

August 20, 2025

Ms. Alison Manugian, Community Development Director  
Dracut Planning Board  
62 Arlington Street  
Dracut, MA 01826

Subject: Transportation Peer Review Services  
Beaver Brook Mill Redevelopment  
88, 91, 101 Mill Street, Dracut, MA

Dear Board Members:

MDM Transportation Consultants, Inc. (MDM) is pleased to provide you with the following initial transportation review comments for the above-referenced project. These comments have been prepared based on a site visit in July 2025 and review of the documents identified below. To facilitate response by Applicant, review items requiring response are noted in ***Bold Italic***.

MDM finds that the Traffic Impact and Access Study (TIAS) has been prepared in general conformance with industry standards and reasonably quantifies existing/baseline traffic, traffic generation, and safety conditions for locations in the project vicinity. Commentary for Proponent response includes a reassessment of the motor vehicle crash history, potential measures for speed reduction along Lakeview Avenue, and general transportation-related site plan comments.

#### **Documents Reviewed**

MDM has reviewed the following documents to gain an understanding of the project and determine if industry standards have been applied in determining the potential impacts of the project. The following relevant documents were reviewed:

- *Traffic Impact and Access Study, Beaver Brook Mill Redevelopment, Dracut, Massachusetts*, prepared by Greenman-Pedersen, Inc. dated May 2025.
- *Special Permit Amendment, Residences at the Beaver Brook, Dracut, Massachusetts*, prepared by Greenman-Pedersen, Inc. dated May 21, 2025.

## **Proposed Development and Context**

The proposed site development, as presented in the Traffic Impact and Access Study (TIAS) and associated Site Layout Plans, consists of the redevelopment of the existing Beaver Brook Mill mixed-use development. Presently the Beaver Brook Mill contains a 47-unit multifamily residential community and 74,500 square feet (sf) of commercial space supported by 359 parking spaces. The proposed redevelopment consists of the expansion of the multifamily residential community by 126-units, a reduction of 13,000 sf of commercial space, and construction of 102 additional parking spaces. Once completed, the renovated and expanded Beaver Brook Mill mixed-use development will consist of a 173-unit multifamily residential community and 61,500 sf of commercial space supported by a total of 461 parking spaces.

Access to the Project will continue to be provided by way of 14 existing driveways; however, access to the proposed redevelopment areas will be focused on three specific driveways: one along the south side of Lakeview Avenue, approximately 255 feet east of Mill Street; one along the east side of Mill Street, approximately opposite Water Street; and one along the east side of Mill Street, approximately 75 feet north of Water Street. The remaining 11 driveways will continue to serve the balance of the mixed-use development.

## **Traffic Impact and Access Study Comments**

### Existing Conditions

1. *Study Area:* The TIAS presents a study area that includes the following locations:

- Lakeview Avenue at Mammoth Road
- Lakeview Avenue at Mill Street and Myron Street
- Lakeview Avenue at the Site driveway
- Lakeview Avenue at Primrose Hill Road
- Mill Street at Water Street and the Site driveway
- Mammoth Road at Mill Street

*Comment 1: MDM field verified the existing conditions at the study area intersections in July 2025. MDM concurs that the study locations along Lakeview Avenue, Mill Street and Mammoth Road are appropriate primary study locations and in context with the likely traffic impacts for the Project. MDM further notes that sidewalks are provided along both sides of Lakeview Avenue, providing a direct pedestrian connection between the Site and the area schools including the Dr. Christos Daoulas Educational Complex located approximately 1 mile west of the site.*

2. *Public Transportation:* The TIAS accurately describes the currently available Lowell Regional Transit Authority (LRTA) services (Bus Route 10) in the immediate study area. The TIAS also notes that the LRTA Bus Route 10 currently offers “fare free” service.

**MDM**

*Comment 2: MDM acknowledges that the site is well served by LRTA bus service and nearby stops.*

**3. Traffic Volumes:** Traffic volumes for study locations were conducted in March 2025 for the weekday morning (7:00 – 9:00 AM), weekday evening (4:00 – 6:00 PM) and Saturday midday (11:00 AM – 2:00 PM) peak periods. The TIAS indicated that March is an above-average month based on the MassDOT Statewide Traffic Data Collection 2023 Weekday Seasonal Factors and the appropriate roadway classifications. The observed volumes were not adjusted downwards and therefore represent above average-month traffic volume conditions. Furthermore, the presented volumes along Lakeview Avenue were also adjusted upwards to balance the volume flows between Mill Street/Myron Street and Primrose Hill Road.

*Comment 3: MDM has reviewed count data relative to historic count data (June 2017 and October 2022) and finds that traffic volumes presented in the TIAS are generally consistent with these data. Accordingly, baseline traffic volume data in the TIS presents a reasonable basis for analysis purposes.*

*MDM notes that the TMCs at the Lakeview Avenue at Mammoth Road intersection do not include volumes from the Lakeview Avenue westbound channelized right-turn lane; however, this does not impact analyses presented in the TIAS.*

**4. Collisions:** The TIAS presents relevant crash data for the study intersections between 2017 and 2021 from the statewide crash database. The TIAS reports that the study area intersections have crash rates below the statewide and district averages, and no fatalities were reported. Further, the study area intersections were not listed as high crash locations in the Highway Safety Improvement Program (HSIP) database. The TIAS provides a supplemental narrative of Dracut Police Department crash records between 2020 through 2025 for the study area intersections, and indicate a similar crash occurrence to the MassDOT records.

*Comment 4: Specific crash records for the study area intersections were not provided in the Technical Appendix of the TIAS. It appears that the summarized crashes were obtained through the "Spatial Search" feature of the statewide Crash Query and Visualization page of the MassDOT Crash Data Portal using a single selection point rather than the "Area" selection tool. This limited search is likely undercounting the amount of crashes experienced at the intersection and its approaches. MDM performed an inquiry of the Lakeview Avenue at Mammoth Road intersection using a single selection point with a 100-foot diameter buffer over the same 2017 through 2021 time period. This expanded search area included a total of 33 crashes recorded, resulting in a crash rate of 0.85, which is above the statewide and district average rates. This buffer area does not include the channelized right-turn lane, which MDM concurs is appropriate to omit based on the traffic volume observations. Copies of the crashes, the crash rate calculations and a summary table are provided as an attachment.*

*MDM has also previously prepared a Road Safety Audit (RSA) for the Lakeview Avenue at Mammoth Road intersection; the RSA has been submitted to the Town and MassDOT and provides guidance on potential safety countermeasures for the intersection. A copy of this RSA is attached for reference.*

**MDM**

*MDM requests the proponent update the crash history at the study area intersections and describe potential safety enhancements at any above-average intersections, as appropriate including consideration of the previously conducted RSA for the Lakeview Avenue at Mammoth Road intersection.*

5. *Vehicle Speeds:* Vehicle travel speed measurements were obtained along Lakeview Avenue and Mill Street as a part of the data collection effort. The predominant travel speeds were found to be 10 to 11 mph above the posted speed limit (25 miles per hour (mph)) along Lakeview Avenue; and generally consistent with the posted speed limit (30 mph) along Mill Street.

*Comment 5: MDM suggests the Proponent install radar-equipped speed feedback signs along Lakeview Avenue in an effort to reduce vehicle travel speeds in the vicinity of the Site. If equipped with data collection capability, speed data could be available to the Dracut Police Department to identify times when targeted speed enforcement may be appropriate. MDM notes that radar-equipped speed feedback signs are currently installed along Mammoth Road, south of Mill Street.*

6. *Sight Distance:* The TIAS presents the required minimum stopping sight distance (SSD) and intersection sight distance (ISD) criteria for a travel speed consistent with or above the observed vehicle travel speeds along Lakeview Avenue and Mill Street. The TIAS indicates that the available sight lines at site driveway intersections and the Lakeview Avenue at Mill Street intersection meet or exceed applicable minimum criteria based on the observed speeds.

*Comment 6: MDM field review confirms that sight distances as described in the TIAS at the three locations analyzed meet or exceed the recommended minimum distances for safe operation. MDM also measured available sight distances at the nearby Mammoth Road at Mill Street intersection, also confirming that available sight distances at this intersection exceed 500 feet in length for all approaches.*

#### Future Conditions

7. *Traffic Growth:* Future traffic volumes are projected in the TIAS to a 7-year horizon using a 1.0 percent per year compounded annual growth rate. The future year conditions presented in the TIAS do not include traffic associated with any specific development projects to be completed by others.

*Comment 7: MDM concurs that future traffic projections as documented in the TIAS present a reasonable basis for analysis; no further comment.*

8. *Planned Roadway Improvements:* The TIAS describes the ongoing efforts to improve conditions at the Lakeview Avenue at Mammoth Road intersection.

**MDM**

*Comment 8: MDM notes that a source of funding for potential intersection improvements have not been identified as of this date. As such, the advancement of conceptual improvement plans for the intersection have not proceeded beyond those conceptually identified in the RSA.*

9. *Trip Generation:* Peak hour trip estimates for the Project are appropriately based on characteristics published by the Institute of Transportation Engineers (ITE) in *Trip Generation* 11<sup>th</sup> Edition for Land Use Code (LUC) 215 – Single Family Attached Housing, 220 – Multifamily Housing (Low-Rise), and 221 – Multifamily Housing (Mid-Rise) for the proposed multifamily residential community expansion. No credits or reductions for the peak hour traffic volumes were applied to account for the eliminated commercial space. The resulting trip generation is estimated at approximately 74 additional vehicles or less during the peak hours. Projected daily trip estimates are derived by calculating trip differences for existing and proposed site programming using ITE daily trip rates, resulting in a net trip reduction of 120 vehicles on an average weekday and a reduction of 410 vehicles on a Saturday.

*Comment 9: MDM concurs that the application of ITE trip rates and the methodology used in the TIAS to estimate peak hour trip generation provides a reasonable basis of analysis. However, we question the net daily reduction in trips; application of ITE daily trip rates to the residential component results in daily increases of 708 additional vehicles on an average weekday and 666 additional vehicles on a Saturday. Elimination of apportion of the commercial uses may partially offset this increase; however we do not anticipate a net overall trip reduction as a practical matter. However, while daily increases may occur (rather than being reduced), the impact of the project is appropriately accounted for in the peak-hour increases noted in the TIAS.*

10. *Trip Distribution and Assignment:* Trip patterns for Site traffic presented in the TIAS are based on Journey-to-Work data for residents of Dracut (via zip code).

*Comment 10: MDM generally concurs that the application of the methodology used in the TIAS to estimate the trip distribution and assignment of the site generated traffic is appropriate and generally consistent with the observed travel patterns.*

### Traffic Operations Analysis

11. *Analysis Results:* Operational analyses in the TIAS follow generally accepted traffic engineering practices. The Lakeview Avenue at Mill Street and Myron Street intersection modeling is calibrated based on observed vehicle delays, which is an accepted practice per MassDOT guidance.

*Comment 11: MDM concurs with TIAS analysis results which indicate the project will not result in a material impact to operating conditions at the study area intersections relative to No Build conditions.*

### Conclusions

12. *Conclusions:* The TIAS offers summary points describing the general findings of the development, the proposed access/egress, trip generation and operational analysis. The TIAS offers no specific mitigation measures or safety enhancements.

*Comment 12: As noted earlier, MDM requests the Proponent revisit the crash analysis methodology to ensure all crashes that can be attributed to operations at the intersections are included in the analysis. Proponent should identify appropriate safety countermeasures at locations that exhibit an above-average crash rate. Additionally, as described under Comment 5 the Proponent should implement radar-equipped speed feedback signs to help reduce the predominant travel speeds along Lakeview Avenue. MDM concurs that no specific operational improvements are required to accommodate the redevelopment of the Site.*

### General Site Plan Comments

13. General Site Plan Comments (Transportation):

- (a) *Provide swept path analysis/modeling for the site using the current Dracut Fire Department tower vehicle/template dimensions for Dracut Fire Department review. Modeling should include movements navigating the dead-end parking bays adjacent to Buildings B1; B2; C; D; and E.*
- (b) *Provide swept path analysis/modeling for the site based on the largest anticipated service/delivery vehicle expected (assumed to be a SU-30 vehicle at a minimum).*
- (c) *The Proponent should consult with the Town on the implementation of pavement markings, including solid white edge lines, centerlines, crosswalks, and MUTCD-compliant signage along Mill Street to promote positive driver guidance and establish motorist right-of-way in this area.*
- (d) *An MUTCD-compliant crosswalk should be provided across the Lakeview Avenue driveway to define the pedestrian right-of-way.*
- (e) *The site plan should include a note citing that "Signs, landscaping and other features located within sight triangle areas shall be designed, installed, and maintained so as not to exceed 2.0-feet in height. Snow windrows located within sight triangle areas that exceed 3.5-feet in height or that would otherwise inhibit sight lines shall be promptly removed."*

**MDM**

Ms. Alison Manugian/Planning Department

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MDM appreciates the opportunity to provide Transportation Planning & Engineering Services to the Town of Dracut and look forward to discussing our findings at an upcoming Planning Board hearing. If you have any questions or concerns, please feel free to contact this office.

Sincerely,

A handwritten signature in blue ink, appearing to read "R. J. Michaud".

Robert J. Michaud, P.E.

Managing Principal

**MDM**

## **ATTACHMENTS**

Crash Data

□ Crash Data

**INTERSECTION CRASH SUMMARY**  
**2017 THROUGH 2021<sup>1</sup>**

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**INTERSECTION**

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Data Category	Main Street at East Street
Traffic Control	Signalized
Crash Rate <sup>2</sup>	<b>0.85</b>
MassDOT Avg. Rate <sup>3</sup>	0.73
Above Avg. Rate?	<b>Yes</b>
<i>Year:</i>	
2017	6
2018	10
2019	9
2020	6
<u>2021</u>	<u>2</u>
Total	<b>33</b>
<i>Type:</i>	
Angle	15
Rear-End	8
Head-On	3
Sideswipe	5
Fixed-Object	1
Pedestrian/Bicyclist	1
Other	0
<i>Severity:</i>	
P. Damage Only	8
Personal Injury	25
Fatality	0
Unknown	0
<i>Conditions:</i>	
Dry	26
Wet	5
Snow/Ice	2
Unknown/Other	0
<i>Time:</i>	
7:00 AM to 9:00 AM	4
4:00 PM to 6:00 PM	7
Rest of Day/Weekend	<b>22</b>

<sup>1</sup>Source: MassDOT Crash Database

<sup>2</sup>Crashes per million entering vehicles.

<sup>3</sup>District 4 Average Crash Rates: 0.73 (Signalized)

Crash Number	City/Town Name	Crash Date	Crash Severity	Crash Time	Crash Year	Max Injury Severity Reported	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	Driver Distracted By (All Vehicles)	First Harmful Event	Light Conditions	Manner of Collision	RMV Document Numbers	Road Surface Condition	Roadway Junction Type	Total Fatalities	Total Non-Fatal Injuries	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Configuration (All Vehicles)	Vehicle Emergency Use (All Vehicles)	Vehicle Towed From Scene (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Crash Report IDs	First Harmful Event Location	Most Harmful Event (All Vehicles)	Road Contributing Circumstance	Traffic Control Device Function	Vehicle Sequence of Events (All Vehicles)	Street Number	Roadway
<b>Lakeview Avenue at Mammoth Road</b>																															
4342965	DRACT	03/18/2017	Non-fatal injury	5:10 PM	2017	Non-fatal injury - Non-incapacitating	2	D1: (Unknown) / D2: (Unknown)		Collision with motor vehicle in traffic	Dark - lighted roadway	Angle	PW201705900333	Wet	Not at junction	0	1	V1: Travelling straight ahead / V2: Light truck(van, mini-van, pickup, sport utility)	V1: (Passenger car) / V2: (Light truck(van, mini-van, pickup, sport utility))	V1: (No) / V2: (No)	V1: E / V2: N	Rain	17000001068	Roadway	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Collision with motor vehicle in traffic	V2: Collision with motor vehicle in traffic	2042	LAKEVIEW AVENUE		
4347218	DRACT	02/10/2017	Property damage only	1:36 PM	2017	No injury	2	D1: (Failure to keep in proper lane or running off road)		Collision with motor vehicle in traffic	Daylight	Angle	PW201708700817	Snow	Not at junction	0	1	V1: Travelling straight ahead / V2: 0 Turning left	V1: (light truck(van, mini-van, pickup, sport utility)) / V2: (Passenger car)	V1: (No) / V2: (Yes, vehicle or trailer disabled)	V1: Not Reported / V2: Not Reported	Clear/Clear	17002404	Roadway	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Collision with motor vehicle in traffic	V2: Collision with motor vehicle in traffic	1198	MAMMOTH ROAD		
4383334	DRACT	06/27/2017	Property damage only	8:01 AM	2017	No injury	2	D1: (Disregarded traffic signs, signals, road markings) / D2: (No improper driving)	D2: Not Distracted	Collision with motor vehicle in traffic	Daylight	Angle	PW201717900205	Dry	Four-way intersection	0	0	V1: Travelling straight ahead / V2: 0 Travelling straight ahead	V1: (light truck(van, mini-van, pickup, sport utility))	V1: (No) / V2: (No)	V1: S / V2: E	Clear	2017000010577	Roadway	V1: Collision with other movable object / V2: Collision with motor vehicle in traffic	V1: Collision with motor vehicle in traffic	V2: Collision with motor vehicle in traffic	LAKEVIEW AV / MAMMOTH RD. / LAKEVIEW AVE.			
4444838	DRACT	10/25/2017	Property damage only	7:31 AM	2017	No injury	1	D1: (Visibility obstructed)	D1: Not Distracted		Collision with other light pole or other post/support	Daylight	Angle	PW20173030064	Wet	Four-way intersection	0	0	V1: Turning right	V1: (Passenger car)	V1: (No)	V1: Yes, vehicle or trailer disabled	V1: S	Rain	2017000018541	Roadway	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Collision with motor vehicle in traffic	V2: Collision with light pole or other post/support	MAMMOTH RD Rte SB / LAKEVIEW AV / MAMMOTH RD	
4444839	DRACT	10/25/2017	Property damage only	7:05 PM	2017	No injury	2	D1: (No improper driving) / D2: (No improper driving)	D1: Not Distracted / D2: Not Distracted	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle	PW201730301304	Wet	Four-way intersection	0	0	V1: Travelling straight ahead / V2: 0 Travelling straight ahead	V1: (light truck(van, mini-van, pickup, sport utility)) / V2: (Passenger car)	V1: (No) / V2: (No)	V1: S / V2: W	Rain/Cloudy	2017000018574	Roadway	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Collision with motor vehicle in traffic	V2: Collision with motor vehicle in traffic	1198	MAMMOTH RD		
4469759	DRACT	12/16/2017	Non-fatal injury	11:14 PM	2017	Non-fatal injury - Non-incapacitating	2	D1: (Operating vehicle in erratic, reckless, careless, negligent or 2 aggressive manner)	D1: Not Distracted / D2: Not Distracted	Collision with motor vehicle in traffic	Dark - lighted roadway	Head-on	PW201725300705	Dry	Four-way intersection	0	2	V1: Travelling straight ahead / V2: 2 Turning left	V1: (light truck(van, mini-van, pickup, sport utility)) / V2: (Passenger car)	V1: (No) / V2: (No)	V1: Yes, vehicle or trailer disabled	V1: E / V2: W	Clear	2017000021971	Roadway	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Collision with motor vehicle in traffic	V2: Collision with motor vehicle in traffic	MAMMOTH RD / MAMMOTH RD. / LAKEVIEW AVE.		
4484404	DRACT	07/15/2018	Property damage only	8:41 PM	2018	No injury	2			Collision with motor vehicle in traffic	Dark - lighted roadway	Rear-end	PW201801701803	Dry	Four-way intersection	0	0	V1: Travelling straight ahead	V1: (No) / V2: (No)	V1: (No)	V1: W / V2: W	Clear	2018000000890	Roadway	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Collision with motor vehicle in traffic	V2: Collision with motor vehicle in traffic	MAMMOTH RD / MAMMOTH RD / LAKEVIEW AVENUE			
4539164	DRACT	05/12/2018	Non-fatal injury	11:57 AM	2018	Non-fatal injury - Non-incapacitating	2	D1: (Failed to yield right of way) / D2: (Unknown) / D3: (No improper driving)	D1: Not Distracted / D2: Not Distracted	Collision with motor vehicle in traffic	Daylight	Angle	PW201813800109	Dry	Four-way intersection	0	1	V1: Turning left / V2: Travelling straight ahead	V1: (light truck(van, mini-van, pickup, sport utility)) / V2: (Passenger car)	V1: (No) / V2: (No)	V1: Yes, vehicle or trailer disabled	V1: S / V2: E	Cloudy/Clear	2018000009022	Roadway	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Collision with motor vehicle in traffic	V2: Collision with motor vehicle in traffic	MAMMOTH RD / LAKEVIEW AVE		
4544136	DRACT	05/28/2018	Property damage only	9:44 PM	2018	No injury	2	D1: (No improper driving) / D2: (No improper driving)	D1: Not Distracted / D2: Not Distracted	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle	PW201815000119	Dry	Four-way intersection	0	0	V1: Travelling straight ahead / V2: 0 Turning left	V1: (No) / V2: (No)	V1: (No) / V2: (No)	V1: Yes, vehicle or trailer disabled	V1: E / V2: W	Clear	2018000009802	Roadway	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Collision with motor vehicle in traffic	V2: Collision with motor vehicle in traffic	1198	MAMMOTH RD	
4569237	DRACT	07/20/2018	Property damage only	7:54 AM	2018	No injury	2	D1: (Failed to yield right of way) / D2: (Unknown)		Collision with motor vehicle in traffic	Daylight	Angle	PW201820400222	Dry	Four-way intersection	0	0	V1: Turning left / V2: Travelling straight ahead	V1: (Passenger car) / V2: (Passenger car)	V1: (No) / V2: (No)	V1: Yes, vehicle or trailer disabled	V1: W / V2: E	Clear	2018000013430	Roadway	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Collision with motor vehicle in traffic	V2: Collision with motor vehicle in traffic	LAKEVIEW AV / MAMMOTH RD		
4573731	DRACT	07/28/2018	Property damage only	4:15 PM	2018	No injury	2	D1: (Unknown) / D2: (Unknown)		Collision with motor vehicle in traffic	Daylight	Rear-end	PW201821200228	Dry	Four-way intersection	0	0	V1: Travelling straight ahead / V2: 0 Unknown	V1: (light truck(van, mini-van, pickup, sport utility)) / V2: (Passenger car)	V1: (No) / V2: (No)	V1: Yes, vehicle or trailer disabled	V1: E / V2: E	Clear	2018000013850	Roadway	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Collision with motor vehicle in traffic	V2: Collision with motor vehicle in traffic	LAKEVIEW AV / LAKEVIEW AVE / MAMMOTH ROAD		
4611874	DRACT	10/19/2018	Property damage only	5:21 PM	2018	No injury	2	D1: (No improper driving) / D2: (Failed to yield right of way)	D1: Not Distracted / D2: Not Distracted	Collision with motor vehicle in traffic	Daylight	Angle	PW201829600257	Dry	Not at junction	0	0	V1: Travelling straight ahead / V2: 0 Turning left	V1: (Passenger car) / V2: (Passenger car)	V1: (No) / V2: (No)	V1: Yes, vehicle or trailer disabled	V1: E / V2: W	Clear	2018000018933	Roadway	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Collision with motor vehicle in traffic	V2: Collision with motor vehicle in traffic	1198	MAMMOTH RD	
4617993	DRACT	11/05/2018	Property damage only	5:43 PM	2018	No injury	2	D1: (Over-correcting/over-steering),(inattention) / D2: (No improper driving)		Collision with motor vehicle in traffic	Dark - lighted roadway	Angle	PW201831100143	Wet	Not reported	0	0	V1: Turning left / V2: Turning right	V1: (Passenger car) / V2: (Passenger car)	V1: (No) / V2: (No)	V1: Yes, vehicle or trailer disabled	V1: W / V2: N	Not Reported	2018000019933	Roadway	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Collision with motor vehicle in traffic	V2: Collision with motor vehicle in traffic	1198	MAMMOTH RD	
4620593	DRACT	11/10/2018	Property damage only	7:27 PM	2018	No injury	2	D1: (Unknown) / D2: (No improper driving)	D1: Not Distracted / D2: Not Distracted	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle	PW201831800439	Dry	Four-way intersection	0	0	V1: Travelling straight ahead / V2: 0 Travelling straight ahead	V1: (light truck(van, mini-van, pickup, sport utility)) / V2: (Passenger car)	V1: (No) / V2: (No)	V1: Yes, vehicle or trailer disabled	V1: S / V2: E	Clear/Clear	2018000020327	Roadway	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Collision with motor vehicle in traffic	V2: Collision with motor vehicle in traffic	MAMMOTH RD / LAKEVIEW AVENUE / MAMMOTH ROAD		
4633268	DRACT	12/05/2018	Property damage only	8:10 PM	2018	No injury	2	D1: (No improper driving) / D2: (Failed to yield right of way),(Unknown)	D1: Not Distracted	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle	PW201834100305	Dry	Four-way intersection	0	0	V1: Turning left / V2: 0 Turning left	V1: (No) / V2: (No)	V1: (No) / V2: (No)	V1: Yes, vehicle or trailer disabled	V1: S / V2: W	Clear	2018000021841	Roadway	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Collision with motor vehicle in traffic	V2: Collision with motor vehicle in traffic	MAMMOTH RD / LAKEVIEW AVE / MAMMOTH ROAD		
4641454	DRACT	12/24/2018	Property damage only	8:03 PM	2018	No injury	2	D1: (Distracted),(inattention) / D2: (No improper driving)		Collision with motor vehicle in traffic	Dark - lighted roadway	Rear-end	PW201836100207	Dry	Not at junction	0	0	V1: Slowing or stopped / V2: 0 Turning left	V1: (light truck(van, mini-van, pickup, sport utility)) / V2: (Passenger car)	V1: (No) / V2: (No)	V1: Yes, vehicle or trailer disabled	V1: E / V2: N	Not Reported	2018000023133	Roadway	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Collision with motor vehicle in traffic	V2: Collision with motor vehicle in traffic	1198	MAMMOTH RD	
4670593	DRACT	03/01/2019	Non-fatal injury	7:20 AM	2019	Non-fatal injury - Non-incapacitating	2	D1: (Failed to yield right of way) / D2: (No improper driving),(No improper driving)	D2: Not Distracted	Collision with motor vehicle in traffic	Daylight	Angle	PW201906400217	Dry	T-intersection	0	1	V1: Travelling straight ahead	V1: (No) / V2: (No)	V1: (No) / V2: (No)	V1: Yes, vehicle or trailer disabled	V1: N / V2: E	Clear/Cloudy	2019000004289	Roadway	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Collision with motor vehicle in traffic	V2: Collision with motor vehicle in traffic	1198	MAMMOTH RD	
4677135	DRACT	03/16/2019	Property damage only	8:33 AM	2019	No injury	2	D1: (No improper driving),(No improper driving)	D1: Not Distracted	Collision with motor vehicle in traffic	Daylight	Angle	PW201907800620	Dry	Not at junction	0	0	V1: Turning left / V2: Turning right	V1: (No) / V2: (No)	V1: (No) / V2: (No)	V1: Yes, vehicle or trailer disabled	V1: W / V2: E	Clear/Clear	2019000005457	Roadway	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Collision with motor vehicle in traffic	V2: Collision with motor vehicle in traffic	1198	MAMMOTH RD	
4679030	DRACT	03/20/2019	Property damage only	5:46 PM	2019	No injury	2	D1: (No improper driving) / D2: (Glim),[Followed closely]	D1: Not Distracted / D2: Not Distracted	Collision with motor vehicle in traffic	Dusk	Angle	PW201908100212	Dry	Four-way intersection	0	0	V1: Slowing or stopped / V2: 0 Turning left	V1: (light truck(v												

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Dracut, MA COUNT DATE : Mar-25

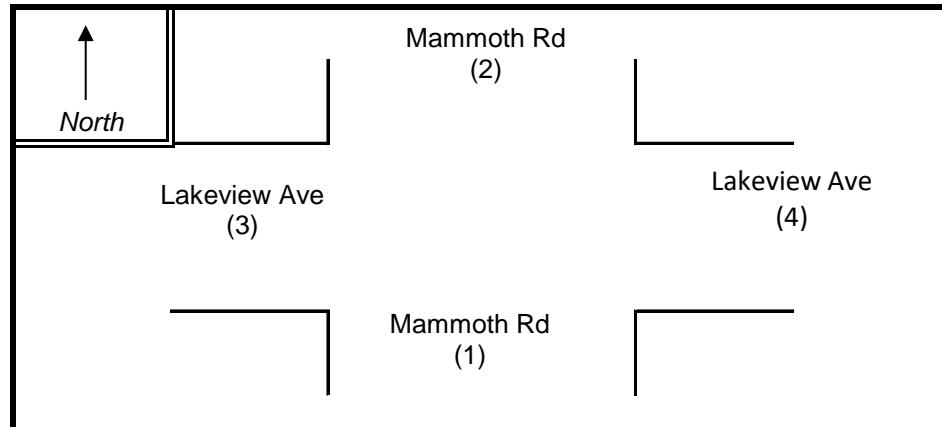
DISTRICT : 4 UNSIGNALIZED :  SIGNALIZED :  **X**

### ~ INTERSECTION DATA ~

MAJOR STREET : Lakeview Ave

MINOR STREET(S) : Mammoth Rd

**INTERSECTION  
DIAGRAM  
(Label Approaches)**



### PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	<b>Total Peak Hourly Approach Volume</b>
DIRECTION :	NB	SB	EB	WB		
PEAK HOURLY VOLUMES (PM) :	437	521	558	425		<b>1,941</b>

" K " FACTOR : **0.091** INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME : **21,330**

TOTAL # OF CRASHES : **33** # OF YEARS : **5** AVERAGE # OF CRASHES PER YEAR ( A ) : **6.60**

**CRASH RATE CALCULATION :** **0.85** RATE = 
$$\frac{(A * 1,000,000)}{(V * 365)}$$

Comments : MassDOT District 4 Avg: Signalized = 0.73; Unsignalized = 0.57

Project Title & Date: 1436 - Dracut

# ROAD SAFETY AUDIT

Lakeview Avenue at Mammoth Road

Dracut, MA

September 20, 2022

Prepared For:  
Town of Dracut



Prepared By:  
MDM Transportation Consultants, Inc.  
28 Lord Road Suite 280  
Marlborough, MA 01752

**MDM** TRANSPORTATION CONSULTANTS, INC.  
Planners & Engineers

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## Background

In an effort to reduce the number of crash-related fatalities and incapacitating injuries, Massachusetts Department of Transportation has developed a Strategic Highway Safety Plan. The mission of the Plan is to “Develop, promote, implement, and evaluate data-driven, multidisciplinary strategies to maximize safety for users of the roadway system.” One of the many strategies noted in the current Safety Plan is to “conduct Road Safety Audits (RSA) at high-crash locations throughout the Commonwealth.”

A Road Safety Audit, as defined by the Federal Highway Administration (FHWA) is “a formal safety performance examination of an existing or future road or intersection by an independent audit team.”

An RSA of the intersection of Lakeview Avenue at Mammoth Road in Dracut, Massachusetts was conducted on behalf of the Town of Dracut as a first step to identify appropriate roadway and safety improvements in the study area as the Town works to identify funding sources. The location of the Lakeview Avenue signalized intersection with Mammoth Road is shown in **Figure 1**. The study area has also been expanded to include several pedestrian zones in the approach areas along both Lakeview Avenue and Mammoth Road. The RSA will be utilized to develop and support design concepts and lane configurations. Improvements to correct the deficiencies will be incorporated into the conceptual design, where feasible.

The intersection experiences high traffic volumes during the weekday morning and weekday evening peak commuter travel periods as well as high pedestrian volumes in the area. The intersection is currently not listed as a Highway Safety Improvement Program (HSIP) crash cluster (2017 -2019) based on MassDOT crash data, but it has experienced an above-average crash rate for signalized intersections within MassDOT District 4. To be categorized as HSIP eligible, an intersection must be within the top five percent of crash clusters in its respective Regional Planning Commission’s (RPC’s) boundaries. The Lakeview Avenue at Mammoth Road intersection is listed by the Northern Middlesex Council of Governments (NMCOG) in the Regional Top 100 High Crash Locations at number 65 for the region. The intersection is not considered HSIP-eligible based on MassDOT’s online database.

This RSA is intended to identify specific safety issues as well as identify short-term, mid-term and long-term safety enhancements that can be considered for implementation.



Figure 1: Locus Map

## Project Data

A Road Safety Audit was conducted for the intersection of Lakeview Avenue at Mammoth Road in Dracut, MA on September 20, 2022. As shown below in **Table 1**, the audit team consisted of a multidisciplinary team with representatives from state, regional and local agencies providing expertise in the engineering, planning, maintenance, and emergency response fields. Contact information for the RSA attendees is provided in **Appendix B** of this report.

**Table 1: Participating Audit Team Members**

<b>Audit Team Member</b>	<b>Agency/Affiliation</b>
Cynthia Curtis	Dracut Schools
Michelle Deng	MassDOT Traffic Safety
Steven Stone	Dracut Schools
Rich Patterson	Dracut Fire
Abiola Ajaka	MassDOT D4 Traffic
Mark Hamel	Town of Dracut
Andrew Graham	Dracut Schools
David Tilton	Northern Middlesex Council Government
Jim Terlizzi	MassDOT Traffic Safety
Sara Timoner	MassDOT D4 Traffic
Tina Rivard	Dracut DPW
Marguerite Hoover	Dracut Engineering
David Chartrand	Dracut Police
Alison Manugian	Town of Dracut
Dan Mills	MDM Transportation Consultants, Inc.
Jack Lawrence	MDM Transportation Consultants, Inc.
Dan Dumais	MDM Transportation Consultants, Inc.

The Audit team members received a meeting packet prior to the RSA including a meeting agenda (**Appendix A**), a collision diagram, crash data tables, crash data graphs, and an RSA prompt list. Additional information was also provided to the team that included:

- Intersection Photos
- Signal Timings
- Intersection Volumes
- Pedestrian Volumes

The collision diagram provides a graphical representation of the crash data showing both the crash type and approximate crash location within a study area. The collision diagram also shows the severity of the crash and the daytime versus nighttime conditions. The audit members were asked to review the packet and visit the RSA study area prior to the meeting.

The RSA was held in person with the Audit Team in the field to gather information and help answer questions as needed during the meeting. Following a brief overview of the intersection location and characteristics, safety issues were identified by the team, followed by a field visit to the study intersection. The audit team finished the meeting by discussing and summarizing safety issues as noted on the field visit.

## **Crash Data**

Crash trends and safety characteristics for the study area are based on crash data obtained from MassDOT and the Town of Dracut for the five-year period covering 2017 through 2021. The RSA team was provided an information package that included a detailed crash summary and graphs for the study location and a collision diagram, which were prepared based on police crash reports and MassDOT crash database records. The detailed crash information is provided in **Appendix C** with an overview as follows:

### **Lakeview Avenue at Mammoth Road**

The crashes within the immediate influence area of the Lakeview Avenue signalized intersection with Mammoth Road was first reviewed with the following observed statistics:

- *Intersection Total Crashes & Crash Rate.* Forty-five (45) crashes were reported at or near the intersection of Lakeview Avenue and Mammoth Road over the five-year study period. This resulted in a crash rate of 0.91 crashes per million entering vehicles (c/mev), which is above the District 4 average of 0.73 for signalized intersections. Equivalent Property Damage Only (EPDO) is a method of weighing factors related to the societal costs of fatalities, injuries, and property damage-only crashes. The EPDO crashes were calculated using the MassDOT's severity index where Property Damage Only crashes = 1 Point; Injury crashes = 21 Points; Fatal crashes = 21 points. NMCOG (Northern Middlesex Council of Governments) in their 2022 Regional Transportation Safety Report including 2017-2019 crash data lists Lakeview Avenue at Mammoth Road as the 65<sup>th</sup> ranked regional high crash location in the region over the three-year study period (2017 – 2019) with an EPDO of 55.
- *HSIP Cluster.* The intersection is not considered a Highway Safety Improvement Program (HSIP) crash cluster for the recent study period (2017-2019).
- *Crash Trends.* The reported crashes included 14 rear-end type collisions, 18 angle type collisions, 7 sideswipe type collisions, 2 head-on type collisions, and 4 single vehicle crashes. The majority of the crashes (82%) resulted in property damage type collisions. There were no fatalities or pedestrian/bicycle related incidents reported. The intersection crashes were shown to increase through the morning period with the majority 56% of the crashes occurring between 12:00 pm and 8:00 pm. The crash data also indicates that 32% of the crashes occurred under dark/dusk/dawn conditions with the remaining crashes 68% occurring during daylight hours. Twenty percent (20%) of the crashes occurred under wet/snowy conditions with the remaining crashes 80% occurring under dry/clear conditions.

## **Study Area**

The study area was then expanded to include several pedestrian zones in the approach areas along both Lakeview Avenue and Mammoth Road. This area has a high number of crosswalks and commercial driveways that are located within the approach areas to the intersection.

- *Area Total Crashes & Crash Rate.* One hundred (100) crashes were reported within the entire expanded study area for the five-year study period. The study area experienced a high percentage of injury type crashes on the approaches to the Lakeview Avenue and Mammoth Road intersection within an area of pedestrian activity and closely spaced crosswalks and commercial driveways.
- *HSIP Cluster.* The study area is not considered a Highway Safety Improvement Program (HSIP) crash cluster for the recent study period (2017-2019).
- *Crash Trends.* The reported crashes included 31 rear-end type collisions, 40 angle type collisions, 15 sideswipe type collisions, 4 head-on type collisions, and 9 single vehicle crashes. The majority of the crashes (79%) resulted in property damage type collisions. There were no reported fatalities. Two (2) pedestrian/bicycle related incidents were reported. The expanded study area crashes were shown to increase through the morning period with the majority 63% of the crashes occurring between 12:00 pm and 8:00 pm. The crash data also indicates that 31% of the crashes occurred under dark/dusk/dawn conditions with the remaining crashes 69% occurring during daylight hours. Twenty percent (21%) of the crashes occurred under wet/snowy conditions with the remaining crashes 79% occurring under dry/clear conditions.

## **Traffic Data**

The RSA team was provided information regarding peak hour traffic volumes for the study intersection as well as peak hour pedestrian and bicycle volumes. The traffic data also included daily traffic volumes along Lakeview Avenue. This information is provided in **Appendix D** with summary as follows:

- *Daily Traffic Volumes.* Daily Traffic on Lakeview Avenue to the west of the signalized intersection with Mammoth Road is approximately 12,616 vehicles per day (vpd) with approximately 10% of the daily traffic occurring during the peak hours, based on a 24-hour turning movement count (TMC) conducted on Thursday May 5, 2022. During the weekday morning peak hour, the peak directional flow is 54% eastbound toward Mammoth Road. During the evening peak hour, direction flow is 57% eastbound toward Mammoth Road.
- *Peak Hour Traffic Volumes.* Peak hour traffic flow through the intersection of Lakeview Avenue and Mammoth Road ranges from approximately 1,800 to 2,300 vehicles per hour (vph) during weekday morning and weekday evening peak hours, respectively.
- *Pedestrian and Bicycle Volumes.* Existing peak hour pedestrian and bicycle volumes at the signalized Lakeview Avenue at Mammoth Road intersection are limited but do exist with between 5 and 19 total pedestrians observed and less than 5 total bicycles observed during the peak hours. The weather on Thursday May 5, 2022 included clear skies and temperatures between 50 and 70 degrees during peak hours.

## Project Location and Description

As shown in **Figure 2**, this RSA focuses on the study area including the intersection of Lakeview Avenue and Mammoth Road. This intersection and area are not listed as a Highway Safety Improvement Program (HSIP) location, but it does experience a crash rate that are above average for signalized intersections in the region and is listed by NMCOG as number 65 out of the top 100 intersection in the region. A description of the roadways and study intersection is detailed below.

### Roadways

#### *Lakeview Avenue*

Lakeview Avenue is generally an east-west roadway under local jurisdiction within the study area. Lakeview Avenue is classified by the MassDOT as an Urban Minor Arterial roadway, and within the study areas it provides access to Route 113 to the east and Nashua Road to the west. Lakeview Avenue provides one travel lane in each direction within the study area with additional turn lanes provided at its major intersections. Sidewalks are provided along Lakeview Avenue at the Mammoth Road intersection except for a gap along the northern side of Lakeview Avenue just west of the traffic signal. The posted (regulatory) speed limit on Lakeview Avenue is 25 mph in both travel directions at its intersection with Mammoth Road. The speed limit increases to 35 mph to the east and west of Mammoth Road outside of the RSA area.

#### *Mammoth Road*

Mammoth Road is generally a north-south roadway under local jurisdiction within the study area. Mammoth Road is classified as an Urban Minor Arterial roadway, and it provides a connection between the New Hampshire state border to the north and the city of Lowell to the south. Mammoth Road provides a single travel lane in each direction within the study area with additional turn lanes provided at its intersection with Lakeview Avenue. Sidewalks are provided along the west side of Mammoth Road to the north of Lakeview Avenue and along the east side of Mammoth Road to the south of Lakeview Avenue. The posted (regulatory) speed limit on Mammoth Road is 25 mph in both travel directions.

### Intersection

#### *Lakeview Avenue at Mammoth Road*

Lakeview Avenue meets Mammoth Road to form a slightly skewed four-legged, signalized intersection under local jurisdiction. The eastbound Lakeview Avenue approach widens from a single travel lane with a short taper to provide an exclusive left turn lane, an exclusive through lane, and an exclusive right turn lane. The Lakeview Avenue westbound approach provides an exclusive left-turn lane, an exclusive through travel lane, and right turning vehicles are able to bypass the signal control by way of a single lane channelized by a large triangular shaped island. Traffic in this lane is under STOP sign control on its approach to Mammoth Road. The Mammoth Road southbound approach provides an exclusive left-turn lane and a shared through/right turn lane. The Mammoth Road northbound approach provides a single shared left/through/right travel lane. There are sidewalks provided at the intersection with signalized crosswalks across all four approaches. Land uses at the intersection include a Dracut Public School administration building, a small public park, a Dunkin' restaurant, and commercial/retail properties. While a full access/egress driveway for the Dunkin Donuts on the southwest corner is offset some 300 feet along Lakeview Avenue from the signalized intersection, another driveway, which primarily serves vehicles

exiting the drive-through, is offset only 140 feet from the intersection along Mammoth Road. Additionally, a recently constructed medical office building on the southeast corner has a driveway with an offset some 275 feet along Mammoth Road from the signalized intersection, however another enter/exit driveway is offset only 100 feet from the intersection along Lakeview Avenue.



Figure 2: Aerial – Lakeview Avenue at Mammoth Road

The traffic signal is operating in a pretimed mode with timing set for maximum recall on both the Lakeview Avenue and the Mammoth Road approaches. The intersection is equipped with emergency pre-emption in only the eastbound and westbound directions (Lakeview Avenue). The signal generally operates under a 3-phase operation plus an exclusive pedestrian phase when activated as shown in **Figure 3**.

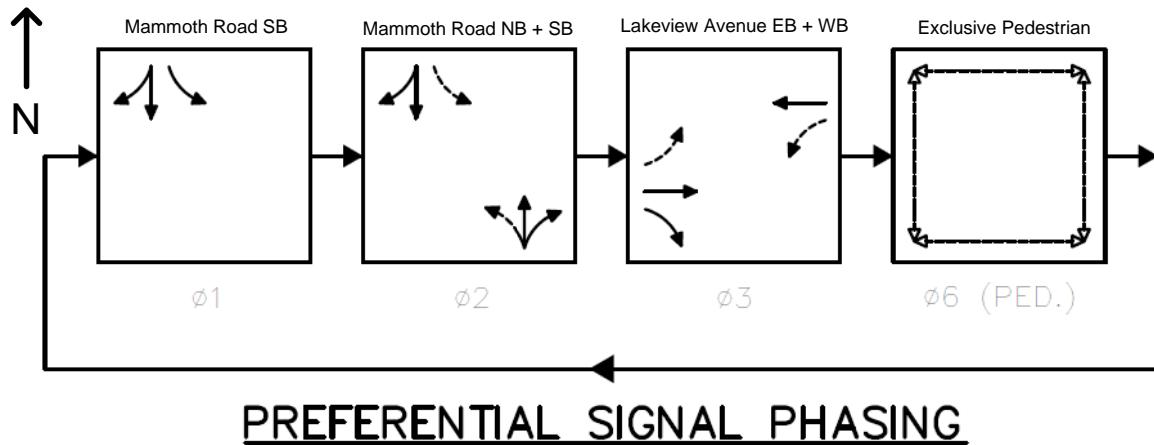


Figure 3: Phasing Sequence

The intersection operates with a cycle length of 101 seconds during all time periods with all phases ( $\emptyset 1$ ,  $\emptyset 2$  and  $\emptyset 3$ ) operating under max recall and the pedestrian phase ( $\emptyset 6$ ) as actuated by push button. The Mammoth Road southbound approach first operates with a brief left turn protected advance phase with a 3 second yellow and 2 second all red clearance times then, along with the northbound approach, operates with permitted left turns with a 4 second yellow and 2 second all red clearance times. The Lakeview Avenue phase ( $\emptyset 3$ ) provide permitted left turns and operates with 3 second yellow and 2 second all red clearance times. The traffic signal controller is located in the northeast corner of the intersection within the Costello Square grassed island.

## Audit Observations and Potential Safety Enhancements

The RSA team participated in a presentation that included information regarding the study location, which included existing traffic volumes, existing geometric conditions, existing travel speeds, collision diagrams, crash statistics, and photographs of the intersection including each approach. The RSA conducted on September 20, 2022, was an interactive process in which safety issues, observations and concerns were discussed for the intersection. The team members conducted a site visit to identify safety issues and areas for improvement. Following the site visit the team discussed observations following the RSA Prompt List. The team also discussed potential improvement measures for the various safety issues.

The subsequent sections of this report summarize the issues and potential improvements.

Based on field observations, the RSA team determined that the intersection of Lakeview Avenue and Mammoth Road has the following potential safety issues, which are described in detail in the following sections:

- 1 - Intersection Geometry and Travel Speeds
- 2 - Signage and Pavement Markings
- 3 - Traffic Signal and Intersection Operations
- 4 - Pedestrian and Bicycle Accommodations
- 5 - Lighting and Maintenance Items

The feasibility of implementing the improvements to address the various safety issues may require additional engineering and/or technical review.

### **Safety Issue #1: Intersection Geometry & Travel Speeds**

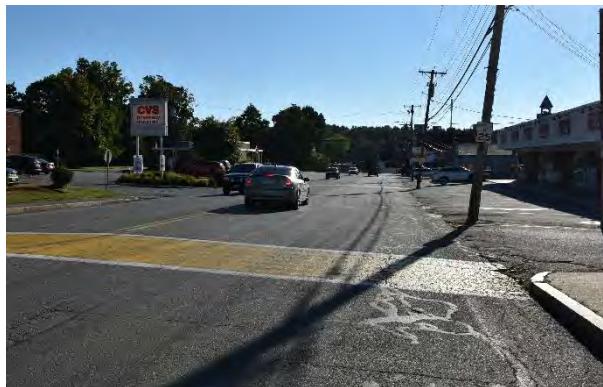
**Observations:** The RSA team noted that vehicles utilizing the westbound channelized road Brown's Lane to turn from Lakeview Avenue onto Mammoth Road northbound travel at high speeds and do not often stop at the stop sign prior to completing the movement. The expansive pavement width (between 25' and 30' wide) within the channelized lane results in drivers generally travelling faster than they otherwise would on a narrower lane. Additionally, visibility is partially obstructed by trees looking to the left when approaching Mammoth Road from the Brown's Lane stop bar. The high speeds and obstructed views resulted in five rear-end type crashes along Brown's Lane in the five-year study period.

It was noted that the short green time on the southbound protected phase for the Mammoth Road high volume left turn onto Lakeview Avenue movement often results in vehicles accelerating into the intersection to make the turn prior to the signal phase change. Northbound speeds along Mammoth Road approaching the intersection are well managed with a speed advisory sign while southbound travel speeds are typically well above the regulatory speed limit as noted by the RSA team.

Access to the commercial properties along the southern side of Lakeview Avenue to the east of Mammoth Road is provided via a single  $500\pm$  ft curb cut resulting in excessive pedestrian crossing distances along this section of Lakeview Avenue. The head in parking for the commercial properties utilizes the sidewalk areas along the southern side of the roadway creating many conflict points. Seven reported sideswipe crashes occurred due to vehicles attempting to pass vehicles utilizing the extensive curb cut to pull into these properties. The head in parking spaces require the use of Lakeview Avenue to back out resulting in two crashes during the study period. Additionally, large parking lots for the commercial properties on the north side of Lakeview Avenue were also observed to be used by the patrons of commercial properties on the south side creating several crossing points along a short section of Lakeview Avenue. Furthermore, extensive driveways, aprons, and parking spaces create impervious areas that all appear to currently drain into the public drainage system.

The location and abundance of curb cuts within the influence area of the signalized intersection of Lakeview at Mammoth Road creates conflict point resulting in a substantial number of crashes. The curb cut for the convenience store/gas station driveway to the north of the intersection is immediately adjacent to the Brown's Lane channelized right turn approach which is a high-volume movement from Lakeview Avenue westbound onto Mammoth Road northbound. The Dunkin' Donuts in the southern corner of the intersection has two driveways within the influence area of the intersection. Eleven crashes were reported during the study period due to vehicles pulling in and out of these driveways. There is also a right-in/right-out driveway with a utility pole located within its median for the office building located along Lakeview Avenue (1175 Mammoth Road) that is located less than 50 feet east of Mammoth Road. Vehicles travelling through the intersection may not anticipate a car slowing/stopped for the many driveways located in close proximity to a major intersection resulting in conflict points and crashes.

The RSA team also noted that the widths of travel lanes differ within the intersection, and that the approach lanes and departure lanes do not align. Drivers maneuvering through this intersection without knowledge of the misalignment in the travel lanes may result in sideswipe type collisions. The alignment of the lanes for vehicles travelling straight through eastbound or westbound on Lakeview Avenue partially line up with the opposing dedicated left-turn lanes. During the RSA field walk vehicles were observed to travel straight from a dedicated turn lane due to the poor alignment of the approach and departure lanes.



**Figure 4.** Lakeview Avenue looking east towards Mammoth Road. Wide turn lanes and nearby commercial curb cuts.



**Figure 5.** Lakeview Avenue eastbound approach. Significant difference in width between approach and departure lane. Worn pavement markings.

**Potential Enhancements:**

- Consider a mill and overlay for the intersection to improve the current surface condition.
- Consider full depth reconstruction on the southbound approach and other approaches to the intersection to enhance the subsurface roadway structure.
- Consider the closing/relocating/restricting of nearby commercial driveways adjacent to the intersection to reduce conflicts.
- Consider removing the head in parking spaces along Lakeview Avenue near the retail plaza, Dracut Hardware and old fire station properties to eliminate vehicles reversing directly onto a busy roadway.
- Consider shared parking for area uses with consolidated access.
- Provide a formalized sidewalk along the southern side of Lakeview Avenue to the east of Mammoth Road to improve pedestrian access/safety.
- Consider improvements to reduce impervious area and reduce runoff into the public drainage system.
- Consider the need for the Lakeview Avenue eastbound right turn lane at Mammoth Road and remove if unwarranted to enhance intersection geometry and reduce the pedestrian crossing lengths.
- Consider eliminating the Lakeview Avenue westbound channelized right turn lane (Brown's Lane) and bringing the right turn lanes into the primary intersection to provide an improved alignment. This may include modifying the westbound island to encourage lower speeds on Lakeview Avenue and/or Brown's Lane. This may require a change to the Costello Square green space.
- Consider narrowing the travel lanes on the eastern leg of Lakeview Avenue to reduce speeds and to enhance alignment between the eastbound approach lane and the eastbound departure lane.
- Consider geometric modifications to provide enhanced approach/departure alignment at the intersection.
- Evaluate adding speed advisory signage for the Mammoth Road southbound approach to the intersection.
- Evaluate and analyze alternative intersection geometries and traffic controls, including a roundabout.

## Safety Issue #2: Signage, Pavement Markings, & Signal Equipment

**Observations:** The signage at the intersection was field checked for visibility, reflectiveness, and adequate sign supports. Field observations indicate that the traffic signal indications do not appear to be LED and several signal heads need replacement in order to improve visibility. The RSA team also noted the older mast arms supporting the signals and the lack of back plates behind the traffic signal heads. In the eastbound direction, there are three approach lanes but only one overhead signal head and one post-mounted signal head, which may cause driver confusion.

Field observations indicate that the pavement markings on the approaches to the intersection are fairly worn down, especially the turn lane lines and arrows, as well as the crosswalk paint on the four approaches. Worn wheel tracks in the lanes also make visibility of these pavement markings more difficult where markings are provided.

The RSA team noted that nearby crosswalk and speed limit signs are attached to utility poles in the area, especially in the eastbound direction just east of the study intersection. This signage hangs a bit into the roadway and vehicles may potentially hit it. The crosswalk warning signs along Lakeview Avenue, which are rectangular signs with small yield and pedestrian symbols that would be difficult for vehicle operators to see, also need to be updated to match current MUTCD standard signs with advanced warning signs were applicable. Speed limit signs along other legs of the intersection, in order to describe the special speed regulation of 25 mph in the area, were not located in the field. Most notably Lakeview Avenue lacks speed limit signs to the west of the study intersection in both directions.

The RSA team noted that “No Turn on Red” signs are provided for the northbound and eastbound approaches and visible to other approaches, potentially being confusing to traffic on the southbound and westbound approaches which do not have said restriction. Lane control signage and advanced intersection lane control signage is generally not provided on the approaches to this intersection. This type of lane control signage would allow drivers identify appropriate lane placement prior to arriving at the intersection, avoiding last minute lane changes. Roadway surface replacement and updated pavement markings could then be provided to compliment the signs.



**Figure 6.** Worn pavement markings on Mammoth Road southbound approach to Lakeview Avenue. Including pavement rutting in southbound lanes.



**Figure 7.** Midblock crosswalk not connected to sidewalks on either side of Lakeview Avenue. A non-MUTCD compliant crosswalk warning sign.

**Potential Enhancements:**

- Consider refreshing worn pavement markings on the Mammoth Road and Lakeview Avenue approaches.
- Consider replacing older style mast arms with current mast arms to hold additional signal heads and hold the current ones higher over the road to increase visibility.
- Provide updated pedestrian signals with countdown style pedestrian heads, ADA compliant push buttons, and audible warning to improve pedestrian safety.
- Conduct a formal sign and signal reflectivity/visibility assessment and replace non-compliant or faded signs to improve visibility and reduce confusion.
- Consider adding dotted white lane extension lines as a temporary enhancement to alleviate driver confusion.
- Provide/repost missing 25 mph speed limit (R2-1 [25]) signs along Lakeview Avenue and Mammoth Road.

### Safety Issue #3: Traffic Signal & Intersection Operations

**Observations:** Field observations indicated that the traffic signals at the intersection are primarily hung from two mast arm poles located on the southeast corner and northwest corner of the intersection. Based on the traffic signal layout plan for the intersection and field review, the two eastbound signal heads do not provide enough information for the three eastbound approach lanes. Additionally, it was noted that it is difficult to see the traffic signal heads for the southbound through/right turn lane due to the skewed location and position of the pole.

The RSA team noted that Brown's Lane westbound right-turning vehicles onto Mammoth Road often times treat the approach as if it's a "Yield" instead of a "Stop" despite a Stop sign on each side of the Brown's Lane approach to Mammoth Road. Within the 5-year study period, there were 6 rear-end type collisions within the immediate area where Brown's Lane joins Mammoth Road, presumably occurring when one vehicle was stopped at the Stop sign while a car following assumed they might roll through.

Field observations indicated that southbound left turn lane gets a short, advanced phase ( $5\pm$  second green plus 5 second clearance). There is no signage or arrow signal indications designating the lead phase on the Mammoth Road southbound protected approach for the protected left turn lane. This lack of information can often lead to southbound vehicles making left turns in front of northbound through traffic advancing into the intersection. The short lead time can also encourage vehicle operators to speed in the southbound approach in order to make the light before northbound cars can begin to enter the intersection. This issue can be seen in the number of angle-type collisions between southbound and northbound travelling vehicles.

Field observations indicated that the intersection contains Emergency Preemption Opticom with a visible strobe indication located in central positions on the mast arms. The RSA team indicated that the Opticom system at the signal only operates in the eastbound/westbound directions. Specifically, it was noted that the traffic signal controller and equipment are not equipped to provide the Opticom for the northbound and southbound approaches, forcing emergency vehicles traveling along Mammoth Road to navigate the intersection in these directions using solely its siren and lights.



**Figure 8. Mammoth Road southbound approach signal heads do not have arrow indications for protected phase. Pedestrian push button in northeast corner of intersection needs updating to be accessible.**



**Figure 9. Lakeview Avenue eastbound approach provides only two signal heads for three travel lanes.**

**Potential Enhancements:**

- Evaluate the yellow and all red clearance times to ensure vehicles can clear the intersection safely.
- Consider installing auxiliary signal heads for improved visibility.
- Consider providing a green arrow and flashing yellow indication for the southbound protected and permitted left turn phases to reduce confusion about the southbound advance, as well as reduce conflicts with northbound through vehicles.
- Consider providing protected left turn phasing for the eastbound and westbound approaches with updated traffic signal heads and phasing as required to limit queues forming in the middle of the intersection.
- Consider implementing alternative phasing to reduce conflicts.
- Consider increasing the number of signal heads and aligning them with the designated travel lanes to reduce confusion and improve visibility.
- Consider signalizing the westbound channelized right turn approach to reduce conflicts.
- Evaluate the Opticom system to either fix it or add it to all four approaches, revise signal phasing priority if necessary.
- Consider updating the traffic signal controller, traffic signal controller cabinet and foundation to current standards.
- Consider installing yellow reflective back plates on all signal heads to improve visibility.

### Safety Issue #4: Pedestrian and Bicycle Accommodations

**Observations:** Field observations indicated that there are crosswalks across each approach at the study intersection, but the sidewalks along the approaches do not provide enough coverage to the potential destinations nearby. There is a small section of sidewalk provided along the northwest corner of the intersection that provides access to the Dracut School administration building at the corner of the study intersection, however any destination further to the north along Mammoth Road or west along Lakeview Avenue does not have access via sidewalk. Similarly, the sidewalk in the northeast corner of the intersection provides access to the green space within Costello Square (i.e., the channelized island between Lakeview Avenue and Brown's Lane), but further destinations, including crossing Brown's Lane, are not connected to this sidewalk. There are handicapped ramps provided at the four corners of the intersection and audible warnings are provided for pedestrians utilizing the crosswalk push button, but no tactile warning panels are included on the ramps. The RSA team also noted the push buttons on a few of the corners of the intersection need to be updated to be more accessible. Further to the east along Lakeview Avenue, multiple other crosswalks are provided in proximity to one another.

Additionally, there are currently no bicycle accommodations at the intersection or roadways (Lakeview Avenue and Mammoth Road). Given the lack of accommodations, the pedestrian and bicycle activity are relatively low; however, pedestrians and bicycles do navigate the intersection on a daily basis between the residential uses in the area and the local shops, parks, and the Dracut Schools located to the east along Lakeview Avenue. The RSA team noted an increase in pedestrian and bicycle activity corresponding with the local schools' release time in the 2:00 PM and 4:00 PM window. A review of the crash records indicates that one crash involving a pedestrian and one involving a bicyclist were reported within the RSA study area, but outside of the signalized intersection over the five-year study period. It was noted that pedestrians also walk along the west side of Mammoth Road to the south of the intersection on the grass shoulder, as evidenced by worn grass between the Dunkin' and the church to the south.



**Figure 10.** Older pedestrian signal heads do not provide a countdown timer on some corners of the intersection. Some push buttons need updating too.



**Figure 11.** Sidewalk on west side of Mammoth Road ends abruptly in both the north and south directions. Worn down grass shows high volume of pedestrian activity.

The RSA team noted that branches from the trees in front of the Dunkin' along the Lakeview Avenue sidewalk hung low enough to block pedestrians or to force them to duck under or walk around. This is potentially unsafe if pedestrians decide to step into the roadway to avoid the branches.

The Town of Dracut has emphasized their prioritization of a Complete Streets program in town, so any potential redesign of this intersection should consider future updates with Complete Streets in mind. The Town currently does not have a set town-wide sidewalk connectivity plan.

**Potential Enhancements:**

- Consider providing curb ramps and crosswalks within the intersection and along Lakeview Avenue and Mammoth Road to improve pedestrian safety.
- Consider providing ADA compliant sidewalk sections for missing segments.
- Provide detectable warning panels at all crosswalks along the study area.
- Study pedestrian desire lines in the area to evaluate if the mid-block crossings can be consolidated or need to be relocated to help pedestrians cross the street.
- Consider installing accessible curb ramps and markings across the Brown's Lane segment to improve pedestrian safety.
- Consider installing bicycle facilities through the area to provide safe accommodation to bicyclists.
- Landscaping and tree branches currently overhang sidewalks within the area of the intersection, especially along Lakeview Avenue in front of the Dunkin'. Provide maintenance to the encroaching landscaping to restore the lowered effective width of the sidewalk.
- Consider the development of a town-wide sidewalk and bike lane network plan to improve safe walkability/bike-ability across the town.

### Safety Issue #5: Light and Maintenance Items

**Observations:** The RSA team noted that approximately 40% of the crashes at the intersection occurred outside of daylight hour under dusk or dark roadway conditions. Field observations indicated that lighting of the intersection is limited to two streetlights, one on the northwest corner of the intersection and one in the southeast corner. The adjacent land uses have parking lot/driveway lighting nearby, but the intersection may not have adequate lighting on its own. The RSA team noted a recent crash had broken a streetlight near the southeast corner of the intersection at the right-in/right-out office driveway on Lakeview Avenue.

The RSA team also noted the pavement condition of both the Lakeview Avenue and Mammoth Road approaches to the study intersection. According to MassDOT's grading scale of pavement condition, both roads are approximately average in the study area. Pavement rutting has been experienced at this intersection, specifically noticeable in the southbound left turn lane, even after repair efforts took place.

Drainage at the intersection was noted to be an issue in wet/snow weather conditions. Notably in the northwest corner of the intersection there are no catch basins, oftentimes forcing water in that corner to pool up or even drain into the existing utility manhole. Issues with the underground equipment beneath the manholes results in utility vehicles parking in the intersection to manage this equipment, causing potential conflicts with other vehicles.



**Figure 12. Streetlight on Lakeview Avenue just east of intersection not repaired after recent crash took it down.**



**Figure 13. Lack of drainage options at a low point in the northwest corner of the intersection.**

### Potential Enhancements:

- Evaluate lighting within the intersection and fix broken lighting fixtures.
- Provide additional lighting if required to improve nighttime visibility.
- Evaluate pavement condition within the intersection and potential solutions to pavement rutting issues, especially along Mammoth Road.
- Provide catch basin maintenance to remove debris.
- Evaluate and include a full drainage design with any future changes to the intersection.
- Work with the utility companies to relocate or secure underground utilities. Issues with the underground equipment results in utility vehicles parking in the intersection, causing potential conflicts with other vehicles.

## Summary of Road Safety Audit

The RSA is intended to identify potential safety improvements that can be further evaluated and scheduled for implementation by the appropriate agency. After discussing the various safety deficiencies observed within the study area, participants discussed potential safety enhancements. Each enhancement considered has been categorized as short-term, mid-term, or long-term based on the definitions shown in Table 2. Additionally, a cost category has been assigned to each improvement based on the parameters set forth in Table 2.

**Table 2: Estimated Time Frame and Costs Breakdown**

Time Frame		Costs	
Short-Term	<1 Year	Low	<\$10,000
Mid-Term	1-3 Years	Medium	\$10,001-\$50,000
Long-Term	>3 Years	High	>\$50,000

A summary of the potential recommendations discussed by the RSA audit team are summarized in Table 3. The recommendations are summarized based on the potential safety payoff, time frame, approximate cost and jurisdiction. The safety payoff is based on engineering judgment of the potential effectiveness of the safety recommendations listed below.

Table 3: Potential Safety Enhancement Summary  
 Lakeview Avenue at Mammoth Road

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
1. Intersection Geometry & Travel Speeds	Consider the closing/relocating/restriction of commercial driveways adjacent to the intersection to reduce conflicts.	High	Long-Term	High	Town/Land Owners
	Consider removing the head in parking spaces along Lakeview Avenue near the retail plaza, Dracut Hardware and old fire station properties to eliminate vehicles reversing directly onto a busy roadway.	High	Long-Term	High	Town/Land Owners
	Consider shared parking for area uses with consolidated access.	Low	Long-Term	High	Town
	Provide a formalized sidewalk along the southern side of Lakeview Avenue to the east of Mammoth Road.	High	Long-Term	High	Town
	Consider improvements to reduce impervious area and reduce runoff into the public drainage system.	Medium	Mid-Term	High	Town
	Consider the need for the eastbound right turn lane and remove if unwarranted to enhance intersection geometry and reduce the pedestrian crossing lengths.	Medium	Mid-Term	High	Town
	Consider eliminating the channelized right turn lane and bringing the right turn lane into the primary intersection to provide an improved alignment. This may include modifying the westbound island to encourage lower speeds on Lakeview Avenue and/or Brown's Lane. This may require a change to the "Park" space.	High	Long-Term	High	Town
	Consider narrowing the travel lanes on the eastern leg of Lakeview Avenue to reduce speeds and to enhance alignment between the eastbound approach lane and the eastbound departure lane.	Medium	Long-Term	High	Town
	Consider geometric modifications to provide enhanced approach/departure alignment at the intersection.	High	Long-Term	High	Town
	Evaluate adding speed advisory signage to the north of the intersection for southbound vehicle operators on Mammoth Road.	Medium	Short-Term	Low	Town

Table 3 (Continued): Potential Safety Enhancement Summary  
 Lakeview Avenue at Mammoth Road

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
1. Intersection Geometry & Travel Speeds (cont.)	Consider a mill and overlay for the intersection.	Medium	Mid-Term	High	Town
	Consider full depth reconstruction on the southbound approach and other approaches to the intersection to enhance the subsurface roadway structure.	Medium	Mid-Term	High	Town
	Evaluate and analyze alternative intersection geometries and traffic controls, including a roundabout.	High	Long-Term	High	Town
2. Signage, Pavement Markings & Signal Equipment	Consider refreshing worn pavement markings on the Mammoth Road and Lakeview Avenue approaches.	Medium	Short-Term	Low	Town
	Consider replacing older style mast arms with current mast arms to hold additional signal heads and hold the current ones higher over the road to increase visibility.	Low	Long-Term	High	Town
	Provide updated pedestrian signals with countdown style pedestrian heads, ADA compliant push buttons, and audible warning to improve pedestrian safety.	Medium	Mid-Term	Medium	Town
	Conduct a formal sign and signal reflectivity/visibility assessment and replace non-compliant signs to improve visibility and reduce confusion.	Low	Mid-Term	Medium	Town
	Consider adding dotted white lane extension lines as a temporary enhancement to alleviate driver confusion.	Medium	Short-Term	Low	Town
	Provide/repost missing 25 mph speed limit (R2-1 [25]) signs along Lakeview Avenue and Mammoth Road.	Low	Short-Term	Low	Town

Table 3 (Continued): Potential Safety Enhancement Summary  
 Lakeview Avenue at Mammoth Road

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
3. Traffic Signal & Intersection Operations	Evaluate the yellow and all red clearance times to ensure vehicles can clear the intersection safely.	Low	Short-Term	Low	Town
	Consider installing auxiliary signal heads for improved visibility.	Medium	Mid-Term	Medium	Town
	Consider providing a green arrow and flashing yellow indication for the southbound protected and permitted left turn phases to reduce confusion about the southbound advance, as well as reduce conflicts with northbound through vehicles.	High	Short-Term	Medium	Town
	Consider providing protected left turn phasing for the eastbound and westbound approaches with updated traffic signal heads and phasing as required to limit queues forming in the middle of the intersection.	Medium	Mid-Term	Medium	Town
	Consider implementing an alternative phasing to reduce conflicts.	Medium	Mid-Term	Medium	Town
	Consider increasing the number of signal heads and aligning them with the designated travel lanes to improve visibility.	Medium	Mid-Term	High	Town
	Consider signalizing the westbound channelized right turn approach to reduce conflicts.	Medium	Mid-Term	High	Town
	Evaluate the Opticom system to either fix it or add it to all four approaches, revise signal phasing priority if necessary.	Low	Mid-Term	Low	Town
	Consider updating the traffic signal controller, traffic signal controller cabinet and foundation to current standards.	Low	Mid-Term	Medium	Town
	Consider installing yellow reflective back plates on all signal heads to improve visibility.	Low	Short-Term	Low	Town

Table 3 (Continued): Potential Safety Enhancement Summary  
 Lakeview Avenue at Mammoth Road

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
4. Pedestrian and Bicycle Accommodations	Consider providing curb ramps and crosswalks within the intersection and along Lakeview Avenue and Mammoth Road.	Low	Long-Term	High	Town
	Consider providing ADA compliant sidewalk sections for missing segments.	Low	Long-Term	High	Town
	Provide detectable warning panels at all crosswalks along the study area.	Low	Long-Term	Low	Town
	Study pedestrian desire lines in the area to evaluate if the mid-block crossings can be consolidated or need to be relocated to help pedestrians cross the street.	High	Long-Term	Medium	Town
	Consider installing accessible curb ramps and markings across the Brown's Lane segment to improve pedestrian safety.	Low	Long-Term	Medium	Town
	Consider installing bicycle facilities through the area to provide safe accommodation to bicyclists.	High	Long-Term	High	Town
	Landscaping and tree branches currently overhang sidewalks within the area of the intersection, especially along Lakeview Avenue in front of the Dunkin'. Provide maintenance to the encroaching landscaping to restore the lowered effective width of the sidewalk.	Low	Short-Term	Low	Town
	Consider the development of a town-wide sidewalk and bike lane network plan to improve safe walkability/bike-ability across the town.	High	Long-Term	Medium	Town

Table 3 (Continued): Potential Safety Enhancement Summary  
Lakeview Avenue at Mammoth Road

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
5. Lighting and Maintenance Items	Evaluate lighting within the intersection and fix broken lighting fixtures.	High	Short-Term	High	Town
	Provide additional lighting if required to improve nighttime visibility.	High	Long-Term	High	Town
	Evaluate pavement condition within the intersection and potential solutions to pavement rutting issues, especially along Mammoth Road.	Medium	Long-Term	High	Town
	Provide catch basin maintenance to remove debris.	Medium	Short-Term	Low	Town
	Evaluate and include a full drainage design with any future changes to the intersection.	Low	Long-Term	High	Town
	Work with the utility companies to relocate or secure underground utilities. Issues with the underground equipment results in utility vehicles parking in the intersection, causing potential conflicts with other vehicles.	Low	Long-Term	High	Town

## Appendix A. RSA Meeting Agenda

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# Agenda

## Road Safety Audit Dracut, MA

MEETING LOCATION: Dracut Public Schools  
Eldridge Administration Building  
2063 Lakeview Avenue  
Dracut, MA 01826

DATE: September 20, 2022  
TIME: 9:30 AM – 12:00 PM

Type of meeting: **Road Safety Audit – Lakeview Avenue at Mammoth Road**

Attendees: **Invited Participants to Comprise a Multidisciplinary Team**

**9:30 AM** **Welcome and Introductions**

**9:35 AM** **Review of Site-Specific Material**

- Crash Data, Collision Diagrams & Traffic Volumes - provided in advance
- Existing Geometries and Conditions – Aerial Orthophoto and Google Street Views
- As a group, identify safety issues and areas for improvement pre-site walk

**10:15 AM** **Site Visit**

- Tour of the Lakeview Avenue at Mammoth Road intersection and surrounding area
- As a group, identify safety issues and areas for improvement

**11:00 AM** **Post Visit Discussion / Recommendations**

- Discuss observations and finalize safety issue areas
- Discuss potential improvements and finalize recommendations

**12:00 PM** **Adjourn for the Day – but the RSA has not ended**

### Instructions for Participants:

- Before attending the RSA on September 20, 2022, participants are encouraged to drive through the intersection and complete/consider elements on the RSA Prompt List with a focus on safety.
- All participants will be actively involved in the process throughout. Participants are encouraged to come with thoughts and ideas but are reminded that the synergy that develops and respect for others' opinions are key elements to the success of the overall RSA process.
- After the RSA meeting, participants will be asked to comment and respond to the document materials to assure it is reflective of the RSA completed by the multidisciplinary team.

## Appendix B. RSA Audit Team Contact List

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**MAMMOTH ROAD/LAKEVIEW AVENUE ROAD SAFETY AUDIT  
PARTICIPATING AUDIT TEAM MEMBERS**

Date: Tuesday, September 20, 2022 at 9:30 AM

Location: Dracut Public Schools Eldridge Administration Building  
2063 Lakeview Ave, Dracut, MA 01826

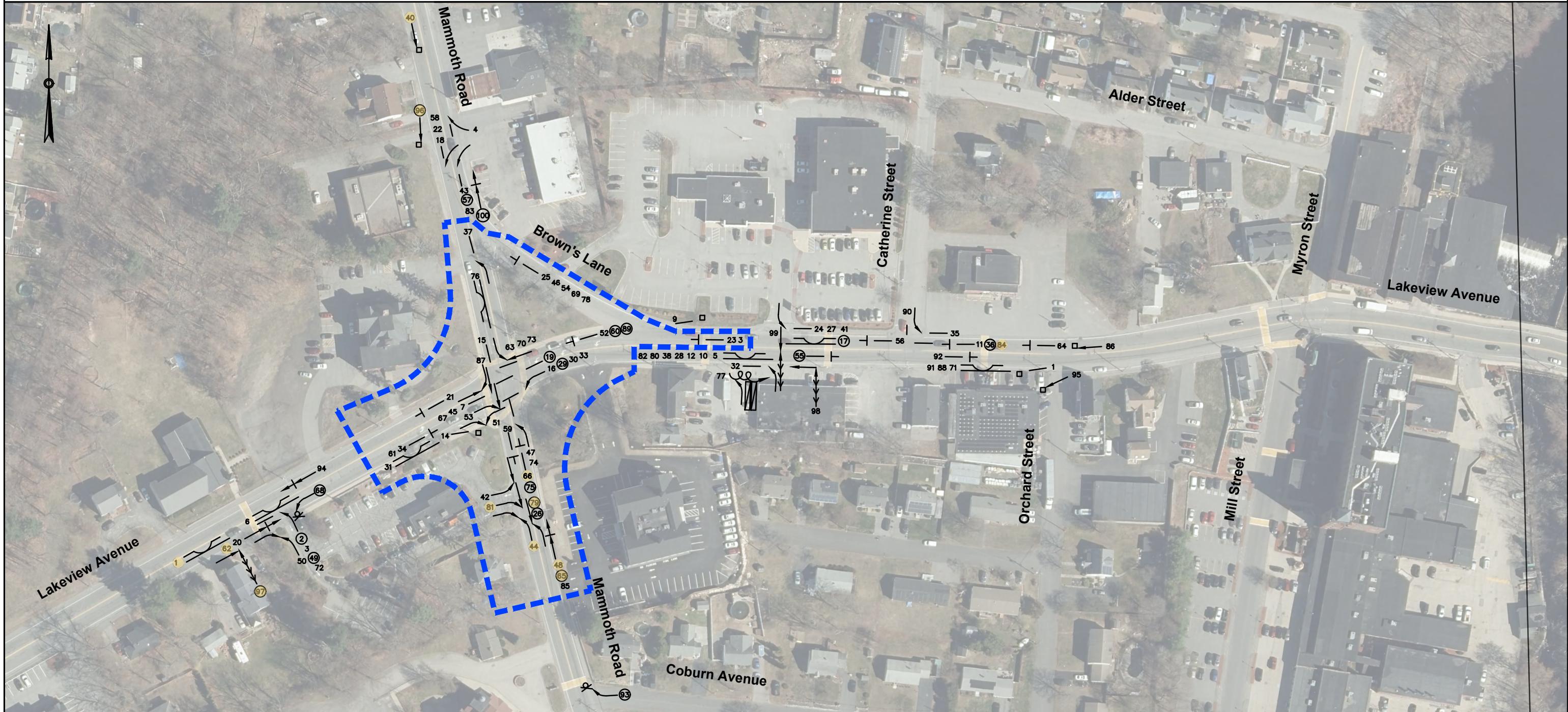
Name (Please Print)	Agency/Affiliation	Email
Cynthia Curtis	Dracut Schools	<a href="mailto:ccurtis@dracutps.org">ccurtis@dracutps.org</a>
Michelle Deng	MassDOT Traffic Safety	<a href="mailto:Michelle.deng@state.ma.us">Michelle.deng@state.ma.us</a>
Steven Stone	Dracut Schools	<a href="mailto:sstone@dracutps.org">sstone@dracutps.org</a>
Rich Patterson	Dracut Fire	<a href="mailto:rpatterson@dracutma.gov">rpatterson@dracutma.gov</a>
Abiola Asaka	MassDOT D4 Traffic	<a href="mailto:abiola.ajaka@state.ma.us">abiola.ajaka@state.ma.us</a>
Mark Hamel	Town of Dracut	<a href="mailto:mhamel@dracutma.gov">mhamel@dracutma.gov</a>
Andrew Graham	Dracut Schools	<a href="mailto:agraham@dracutps.org">agraham@dracutps.org</a>
David Tilton	Northern Middlesex Council Government	<a href="mailto:Dtilton@nmcoag.org">Dtilton@nmcoag.org</a>
Jim Terlizzi	MassDOT Traffic Safety	<a href="mailto:James.v.terlizzi@dot.state.ma.us">James.v.terlizzi@dot.state.ma.us</a>
Sara Timoner	MassDOT D4 Traffic	<a href="mailto:Sara.timoner@dot.state.ma.us">Sara.timoner@dot.state.ma.us</a>
Tina Rivard	Dracut DPW	<a href="mailto:trivard@dracutma.gov">trivard@dracutma.gov</a>
Marguerite Hoover	Dracut Engineering	<a href="mailto:mhoover@dracutma.gov">mhoover@dracutma.gov</a>
David Chartrand	Dracut Police	<a href="mailto:dchartrand@dracutma.gov">dchartrand@dracutma.gov</a>
Alison Manugian	Town of Dracut	<a href="mailto:amanugian@dracutma.gov">amanugian@dracutma.gov</a>
Dan Mills	MDM Transportation Consultants, Inc.	<a href="mailto:dmills@mdmtrans.com">dmills@mdmtrans.com</a>
Jack Lawrence	MDM Transportation Consultants, Inc.	<a href="mailto:jlawrence@mdmtrans.com">jlawrence@mdmtrans.com</a>
Dan Dumais	MDM Transportation Consultants, Inc.	<a href="mailto:ddumais@mdmtrans.com">ddumais@mdmtrans.com</a>

## Appendix C. Detailed Crash Data

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# COLLISION DIAGRAM

STUDY AREA Mammoth Road and Lakeview Street  
 PERIOD 2017-2021 FROM January 2017 TO December 2021  
 CITY Dracut PREPARED BY GRD



TOTAL AREA CRASHES

79 VEHICLE D = ONLY

21 INJURY OR T-

100 TOT- V- H- S

COR- INT- RS- CTION CRASHES

37 VEHICLE D = ONLY

8 INJURY OR T-

45 TOT- V- H- S

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CRASH SUMMARY – DRACUT – LAKEVIEW AVENUE @ MAMMOTH STREET – TOTAL AREA CRASHES  
JANUARY 2017 THROUGH DECEMBER 2021

Crash Number	Date	Crash Time	Collision Type	Roadway Lighting	Weather Condition	Roadway Condition	Severity	Driver Contribution Code	D1 Age	D2 Age	D3 Age	D4 Age	Comments
1	Friday, January 13, 2017	23:45	Single vehicle crash	Dark - lighted roadway	Clear	Dry	Property damage only (none injured)	D1: (Fatigued/asleep)	37				V1 was traveling westbound on Lakeview Avenue when the operator fell asleep, crossed centerline, and collided with the Dracut Hardware sign.
2	Wednesday, January 18, 2017	17:10	Angle	Dark - lighted roadway	Rain	Wet	Non-fatal injury	D1: (Unknown) / D2: (Unknown)	47	53			V1 was traveling eastbound on Lakeview Avenue when it collided with V2, which was turning left out of the Dunkin' parking lot.
3	Friday, February 10, 2017	13:36	Angle	Daylight	Clear/Clear	Snow	Property damage only (none injured)	D1: (Failure to keep in proper lane or running off road)	Unknown	24			V1 was traveling eastbound on Lakeview Avenue when it went around another vehicle that had stopped to allow V2 to turn left out of the Dunkin' parking lot and V1 hit V2.
4	Tuesday, March 21, 2017	17:20	Angle	Daylight	Clear	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (Failed to yield right of way)	50	63			V1 was traveling northbound on Mammoth Road when V2 was turning right onto Mammoth Road and failed to yield the right of way and hit V1.
5	Saturday, April 1, 2017	16:12	Sideswipe, same direction	Daylight	Snow/Cloudy	Wet	Property damage only (none injured)	D1: (Unknown) / D2: (Other improper action)	63	42			V1 and V2 were traveling eastbound on Lakeview Avenue when V2 turned right without a blinker, causing V1 to crash into V2.
6	Monday, June 12, 2017	7:20	Sideswipe, same direction Angle	Daylight	Clear/Clear	Dry	Property damage only (none injured)	D1: (Disregarded traffic signs, signals, road markings) / D2: (No improper driving),(No improper driving)	38	42			V1 and V2 were traveling eastbound on Lakeview Avenue when V2 turned right without a blinker, causing V2 to crash into V1.
7	Tuesday, June 27, 2017	8:01	Angle	Daylight	Clear	Dry	Property damage only (none injured)	D1: (Disregarded traffic signs, signals, road markings) / D2: (No improper driving)	33	62			V1 was traveling southbound on Mammoth Road and ran a red light causing V2, who was traveling eastbound on Lakeview Avenue to strike V1's trailer.
8	Monday, August 7, 2017	13:10	Angle	Daylight	Clear	Dry	Property damage only (none injured)	D1: (Unknown) / D2: (No improper driving)	44	66			V1 was attempting to turn right onto Lakeview Avenue from Catherine Street, but failed to yield the right of way and collided with V1, which was traveling westbound on Lakeview Avenue.
9	Tuesday, August 15, 2017	14:54	Single vehicle crash	Daylight	Cloudy/Cloudy	Dry	Property damage only (none injured)	D1: (Fatigued/asleep)	46				V1 was traveling eastbound on Lakeview Avenue when operator fell asleep, crossed centerline, and jumped the curb into the bank parking lot.
10	Thursday, August 17, 2017	14:24	Sideswipe, same direction	Daylight	Clear	Dry	Property damage only (none injured)	D1: (Failure to keep in proper lane or running off road) / D2: (No improper driving)	32	25			V1 and V2 were traveling eastbound on Lakeview Avenue when V1 struck V2 while V2 was trying to turn right.
11	Monday, September 25, 2017	19:37	Rear-end	Daylight	Clear	Not reported	Not Reported		Unknown				V1 and V2 were involved in a rear-end on Lakeview Avenue.
12	Sunday, October 1, 2017	19:04	Sideswipe, same direction	Daylight	Clear	Dry	Property damage only (none injured)	D1: (No improper driving)	34				V1 was traveling eastbound on Lakeview Avenue when it attempted to turn right and V2 attempted to go around and crashed into V1.
13	Friday, October 6, 2017	21:05	Sideswipe, same direction	Dark - lighted roadway	Clear	Dry	Property damage only (none injured)	D1: (Made an improper turn),(Failure to keep in proper lane or running off road) / D2: (No improper driving)	26	47			V1 and V2 were traveling eastbound on Lakeview Avenue when V1 struck V2 while V2 was trying to turn right.
14	Wednesday, October 25, 2017	7:31	Single vehicle crash	Daylight	Rain	Wet	Property damage only (none injured)	D1: (Visibility obstructed)	74				V1 was turning right onto Mammoth Road from Lakeview Avenue eastbound when the driver's view was obstructed and they crashed into a traffic light post.
15	Wednesday, October 25, 2017	19:05	Angle	Dark - lighted roadway	Rain/Cloudy	Wet	Property damage only (none injured)	D1: (No improper driving) / D2: (No improper driving)	48	58			V1 was traveling southbound on Mammoth Road and V2 was traveling westbound on Lakeview Avenue when one operator ran a red light and the vehicles collided.
16	Wednesday, October 25, 2017	22:29	Angle	Dark - lighted roadway	Rain/Cloudy	Wet	Property damage only (none injured)	D1: (No improper driving) / D2: (No improper driving),(No improper driving)	56	27			V1 was traveling eastbound on Lakeview Avenue when V2 was traveling westbound on Lakeview Avenue and turned left onto Mammoth Road and the two cars collided.
17	Saturday, October 28, 2017	15:11	Sideswipe, same direction-Not reported	Daylight	Clear	Dry	Non-fatal injury	D1: (Failure to keep in proper lane or running off road),(Made an improper turn) / D2: (No improper driving)	49	32			V1 (moped) attempted to overtake V2 while it was turning right while traveling on Lakeview Avenue westbound.
18	Wednesday, November 22, 2017	16:11	Angle Single-vehicle-crash	Dusk	Rain	Wet	Property damage only (none injured)	D1:(Failed to yield right of way),(Unknown) D2:(No improper driving)	16	26			V1 was turning left onto Mammoth Road when it failed to yield to the right of way and crashed into V2, which was traveling southbound on Mammoth Road.
19	Saturday, December 16, 2017	23:14	Head-on	Dark - lighted roadway	Clear/Clear	Dry	Non-fatal injury	D1: (No improper driving) / D2: (Operating vehicle in erratic, reckless, careless, negligent or aggressive manner)	48	49			V1 was traveling eastbound on Lakeview Avenue and V2 was traveling westbound when V2 failed to yield the right of way and turned left into V1.
20	Thursday, December 21, 2017	12:32	Rear-end	Daylight	Clear/Cloudy	Dry	Property damage only (none injured)	D1: (Followed too closely) / D2: (No improper driving)	72	65			V1 and V2 were traveling eastbound on Lakeview Avenue when V2 slowed to turn right into the Dunkin' parking lot and V1 failed to slow and rear-ended V2.
21	Monday, January 15, 2018	20:41	Rear-end	Dark - lighted roadway	Clear	Dry	Property damage only (none injured)		28	Unknown			V1 and V2 were traveling westbound on Lakeview Avenue when V1 rear-ended V2.
22	Tuesday, January 23, 2018	19:11	Angle	Dark - lighted roadway	Sleet, hail (freezing rain or drizzle)	Ice	Property damage only (none injured)	D1: (Failed to yield right of way),(Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway, etc) / D2: (No improper driving)	47	35			Roadways were slippery due to inclement weather when V1 was turning left onto Mammoth Road when it failed to yield the right of way and crashed into V2, which was traveling southbound on Mammoth Road.
23	Thursday, February 1, 2018	16:48	Rear-end	Daylight	Cloudy	Dry	Property damage only (none injured)	D1: (Inattention)	57				V1 and V2 were traveling westbound on Lakeview Avenue when V1 rear-ended V2.
24	Monday, February 12, 2018	15:49	Angle	Daylight	Clear	Dry	Property damage only (none injured)	D1: (Unknown) / D2: (Failed to yield right of way)	25	83			V1 was traveling westbound on Lakeview Avenue and V2 was turning left onto Lakeview Avenue and failed to yield the right of way and was struck by V1.
25	Wednesday, April 11, 2018	14:14	Rear-end	Daylight	Clear/Cloudy	Dry	Property damage only (none injured)	D1: (Inattention),(Followed too closely) / D2: (No improper driving),(No improper driving)	39	40			V1 and V2 were traveling westbound on Brown's Lane when V1 rear-ended V2.
26	Friday, April 13, 2018	13:19	Angle	Daylight	Clear	Dry	Non-fatal injury	D1: (Failed to yield right of way) / D2: (No improper driving)	72	58			V1 was traveling northbound on Mammoth Road and turned left into the Dunkin's parking lot and was struck by V2 (motorcycle), which was traveling southbound on Mammoth Road.
27	Wednesday, April 25, 2018	18:08	Angle Not-reported	Daylight	Rain	Wet	Property damage only (none injured)	D1: (Failed to yield right of way) / D2: (No improper driving)	18	50			V1 was traveling westbound on Lakeview Avenue and failed to yield the right of way and struck by V1.
28	Friday, May 11, 2018	19:29	Sideswipe, same direction Angle	Daylight	Clear	Dry	Property damage only (none injured)	D1: (Unknown) / D2: (No improper driving)	46	16			V1 and V2 (motorcycle) were traveling eastbound on Lakeview Avenue when V2 struck V1 while V1 was trying to turn right.
29	Thursday, May 17, 2018	11:57	Angle	Daylight	Cloudy/Clear	Dry	Non-fatal injury	D1: (Failed to yield right of way),(Unknown) / D2: (Unknown),(No improper driving)	76	91			V1 was traveling eastbound on Lakeview Avenue when V2 was traveling westbound on Lakeview Avenue and turned left onto Mammoth Road and the two cars collided.
30	Monday, May 28, 2018	21:44	Angle	Dark - lighted roadway	Clear	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (No improper driving)	23	25			V1 was traveling eastbound on Lakeview Avenue when V2 was traveling westbound on Lakeview Avenue and turned left onto Mammoth Road and the two cars collided.
31	Thursday, May 31, 2018	5:59	Sideswipe, same direction Not-reported	Daylight	Clear	Dry	Property damage only (none injured)	D1: (Glare)	59	53			V1 was traveling eastbound on Lakeview Avenue when the sun glare caused them to crash into V2's trailer, which was in the eastbound right turn lane.
32	Saturday, June 30, 2018	14:23	Angle Single-vehicle-crash	Daylight	Clear/Clear	Dry	Property damage only (none injured)	D1: (Unknown),(Unknown) / D2: (No improper driving),(No improper driving)	53	18			V1 was traveling left onto Lakeview Avenue westbound from a parking lot when V2, traveling eastbound on Lakeview Avenue, crashed into V1.
33	Friday, July 20, 2018	7:54	Angle Not-reported	Daylight	Clear	Dry	Property damage only (none injured)	D1: (Failed to yield right of way) / D2: (Unknown)	31	21			V1 was traveling westbound on Lakeview Avenue and attempted to turn left onto Mammoth Road when V2 was traveling eastbound on Lakeview Avenue and the two cars collided.
34	Saturday, July 28, 2018	16:15	Rear-end	Daylight	Clear	Dry	Property damage only (none injured)	D1: (Unknown) / D2: (Unknown)	42	18			V1 and V2 were involved in a rear-end on Lakeview Avenue eastbound at the Mammoth Road intersection.
35	Tuesday, August 14, 2018	14:05	Angle	Daylight	Rain	Wet	Property damage only (none injured)	D1: (Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway, etc)	21	19			V1 was attempting to turn left onto Lakeview Avenue from Catherine Street and veered into V2, which was traveling westbound on Lakeview Avenue, due to heavy rain.
36	Sunday, August 19, 2018	16:46	Rear-end	Daylight	Clear	Dry	Non-fatal injury	D1: (No improper driving) / D2: (No improper driving)	24	21			V1 and V2 (motorcycle) were traveling westbound on Lakeview Avenue when V1 stopped suddenly, causing V2 to rear-end V1.
37	Tuesday, September 25, 2018	10:06	Angle	Daylight	Rain	Wet	Property damage only (none injured)	D1: (No improper driving) / D2: (Failed to yield right of way)	29	41			V1 was traveling southbound on Mammoth Road when it was struck by V2, which was traveling northbound on Mammoth Road, as it was attempting to turn left into a parking lot.
38	Wednesday, September 26, 2018	20:27	Sideswipe, same direction Not-reported	Dark - lighted roadway	Clear	Dry	Property damage only (none injured)	D1: (Failed to yield right of way) / D2: (No improper driving)	20	45			V1 and V2 were traveling eastbound on Lakeview Avenue when V1 struck V2 while V2 was trying to turn right.

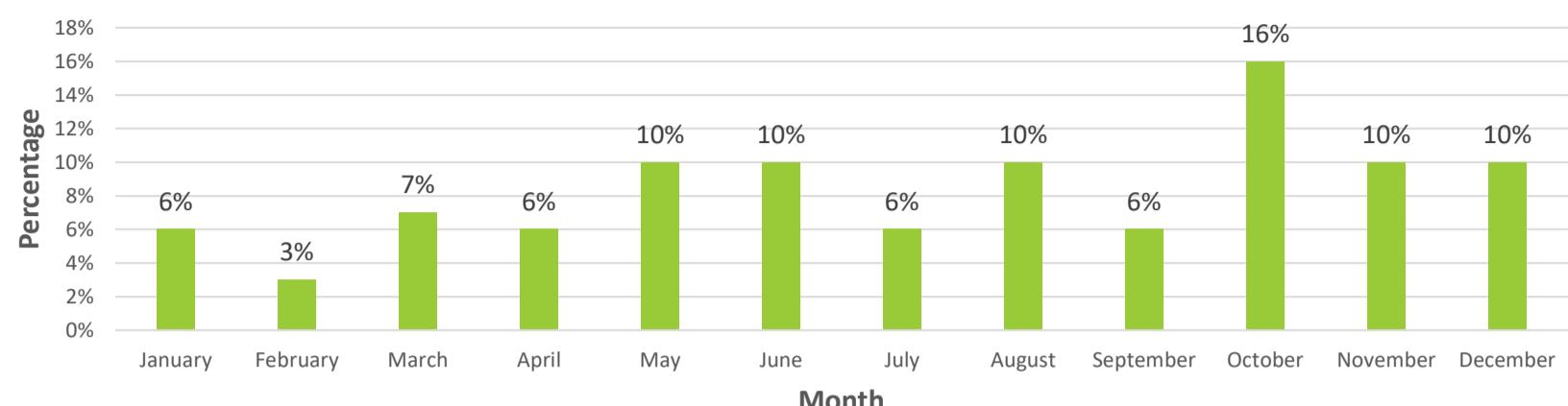
CRASH SUMMARY – DRACUT – LAKEVIEW AVENUE @ MAMMOTH STREET – TOTAL AREA CRASHES  
JANUARY 2017 THROUGH DECEMBER 2021

Crash Number	Date	Crash Time	Collision Type	Roadway Lighting	Weather Condition	Roadway Condition	Severity	Driver Contribution Code	D1 Age	D2 Age	D3 Age	D4 Age	Comments
39	Monday, October 1, 2018	11:30	Rear-end	Daylight	Clear	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (Followed too closely)	43	20			V1 and V2 were traveling on Lakeview Avenue when V1 slowed to a stop and V2 rear-ended V1.
40	Tuesday, October 2, 2018	5:42	Single vehicle crash (collision with dog)	Dusk	Rain	Wet	Property damage only (none injured)	D1: (No improper driving)	37				V1 was traveling southbound on Mammoth Road when a dog wandered onto the road and V1 hit it.
41	Thursday, October 18, 2018	15:43	Angle Not reported	Daylight	Clear	Dry	Property damage only (none injured)	D1: (Failed to yield right of way) / D2: (No improper driving)	64	35			V1 was turning left onto Lakeview Avenue eastbound from a parking lot when V2, traveling westbound on Lakeview Avenue, crashed into V1.
42	Friday, October 19, 2018	17:21	Angle	Daylight	Clear	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (Failed to yield right of way)	20	16			V1 was turning left onto Mammoth Road from the Dunkin' parking lot and V2 was traveling southbound on Mammoth Road and crashed into V1.
43	Saturday, October 20, 2018	15:49	Angle	Daylight	Clear/Clear	Dry	Property damage only (none injured)	D1: (Unknown),(Unknown) D2: (Unknown),(Unknown)	65	63			V1 was turning left onto Mammoth Road from the 7-11 parking lot and V2 was traveling northbound on Mammoth Road and crashed into V1.
44	Monday, November 5, 2018	17:43	Angle Sideswipe, same direction	Dark - lighted roadway	Rain	Wet	Property damage only (none injured)	D1: (Over-correcting/over-steering),(Inattention) / D2: (No improper driving)	45	41			V1 was traveling northbound on Mammoth Road and turned left into the Dunkin's parking lot and V2 was turning right out of the parking lot when the two vehicles collided.
45	Saturday, November 10, 2018	19:27	Angle	Dark - lighted roadway	Clear/Clear	Dry	Property damage only (none injured)	D1: (Unknown) / D2: (No improper driving)	58	55			V1 was traveling eastbound on Lakeview Avenue and V2 was traveling southbound on Mammoth Road when the two vehicles collided.
46	Wednesday, November 21, 2018	12:07	Rear-end Not reported	Daylight	Cloudy	Dry	Property damage only (none injured)	D1: (Inattention) / D2: (No improper driving)	60	54			V1 and V2 were traveling westbound on Brown's Lane when V1 rear-ended V2.
47	Wednesday, December 5, 2018	20:10	Angle Sideswipe, opposite direction	Dark - lighted roadway	Clear	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (Failed to yield right of way),(Unknown)	59	22			V1 was traveling northbound on Mammoth Road when it failed to yield the right of way and turned left, colliding into V2, which was traveling southbound on Mammoth Road.
48	Monday, December 24, 2018	20:03	Rear-end	Dark - lighted roadway	Clear	Dry	Property damage only (none injured)	D1: (Distracted),(Inattention) / D2: (No improper driving)	35	17			V1 and V2 were traveling on Mammoth Road when they were involved in a rear-end collision.
49	Friday, March 1, 2019	7:20	Angle	Daylight	Clear/Cloudy	Dry	Non-fatal injury	D1: (Failed to yield right of way) / D2: (No improper driving),(No improper driving)	16	38			V1 was turning left out of the Dunkin's parking lot onto Lakeview Avenue when it failed to yield the right of way to V2, which was traveling eastbound on Lakeview Avenue, and V2 crashed into V1.
50	Saturday, March 16, 2019	8:33	Angle Sideswipe, opposite direction	Daylight	Clear/Clear	Dry	Property damage only (none injured)	D1: (No improper driving),(No improper driving)	48	60			V1 was turning right into the Dunkin's parking lot from Lakeview Avenue when it struck V2, which was turning left out of the parking lot.
51	Wednesday, March 20, 2019	17:46	Angle	Dusk	Clear	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (Glare),(Followed too closely)	27	29			V1 turned right onto Mammoth Road southbound from Lakeview Avenue, stopped and the operator opened his door when V2 turned left from Lakeview Avenue onto Mammoth Road and hit V1's door.
52	Saturday, April 6, 2019	12:37	Rear-end	Daylight	Clear	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (No improper driving) / D3: (Inattention)	67	44	45		V1, V2, and V3 were traveling westbound on Lakeview Avenue when V1 and V2 stopped at the Mammoth Road intersection and V2 rear-ended V2, causing V2 to rear-end V1.
53	Thursday, May 9, 2019	19:19	Angle	Dusk	Cloudy	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (No improper driving)	32	45			V1 was turning right onto Mammoth Road from Lakeview Avenue eastbound when V2 was traveling southbound on Mammoth Road and the two cars collided in the intersection.
54	Saturday, May 11, 2019	12:21	Rear-end	Daylight	Clear	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (Inattention)	33	36			V1 and V2 were traveling westbound on Brown's Lane when V1 rear-ended V2.
55	Friday, June 21, 2019	8:54	Rear-end	Daylight	Rain/Cloudy	Wet	Non-fatal injury	D1: (Inattention) / D2: (No improper driving) / D3: (No improper driving)	30	34	54		V1, V2, and V3 were traveling eastbound on Lakeview Avenue when V2 and V3 stopped at the Mammoth Road intersection and V1 rear-ended V2, causing V2 to rear-end V3.
56	Monday, July 1, 2019	12:17	Rear-end	Daylight	Clear	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (No improper driving)	47	32			V1 and V2 were traveling westbound on Lakeview Avenue when V1 slowed for a pedestrian in the crosswalk and V2 rear-ended V1.
57	Sunday, July 7, 2019	13:17	Angle	Daylight	Clear	Dry	Non-fatal injury	D1: (No improper driving) / D2: (Failed to yield right of way)	21	73			V1 (motorcycle) was traveling northbound on Mammoth Road when V2 turned left out of the 7-11 parking lot and hit V1.
58	Thursday, August 15, 2019	17:54	Angle	Daylight	Clear	Dry	Property damage only (none injured)	D1: (Unknown) / D2: (Unknown)	51	19			V1 was turning left onto Mammoth Road when it failed to yield the right of way and crashed into V2, which was traveling southbound on Mammoth Road.
59	Tuesday, August 27, 2019	18:41	Rear-end	Daylight	Clear/Clear	Dry	Property damage only (none injured)	D1: (No improper driving),(No improper driving) / D2: (No improper driving),(Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway, etc)	56	32			V1 and V2 were traveling southbound on Mammoth Road when V1 slowed for pedestrians (not at a crosswalk) and V2 rear-ended V1.
60	Friday, September 6, 2019	10:06	Rear-end	Daylight	Cloudy	Dry	Non-fatal injury	D1: (Inattention) / D2: (No improper driving)	82	51			V1 and V2 were traveling westbound on Lakeview Avenue when V2 stopped at the Mammoth Road intersection and V1 rear-ended V2.
61	Thursday, October 3, 2019	16:52	Rear-end	Daylight	Clear	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (Inattention)	45	22			V1 and V2 were involved in a rear-end on Lakeview Avenue eastbound at the Mammoth Road intersection.
62	Monday, November 4, 2019	17:36	Rear-end	Dark - roadway not lighted	Clear/Clear	Dry	Property damage only (none injured)	D1: (Followed too closely),(Distracted) / D2: (No improper driving),(No improper driving)	23	21			V1 and V2 were traveling eastbound on Lakeview Avenue when V2 stopped for traffic and V1 failed to slow and rear-ended V2.
63	Thursday, November 7, 2019	17:48	Angle Sideswipe, opposite direction	Dark - lighted roadway	Rain	Wet	Property damage only (none injured)	D1: (Over-correcting/over-steering) / D2: (No improper driving)	39	35			V1 was turning left onto Lakeview Avenue from Mammoth Road southbound and turned into V2 which was stopped at the intersection, heading westbound on Lakeview Avenue.
64	Saturday, November 9, 2019	13:25	Rear-end	Daylight	Clear	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (Followed too closely)	61	22			V1 and V2 were traveling westbound on Lakeview Avenue when V1 slowed for a pedestrian in the crosswalk and V2 rear-ended V1.
65	Monday, November 11, 2019	16:18	Rear-end	Dusk	Cloudy/Cloudy	Dry	Non-fatal injury	D1: (Followed too closely),(Inattention) / D2: (No improper driving),(No improper driving)	31	42			V1 and V2 were traveling northbound on Mammoth Road when V2 stopped for traffic and V1 failed to slow and rear-ended V2.
66	Tuesday, December 3, 2019	9:38	Front to Rear	Dawn	Snow	Snow	Property damage only (none injured)	D1: (Followed too closely) / D2: (No improper driving)	22	58			V1 and V2 were traveling northbound on Mammoth Road when V2 stopped for traffic and V1 failed to slow and rear-ended V2.
67	Friday, December 13, 2019	16:19	Angle	Dark - lighted roadway	Cloudy	Wet	Property damage only (none injured)	D1: (No improper driving) / D2: (No improper driving) / D3: (Disregarded traffic signs, signals, road markings),(Distracted)	55	66	18		V1 was travelling southbound on Mammoth Road when it ran a red light, striking V3, which was heading eastbound on Lakeview Avenue, which then caused V1 to hit V2, which was waiting at the red light in the northbound Mammoth Road lane.
68	Saturday, December 28, 2019	11:51	Single vehicle crash (collision with pedestrian)	Daylight	Clear	Dry	Non-fatal injury	D1: (Visibility obstructed),(Glare)	39				V1 was travelling westbound on Lakeview Avenue and making a left turn into the Dunkin's parking lot when it struck a pedestrian crossing the parking lot driveway.
69	Friday, March 13, 2020	15:39	Rear-end	Daylight	Clear	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (Inattention)	79	82			V1 and V2 were traveling westbound on Brown's Lane when V2 rear-ended V1.
70	Saturday, March 14, 2020	12:31	Angle	Daylight	Clear	Dry	Property damage only (none injured)	D1: (Failure to keep in proper lane or running off road) / D2: (No improper driving)	66	53			V1 was turning left onto Lakeview Avenue from Mammoth Road southbound and turned into V2 which was stopped at the intersection, heading westbound on Lakeview Avenue.
71	Friday, April 17, 2020	15:20	Sideswipe, same direction Angle	Daylight	Clear	Dry	Property damage only (none injured)	D1: (Failure to keep in proper lane or running off road),(Inattention) / D2: (No improper driving)	40	54			V1 and V2 were traveling eastbound on Lakeview Avenue when V1 struck V2 while V2 was trying to turn right.
72	Saturday, May 16, 2020	15:53	Angle	Daylight	Clear/Clear	Dry	Property damage only (none injured)	D1: (Failed to yield right of way),(Visibility obstructed) / D2: (No improper driving),(No improper driving)	48	23			V1 was turning left out of the Dunkin's parking lot onto Lakeview Avenue when it failed to yield the right of way to V2, which was traveling eastbound on Lakeview Avenue, and V1 crashed into V2.
73	Saturday, June 20, 2020	13:06	Angle	Daylight	Clear	Dry	Property damage only (none injured)	D1: (Disregarded traffic signs, signals, road markings),(Inattention) / D2: (No improper driving)	24	17			V1 was travelling westbound on Lakeview Avenue when it ran a red light and crashed into V2, which was waiting to take a left onto Lakeview Avenue from Mammoth Road southbound.
74	Sunday, June 21, 2020	9:02	Angle	Daylight	Clear	Dry	Property damage only (none injured)	D2: (No improper driving)	60	23			V1 was traveling northbound on Mammoth Road when it failed to yield the right of way and turned left, colliding into V2, which was traveling southbound on Mammoth Road.

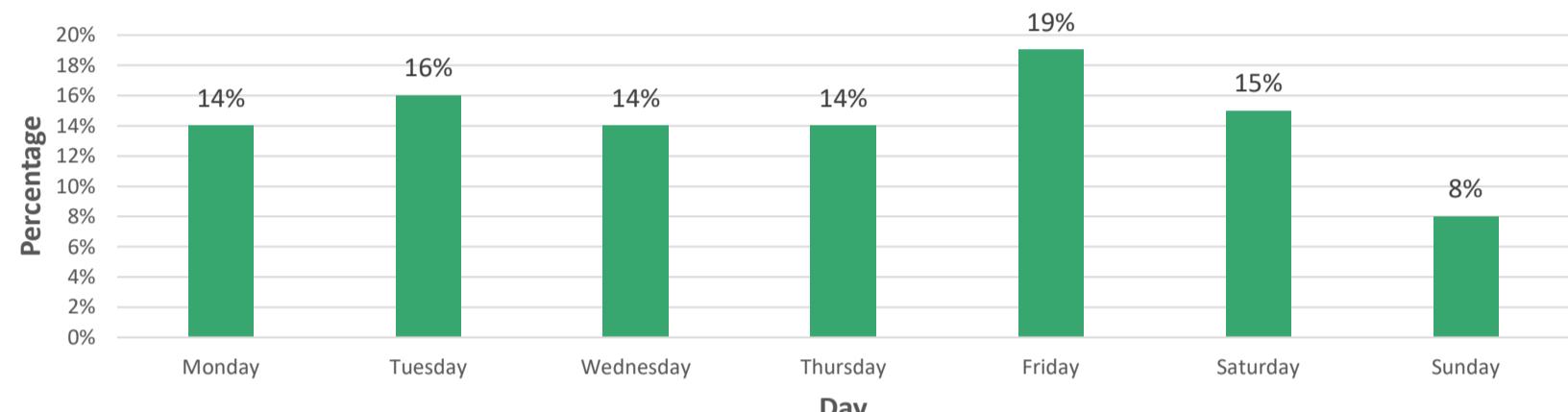
CRASH SUMMARY – DRACUT – LAKEVIEW AVENUE @ MAMMOTH STREET – TOTAL AREA CRASHES  
JANUARY 2017 THROUGH DECEMBER 2021

Crash Number	Date	Crash Time	Collision Type	Roadway Lighting	Weather Condition	Roadway Condition	Severity	Driver Contribution Code	D1 Age	D2 Age	D3 Age	D4 Age	Comments
75	Tuesday, June 23, 2020	19:13	Rear-end	Daylight	Clear	Dry	Non-fatal injury	D1: (Distracted) / D2: (No improper driving)	36	33			V1 and V2 were traveling northbound on Mammoth Road when V2 stopped for traffic and V1 failed to slow and rear-ended V2.
76	Tuesday, June 23, 2020	19:44	Sideswipe, same direction	Daylight	Clear	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (Failure to keep in proper lane or running off road)	35	17			V1 and V2 were travelling southbound on Mammoth Road when V2 crashed into V1 while trying to merge into the left turn lane at the intersection with Lakeview Avenue.
77	Tuesday, July 21, 2020	16:33	Angle	Daylight	Clear/Clear	Dry	Property damage only (none injured)	D1: (Operating defective equipment),(Failure to keep in proper lane or running off road) / D2: (No improper driving),(No improper driving)	18	17	33	51	V1 was travelling eastbound on Lakeview Avenue through the Mammoth Road intersection when the operator lost control of the vehicle and it struck V2, which was turning left out of a parking lot, as well as V3 and V4, which were parked in the parking lot.
78	Monday, August 3, 2020	22:10	Rear-end	Dark - lighted roadway	Clear/Clear	Dry	Property damage only (none injured)		23	48			V1 and V2 were traveling westbound on Brown's Lane when V1 rear-ended V2.
79	Friday, August 14, 2020	20:32	Front to Front	Dark - lighted roadway	Clear	Dry	Non-fatal injury	D1: (Failed to yield right of way) / D2: (No improper driving)	18	19			V1 was traveling northbound on Mammoth Road and turned left into the Dunkin's parking lot and was struck by V2, which was traveling southbound on Mammoth Road.
80	Monday, September 7, 2020	10:25	Sideswipe, same direction	Daylight	Clear/Clear	Dry	Property damage only (none injured)	D1: (Other improper action) / D2: (No improper driving),(No improper driving)	42	38			V1 and V2 were traveling eastbound on Lakeview Avenue when V1 struck V2 while V2 was trying to turn right.
81	Wednesday, September 30, 2020	5:11	Angle	Dark - lighted roadway	Rain/Cloudy	Wet	Property damage only (none injured)	D1: (Failed to yield right of way),(Inattention)	20	47			V1 was turning right out of the Dunkin's parking lot onto Mammoth Road southbound when it failed to yield the right of way and crashed into V2, which was traveling southbound on Mammoth Road.
82	Sunday, October 18, 2020	19:01	Sideswipe, same direction	Dark - lighted roadway	Clear/Clear	Dry	Property damage only (none injured)	D1: (Failure to keep in proper lane or running off road),(Other improper action) / D2: (No improper driving),(No improper driving)	18	44			V1 and V2 were traveling eastbound on Lakeview Avenue when V1 struck V2 while V2 was trying to turn right.
83	Sunday, October 25, 2020	17:59	Front to Front	Dark - lighted roadway	Clear	Dry	Property damage only (none injured)	D1:(Inattention),(Failed to yield right of way) D2:(No improper driving)	71	51			V1 was turning left out of the 7-11 parking lot when it failed to yield the right of way and struck V2, which was traveling northbound on Mammoth Road.
84	Thursday, November 5, 2020	17:29	Front to Rear	Dark - lighted roadway	Clear/Cloudy	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (No improper driving) / D3: (No improper driving)	61	23	51		V1, V2, and V3 were traveling westbound on Lakeview Avenue when V0 (which fled the scene) rear-ended V1, which then hit V2, which then hit V3.
85	Friday, December 11, 2020	13:01	Rear-end	Daylight	Clear	Dry	Property damage only (none injured)	D1:(Inattention),(Physical impairment) D2:(No improper driving)	37	22			V1 and V2 were traveling northbound on Mammoth Road when V2 stopped for traffic and V1 failed to slow and rear-ended V2.
86	Thursday, December 17, 2020	14:33	Single vehicle crash Unknown	Daylight	Snow	Snow	Property damage only (none injured)	D1: (Other improper action) / D2: (No improper driving)	31	19			V1 was plowing the Santander parking lot when it backed into a utility pole, which snapped in half and fell onto V2.
87	Friday, January 15, 2021	15:44	Head-on	Daylight	Clear	Dry	Property damage only (none injured)	D1: (Physical impairment) / D2: (No improper driving)	56	22			V1 was traveling southbound on Mammoth Road when the operator passed out and crashed into V2, which was traveling eastbound on Lakeview Avenue.
88	Friday, January 22, 2021	12:41	Sideswipe, same direction	Daylight	Clear	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (No improper driving)	57	77			V1 (bus) was travelling eastbound on Lakeview Avenue when V2 was turning right onto Lakeview Avenue from a parking lot and V2 struck V1.
89	Tuesday, March 9, 2021	1:56	Rear-end	Dark - lighted roadway	Clear	Dry	Non-fatal injury	D1: (Distracted) / D2: (No improper driving)	20	48			V1 and V2 were traveling westbound on Lakeview Avenue when V2 stopped at the Mammoth Road intersection and V1 rear-ended V2 due to distracted driving.
90	Thursday, May 6, 2021	11:01	Angle	Daylight	Clear	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (No improper driving)	69	18			V1 was attempting to enter traffic on Lakeview Avenue from Catherine Street, but collided with V1, which was traveling westbound on Lakewood Avenue.
91	Friday, May 21, 2021	9:28	Sideswipe, same direction Angle	Daylight	Clear	Dry	Property damage only (none injured)	D1: (Failed to yield right of way) / D2: (No improper driving)	60	57			V1 and V2 were traveling eastbound on Lakeview Avenue when V1 struck V2 while V2 was trying to turn right.
92	Sunday, May 30, 2021	10:37	Rear-end	Daylight	Cloudy/Rain	Wet	Property damage only (none injured)	D1: (No improper driving) / D2: (No improper driving)	59	25			V1 and V2 were traveling eastbound on Lakeview Avenue when a vehicle in front of V1 braked suddenly to let a pedestrian cross the crosswalk and V2 rear-ended V1.
93	Thursday, June 10, 2021	17:35	Single vehicle crash (collision with bicycle)	Daylight	Clear	Dry	Non-fatal injury	D1: (Unknown)	46				V1 was turning right onto Mammoth Road northbound from Coburn Avenue when it was involved in a collision with a bicycle traveling southbound on Mammoth Road.
94	Wednesday, June 23, 2021	11:39	Rear-end	Daylight	Clear	Dry	Non-fatal injury	D1: (No improper driving) / D2: (Unknown)	81	19			V1 and V2 were traveling westbound on Lakeview Avenue when V1 stopped to turn left into the Dunkin's parking lot and V2 rear-ended V1.
95	Wednesday, July 28, 2021	7:20	Single vehicle crash	Daylight	Cloudy	Dry	Non-fatal injury	D1: (Illness),(History heart/epilepsy/fainting)	22				V1 was traveling westbound on Lakeview Avenue when the operator suffered a medical episode, hit the curb and a pedestrian crossing sign, then veered across the road and hit some mulch bags owned by Dracut Hardware.
96	Friday, August 27, 2021	20:55	Single vehicle crash	Dark - unknown roadway lighting	Clear	Dry	Non-fatal injury	D1: (Over-correcting/over-steering),(Failure to keep in proper lane or running off road)	37				V1 was traveling southbound on Mammoth Road when the operator crossed the center line and over corrected, colliding with a tree off the road.
97	Tuesday, October 5, 2021	6:25	Angle	Dark - lighted roadway	Rain	Wet	Non-fatal injury	D1: (Unknown) / D2: (Unknown)	19	58			V1 was traveling eastbound on Lakeview Avenue when V2 backed out of a parking lot and the two vehicles crashed into each other.
98	Tuesday, October 19, 2021	12:20	Rear-to-rear	Daylight	Clear	Dry	Property damage only (none injured)	D1: (Unknown) / D2: (Unknown)	69	32			V1 was backing out of the parking lot at 2006 Lakeview Avenue when it backed into V2, which was waiting to merge into traffic on Lakeview Avenue.
99	Tuesday, November 2, 2021	12:00	Front to Rear	Daylight	Clear	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (No improper driving)	33	48			V1 was turning left out of the CVS parking lot onto Lakeview Avenue eastbound when V2 was backing out of the parking lot across the street onto Lakeview Avenue westbound and the two vehicles collided.
100	Sunday, December 26, 2021	14:10	Rear-end	Daylight	Clear	Dry	Non-fatal injury	D1: (Unknown) / D2: (Unknown)	49	51			V1 and V2 were traveling northbound on Mammoth Road when V2 started to turn right into a parking lot and V1 failed to slow and rear-ended V2.

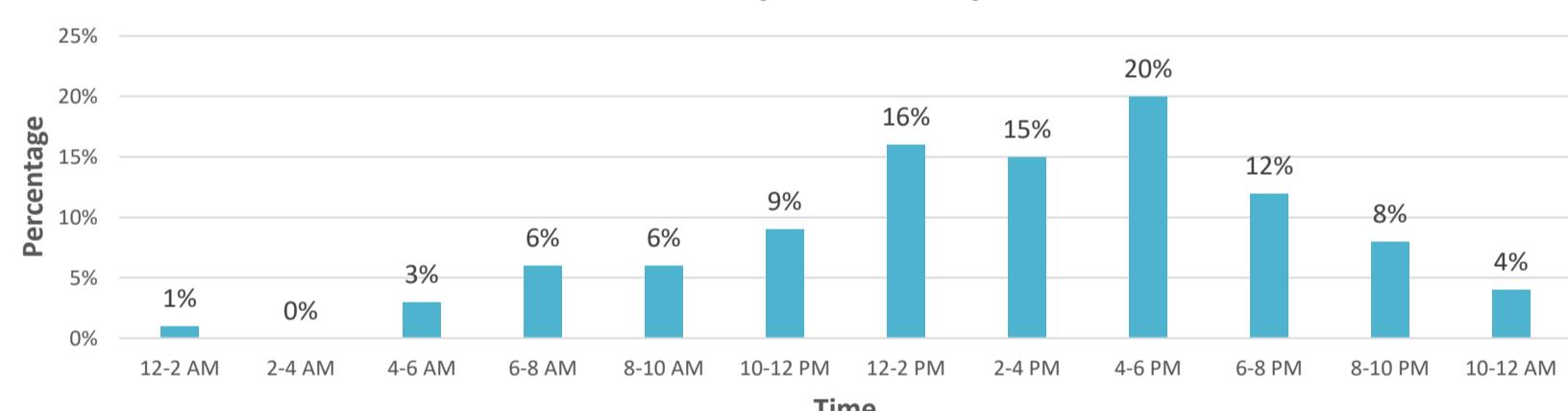
### Crashes by Month



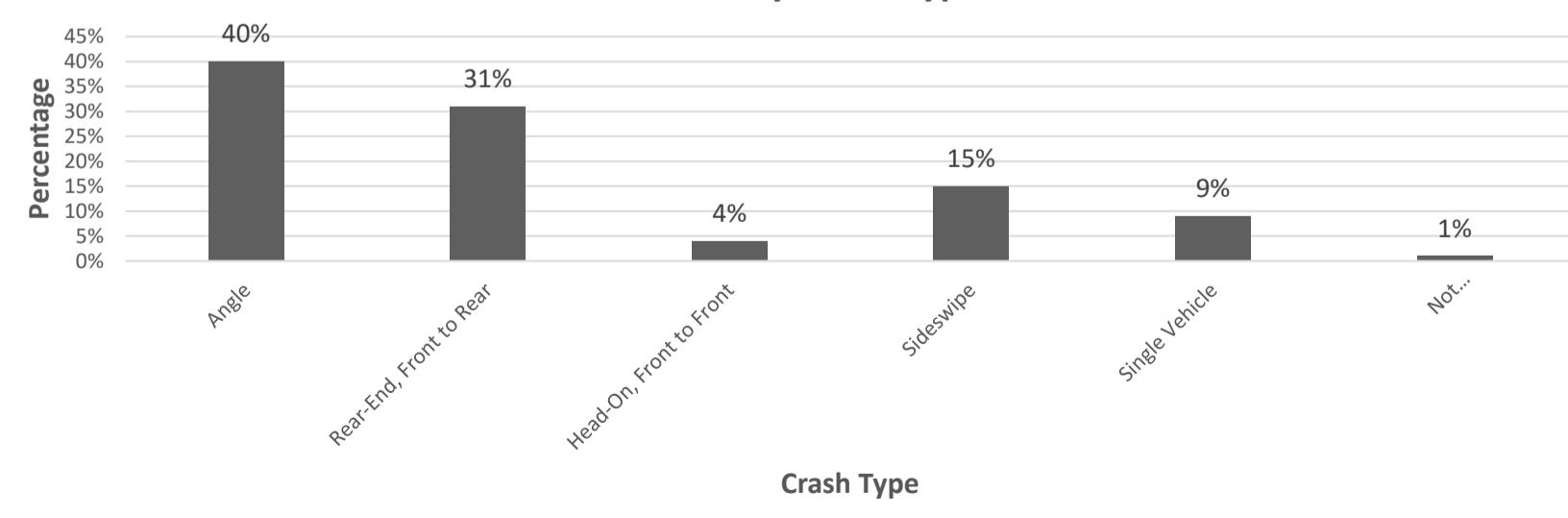
### Crashes by Day of the Week

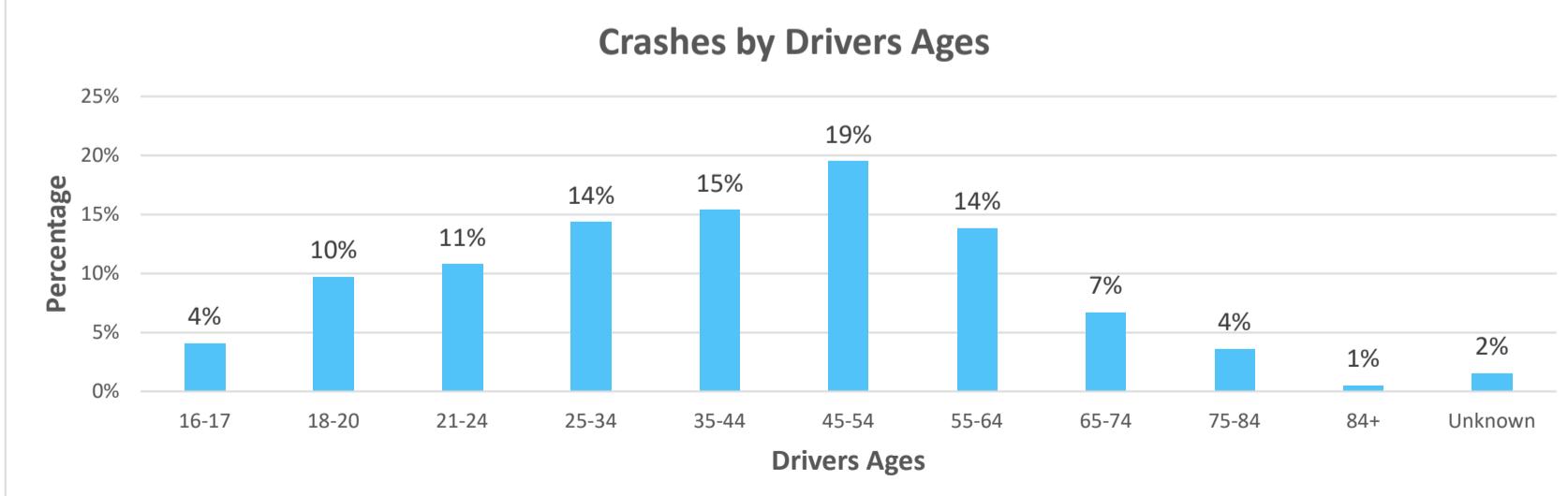
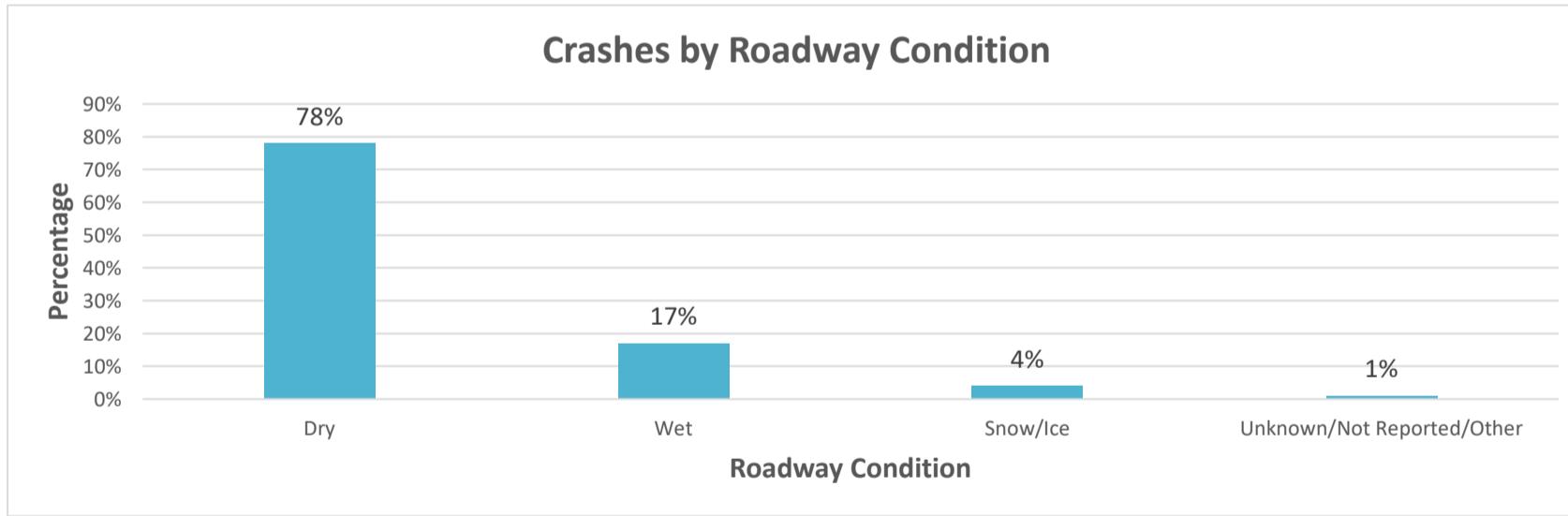
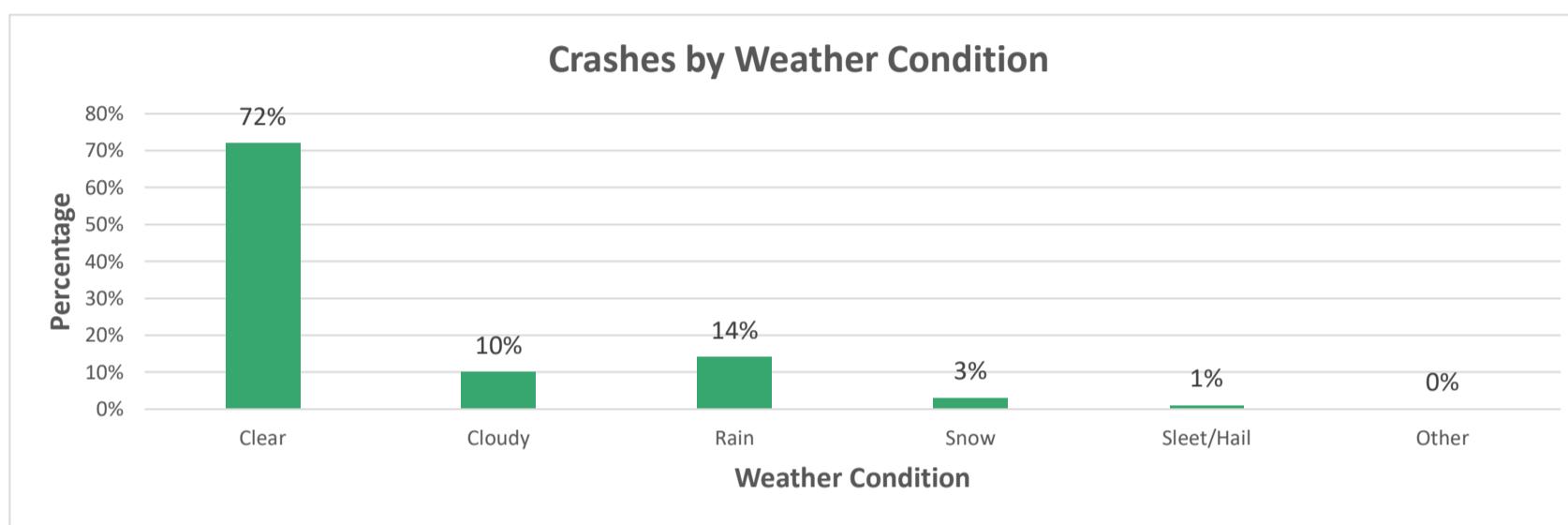
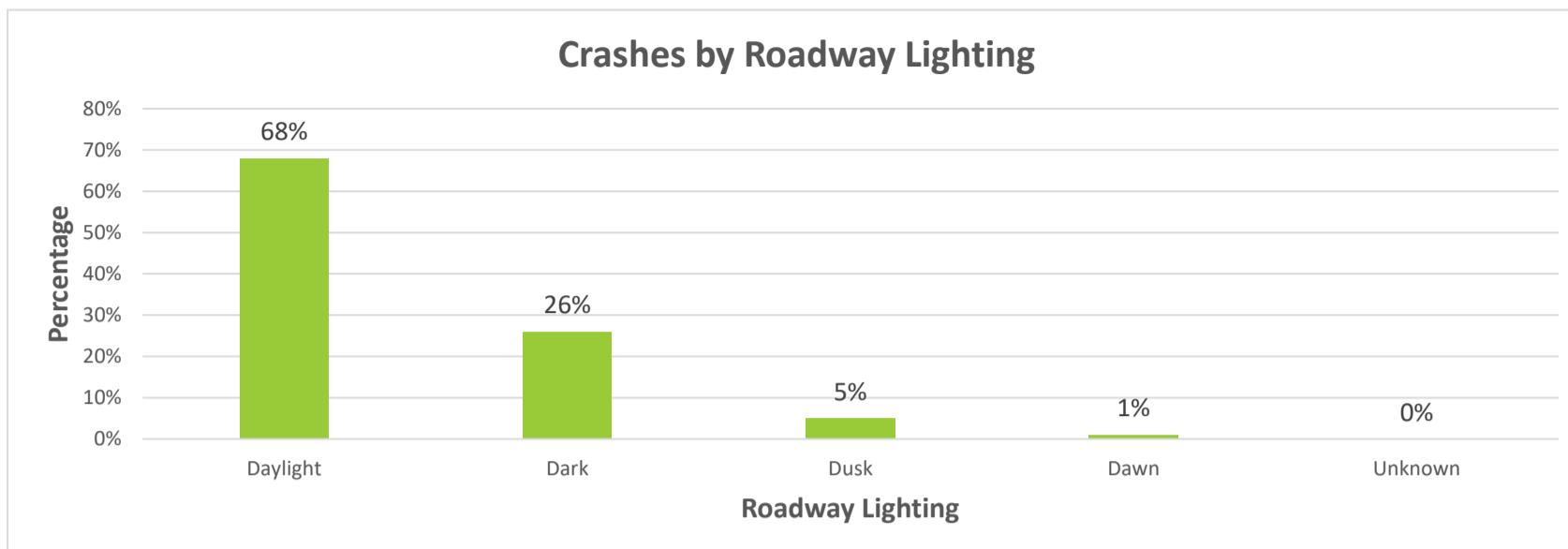


### Crashes by Time of Day



### Crashes by Crash Type



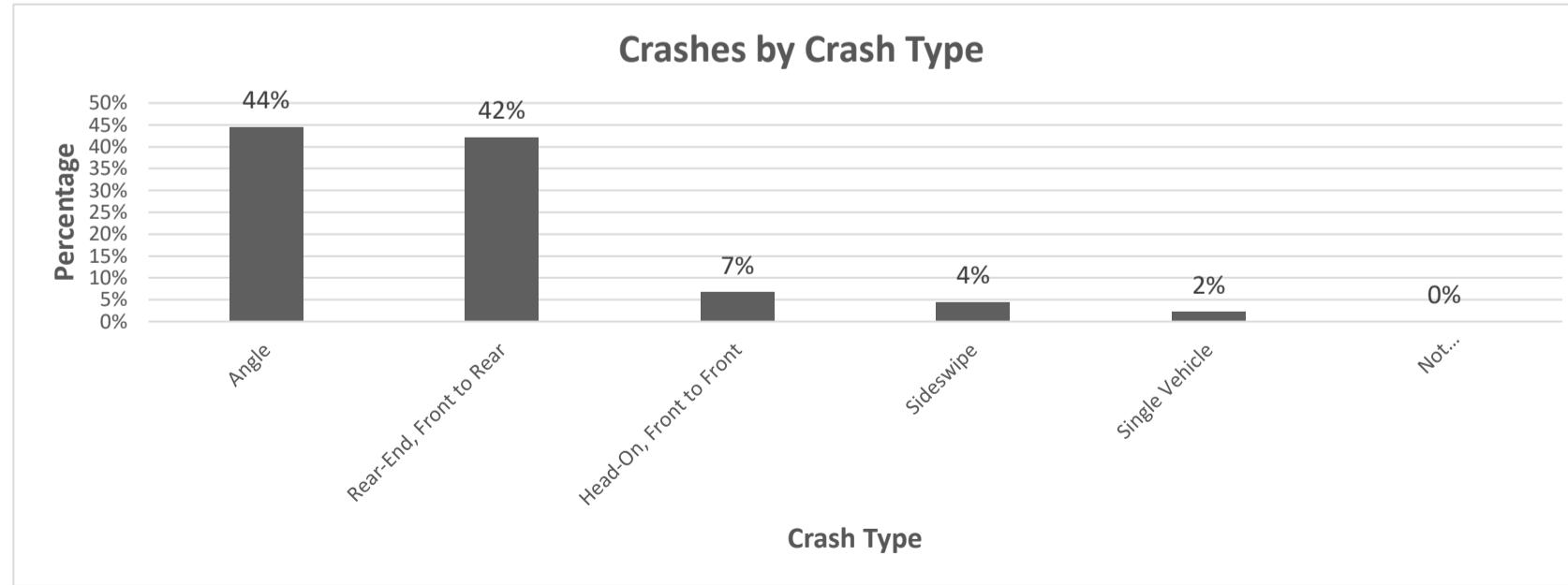
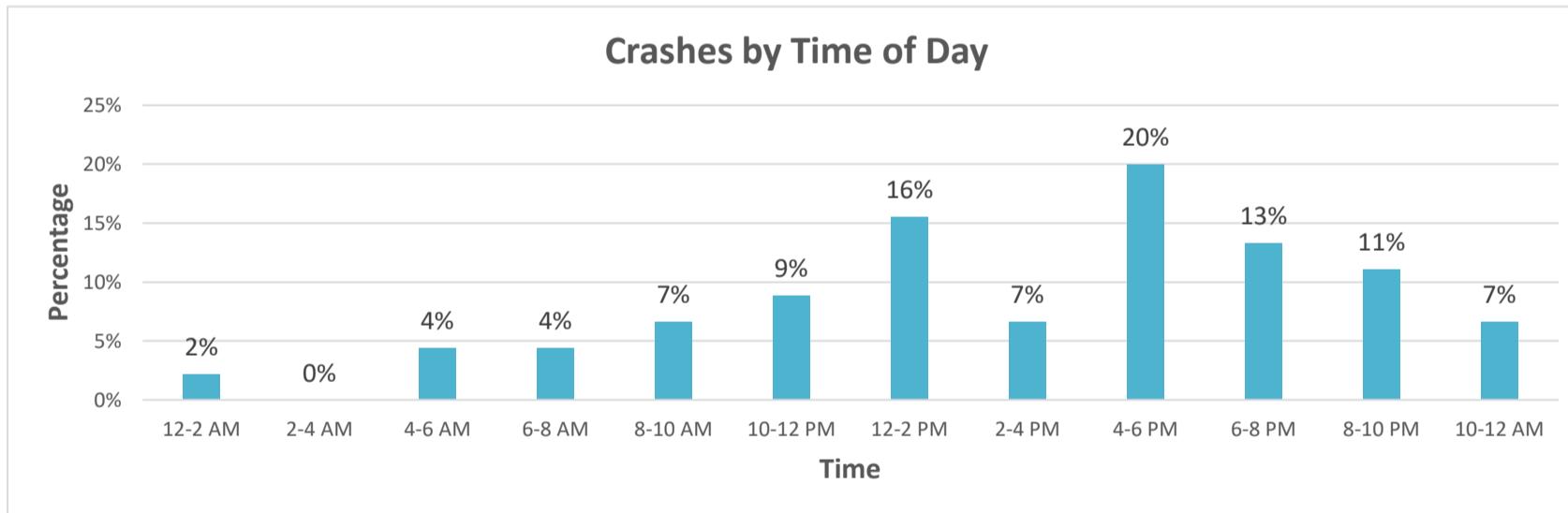
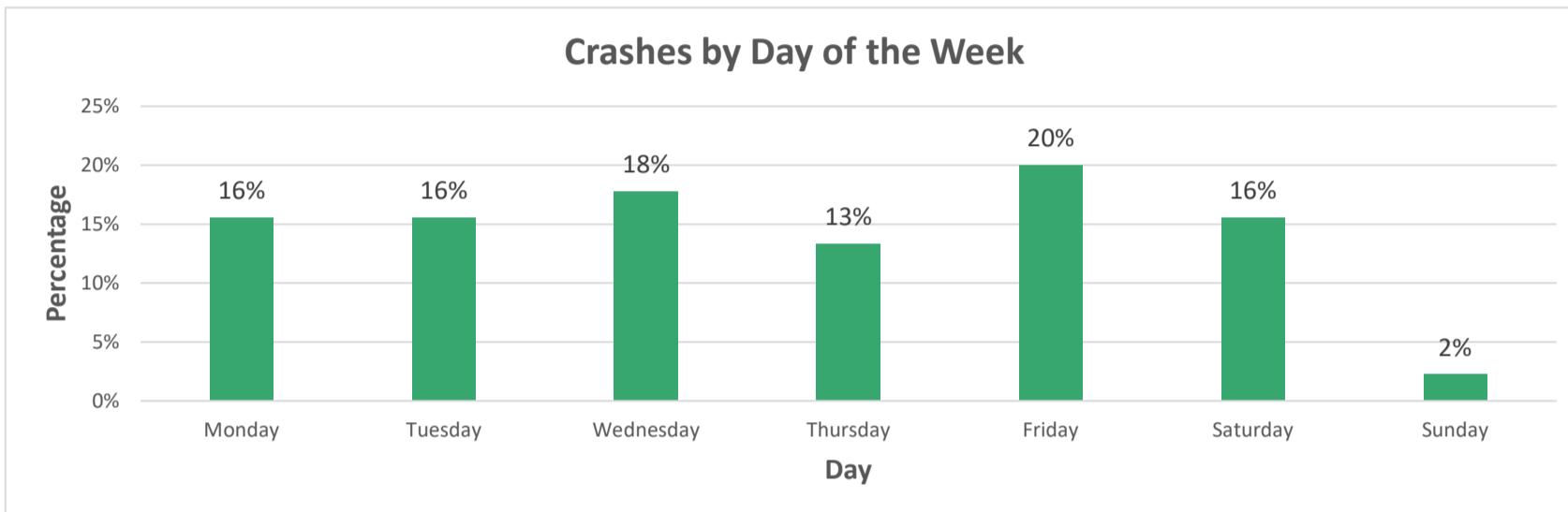
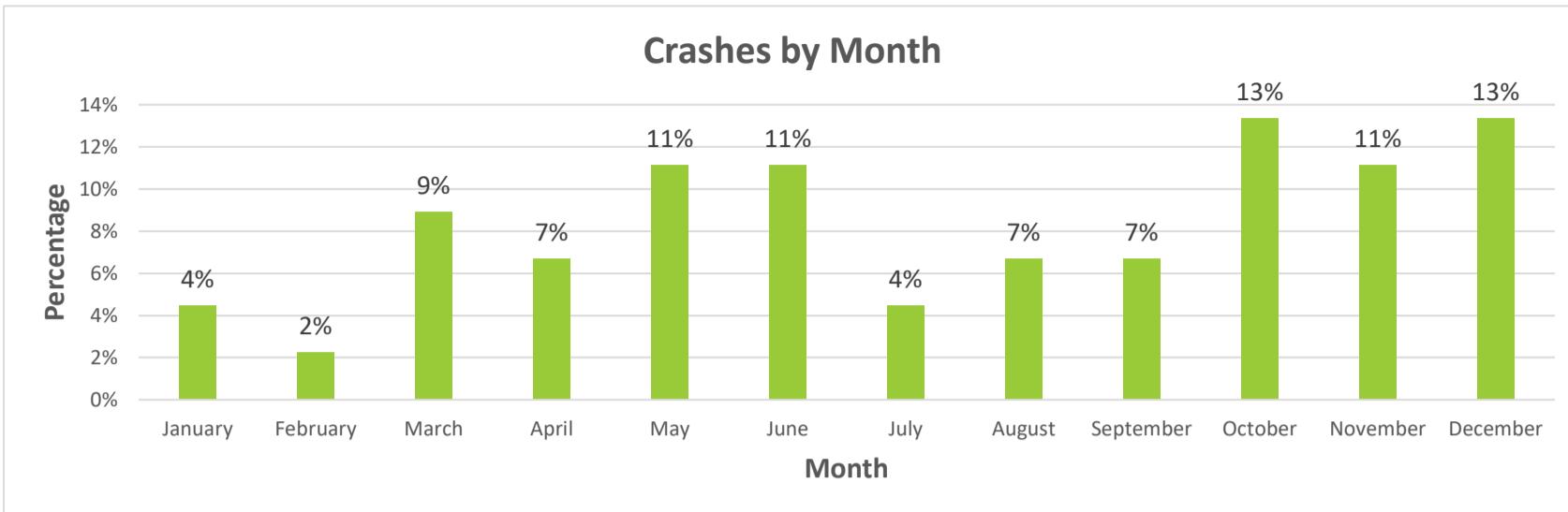


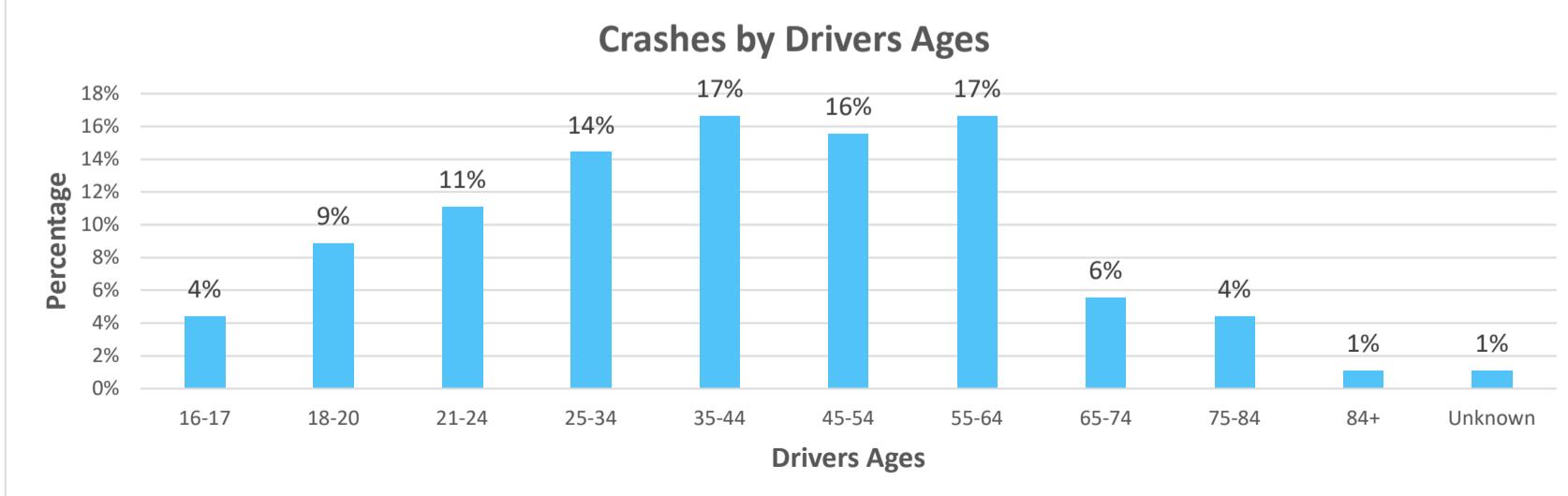
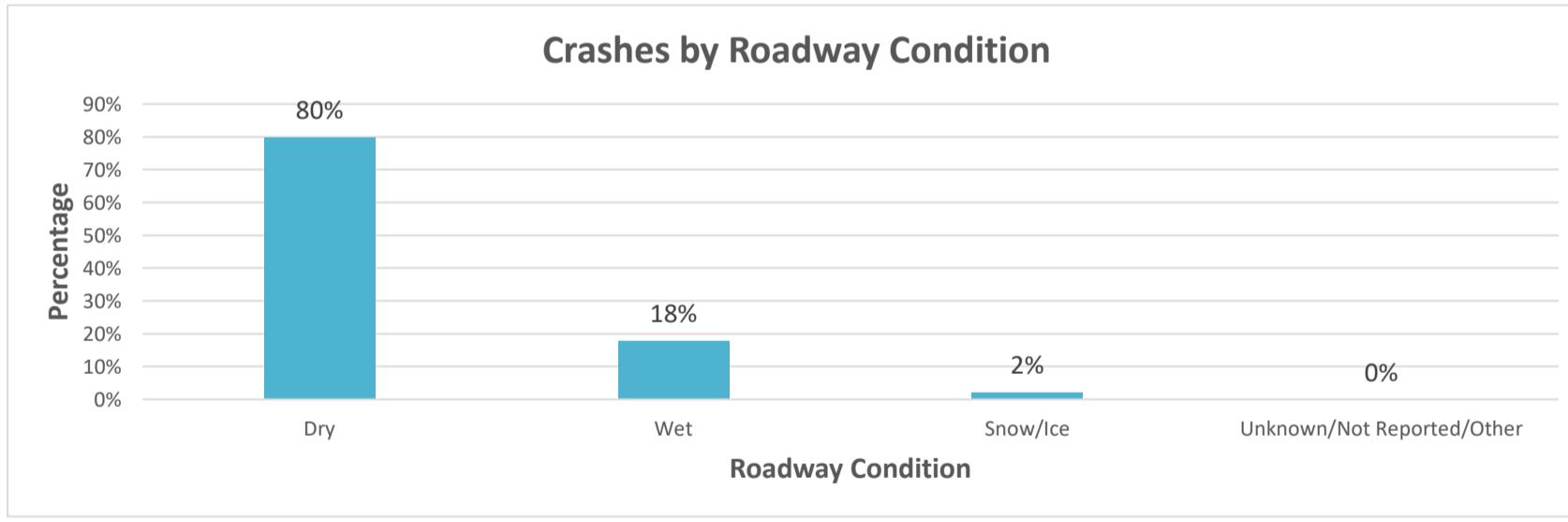
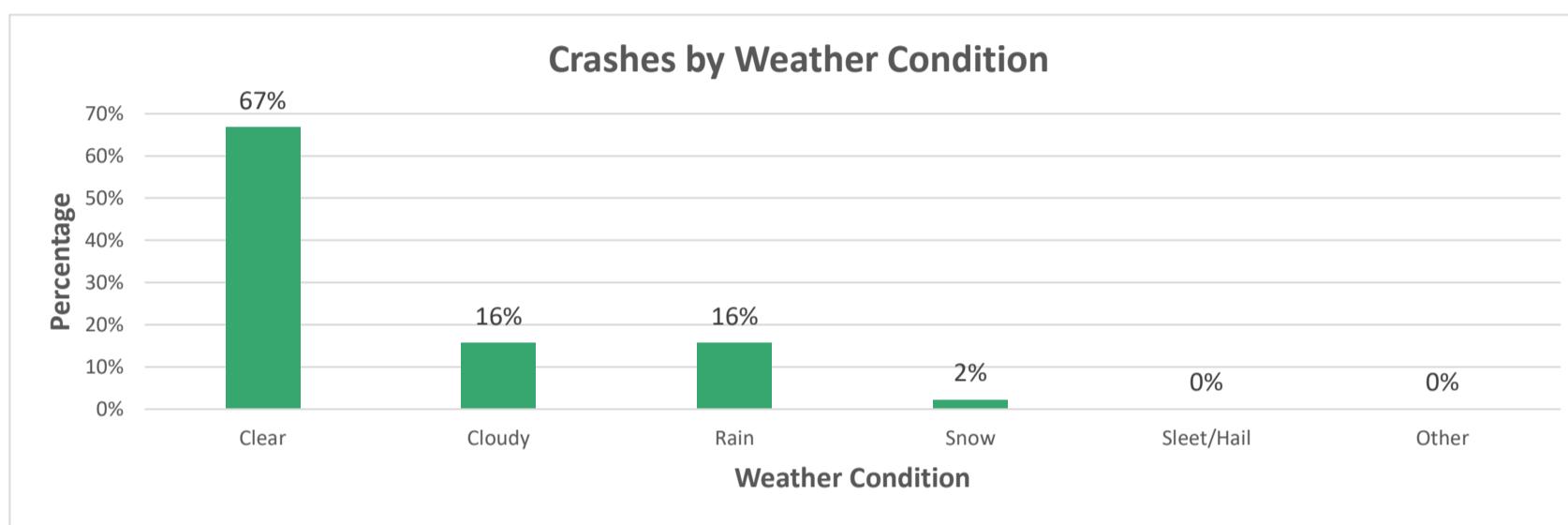
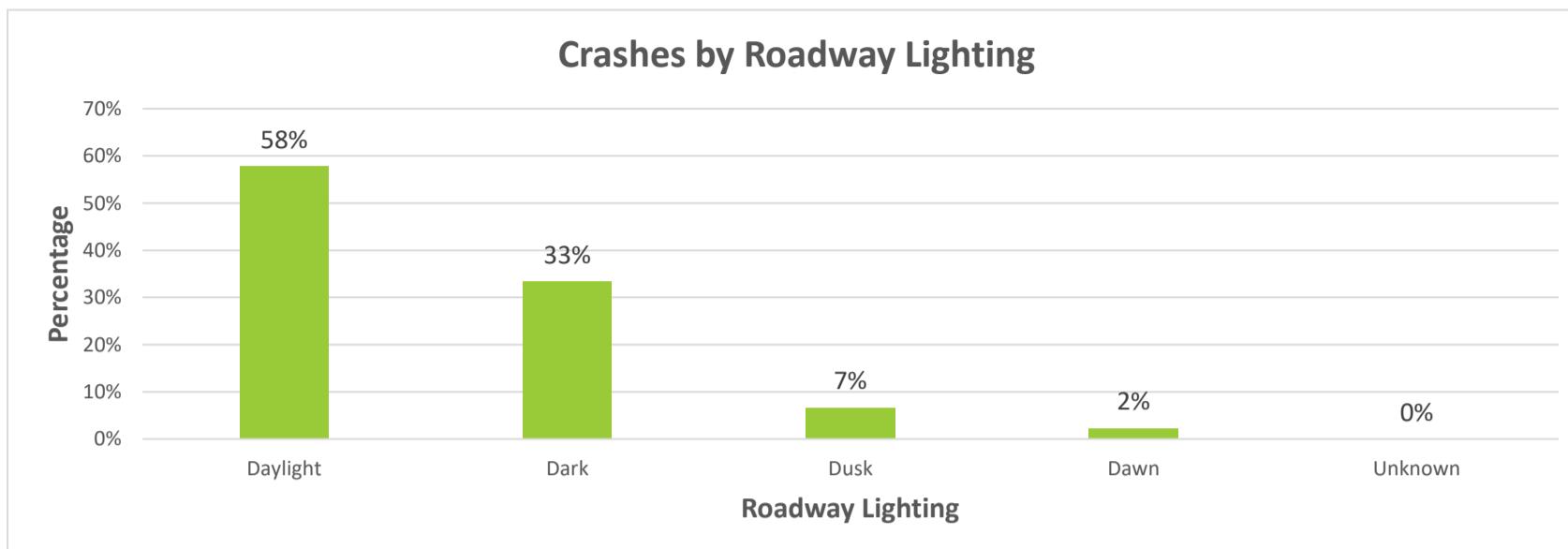
CRASH SUMMARY – DRACUT – LAKEVIEW AVENUE @ MAMMOTH STREET – CORE AREA CRASHES  
JANUARY 2017 THROUGH DECEMBER 2021

Crash Number	Date	Crash Time	Collision Type	Roadway Lighting	Weather Condition	Roadway Condition	Severity	Driver Contribution Code	D1 Age	D2 Age	D3 Age	D4 Age	Comments
7	Tuesday, June 27, 2017	8:01	Angle	Daylight	Clear	Dry	Property damage only (none injured)	D1: (Disregarded traffic signs, signals, road markings) / D2: (No improper driving)	33	62			V1 was traveling southbound on Mammoth Road and ran a red light causing V2, who was traveling eastbound on Lakeview Avenue to strike V1's trailer.
14	Wednesday, October 25, 2017	7:31	Single vehicle crash	Daylight	Rain	Wet	Property damage only (none injured)	D1: (Visibility obstructed)	74				V1 was turning right onto Mammoth Road from Lakeview Avenue eastbound when the driver's view was obstructed and they crashed into a traffic light post.
15	Wednesday, October 25, 2017	19:05	Angle	Dark - lighted roadway	Rain/Cloudy	Wet	Property damage only (none injured)	D1: (No improper driving) / D2: (No improper driving)	48	58			V1 was traveling southbound on Mammoth Road and V2 was traveling westbound on Lakeview Avenue when one operator ran a red light and the vehicles collided.
16	Wednesday, October 25, 2017	22:29	Angle	Dark - lighted roadway	Rain/Cloudy	Wet	Property damage only (none injured)	D1: (No improper driving) / D2: (No improper driving),(No improper driving)	56	27			V1 was traveling eastbound on Lakeview Avenue when V2 was traveling westbound on Lakeview Avenue and turned left onto Mammoth Road and the two cars collided.
19	Saturday, December 16, 2017	23:14	Head-on	Dark - lighted roadway	Clear/Clear	Dry	Non-fatal injury	D1: (No improper driving) / D2: (Operating vehicle in erratic, reckless, careless, negligent or aggressive manner)	48	49			V1 was traveling eastbound on Lakeview Avenue and V2 was traveling westbound when V2 failed to yield the right of way and turned left into V1.
21	Monday, January 15, 2018	20:41	Rear-end	Dark - lighted roadway	Clear	Dry	Property damage only (none injured)		28	Unknown			V1 and V2 were traveling westbound on Lakeview Avenue when V1 rear-ended V2.
23	Thursday, February 1, 2018	16:48	Rear-end	Daylight	Cloudy	Dry	Property damage only (none injured)	D1: (Inattention)	57				V1 and V2 were traveling westbound on Lakeview Avenue when V1 rear-ended V2.
25	Wednesday, April 11, 2018	14:14	Rear-end	Daylight	Clear/Cloudy	Dry	Property damage only (none injured)	D1: (Inattention),(Followed too closely) / D2: (No improper driving),(No improper driving)	39	40			V1 and V2 were traveling westbound on Brown's Lane when V1 rear-ended V2.
26	Friday, April 13, 2018	13:19	Angle	Daylight	Clear	Dry	Non-fatal injury	D1: (Failed to yield right of way) / D2: (No improper driving)	72	58			V1 was traveling northbound on Mammoth Road and turned left into the Dunkin's parking lot and was struck by V2 (motorcycle), which was traveling southbound on Mammoth Road.
29	Thursday, May 17, 2018	11:57	Angle	Daylight	Cloudy/Clear	Dry	Non-fatal injury	D1: (Failed to yield right of way),(Unknown) / D2: (Unknown),(No improper driving)	76	91			V1 was traveling eastbound on Lakeview Avenue when V2 was traveling westbound on Lakeview Avenue and turned left onto Mammoth Road and the two cars collided.
30	Monday, May 28, 2018	21:44	Angle	Dark - lighted roadway	Clear	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (No improper driving)	23	25			V1 was traveling eastbound on Lakeview Avenue when V2 was traveling westbound on Lakeview Avenue and turned left onto Mammoth Road and the two cars collided.
31	Thursday, May 31, 2018	5:59	Sideswipe, same direction <sup>Not reported</sup>	Daylight	Clear	Dry	Property damage only (none injured)	D1: (Glare)	59	53			V1 was traveling eastbound on Lakeview Avenue when the sun glare caused them to crash into V2's trailer, which was in the eastbound right turn lane.
33	Friday, July 20, 2018	7:54	Angle <sup>Not reported</sup>	Daylight	Clear	Dry	Property damage only (none injured)	D1: (Failed to yield right of way) / D2: (Unknown)	31	21			V1 was traveling westbound on Lakeview Avenue and attempted to turn left onto Mammoth Road when V2 was traveling eastbound on Lakeview Avenue and the two cars collided.
34	Saturday, July 28, 2018	16:15	Rear-end	Daylight	Clear	Dry	Property damage only (none injured)	D1: (Unknown) / D2: (Unknown)	42	18			V1 and V2 were involved in a rear-end on Lakeview Avenue eastbound at the Mammoth Road intersection.
37	Tuesday, September 25, 2018	10:06	Angle	Daylight	Rain	Wet	Property damage only (none injured)	D1: (No improper driving) / D2: (Failed to yield right of way)	29	41			V1 was traveling southbound on Mammoth Road when it was struck by V2, which was traveling northbound on Mammoth Road, as it was attempting to turn left into a parking lot.
39	Monday, October 1, 2018	11:30	Rear-end	Daylight	Clear	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (Followed too closely)	43	20			V1 and V2 were traveling on Lakeview Avenue when V1 slowed to a stop and V2 rear-ended V1.
42	Friday, October 19, 2018	17:21	Angle	Daylight	Clear	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (Failed to yield right of way)	20	16			V1 was turning left onto Mammoth Road from the Dunkin' parking lot and V2 was traveling southbound on Mammoth Road and crashed into V1.
44	Monday, November 5, 2018	17:43	Angle <sup>Sideswipe, same direction</sup>	Dark - lighted roadway	Rain	Wet	Property damage only (none injured)	D1: (Over-correcting/over-steering),(Inattention) / D2: (No improper driving)	45	41			V1 was traveling northbound on Mammoth Road and turned left into the Dunkin's parking lot and V2 was turning right out of the parking lot when the two vehicles collided.
45	Saturday, November 10, 2018	19:27	Angle	Dark - lighted roadway	Clear/Clear	Dry	Property damage only (none injured)	D1: (Unknown) / D2: (No improper driving)	58	55			V1 was traveling eastbound on Lakeview Avenue and V2 was traveling southbound on Mammoth Road when the two vehicles collided.
46	Wednesday, November 21, 2018	12:07	Rear-end <sup>Not reported</sup>	Daylight	Cloudy	Dry	Property damage only (none injured)	D1: (Inattention) / D2: (No improper driving)	60	54			V1 and V2 were traveling westbound on Brown's Lane when V1 rear-ended V2.
47	Wednesday, December 5, 2018	20:10	Angle <sup>Sideswipe, opposite direction</sup>	Dark - lighted roadway	Clear	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (Failed to yield right of way),(Unknown)	59	22			V1 was traveling northbound on Mammoth Road when it failed to yield the right of way and turned left, colliding into V2, which was traveling southbound on Mammoth Road.
48	Monday, December 24, 2018	20:03	Rear-end	Dark - lighted roadway	Clear	Dry	Property damage only (none injured)	D1: (Distracted),(Inattention) / D2: (No improper driving)	35	17			V1 and V2 were traveling on Mammoth Road when they were involved in a rear-end collision.
51	Wednesday, March 20, 2019	17:46	Angle	Dusk	Clear	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (Glare),(Followed too closely)	27	29			V1 turned right onto Mammoth Road southbound from Lakeview Avenue, stopped and the operator opened his door when V2 turned left from Lakeview Avenue onto Mammoth Road and hit V1's door.
52	Saturday, April 6, 2019	12:37	Rear-end	Daylight	Clear	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (No improper driving) / D3: (Inattention)	67	44	45		V1, V2, and V3 were traveling westbound on Lakeview Avenue when V1 and V2 stopped at the Mammoth Road intersection and V2 rear-ended V2, causing V2 to rear-end V1.
53	Thursday, May 9, 2019	19:19	Angle	Dusk	Cloudy	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (No improper driving)	32	45			V1 was turning right onto Mammoth Road from Lakeview Avenue eastbound when V2 was traveling southbound on Mammoth Road and the two cars collided in the intersection.
54	Saturday, May 11, 2019	12:21	Rear-end	Daylight	Clear	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (Inattention)	33	36			V1 and V2 were traveling westbound on Brown's Lane when V1 rear-ended V2.
59	Tuesday, August 27, 2019	18:41	Rear-end	Daylight	Clear/Clear	Dry	Property damage only (none injured)	D1: (No improper driving),(No improper driving) / D2: (No improper driving),(Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway, etc)	56	32			V1 and V2 were traveling southbound on Mammoth Road when V1 slowed for pedestrians (not at a crosswalk) and V2 rear-ended V1.
60	Friday, September 6, 2019	10:06	Rear-end	Daylight	Cloudy	Dry	Non-fatal injury	D1: (Inattention) / D2: (No improper driving)	82	51			V1 and V2 were traveling westbound on Lakeview Avenue when V2 stopped at the Mammoth Road intersection and V1 rear-ended V2.
61	Thursday, October 3, 2019	16:52	Rear-end	Daylight	Clear	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (Inattention)	45	22			V1 and V2 were involved in a rear-end on Lakeview Avenue eastbound at the Mammoth Road intersection.
63	Thursday, November 7, 2019	17:48	Angle <sup>Sideswipe, opposite direction</sup>	Dark - lighted roadway	Rain	Wet	Property damage only (none injured)	D1: (Over-correcting/over-steering) / D2: (No improper driving)	39	35			V1 was turning left onto Lakeview Avenue from Mammoth Road southbound and turned into V2 which was stopped at the intersection, heading westbound on Lakeview Avenue.
65	Monday, November 11, 2019	16:18	Rear-end	Dusk	Cloudy/Cloudy	Dry	Non-fatal injury	D1: (Followed too closely),(Inattention) / D2: (No improper driving),(No improper driving)	31	42			V1 and V2 were traveling northbound on Mammoth Road when V2 stopped for traffic and V1 failed to slow and rear-ended V2.
66	Tuesday, December 3, 2019	9:38	Front to Rear	Dawn	Snow	Snow	Property damage only (none injured)	D1: (Followed too closely) / D2: (No improper driving)	22	58			V1 and V2 were traveling northbound on Mammoth Road when V2 stopped for traffic and V1 failed to slow and rear-ended V2.
67	Friday, December 13, 2019	16:19	Angle	Dark - lighted roadway	Cloudy	Wet	Property damage only (none injured)	D1: (No improper driving) / D2: (No improper driving) / D3: (Disregarded traffic signs, signals, road markings),(Distracted)	55	66	18		V1 was travelling southbound on Mammoth Road when it ran a red light, striking V3, which was heading eastbound on Lakeview Avenue, which then caused V1 to hit V2, which was waiting at the red light in the northbound Mammoth Road lane.
69	Friday, March 13, 2020	15:39	Rear-end	Daylight	Clear	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (Inattention)	79	82			V1 and V2 were traveling westbound on Brown's Lane when V2 rear-ended V1.
70	Saturday, March 14, 2020	12:31	Angle	Daylight	Clear	Dry	Property damage only (none injured)	D1: (Failure to keep in proper lane or running off road) / D2: (No improper driving)	66	53			V1 was turning left onto Lakeview Avenue from Mammoth Road southbound and turned into V2 which was stopped at the intersection, heading westbound on Lakeview Avenue.

CRASH SUMMARY – DRACUT – LAKEVIEW AVENUE @ MAMMOTH STREET – CORE AREA CRASHES  
JANUARY 2017 THROUGH DECEMBER 2021

Crash Number	Date	Crash Time	Collision Type	Roadway Lighting	Weather Condition	Roadway Condition	Severity	Driver Contribution Code	D1 Age	D2 Age	D3 Age	D4 Age	Comments
73	Saturday, June 20, 2020	13:06	Angle	Daylight	Clear	Dry	Property damage only (none injured)	D1: (Disregarded traffic signs, signals, road markings),(Inattention) / D2: (No improper driving)	24	17			V1 was travelling westbound on Lakeview Avenue when it ran a red light and crashed into V2, which was waiting to take a left onto Lakeview Avenue from Mammoth Road southbound.
74	Sunday, June 21, 2020	9:02	Angle	Daylight	Clear	Dry	Property damage only (none injured)	D2: (No improper driving)	60	23			V1 was traveling northbound on Mammoth Road when it failed to yield the right of way and turned left, colliding into V2, which was traveling southbound on Mammoth Road.
75	Tuesday, June 23, 2020	19:13	Rear-end	Daylight	Clear	Dry	Non-fatal injury	D1: (Distracted) / D2: (No improper driving)	36	33			V1 and V2 were traveling northbound on Mammoth Road when V2 stopped for traffic and V1 failed to slow and rear-ended V2.
76	Tuesday, June 23, 2020	19:44	Sideswipe, same direction	Daylight	Clear	Dry	Property damage only (none injured)	D1: (No improper driving) / D2: (Failure to keep in proper lane or running off road)	35	17			V1 and V2 were travelling southbound on Mammoth Road when V2 crashed into V1 while trying to merge into the left turn lane at the intersection with Lakeview Avenue.
78	Monday, August 3, 2020	22:10	Rear-end	Dark - lighted roadway	Clear/Clear	Dry	Property damage only (none injured)		23	48			V1 and V2 were traveling westbound on Brown's Lane when V1 rear-ended V2.
79	Friday, August 14, 2020	20:32	Front to Front	Dark - lighted roadway	Clear	Dry	Non-fatal injury	D1: (Failed to yield right of way) / D2: (No improper driving)	18	19			V1 was traveling northbound on Mammoth Road and turned left into the Dunkin's parking lot and was struck by V2, which was traveling southbound on Mammoth Road.
81	Wednesday, September 30, 2020	5:11	Angle	Dark - lighted roadway	Rain/Cloudy	Wet	Property damage only (none injured)	D1: (Failed to yield right of way),(Inattention)	20	47			V1 was turning right out of the Dunkin's parking lot onto Mammoth Road southbound when it failed to yield the right of way and crashed into V2, which was traveling southbound on Mammoth Road.
85	Friday, December 11, 2020	13:01	Rear-end	Daylight	Clear	Dry	Property damage only (none injured)	D1:(Inattention),(Physical impairment) D2:(No improper driving)	37	22			V1 and V2 were traveling northbound on Mammoth Road when V2 stopped for traffic and V1 failed to slow and rear-ended V2.
87	Friday, January 15, 2021	15:44	Head-on	Daylight	Clear	Dry	Property damage only (none injured)	D1: (Physical impairment) / D2: (No improper driving)	56	22			V1 was traveling southbound on Mammoth Road when the operator passed out and crashed into V2, which was traveling eastbound on Lakeview Avenue.
89	Tuesday, March 9, 2021	1:56	Rear-end	Dark - lighted roadway	Clear	Dry	Non-fatal injury	D1: (Distracted) / D2: (No improper driving)	20	48			V1 and V2 were traveling westbound on Lakeview Avenue when V2 stopped at the Mammoth Road intersection and V1 rear-ended V2 due to distracted driving.





## Appendix D. Additional Information

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# Lakeview Avenue west of Mammoth Road

Start Time	05-May-22 Thu	Eastbound		Hour Totals		Westbound		Hour Totals		Combined Totals	
		Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		12	166			6	3				
12:15		4	162			6	0				
12:30		4	170			5	0				
12:45		7	175	27	673	1	0	18	3	45	676
01:00		5	150			2	0				
01:15		6	169			3	0				
01:30		3	184			3	3				
01:45		4	158	18	661	2	2	10	5	28	666
02:00		1	170			0	5				
02:15		3	183			1	44				
02:30		2	174			2	100				
02:45		4	138	10	665	0	82	3	231	13	896
03:00		0	148			0	88				
03:15		3	169			2	98				
03:30		5	168			3	95				
03:45		4	160	12	645	2	107	7	388	19	1033
04:00		6	201			5	82				
04:15		8	196			2	98				
04:30		8	166			5	87				
04:45		14	184	36	747	11	96	23	363	59	1110
05:00		15	171			10	111				
05:15		19	193			10	138				
05:30		23	185			22	102				
05:45		37	146	94	695	32	104	74	455	168	1150
06:00		52	117			27	76				
06:15		55	108			34	118				
06:30		54	110			75	109				
06:45		83	104	244	439	62	98	198	401	442	840
07:00		110	97			56	92				
07:15		110	83			84	77				
07:30		101	89			123	81				
07:45		105	100	426	369	76	73	339	323	765	692
08:00		136	71			80	79				
08:15		130	73			22	74				
08:30		136	64			3	77				
08:45		138	60	540	268	1	46	106	276	646	544
09:00		146	60			7	38				
09:15		130	60			1	39				
09:30		149	45			1	29				
09:45		131	29	556	194	2	24	11	130	567	324
10:00		118	36			2	27				
10:15		146	45			0	23				
10:30		121	23			2	15				
10:45		147	30	532	134	0	17	4	82	536	216
11:00		136	22			0	20				
11:15		137	13			0	16				
11:30		132	13			0	17				
11:45		152	13	557	61	2	11	2	64	559	125
Total		3052	5551			795	2721			3847	8272
Percent		35.5%	64.5%			22.6%	77.4%			31.7%	68.3%
Total		3052	5551			795	2721			3847	8272
Percent		35.5%	64.5%			22.6%	77.4%			31.7%	68.3%
Combined Total		8603			3516				12119		

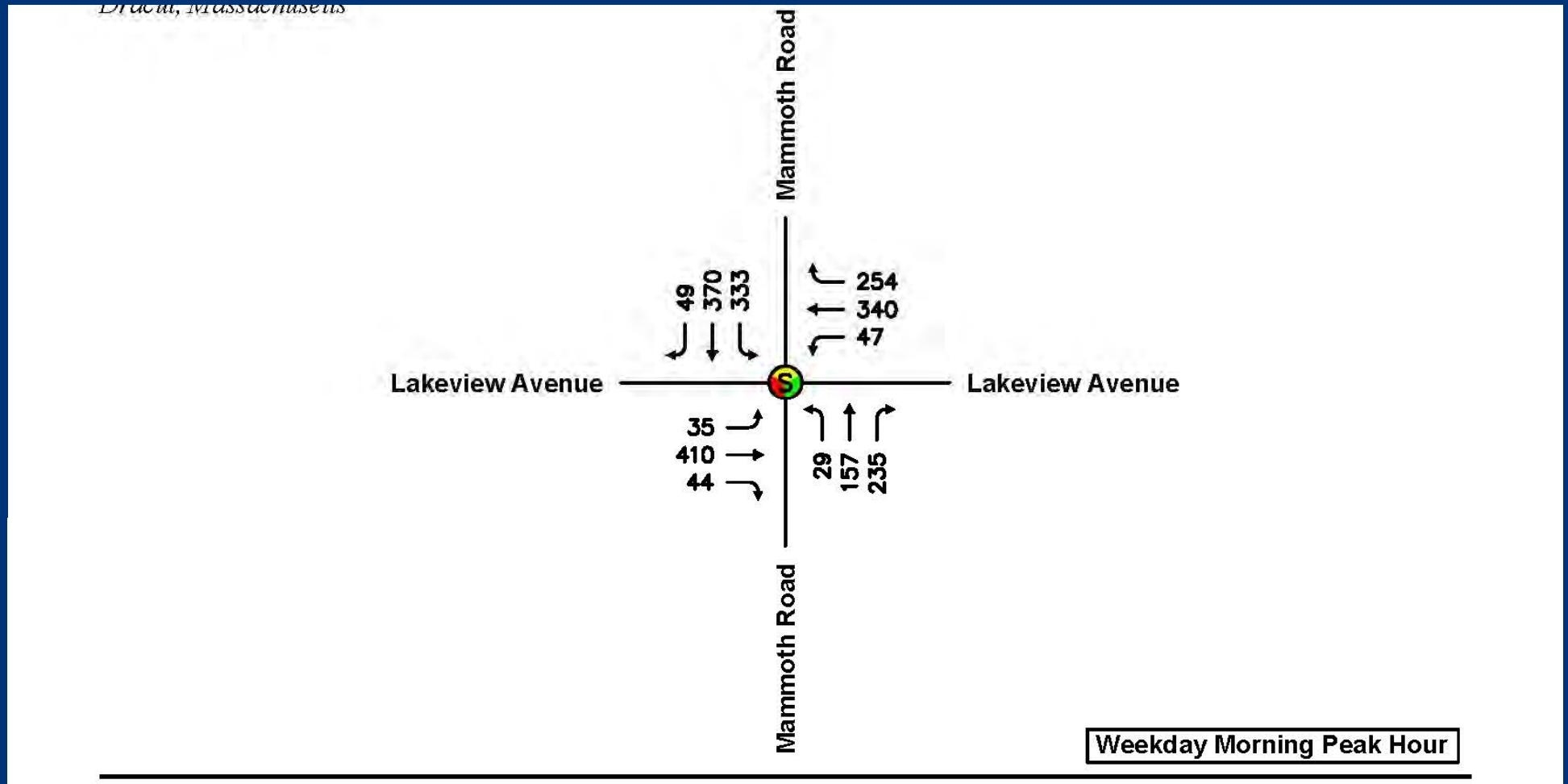
## Eastbound:

Statistics	15th Percentile :	27 MPH
	50th Percentile :	32 MPH
	85th Percentile :	37 MPH
	95th Percentile :	39 MPH
	10 MPH Pace Speed :	26-35 MPH
	Number in Pace :	6295
	Percent in Pace :	73.2%
	Number of Vehicles > 30 MPH :	6287
	Percent of Vehicles > 30 MPH :	73.1%
	Mean Speed(Average) :	33 MPH

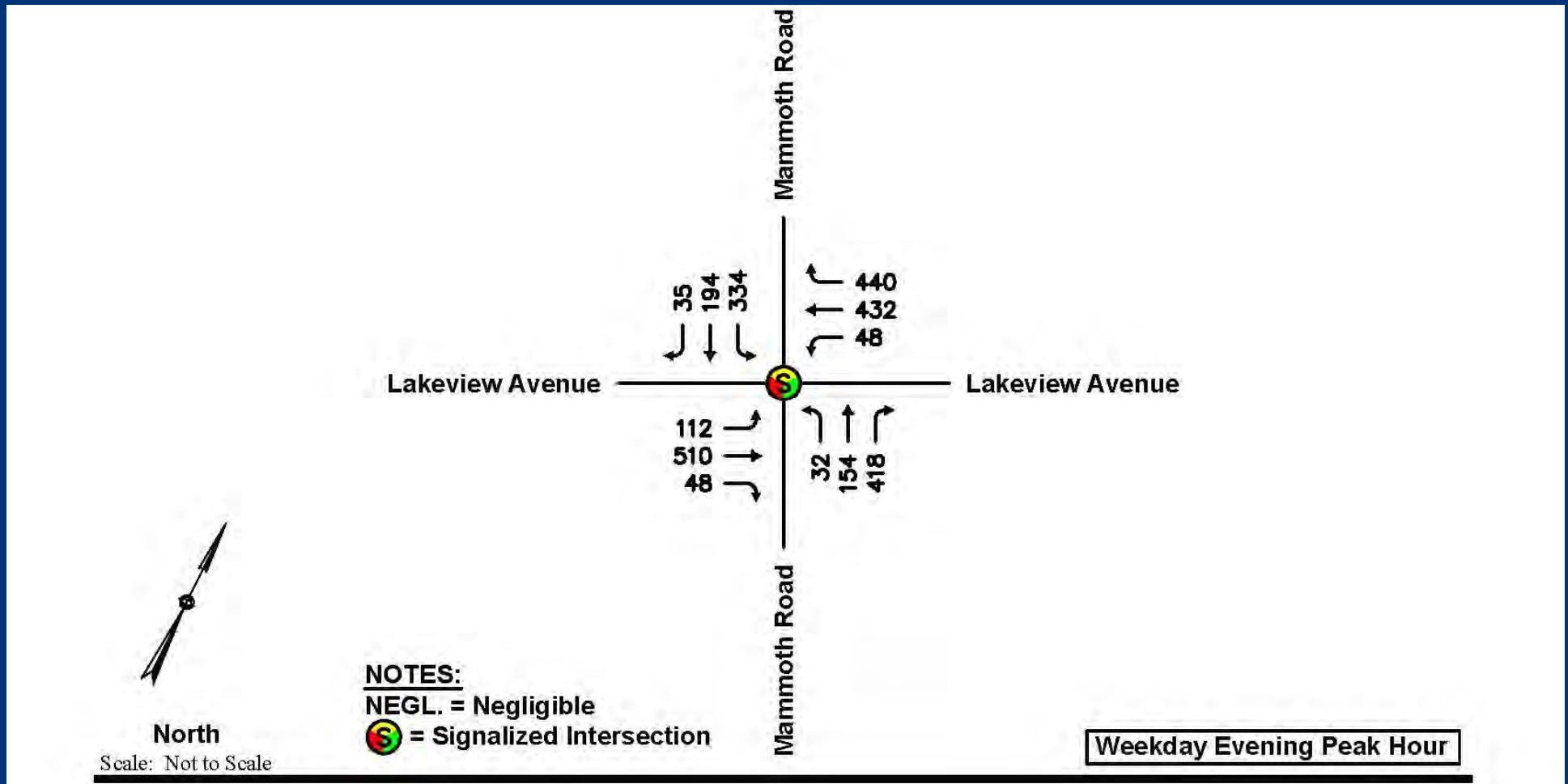
## Westbound:

Statistics	15th Percentile :	26 MPH
	50th Percentile :	31 MPH
	85th Percentile :	36 MPH
	95th Percentile :	39 MPH
	10 MPH Pace Speed :	26-35 MPH
	Number in Pace :	2495
	Percent in Pace :	71.0%
	Number of Vehicles > 30 MPH :	2250
	Percent of Vehicles > 30 MPH :	64.0%
	Mean Speed(Average) :	32 MPH

# Existing Traffic Volumes – AM Peak Hour

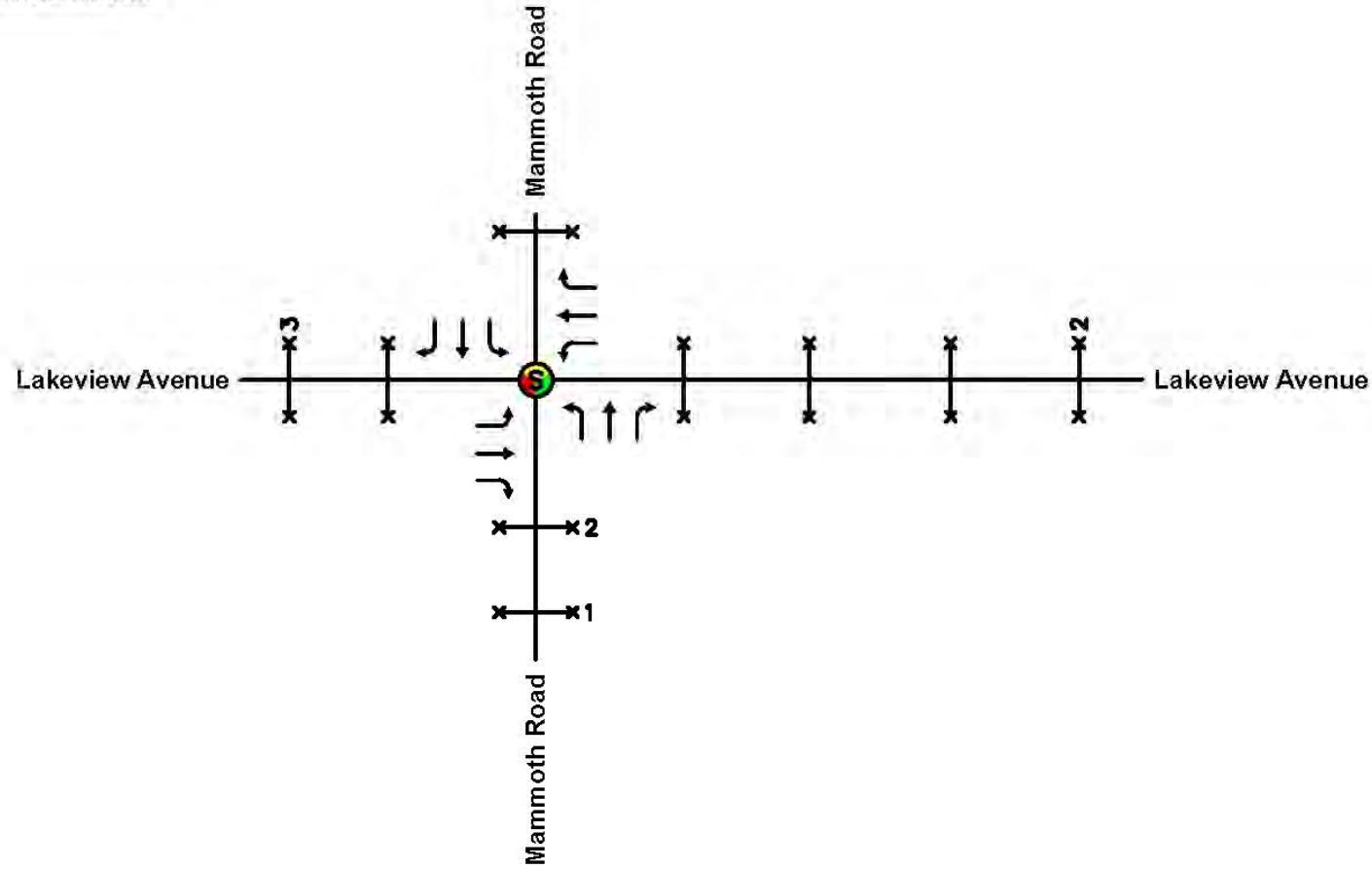


# Existing Traffic Volumes – PM Peak Hour



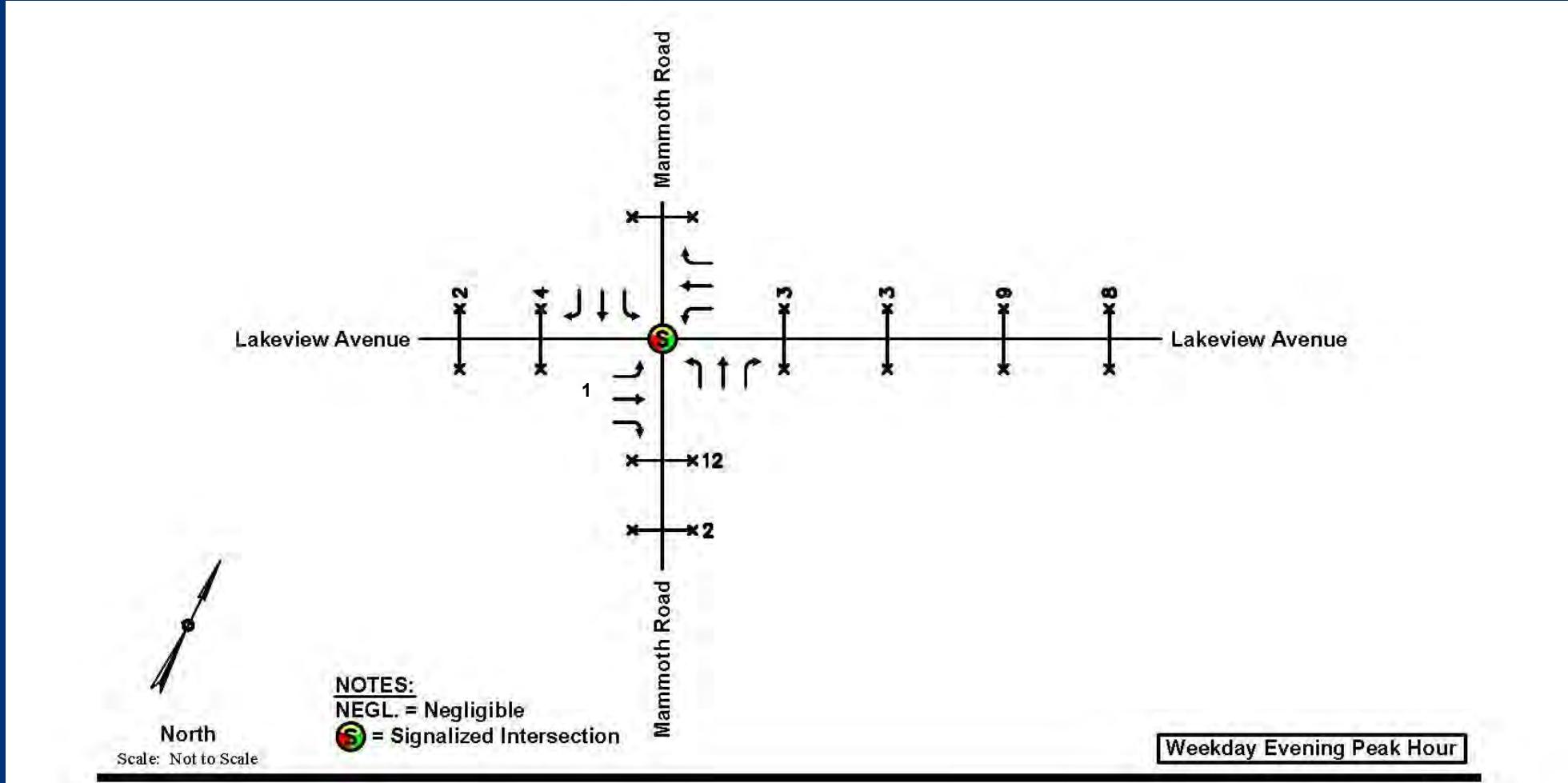
# Existing Pedestrian & Bike Volumes – AM Peak

Dracut, Massachusetts



Weekday Morning Peak Hour

# Existing Pedestrian & Bike Volumes – PM Peak



Mr. Sullivan  
DEC 06 1979

TOWN OF DRACUT  
SPECIAL SPEED REGULATION NO. 915-A

Highway Location: DRACUT

Authority In Control: TOWN OF DRACUT

Name of Highway: MAMMOTH ROAD

In accordance with the provisions of Chapter 90, Section 18, of the General Laws (Ter. Ed.) as amended, the following Special Speed Regulation is

hereby Adopted

by the Board of Selectmen

of the Town of Dracut

Special Speed Regulation number 915 dated May 10, 1974 is hereby amended on Mammoth Road as follows:

That the following speed limits are established at which motor vehicles may be operated in the areas described:

MAMMOTH ROAD-NORTHBOUND

By striking out the clauses reading:

0.90 miles at 35 miles per hour  
0.48 " " 40 " " "  
0.45 " " 35 " " "

And inserting in place thereof:

1.83 miles at 35 miles per hour

MAMMOTH ROAD-SOUTHBOUND

By striking out the clauses reading:

0.45 miles at 35 miles per hour  
0.48 " " 40 " " "  
0.90 " " 35 " " "

And inserting in place thereof:

1.83 miles at 35 miles per hour

Operation of a motor vehicle at a rate of speed in excess of these limits shall be prima facie evidence that such speed is greater than is reasonable and proper.

The provisions of this regulation shall not, however, abrogate in any sense Chapter 90, Section 14, of the General Laws (Ter. Ed.).

Date of Passage October 30, 1979Brenda M. DelaneyJohn F. KellyTom O'Neal

Board of Selectmen

Douglas J. W. ElliottCharles L. Delaney

Attest

Deb H. Beale

Town Clerk

COMMONWEALTH OF MASSACHUSETTS  
DEPARTMENT OF PUBLIC WORKS

## SPECIAL SPEED REGULATION NO. 915-A

The Department of Public Works and the Registrar of Motor Vehicles, acting jointly, do hereby certify that this regulation is consistent with the public interests.

Standard signs must be erected at the beginning of each zone.

DATE: DEC 06 1979

FOR THE DEPARTMENT OF PUBLIC WORKS

BY:

J. R. Keating  
Traffic EngineerE. Theodore O'Connor  
Chief Deputy Registrar

May 10, 1974

Mr. Sullivan

TOWN OF DRACUT  
SPECIAL SPEED REGULATION NO. 915

Highway Location:	DRACUT	
Authority in Control:	TOWN OF DRACUT	
Name of Highway:	Route 38 Route 113 Lakeview Avenue	Nashua Road Mammoth Road Hildreth Street

In accordance with the provisions of Chapter 90, Section 18, of the General Laws (Ter. Ed.) as amended, the following Special Speed Regulation is

hereby Adopted  
by the Board of Selectmen  
of the Town of Dracut

That the following speed limits are established at which motor vehicles may be operated in the areas described:

Route 38 - NORTHBOUND

Beginning at the Lowell City line,  
Thence northerly on Route 38  
0.61 miles at 30 miles per hour *MISSING (30 posted at 28 above)*  
0.54 " " 40 ✓ " " "  
0.98 " " 45 ✓ " " "  
0.21 " " 35 ✓ " " " ending at the Pelham,  
New Hampshire line; the total distance being 2.34 miles.

Route 38 - SOUTHBOUND

Beginning at the Pelham, New Hampshire line,  
Thence southerly on Route 38  
0.21 miles at 35 ✓ miles per hour  
0.98 " " 45 ✓ " " "  
0.54 " " 40 ✓ " " "  
0.61 " " 30 " " " ending at the Lowell  
City line; the total distance being 2.34 miles.

Route 113 - EASTBOUND

Beginning at the Lowell City line,  
Thence easterly on Route 13  
0.50 miles at 25 miles per hour  
0.27 " " 35 " " "  
0.23 " " 25 " " "  
0.35 " " 35 " " "  
0.61 " " 25 " " " ending at the beginning  
of State Highway; the total distance being 1.96 miles.

Route 113 - WESTBOUND

Beginning at the end of State Highway,  
Thence westerly on Route 113  
0.61 miles at 25 miles per hour  
0.35 " " 35 " " "  
0.23 " " 25 " " "  
0.27 " " 35 " " "  
0.50 " " 25 " " " ending at the Lowell  
City line; the total distance being 1.96 miles.

Lakeview Avenue - NORTHBOUND

Beginning at the Lowell City line,  
Thence northerly on Lakeview Avenue  
0.83 miles at 30 miles per hour  
1.37 " " 35 " " "  
0.36 " " 25 " " "  
0.33 " " 40 " " "  
0.05 " " 25 " " " ending at Nashua Road;  
the total distance being 2.94 miles.

Lakeview Avenue - SOUTHBOUND

Beginning at Nashua Road,  
Thence southerly on Lakeview Avenue  
0.38 miles at 40 miles per hour  
0.36 " " 25 " " "  
1.37 " " 35 " " "  
0.83 " " 30 " " " ending at the Lowell  
City line; the total distance being 2.94 miles.

Nashua Road - NORTHBOUND

Beginning at Mammoth Road,  
Thence northerly on Nashua Road  
1.05 miles at 35 miles per hour  
0.26 " " 25 " " "  
0.75 " " 35 " " " ending at the Tyngsborough  
Town line; the total distance being 2.06 miles.

Nashua Road - SOUTHBOUND

Beginning at the Tyngsborough Town line,  
Thence southerly on Nashua Road  
0.75 miles at 35 miles per hour  
0.26 " " 25 " " "  
0.99 " " 35 " " "  
0.06 " " 25 " " " ending at Mammoth Road;  
the total distance being 2.06 miles

Mammoth Road - NORTHBOUND

Beginning at the Lowell City line,  
Thence northerly on Mammoth Road  
*183 W 35* { 0.90 miles at 35 miles per hour  
0.48 " " 40 " " "  
0.45 " " 35 " " "  
0.29 " " 25 " " "  
0.98 " " 35 " " " ending at the Pelham, New  
Hampshire line; the total distance being 3.10 miles.

Mammoth Road - SOUTHBBOUND

Beginning at the Pelham, New Hampshire line,  
Thence southerly on Mammoth Road  
0.98 miles at 35 miles per hour  
0.29 " " 25 " " "  
*183* { 0.45 " " 35 " " "  
0.43 " " 40 " " "  
0.90 " " 35 " " " ending at the Lowell City  
line; the total distance being 3.10 miles.

Hildreth Street - NORTHBOUND

Beginning at the Lowell City line,  
Thence northerly on Hildreth Street  
0.17 miles at 25 miles per hour  
0.78 " " 35 " " "  
0.57 " " 30 " " "  
0.28 " " 35 " " "  
0.25 " " 30 " " "  
0.72 " " 25 " " " ending at the Pelham, New  
Hampshire line; the total distance being 2.77 miles.

Hildreth Street - SOUTHBBOUND

Beginning at the Pelham, New Hampshire line,  
Thence southerly on Hildreth Street  
0.72 miles at 25 miles per hour  
0.25 " " 30 " " "  
0.28 " " 35 " " "  
0.57 " " 30 " " "  
0.78 " " 35 " " "  
0.17 " " 25 " " " ending at the Lowell City  
line; the total distance being 2.77 miles.

Operation of a motor vehicle at a rate of speed in excess of these limits shall be *prima facie* evidence that such speed is greater than is reasonable and proper.

The provisions of this regulation shall not, however, abrogate in any sense Chapter 90, Section 14, of the General Laws (Ter. Ed.).

Date of Passage February 10, 1974

John J. Gallagher

William A. Day

Clester L. Clutten

George L. Sayo  
Board of Selectmen

Attest

Keith G. Bent  
Town Clerk

COMMONWEALTH OF MASSACHUSETTS  
DEPARTMENT OF PUBLIC WORKS

SPECIAL SPEED REGULATION NO. 915

The Department of Public Works and the Registrar of Motor Vehicles, acting jointly, do hereby certify that this regulation is consistent with the public interests.

Standard signs must be erected at the beginning of each zone.

DATE: May 10, 1974

FOR THE DEPARTMENT OF PUBLIC WORKS

BY:

L. T. Ruckman  
Traffic Engineer

David J. Lucy  
Registrar of Motor Vehicles

## Appendix E. Road Safety Audit References

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## Road Safety Audit References

*FHWA Office of Safety - Proven Safety Countermeasures*, U.S. Department of Transportation, Federal Highway Administration <https://safety.fhwa.dot.gov/provencountermeasures/>.

*Road Safety Audits, A Synthesis of Highway Practice*. NCHRP Synthesis 336. Transportation Research Board, National Cooperative Highway Research Program, 2004.

*Road Safety Audits*. U.S. Department of Transportation, Federal Highway Administration, <https://safety.fhwa.dot.gov/rsa/>

*FHWA Road Safety Audit Guidelines*. U.S. Department of Transportation, Federal Highway Administration, 2006.

*Road Safety Audit*, 2<sup>nd</sup> edition. Austroads, 2000.

*Road Safety Audits*. ITE Technical Council Committee 4S-7. Institute of Transportation Engineers, February 1995.