike traffic on Hampshire Street use the intersection at different times. Under this proposal, the light would turn green for vehicles, then red, then the green light for bicycles and the WALK sign across Portland and Cardinal Medeiros would turn on. Vehicles would no longer turn right into the bike lane when bikes are allowed to go.

We determined that this proposal is not feasible for two reasons. First, both vehicles and bikes would have less than half the green time that they do today. This would result in a line of vehicle traffic stretching in both directions on Hampshire Street, at times all the way back to Technology Square. Additionally, bike traffic is heavy on Hampshire Street and continues to grow. Reducing green times for bikes would mean that at rush hours, not all bikes would make it through in one signal cycle. This solution would have relied heavily on compliance with a signal operation unlike the rest of the intersections along this busy bike corridor.

Another approach we explored was creating a right turn lane so that right turning vehicles would have their own signal phase, so that turns happen when cyclists were not moving through the intersection. However, there is not enough width on the roadway for both separated bicycle lanes and a right turn lane. Given the very high volume of through cyclists, it was not feasible to remove the separation.

Long-term improvements: Raising the bike lanes up to sidewalk level would free up some space in the street and we can consider adding a right-turn only lane to the inbound approach. This would allow us to fully protect the vehicle right turns and run the vehicles, bikes, and pedestrians in parallel at the same time across Portland Street. This improvement would substantially reduce the number of right hook conflicts. It is a very similar treatment as the change we made recently at Mt. Auburn at DeWolfe Street.

Raising the bike lanes would be a capital improvement and requires conceptual and detailed design work.

Mt. Auburn Street at DeWolfe Street

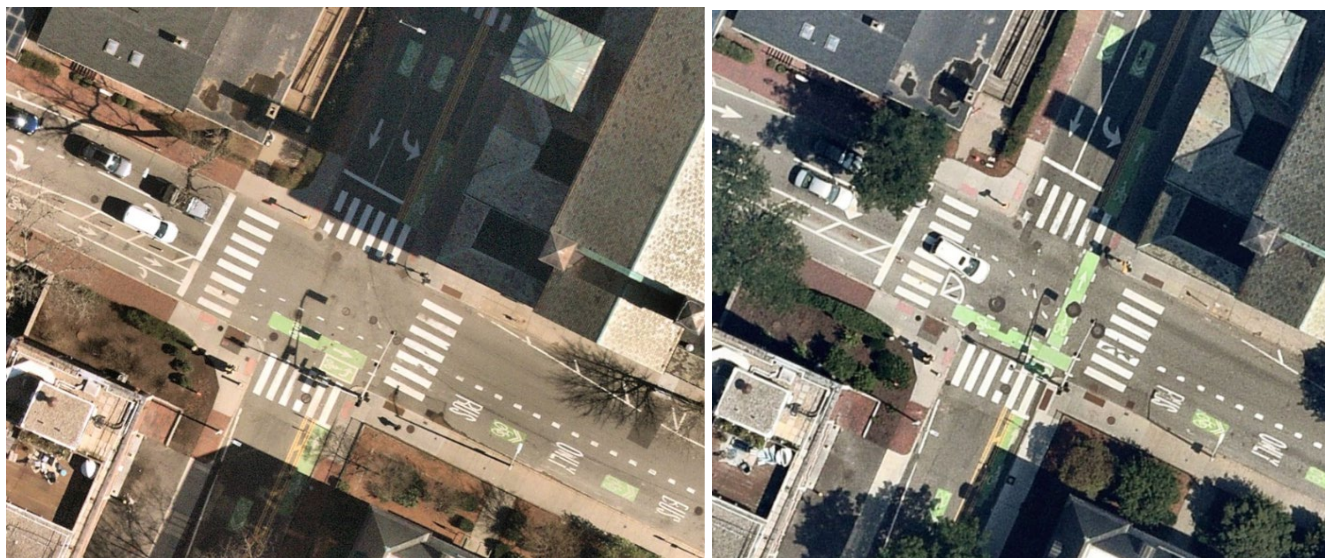
- Crash Date: June 7, 2024, at 4:30 PM
- Crash Type: Right hook
- Vehicles Involved: Box truck, bicycle

Events: Cyclist traveling eastbound on Mt. Auburn Street in the bike lane. Truck driver made a right turn onto DeWolfe Street and struck the cyclist.

Short and medium-term improvements:

CDOT installed a buffer and posts on the southeast corner of the intersection, beyond the crosswalk. This substantially reduced the turn radius for vehicles turning right onto DeWolfe Street. Smaller turn radii force vehicles to take turns at a lower speed, which results in fewer and

less severe crashes. Additionally, the buffer along the bike lane was narrowed to one 6 foot-wide lane (from two lanes) to channelize cyclists; a green bike lane marking was installed across Mt. Auburn Street; and white dashed markings for turning vehicles were installed.



Left: Mt. Auburn Street at DeWolfe Street, April 2024.

Right: Posts and buffers installed on Mt. Auburn Street at DeWolfe Street, July 2025.

Second, CDOT modified the operation of the traffic signal. This intersection had a bike signal at the time of the crash and the right turns were fully protected. However, during our rapid response site meeting, staff observed compliance of the bike red light to be poor; several cyclists ran the red even though the green right arrow for vehicles was on. This puts cyclists at high risk for a right hook crash. We concluded so many cyclists chose to do this because they perceived no conflict – usually there were no conflicting vehicles turning at the time. During this signal phase, drivers had a green light to both go straight or turn right, while cyclists had a red light.

The new operation has eastbound vehicle right turns running at the same time as southbound vehicle lefts rather than eastbound through vehicles. As a result, the bike crossing of DeWolfe Street is now occupied nearly all of the time that the bike light is red. This discourages cyclists from running the red. We also replaced both bike signal housings at this location with yellow frames and visors (instead of black), to further differentiate them from the vehicle signals and to make them more prominent.

Long-term improvements: Raising the bike lanes up to sidewalk level and building out the inside of the intersection with raised curb would provide additional physical protection. For vulnerable users – this treatment is called a “protected intersection.”

Building a protected intersection would be a capital improvement and requires conceptual and detail design work as well as a full public process. At the same time, we would look to install a nearside bike signal near the stop line to provide additional reinforcement.

Appendix A

Fatal and Severe Crash Rapid Response Protocol

Following a fatal crash and serious injury crashes, the Cambridge Department of Transportation (CDOT) will respond immediately by activating a Roadway Safety Audit. The audit will be conducted for either an intersection or roadway segment, depending on the location of the crash. The audit program will apply only to City assets; however, we will assist MassDOT or DCR on crashes occurring on state roadways.

The Audit will be led by CDOT Street Management Division but will also involve staff in Cambridge Police (CPD), the Department of Public Works (DPW), and CDOT and Central Communications staff. Depending on the specifics of a particular crash, additional City staff may be asked to join in the Audit.

Immediate Response

The immediate Response will be conducted over three stages: Initial Action, Research and Engineering, and Reporting and Implementation.

Stage 1: Initial Action

In the initial stage of the audit, staff across all involved departments will collaborate, share information, and prepare external communications. At this early stage there may be little information available about the circumstances leading to the crash.

Initial steps will include:

Research and Document Crash History

CDOT Engineering will generate a table summarizing all crashes involving all users for the intersection or roadway segment since 2002. The summary should list crash date and time, manner of collision, user types involved (vehicle, bike, ped), severity of injury, and road surface and weather conditions. The source of this information should be the MassDOT IMPACT crash database, which includes reported crashes that took place within the City that were responded to by CPD as well as other agencies.

This list should be further filtered for pedestrian and bike crashes, severe crashes, and for the most recent 10-year period. This should be illustrated in two stacked bar charts, one showing injury severity by year and the other showing user type by year.

CDOT will request copies of crash reports for all non-property-damage-only (PDO) crashes and all crashes involving a vulnerable user between 2015 and the present from the CPD Records Unit. The crash reports themselves contain additional details and specifics of the crashes not available in the MassDOT IMPACT database.

Catalogue recent intersection improvements or changes

Identify changes to the intersection or roadway segment completed over the past 5 years. This will include signal equipment, phasing, and timing changes for signalized intersections as well as layout, signs and markings, and safety improvements. For street segments, this will include any major changes to cross-section, signs and markings, sidewalk and disability ramps, and paving.

Site Visit

A multi-departmental group of City staff will visit the site soon after the crash at or about the same time of day and weather conditions as the crash when practical. CDOT, public safety, and DPW should be represented. Representation should be determined by leadership in each department, but the number of people participating should be kept to a minimum for practical reasons; some intersections are small and the group needs to fit safely on the sidewalk and all participants should be able to hear each other.

CDOT will provide material on the crashes discussed above before the site visit to staff attending the site visit. Staff will work from a checklist (included in appendix).

During the visit, staff should observe and discuss:

- Behavior of the road users (speed, attentiveness, compliance with traffic controls)
- Operation of traffic controls, particularly traffic signals
- Condition of traffic controls (signs, markings, flex posts, signals, etc.)
- Layout of intersection elements
- Sight lines
- Sun glare and other natural elements

Staff should also discuss any known contributing factors of the crash and explore whether it fits a pattern of previous crashes. During the visit, the group should begin a conversation about possible remedies, both short- and long term.

CDOT staff will note all major discussion points.

Communications

Determine external communications needed, including press release, web site item, newsletter addition, and/or e-mail. Draft text for the communication, which will be reviewed by all involved departments. Release communications as needed and appropriate.

Stage 1 Summary

<i>Action</i>	<i>Generated by</i>	<i>Assisted by</i>
Research and Document Crash History	CDOT	
Catalogue recent intersection improvements or changes	CDOT	DPW
Conduct Site Visit	CDOT, DPW, CPD	
Communications	Comms	CDOT, DPW, CPD

Stage 2: Research and Engineering

Details about the crash will emerge in the second stage of the audit, which will be supplemented by collected data. CDOT will assemble a long list of possible interventions, and all departments will meet to augment and hone the list.

Traffic Count

Conduct peak period counts of all vehicles, pedestrians, and bicycles. This will allow us to assess risk on a per-user basis.

Crash Reports

CDOT Engineering staff will review a copy of each crash report furnished by CPD. The reports contain information not available in the summary and will help us determine a common cause of crashes.

Crash Diagram

Using the MassDOT template, CDOT will produce a crash diagram for the intersection showing the location of each crash grouped by manner of location and showing also the road user types involved. This diagram will be informed by the written crash reports and is an effective way of showing common causes on a single page.

Improvements Meeting

CDOT will distribute notes from the site walk for review by the site walk participants, along with a summary of the data collected above and the draft list of interventions. An office meeting will follow the site walk to discuss the notes. This meeting can have more participants than the site visit because we are not constrained by space. This meeting will be chaired by a CDOT Assistant Commissioner or designee.

The objectives of the meeting are:

- Review the site visit observations and resolve any differences
- Discuss common crash causes
- Discuss the list of short- and long-term improvements and assign each item to the relevant department

The group should plan to finalize conclusions after one meeting, but additional meetings may be needed.

Stage 2 Summary

<i>Action</i>	<i>Generated by</i>	<i>Assisted by</i>
Traffic Count	CDOT	
Crash Reports	CDOT	CPD
Crash Diagram	CDOT	
Improvements Meeting	CDOT, DPW, CPD, other	

Stage 3: Reporting and Implementation

In the final stage of Rapid Response, all research, data, observations, and list of roadway or intersection improvements will be reported in a technical memorandum. CDOT will generate a work plan outlining desired changes to the crash location with deadlines for implementation.

Audit Report

CDOT will prepare a technical memorandum explaining the audit process, findings, and proposed improvements. The draft memo will be distributed to the Improvements Meeting participants for comment. The final memo will be reviewed and approved by the City Manager's office.

The final report will be published to the City's Vision Zero website.

Work Plan

The list of improvements from the Rapid Response final report will be expanded into a full work plan. The plan will be divided into short-, medium-, and long-term actions with estimated completion dates. Some items may require engineering design, equipment purchase, contractual support, coordination across departments, and/or public notice.

The work plan should include updates on the Vision Zero website on the progress of work.

Before and After Study

Three years after completing the entire work plan, CDOT will conduct a before and after study to determine if the improvements have had a noticeable effect on the safety of the road segment or intersection. The study will take new traffic counts and crash history. The study, which will be summarized in a memo and added to the Vision Zero web site, will compare the recent 3-year period to the 3-year period immediately before the crash.

<i>Action</i>	<i>Generated by</i>	<i>Assisted by</i>
Audit Report	CDOT	DPW, CDD, CPD, Comms
Work Plan	CDOT	DPW, CDD, CPD, Comms
Before and After Study	CDOT	

Appendix B

Higher Crash Location Methodology

There are two primary sources of crash data – Cambridge Police Department and MassDOT.

All crashes resulting in a written police report – including Cambridge Police and state police agencies – are submitted to the Registry of Motor Vehicles and then to MassDOT, which conducts quality control on all submitted data. All data is tracked in MassDOT’s IMPACT tool, which is available to the public and includes powerful query features.

The Cambridge Police crash database is also a good source of crash data, but their database does not offer the same geospatial querying tools and does not include reports by state or transit police.

For the purposes of our analysis to identify the highest crash locations in the City, we will use the MassDOT IMPACT crash database. We still rely on the Records Unit of CPD for copies of written reports for our detailed investigations.

Weighting System

Generating a ranked list is a data-driven approach to setting priorities for investing in safety improvements on transportation infrastructure. There are several approaches to ranking intersections, but using only the raw number of total reported crashes is not good practice because a location with a low number of severe crashes might be overlooked in favor of another with a high number of minor crashes.

Best practice when generating a ranked list is to assign weights to crash types. Crashes involving injuries are more important in the ranking, while crashes involving only vehicles and property damage are less important. In Cambridge, crashes involving pedestrians or bicycles – which we define as vulnerable users – are very important and should carry a higher weight. (We are not able to quantify near-miss or unreported crashes, so they are not part of our analysis.)

- Any crash reported involving a pedestrian or cyclist (a vulnerable user, or VU) is assigned a weight of 5.
- Any crash involving a reported injury of any kind (possible, minor, serious, fatal) is assigned a weight of 1.
- Any other crash (property damage only or injury not reported) is assigned a weight of 0. These crashes are usually rear-end and sideswipe types where vehicles sustain minor

damage and are not informative of the safety of the intersection. These crashes accounted for 78.1% of all Cambridge crashes in 2024.

- Intersections with the same weighted score total are sorted by total crashes.

Timeframe of Analysis

For the purposes of our analysis, we included crashes from January 2014 and July 2024. CPDs electronic crash database begins in 2014 and so it is easier for the Records Division to retrieve written reports when requested by CDOT. The 11-year period gives us a good sample size, especially for locations with fewer crashes.

Next, staff prepared to query the database. Some crashes are not coded on the map exactly at the intersection, so CDOT staff quality checked the results at each intersection for accuracy. We used the IMPACT Spatial Search tool.

There are about 1400 intersections in Cambridge. More than 200 of these are on state highways or parkways; these are excluded from our list. We conducted a special search at 350 locations, including:

- Any intersection with at least one VU crash
- All intersections controlled by a traffic signal or flashing beacon
- Any intersection for which we have a safety complaint on record
- Any other locations determined by staff as a possible concern

Third, we applied the weighting formula to the query results, calculated a safety score, and ranked the list.

Next, CDOT reviewed the results of the ranking. Many of the locations at the top of the list were recently improved and may have a better safety record more recently as a result of those improvements. Some other locations are already under study, design, or construction as part of an action already underway.

Last, the list was finalized and the highest remaining ten intersections were identified as having the greatest need.

Appendix C

Higher Crash Location List (Reported crashes between 1/1/14 and 7/25/24)

Rank	Total	Injury	Fatal	Main Street	Minor Street	Bike	Ped	Total VU	Non-VU Injury	Total HCL Score
1	79	34		Massachusetts Avenue	Albany Street	16	12	28	6	146
2	76	36		Hampshire Street	Prospect Street	17	10	27	9	144
3	79	29		Massachusetts Avenue	Vassar Street	18	9	27	2	137
4	78	28		Cambridge Street	Hampshire Street	14	6	20	8	108
5	44	20		Massachusetts Avenue	Main Street	17	2	19	1	96
6	51	20		Cambridge Street	Cardinal Medeiros Avenue	14	3	17	3	88
7	53	19		Broadway	Prospect Street	8	8	16	3	83
8	49	18		Cambridge Street	Windsor Street	11	4	15	3	78
9	43	16	1	Massachusetts Avenue	Mt. Auburn Street	9	4	13	3	68
10	44	15		Cambridge Street	Prospect Street	3	10	13	2	67
11	32	12		Massachusetts Ave	Windsor Street	11	2	13	0	65
12	31	11		Massachusetts Ave	Norfolk Street	3	10	13	0	65
13	26	10		Massachusetts Ave	Pearl Street	7	6	13	0	65
14	48	14		Harvard Street	Prospect Street	6	6	12	2	62
15	34	14		Main Street	Vassar Street	7	5	12	2	62
16	34	12		Hampshire Street	Columbia Street	9	3	12	0	60
17	36	11		Broadway	Portland Street	9	3	12	0	60
18	47	13		Massachusetts Avenue	Church Street	8	3	11	2	57
19	40	13		Massachusetts Avenue	Johnston Gate	8	3	11	2	57
20	38	13		Cambridge Street	Columbia Street	7	4	11	2	57
21	19	10		Cambridge Street	Felton Street	9	2	11	0	55
22	50	18		Massachusetts Avenue	Amherst Street	6	2	8	10	50
23	18	10		Broadway	Felton Street	8	2	10	0	50
24	34	13		Cambridge Street	Third Street	3	6	9	4	49
25	38	12		Massachusetts Avenue	Cameron Avenue	8	1	9	3	48
26	35	12		Hampshire Street	Tremont Street	7	2	9	3	48
27	45	13		Main Street	Portland Street	4	4	8	5	45
28	97	16		Massachusetts Avenue	Cambridge Street	5	2	7	9	44

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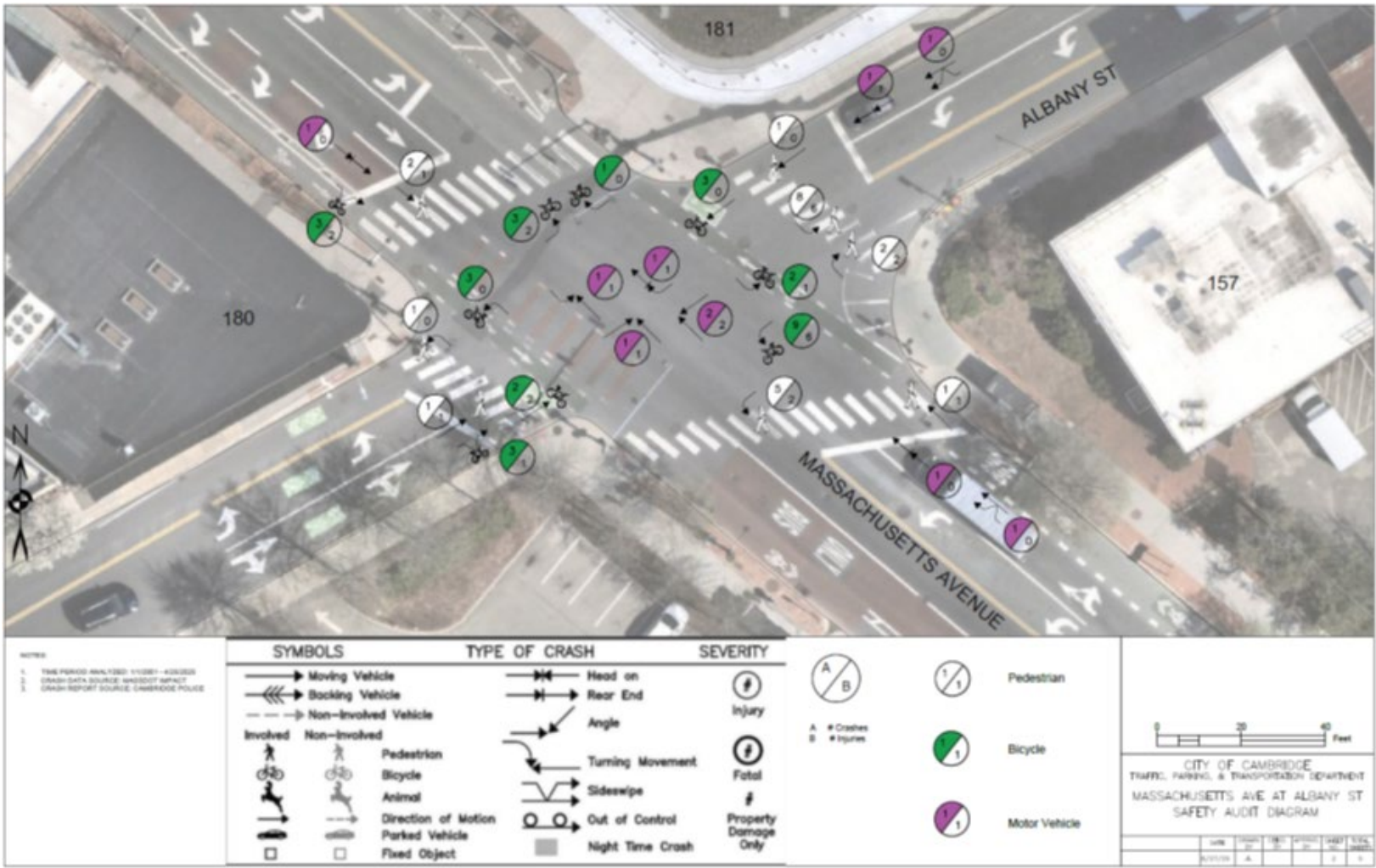
29	51	16		Broadway	Ames Street	7	0	7	9	44
30	60	12		Massachusetts Avenue	Prospect Street	2	6	8	4	44
31	34	12		Cambridge Street	Quincy Street	6	2	8	4	44
32	30	12		Broadway	Columbia Street	8	0	8	4	44
33	32	10		Massachusetts Avenue	Rindge Avenue	6	2	8	2	42
34	28	10	1	Mt. Auburn Street	DeWolfe Street	7	1	8	2	42
35	24	9		Concord Avenue	Fawcett Street	5	3	8	1	41
36	21	9		Oxford Street	Wendell Street	4	4	8	1	41
37	36	12		Brattle Street	Sparks Street	7	0	7	5	40
38	35	7		JFK Street	Mt. Auburn Street	2	6	8	0	40
39	40	6		Massachusetts Avenue	JFK Street	5	3	8	0	40
40	43	5		Garden Street	Mason Street	5	3	8	0	40
41	39	14	1	Hampshire Street	Cardinal Medeiros Avenue	4	2	6	8	38
42	38	10		Broadway	Windsor Street	4	3	7	3	38
43	27	10		Broadway	Inman Street	4	3	7	3	38
44	101	21		Massachusetts Avenue	Alewife Brook Parkway	3	1	4	17	37
45	35	13		Main Street	Windsor Street	4	2	6	7	37
46	17	9		Mt. Auburn Street	Holyoke Street	5	2	7	2	37
47	40	12		Broadway	Ellery Street	1	5	6	6	36
48	37	12		Massachusetts Avenue	Chauncy Street	4	2	6	6	36
49	38	11		Massachusetts Avenue	Walden Street	6	0	6	5	35
50	30	7		Eliot Street	Bennett Street	1	6	7	0	35
51	20	7	1	Somerville Avenue	White Street	3	4	7	0	35
52	15	7		Massachusetts Avenue	Dudley Street	2	5	7	0	35
53	20	6		Cambridge Street	Second Street	3	4	7	0	35
54	12	6		Broadway	Hampshire Street	6	1	7	0	35
55	19	5		Cambridge Street	Sixth Street	4	3	7	0	35
56	35	13		JFK Street	Eliot Street	5	0	5	8	33
57	27	9		Prospect Street	Bishop Allen Drive	3	3	6	3	33
58	32	12		Massachusetts Ave	Davenport Street	2	3	5	7	32
59	18	7		Massachusetts Avenue	Hancock Street	3	3	6	1	31
60	15	7		Mt. Auburn Street	Sparks Street	1	5	6	1	31
61	13	7		Portland Street	Albany Street	5	1	6	1	31

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62	47	14		Mt. Auburn Street	Aberdeen Avenue	2	2	4	10	30
63	19	10		Hampshire Street	Windsor Street	5	0	5	5	30
64	26	6		Massachusetts Avenue	Cogswell Avenue	6	0	6	0	30
65	14	6		Kirkland Street	Irving Street	5	1	6	0	30
66	22	5		Massachusetts Avenue	Essex Street	3	3	6	0	30
67	15	5		Massachusetts Avenue	Dana Street	2	4	6	0	30
68	25	4		Broadway	Third Street	4	2	6	0	30
69	19	4		Brattle Street	Brattle Square	3	3	6	0	30
70	18	4		Massachusetts Avenue	Landsdowne Street	4	2	6	0	30
71	29	3	1	Massachusetts Avenue	Somerville Avenue	6	0	6	0	30
72	24	9		Massachusetts Avenue	Russell Street	5	0	5	4	29
73	20	9		Dunster Street	Mt. Auburn Street	0	5	5	4	29
74	31	8		Concord Avenue	Blanchard Road	2	3	5	3	28
75	28	8		Massachusetts Avenue	Brookline Street	3	2	5	3	28

Appendix D

Sample Audit Documents



Crash Diagram -- Mass at Albany

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MASS AVE @ ALBANY ST - CRASH SUMMARY (2000-2025)								
Crash Number	Date of Crash	Time of Crash	Manner of collision	First Harmful event	Light Conditions	Weather Condition	Driver Contribution	Injury Status
4919032	01/06/2021	12:08 PM	Angle	Collision with cyclist	Daylight	Clear	D1: (Failed to yield right of way),(Inattention)	Suspected Serious Injury (A)
5538790	06/12/2025	3:29 PM	Angle	Collision with cyclist	Daylight	Clear	D1: (Failed to yield right of way)	No Apparent Injury (O)
4377404	06/13/2017	12:36 AM	Angle	Collision with motor vehicle in traffic	Dark - lighted roadway	Clear	D1: (No improper driving) / D2: (No improper driving)	Non-fatal injury - Possible
1864535	09/08/2004	12:43 PM	Single vehicle crash	Collision with pedestrian	Daylight	Cloudy	D1: (Failed to yield right of way)	Fatal Injury (K)
1894568	05/25/2005	7:59 AM	Single vehicle crash	Collision with pedestrian	Daylight	Rain	D1: (Failed to yield right of way)	Non-fatal injury - Non-incapacitating
3382305	02/15/2013	2:42 PM	Single vehicle crash	Collision with pedestrian	Daylight	Clear	D1: (Glare)	Non-fatal injury - Non-incapacitating
4218300	07/18/2016	11:30 AM	Single vehicle crash	Collision with pedestrian	Daylight	Clear		Non-fatal injury - Possible
4331456	02/23/2017	1:57 PM	Angle	Collision with pedestrian	Daylight	Not Reported	D1: (Unknown)	No injury
5073634	02/18/2022	12:47 PM	Single vehicle crash	Collision with pedestrian	Daylight	Clear	D1: (Failed to yield right of way)	Suspected Minor Injury (B)
5182392	11/29/2022	11:17 AM	Angle	Collision with pedestrian	Daylight	Cloudy	D1: (Inattention)	Suspected Minor Injury (B)
5332249	09/13/2023	6:29 PM	Single vehicle crash	Collision with pedestrian	Dark - lighted roadway	Rain	D1: (Unknown)	Suspected Minor Injury (B)
5121164	06/14/2022	3:09 PM	Sideswipe, same direction	Collision with motor vehicle in traffic	Daylight	Clear	D1: (No improper driving) / D2: (Unknown)	Suspected Minor Injury (B)
2553569	11/24/2009	9:04 AM	Single vehicle crash	Collision with cyclist	Daylight	Cloudy	D1: (No improper driving)	Non-fatal injury - Incapacitating
3730706	11/04/2013	5:45 PM	Angle	Collision with motor vehicle in traffic	Dusk	Clear	D1: (No improper driving)	Non-fatal injury - Non-incapacitating
4764976	10/19/2019	8:38 PM	Rear-end	Collision with motor vehicle in traffic	Dark - unknown roadway lighting	Clear	D1: (No improper driving)	Possible Injury (C)
4408944	08/14/2017	8:05 AM	Angle	Collision with cyclist	Daylight	Clear	D1: (Failed to yield right of way)	Non-fatal injury - Possible
4684986	04/02/2019	5:30 PM	Head-on	Collision with pedestrian	Daylight	Clear	D1: (No improper driving),(No improper driving)	Suspected Serious Injury (A)
5429437	08/14/2024	6:07 PM	Single vehicle crash	Collision with pedestrian	Daylight	Clear	D1: (Failed to yield right of way)	Suspected Minor Injury (B)
4067786	04/17/2015	11:26 PM	Angle	Collision with cyclist	Dark - lighted roadway	Clear	D1: (No improper driving)	Non-fatal injury - Possible
4200987	06/06/2016	7:24 PM	Single vehicle crash	Collision with cyclist	Daylight	Clear	D1: (Failed to yield right of way)	Non-fatal injury - Non-incapacitating
4960667	05/10/2021	1:48 PM	Angle	Collision with cyclist	Daylight	Clear	D1: (Unknown)	Suspected Minor Injury (B)
3998935	09/08/2014	5:30 PM	Single vehicle crash	Collision with cyclist	Daylight	Clear	D1: (Unknown)	No injury
4750136	09/12/2019	4:50 PM	Rear-end	Collision with cyclist	Daylight	Cloudy	D1: (No improper driving)	No Apparent Injury (O)
2943500	10/18/2011	10:15 PM	Rear-end	Collision with cyclist	Dark - lighted roadway	Clear	D1: (No improper driving)	Non-fatal injury - Possible
5194494	12/20/2022	1:00 PM	Angle	Collision with cyclist	Daylight	Clear	D1: (Unknown),(Unknown)	Suspected Minor Injury (B)
4938913	03/07/2021	12:27 PM	Angle	Collision with motor vehicle in traffic	Daylight	Clear	D1: (No improper driving),(No improper driving)	Suspected Minor Injury (B)
5398342	05/20/2024	8:36 PM	Angle	Collision with motor vehicle in traffic	Daylight	Clear	D1: (No improper driving)	Suspected Minor Injury (B)
1479298	05/30/2002	3:56 PM	Single vehicle crash	Collision with pedestrian	Daylight	Clear	D1: (No improper driving)	Non-fatal injury - Possible
3248985	08/28/2012	9:18 AM	Single vehicle crash	Collision with cyclist	Daylight	Rain	D1: (No improper driving)	Non-fatal injury - Non-incapacitating
4200354	06/05/2016	10:45 PM	Single vehicle crash	Collision with cyclist	Dark - lighted roadway	Rain		Not Applicable

Excerpt from crash table -- Mass at Albany

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Start Date:	4/10/2018															
Start Time:	8:00:00 AM															
Site Code:	00000481															
Comment 1:	Mt Auburn@Dewolfe															
Comment 2:	Change These in The Preferences Window															
Comment 3:	Select File/Preference in the Main Scree															
Comment 4:	Then Click the Comments Tab															
Vehicles	From North				From East				From South				From West			
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
08:00 AM	0	59	40	11	0	0	0	3	0	0	0	36	47	140	0	25
08:15 AM	0	45	33	16	0	0	0	11	0	0	0	38	43	145	0	28
08:30 AM	0	39	26	23	0	0	0	11	0	0	0	38	43	153	0	19
08:45 AM	0	49	33	35	0	0	0	21	0	0	0	53	42	137	0	34
Total	0	192	132	85	0	0	0	46	0	0	0	165	175	575	0	106
Total(bike)	0	30	4	0	1	1	0	0	0	2	0	0	8	68	0	0
Total(truck)	0	13	17	0	0	0	0	0	0	0	0	0	5	34	0	0
		0.06	0.11										0.03	0.06		
Bikes																
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
08:00 AM	0	6	2	0	0	0	0	0	0	0	0	0	0	15	0	0
08:15 AM	0	12	1	0	0	0	0	0	0	0	0	0	2	14	0	0
08:30 AM	0	2	1	0	1	1	0	0	0	1	0	0	2	28	0	0
08:45 AM	0	10	0	0	0	0	0	0	0	1	0	0	4	11	0	0
Total	0	30	4	0	1	1	0	0	0	2	0	0	8	68	0	0
Trucks																
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
08:00 AM	0	5	4	0	0	0	0	0	0	0	0	0	1	8	0	0
08:15 AM	0	3	4	0	0	0	0	0	0	0	0	0	2	12	0	0
08:30 AM	0	2	3	0	0	0	0	0	0	0	0	0	2	10	0	0
08:45 AM	0	3	6	0	0	0	0	0	0	0	0	0	0	4	0	0
Total	0	13	17	0	0	0	0	0	0	0	0	0	5	34	0	0

Traffic Count Sample -- Mt. Auburn Street at DeWolfe Street

City of Cambridge Department of Transportation									
Roadway Safety Audit Site Walk Checklist	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">Location</td> <td>Mass Ave @ Vassar St</td> </tr> <tr> <td>Weather/Lighting cond.</td> <td></td> </tr> </table>	Location	Mass Ave @ Vassar St	Weather/Lighting cond.					
Location	Mass Ave @ Vassar St								
Weather/Lighting cond.									
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Date</td> <td style="width: 50%;">Intersection Number</td> </tr> <tr> <td>Time</td> <td>219</td> </tr> <tr> <td></td> <td>Intersection Control</td> </tr> <tr> <td></td> <td>Traffic signal</td> </tr> </table>	Date	Intersection Number	Time	219		Intersection Control		Traffic signal	
Date	Intersection Number								
Time	219								
	Intersection Control								
	Traffic signal								
Visibility <i>Sightlines, faded markings, obscured traffic control devices or signs, lighting, etc</i>									
Maintenance <i>Accessible ramps, pavement condition, missing or damaged flexposts, etc</i>									
Behavior of road users <i>Speed, yield/stop compliance, other rulebreaking, difficulty finding gaps, difficulty making turns, etc</i>									
Bike/Ped <i>Bike lanes, sidewalks, desire paths, turn hardening, turn boxes, conflict markings, etc</i>									
Unsignalized only: check box if present and write notes									
☐	Crosswalk signage (R1-6, W11-2, W16-7P) _____								
☐	RRFB or PHB _____								
☐	Raised crosswalk/intersection _____								
☐	Median/refuge islands _____								
☐	Curb extensions/daylighting _____								

Sample page from Site Visit Checklist