Boston EMS 2020 Cyclist & Pedestrian Report

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EXECUTIVE SUMMARY

Boston EMS and the City of Boston work closely with the Commonwealth of Massachusetts, and are dedicated to ensuring all streets are safe for all users by monitoring and applying traffic safety data to reduce future incidents. The 2020 data shows a 19% decrease in bicyclist and 40% decrease in pedestrian incidents, compared to the year prior. The numbers of bicyclists and pedestrians involved in incidents have continued to decline over the last few years. Although reduced mobility associated with the COVID-19 pandemic is assumed to be a contributor to the degree of decline in the year 2020.

Notable trends for 2020 include:

- Neighborhoods with highest incident counts:
    - Bicyclist: Boston, Brighton, Dorchester
    - Pedestrian: Dorchester, Boston, Roxbury
- Residents ages 23-35 had the highest incidence of being involved in a bicyclist incident
- Most frequent pedestrian activity during time of incident was crossing the street

INTRODUCTION & METHODS

Boston EMS has been committed to identifying and evaluating roadway incidents involving bicyclists and pedestrians since 2013. Using records pulled from the City's Computerized Aided Dispatch (CAD) system, the department is able to analyze date, time and location information, which allows for analysis based on where and when such incidents are occurring throughout the city. Boston EMS EMTs, trained as emergency medical communication operators, answer 9-1-1 medical emergency calls in the City. Using a standardized Association of Public Safety Communications Officials (APCO) emergency medical dispatch call taking protocols, the department member answering the 9-1-1 call asks a series of questions where the member then codes roadway incidents as motor vehicle incidents with or without injuries, or as pedestrian incidents.

There is no cyclist type code. This call type information is entered into CAD, along with other relevant incident information necessary to advise the dispatched ambulance crew(s). The patient encounter is documented in an electronic patient care report (ePCR) system, where crews will add pertinent patient and situational details. Between the CAD and ePCR system, there is no mechanism by which to automate the capture and reporting of cyclist and pedestrian incidents. As such, manual review of potential incidents is necessary to verify case inclusion. A grant from the National Highway Traffic Safety Administration, through the Massachusetts Executive office of Public Safety and Security, allowed for:

- Development of an automated system to identify probable incidents, using type codes and key words.
- Paying for a dedicated member to manually review all probable cyclist and pedestrian incidents to verify case inclusion.
- The ability to verify roadway incidents with the City of Boston Department of Innovation technology in a HIPAA compliant manner, allowing for data driven infrastructure improvement efforts.
- Tracking incident cause, helmet use, and bicyclist activity during the time of the incident.
- Ability to map incident locations to identify street sections and intersections with increased incident activity.
- Transparency and accessibility of results for Boston residents and stakeholders on Boston's data portal

VALIDATION

A computer program searches all available records for relevant keywords to identify potential bicyclist and pedestrian incidents. These words include: bike, bicycle, bicyclist, pedestrian, standing, and ambulatory. However, there is a margin of error with this computer system as it frequently identifies records that mention a bike, but do not involve a bicyclist operator at the time of incident.

A member of Boston EMS then reviews these records and confirms each encounter fits the criteria to be included in either the bicyclist or pedestrian database. These records are kept separate for analysis and reporting.

For bicyclist encounters the case definition is limited to non-motorized outdoor bicycles, where the precipitating incident is directly attributable to riding a bicycle. The cause of the incident is not limited to motor vehicle crashes, as they may be a result of other factors, such as the road or stationary object. Patient encounters involving a motorcycle, spin-exercise equipment, bicycle maintenance, or motorized scooters are excluded from the bicyclist dataset, as are medical illnesses that occur simultaneously while riding a bike. Verified data is then stored separately for data analysis and reporting.

For pedestrian encounters the case definition is limited to a person walking on a street or sidewalk involved in an incident with a motor vehicle, motorcycle, bicycle, scooter, or train. Pedestrian activity is categorized by crossing the street, walking along the street, getting backed into, other, or unknown. Other refers to the pedestrian activity being listed but does not fall into one of the previous categories. While unknown refers to when the pedestrian activity at the time of incident was not recorded.

VISION ZERO

Since 2013, Boston EMS has been an active participant of the City of Boston's Vision Zero taskforce whose goal is to eliminate all fatal and serious traffic incidents by 2030. Non-fatal roadway incidents with a confirmed Boston EMS response are reported on the Vision Zero website and are used to inform the Department of Transportation about traffic trends and any potentially problematic areas within the City. Confirmed fatal incidents are reported by the Boston Police Department (BPD). While Boston EMS responds to state roadways and highways, these incidents are not included in the City's report. Boston EMS works separately with the Massachusetts Department of Transportation to report these incidents. Vision Zero reports by incident while Boston EMS' figures are by patient transport; in some circumstances Boston EMS may care for multiple patients at one incident, although this is not common. For these reasons, Boston EMS roadway incidents reported by Vision Zero will be moderately less than what is included in this report.

CAVEATS

Boston EMS personnel do not determine fault in bicyclist or pedestrian incidents. While the ePCR does document apparent causes for incidents precipitating the patient encounter, BPD is responsible for investigating and determining fault. Boston EMS discourages readers from drawing inferences from data provided in this report. Furthermore, all incidents are analyzed based on best information available.

2020 FINDINGS

PATIENT COUNTS

In 2020, Boston EMS responded to a decrease in both bicyclist and pedestrian incidents compared to 2019. In 2019, there were 377 documented bicyclist incidents which reduced to 306 in 2020 (a 19% decline). There were also 736 pedestrian incidents which decreased to 440 in 2020. Common knowledge would suggest that reduced mobility associated with COVID-19 resulted in fewer pedestrians and cyclists on the street, leading to fewer pedestrian or cyclist incidents requiring EMS. This effect will be further analyzed in the COVID-19 impact section of this report.

Overall, there has been a decline in such roadway incidents over the last three years (2018-2020).

Incident data for 2020 was compiled by Boston Neighborhood to identify and track incidents within each neighborhood.

Neighborhood	Bicyclist Incidents	Pedestrian Incidents
Boston	84	88
Brighton	32	29
Charlestown	7	5
Dorchester	57	118
East Boston	10	13
Hyde Park	5	13
Jamaica Plain	29	25
Mattapan	5	20
Roslindale	6	15
Roxbury	45	86
South Boston	16	24
West Roxbury	8	5

Table 1: Details the number of bicyclist and pedestrian incidents during 2020 by Boston neighborhood.

BICYCLIST INCIDENTS

There were 306 documented bicyclist incidents in 2020, where 217 resulted in transport to an area hospital. Of the remaining 89 incidents, 83 were patient refusals, 4 “no medicals”, and 2 fatal incidents referred directly to the medical examiner. In general, patients have the right to refuse medical transport; this may occur if the individual feels their injuries are sufficiently minor and do not require further medical attention. Patients who refused medical transport, may at a later time seek medical attention. Incidents classified as “no medicals”, would still include a bicyclist involved in an incident, where the individual declined any medical attention.

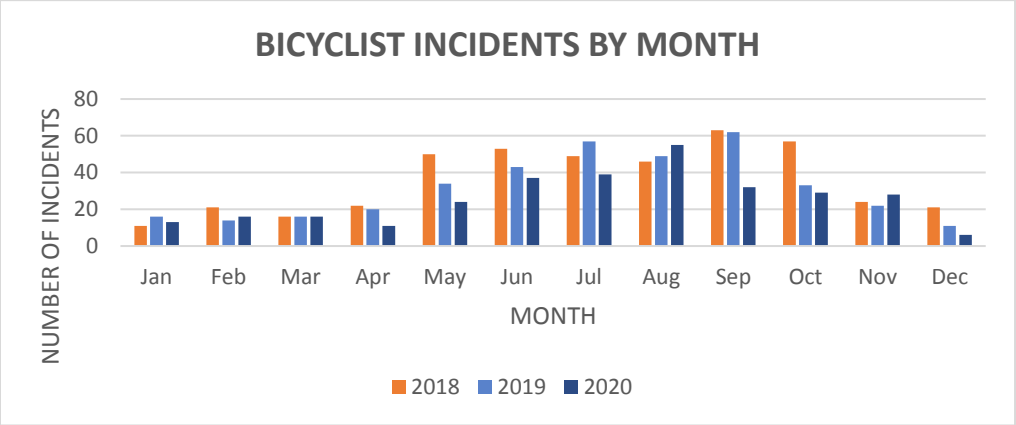

Figure 1: Depicts total bicyclist incidents by month for the last three years.

Level of Care	Transports
Basic Life Support (BLS)	210
Advanced Life Support (ALS)	7
TOTAL	217

Incident Outcome	Incidents
Refusal	83
Transport	217
TOTAL	300

HELMET USE

Recognizing the importance of helmets in reducing injury severity, Boston EMS closely monitors helmet use among individuals involved in bicycle incidents. The electronic patient care report system has a field for crews to capture helmet use. If it is not filled out, but documented in the notes, it is entered during the manual vetting process. Compared to 2019, there were fewer cyclist incidents where helmet use was documented, leading to more categorized as "unknown". As a result, there was a reduction of incidents where individuals were not wearing a helmet (from 40-35%), *as well as* a reduction in patients listed as wearing a helmet from 43% to 36%, making it difficult to draw conclusions. COVID-19 presented significant challenges to Boston EMS crews and likely impacted inclusion of such details when it was not directly related to patient condition or care.

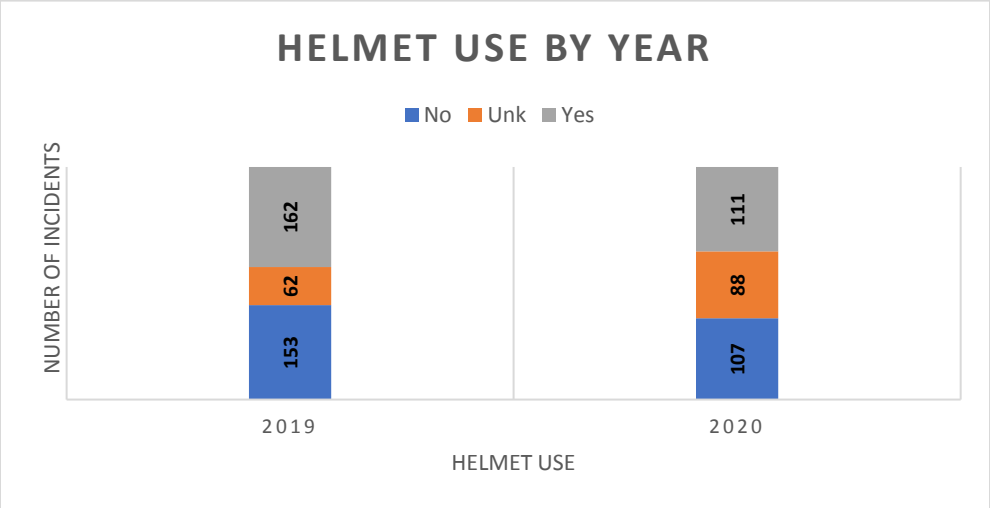

Figure 2: Comparison of helmet use over the last two years (2019-2020).

2020: No (35%), Unk (28.8%), Yes (36%)

2019: No (40.6%), Unk (16%), Yes(43%)

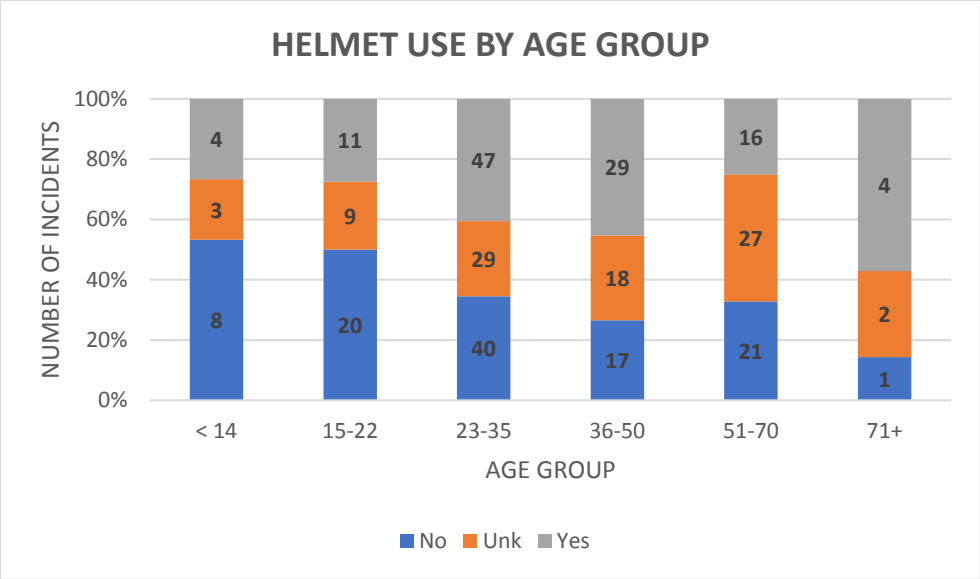

Figure 3: Helmet use by age group for bicyclist incidents in 2020.

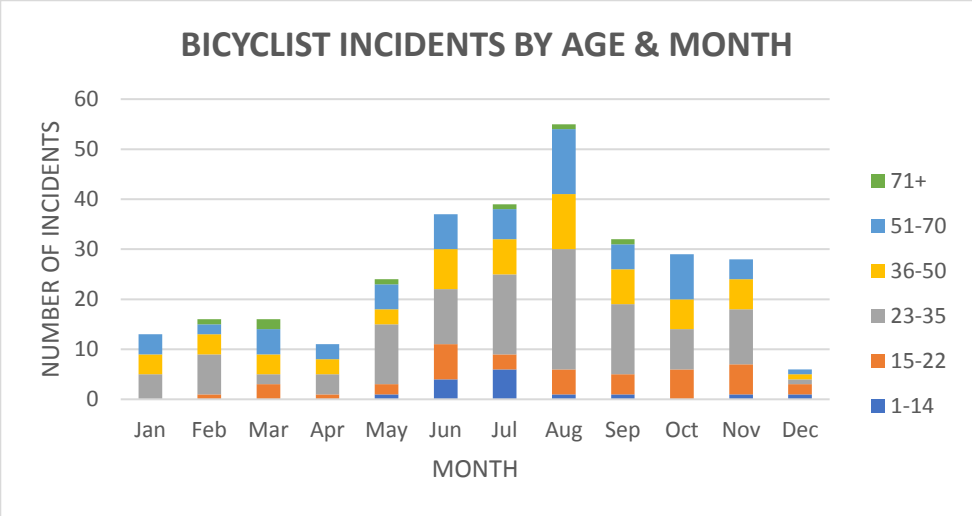

Figure 4: Bicyclist incidents by month and age group in 2020.

INCIDENT TYPES

Approximately 55% of all bicyclist incidents involved a motor vehicle, 18% a road surface, and 9% pedestrian. For incidents involving a cyclist and a pedestrian, the two individuals would be categorized separately in the respective bicyclist and pedestrian data sets.

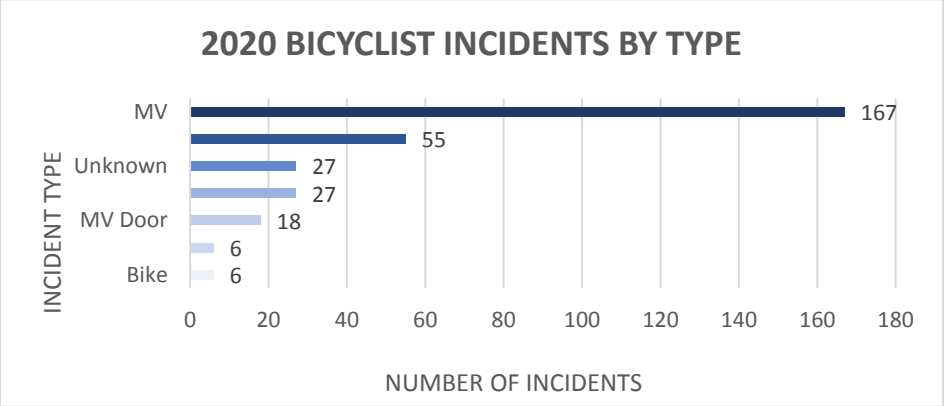

Figure 5: Depicts incident causes during 2020 by incident cause type.

TIME AND WEATHER IMPACT

Bicyclist incidents were analyzed by time and weather data to determine relevant trends. When analyzed by time bicyclist incidents were noted to spike around 10am and plateau throughout the afternoon until about 7PM, with a notable peak around 3PM.

When analyzed by weather, a positive correlation between average temperature and the number of incidents was noted. Meaning on warmer days there was a higher incidence of bicyclist accidents, most likely due to a higher number of bicyclists being out.

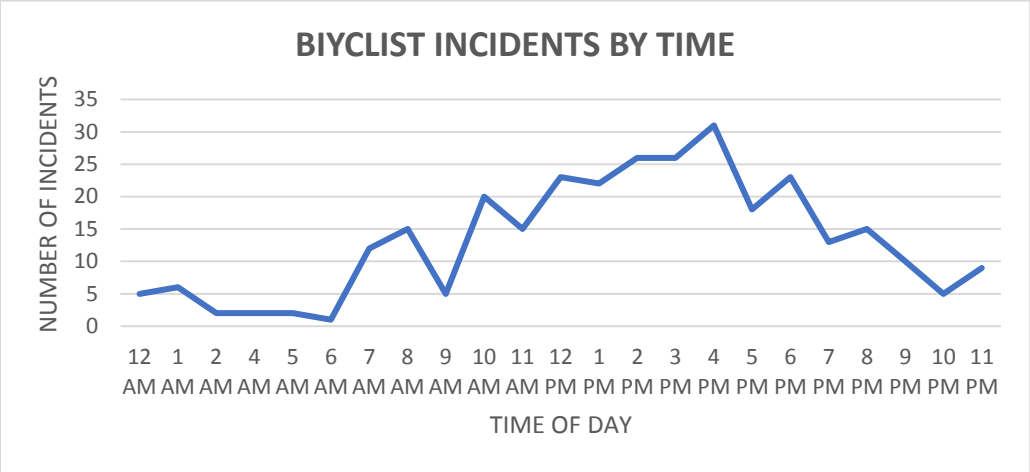

Figure 6: Bicyclist incidents by time during 2020.

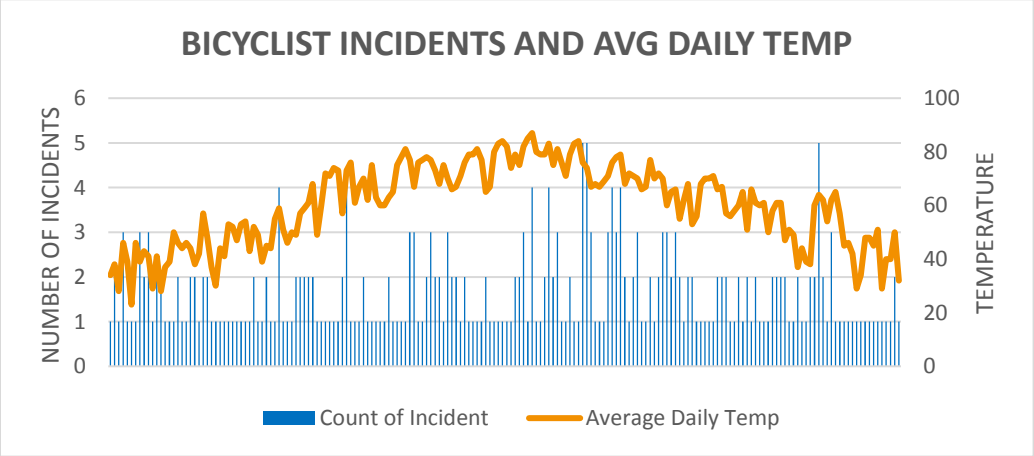

Figure 7: Bicyclist incidents by average daily temperature in 2020.

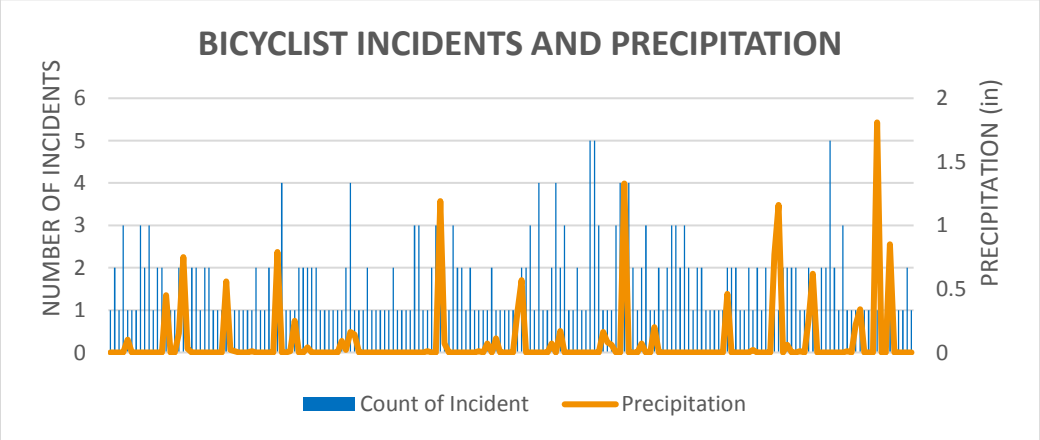

Figure 8: Bicyclist incidents by amount of precipitation in 2020.

BICYCLIST INCIDENTS BY NEIGHBORHOOD

Bike vs	Highest Cases	Second Highest Cases	Third Highest Cases
MV Door	Brighton (27.7%)	Boston (22.2%)	Jamaica Plain (22.2%)
MV	Boston (29.3%)	Dorchester (23.9%)	Roxbury (14.9%)
Bike	Boston (50%)	Roxbury (33.3%)	Mattapan (16.6%)
Pedestrian	Boston (50%)	Brighton (33.3%)	East Boston (16.6%)
Road Surface	Boston (22.2%)	Roxbury (18.5%)	Jamaica Plain (18.5%)
Unknown	Boston (23.1%)	Roxbury (23.1%)	Dorchester (23%)
Other	Brighton (18.5%)	Jamaica Plain (18.5%)	Boston (15.9%)

Table 2: Depicts bicyclist incidents by neighborhood and category. Calculated percentages represent the percentage of the total incidents for that specific incident type. Boston proper accounts for 29.3% of all bicyclist incidents involving a MV, Dorchester accounts for 23.9%, and Roxbury 14.9%. Brighton accounted for 27.7% of all incidents involving a MV door, Boston proper for 22.2%, and Jamaica Plain for 22.2%.

These findings are different than 2019's data where Boston Proper, Dorchester, and Roxbury consistently accounted for the highest cases in Boston across all incident types. While some of this trend can still be observed in the 2020 data, Jamaica Plain, East Boston, and Mattapan now are in the top three neighborhoods for bicyclist incidents. It is unknown if this is due to some structural changes made in these neighborhoods over the last year or if it a side effect of more people being at home due to the pandemic in these areas.

PEDESTRIAN INCIDENTS

There were 440 pedestrian incidents in 2020, where 335 of these encounters resulted in transport to a medical facility. Of the remaining 105 incidents, 89 were patient refusals (the patient declined ambulance transport), 15 "no medicals" (patient advised thy were uninjured), and 1 fatal incident referred to the medical examiner.

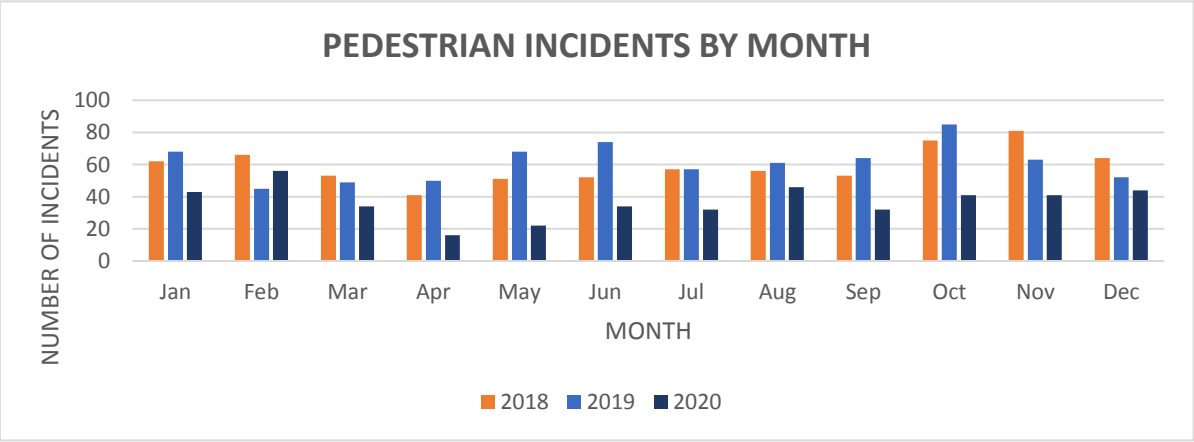

Figure 9: Compares pedestrian incidents by month from 2018-2020. Data shows 38 % decrease in pedestrian incidents since 2018.

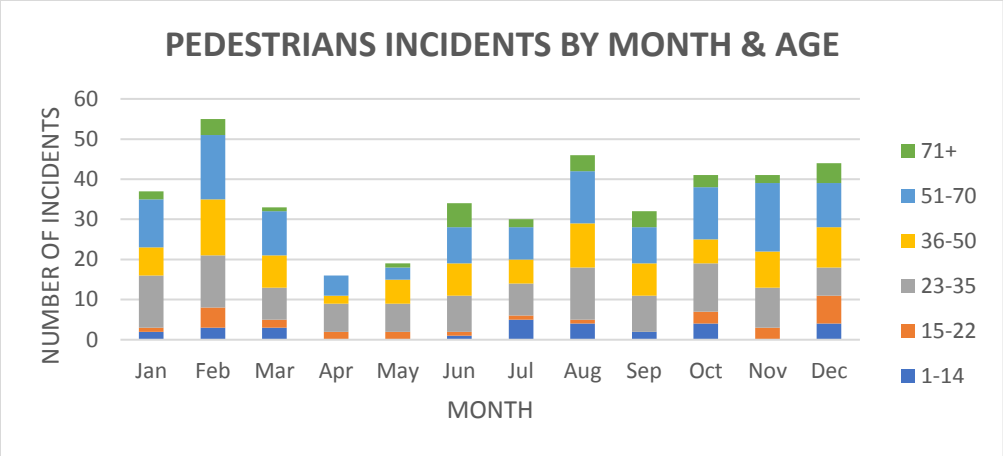

Figure 10: Breaks down pedestrian incidents by age group in 2020.

Level of Care	Transports
Basic Life Support (BLS)	210
Advanced Life Support (ALS)	7
TOTAL	217

Incident Outcome	Incidents
Refusal	83
Transport	217
TOTAL	300

INCIDENT TYPES

Approximately 45% of all pedestrian incidents occurred while the pedestrian was documented as crossing the street, or walking along the street (10%). For 23% of pedestrian incidents there was not sufficient documentation to determine pedestrian activity. Crossing the street during the time of incident has consistently been the highest predictor of a pedestrian incident, however there was a 50% increase in the number incidents that occurred while walking the street compared to 2019.

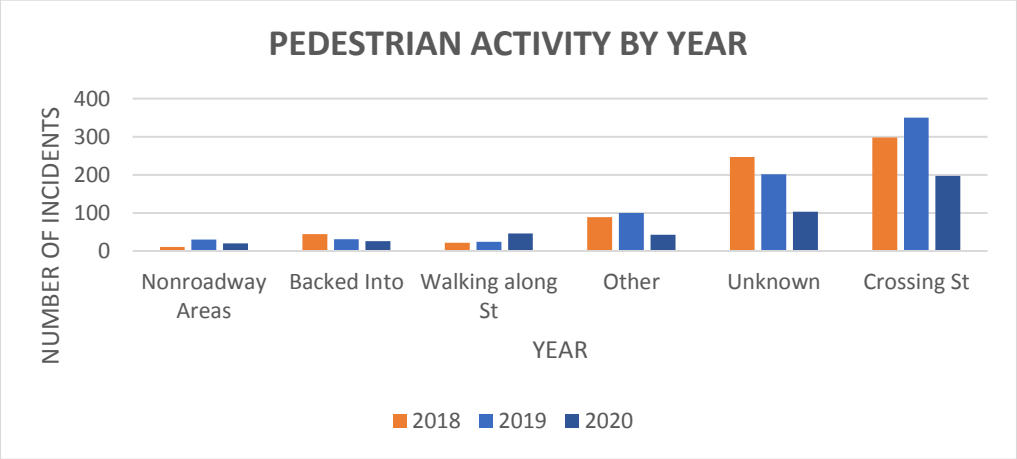

Figure 11: Pedestrian activity during the time of the incident from 2018-2020.

TIME IMPACT

Prior analysis has not shown a correlation between weather and pedestrian incidents. When analyzed by time, data is consistent with previous trends where most incidents occur during "peak" times around 8am and 4-6pm at night. However, there is no "lunch rush" as we have observed in previous years, but this is most likely attributed to many residents working remotely during 2020.

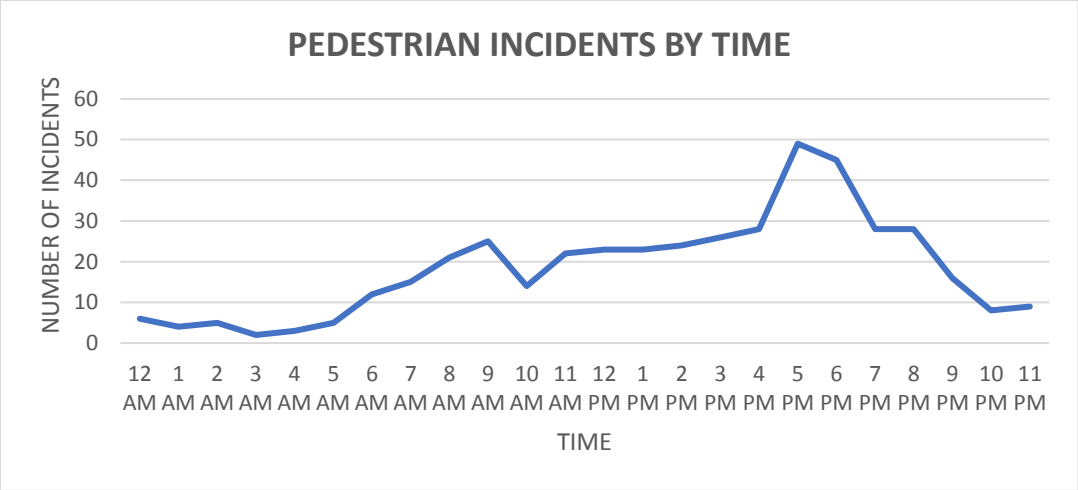

Figure 12: Depicts pedestrian incidents by hour block in 2020.

PEDESTRIAN INCIDENTS BY NEIGHBORHOOD

Incident Type	Highest Cases	Second Highest Cases	Third Highest Cases
Crossing St	Dorchester (28.9%)	Roxbury (17.3%)	Boston (17.3%)
Walking along St	Boston (30.4%)	Dorchester (19.5%)	Roxbury (8.6%)
Backed into	Dorchester (26.9%)	Roxbury (19.2%)	Boston (19.2%)
Non-Roadway Area	Dorchester (30%)	Boston (20%)	Boston (10%)
Unknown	Dorchester (27.2%)	Boston (22.3%)	Roxbury (20.4%)
Other	Dorchester (25.6%)	Boston (16.3%)	Roxbury (9.3%)

Table 3: Depicts pedestrian incidents by neighborhood and incident type. Calculated percentages represent the percentage of the total incidents for that specific incident type. Dorchester accounts for 28.9% of all incidents when a pedestrian was crossing the street, followed by Roxbury (17.3%), and Boston proper (17.3%). Boston proper accounts for 30.4% of incidents occurring while the pedestrian was walking along the street, Dorchester accounting for 19.5%, and Roxbury for 8.6% of incidents.

Overall, the top three neighborhoods identified are the same ones identified from last year. While the percentages have changed, Boston proper, Dorchester, and Roxbury continue to account for the majority of pedestrian incidents in Boston.

COVID-19 IMPACT ON INCIDENTS

PRE-COVID *Jan 1st-Mar 10th*

Initial data analysis of the pre-COVID period reveals trends consistent with the previous year. From Jan 1-March 10, the data among both bicyclist and pedestrian incidents were comparable with 2019's data. There were no significant changes or new trends during that time. When analyzed by age group and gender, no significant variance was found.

COVID *Mar 10th -Dec 31st*

Due to the nature of the timeframe covering 9 months, the data was broken up into multiple subunits for comparison correlating to significant dates in Boston (e.g. closures, reopening, etc.). The first period covered the initial quarantine period from March 10th-April 30th. The second period covered the warmer months from May 1-August 31st; it is important to note there were several noteworthy dates during this

time as the city underwent phases of reopening. Lastly, the fall was grouped together as the final group from September 1-Dec 31st for comparison to 2019.

Period 1: March 11th-April 30th

This period is marked by all non-essential businesses closing and the period with the highest number of residents staying at home. There was a 19% decrease in bicyclist incidents during this timeframe compared to 2019. While there was a 15% decrease in bicyclist vs. MV alone, this incident category remained the highest cause of bicyclist incidents during this timeframe. Among pedestrian incidents there was an 11% decrease during this time frame, compared to 2019, with the largest decrease among pedestrian's crossing the street at the time of the incident.

Period 2: May 1st-August 31st

This period encompassed the phases of reopening: Phase 1 5/18/20, Step 1 Phase II 6/8/20, and Step 2 Phase II 6/22/20. There was a 9% decrease in bicyclist incidents during this timeframe compared to the same timeframe compared to 2019. No other notable changes. Compared to the same months in 2019, there was a 28% decrease in pedestrian incidents with the largest decrease noted among pedestrians crossing the street at the time of the incident.

Period 3: Sep 1st-Dec 31st

During this period there was a 10% decrease in bicyclist incidents compared to the same timeframe in 2019. The decrease in bicyclist incidents is consistent with trends seen with less individuals being outside due to the pandemic, but there was a notable decrease in bicyclist v. MV doors (2019: 14; 2020: 4). Compared to 2019 there was a 24% decrease in pedestrian incidents, where there was a 14% decrease in incidents occurring while pedestrians were crossing the street.