

ROAD SAFETY AUDIT

Dascomb Road (Frontage Road to I-93 NB Ramps)

Town of Andover

March 29, 2017

Prepared For:
Massachusetts Department of Transportation



Town of Andover, Massachusetts



Prepared By:
TEC, Inc.
65 Glenn Street
Lawrence, MA 01843



Table of Contents

Contents

Background	1
Project Data	2
Project Location and Description.....	3
Audit Observations and Potential Safety Enhancements.....	9
Summary of Road Safety Audit.....	19

List of Appendices

Appendix A.	RSA Meeting Agenda
Appendix B.	RSA Audit Team Contact List
Appendix C.	Detailed Crash Data
Appendix D.	Additional Information
Appendix E.	RSA References

List of Figures

Figure 1: Locus Map	5
---------------------------	---

List of Tables

Table 1: Participating Audit Team Members.....	2
Table 2: Stopping Sight Distance Summary	6
Table 3: Intersection Sight Distance Summary.....	6
Table 4: Crash Rates by Intersection	7
Table 5: Crash Data Summary	8
Table 6: Estimated Time Frame and Costs Breakdown.....	19
Table 7: Potential Safety Enhancement Summary.....	20

Background

TEC, Inc. (TEC), in cooperation with the Town of Andover and the Massachusetts Department of Transportation (MassDOT), is evaluating the existing traffic safety characteristics at the Dascomb Road / Frontage Road and Dascomb Road / Interstate 93 (I-93) Northbound (NB) Ramps intersections in Andover, Massachusetts. TEC is conducting this safety evaluation as the first step towards off-site improvements for the proposed #146 Dascomb Road Redevelopment project. To date, the private mixed-use development project is in the early planning phase and is anticipated to begin state review with the Massachusetts Environmental Policy Act (MEPA) office in the spring of 2017.

Road Safety Audit Justification

A Road Safety Audit (RSA), as defined by the Federal Highway Administration (FHWA), is the *formal safety performance examination of an existing or future road or intersection by an independent, multidisciplinary team*. The purpose of the RSA is to observe, identify, and report all safety issues and identify future opportunities for safety enhancement improvements for all roadway users. This includes identifying both short-term and long-term safety enhancements that can be implemented through general maintenance, immediate installation/removal, or could be potentially incorporated into future improvement projects. Enhancements, or improvements, can take the form of one or more of the 4 E's; including: **E**ngineering, **E**ducation, **E**mergency Response, and **E**nforcement.

The U.S. Congress enacted the “Safe, Accountable, Flexible, Efficient, Transportation Act - A Legacy for Users” (SAFETEA-LU) in August 2005. This act provides guidance and funding for the implementation of a State Highway Safety Improvement Program (HSIP). As part of this Program, all states are required to develop a Strategic Highway Safety Plan (SHSP). The MassDOT guidelines require an RSA be conducted where HSIP-eligible crash clusters are present within the study area of a transportation improvement project prior to commencing or finalizing a 25% Design. In this case, the RSA is being conducted during the early MEPA review process. An intersection is defined as HSIP-eligible if the intersection is within the top 5% of crash clusters in its respective Regional Planning Commission (RPC) boundaries based on Equivalent Property Damage Only (EPDO). EPDO rates crashes based on the crash severity.

HSIP Eligibility

Based on the MassDOT online crash cluster database, the Dascomb Road / Smith Drive intersection is considered 2012-2014 HSIP-eligible. Upon further review of the compiled crash reports, many of the crashes that MassDOT geocoded to the intersection of Dascomb Road / Smith Drive were found to be incorrectly placed. Crash reports indicate that nearly all of these crashes occurred at or within the influence of the Dascomb Road / Frontage Road intersection, which is located approximately 600 feet to the east. TEC had identified this error with the MassDOT Traffic Safety Section in October 2016. As part of all subsequent traffic related documents, the intersection of Dascomb Road / Smith Drive will not be considered HSIP-eligible; however the intersection of Dascomb Road / Frontage Road is to be considered.

The Interstate 93 Interchange 42 is considered HSIP-eligible as a whole. Like many freeway interchanges throughout the Commonwealth, a large number of crashes that occurred along the freeway segment,

ramps, surface intersections, and at locations far upstream and downstream of the interchanges are geocoded to the interchange regardless of influence location. Therefore, it is difficult to decipher where the crash issues, if any, exist on or at the general interchange. After a review of all interchange crash reports, the reports indicated that the surface intersection of Dascomb Road / I-93 NB Ramps is HSIP-eligible separate from the interchange.

Project Data

TEC of Lawrence, Massachusetts is the primary traffic safety investigation consultant in this RSA for the Dascomb Road / Frontage Road and Dascomb Road / I-93 NB Ramps intersections. The RSA meeting was conducted on Wednesday, December 14, 2016 at 1:00 PM, with the pre- and post-audit meetings held at the Andover Public Safety Center, located at #32 North Main Street in Andover, Massachusetts. A copy of the RSA agenda can be found in Appendix A. TEC and representatives of the Town have also conducted various other field visits to the audit location as part of their private development project scoping process.

As presented in Table 1 below, the audit team consisted of a cross-section of state, regional, and local engineering, enforcement, maintenance, and emergency response professionals and was assembled in conjunction with input from MassDOT's Traffic Safety Management Unit. Contact information for all participating audit team members is provided in Appendix B.

Table 1: Participating Audit Team Members

Audit Team Member	Agency/Affiliation
Brian Moore	Andover Engineering Department
Paul Materazzo	Andover Planning Department
Glen Ota	Andover Police Department
Chris Moore	Andover Police Department
John Mangiaratti	Andover Town Manager
Adam Prichard	MassDOT Traffic Safety
Michelle Deng	MassDOT Traffic Safety
Elsa Chan	MassDOT Traffic Safety
Tony Komornick	Merrimack Valley Planning Commission (MVPC)
Jim Terlizzi	Merrimack Valley Planning Commission (MVPC)
Tim Roberts	MassDOT District 4
Timothy Paris	MassDOT District 4
Mikel Myers	TEC, Inc.
Rick Friberg	TEC, Inc.
Samuel Gregorio	TEC, Inc.

Audit participants were provided with materials to review prior to the audit meeting. The materials included a summary of crash data, collision diagrams (See Appendix), a summary of the type and severity of crashes, and traffic volume data. Participants were encouraged to visit the site prior to the audit and urged to consider elements on MassDOT's Safety Review Prompt List.

On the day of the audit, a pre-audit meeting was held to discuss the project's background, the audit process, review the distributed materials, and discuss some of the issues that team members had

observed individually. The audit site walk consisted of field observations at the audit intersections. Handwritten notes and photographs documented the observations made by audit team members during the site walk. Following the audit site walk, a post-audit meeting was held where the team confirmed the observations made in the field and offered solutions to enhance the safety of areas noted in the site walk and pre-audit meeting.

Project Location and Description

The RSA was conducted at the Dascomb Road / Frontage Road and Dascomb Road / I-93 NB Ramps intersections in the Town of Andover, Massachusetts. A study area location map is provided in Figure 1. A detailed description of the study area roadways and intersections is provided below:

Existing Geometry and Infrastructure Summary

Dascomb Road

Dascomb Road is a northeast-southwest urban minor arterial roadway maintained by the Town of Andover. MassDOT maintains a short segment of the roadway between Frontage Road and the I-93 NB Interchange 42 Ramps. For the purposes of this audit, the cardinal direction of the corridor is east-west. Within the Town of Tewksbury, the corridor is signed as East Street. The corridor provides a local connection between Tewksbury Center to the west and Andover Street to Andover Center to the east. Dascomb Road ranges from approximately 42 to 55-foot wide and features a posted speed limit of 35 miles per hour (mph) within the vicinity of the audit site. Land uses along Dascomb Road include residential and industrial uses. Dascomb Road / East Street to the west carries a significant level of heavy vehicle traffic as a result of the Market Basket Headquarters and Distribution Warehouse located approximately 1-mile west of the audit area.

Frontage Road

Frontage Road is a north-south local roadway maintained by the Town of Andover. The roadway provides a local connection between Osgood Street and the Raytheon facility to the north and Dascomb Road to the south as well as regional access to the I-93 SB Interchange 42 Ramps. Frontage Road is approximately 53-foot wide and does not feature a posted speed limit within the vicinity of the audit area. Land uses along Frontage Road are predominantly industrial in nature. Immediately north of Dascomb Road, Frontage Road provides access/egress to a MassDOT Park 'n' Ride facility.

Intersection: Dascomb Road / Frontage Road

Frontage Road intersects Dascomb Road to form a three-way, T-type, fully-actuated signalized intersection. The Dascomb Road eastbound approach consists of an exclusive left-turn lane and a through lane, while the Dascomb Road westbound approach consists of two through lanes and a channelized right-turn lane, which operates under YIELD-control. Directional flow along Dascomb Road is separated by a marked centerline. The Frontage Road southbound approach consists of an exclusive left-turn lane and a channelized right-turn lane, which operates under YIELD-control. Directional flow along Frontage Road is separated by a raised concrete median which transitions to a marked centerline. Sidewalks and crosswalks are not provided along any of the roadways or intersection approaches. Although the traffic

signal is programmed for coordination, the traffic signal currently operates under free operation. The master controller unit, which is not currently connected and is located at the adjacent East Street / Shawsheen Street / Dascomb Road intersection, will be transferred to this intersection upon further improvements to the corridor signalization per MassDOT.

Recently in the late summer of 2016, MassDOT installed a permitted flashing yellow arrow (FYA) left-turn indication along Dascomb Road eastbound. Anecdotal information from an RSA team member indicates that the installation of the FYA indication has made a minimal impact on the occurrence of crashes on the left-turn movement.

Intersection: Dascomb Road / Interstate 93 Northbound Ramps [Interchange 42]

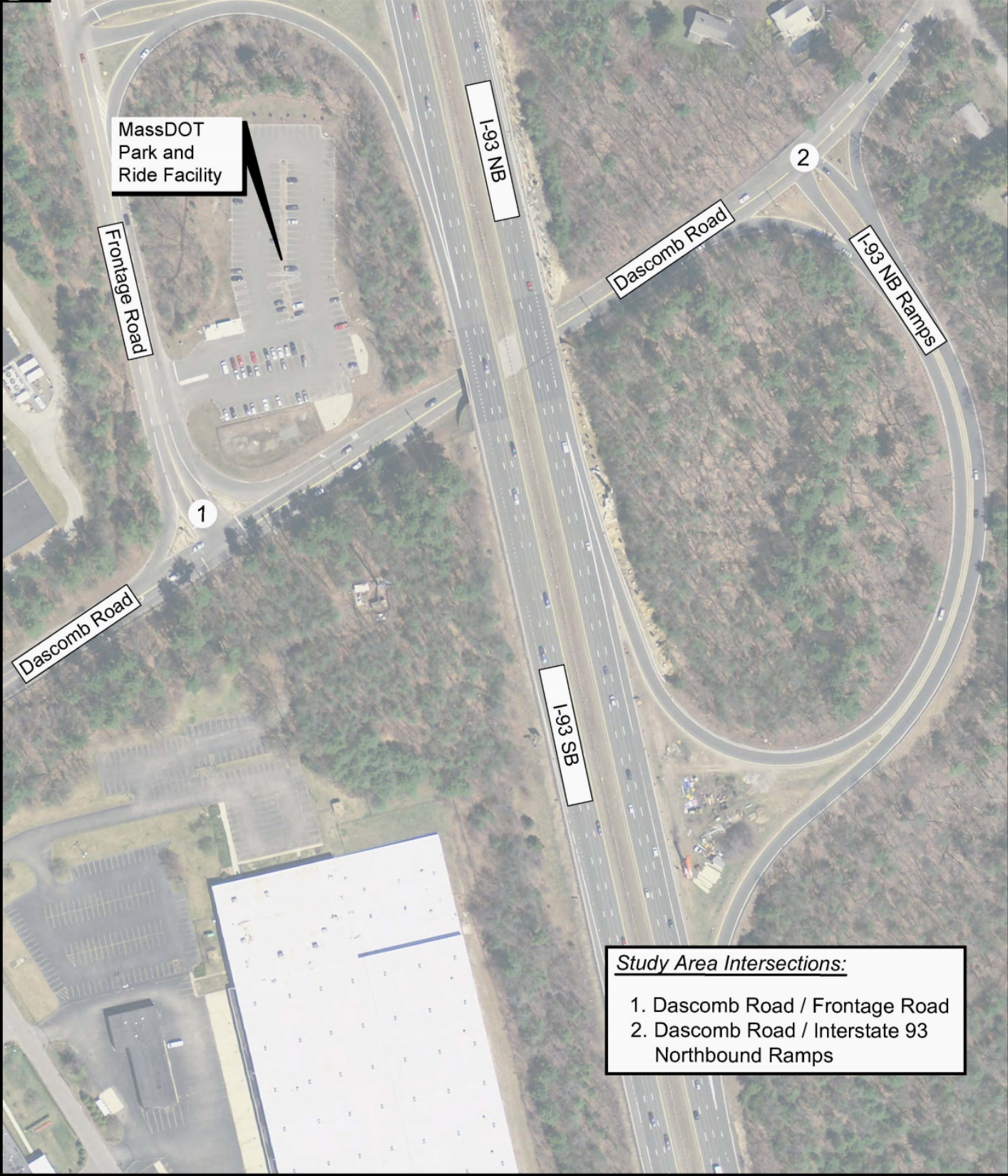
The Interstate 93 Northbound Interchange 42 Ramps (I-93 NB Ramps) intersect Dascomb Road to form a three-way, T-type, unsignalized intersection. The intersection is constructed as a standard half-cloverleaf. The Dascomb Road eastbound approach consists of a through lane and a channelized right-turn lane. The Dascomb Road westbound approach consists of an exclusive left-turn lane and a through lane. Directional flow along Dascomb Road is separated by a marked centerline. The I-93 NB Ramps northbound approach consists of an exclusive left-turn lane and a channelized right-turn lane, which operates under YIELD-control. The ramp is marked as one travel lane immediately south of the channelization. Directional flow along the I-93 NB Ramps is separated by a landscaped median which transitions to a raised concrete median. Sidewalks and crosswalks are not provided along any of the roadways or intersection approaches. Upon observation, the queue for the left-turn movement along the I-93 NB Ramps is extensive during the commuter peak periods. To bypass this extensive queue, left-turning vehicles often turn right instead and then make a U-turn on one of the nearby side streets. As a result, many side street roadways to the east along Dascomb Road are signed for prohibited reverse movements. Although much of the off-ramp is striped as one-lane, left-turning vehicles will queue against the far left shoulder allowing right-turning vehicles to by-pass.

Sight Distance Measurements

TEC visited the site on Monday, October 11, 2016 to measure the available sight distances along the study area roadways. The available sight distances were compared to minimum requirements established by the American Association of State Highway and Transportation Officials (AASHTO).

Sight distance represents the length of roadway that is visible to a driver traveling within the roadway. Two types of sight distance are typically evaluated for driveways and intersections: stopping sight distance (SSD) and intersection sight distance (ISD). SSD is the minimum distance required for a driver traveling along a roadway to perceive an object in the roadway and stop safely in advance of the object when traveling on a wet pavement surface. SSD is measured from an eye height of 3.5 feet to an object height of two (2) feet above the ground, which is equivalent to a driver viewing the taillight of a vehicle ahead. SSD is measured along the centerline of the travel lane approaching the driveway or intersection.

North
1" = 200'



T:\T0680\CAD\Highway\Graphics\T0680_Locus Map.dwg 12/19/2016 3:40:52 PM

Figure 1

Project Location Map &
Study Area Intersections



ISD represents the length of the roadway visible to a driver waiting to exit a driveway or minor street. The minimum ISD desired are based on the distance required for a driver to exit a minor street onto a major street without requiring an approaching vehicle to reduce its speed from the design speed to less than 70 percent of the design speed. ISD is measured from an eye height of 3.5 feet to an object height of 3.5 feet, and is measured from a distance 14.5 feet off the edge of the travel-way of the major roadway to represent a driver waiting to exit a driveway or minor roadway.

SSD is typically considered the critical sight distance, as it represents the minimum distance required for safe stopping, while ISD represents an acceptable speed reduction for approaching vehicles. The ISD, however, must be at least equal to the minimum required SSD in order to prevent a driver from entering the roadway when an approaching vehicle is too close to safely stop. The guidance provided by AASHTO states:

“If the available sight distance for an entering or crossing vehicle is at least equal to the appropriate stopping sight distance for the major road, then drivers have sufficient sight distance to anticipate and avoid collisions. However, in some cases, this may require a major-road vehicle to stop or slow to accommodate the maneuver by a minor-road vehicle. To enhance traffic operations, intersection sight distances that exceed stopping sight distances are desirable along the major road.”

Tables 2 and 3 provide a summary of the available SSD and ISD at the audit intersections, respectively. The posted speed of along Dascomb Road is 35 MPH. For calculation purposes, the 85th percentile speed measured from the Automatic Traffic Recorder (ATR) counts was utilized as the design speed to provide a conservative depiction of sight distance criteria.

Table 2: Stopping Sight Distance Summary

Approach / Direction	Design Speed ^(a)	Minimum Required	Measured Sight Distance
Dascomb Road EB	36	260 FT	>500 FT
Dascomb Road WB	40	305 FT	>500 FT

^a 85th percentile speed utilized as measurement of “Design Speed” for Dascomb Road approaches

Table 3: Intersection Sight Distance Summary

Approach / Direction	Design Speed ^(a)	Minimum Required ISD	Desired ISD	Measured ISD
Frontage Road SB – Looking East	40	305 FT	445 FT	>500 FT
I-93 NB Ramps NB – Looking East	40	305 FT	445 FT	>500 FT
I-93 NB Ramps NB – Looking West	36	260 FT	400 FT	>500 FT

^a 85th percentile speed utilized as measurement of “Design Speed” for Dascomb Road approaches

The sight distance measurements, as shown in Tables 2 and 3, indicate that the SSD approaching the intersections exceed the minimum recommendations for safe operations. The measurements also indicate that the ISD exceed both minimum recommended and desired sight lines.

General Crash History

Crash incident reports for the Dascomb Road / Frontage Road and Dascomb Road / I-93 NB Ramps intersections were compiled and analyzed for the most recent consecutive 5+ year period (January 2011 – September 2016) on file with the Town of Andover Police Department and supplemented by crash reports provided by MassDOT.

In addition to examining the number of crashes at the intersections, a crash rate was calculated to compare the occurrence of crashes to the volume of traffic passing through the intersection. The crash rate per million entering vehicles (MEV) was calculated using the evening peak hour traffic volumes from the Turning Movement Counts (TMCs), and a K-factor of 0.085 was determined from ATR counts conducted along Dascomb Road. The crash rate at each of the intersections was compared to the statewide and district-wide averages published by MassDOT in February 2016 to determine the significance of the crash occurrence. The statewide average for the signalized intersections is 0.77, and the District 4 average for signalized intersections is 0.73. The statewide average for unsignalized intersections is 0.58, and the District 4 average for unsignalized intersections is 0.56.

The crash rate per MEV for the Dascomb Road / Frontage Road and Dascomb Road / I-93 NB Ramps intersections are provided in Table 4.

Table 4: Crash Rates by Intersection

Intersection	Total Crashes	Crash Rate
Dascomb Road / Frontage Road	69	1.05
Dascomb Road / I-93 NB Ramps	26	0.45

Below is a general crash history summary for the Dascomb Road / Frontage Road and Dascomb Road / I-93 NB Ramps intersections. Further information regarding crashes is provided in the General Observations section. A detailed breakdown of the reported collisions is provided in Table 5.

Intersection: Dascomb Road / Frontage Road

The intersection of Dascomb Road / Frontage Road experienced an average of approximately 12 reported crashes per year during the 5+ year study period. The crash rate for this intersection is higher than the statewide and district-wide averages for signalized intersections. More than half (38 of 69) of the reported crashes located at this intersection were angle crashes in which an eastbound left-turning vehicle and westbound through vehicle made contact. An additional 15 crashes were designated as rear-end crashes that occurred within the channelized right-turn lane along Frontage Road southbound. These two crash occurrences resulted in over 75 percent of the total intersection crashes at the intersection.

Approximately 40 percent of the reported crashes resulted in non-fatal injuries. An RSA team member noted that the high injury occurrence is a direct result of the “T-bone” nature of the angled crashes. Approximately 45 percent of the crashes occurred between 3:00 PM to 9:00 PM during the late-afternoon and evening peak period which represents the peak traffic period for Dascomb Road eastbound traffic. Nearly 35 percent (24 of 69) of the crashes occurred during the nighttime (dark - lighted or dark – not lighted) period, indicating the intersection may not be properly illuminated.

Table 5: Crash Data Summary

		Dascomb Road @ Frontage Road	Dascomb Road @ I- 93 NB Ramps
Crash Year:	2011	8	5
	2012	13	3
	2013	12	2
	2014	13	3
	2015	10	7
	2016 ¹	13	6
TOTAL		69	26
Annual Average Crash Rate (MEV)		12.00	4.52
		1.05	0.45
Type:	Angle	38	18
	Rear-End	24	3
	Sideswipe	2	0
	Head-on	3	1
	Single Vehicle	2	3
	Ped / Bike	0	1
	Not Reported	0	0
TOTAL		69	26
Surface Conditions:	Dry	54	22
	Wet	12	2
	Snow / Ice / Slush	2	1
	Other / Unknown	1	1
TOTAL		69	26
Severity:	Property Damage	43	19
	Non-Fatal Injury	26	7
	Not Reported	0	0
TOTAL		69	26
Day of Week:	Monday-Friday	56	20
	Saturday-Sunday	13	6
TOTAL		69	26
Time of Day:	6:00AM-9:00AM	11	5
	9:00AM-12:00PM	9	1
	12:00PM-3:00PM	5	5
	3:00PM-6:00PM	12	7
	6:00PM-9:00PM	19	4
	9:00PM-6:00AM	13	4
TOTAL		69	26
Ambient Light:	Daylight	40	18
	Dawn/Dusk	5	2
	Dark – Lighted	24	6
TOTAL		69	26

¹ 2016 data include crashes occurring between 1/1/2016 and 9/31/2016.

Intersection: Dascomb Road / I-93 NB Ramps

The intersection of Dascomb Road / I-93 NB Ramps experienced an average of more than four (4.52) crashes per year during the 5+ year study period. The crash rate for this intersection is significantly lower than the statewide and district-wide averages for unsignalized intersections. Approximately 69 percent (18 of 26) of the crashes were designated as angle crashes, which are typical of unsignalized intersections on half-cloverleaf interchanges. The high rate of angled crashes may be a result of the high travel speeds along Dascomb Road where vehicles attempting to enter the roadway misjudge the gap in traffic. Nearly half (12 of 26) of the crashes attributed “Failure to Yield Right-of-Way” as the primary cause.

Approximately 30 percent of the crashes resulted in non-fatal injuries. In addition, approximately 30 percent of the crashes occurred during the evening commuter peak period (3:00 PM to 6:00 PM) which represents the peak traffic period for Dascomb Road eastbound traffic and a period for which the queue along the I-93 NB Ramp northbound approach is at its peak length. Roughly 23 percent (6 of 26) of the crashes occurred during the nighttime (dark - lighted or dark – not lighted) period, indicating the intersection may not be properly illuminated.

Note that the crash data provided as part of the Appendix indicates the main contributing factor of the crash that was included on the crash report and may not be indicative of what is described in the report narrative. Further details regarding the crash data is noted in the following RSA sections.

Audit Observations and Potential Safety Enhancements

Pre- and post-RSA site walk meetings were held at the Andover Public Safety Center, located at #32 North Main Street in Andover. The pre-audit meeting included brief introductions, an overview of the future design project and RSA process, and an overview of the safety characteristics of the Dascomb Road / Frontage Road and Dascomb Road / I-93 NB Ramps intersections. Each participant was asked to provide his or her concerns and comments related to the safety issues at the intersections. This process was also utilized during comment periods after the audit meeting.

Based on a summary of the existing crash information and the RSA site visit, audit participants identified both corridor-wide safety issues and safety issues that were unique to each of the individual intersections. The findings are summarized below.

Summary of Safety Concerns

The RSA Team identified the following safety issues prior to, during, and after the field visit:

- Solar Glare
- Red Light Running
- Permitted Left-Turn Traffic Signal Phasing
- YIELD Channelization at Traffic Signal
- Sub-Standard Pedestrian and Bicycle Accommodations
- Lack of / Misplacement of Pavement Markings and Regulatory Signage
- Drainage and Debris
- Vehicle Queue Length, Congestion, and Courtesy Gaps
- Speed
- Dascomb Road Westbound Lane Delineation at I-93 NB Ramps

The following section provides a detailed summary of the identified safety concerns and potential safety enhancements along the corridor and at the two intersections.

Safety Issue #1: Solar Glare

Solar glare along the corridor currently makes it difficult for drivers to see along Dascomb Road westbound, where the direction of travel and lack of overhead canopy invites direct sunlight onto the roadway. The issue is exacerbated in the Dascomb Road westbound direction as vehicles approach the I-93 overpass and leave the sun-field for an extended period due to the noise barriers along I-93 across the overpass. When the vehicle passes the far-side of the overpass, the sun is unblocked. Only one (1) crash report identified solar glare as a direct factor in the crash; however, solar glare may be a contributing factor in other crashes during the afternoon and evening commuter peak periods. Solar glare does not appear to be an issue for travel along Dascomb Road eastbound.

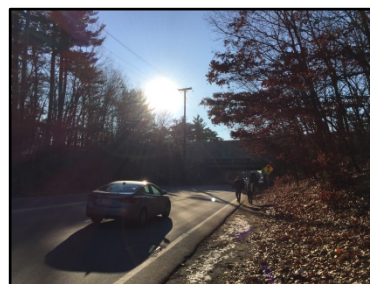


Image 1: Solar glare along Dascomb Road westbound.

To partially mitigate the impacts of solar glare, retro-reflective back plates were installed onto the existing traffic signal housings for the intersection of Dascomb Road / Frontage Road as part of the recent transportation improvement project for the adjacent Dascomb Road / Shawsheen Street / East Street intersection.

Potential Safety Enhancements:

1. Install under-deck lighting under the I-93 overpass to reduce the impact on drivers' eyes as they transition from glare-darkness-glare.
2. Install advanced warning signage along Dascomb Road westbound to provide notice of solar glare to motorists.

3. Should an alternative for the installation of additional traffic signals along the corridor be implemented, install retro-reflective back plates and tunnel visors on all traffic signal indications to increase signal visibility.

Safety Issue #2: Red Light Running

Specific Observations:

Four (4) of the crashes that occurred at the signalized intersection of Dascomb Road / Frontage Road include a vehicle running a red light. Three (3) of these four (4) crashes involved a Dascomb Road westbound vehicle running the red light. All three (3) of the crashes that resulted from the red-light running in the westbound direction occurred during the Dascomb Road eastbound protected left-turn traffic signal phase.

Potential Safety Enhancements:

1. Re-calculate traffic signal clearance intervals based on standard guidelines for travel speed, roadway grade, and intersection width.
2. Increase enforcement of red-light running at and in the vicinity of the Dascomb Road corridor.

Safety Issue #3: Permitted Left-Turn Signal Phasing

Specific Observations:

The Dascomb Road eastbound left-turn movement at the Frontage Road intersection is currently controlled with a protected left-turn traffic signal phase, followed by a permitted left-turn traffic signal phase. The permitted phase currently operates with a FYA, which was recently installed in the summer of 2016. More than half (38 of 69) of the reported crashes located at this intersection were angle crashes in which an eastbound left-turning vehicle and westbound through vehicle made contact. This indicates that most, if not all, of these crashes resulted during the permitted left-turn traffic signal phasing. Anecdotal information from an RSA team member indicates that the installation of the FYA has made a minimal impact on the occurrence of crashes on the left-turn movement; however there is insufficient data to confirm this information.

A representative of the Town of Andover noted that the two through lanes along Dascomb Road westbound through the Frontage Road intersection result in potential conflicts from courtesy gaps. A courtesy gap is created when a Dascomb Road westbound vehicle stops on the green traffic signal indication and “waves” a Dascomb Road eastbound vehicle to turn left. Because Dascomb Road westbound is two through lanes, westbound traffic may by-pass the stopped vehicle unknowing that a “wave” is allowing the left-turning vehicle to go.



Image 2: Dascomb Road westbound approach at Frontage Road.

Potential Safety Enhancements:

1. Further evaluate the crash impacts of the FYA installation on the Dascomb Road eastbound approach.
2. Consider the removal of the Dascomb Road eastbound permitted left-turn phase and retain only the protected left-turn phasing.
3. Consider narrowing the cross-section of Dascomb Road westbound to consist of only one through lane. Exploration of this alternative will require evaluation of potential queuing that may result during the commuter peak periods. This will help eliminate potential conflicts with the existing merge condition upstream at the channelized right-turn lane.

Safety Issue #4: YIELD Channelization at Traffic Signal

Specific Observations:

The Frontage Road southbound right-turn movement is currently separated from left-turning southbound traffic by a channelized right-turn lane. The channelized lane operates under YIELD-control, though the YIELD sign is currently obscured from view due to overgrown vegetation. The significant skew of the channelized lane forces motorists to view far over their shoulder to decipher gaps in the Dascomb Road westbound traffic. In some cases, a vehicle will begin to “creep” into the flow of traffic only to reevaluate the gap and then step on the brake. This has the potential to cause following vehicles to also stop quickly, or in some cases, rear-end the vehicle in front. Fifteen (15) crashes were designated as rear-end crashes that occurred within the right-turn channelized lane along Frontage Road southbound.

Potential Safety Enhancements:

1. Relocate or supplement (on opposing curb line) existing YIELD signage along the channelized lane to increase visibility.
2. Stripe YIELD markings “Shark Teeth” along the channelized lane to increase awareness of the YIELD-control condition.
3. Consider the removal of YIELD-control along the channelized lane and install traffic signal indications and phasing to control the approach. This may reduce the expectation of right-turning vehicles for the need of a gap in Dascomb Road traffic. As part of this improvement, it is anticipated that the turn-lane can remain channelized to accommodate heavy vehicle turning radii.
4. If pedestrian signals, sidewalk, and crosswalks are considered for the Dascomb Road / Frontage Road intersection, signalized-control should be considered in place of the YIELD-control along the channelized right-turn lane from Frontage Road southbound onto Dascomb Road westbound. An approved variance is required if a YIELD-control, STOP-control, or uncontrolled condition is proposed.

5. Consider narrowing the cross-section of Frontage Road southbound to consist of only one travel lane, thus removing the merge condition from the channelized right-turn lane. Exploration of this alternative will require evaluation of potential queuing that may result during the commuter peak periods and evaluation of heavy vehicle turns.

Safety Issue #5: Sub-Standard Pedestrian and Bicycle Accommodations

Specific Observations:

Pedestrian Accommodations - It was noted during the RSA that the intersections lacked ADA-compliant pedestrian accommodations; including accessible ramps, detectable warning strips, crosswalks, or advanced pedestrian warning signage. RSA participants observed roadway debris accumulating in the turning islands and along the roadway edges, specifically in the short segment of paved sidewalk below the I-93 overpass. Pedestrian signal infrastructure is not provided at the intersection of Dascomb Road / Frontage Road. A representative of the Town of Andover indicated that pedestrian traffic is more prevalent further west along the Dascomb Road corridor in the vicinity of Shawsheen Street; however, increased pedestrian traffic is expected should any development become active near the I-93 Interchange. No crashes during the 5+ year period at the subject intersections involved a pedestrian.



Image 3: Debris located on sidewalk below I-93 overpass.

Bicycle Accommodations – Bicycle accommodations are not currently provided along Dascomb Road in the vicinity of the RSA intersections. On the intersection approaches, the shoulders are relatively narrow and do not provide sufficient space as a bike-able shoulder. One crash involving a bicyclist was reported during the 5+ year study period at the Dascomb Road / I-93 NB Ramps intersection.

Potential Safety Enhancements:

1. Consider the construction of sidewalk along Dascomb Road and along Frontage Road through the audit area. Considerations should be made to provide connectivity between existing sidewalk to the east, which terminates at Osgood Street, and to the west, which terminates at Shawsheen Street.
2. Construct new Americans with Disabilities Act (ADA) / Architectural Access Board (AAB) compliant accessible curb ramps at each corner of the several intersections along Dascomb Road and Frontage Road, where applicable. Consider providing two accessible ramps per corner, where two crosswalks are present, to allow for improved access for disabled pedestrians. Stripe new crosswalks at the intersections between each ramp pair.
3. Install pedestrian traffic signal infrastructure at the signalized intersection of Dascomb Road / Frontage Road; including countdown signal heads, Accessible Pedestrian Signal (APS) push buttons, and dedicated pedestrian signal timings.

4. Should an alternative for the installation of additional traffic signals along the corridor be implemented, install pedestrian traffic signal infrastructure at newly constructed signalized intersections.
5. Consider the striping of shared-use “sharrows” pavement markings, with associated signage, along the Dascomb Road corridor to encourage cyclists to travel within the roadway and on the correct roadway approach.
6. Consider the construction of bicycle lanes along Dascomb Road to provide a dedicated space for cyclists to maneuver. The construction of bicycle lanes may require the widening of pavement and potentially require modifications to the I-93 overpass bridge abutments. If Dascomb Road is converted into one lane in each direction, bicycle lanes may be accommodated within the existing curb lines.

Safety Issue #6: Lack of / Misplacement of Pavement Markings and Regulatory Signage

Specific Observations:

YIELD-Control Conditions – The Dascomb Road westbound and the Frontage Road southbound approaches each provide a channelized right-turn lane which operates under YIELD-control. Each of the YIELD signs posted at the end of each channelized right-turn lanes are partially blocked for upstream viewing by the surroundings; including steep slope grading, vegetation, and traffic signal infrastructure. No advanced YIELD signage is present nor are YIELD pavement markings painted along the channelized lanes. Eighteen (18) crashes at the intersection of Dascomb Road / Frontage Road occurred within both channelized right-turn lanes. An RSA team member noted that it is not uncommon for vehicles turning left onto Frontage Road from Dascomb Road eastbound to ignore the solid white cross hatch markings adjacent to the channelized right-turn lane in order to cut in front of right-turning vehicles prior to the I-93 SB Ramps.



Image 4: YIELD sign visibility limited by sloped grade.

The Dascomb Road / I-93 NB Ramps intersection operates as a typical half-cloverleaf unsignalized intersection. The I-93 NB Ramps northbound approach and the Dascomb Road eastbound approach each provide a channelized right-turn lane. The Dascomb Road eastbound channelized right-turn lane lacks both YIELD signage and pavement markings, although geometry normally dictates that right-turning vehicles accessing the on-ramp must yield to Dascomb Road westbound left-turning vehicles. Similar to the Frontage Road intersection, no advanced YIELD signage is present along the I-93 NB Ramps channelized lane. Five (5) crashes at the intersection of Dascomb Road / I-93 NB Ramps occurred within the channelized right-turn lanes. The one crash which occurred within



Image 5: Lack of YIELD signage and markings on Dascomb Road channelized lane.

the Dascomb Road eastbound channelized lane resulted in a rear-end crash in which the first vehicle yielded and was subsequently struck by two trailing vehicles. This may have been the result of no defined YIELD condition on the movement.

YIELD Ambiguity – The Dascomb Road westbound channelized right-turn lane opens into a dedicated receiving lane along Frontage Road. With a YIELD-sign present, but no pavement markings and the driver expectation that a dedicated lane is provided, some motorists may be confused on whether to yield, stop, or go. This ambiguity of not knowing where or if to yield, and which vehicle has the right-of-way, may be contributing factors with the two (2) rear-end crashes that occurred within the channelized right-turn lane. This issue is exacerbated by the location of the Park and Ride driveway, located immediately north of the intersection, and vehicles trying to position themselves to access the I-93 SB Ramps.

Faded Pavement Markings – Although generally in an above average condition, several pavement markings along the Dascomb Road corridor, and along the Frontage Road and I-93 NB Ramps approaches, were observed to be faded or missing. The lack of visible lane lines increases the potential for sideswipe crashes as clear and consistent lane delineation is not provided. There were two (2) sideswipe collisions within the audit area during the study period. It should be noted that an RSA team member indicated that recent restriping of the Dascomb Road westbound channelized lane has resulted in a noticeable improvement.

Faded or Murky Signage – Similar to the condition of pavement markings, some traffic signs within the audit area are faded, murky, or have lost their reflectivity over time. For example, the YIELD sign along the Frontage Road southbound channelized lane is currently covered in grime and lacks reflectivity. The lack of sign visibility and the close proximity of some signs to the roadway edge could be contributing factors for damage to the signs caused by heavy vehicles. This condition coupled with the sign placement, as previously noted, renders the sign unable to convey a clear and concise message from a distance or during darker time periods. One (1) rear-end crash within the channelized lane occurred during the nighttime hours when lack of reflectivity may have been a contributing factor.



Image 6: Murky YIELD sign along Frontage Road.

Lack of Lane Configuration Signage – Although some lane specific signage (R3-7 series) is present for turn lanes along Dascomb Road, approaching Frontage Road, there is a lack of lane configuration signage on the several intersection approaches in the audit area. The lack of signage may be contributing to lane choice confusion. For example, the Dascomb Road westbound exclusive left-turn lane at the I-93 NB Ramps immediately turns into a through lane on the opposing side of the intersection. This may lead to some vehicles utilizing the left-turn lane as a through lane.

Lane configuration signage or delineation is not currently provided along the I-93 NB Ramps. Although striped as a one-lane approach with a diverge point for right-turns, vehicles along the ramp will form two lanes of traffic along the ramp during congested periods. No crashes occurred as a result of the queuing along the ramp; however the potential exists for a safety concern where no clear lane designation signage or markings are present.

Tewksbury Location Confusion – An RSA team member noted that drivers exiting the I-93 SB Ramps along Frontage Road sometimes assume the roadway to be Dascomb Road and that a right-turn will head towards Tewksbury. Vehicles will turn right from the ramps and continue north along Frontage Road until they realize that they are on the incorrect roadway. This driver confusion sometime results in unnecessary and illegal turning maneuvers.

Potential Safety Enhancements:

1. Install advanced warning signage for YIELD-control upstream from channelized right-turn lanes and provide MUTCD-compliant pavement markings to supplement at both intersections.
2. Relocate or supplement (on opposing curb line) existing YIELD signs along channelized lanes to increase visibility of the signs.
3. Trim the overgrown vegetation currently blocking the YIELD signs to increase visibility of the signs.
4. Stripe YIELD markings “Shark Teeth” along channelized lanes to indicate the required yielding point.
5. Consider the removal of YIELD-control along the Dascomb Road westbound channelized right-turn lane to Frontage Road as a dedicated receiving lane exists.
6. Install advanced guide signage to the MassDOT Park and Ride lot to alert drivers of which lane to travel in to avoid confusion at the Dascomb Road / Frontage Road intersection due to the entrance’s close proximity to the intersection.
7. Restripe pavement markings, including: lane lines and stop bars along all approaches to the intersections within the audit area to provide improved clarity of lane delineation. Supplement lane markings with lane designation signage on the several intersection approaches.
8. Perform a signage inventory along the Dascomb Road corridor to remove/replace any MUTCD non-compliant signage or faded/damage signage. Existing signage post locations should be re-evaluated to a new position out of harm’s way where there is evidence of damage from heavy vehicles. This will reduce the maintenance costs for MassDOT.
9. Improve guide signage along Frontage Road at the I-93 SB Ramps to direct vehicles to Dascomb Road and Tewksbury and to reduce the risk of driver confusion.

Safety Issue #7: Drainage and Debris

Specific Observations:

It was noted and observed that a large amount of roadway debris currently lines the edge of pavement along the Dascomb Road corridor. This includes sand, bottles, tree branches, and other litter. Debris is extensive on the sidewalk below the I-93 overpass and within a number of catch basins within the audit area. This debris creates obstacles for bicyclists utilizing the shoulders along Dascomb Road. As cyclists approach debris, they may enter the vehicle paths to avoid it, which forces vehicles in the travel lanes to swerve or to unexpectedly stop or slow. Although no collisions were attributed to a bicyclist entering the travel lane, the potential for roadway debris remains a safety concern. In addition, the build-up of debris also creates a concern for an increase in ponding of stormwater along the roadway edge.



Image 7: Debris within Dascomb Road catch basin.

Potential Safety Enhancements:

1. Clear roadway debris and street sweep along the gutter lines of Dascomb Road, Frontage Road, and the I-93 NB Ramps to improve the travel experience and safety for bicyclists and motorists.

Safety Issue #8: Congestion and Vehicle Queue Length

Specific Observations:

Congestion and Queues - As a result of the numerous commercial and residential land uses along Dascomb Road, in addition to the proximity to I-93, traffic volumes at the intersections along Dascomb Road generally increase during the weekday peak periods. These additional traffic volumes, combined with the numerous driveway / side-street access locations, result in increased traffic congestion. With elevated traffic volumes along Dascomb Road, insufficient gaps are created for vehicles to exit the I-93 NB Ramps. This problem is exacerbated by the elevated truck traffic attempting to turn left from the off-ramp. Approximately 35 percent of the crashes reported in the audit area occurred during the commuter peak periods. Nearly 30 percent of the crashes reported were rear-end crashes. These collisions indicate that driver frustration caused by heavy traffic congestion may result in drivers running the red light or taking unsafe gaps to make left-turns. Approximately 59 percent of the reported crashes were angle crashes. As previously noted, some of these crashes may be left-turn courtesy crashes, where one vehicle “waves” on the opposing left-turn vehicle to turn when that vehicle does not have the right-of-way. Upon the vehicle making the turn, other vehicles from the second oncoming through lane are unaware of the “courtesy” given and strike the left-turning vehicle while travelling normally through the intersection.



Image 8: Queue along I-93 NB Ramps.

Right-turning U-Turns - All representatives of the Town of Andover noted the excessive queues along the I-93 NB Ramps during the commuter peak hours. Generally, the queue for left-turning vehicles will line-up along the inside of the ramp and extend back onto the mainline freeway. As the left-turning vehicles

line-up on the inside of the ramp, right-turning traffic by-passes the queue. It was also noted that drivers who want to take a left will historically act as a right-turning vehicle, exit the ramp, and enter Cardinal Lane or Surrey Lane located to the east of the Dascomb Road / I-93 NB Ramps intersection. Vehicles will then make a U-turn and proceed along Dascomb Road westbound. “Turns Prohibited to Reverse Direction” signs are currently present on multiple side streets to discourage this practice. Such an attempt was made during the RSA site walk.

Potential Safety Enhancements:

1. Consider the installation of a traffic signal at the intersection of Dascomb Road / I-93 NB Ramps.
2. Install advanced queue detection on the I-93 NB Ramps, pending the installation of a traffic signal at this location.
3. Continue enforcement and levying penalties to deter motorists from performing illegal U-turns.

Safety Issue #9: Speed

Specific Observations:

Excessive speed was noted as the contributing factor in two (2) crashes at the Dascomb Road / I-93 NB Ramps intersection. Based on the traffic counts conducted in October 2016, the 85th percentile speed along Dascomb Road was measured above the posted speed. Speed of vehicles along Dascomb Road westbound was also noted anecdotally as a cause for queuing along the I-93 NB Ramps as vehicles will generally have a difficult time perceiving gaps along Dascomb Road.

Potential Safety Enhancements:

1. Consider reducing the travel lane widths along Dascomb Road to encourage slower speeds along the corridor.
2. Increase enforcement of speeding at and in the vicinity of the intersections.
3. Evaluate the need to reconstruct turning islands at both intersections to help reduce turning speeds. Note that damage to curb reveal is evident under existing conditions which may indicate that heavy vehicles may not have sufficient space to complete turns at the intersections.

Safety Issue #10: Dascomb Road Westbound Lane Delineation at I-93 NB Ramps

Specific Observations:

It was observed at the audit meeting that left-turning vehicles exiting the I-93 NB Ramps will attempt to enter the far-right lane along Dascomb Road westbound, crossing over the far-left lane. Typically, the traffic volume in this far-left lane is minimal as the opposing lane on Dascomb Road entering the intersection is the exclusive left-turn lane onto the I-93 NB on-ramp. Several audit participants noted that

vehicles attempting to cross these lanes of traffic pose a risk to Dascomb Road westbound traffic that may assume that the ramp traffic is entering Dascomb Road in the far-left lane. It was also observed that almost all heavy vehicle traffic utilized both lanes of Dascomb Road westbound to enter the roadway from the I-93 off-ramp.

Potential Safety Enhancements:

1. Provide tracking pavement markings at the intersection to guide I-93 NB Ramp left-turning traffic into the far-left lane along Dascomb Road. This will maintain unopposed flow in the far-right lane for Dascomb Road westbound traffic.

Summary of Road Safety Audit

Each improvement considered has been categorized as short-term, mid-term, or long-term. Additionally, a cost category has been assigned to each improvement based on the definitions shown in Table 6. Table 7 includes a summary of the several potential safety enhancements. Safety benefit estimates are subjective and are based on engineering experience and the relative percent of crashes that may be reduced by the enhancement based on known and documented crash reduction factors (such as FHWA documented crash reduction factors).

Note that some costs are noted with two cost thresholds. This is included as some enhancements may require additional measures to ensure regulatory compliance. For instance, the relocation of a YIELD sign is low-cost; however, along the Dascomb Road corridor, the signalization and timing coordination may require reconstruction of intersection approaches and impacts to utilities. In addition, some enhancements are defined to mitigate multiple safety issues. For those enhancements identified for multiple issues, such as the construction of a roundabout, the enhancement has only been listed once in Table 7.

Table 6: 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

Table 7: Potential Safety Enhancement Summary

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Responsible Party
Solar Glare	Install under-deck lighting under the I-93 overpass to reduce the impact on drivers' eyes as they transition from glare-darkness-glare.	Medium	Short-Term	Medium	MassDOT
	Install advanced warning signage along Dascomb Road westbound to provide notice of solar glare to motorists.	Low	Short-Term	Low	MassDOT / Town
	Should an alternative for the installation of additional traffic signals along the corridor be implemented, install retro-reflective back plates and tunnel visors on all traffic signal indications.	Medium	Short-Term	Low	MassDOT
Red Light Running	Re-calculate traffic signal clearance intervals based on standard guidelines for travel speed, roadway grade, and intersection width.	Medium	Short-Term	Low	MassDOT
	Increase enforcement of red-light running at and in the vicinity of the Dascomb Road corridor.	High	Short-Term	Medium	MSP / Andover PD
Permitted Left-Turn Phasing	Further evaluate the crash impacts of the FYA installation on the Dascomb Road eastbound approach.	Medium	Mid-Term	Low	MassDOT
	Consider the removal of the Dascomb Road eastbound permitted left-turn phase and retain only the protected left-turn phasing.	High	Mid-Term	Low	MassDOT
	Consider narrowing the cross-section of Dascomb Road westbound to consist of only one through lane.	High	Long-Term	High	MassDOT / Town
Yield Channelization at Traffic Signal	Relocate or supplement (on opposing curb line) existing YIELD signage along the channelized lane.	Medium	Short-Term	Low	Town
	Stripe YIELD markings "Shark Teeth" along the channelized lane.	Medium	Short-Term	Low	Town
	Consider the removal of YIELD-control along the channelized lane and install traffic signal indications and phasing to control the approach.	Medium	Long-Term	High	Town
	If pedestrian signals, sidewalk, and crosswalks are considered for the Dascomb Road / Frontage Road intersection, signalized-control should be considered in place of the YIELD-control along the channelized right-turn lane from Frontage Road southbound onto Dascomb Road westbound.	Medium	Long-Term	High	Town

Table 7: Potential Safety Enhancement Summary

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Responsible Party
Yield Channelization at Traffic Signal	Consider narrowing the cross-section of Frontage Road southbound to consist of only one travel lane, thus removing the merge condition from the channelized right-turn lane.	Low	Long-Term	Medium	Town
Sub-Standard Pedestrian and Bicycle Accommodations	Consider the construction of sidewalk along Dascomb Road and along Frontage Road through the audit area.	High	Long-Term	High	MassDOT / Town
	Construct new ADA / AAB compliant accessible curb ramps at each corner of the several intersections along Dascomb Road and Frontage Road, where applicable. Stripe new crosswalks at the intersections between each ramp pair.	Medium	Long-Term	High	MassDOT / Town
	Install pedestrian traffic signal infrastructure at the signalized intersection of Dascomb Road / Frontage Road; including countdown signal heads, Accessible Pedestrian Signal (APS) push buttons, and dedicated pedestrian signal timings.	High	Long-Term	Medium	MassDOT
	Should an alternative for the installation of additional traffic signals along the corridor be implemented, install pedestrian traffic signal infrastructure at newly constructed signalized intersections.	High	Long-Term	Medium	MassDOT
	Consider the striping of shared-use “sharrows” pavement markings, with associated signage, along the Dascomb Road corridor.	Medium	Short-Term	Low	MassDOT / Town
	Consider the construction of bicycle lanes along Dascomb Road.	High	Long-Term	High	MassDOT / Town
Lack of / Misplacement of Pavement Markings and Regulatory Signage	Install advanced warning signage for YIELD-control upstream from channelized right-turn lanes and provide MUTCD compliant pavement markings to supplement at both intersections.	Low	Short-Term	Low	MassDOT / Town
	Relocate or supplement (on opposing curb line) existing YIELD signs along channelized lanes.	Medium	Short-Term	Low	MassDOT / Town
	Trim the overgrown vegetation currently blocking the YIELD signs.	Medium	Short-Term	Low	Town
	Stripe YIELD markings “Shark Teeth” along channelized.	Medium	Short-Term	Low	MassDOT / Town

Table 7 Continued: Potential Safety Enhancement Summary

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Responsible Party
Lack of / Misplacement of Pavement Markings and Regulatory Signage	Consider the removal of YIELD-control along the Dascomb Road westbound channelized right-turn lane to Frontage Road.	Low	Short-Term	Low	Town
	Install advanced guide signage to the MassDOT Park and Ride lot.	Low	Short-Term	Low	MassDOT / Town
	Restripe pavement markings, including: lane lines, stop bars, and crosswalks along all approaches to the intersections within the audit area. Supplement lane markings with lane designation signage on the several intersection approaches.	Medium	Short-Term	Medium	MassDOT / Town
	Perform a signage inventory along the Dascomb Road corridor to remove/replace any MUTCD non-compliant signage or faded/damage signage.	Medium	Short-Term	Medium	MassDOT / Town
	Improve guide signage along Frontage Road at the I-93 SB Ramps to direct vehicles to Dascomb Road and Tewksbury.	Low	Short-Term	Low	MassDOT / Town
Drainage and Debris	Clear roadway debris and street sweep along the gutter lines of Dascomb Road, Frontage Road, and the I-93 NB Ramps.	Low	Short-Term	Low	MassDOT / Town
Congestion and Vehicle Queue Length	Consider the installation of a traffic signal at the intersection of Dascomb Road / I-93 NB Ramps.	High	Long-Term	High	MassDOT
	Install advanced queue detection on the I-93 NB Ramps (pending installation of traffic signal control).	Medium	Mid-Term	Medium	MassDOT
	Continue enforcement and levying penalties to deter motorists from performing illegal U-turns.	Medium	Short-Term	Medium	Andover PD
Speed	Consider reducing the travel lane widths along Dascomb Road to encourage slower speeds along the corridor.	Medium	Short-Term	Low	MassDOT / Town
	Increase enforcement of speeding at and in the vicinity of the intersections.	Medium	Short-Term	Medium	MSP / Andover PD
	Evaluate the need to reconstruct turning islands at both intersections to help reduce turning speeds.	Low	Mid-Term	Medium	MassDOT / Town
Dascomb Road WB Lane Delineation at I-93 NB Ramps	Provide tracking pavement markings at the intersection to guide I-93 NB Ramps left-turning traffic into the far-left lane along Dascomb Road.	Medium	Short-Term	Low	MassDOT

Appendix A. RSA Meeting Agenda

Agenda

Road Safety Audit

LOCATION

Meeting Location:

Andover Public Safety Center
32 N. Main Street
Andover, Massachusetts
Wednesday December 14, 2016
1:00 PM – 4:00 PM

Type of meeting: High Crash Locations – Road Safety Audit
Attendees: Invited Participants to Comprise a Multidisciplinary Team
Please bring: Thoughts and Enthusiasm!

1:00 PM **Welcome and Introductions**
• Introductions

1:15 PM **Review of Site Specific Material**
• Crash Summaries – provided in advance
• Dascomb Road @ Frontage Road
• Dascomb Road @ I-93 NB Ramps
• Existing Geometries and Conditions

2:00 PM **Visit the Site**
• Conduct Field Visit
• As a group, identify areas for improvement

3:00 PM **Post Visit Discussion / Completion of RSA**
• Discuss observations and finalize findings
• Discuss potential improvements and finalize recommendations

4:00 PM **Adjourn for the Day – but the RSA has not ended**

Instructions for Participants:

- Before attending the RSA on December 14, participants are encouraged to drive through the Dascomb Road intersections with both Frontage Road and the I-93 NB Ramps and complete / consider elements on the RSA Prompt List, with a focus on safety.
- All participants will be actively involved throughout the RSA process. Participants are encouraged to come with thoughts and ideas; however, remember 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

Participating Audit Team Members

Date: December 14, 2016 Location: Andover, Massachusetts

Audit Team Members	Agency/Affiliation	Email Address
<i>Name</i>	<i>Agency</i>	<i>Email</i>
Brian Moore	Andover Engineering	bmoore@andoverma.gov
Paul Materazzo	Andover Planning	pmaterazzo@andoverma.gov
Glen Ota	Andover Police Department	gota@andoverps.net
Chris Moore	Andover Police Department	cmoo@andoverps.net
Adam Prichard	MassDOT Traffic Safety	adam.prichard@dot.state.ma.us
Michelle Deng	MassDOT Traffic Safety	michelle.deng@dot.state.ma.us
Elsa Chan	MassDOT Traffic Safety	elsa.chan@dot.state.ma.us
John Mangiaratti	Andover Town Manager	john.mangiaratti@andoverma.us
Tony Komornick	Merrimack Valley Planning Commission (MVPC)	akomornick@mvpc.org
Jim Terlizzi	Merrimack Valley Planning Commission (MVPC)	jterlizzi@mvpc.org
Tim Roberts	MassDOT District 4	timothy.roberts@state.ma.us
Timothy Paris	MassDOT District 4	timothy.paris@state.ma.us
Mikel Myers	TEC, Inc.	mmyers@theengineeringcorp.com
Rick Friberg	TEC, Inc.	rfriberg@theengineeringcorp.com
Samuel Gregorio	TEC, Inc.	sgregorio@theengineeringcorp.com

Appendix C. Detailed Crash Data

Crash Data Summary Tables
Dascomb Road @ Frontage Road - Andover, MA
01/01/2011 - 09/31/2016

Collision Diagram	Crash Date	Crash Time	Ambient Light	Weather Condition	Road Surface	Operator's Age				Manner of Collision	Driver Contributing Codes	Detailed Narrative (from Crash Portal)
						V1	V2	V3	V4			
1	2/18/2011	12:54 PM	Daylight	Clear	Dry	52	26			Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV2 struck MV1 when MV2 turned left onto Frontage Rd.
2	3/18/2011	8:14 AM	Daylight	Clear	Dry	28	40			Sideswipe	Not Reported	MV1 and MV2: traveled EB on Dascomb Rd, turned left onto Frontage Rd and traveling NB. MV1 sideswiped in the same direction with MV2 when MV1 attempted to pass MV2 on the right while MV2 was turning right into the Park and Ride causing minor damages to both vehicles.
3	5/19/2011	3:32 PM	Daylight	Cloudy	Dry	56	N/A			Rear-end	Not Reported	MV1 and MV2: traveling SB on Frontage Rd. Both vehicles were stopped at a yield sign to turn right onto Dascomb Rd. MV2 and rear-ended MV1 and fled the scene.
4	6/24/2011	10:31 AM	Daylight	Rain	Wet	30	24			Rear-end	No Improper Driving	MV1 and MV2: traveling SB on Frontage Rd and turning right onto Dascomb Rd WB traffic lane. MV1 slowed/stopped on Frontage Rd. MV2 slowed in time but was unable to stop and collided with MV1. The road surface was wet due to the rain.
5	10/19/2011	8:06 PM	Dark - Lighted	Rain	Wet	28	49			Angled	Erratic / Aggressive / Reckless Driving	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV2 had the green arrow and was turning left onto Frontage Rd NB lane. MV1 and MV2 collided when MV1 ran the red light.
6	10/26/2011	6:33 AM	Dark - Lighted	Clear	Dry	47	58			Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV2 struck MV1 when MV2 failed to yield for MV1 while turning left onto Frontage Rd NB lane.
7	11/28/2011	5:11 PM	Dark - Lighted	Clear	Dry	63	30			Rear-end	Inattention / Distracted	MV1 and MV2: traveling EB on Dascomb Rd. MV2 rear-ended MV1 when MV1 stopped at the traffic light to make a left turn onto Frontage Rd. MV2 was towed and the operator was taken to the hospital due to pregnancy.
8	12/24/2011	7:49 PM	Dark - Lighted	Clear	Dry	25	52			Rear-end	Inattention / Distracted	MV1 and MV2: traveling SB on Frontage Rd and waiting to turn left onto Dascomb Rd EB lane. MV1 operator's foot slipped off from brake and rear-ended MV2.
9	1/30/2012	2:35 PM	Daylight	Cloudy	Dry	45	46			Angled	Inattention / Distracted	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV2 collided with MV1 when MV2 operator was distracted briefly and made a left turn onto Frontage Rd NB lane.
10	2/15/2012	8:12 PM	Dark - Lighted	Clear	Dry	58	26			Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV2 struck MV1 when MV2 failed to yield for MV1 while turning left onto Frontage Rd NB lane.
11	6/5/2012	5:40 PM	Daylight	Cloudy	Dry	68	53			Rear-end	Followed Too Closely	MV1 and MV2: traveling SB on Frontage Rd. MV1 stopped to yield for traffic on Dascomb Rd before turning right to merge. MV2 followed MV1 too closely and was unable to stop on time and rear-ended MV1.
12	7/5/2012	4:51 PM	Daylight	Clear	Dry	27	22	18		Rear-end	Followed Too Closely	MV1: traveling WB on Dascomb Rd; MV2 and MV3: from Frontage Rd SB lane merged onto Dascomb Rd WB approach. MV3 rear-ended MV2 and pushed MV2 into MV1.
13	8/18/2012	10:55 AM	Daylight	Cloudy	Wet	34	42			Rear-end	Inattention / Distracted	MV1 and MV2: traveling EB on Dascomb Rd. MV2 rear-ended MV1 when MV1 pulled over to the side of the road to use GPS.
14	9/5/2012	8:53 AM	Daylight	Cloudy	Wet	60	45			Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV2 struck MV1 when MV2 attempted to turn left onto Frontage Rd without yielding to the oncoming traffic.
15	9/26/2012	2:36 PM	Daylight	Cloudy	Dry	48	18			Rear-end	Inattention / Distracted	MV1 and MV2: traveling SB on Frontage Rd. MV1 slowed at a yield sign before turning right to merge onto Dascomb Rd WB traffic. MV2 was unable to stop on time and rear-ended MV1.



Crash Data Summary Tables
Dascomb Road @ Frontage Road - Andover, MA
01/01/2011 - 09/31/2016

Collision Diagram	Crash Date	Crash Time	Ambient Light	Weather Condition	Road Surface	Operator's Age				Manner of Collision	Driver Contributing Codes	Detailed Narrative (from Crash Portal)
						V1	V2	V3	V4			
16	10/17/2012	6:46 PM	Dark - Lighted	Clear	Dry	19	52			Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV2 struck MV1 when MV2 attempted to turn left onto Frontage Rd without yielding to the oncoming traffic.
17	10/29/2012	10:35 PM	Dark - Not Lighted	Rain	Wet	28	72			Angled	Inattention / Distracted	MV1: traveling WB on Dascomb Rd; MV2: traveling SB on frontage Rd and turning right onto Dascomb Rd WB lane. MV2 struck MV1 when MV2 failed to yield for MV1 which has the right-
18	11/3/2012	6:53 PM	Dark - Lighted	Clear	Dry	20	27			Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV2 struck MV1 when MV2 attempted to turn left onto Frontage Rd without yielding to the oncoming traffic.
19	11/6/2012	5:58 PM	Dark - Lighted	Clear	Dry	26	56			Angled	Failure to Yield Right-of-Way	MV1: traveling EB on Dascomb Rd; MV2: traveling WB on Dascomb Rd. MV1 struck MV2 when MV1 turned left onto Frontage Road NB lane without yielding for MV2.
20	11/27/2012	5:48 PM	Dark - Lighted	Rain	Wet	66	26			Angled	Other	MV1: traveling WB on Dascomb Rd; MV2: traveling SB on Frontage Rd. MV2 had a red light and attempted to stop but the brake failed and MV2 stuck MV1.
21	12/13/2012	9:20 PM	Dark - Lighted	Clear	Dry	52	64			Rear-end	Inattention / Distracted	MV1 and MV2: traveling SB on Frontage Rd. MV2 rear-ended MV1 causing MV1 operator and passenger to be transported to the hospital with non-incapacitating injuries.
22	1/4/2013	5:31 PM	Dark - Lighted	Cloudy	Dry	31	41			Angled	Failure to Yield Right-of-Way	MV1: traveling EB on Dascomb Rd; MV2: traveling WB on Dascomb Rd. MV1 collided with MV2 when MV1 made a left turn onto Frontage Rd NB lane thinking that MV1 was turning right onto Frontage Rd.
23	2/19/2013	7:25 PM	Dark - Lighted	Rain	Wet	41	18			Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV1 and MV2 collided when MV2 attempted to turn left onto Frontage Rd.
24	6/20/2013	11:32 PM	Dark - Lighted	Clear	Dry	23	26			Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV1 and MV2 collided when MV2 attempted to turn left onto Frontage Rd causing MV1 operator to be taken to
25	6/25/2013	6:10 PM	Dusk	Clear	Dry	18	32			Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV2 struck MV1 when MV2 was making a left turn onto Frontage Rd without yielding for MV1. All parties involved were transported to the hospital.
26	7/1/2013	6:25 PM	Daylight	Rain	Wet	29	77			Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV2 collided with MV1 when MV2 made a left turn onto Frontage Rd NB lane without yielding for MV1.
27	7/9/2013	6:16 PM	Daylight	Clear	Dry	28	61			Rear-end	Inattention / Distracted	MV1 and MV2: traveling SB on Frontage Rd. MV1 was attempting to turn right onto Dascomb Rd when it was rear-ended by MV2 whom had thought that MV1 was moving and accelerated into it.
28	8/30/2013	3:04 PM	Daylight	Clear	Dry	41	19			Rear-end	Followed Too Closely	MV1 and MV2: traveling SB on Frontage Rd. MV1 stopped to yield for traffic on Dascomb Rd before turning right to merge. MV2 followed MV1 too closely and was unable to stop on time and rear-ended MV1.
29	9/29/2013	3:31 PM	Daylight	Clear	Dry	59	41			Rear-end	Inattention / Distracted	MV1 and MV2: traveling SB on Frontage Rd. MV1 slowed at a yield sign before turning right to merge onto Dascomb Rd WB traffic. MV2 was unable to stop on time and rear-ended MV1.
30	9/30/2013	6:57 AM	Dawn	Other	Dry	49	48			Angled	Failure to Yield Right-of-Way	MV1: traveling EB on Dascomb Rd; MV2: traveling WB on Dascomb Rd. MV1 struck MV2 when MV1 turned left onto Frontage Road NB lane without yielding for MV2. MV1 did not have green light to turn at that time as well.
31	10/17/2013	9:24 PM	Dark - Lighted	Clear	Dry	17	26			Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV2 struck MV1 when MV2 attempted to turn left onto Frontage Rd without yielding for the oncoming traffic.

Crash Data Summary Tables
Dascomb Road @ Frontage Road - Andover, MA
01/01/2011 - 09/31/2016

Collision Diagram	Crash Date	Crash Time	Ambient Light	Weather Condition	Road Surface	Operator's Age				Manner of Collision	Driver Contributing Codes	Detailed Narrative (from Crash Portal)
						V1	V2	V3	V4			
32	10/31/2013	7:10 AM	Daylight	Cloudy	Dry	22	49			Rear-end	Followed Too Closely	MV1 and MV2: traveled WB on Dascomb Rd and turning right onto Frontage Road. MV2 stopped to yield for traffic on Frontage Rd before merging. MV1 followed MV2 too closely and was unable to stop on time and rear-ended MV1.
33	12/8/2013	6:50 PM	Dark - Lighted	Clear	Dry	43	26	46		Head-on	Disregarded Traffic Controls	MV1: traveling WB on Dascomb Rd; MV2: attempting to turn left onto Frontage Rd NB lane from Dascomb Rd EB lane; MV3: stopped for traffic on Frontage Rd SB lane. MV1 ran the red light and struck MV2 head on. Then MV1 spun out and struck MV3 and the Mass Highway sign.
34	3/10/2014	10:04 AM	Daylight	Cloudy	Dry	67	22			Angled	Failure to Yield Right-of-Way	MV1: traveling EB on Dascomb Rd; MV2: traveling WB on Dascomb Rd. MV1 collided with MV2 when MV1 made a left turn onto Frontage Rd NB lane without yielding for MV1.
35	3/18/2014	4:14 PM	Daylight	Clear	Dry	23	25			Rear-end	Followed Too Closely	MV1 and MV2: traveling SB on Frontage Rd. MV1 slowed at a yield sign before turning right to merge onto Dascomb Rd WB traffic. MV2 followed MV1 too closely and was unable to stop on time and rear-ended MV1.
36	3/19/2014	9:23 AM	Daylight	Clear	Dry	34	45			Rear-end	Inattention / Distracted	MV1 and MV2: traveling SB on Frontage Rd. MV2 rear-ended MV1 when MV1 was turning right onto Dascomb Rd EB lane.
37	4/15/2014	3:22 PM	Daylight	Rain	Wet	33	63			Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV2 struck MV1 when MV2 was attempting to make a left turn onto Frontage Rd NB lane without yielding for
38	7/16/2014	9:18 PM	Dark - Lighted	Clear	Dry	39	22			Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV2 struck MV1 when MV2 was attempting to make a left turn onto Frontage Rd NB lane without yielding for
39	8/5/2014	5:33 AM	Dawn	Clear	Dry	27	38			Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV2 struck MV1 when MV2 was attempting to make a left turn onto Frontage Rd NB lane without yielding for
40	8/6/2014	10:05 PM	Dark - Lighted	Clear	Dry	22	27			Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV2 struck MV1 when MV2 was attempting to make a left turn onto Frontage Rd NB lane without yielding for
41	9/4/2014	9:12 AM	Daylight	Clear	Dry	41	52			Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV2 struck MV1 when MV2 was attempting to make a left turn onto Frontage Rd NB lane without yielding for
42	9/15/2014	9:43 AM	Daylight	Cloudy	Dry	55	18			Angled	Failure to Yield Right-of-Way	MV1: traveling EB on Dascomb Rd; MV2: traveling WB on Dascomb Rd. MV1 struck MV2 when MV1 was attempting to make a left turn onto Frontage Rd NB lane without yielding for
43	10/8/2014	10:47 AM	Daylight	Clear	Dry	28	18			Rear-end	Followed Too Closely	MV1 and MV2: traveling SB on Frontage Rd. MV1 stopped to yield for traffic on Dascomb Rd before turning right to merge. MV2 followed MV1 too closely and was unable to stop on time and rear-ended MV1.
44	10/12/2014	8:52 PM	Dark - Lighted	Clear	Dry	45	19			Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV2 struck MV1 when MV2 attempted to turn left onto Frontage Rd without yielding for the oncoming traffic.
45	11/20/2014	5:57 AM	Dawn	Clear	Dry	33	23			Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV2 struck MV1 when MV2 was attempting to make a left turn onto Frontage Rd NB lane without yielding for
46	12/6/2014	5:56 PM	Dark - Not Lighted	Rain	Wet	41	31			Angled	Failure to Yield Right-of-Way	MV1: traveling EB on Dascomb Rd; MV2: traveling WB on Dascomb Rd. MV1 struck MV2 when MV1 turned left onto Frontage Road NB lane without yielding for MV2. MV2 might not have the headlights on.

Crash Data Summary Tables
Dascomb Road @ Frontage Road - Andover, MA
01/01/2011 - 09/31/2016

Collision Diagram	Crash Date	Crash Time	Ambient Light	Weather Condition	Road Surface	Operator's Age				Manner of Collision	Driver Contributing Codes	Detailed Narrative (from Crash Portal)
						V1	V2	V3	V4			
47	2/13/2015	6:28 AM	Dawn	Clear	Snow	31	30			Rear-end	Followed Too Closely	MV1 and MV2: turning right onto Frontage Rd NB lane from Dascomb Rd WB lane. MV2 rear-ended MV1 when MV1 slowed to yield to the oncoming traffic.
48	4/5/2015	5:45 PM	Daylight	Clear	Dry	46	40			Rear-end	No Improper Driving	MV1 and MV2: traveling SB on Frontage Rd. MV2 rear-ended
49	5/28/2015	5:13 AM	Daylight	Clear	Dry	41				Single Vehicle	No Improper Driving	MV1: traveling EB on Dascomb Rd. MV1 attempted to turn left onto Frontage Rd when the operator felt ill. Vehicle continued over an embankment and through a fence landing in a ditch.
50	8/2/2015	4:44 PM	Daylight	Clear	Dry	23	30			Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV2 struck MV1 when MV2 was attempting to make a left turn onto Frontage Rd NB lane without yielding for
51	8/13/2015	10:15 PM	Dark - Lighted	Clear	Dry	26	26			Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV2 struck MV1 when MV2 attempted to turn left onto Frontage Rd without yielding for the oncoming traffic.
52	10/21/2015	5:18 AM	Dark - Lighted	Clear	Dry	31	30			Head-on	Failure to Yield Right-of-Way	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV2 collided head on with MV1 when MV2 turned left onto Frontage Rd NB lane.
53	10/24/2015	4:47 PM	Daylight	Clear	Dry	56	17			Rear-end	Followed Too Closely	MV1 and MV2: traveling SB on Fronage Rd. MV2 rear-ended MV1 when MV1 stopped at the yield sign.
54	11/4/2015	9:08 PM	Dark - Lighted	Clear	Dry	72	25			Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV2 struck MV1 when MV2 made a left turn onto Frontage Rd NB lane without yielding for MV1.
55	12/14/2015	10:52 AM	Daylight	Cloudy	Dry	30	30			Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV2 struck MV1 when MV2 made a left turn onto Frontage Rd NB lane without yielding for MV1.
56	12/29/2015	9:03 AM	Daylight	Other	Other	39	23			Rear-end	Not Reported	MV1 and MV2: traveling EB on Dascomb Rd; MV1 rear-ended MV2 when MV2 was slowing due to traffic.
57	1/7/2016	3:20 PM	Daylight	Cloudy	Dry	22	34	80		Rear-end	Other	MV1, MV2 and MV3: traveling EB on Dascomb Rd. MV1 and MV2 stopped at the red light but MV3 didn't stop in time and struck MV2 which caused MV2 to struck MV1.
58	1/13/2016	10:10 PM	Dark - Lighted	Clear	Wet	18	53			Rear-end	Disregarded Traffic Controls	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV2 struck MV1 when MV2 ran the red light and turned left onto Frontage Rd.
59	1/14/2016	1:06 PM	Daylight	Clear	Dry	50	28			Rear-end	Followed Too Closely	MV1 and MV2: traveling SB on Frontage Rd. MV1 stopped to yield for traffic on Dascomb Rd before turning right to merge. MV2 followed MV1 too closely and was unable to stop on time and rear-ended MV1.
60	2/16/2016	7:46 AM	Daylight	Cloudy	Ice	36				Single Vehicle	Other	MV1: traveling EB on Dascomb Rd approaching the Frontage Rd intersection. Due to the icy road surface conditions, MV1 began to slide on the ice and in an effort to avoid rear ending a vehicle in front, the operator cut the wheel to the right which caused her to crash into a snow bank.
61	2/24/2016	3:15 PM	Daylight	Rain	Wet	46	24			Rear-end	Followed Too Closely	MV1 and MV2: traveling SB on Frontage Rd. Both vehicles were stopped at a yield sign to turn right onto Dascomb Rd. MV2 rolled forward and rear-ended MV1.
62	5/14/2016	8:26 AM	Daylight	Clear	Dry	62	43			Angled	Failure to Yield Right-of-Way	MV1: traveling EB on Dascomb Rd; MV2: traveling WB on Dascomb Rd. MV1 and Mv2 collided when MV1 made a left turn onto Frontage Rd without yielding for MV2.
63	5/19/2016	5:13 PM	Daylight	Clear	Dry	38	37			Angled	Other	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV2 struck MV1 when MV2 attempted to turn left onto Frontage Rd.

Crash Data Summary Tables
Dascomb Road @ Frontage Road - Andover, MA
01/01/2011 - 09/31/2016

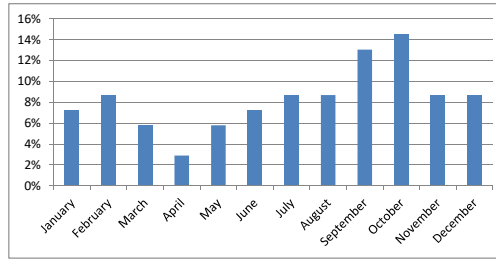
Collision Diagram	Crash Date	Crash Time	Ambient Light	Weather Condition	Road Surface	Operator's Age				Manner of Collision	Driver Contributing Codes	Detailed Narrative (from Crash Portal)
						V1	V2	V3	V4			
64	6/19/2016	8:01 AM	Daylight	Clear	Dry	28	58			Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV1 and MV2 collided when MV1 turned left onto Frontage Rd without yielding for MV1.
65	7/23/2016	3:25 PM	Daylight	Clear	Dry	32	52			Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV2 struck MV1 when MV2 attempted to turn left onto Frontage Rd without yielding to the oncoming traffic.
66	7/26/2016	7:17 AM	Daylight	Clear	Dry	48	29			Angled	Disregarded Traffic Controls	MV1: attempting to make a left turn from Dascomb Rd EB lane onto Frontage Rd NB lane; MV2: traveling WB on Dascomb Rd. MV2 struck MV1 when MV2 went through the red light .
67	9/15/2016	1:42 PM	Daylight	Cloudy	Dry	64	49			Sideswipe	Other	MV1 and MV2: traveling SB on Frontage Rd towards Dascomb Rd intersection. MV1 was on the inside lane and MV2 was on the outside lane. The vehicles struck each other when MV1 moved over towards MV2.
68	9/21/2016	6:01 AM	Daylight	Clear	Dry	27	35			Angled	Failure to Yield Right-of-Way	MV1: traveling EB on Dascomb Rd; MV2: traveling WB on Dascomb Rd. MV1 struck MV2 when MV1 turned left onto Frontage Road NB lane without yielding for MV2.
69	9/29/2016	4:33 PM	Daylight	Clear	Dry	31	37			Head-on	Not Reported	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV1 and MV2 collided when MV2 attempted to make a left-turn onto Frontage Rd.

Crash Data Summary Tables
Dascomb Road @ Frontage Road - Andover, MA
01/01/2011 - 09/31/2016

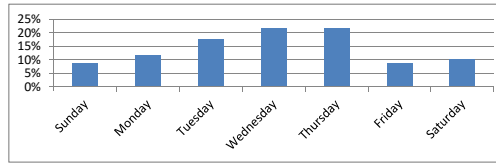
Dascomb Road @ Frontage Road

69

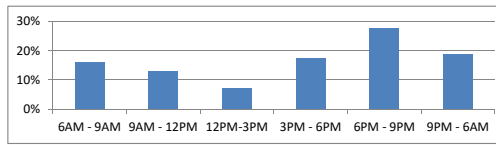
Month	#	%
January	5	7%
February	6	9%
March	4	6%
April	2	3%
May	4	6%
June	5	7%
July	6	9%
August	6	9%
September	9	13%
October	10	14%
November	6	9%
December	6	9%



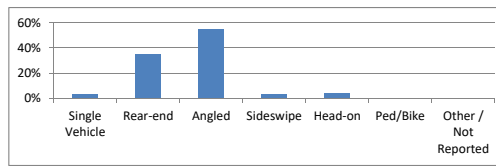
Day of Week	#	%
Sunday	6	9%
Monday	8	12%
Tuesday	12	17%
Wednesday	15	22%
Thursday	15	22%
Friday	6	9%
Saturday	7	10%



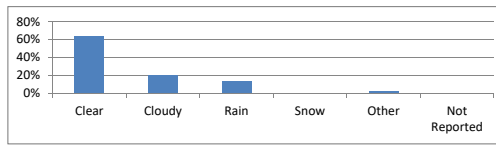
Time of Day	#	%
6AM - 9AM	11	16%
9AM - 12PM	9	13%
12PM-3PM	5	7%
3PM - 6PM	12	17%
6PM - 9PM	19	28%
9PM - 6AM	13	19%



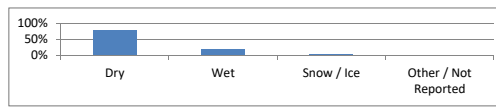
Manner of Collision	#	%
Single Vehicle	2	3%
Rear-end	24	35%
Angled	38	55%
Sideswipe	2	3%
Head-on	3	4%
Ped/Bike	0	0%
Other / Not Reported	0	0%



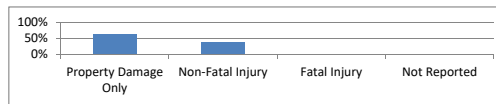
Weather Conditions	#	%
Clear	44	64%
Cloudy	14	20%
Rain	9	13%
Snow	0	0%
Other	2	3%
Not Reported	0	0%



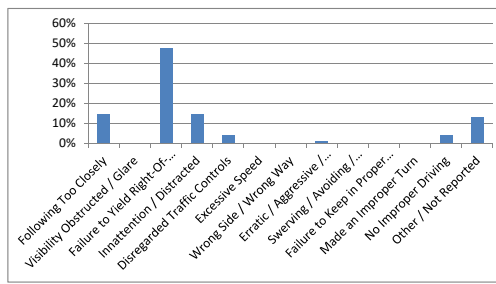
Road Surface	#	%
Dry	54	78%
Wet	12	17%
Snow / Ice	2	3%
Other / Not Reported	1	1%



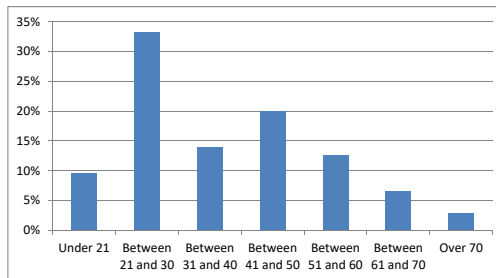
Crash Severity	#	%
Property Damage Only	43	62%
Non-Fatal Injury	26	38%
Fatal Injury	0	0%
Not Reported	0	0%



Main Contributing Factor from Narrative	#	%
Following Too Closely	10	14%
Visibility Obstructed / Glare	0	0%
Failure to Yield Right-Of-Way	33	48%
Inattention / Distracted	10	14%
Disregarded Traffic Controls	3	4%
Excessive Speed	0	0%
Wrong Side / Wrong Way	0	0%
Erratic / Aggressive / Reckless Driving	1	1%
Swerving / Avoiding / Over-Steering / Over-Correcting	0	0%
Failure to Keep in Proper Lane	0	0%
Made an Improper Turn	0	0%
No Improper Driving	3	4%
Other / Not Reported	9	13%



Age	#	%
Under 21	13	10%
Between 21 and 30	45	33%
Between 31 and 40	19	14%
Between 41 and 50	27	20%
Between 51 and 60	17	13%
Between 61 and 70	9	7%
Over 70	4	3%

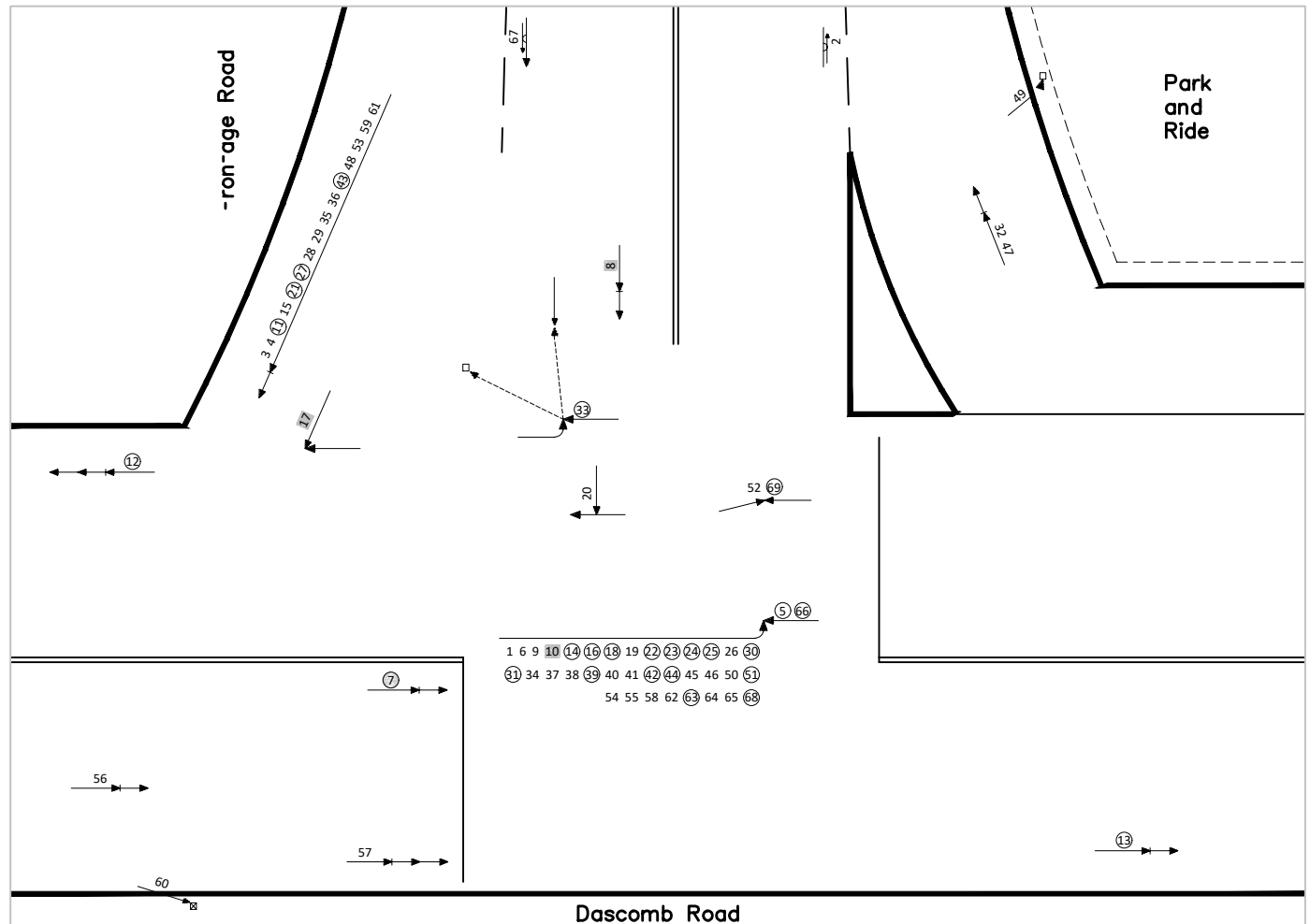




Not to Scale

Dascomb Road Improvements Project - Andover, Massachusetts Expanded Environmental Notification Form (EENF)

LOCATION: Dascomb Road @ Frontage Road
 CITY/STATE: Andover, Massachusetts
 TIME PERIOD: 01/01/2011- 09/31/2016
 PREPARED BY: TEC, Inc. / Eindra (Elena) Aung, E.I.T.
 SOURCE: MassDOT / Town of Andover Police Department



Dascomb Road

LEGEND			SHOW FOR COLLISION
VEHICLE PATH	HEAD-ON COLLISION	FIXED OBJECT	1. Approximate location of collision, 2. Direction of collision, 3. Type of collision and vehicles involved, 4. Time, Day, Date 5. Any other pertinent factors mentioned on the report. NOTE: Shaded number indicates crash occurred under "nighttime" conditions
BACKING VEHICLE	ANGLED COLLISION	MOVEABLE OBJECT	
SIDESWIPE COLLISION	FIXED OBJECT COLLISION	PARKED VEHICLE	
PEDESTRIAN COLLISION	OVERTURNED VEHICLE	PERSONAL INJURY	
CYCLIST COLLISION	OUT-OF-CONTROL VEHICLE	FATALITY	
REAR-END COLLISION		ANIMAL	

SUMMARY OF CRASHES ON DIAGRAM [no fatal collisions]

	REAR-END	SIDESWIPE	HEAD-ON	ANGLED	SINGLE VEH	PED/BIKE	OTHER / UNK	TOTAL
PROPERTY DAMAGE ONLY	17	2	2	20	2	0	0	43
NON-FATAL INJURY	7	0	1	18	0	0	0	26
UNKNOWN / NOT REPORTED	0	0	0	0	0	0	0	0
TOTAL	24	2	3	38	2	0	0	69

Figure F-6

Collision Diagram 2011-2016 Collision Data



TEC, Inc.
 65 Glenn Street | 169 Ocean Blvd, Unit 101
 Lawrence, MA 01843 | Hampton, NH 03842
 (978) 794.1792 | (603) 601.8154
 www.TheEngineeringCorp.com

Crash Data Summary Tables
Dascomb Road @ I-93 Northbound Ramps - Andover, MA
01/01/2011 - 09/31/2016

Collision Diagram	Crash Date	Crash Time	Ambient Light	Weather Condition	Road Surface	Operator's Age				Manner of Collision	Driver Contributing Codes	Detailed Narrative (from Crash Report)
						V1	V2	V3	V4			
1	2/5/2011	12:10 AM	Dark - Lighted	Clear	Dry	54	44			Angled	Failure to Yield Right-of-Way	MV1: traveling EB on Dascomb Rd; MV2: exiting from I93 NB off-ramp. MV2 collided with MV1 when MV2 made a left turn onto Dascomb Rd WB lane without yielding for MV1. MV2 did not stop at the STOP-sign prior to making the turn as well. Both vehicles were towed.
2	2/18/2011	5:59 PM	Dark - Lighted	Cloudy	Wet	16	20			Angled	Failure to Yield Right-of-Way	MV1: traveling EB on Dascomb Rd; MV2: traveling NB on I-93NB Ramp. MV2 collided with MV1 when MV2 merged onto Dascomb Rd EB lane without yielding for MV1.
3	7/21/2011	5:30 PM	Daylight	Clear	Dry	44	50			Angled	Failure to Yield Right-of-Way	MC1: traveling EB on Dascomb Rd; MV1: traveling WB on Dascomb Rd. MV1 took a left turn onto I93 NB on ramp, cutting off MC1. MV1 struck MC1 and the operator of MC1 was subsequently transported to the hospital.
4	9/21/2011	7:51 AM	Daylight	Clear	Dry	23	44			Angled	Made an Improper Turn	MV1 and MV2: traveling WB on Dascomb Rd. MV2 struck MV1 when MV1 made an improper U-turn to get on the I-93NB on-ramp since MV1 missed the entrance to the on-ramp.
5	10/21/2011	12:30 AM	Dark - Not Lighted	Clear	Dry	24				Single Vehicle	Excessive Speed	MV1: traveling NB on I-93NB off-ramp. MV1 was driving at an excess speed on the ramp. MV1 was unable to negotiate the corner on the ramp and enters the island where it rolls over.
6	1/21/2012	8:25 AM	Daylight	Clear	Other	24	50			Angled	Excessive Speed	MV1: exiting I-93NB off-ramp; MV2: traveling WB on Dascomb Rd. MV1 was driving too fast for the roadway conditions at that time. MV1 could not stop at the Stop sign, continued to slide into Dascomb Rd and collided with MV2.
7	4/1/2012	2:25 AM	Dark - Not Lighted	Clear	Dry	50				Single Vehicle	Other	MV1: traveling NB on I-93NB off-ramp. The operator of MV1 was fatigue/sleepy while operating the vehicle. When the police arrived at the scene, the vehicle was ontop of the grassy knoll overturned and on fire with the gas tank exposed.
8	9/13/2012	6:44 PM	Dusk	Clear	Dry	49	N/A			Angled	Other	MV1: exiting I-93NB off-ramp; MV2: traveling WB on Dascomb Rd. MV1 struck MV2 while turning left onto Dascomb Rd without yielding. MV1 turned onto I-93 NB on-ramp and fled the scene.
9	8/2/2013	4:05 PM	Daylight	Clear	Dry	39	21	41		Rear-end	Followed Too Closely	MV1, MV2, and MV3: traveling SB on I-93NB on-ramp. MV3 was yielding for the traffic and was rear-ended by MV1 and MV2.
10	10/8/2013	7:38 AM	Daylight	Clear	Dry	27	40			Angled	Disregarded Traffic Controls	MV1: traveling WB on Dascomb Rd; MV2: exiting I-93NB off-ramps. MV1 was preparing to turn left onto I-93NB on-ramp. MV2 hit MV1 when MV2 failed to use care while turning left onto Dascomb Rd WB lane.
11	1/22/2014	9:24 AM	Daylight	Clear	Wet	62	25			Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Dascomb Rd; MV2: exiting I-93NB off-ramps. MV1 was slowing to turn left onto I-93NB on-ramp. MV2 hit MV1 when MV2 failed to use care while turning left onto Dascomb Rd WB lane.
12	7/8/2014	2:53 PM	Daylight	Clear	Dry	77	61			Angled	Failure to Yield Right-of-Way	MV1: traveling EB on Dascomb Rd; MV2: traveling NB on I-93NB Ramp. MV2 collided with MV1 when MV2 turned left onto Dascomb Rd WB lane without yielding for MV1.
13	10/6/2014	4:51 PM	Daylight	Clear	Dry	24	60			Angled	Disregarded Traffic Controls	MV1: traveling EB on Dascomb Rd; MV2: exiting I-93NB off-ramps piggy backing the car in front. MV2 hit MV1 when MV2 failed to yield while turning left onto Dascomb Rd WB lane.

**Crash Data Summary Tables
Dascomb Road @ I-93 Northbound Ramps - Andover, MA
01/01/2011 - 09/31/2016**

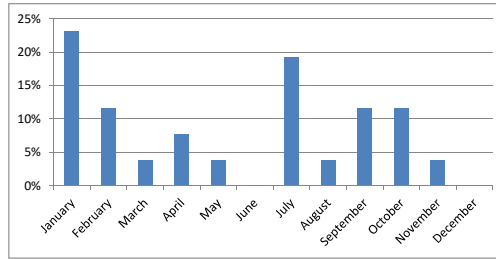
Collision Diagram	Crash Date	Crash Time	Ambient Light	Weather Condition	Road Surface	Operator's Age				Manner of Collision	Driver Contributing Codes	Detailed Narrative (from Crash Report)
						V1	V2	V3	V4			
14	1/16/2015	12:41 PM	Daylight	Clear	Dry	63	N/A			Head-on	Failure to Yield Right-of-Way	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV1 made a left turn on to I-93NB on-ramp without yielding for MV2 causing a head-on accident.
15	1/16/2015	4:51 PM	Dusk	Clear	Dry	43	26			Angled	Inattention / Distracted	MV1: traveling EB on Dascomb Rd; MV2: exiting I-93 NB off-ramp. MV1 struck MV2 when MV2 made a left turn onto Dascomb Rd.
16	3/8/2015	7:39 AM	Daylight	Clear	Dry	41	41			Angled	Visibility Obstructed	MV1: traveling WB on Dascomb Rd; MV2: exiting I-93NB off-ramps. MV1 was turning left onto I-93NB on-ramp. MV2 hit MV1 when MV2 failed to use care while turning left onto Dascomb Rd
17	4/11/2015	4:08 PM	Daylight	Clear	Dry	46	27			Rear-end	Followed Too Closely	MV1 and MV2: exiting I-93NB off-ramp. MV2 rear-ended MV1 when MV1 stopped at the yield sign.
18	5/18/2015	3:31 PM	Daylight	Clear	Dry	57	44			Angled	Failure to Yield Right-of-Way	MV1: traveling EB on Dascomb Rd; MV2: traveling WB on Dascomb Rd. MV2 struck MV1 when MV2 made a left turn on to I-93NB on-ramp without yielding for MV1.
19	7/15/2015	4:45 PM	Daylight	Clear	Dry	30	18			Rear-end	Other	MV1 and MV2: exiting I-93NB off-ramp. MV2 rear-ended MV1 when MV1 stopped at the yield sign.
20	11/3/2015	3:59 PM	Daylight	Cloudy	Dry	19	75			Angled	No Improper Driving	MC1: traveling EB on Dascomb Rd; MV1: exiting I93NB off-ramp. MV1 struck MC1 when MV1 turned left onto Dascomb Rd.
21	1/15/2016	2:59 PM	Daylight	Cloudy	Dry	34	77			Angled	Failure to Yield Right-of-Way	MV1: traveling EB on Dascomb Rd; MV2: exiting from I93 NB off-ramp. MV2 collided with MV1 when MV2 made a left turn onto Dascomb Rd WB lane without yielding for MV1.
22	1/18/2016	8:12 AM	Daylight	Snow	Snow	26	47			Angled	Failure to Yield Right-of-Way	MV1: traveling WB on Dascomb Rd; MV2: traveling EB on Dascomb Rd. MV1 made a left turn on to I-93NB on-ramp without yielding for MV2 causing a head-on accident.
23	2/1/2016	11:24 PM	Dark - Lighted	Clear	Dry	61	56			Angled	Failure to Yield Right-of-Way	MV1: exiting I-93NB off-ramp; MV2: traveling WB on Dascomb Rd. MV1 was attempting to make a left turn onto Dascomb Rd and MV2 was attempting to make a left turn onto I93 NB on -ramp. The accident occurred when MV1 failed to yield for MV2.
24	7/8/2016	12:21 PM	Daylight	Clear	Dry	58	42			Angled	Failure to Yield Right-of-Way	MV1: attempting to enter Dascomb Rd from I-93NB off-ramp; MV2: traveling WB on Dascomb Rd. MV1 collided with MV2 when MV1 turned left without yielding for MV2.
25	7/17/2016	12:16 PM	Daylight	Clear	Dry	27	62			Cyclist	Failure to Yield Right-of-Way	Cyclist 1: traveling EB on Dascomb Rd; MV1: exiting I-93NB off-ramp. MV1 sideswiped Cyclist 1 when MV1 attempted to turn left onto Dascomb Rd.
26	9/29/2016	8:06 PM	Dark - Lighted	Clear	Dry	62				Single Vehicle	No Improper Driving	MV1: traveling WB on Dascomb Rd. MV1 collided with a deer when the deer ran across the roadway.

Crash Data Summary Tables
Dascomb Road @ I-93 Northbound Ramps - Andover, MA
01/01/2011 - 09/31/2016

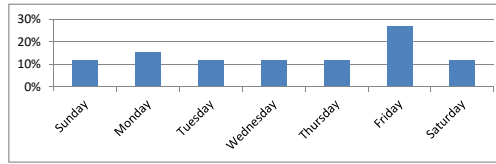
Dascomb Road @ I-93 North Ramps

26

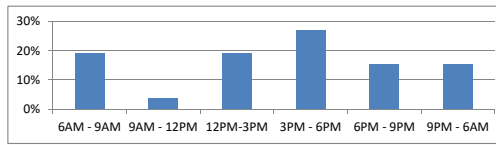
Month	#	%
January	6	23%
February	3	12%
March	1	4%
April	2	8%
May	1	4%
June	0	0%
July	5	19%
August	1	4%
September	3	12%
October	3	12%
November	1	4%
December	0	0%



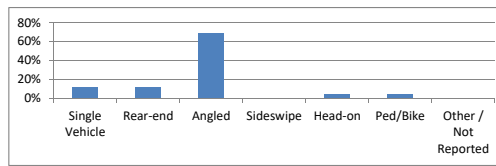
Day of Week	#	%
Sunday	3	12%
Monday	4	15%
Tuesday	3	12%
Wednesday	3	12%
Thursday	3	12%
Friday	7	27%
Saturday	3	12%



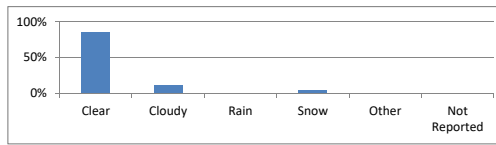
Time of Day	#	%
6AM - 9AM	5	19%
9AM - 12PM	1	4%
12PM-3PM	5	19%
3PM - 6PM	7	27%
6PM - 9PM	4	15%
9PM - 6AM	4	15%



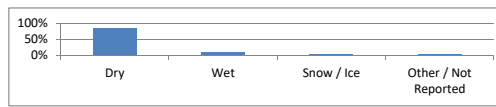
Manner of Collision	#	%
Single Vehicle	3	12%
Rear-end	3	12%
Angled	18	69%
Sideswipe	0	0%
Head-on	1	4%
Ped/Bike	1	4%
Other / Not Reported	0	0%



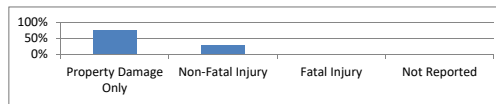
Weather Conditions	#	%
Clear	22	85%
Cloudy	3	12%
Rain	0	0%
Snow	1	4%
Other	0	0%
Not Reported	0	0%



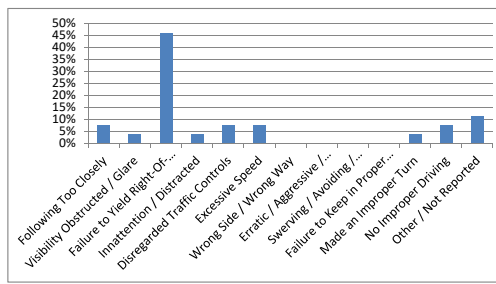
Road Surface	#	%
Dry	22	85%
Wet	2	8%
Snow / Ice	1	4%
Other / Not Reported	1	4%



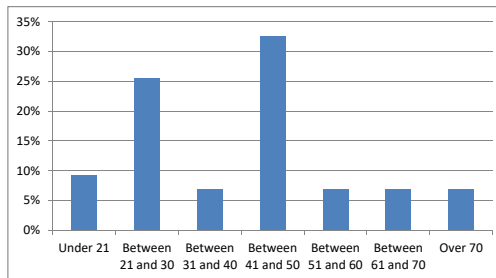
Crash Severity	#	%
Property Damage Only	19	73%
Non-Fatal Injury	7	27%
Fatal Injury	0	0%
Not Reported	0	0%



Main Contributing Factor from Narrative	#	%
Following Too Closely	2	8%
Visibility Obstructed / Glare	1	4%
Failure to Yield Right-Of-Way	12	46%
Inattention / Distracted	1	4%
Disregarded Traffic Controls	2	8%
Excessive Speed	2	8%
Wrong Side / Wrong Way	0	0%
Erratic / Aggressive / Reckless Driving	0	0%
Swerving / Avoiding / Over-Steering / Over-Correcting	0	0%
Failure to Keep in Proper Lane	0	0%
Made an Improper Turn	1	4%
No Improper Driving	2	8%
Other / Not Reported	3	12%



Age	#	%
Under 21	4	9%
Between 21 and 30	11	26%
Between 31 and 40	3	7%
Between 41 and 50	14	33%
Between 51 and 60	3	7%
Between 61 and 70	3	7%
Over 70	3	7%

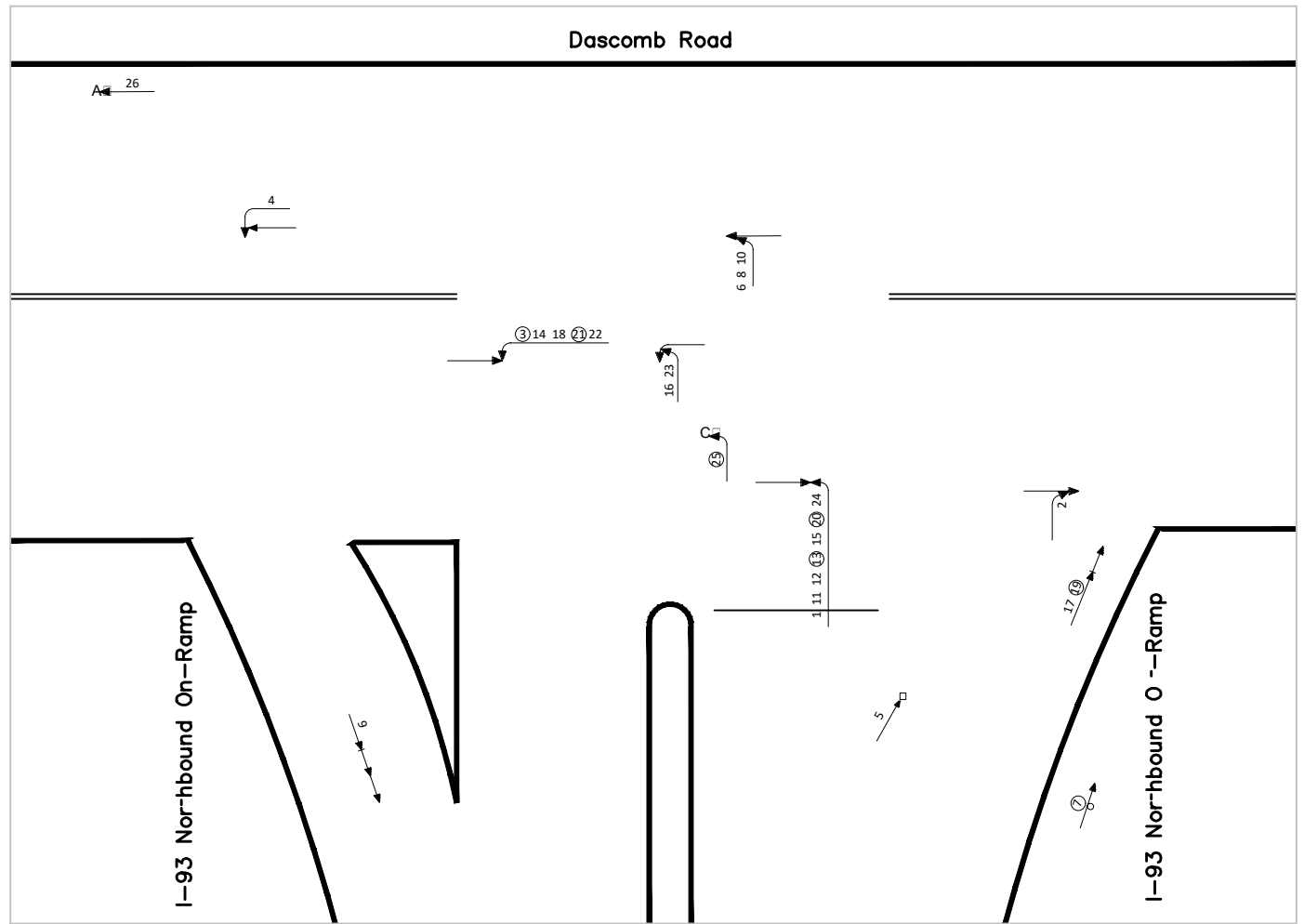




Not to Scale

Dascomb Road Improvements Project - Andover, Massachusetts Expanded Environmental Notification Form (EENF)

LOCATION: Dascomb Road @ I-93 Northbound Ramps
 CITY/STATE: Andover, Massachusetts
 TIME PERIOD: 01/01/2011- 09/31/2016
 PREPARED BY: TEC, Inc. / Eindra (Elena) Aung, E.I.T.
 SOURCE: MassDOT / Town of Andover Police Department



LEGEND			SHOW FOR COLLISION	
→	VEHICLE PATH	↔	HEAD-ON COLLISION	1. Approximate location of collision, 2. Direction of collision, 3. Type of collision and vehicles involved, 4. Time, Day, Date 5. Any other pertinent factors mentioned on the report. NOTE: Shaded number indicates crash occurred under "nighttime" conditions
←←	BACKING VEHICLE	↘	ANGLED COLLISION	
↔↔	SIDESWIPE COLLISION	→□	FIXED OBJECT COLLISION	
→□	PEDESTRIAN COLLISION	→○	OVERTURNED VEHICLE	
→C	CYCLIST COLLISION	↘↘	OUT-OF-CONTROL VEHICLE	
→→	REAR-END COLLISION	□	FIXED OBJECT	
		⊠	MOVEABLE OBJECT	
		▨	PARKED VEHICLE	
		○	PERSONAL INJURY	
		○	FATALITY	
		□	ANIMAL	

SUMMARY OF CRASHES ON DIAGRAM [no fatal collisions]								
	REAR-END	SIDESWIPE	HEAD-ON	ANGLED	SINGLE VEH	PED/BIKE	OTHER / UNK	TOTAL
PROPERTY DAMAGE ONLY	2	0	1	14	2	0	0	19
NON-FATAL INJURY	1	0	0	4	1	1	0	7
UNKNOWN / NOT REPORTED	0	0	0	0	0	0	0	0
TOTAL	3	0	1	18	3	1	0	26

Figure F-4

Collision Diagram 2011-2016 Collision Data



TEC, Inc.
 65 Glenn Street | 169 Ocean Blvd, Unit 101
 Lawrence, MA 01843 | Hampton, NH 03842
 (978) 794.1792 | (603) 601.8154
 www.TheEngineeringCorp.com

Appendix D. Additional Information



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Dascomb Road EB
east of California Products Driveway
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli
EB

165301 A EB Class
Site Code:

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
10/06/1														
6	2	35	13	1	4	1	0	0	0	0	0	0	0	56
01:00	2	59	13	1	2	2	0	0	4	0	0	0	0	83
02:00	2	36	6	2	2	1	0	0	5	0	0	0	0	54
03:00	2	22	10	2	7	3	0	0	0	0	0	0	0	46
04:00	5	84	31	3	15	5	0	1	4	0	0	0	0	148
05:00	10	308	120	2	47	14	1	0	26	0	0	0	0	528
06:00	7	399	126	3	33	14	1	2	9	0	0	0	0	594
07:00	14	700	156	21	41	14	1	3	9	0	0	0	0	959
08:00	15	572	134	6	36	11	0	3	9	0	0	0	0	786
09:00	15	454	135	12	31	15	0	6	12	0	0	0	0	680
10:00	16	409	151	13	52	18	1	8	23	0	0	0	0	691
11:00	14	438	150	10	50	13	0	5	9	0	0	0	0	689
12 PM	14	425	124	7	38	16	0	2	15	0	0	0	0	641
13:00	10	469	150	9	48	16	0	3	9	0	0	0	0	714
14:00	11	563	171	12	43	16	1	4	10	0	0	0	0	831
15:00	13	693	201	8	63	11	0	4	5	0	0	0	0	998
16:00	6	773	211	5	45	1	0	4	3	0	0	0	0	1048
17:00	10	865	166	3	35	1	0	5	2	0	0	0	0	1087
18:00	10	763	157	3	41	3	0	2	2	0	0	0	0	981
19:00	7	471	94	2	23	0	0	2	1	0	0	0	0	600
20:00	7	304	77	0	5	7	0	0	1	0	0	0	0	401
21:00	5	241	51	1	8	1	0	0	0	0	0	0	0	307
22:00	4	127	22	0	6	3	0	0	6	0	0	0	0	168
23:00	4	116	17	0	4	1	0	0	0	0	0	0	0	142
Percent	1.5%	70.5%	18.8%	1.0%	5.1%	1.4%	0.0%	0.4%	1.2%	0.0%	0.0%	0.0%	0.0%	
AM Peak	10:00	07:00	07:00	07:00	10:00	10:00	05:00	10:00	05:00					07:00
Vol.	16	700	156	21	52	18	1	8	26					959
PM Peak	12:00	17:00	16:00	14:00	15:00	12:00	14:00	17:00	12:00					17:00
Vol.	14	865	211	12	63	16	1	5	15					1087



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Dascomb Road EB
east of California Products Driveway
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli
EB

165301 A EB Class
Site Code:

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
10/07/1														
6	1	44	4	0	1	1	0	0	1	0	0	0	0	52
01:00	4	51	7	0	1	5	0	1	1	0	0	0	0	70
02:00	2	14	6	0	4	2	0	0	1	0	0	0	0	29
03:00	1	20	9	4	4	1	0	0	5	0	0	0	0	44
04:00	10	89	25	1	16	12	0	0	25	0	0	0	0	178
05:00	11	279	109	2	42	12	1	0	11	0	0	0	1	468
06:00	10	363	128	8	41	14	1	4	14	0	0	0	0	583
07:00	12	660	172	10	46	10	1	12	11	0	0	0	0	934
08:00	13	627	154	5	35	15	0	6	7	0	0	0	0	862
09:00	24	485	147	7	33	16	0	6	19	0	0	0	0	737
10:00	16	430	137	13	50	18	0	6	19	0	0	0	0	689
11:00	19	437	139	15	45	15	0	6	15	0	0	0	0	691
12 PM	16	519	140	10	37	15	1	13	17	0	0	0	0	768
13:00	16	542	165	16	40	13	1	8	11	0	0	0	0	812
14:00	15	602	200	15	51	12	0	2	3	0	0	0	0	900
15:00	7	794	212	7	42	6	0	2	2	0	0	0	0	1072
16:00	12	776	186	4	43	7	0	8	3	0	0	0	0	1039
17:00	12	906	175	6	43	4	0	8	0	0	0	0	0	1154
18:00	10	763	168	4	27	1	0	2	1	0	0	0	0	976
19:00	5	449	85	0	22	2	0	1	0	0	0	0	0	564
20:00	5	287	65	1	9	4	0	0	4	0	0	0	0	375
21:00	3	154	33	0	10	1	0	0	1	0	0	0	0	202
22:00	1	250	55	0	16	1	0	0	2	0	0	0	0	325
23:00	0	211	29	1	10	0	0	0	0	0	0	0	0	251
Percent	1.6%	70.8%	18.5%	0.9%	4.8%	1.4%	0.0%	0.6%	1.3%	0.0%	0.0%	0.0%	0.0%	
AM Peak	09:00	07:00	07:00	11:00	10:00	10:00	05:00	07:00	04:00				05:00	07:00
Vol.	24	660	172	15	50	18	1	12	25				1	934
PM Peak	12:00	17:00	15:00	13:00	14:00	12:00	12:00	12:00	12:00					17:00
Vol.	16	906	212	16	51	15	1	13	17					1154



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Dascomb Road EB
east of California Products Driveway
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli
EB

165301 A EB Class
Site Code:

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
10/08/1														
6	0	128	19	0	6	0	0	0	2	0	0	0	0	155
01:00	2	61	8	0	2	2	0	0	0	0	0	0	0	75
02:00	0	17	7	0	0	0	0	0	0	0	0	0	0	24
03:00	0	26	8	1	5	0	0	0	0	0	0	0	0	40
04:00	1	48	19	0	7	1	0	1	1	0	0	0	0	78
05:00	5	97	37	1	6	11	0	0	19	0	0	0	0	176
06:00	3	156	61	5	18	6	1	0	5	0	0	0	0	255
07:00	3	309	102	5	37	3	0	1	0	0	0	0	0	460
08:00	1	427	130	5	33	7	0	1	2	0	0	0	0	606
09:00	6	508	149	1	29	7	0	5	2	0	0	0	0	707
10:00	4	579	142	3	33	8	0	3	5	0	0	0	0	777
11:00	9	667	189	2	41	7	0	5	2	0	0	0	0	922
12 PM	4	638	160	3	22	3	0	3	3	0	0	0	0	836
13:00	15	585	145	2	36	1	1	5	0	0	0	0	0	790
14:00	4	544	144	0	31	2	0	0	0	0	0	0	0	725
15:00	6	652	124	0	28	1	1	3	0	0	0	0	0	815
16:00	4	516	97	1	30	0	0	3	0	0	0	0	0	651
17:00	3	479	92	1	19	0	0	3	0	0	0	0	0	597
18:00	0	374	80	2	24	1	0	0	0	0	0	0	0	481
19:00	0	299	62	0	12	0	0	0	1	0	0	0	0	374
20:00	2	196	45	0	9	0	0	0	0	0	0	0	0	252
21:00	0	194	32	2	5	0	0	0	0	0	0	0	0	233
22:00	0	145	25	0	4	0	0	0	0	0	0	0	0	174
23:00	0	126	18	0	5	0	0	0	0	0	0	0	0	149
Percent	0.7%	75.1%	18.3%	0.3%	4.3%	0.6%	0.0%	0.3%	0.4%	0.0%	0.0%	0.0%	0.0%	
AM Peak	11:00	11:00	11:00	06:00	11:00	05:00	06:00	09:00	05:00					11:00
Vol.	9	667	189	5	41	11	1	5	19					922
PM Peak	13:00	15:00	12:00	12:00	13:00	12:00	13:00	13:00	12:00					12:00
Vol.	15	652	160	3	36	3	1	5	3					836



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Dascomb Road EB
east of California Products Driveway
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli
EB

165301 A EB Speed
Site Code:

Start Time	1	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th %ile	Ave Speed
10/06/	14	19	24	29	34	39	44	49	54	59	64	69	9999			
16	0	0	0	1	18	30	4	2	0	1	0	0	0	56	38	36
01:00	0	0	2	7	22	40	10	1	1	0	0	0	0	83	38	35
02:00	0	0	1	9	15	23	5	1	0	0	0	0	0	54	38	34
03:00	0	0	1	8	15	13	9	0	0	0	0	0	0	46	40	34
04:00	2	5	6	27	47	52	7	2	0	0	0	0	0	148	37	32
05:00	0	0	20	120	250	126	12	0	0	0	0	0	0	528	36	32
06:00	0	9	28	136	261	144	16	0	0	0	0	0	0	594	36	32
07:00	9	49	101	335	369	82	13	1	0	0	0	0	0	959	33	29
08:00	5	23	72	243	328	109	6	0	0	0	0	0	0	786	33	30
09:00	11	46	70	159	271	111	12	0	0	0	0	0	0	680	34	29
10:00	4	23	133	232	217	60	21	1	0	0	0	0	0	691	33	29
11:00	11	26	88	212	275	69	7	1	0	0	0	0	0	689	33	29
12 PM	2	19	75	210	251	74	8	2	0	0	0	0	0	641	33	29
13:00	3	15	83	255	262	85	10	1	0	0	0	0	0	714	33	29
14:00	16	26	101	294	298	87	8	1	0	0	0	0	0	831	33	29
15:00	19	76	176	327	302	80	18	0	0	0	0	0	0	998	33	28
16:00	4	15	112	331	436	141	9	0	0	0	0	0	0	1048	33	30
17:00	35	66	144	426	340	66	9	1	0	0	0	0	0	1087	32	27
18:00	5	28	123	380	357	80	8	0	0	0	0	0	0	981	33	29
19:00	0	7	50	183	238	104	16	2	0	0	0	0	0	600	35	31
20:00	0	5	11	82	182	102	17	2	0	0	0	0	0	401	36	32
21:00	0	2	10	64	127	91	11	2	0	0	0	0	0	307	37	32
22:00	0	3	5	25	82	35	12	4	2	0	0	0	0	168	37	33
23:00	0	0	4	13	54	55	13	3	0	0	0	0	0	142	38	34
Total	126	443	1416	4079	5017	1859	261	27	3	1	0	0	0	13232		
%	1.0%	3.3%	10.7%	30.8%	37.9%	14.0%	2.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	09:00	07:00	10:00	07:00	07:00	06:00	10:00	00:00	01:00	00:00					07:00	
Vol.	11	49	133	335	369	144	21	2	1	1					959	
PM Peak	17:00	15:00	15:00	17:00	16:00	16:00	15:00	22:00	22:00						17:00	
Vol.	35	76	176	426	436	141	18	4	2						1087	

Stats

15th Percentile : 23 MPH
 50th Percentile : 29 MPH
 85th Percentile : 34 MPH
 95th Percentile : 38 MPH

Mean Speed(Average) : 30 MPH
 10 MPH Pace Speed : 25-34 MPH
 Number in Pace : 9096
 Percent in Pace : 68.7%
 Number of Vehicles > 30 MPH : 6165
 Percent of Vehicles > 30 MPH : 46.6%



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Dascomb Road EB
east of California Products Driveway
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli
EB

165301 A EB Speed
Site Code:

Start Time	1	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th %ile	Ave Speed
10/07/	14	19	24	29	34	39	44	49	54	59	64	69	9999			
16	0	0	2	9	14	19	7	0	1	0	0	0	0	52	39	34
01:00	0	0	0	9	30	21	9	1	0	0	0	0	0	70	38	34
02:00	0	0	1	8	5	9	4	1	1	0	0	0	0	29	41	34
03:00	0	0	2	9	17	12	2	2	0	0	0	0	0	44	37	33
04:00	0	0	16	36	68	37	14	7	0	0	0	0	0	178	38	33
05:00	8	14	66	108	168	86	16	2	0	0	0	0	0	468	35	30
06:00	0	3	56	156	250	104	13	1	0	0	0	0	0	583	35	31
07:00	11	21	115	367	323	90	6	1	0	0	0	0	0	934	33	29
08:00	0	17	119	269	348	96	11	2	0	0	0	0	0	862	33	29
09:00	1	19	113	217	300	81	6	0	0	0	0	0	0	737	33	29
10:00	2	23	113	223	236	79	11	2	0	0	0	0	0	689	33	29
11:00	0	6	114	233	249	81	7	1	0	0	0	0	0	691	33	29
12 PM	2	28	129	299	244	60	5	1	0	0	0	0	0	768	32	28
13:00	0	20	145	301	268	74	4	0	0	0	0	0	0	812	33	28
14:00	26	49	157	342	267	48	11	0	0	0	0	0	0	900	32	27
15:00	46	71	235	400	234	79	7	0	0	0	0	0	0	1072	32	26
16:00	18	20	105	350	416	118	9	3	0	0	0	0	0	1039	33	29
17:00	51	69	218	392	354	65	5	0	0	0	0	0	0	1154	32	27
18:00	31	73	168	375	264	59	3	3	0	0	0	0	0	976	32	27
19:00	0	0	29	155	256	104	18	2	0	0	0	0	0	564	35	31
20:00	0	0	17	85	170	84	16	3	0	0	0	0	0	375	36	32
21:00	0	0	8	39	93	46	13	2	1	0	0	0	0	202	37	33
22:00	0	2	8	63	151	83	15	3	0	0	0	0	0	325	37	33
23:00	0	1	3	54	93	71	27	2	0	0	0	0	0	251	38	33
Total	196	436	1939	4499	4818	1606	239	39	3	0	0	0	0	13775		
%	1.4%	3.2%	14.1%	32.7%	35.0%	11.7%	1.7%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	07:00	10:00	08:00	07:00	08:00	06:00	05:00	04:00	00:00							07:00
Vol.	11	23	119	367	348	104	16	7	1							934
PM Peak	17:00	18:00	15:00	15:00	16:00	16:00	23:00	16:00	21:00							17:00
Vol.	51	73	235	400	416	118	27	3	1							1154

Stats

15th Percentile : 22 MPH
50th Percentile : 28 MPH
85th Percentile : 33 MPH
95th Percentile : 37 MPH

Mean Speed(Average) : 29 MPH
10 MPH Pace Speed : 25-34 MPH
Number in Pace : 9317
Percent in Pace : 67.6%
Number of Vehicles > 30 MPH : 5741
Percent of Vehicles > 30 MPH : 41.7%



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Dascomb Road EB
east of California Products Driveway
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli
EB

165301 A EB Speed
Site Code:

Start Time	14	15	19	20	24	25	29	30	34	35	39	40	44	45	49	50	54	55	59	60	64	65	69	70	9999	Total	85th % ile	Ave Speed	
10/08/																													
16	0	2	8	24	55	54	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	155	37	33		
01:00	1	0	2	15	31	18	7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	75	38	33		
02:00	0	0	0	0	8	10	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	41	37		
03:00	0	0	1	7	9	15	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	40	35		
04:00	0	0	6	2	27	31	10	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	78	39	35		
05:00	0	0	3	40	73	50	9	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	176	37	33		
06:00	0	1	8	45	93	81	24	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	255	38	33		
07:00	0	0	7	47	187	183	31	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	460	38	34		
08:00	0	1	17	128	244	185	28	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	606	37	33		
09:00	0	5	32	194	323	133	18	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	707	35	31		
10:00	12	21	69	207	322	137	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	777	35	30		
11:00	4	10	69	293	400	124	20	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	922	34	30		
12 PM	5	7	61	242	370	128	22	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	836	35	31		
13:00	1	9	54	213	333	166	11	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	790	35	31		
14:00	3	2	49	183	322	151	14	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	725	35	31		
15:00	2	6	52	245	354	140	14	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	815	35	31		
16:00	0	0	17	153	311	141	25	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	651	36	32		
17:00	0	3	17	107	275	158	34	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	597	37	33		
18:00	0	2	19	100	240	108	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	481	36	32		
19:00	0	0	10	91	168	86	17	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	374	36	32		
20:00	0	0	5	43	115	71	15	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	252	37	33		
21:00	0	0	2	45	113	63	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	233	37	33		
22:00	0	1	5	48	72	41	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	174	36	32		
23:00	0	0	3	62	60	21	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	149	34	31		
Total	28	70	516	2534	4505	2295	357	43	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10352				
%	0.3%	0.7%	5.0%	24.5%	43.5%	22.2%	3.4%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%					
AM Peak	10:00	10:00	10:00	11:00	11:00	08:00	07:00	07:00	04:00																	11:00			
Vol.	12	21	69	293	400	185	31	5	1																	922			
PM Peak	12:00	13:00	12:00	15:00	12:00	13:00	17:00	16:00	15:00	19:00																12:00			
Vol.	5	9	61	245	370	166	34	4	1	1																836			

Stats

15th Percentile : 25 MPH
50th Percentile : 31 MPH
85th Percentile : 36 MPH
95th Percentile : 38 MPH

Mean Speed(Average) : 32 MPH
10 MPH Pace Speed : 25-34 MPH
Number in Pace : 7039
Percent in Pace : 68.0%
Number of Vehicles > 30 MPH : 6303
Percent of Vehicles > 30 MPH : 60.9%



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Dascomb Road EB
east of California Products Driveway
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli

165301 A EB Volume
Site Code:

Start Time	EB		P.M.	Fri 10/7/201 6
	A.M.			
12:00	17		208	
12:15	12		184	
12:30	11		160	
12:45	12	52	216	768
01:00	12		222	
01:15	14		183	
01:30	23		214	
01:45	21	70	193	812
02:00	6		204	
02:15	5		207	
02:30	6		261	
02:45	12	29	228	900
03:00	6		279	
03:15	9		226	
03:30	13		318	
03:45	16	44	249	1072
04:00	36		267	
04:15	63		260	
04:30	36		274	
04:45	43	178	238	1039
05:00	75		301	
05:15	116		289	
05:30	129		288	
05:45	148	468	276	1154
06:00	125		319	
06:15	139		245	
06:30	143		133	
06:45	176	583	279	976
07:00	199		183	
07:15	265		144	
07:30	242		114	
07:45	228	934	123	564
08:00	216		106	
08:15	227		87	
08:30	210		109	
08:45	209	862	73	375
09:00	199		51	
09:15	192		62	
09:30	163		55	
09:45	183	737	34	202
10:00	164		111	
10:15	163		47	
10:30	190		98	
10:45	172	689	69	325
11:00	161		75	
11:15	180		65	
11:30	182		66	
11:45	168	691	45	251
Total	5337		8438	
Percent			100.0 %	0.0% 0.0%
Day Total		13775		
Peak	07:15	-	05:15	-
Vol.	951	-	1172	-
P.H.F.	0.897		0.918	



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Dascomb Road EB
east of California Products Driveway
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli

165301 A EB Volume
Site Code:

Start Time	EB												Sat	
	A.M.	P.M.											10/8/201	
12:00	55	218											6	
12:15	41	211												
12:30	35	214												
12:45	24	193	836											
01:00	22	208												
01:15	20	216												
01:30	23	165												
01:45	10	201	790											
02:00	5	176												
02:15	6	189												
02:30	7	192												
02:45	6	168	725											
03:00	9	204												
03:15	8	210												
03:30	11	203												
03:45	12	198	815											
04:00	21	170												
04:15	13	166												
04:30	28	180												
04:45	16	135	651											
05:00	34	170												
05:15	56	145												
05:30	37	133												
05:45	49	149	597											
06:00	43	144												
06:15	57	127												
06:30	77	96												
06:45	78	114	481											
07:00	89	96												
07:15	114	79												
07:30	122	106												
07:45	135	93	374											
08:00	121	75												
08:15	161	71												
08:30	152	49												
08:45	172	57	252											
09:00	148	73												
09:15	154	55												
09:30	196	45												
09:45	209	60	233											
10:00	207	40												
10:15	194	47												
10:30	197	47												
10:45	179	40	174											
11:00	245	34												
11:15	240	35												
11:30	218	48												
11:45	219	32	149											
Total	4275	6077												
Percent		100.0 %	0.0%	0.0%										
Day Total		10352												
Peak	11:00	-	12:00	-	-	-	-	-	-	-	-	-	-	-
Vol.	922	-	836	-	-	-	-	-	-	-	-	-	-	-
P.H.F.	0.941		0.959											



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Dascomb Road WB
east of California Products Driveway
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli
WB

165301 A WB Class
Site Code:

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
10/06/1														
6	2	50	13	0	2	2	0	0	3	0	0	0	0	72
01:00	2	24	3	1	0	2	0	0	4	0	0	0	0	36
02:00	1	28	6	0	3	1	0	0	1	0	0	0	0	40
03:00	1	36	11	3	4	1	0	0	2	0	0	0	0	58
04:00	4	88	22	0	11	5	0	0	4	0	0	0	0	134
05:00	9	148	62	6	21	7	0	1	2	0	0	0	0	256
06:00	19	572	162	8	32	20	0	5	8	0	0	0	0	826
07:00	16	711	155	13	29	15	0	2	13	1	0	0	0	955
08:00	21	678	146	11	37	17	0	5	6	0	0	0	0	921
09:00	28	476	140	16	28	26	1	9	9	0	0	0	0	733
10:00	14	391	137	9	39	11	1	4	8	0	0	0	0	614
11:00	13	411	137	14	35	16	3	5	8	0	0	0	0	642
12 PM	20	437	138	6	34	15	0	7	15	0	0	0	0	672
13:00	16	452	146	10	35	17	3	2	5	0	0	0	0	686
14:00	16	507	173	5	32	21	3	5	11	0	1	0	0	774
15:00	14	688	206	13	30	15	0	10	11	0	0	0	0	987
16:00	10	811	191	5	45	5	0	5	4	0	0	0	0	1076
17:00	11	882	152	2	34	2	0	10	2	0	0	0	0	1095
18:00	7	728	131	3	21	2	1	3	1	0	0	0	0	897
19:00	7	500	102	2	14	3	0	1	0	0	1	0	0	630
20:00	4	393	63	3	15	5	0	1	0	0	0	0	0	484
21:00	2	300	56	1	5	0	0	0	2	0	0	0	0	366
22:00	3	200	27	1	5	3	0	0	0	0	0	0	0	239
23:00	2	137	16	0	1	0	0	0	0	0	0	0	0	156
Percent	1.8%	72.3%	17.9%	1.0%	3.8%	1.6%	0.1%	0.6%	0.9%	0.0%	0.0%	0.0%	0.0%	
AM Peak	09:00	07:00	06:00	09:00	10:00	09:00	11:00	09:00	07:00	07:00				07:00
Vol.	28	711	162	16	39	26	3	9	13	1				955
PM Peak	12:00	17:00	15:00	15:00	16:00	14:00	13:00	15:00	12:00		14:00			17:00
Vol.	20	882	206	13	45	21	3	10	15		1			1095



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Dascomb Road WB
east of California Products Driveway
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli
WB

165301 A WB Class
Site Code:

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
10/07/1														
6	8	74	14	1	2	4	0	0	3	0	0	0	0	106
01:00	3	33	3	0	2	1	0	0	5	0	0	0	0	47
02:00	2	16	8	0	1	2	0	0	1	0	0	0	0	30
03:00	3	38	19	0	4	2	0	0	7	0	0	0	0	73
04:00	3	82	18	0	5	5	0	0	2	0	0	0	0	115
05:00	12	169	65	2	18	10	0	2	9	0	0	0	0	287
06:00	21	475	166	4	30	18	0	6	14	0	0	0	0	734
07:00	23	625	146	10	29	22	1	7	4	0	0	0	0	867
08:00	21	519	124	13	40	17	0	8	11	0	0	0	0	753
09:00	20	432	158	15	20	21	0	10	7	0	0	0	0	683
10:00	12	403	145	9	33	12	0	5	8	0	0	0	0	627
11:00	17	459	122	10	31	15	0	5	10	0	0	0	0	669
12 PM	19	505	168	14	32	9	0	8	8	0	0	0	0	763
13:00	19	439	133	15	40	18	2	5	6	0	0	0	0	677
14:00	7	562	163	7	37	7	0	7	12	0	1	0	1	804
15:00	16	708	185	11	33	12	0	3	8	0	0	0	1	977
16:00	14	927	190	6	39	6	0	8	7	0	0	0	1	1198
17:00	8	842	149	3	33	0	0	6	4	0	0	0	0	1045
18:00	6	552	116	3	15	1	0	2	2	0	0	0	0	697
19:00	3	407	92	1	11	1	0	4	0	0	0	0	0	519
20:00	3	358	59	3	10	1	0	0	0	0	0	0	0	434
21:00	0	281	47	2	12	0	0	0	3	0	0	0	0	345
22:00	2	240	43	2	11	1	0	0	1	0	0	0	0	300
23:00	2	186	35	2	4	0	0	0	0	0	0	0	0	229
Percent	1.9%	71.9%	18.2%	1.0%	3.8%	1.4%	0.0%	0.7%	1.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	07:00	07:00	06:00	09:00	08:00	07:00	07:00	09:00	06:00					07:00
Vol.	23	625	166	15	40	22	1	10	14					867
PM Peak	12:00	16:00	16:00	13:00	13:00	13:00	13:00	12:00	14:00		14:00		14:00	16:00
Vol.	19	927	190	15	40	18	2	8	12		1		1	1198



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Dascomb Road WB
east of California Products Driveway
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli
WB

165301 A WB Class
Site Code:

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
10/08/1														
6	1	121	17	0	3	1	0	0	2	0	0	0	0	145
01:00	0	46	10	1	1	0	0	0	1	0	0	0	0	59
02:00	1	38	8	1	1	1	0	0	1	0	0	0	0	51
03:00	0	28	9	0	5	0	0	0	1	0	0	0	0	43
04:00	3	32	19	0	4	1	0	0	0	0	0	0	0	59
05:00	1	87	34	0	9	3	0	0	0	0	0	0	0	134
06:00	2	190	61	2	21	6	0	0	1	0	0	0	0	283
07:00	3	248	78	4	21	5	0	1	2	0	0	0	0	362
08:00	3	371	98	2	18	2	0	1	3	0	0	0	0	498
09:00	8	444	117	3	22	7	0	4	5	0	0	0	0	610
10:00	12	526	150	3	19	9	0	2	4	0	0	0	0	725
11:00	5	582	130	2	30	6	0	4	14	0	0	0	0	773
12 PM	9	573	132	1	18	4	1	6	3	0	0	0	0	747
13:00	4	577	146	5	19	2	0	3	1	0	0	0	0	757
14:00	12	583	145	5	20	1	0	2	1	0	0	0	0	769
15:00	7	591	125	0	21	1	0	1	0	0	0	0	0	746
16:00	6	530	105	4	12	0	0	4	0	0	0	0	0	661
17:00	6	504	95	4	19	1	0	2	0	0	0	0	0	631
18:00	3	428	71	2	13	1	0	0	1	0	0	0	0	519
19:00	0	332	57	0	13	0	0	0	0	0	0	0	0	402
20:00	5	304	60	1	9	0	1	0	0	0	0	0	0	380
21:00	0	264	33	4	5	0	0	0	0	0	0	0	0	306
22:00	1	233	33	0	2	1	0	0	0	0	0	0	0	270
23:00	0	200	34	0	7	0	0	0	0	0	0	0	0	241
Percent	0.9%	77.0%	17.4%	0.4%	3.1%	0.5%	0.0%	0.3%	0.4%	0.0%	0.0%	0.0%	0.0%	
AM Peak	10:00	11:00	10:00	07:00	11:00	10:00		09:00	11:00					11:00
Vol.	12	582	150	4	30	9		4	14					773
PM Peak	14:00	15:00	13:00	13:00	15:00	12:00	12:00	12:00	12:00					14:00
Vol.	12	591	146	5	21	4	1	6	3					769



PRECISION
DATA
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Dascomb Road WB
east of California Products Driveway
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli
WB

165301 A WB Speed
Site Code:

Start Time	1	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th %ile	Ave Speed
10/06/	14	19	24	29	34	39	44	49	54	59	64	69	9999			
16	0	1	2	10	5	24	21	6	3	0	0	0	0	72	43	37
01:00	0	0	4	10	6	5	8	2	0	1	0	0	0	36	42	34
02:00	0	0	0	8	14	7	8	3	0	0	0	0	0	40	42	35
03:00	0	0	4	13	26	7	6	2	0	0	0	0	0	58	38	32
04:00	0	0	5	34	43	21	17	10	3	1	0	0	0	134	42	34
05:00	0	6	18	35	84	55	44	11	3	0	0	0	0	256	41	34
06:00	0	20	45	217	321	166	47	9	1	0	0	0	0	826	36	32
07:00	1	28	71	259	376	164	49	5	2	0	0	0	0	955	36	31
08:00	0	8	70	260	353	161	53	13	3	0	0	0	0	921	36	31
09:00	0	31	64	170	250	141	57	18	2	0	0	0	0	733	37	31
10:00	0	6	36	157	191	136	65	22	1	0	0	0	0	614	38	33
11:00	0	7	50	162	218	122	65	13	5	0	0	0	0	642	38	32
12 PM	4	16	40	141	251	134	66	16	3	1	0	0	0	672	38	32
13:00	0	2	30	146	264	151	81	10	2	0	0	0	0	686	38	33
14:00	0	3	56	209	327	124	45	9	1	0	0	0	0	774	36	31
15:00	0	2	60	309	388	163	60	5	0	0	0	0	0	987	36	31
16:00	2	28	104	315	433	153	31	8	2	0	0	0	0	1076	35	30
17:00	9	24	75	332	453	161	34	7	0	0	0	0	0	1095	35	30
18:00	0	5	41	216	344	198	72	20	1	0	0	0	0	897	37	33
19:00	0	5	21	115	218	158	88	23	2	0	0	0	0	630	40	34
20:00	0	3	6	61	147	147	94	26	0	0	0	0	0	484	41	35
21:00	0	0	3	61	106	92	79	19	4	1	0	0	1	366	42	36
22:00	0	0	5	39	62	50	53	22	7	1	0	0	0	239	43	36
23:00	0	2	3	11	45	40	44	10	1	0	0	0	0	156	42	36
Total	16	197	813	3290	4925	2580	1187	289	46	5	0	0	1	13349		
%	0.1%	1.5%	6.1%	24.6%	36.9%	19.3%	8.9%	2.2%	0.3%	0.0%	0.0%	0.0%	0.0%			
AM Peak	07:00	09:00	07:00	08:00	07:00	06:00	10:00	10:00	11:00	01:00						07:00
Vol.	1	31	71	260	376	166	65	22	5	1				955		
PM Peak	17:00	16:00	16:00	17:00	17:00	18:00	20:00	20:00	22:00	12:00			21:00	17:00		
Vol.	9	28	104	332	453	198	94	26	7	1			1	1095		

Stats

15th Percentile : 25 MPH
50th Percentile : 31 MPH
85th Percentile : 38 MPH
95th Percentile : 42 MPH

Mean Speed(Average) : 32 MPH
10 MPH Pace Speed : 25-34 MPH
Number in Pace : 8215
Percent in Pace : 61.5%
Number of Vehicles > 30 MPH : 8048
Percent of Vehicles > 30 MPH : 60.3%



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Dascomb Road WB
east of California Products Driveway
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli
WB

165301 A WB Speed
Site Code:

Start Time	1	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th %ile	Ave Speed
10/07/	14	19	24	29	34	39	44	49	54	59	64	69	9999			
16	0	8	5	5	24	17	30	13	4	0	0	0	0	106	44	36
01:00	2	0	2	5	14	5	9	8	2	0	0	0	0	47	45	36
02:00	0	2	4	7	10	3	3	0	1	0	0	0	0	30	38	31
03:00	0	0	1	27	24	10	8	3	0	0	0	0	0	73	39	32
04:00	0	0	5	32	33	22	17	4	2	0	0	0	0	115	40	33
05:00	0	13	10	63	102	52	27	17	1	1	1	0	0	287	39	33
06:00	1	20	48	186	283	135	40	19	2	0	0	0	0	734	37	32
07:00	3	14	50	212	350	163	64	10	1	0	0	0	0	867	37	32
08:00	0	14	53	195	295	135	51	9	1	0	0	0	0	753	37	32
09:00	0	19	58	168	215	149	56	16	2	0	0	0	0	683	38	32
10:00	0	1	28	134	207	131	98	22	6	0	0	0	0	627	40	34
11:00	0	5	21	160	233	147	73	21	9	0	0	0	0	669	39	33
12 PM	0	0	39	189	270	158	83	21	3	0	0	0	0	763	38	33
13:00	0	3	40	146	253	136	78	19	2	0	0	0	0	677	38	33
14:00	0	1	17	210	333	155	69	16	2	1	0	0	0	804	37	33
15:00	0	1	55	266	402	168	70	14	1	0	0	0	0	977	37	32
16:00	2	22	110	366	476	165	45	12	0	0	0	0	0	1198	35	30
17:00	11	30	88	260	417	177	51	8	2	0	1	0	0	1045	36	31
18:00	0	0	17	129	273	175	84	16	3	0	0	0	0	697	38	34
19:00	0	0	11	61	193	141	97	14	2	0	0	0	0	519	40	35
20:00	0	0	5	74	111	128	85	25	6	0	0	0	0	434	41	36
21:00	0	0	1	54	106	86	77	19	1	0	0	1	0	345	42	36
22:00	0	0	6	49	86	77	67	12	3	0	0	0	0	300	41	35
23:00	0	0	3	34	65	62	39	19	6	1	0	0	0	229	42	36
Total	19	153	677	3032	4775	2597	1321	337	62	3	2	1	0	12979		
%	0.1%	1.2%	5.2%	23.4%	36.8%	20.0%	10.2%	2.6%	0.5%	0.0%	0.0%	0.0%	0.0%			
AM Peak	07:00	06:00	09:00	07:00	07:00	07:00	10:00	10:00	11:00	05:00	05:00			07:00		
Vol.	3	20	58	212	350	163	98	22	9	1	1			867		
PM Peak	17:00	17:00	16:00	16:00	16:00	17:00	19:00	20:00	20:00	14:00	17:00	21:00		16:00		
Vol.	11	30	110	366	476	177	97	25	6	1	1	1		1198		

Stats

15th Percentile : 25 MPH
 50th Percentile : 31 MPH
 85th Percentile : 38 MPH
 95th Percentile : 43 MPH

Mean Speed(Average) : 33 MPH
 10 MPH Pace Speed : 25-34 MPH
 Number in Pace : 7807
 Percent in Pace : 60.2%
 Number of Vehicles > 30 MPH : 8143
 Percent of Vehicles > 30 MPH : 62.7%



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Dascomb Road WB
east of California Products Driveway
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli
WB

165301 A WB Speed
Site Code:

Start Time	14	15	19	20	24	25	29	30	34	35	39	40	44	45	49	50	54	55	59	60	64	65	69	70	9999	Total	85th % ile	Ave Speed	
10/08/16	0	0	0	3	29	27	31	40	14	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	145	43	36		
01:00	0	0	0	1	5	14	10	22	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59	43	38		
02:00	0	0	0	5	12	11	14	7	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	51	44	38		
03:00	0	0	0	5	9	5	14	8	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43	46	39		
04:00	0	1	4	18	11	11	8	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59	42	33		
05:00	0	2	2	31	45	25	23	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	134	40	34		
06:00	0	1	5	47	87	60	57	23	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	283	42	35		
07:00	0	0	5	53	127	63	71	35	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	362	43	36		
08:00	0	0	5	77	160	128	97	19	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	498	41	35		
09:00	0	5	13	106	211	130	106	33	5	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	610	41	35		
10:00	0	1	23	131	292	158	89	28	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	725	39	34		
11:00	0	5	21	167	300	169	86	21	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	773	38	33		
12 PM	0	2	12	160	278	166	101	25	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	747	39	34	
13:00	2	2	11	141	290	180	98	31	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	757	39	34	
14:00	0	0	18	165	287	162	106	27	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	769	40	34	
15:00	0	0	14	149	281	173	108	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	746	39	34	
16:00	0	0	5	116	268	126	110	34	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	661	41	34	
17:00	0	0	6	107	234	162	93	25	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	631	40	35	
18:00	0	0	5	96	184	121	93	19	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	519	40	35	
19:00	0	0	1	63	152	90	76	18	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	402	41	35	
20:00	0	1	5	73	111	83	80	23	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	380	42	35	
21:00	0	0	2	64	73	80	63	23	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	306	42	35	
22:00	0	5	1	49	82	71	48	12	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	270	41	35	
23:00	0	0	2	76	71	58	30	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	241	38	33	
Total %	2	25	164	1933	3606	2273	1633	467	56	9	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	10171			
AM Peak		09:00	10:00	11:00	11:00	11:00	09:00	07:00	08:00	07:00	02:00																11:00		
Vol.		5	23	167	300	169	106	35	11	2	1																773		
PM Peak	13:00	22:00	14:00	14:00	13:00	13:00	16:00	16:00	12:00	20:00																	14:00		
Vol.	2	5	18	165	290	180	110	34	3	2																	769		

Stats

15th Percentile : 27 MPH
 50th Percentile : 33 MPH
 85th Percentile : 40 MPH
 95th Percentile : 44 MPH

Mean Speed(Average) : 34 MPH
 10 MPH Pace Speed : 30-39 MPH
 Number in Pace : 5879
 Percent in Pace : 57.8%
 Number of Vehicles > 30 MPH : 7326
 Percent of Vehicles > 30 MPH : 72.0%



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Dascomb Road WB
east of California Products Driveway
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli

165301 A WB Volume
Site Code:

Start Time	WB													
	A.M.	P.M.												
12:00	23	167												
12:15	19	166												
12:30	19	169												
12:45	11	170	672											
01:00	6	160												
01:15	10	189												
01:30	11	159												
01:45	9	178	686											
02:00	9	174												
02:15	13	179												
02:30	7	194												
02:45	11	227	774											
03:00	12	231												
03:15	8	262												
03:30	13	243												
03:45	25	251	987											
04:00	21	247												
04:15	29	257												
04:30	26	276												
04:45	58	296	1076											
05:00	37	245												
05:15	61	274												
05:30	57	312												
05:45	101	264	1095											
06:00	133	260												
06:15	175	232												
06:30	227	213												
06:45	291	192	897											
07:00	209	170												
07:15	226	172												
07:30	250	144												
07:45	270	144	630											
08:00	236	132												
08:15	240	115												
08:30	241	109												
08:45	204	128	484											
09:00	202	95												
09:15	187	103												
09:30	164	85												
09:45	180	83	366											
10:00	156	67												
10:15	163	68												
10:30	158	43												
10:45	137	61	239											
11:00	147	53												
11:15	144	44												
11:30	156	35												
11:45	195	24	156											
Total	5287	8062												
Percent		100.0 %	0.0%	0.0%										
Day Total		13349												
Peak	07:30	-	04:45	-	-	-	-	-	-	-	-	-	-	-
Vol.	996	-	1127	-	-	-	-	-	-	-	-	-	-	-
P.H.F.	0.922		0.903											



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Frontage Road NB
south of I-93 SB Ramps
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli
NB

165301 B NB Class
Site Code:

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
10/06/1														
6	0	23	6	1	1	0	0	0	0	0	0	0	0	31
01:00	0	23	9	0	0	0	0	0	0	0	0	0	0	32
02:00	1	26	1	1	0	0	0	0	1	0	0	0	0	30
03:00	0	26	7	0	3	2	0	0	0	0	0	0	0	38
04:00	3	81	24	2	3	4	0	1	3	0	0	0	0	121
05:00	7	405	142	2	20	10	1	2	8	0	0	0	0	597
06:00	5	484	84	4	10	8	0	1	6	0	0	0	0	602
07:00	4	629	82	10	17	8	0	2	5	0	0	0	0	757
08:00	2	601	86	8	11	1	0	1	1	0	0	0	0	711
09:00	8	400	79	4	18	10	0	2	3	0	0	0	0	524
10:00	14	355	79	5	25	15	1	2	6	0	0	0	0	502
11:00	5	311	88	4	15	8	0	1	2	0	0	0	0	434
12 PM	12	322	62	5	11	11	0	0	6	0	0	0	0	429
13:00	4	334	80	3	21	11	0	1	3	0	0	0	0	457
14:00	0	399	90	6	18	8	0	3	3	0	0	0	0	527
15:00	1	363	71	5	19	4	0	1	1	0	0	0	0	465
16:00	4	415	103	1	11	1	0	2	2	0	0	0	0	539
17:00	8	493	75	0	14	2	0	1	0	0	0	0	0	593
18:00	4	444	57	1	15	2	0	1	0	0	0	0	0	524
19:00	5	317	36	0	3	2	0	0	0	0	0	0	0	363
20:00	5	191	21	0	1	5	0	0	0	0	0	0	0	223
21:00	1	163	18	0	1	0	0	1	0	0	0	0	0	184
22:00	3	94	20	0	4	2	0	0	3	0	0	0	0	126
23:00	3	60	9	0	1	1	0	0	0	0	0	0	0	74
Percent	1.1%	78.3%	15.0%	0.7%	2.7%	1.3%	0.0%	0.2%	0.6%	0.0%	0.0%	0.0%	0.0%	
AM Peak	10:00	07:00	05:00	07:00	10:00	10:00	05:00	05:00	05:00					07:00
Vol.	14	629	142	10	25	15	1	2	8					757
PM Peak	12:00	17:00	16:00	14:00	13:00	12:00		14:00	12:00					17:00
Vol.	12	493	103	6	21	11		3	6					593



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Frontage Road NB
south of I-93 SB Ramps
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli
NB

165301 B NB Class
Site Code:

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
10/07/1														
6	1	22	1	0	0	1	0	0	0	0	0	0	0	25
01:00	2	14	1	0	0	3	0	0	0	0	0	0	0	20
02:00	1	9	2	0	1	1	0	0	1	0	0	0	0	15
03:00	0	18	4	2	1	0	0	0	0	0	0	0	0	25
04:00	4	84	25	1	3	4	0	0	6	0	0	0	0	127
05:00	6	375	121	2	22	6	1	1	6	0	0	0	0	540
06:00	8	397	83	6	16	8	1	1	8	0	0	0	0	528
07:00	7	615	95	2	17	3	0	3	2	0	0	0	0	744
08:00	7	590	87	0	15	8	0	4	4	0	0	0	0	715
09:00	14	399	80	4	10	11	0	2	3	0	0	0	0	523
10:00	8	324	79	4	15	10	0	2	6	0	0	0	0	448
11:00	7	324	63	5	16	7	0	4	2	0	0	0	0	428
12 PM	10	352	68	3	18	12	0	4	4	0	0	0	0	471
13:00	9	330	92	10	10	12	0	5	5	0	0	0	0	473
14:00	2	393	89	9	19	3	0	2	1	0	0	0	1	519
15:00	6	410	76	3	12	6	0	1	0	0	0	0	0	514
16:00	8	430	71	5	24	2	0	1	0	0	0	0	0	541
17:00	5	469	76	5	14	2	0	3	0	0	0	0	0	574
18:00	2	414	61	2	6	1	0	1	0	0	0	0	0	487
19:00	2	251	31	0	7	1	0	0	0	0	0	0	0	292
20:00	2	178	32	0	3	1	0	0	0	0	0	0	0	216
21:00	2	113	19	0	2	1	0	0	0	0	0	0	0	137
22:00	4	177	32	0	8	0	0	1	0	0	0	0	0	222
23:00	0	129	16	1	3	0	0	0	0	0	0	0	0	149
Percent	1.3%	78.1%	14.9%	0.7%	2.8%	1.2%	0.0%	0.4%	0.5%	0.0%	0.0%	0.0%	0.0%	
AM Peak	09:00	07:00	05:00	06:00	05:00	09:00	05:00	08:00	06:00					07:00
Vol.	14	615	121	6	22	11	1	4	8					744
PM Peak	12:00	17:00	13:00	13:00	16:00	12:00		13:00	13:00				14:00	17:00
Vol.	10	469	92	10	24	12		5	5				1	574



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Frontage Road NB
south of I-93 SB Ramps
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli
NB

165301 B NB Class
Site Code:

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
10/08/1														
6	0	79	8	0	1	0	0	0	0	0	0	0	0	88
01:00	1	44	8	0	1	1	0	0	0	0	0	0	0	55
02:00	0	15	2	0	0	0	0	0	0	0	0	0	0	17
03:00	0	26	3	1	0	0	0	0	0	0	0	0	0	30
04:00	1	38	10	0	2	1	0	1	0	0	0	0	0	53
05:00	1	75	36	2	1	9	0	0	11	0	0	0	0	135
06:00	1	106	42	3	9	2	1	0	2	0	0	0	0	166
07:00	0	191	35	1	14	2	0	0	1	0	0	0	0	244
08:00	1	247	50	4	6	4	0	0	2	0	0	0	0	314
09:00	4	309	70	0	7	4	0	0	3	0	0	0	0	397
10:00	1	370	62	2	6	6	0	1	2	0	0	0	0	450
11:00	3	381	83	1	7	4	0	2	4	0	0	0	0	485
12 PM	2	365	55	2	5	3	0	0	1	0	0	0	0	433
13:00	4	378	68	2	13	2	0	1	0	0	0	0	0	468
14:00	4	325	76	0	6	0	0	0	0	0	0	0	0	411
15:00	1	373	58	0	6	1	0	0	0	0	0	0	0	439
16:00	2	331	56	0	7	0	0	0	0	0	0	0	0	396
17:00	1	332	50	0	9	0	0	1	0	0	0	0	0	393
18:00	0	303	38	2	8	0	0	0	0	0	0	0	0	351
19:00	1	224	30	0	3	0	0	0	1	0	0	0	0	259
20:00	2	156	21	0	4	0	0	0	0	0	0	0	0	183
21:00	0	147	22	0	2	0	0	0	0	0	0	0	0	171
22:00	0	133	12	0	1	0	0	0	0	0	0	0	0	146
23:00	0	93	13	0	3	0	0	0	0	0	0	0	0	109
Percent	0.5%	81.4%	14.7%	0.3%	2.0%	0.6%	0.0%	0.1%	0.4%	0.0%	0.0%	0.0%	0.0%	
AM Peak	09:00	11:00	11:00	08:00	07:00	05:00	06:00	11:00	05:00					11:00
Vol.	4	381	83	4	14	9	1	2	11					485
PM Peak	13:00	13:00	14:00	12:00	13:00	12:00		13:00	12:00					13:00
Vol.	4	378	76	2	13	3		1	1					468



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Frontage Road NB
south of I-93 SB Ramps
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli
NB

165301 B NB Speed
Site Code:

Start Time	1	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th % ile	Ave Speed
10/06/	14	19	24	29	34	39	44	49	54	59	64	69	9999			
16	0	0	2	6	9	13	1	0	0	0	0	0	0	31	37	33
01:00	0	0	1	8	14	6	2	1	0	0	0	0	0	32	37	32
02:00	0	1	1	3	14	9	2	0	0	0	0	0	0	30	37	33
03:00	0	0	1	9	15	11	2	0	0	0	0	0	0	38	37	33
04:00	1	0	16	25	53	24	2	0	0	0	0	0	0	121	35	31
05:00	1	8	73	116	257	124	16	2	0	0	0	0	0	597	36	31
06:00	0	4	16	83	287	179	29	3	1	0	0	0	0	602	37	33
07:00	0	0	19	104	356	252	24	2	0	0	0	0	0	757	37	33
08:00	0	0	11	70	349	237	40	3	1	0	0	0	0	711	37	34
09:00	0	1	18	57	259	170	19	0	0	0	0	0	0	524	37	33
10:00	1	7	41	84	228	129	11	1	0	0	0	0	0	502	36	32
11:00	1	4	9	49	223	128	17	3	0	0	0	0	0	434	37	33
12 PM	0	0	25	68	195	124	14	2	1	0	0	0	0	429	37	33
13:00	0	2	11	66	211	149	18	0	0	0	0	0	0	457	37	33
14:00	0	1	17	64	257	168	19	1	0	0	0	0	0	527	37	33
15:00	0	4	18	47	249	133	14	0	0	0	0	0	0	465	36	33
16:00	0	0	6	58	277	166	32	0	0	0	0	0	0	539	37	33
17:00	0	0	16	87	287	175	27	1	0	0	0	0	0	593	37	33
18:00	0	1	15	60	268	152	23	4	0	1	0	0	0	524	37	33
19:00	0	4	5	52	193	92	16	1	0	0	0	0	0	363	36	33
20:00	0	3	11	31	107	61	9	1	0	0	0	0	0	223	37	32
21:00	0	0	4	40	83	48	7	1	0	1	0	0	0	184	37	33
22:00	0	1	9	29	56	28	3	0	0	0	0	0	0	126	36	31
23:00	0	1	3	9	36	20	5	0	0	0	0	0	0	74	37	33
Total	4	42	348	1225	4283	2598	352	26	3	2	0	0	0	8883		
%	0.0%	0.5%	3.9%	13.8%	48.2%	29.2%	4.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	04:00	05:00	05:00	05:00	07:00	07:00	08:00	06:00	06:00							07:00
Vol.	1	8	73	116	356	252	40	3	1							757
PM Peak		15:00	12:00	17:00	17:00	17:00	16:00	18:00	12:00	18:00						17:00
Vol.		4	25	87	287	175	32	4	1	1						593

Stats

15th Percentile : 27 MPH
50th Percentile : 32 MPH
85th Percentile : 37 MPH
95th Percentile : 38 MPH

Mean Speed(Average) : 33 MPH
10 MPH Pace Speed : 30-39 MPH
Number in Pace : 6881
Percent in Pace : 77.5%
Number of Vehicles > 30 MPH : 6407
Percent of Vehicles > 30 MPH : 72.1%



PRECISION
DATA
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Frontage Road NB
south of I-93 SB Ramps
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli
NB

165301 B NB Speed
Site Code:

Start Time	1	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th % ile	Ave Speed
10/07/	14	19	24	29	34	39	44	49	54	59	64	69	9999			
16	0	0	3	4	9	6	2	1	0	0	0	0	0	25	38	33
01:00	0	0	0	10	8	1	1	0	0	0	0	0	0	20	33	30
02:00	0	0	2	3	8	2	0	0	0	0	0	0	0	15	33	30
03:00	0	1	0	4	10	8	2	0	0	0	0	0	0	25	37	33
04:00	0	0	24	15	57	29	2	0	0	0	0	0	0	127	36	31
05:00	2	19	69	115	215	108	11	1	0	0	0	0	0	540	35	30
06:00	5	9	24	62	284	128	15	0	0	1	0	0	0	528	36	32
07:00	0	2	24	123	382	184	25	4	0	0	0	0	0	744	36	32
08:00	0	5	27	93	361	199	28	1	1	0	0	0	0	715	37	33
09:00	0	9	36	76	241	148	10	2	1	0	0	0	0	523	36	32
10:00	0	7	19	71	207	135	8	1	0	0	0	0	0	448	36	32
11:00	0	2	22	73	201	115	13	2	0	0	0	0	0	428	36	32
12 PM	0	0	15	72	201	157	22	3	1	0	0	0	0	471	37	33
13:00	2	9	24	76	183	158	18	2	1	0	0	0	0	473	37	32
14:00	0	1	11	60	250	178	17	2	0	0	0	0	0	519	37	33
15:00	0	0	11	65	238	174	25	1	0	0	0	0	0	514	37	33
16:00	0	0	8	82	285	145	18	3	0	0	0	0	0	541	36	33
17:00	0	1	20	68	302	158	22	3	0	0	0	0	0	574	37	33
18:00	0	0	6	50	268	147	16	0	0	0	0	0	0	487	37	33
19:00	0	1	10	57	140	74	10	0	0	0	0	0	0	292	36	32
20:00	0	0	5	36	108	58	9	0	0	0	0	0	0	216	36	33
21:00	0	1	8	23	72	29	3	1	0	0	0	0	0	137	36	32
22:00	0	1	10	47	92	59	9	4	0	0	0	0	0	222	37	32
23:00	1	0	3	16	66	47	12	4	0	0	0	0	0	149	38	34
Total	10	68	381	1301	4188	2447	298	35	4	1	0	0	0	8733		
%	0.1%	0.8%	4.4%	14.9%	48.0%	28.0%	3.4%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	06:00	05:00	05:00	07:00	07:00	08:00	08:00	07:00	08:00	06:00				07:00		
Vol.	5	19	69	123	382	199	28	4	1	1				744		
PM Peak	13:00	13:00	13:00	16:00	17:00	14:00	15:00	22:00	12:00					17:00		
Vol.	2	9	24	82	302	178	25	4	1					574		

Stats

15th Percentile : 27 MPH
50th Percentile : 32 MPH
85th Percentile : 37 MPH
95th Percentile : 38 MPH

Mean Speed(Average) : 32 MPH
10 MPH Pace Speed : 30-39 MPH
Number in Pace : 6635
Percent in Pace : 76.0%
Number of Vehicles > 30 MPH : 6135
Percent of Vehicles > 30 MPH : 70.3%



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Frontage Road NB
south of I-93 SB Ramps
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli
NB

165301 B NB Speed
Site Code:

Start Time	14	15	19	20	24	25	29	30	34	35	39	40	44	45	49	50	54	55	59	60	64	65	69	70	9999	Total	85th % ile	Ave Speed
10/08/16	0	0	0	2	21	35	21	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	88	38	33	
01:00	0	2	0	0	8	20	23	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	37	33	
02:00	0	1	2	0	8	8	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	38	32	
03:00	0	1	3	4	10	9	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	38	32	
04:00	0	0	5	9	29	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53	35	31	
05:00	0	1	5	28	60	36	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	135	36	32	
06:00	0	1	7	23	92	37	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	166	36	32	
07:00	0	0	3	29	133	68	10	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	244	37	33	
08:00	0	0	2	36	167	96	10	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	314	37	33	
09:00	0	2	11	41	197	136	9	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	397	37	33	
10:00	2	0	12	49	232	138	12	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	450	37	33	
11:00	0	0	15	56	242	146	25	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	485	37	33	
12 PM	0	1	6	46	210	146	23	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	433	37	34	
13:00	0	1	5	61	233	156	11	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	468	37	33	
14:00	0	2	11	48	190	144	15	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	411	37	33	
15:00	1	0	7	45	242	125	17	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	439	37	33	
16:00	0	0	12	28	221	112	21	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	396	37	33	
17:00	0	0	9	48	207	112	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	393	37	33	
18:00	0	0	9	43	193	97	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	351	36	33	
19:00	1	4	5	32	149	64	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	259	36	32	
20:00	0	1	5	27	100	46	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	183	36	32	
21:00	0	1	7	27	94	38	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	171	36	32	
22:00	0	1	5	41	73	22	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	146	34	31	
23:00	0	0	6	38	49	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	109	33	30	
Total	4	19	154	788	3186	1802	220	16	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6193			
%	0.1%	0.3%	2.5%	12.7%	51.4%	29.1%	3.6%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				
AM Peak	10:00	01:00	11:00	11:00	11:00	11:00	11:00	11:00	10:00	09:00																11:00		
Vol.	2	2	15	56	242	146	25	5	1																	485		
PM Peak	15:00	19:00	16:00	13:00	15:00	13:00	12:00	16:00	12:00																	13:00		
Vol.	1	4	12	61	242	156	23	2	1																	468		

Stats

15th Percentile : 28 MPH
 50th Percentile : 32 MPH
 85th Percentile : 37 MPH
 95th Percentile : 38 MPH

Mean Speed(Average) : 33 MPH
 10 MPH Pace Speed : 30-39 MPH
 Number in Pace : 4988
 Percent in Pace : 80.5%
 Number of Vehicles > 30 MPH : 4591
 Percent of Vehicles > 30 MPH : 74.1%



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Frontage Road NB
south of I-93 SB Ramps
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli

165301 B NB Volume
Site Code:

Start Time	NB													
	A.M.	P.M.												
12:00	26	107												
12:15	26	107												
12:30	23	120												
12:45	13	88	99	433										
01:00	17	108												
01:15	13	128												
01:30	21	104												
01:45	4	55	128	468										
02:00	4	110												
02:15	4	112												
02:30	3	98												
02:45	6	17	91	411										
03:00	6	107												
03:15	4	109												
03:30	11	117												
03:45	9	30	106	439										
04:00	12	90												
04:15	10	99												
04:30	17	123												
04:45	14	53	84	396										
05:00	19	109												
05:15	47	89												
05:30	31	91												
05:45	38	135	104	393										
06:00	34	107												
06:15	39	83												
06:30	53	82												
06:45	40	166	79	351										
07:00	46	63												
07:15	59	72												
07:30	68	70												
07:45	71	244	54	259										
08:00	56	47												
08:15	75	49												
08:30	94	34												
08:45	89	314	53	183										
09:00	86	50												
09:15	96	45												
09:30	101	40												
09:45	114	397	36	171										
10:00	111	39												
10:15	127	39												
10:30	107	36												
10:45	105	450	32	146										
11:00	133	25												
11:15	115	23												
11:30	116	29												
11:45	121	485	32	109										
Total	2434		3759											
Percent			100.0 %		0.0%		0.0%							
Day Total			6193											
Peak	11:00	-	01:15	-	-	-	-	-	-	-	-	-	-	-
Vol.	485	-	470	-	-	-	-	-	-	-	-	-	-	-
P.H.F.	0.912		0.918											



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Frontage Road SB
south of I-93 SB Ramps
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli
SB

165301 B SB Class
Site Code:

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
10/06/1														
6	1	13	4	0	2	1	0	0	2	0	0	0	0	23
01:00	1	12	2	1	0	1	0	0	3	0	0	0	0	20
02:00	1	19	8	1	1	1	0	0	0	0	0	0	0	31
03:00	1	32	14	1	2	0	0	0	0	0	0	0	0	50
04:00	5	83	29	0	10	3	0	0	1	0	0	0	0	131
05:00	8	132	59	3	20	6	0	0	1	0	0	0	0	229
06:00	12	364	114	7	34	14	0	1	6	0	0	0	0	552
07:00	12	435	94	10	29	13	0	1	5	0	0	0	0	599
08:00	17	390	101	9	28	13	1	3	1	0	0	0	0	563
09:00	13	261	101	11	22	12	1	5	10	0	0	0	0	436
10:00	6	225	64	3	19	3	0	3	8	0	0	0	1	332
11:00	8	273	87	11	24	8	1	1	5	0	0	0	0	418
12 PM	11	271	73	7	16	7	0	5	10	0	0	0	0	400
13:00	10	249	98	8	18	9	0	2	5	0	0	0	0	399
14:00	8	373	106	2	23	14	1	1	11	0	0	0	0	539
15:00	6	395	104	6	11	8	0	2	9	0	0	0	0	541
16:00	7	465	109	4	26	2	0	2	2	0	0	0	0	617
17:00	8	516	81	1	15	2	0	1	2	0	0	0	0	626
18:00	5	322	68	2	3	2	0	1	1	0	0	0	0	404
19:00	6	210	50	0	6	2	0	1	0	0	0	0	0	275
20:00	3	148	38	0	6	2	0	0	0	0	0	0	0	197
21:00	0	134	29	0	4	0	0	0	0	0	0	0	0	167
22:00	1	110	13	0	1	1	0	0	1	0	0	0	0	127
23:00	1	63	8	0	1	1	0	0	0	0	0	0	0	74
Percent	1.9%	70.9%	18.8%	1.1%	4.1%	1.6%	0.1%	0.4%	1.1%	0.0%	0.0%	0.0%	0.0%	
AM Peak	08:00	07:00	06:00	09:00	06:00	06:00	08:00	09:00	09:00				10:00	07:00
Vol.	17	435	114	11	34	14	1	5	10				1	599
PM Peak	12:00	17:00	16:00	13:00	16:00	14:00	14:00	12:00	14:00					17:00
Vol.	11	516	109	8	26	14	1	5	11					626



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Frontage Road SB
south of I-93 SB Ramps
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli
SB

165301 B SB Class
Site Code:

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
10/07/1														
6	6	24	4	1	0	6	0	0	0	0	0	0	0	41
01:00	2	17	2	1	3	1	0	0	0	0	0	0	0	26
02:00	1	13	10	0	0	1	0	0	1	0	0	0	0	26
03:00	2	34	19	0	1	1	0	0	3	0	0	0	0	60
04:00	2	71	28	0	4	2	0	0	1	0	0	0	0	108
05:00	8	159	76	0	19	8	0	0	5	0	0	0	0	275
06:00	15	316	112	2	28	17	0	1	9	0	0	0	0	500
07:00	10	404	91	3	23	10	0	1	4	0	0	0	0	546
08:00	15	328	99	8	18	12	0	3	14	0	0	0	0	497
09:00	12	288	83	13	15	12	0	4	5	0	0	0	0	432
10:00	3	187	76	3	18	4	0	2	5	0	0	0	0	298
11:00	11	292	72	4	20	8	0	4	2	0	0	0	0	413
12 PM	11	321	101	7	22	6	0	3	3	0	0	0	0	474
13:00	13	256	92	10	21	10	1	4	6	0	0	0	0	413
14:00	3	385	103	6	21	2	0	0	7	0	0	0	0	527
15:00	3	423	124	5	14	5	0	3	4	0	0	0	0	581
16:00	5	498	94	2	21	6	0	3	2	0	0	0	0	631
17:00	4	427	86	2	19	0	0	3	2	0	0	0	0	543
18:00	7	259	63	0	8	1	0	1	0	0	0	0	0	339
19:00	3	198	40	1	5	1	0	2	0	0	0	0	0	250
20:00	3	154	29	0	2	1	0	0	0	0	0	0	0	189
21:00	0	136	30	1	5	0	0	0	0	0	0	0	0	172
22:00	0	128	16	0	7	0	0	0	1	0	0	0	0	152
23:00	1	86	20	2	4	0	0	0	0	0	0	0	0	113
Percent	1.8%	71.0%	19.3%	0.9%	3.9%	1.5%	0.0%	0.4%	1.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	06:00	07:00	06:00	09:00	06:00	06:00		09:00	08:00					07:00
Vol.	15	404	112	13	28	17		4	14					546
PM Peak	13:00	16:00	15:00	13:00	12:00	13:00	13:00	13:00	14:00					16:00
Vol.	13	498	124	10	22	10	1	4	7					631



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Frontage Road SB
south of I-93 SB Ramps
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli
SB

165301 B SB Class
Site Code:

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
10/08/1														
6	1	51	9	0	4	1	0	0	0	0	0	0	0	66
01:00	0	19	8	0	1	0	0	0	0	0	0	0	0	28
02:00	0	15	5	1	1	0	0	0	0	0	0	0	0	22
03:00	0	14	4	0	1	0	0	0	0	0	0	0	0	19
04:00	2	25	15	0	1	0	0	0	0	0	0	0	0	43
05:00	1	84	32	0	7	3	0	0	0	0	0	0	0	127
06:00	0	103	43	2	12	0	0	0	2	0	0	0	0	162
07:00	2	143	32	2	9	3	0	1	2	0	0	0	0	194
08:00	0	180	54	1	16	0	0	0	2	0	0	0	0	253
09:00	5	217	67	1	10	5	0	4	2	0	0	0	0	311
10:00	4	309	72	1	7	4	0	1	4	0	0	0	0	402
11:00	6	306	80	1	19	5	0	1	8	0	0	0	0	426
12 PM	5	289	75	0	8	1	0	0	1	0	0	0	0	379
13:00	1	294	81	1	13	0	0	1	0	0	0	0	0	391
14:00	3	327	76	0	7	2	0	3	1	0	0	0	0	419
15:00	6	324	83	0	6	1	0	1	0	0	0	0	0	421
16:00	4	286	64	2	8	0	0	0	0	0	0	0	0	364
17:00	4	247	64	2	8	1	0	0	0	0	0	0	0	326
18:00	2	226	39	2	8	1	0	1	0	0	0	0	0	279
19:00	2	193	32	1	8	0	0	0	0	0	0	0	0	236
20:00	1	156	32	0	5	0	0	0	0	0	0	0	0	194
21:00	1	146	21	0	4	0	0	0	0	0	0	0	0	172
22:00	1	114	24	0	1	1	0	0	0	0	0	0	0	141
23:00	0	106	19	0	1	0	0	0	0	0	0	0	0	126
Percent	0.9%	75.9%	18.7%	0.3%	3.0%	0.5%	0.0%	0.2%	0.4%	0.0%	0.0%	0.0%	0.0%	
AM Peak	11:00	10:00	11:00	06:00	11:00	09:00		09:00	11:00					11:00
Vol.	6	309	80	2	19	5		4	8					426
PM Peak	15:00	14:00	15:00	16:00	13:00	14:00		14:00	12:00					15:00
Vol.	6	327	83	2	13	2		3	1					421



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Frontage Road SB
south of I-93 SB Ramps
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli
SB

165301 B SB Speed
Site Code:

Start Time	1	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th %ile	Ave Speed
10/06/	14	19	24	29	34	39	44	49	54	59	64	69	9999			
16	0	0	2	5	6	9	1	0	0	0	0	0	0	23	37	32
01:00	0	0	2	5	8	4	1	0	0	0	0	0	0	20	36	31
02:00	0	0	2	1	14	12	2	0	0	0	0	0	0	31	37	34
03:00	0	1	2	4	22	17	4	0	0	0	0	0	0	50	37	33
04:00	0	0	2	25	56	41	6	0	1	0	0	0	0	131	37	33
05:00	0	0	14	46	76	77	15	1	0	0	0	0	0	229	37	33
06:00	4	2	18	76	209	190	48	5	0	0	0	0	0	552	38	33
07:00	0	2	20	71	243	213	44	6	0	0	0	0	0	599	38	34
08:00	0	1	21	64	204	212	58	2	1	0	0	0	0	563	38	34
09:00	0	1	10	58	149	163	51	3	1	0	0	0	0	436	38	34
10:00	0	0	2	21	123	145	39	2	0	0	0	0	0	332	38	35
11:00	0	0	7	52	152	153	50	4	0	0	0	0	0	418	38	34
12 PM	0	1	8	59	140	145	39	6	2	0	0	0	0	400	38	34
13:00	0	0	8	51	148	145	40	7	0	0	0	0	0	399	38	34
14:00	0	2	9	64	212	190	59	3	0	0	0	0	0	539	38	34
15:00	0	1	5	66	215	205	43	6	0	0	0	0	0	541	38	34
16:00	0	0	7	53	227	249	74	6	1	0	0	0	0	617	38	35
17:00	0	0	5	74	253	237	49	8	0	0	0	0	0	626	38	34
18:00	0	0	0	29	166	169	36	4	0	0	0	0	0	404	38	35
19:00	0	0	3	17	128	113	13	1	0	0	0	0	0	275	37	34
20:00	0	0	0	16	81	83	16	1	0	0	0	0	0	197	38	35
21:00	0	0	0	19	79	57	11	1	0	0	0	0	0	167	37	34
22:00	0	0	0	18	61	42	5	1	0	0	0	0	0	127	37	33
23:00	0	0	3	3	36	23	8	0	1	0	0	0	0	74	38	34
Total	4	11	150	897	3008	2894	712	67	7	0	0	0	0	7750		
%	0.1%	0.1%	1.9%	11.6%	38.8%	37.3%	9.2%	0.9%	0.1%	0.0%	0.0%	0.0%	0.0%			
AM Peak	06:00	06:00	08:00	06:00	07:00	07:00	08:00	07:00	04:00							07:00
Vol.	4	2	21	76	243	213	58	6	1							599
PM Peak		14:00	14:00	17:00	17:00	16:00	16:00	17:00	12:00							17:00
Vol.		2	9	74	253	249	74	8	2							626

Stats

15th Percentile : 29 MPH
 50th Percentile : 33 MPH
 85th Percentile : 38 MPH
 95th Percentile : 41 MPH

Mean Speed(Average) : 34 MPH
 10 MPH Pace Speed : 30-39 MPH
 Number in Pace : 5902
 Percent in Pace : 76.2%
 Number of Vehicles > 30 MPH : 6086
 Percent of Vehicles > 30 MPH : 78.5%



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Frontage Road SB
south of I-93 SB Ramps
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli
SB

165301 B SB Speed
Site Code:

Start Time	1	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th %ile	Ave Speed
10/07/	14	19	24	29	34	39	44	49	54	59	64	69	9999			
16	0	3	8	9	7	10	4	0	0	0	0	0	0	41	37	30
01:00	0	3	2	1	10	6	4	0	0	0	0	0	0	26	39	32
02:00	0	0	3	3	10	10	0	0	0	0	0	0	0	26	37	32
03:00	0	0	1	6	29	21	3	0	0	0	0	0	0	60	37	34
04:00	0	0	5	22	39	30	11	1	0	0	0	0	0	108	38	33
05:00	0	2	9	49	106	89	17	3	0	0	0	0	0	275	37	33
06:00	0	4	26	62	196	170	36	4	1	1	0	0	0	500	38	33
07:00	0	4	16	64	219	202	38	2	1	0	0	0	0	546	37	34
08:00	1	3	12	70	179	182	48	1	0	1	0	0	0	497	38	34
09:00	0	1	23	55	139	163	43	7	1	0	0	0	0	432	38	34
10:00	0	0	6	25	110	120	30	7	0	0	0	0	0	298	38	35
11:00	0	1	3	31	162	167	44	4	1	0	0	0	0	413	38	35
12 PM	0	0	9	36	186	196	43	4	0	0	0	0	0	474	38	35
13:00	0	0	3	52	155	163	36	4	0	0	0	0	0	413	38	34
14:00	0	0	6	49	195	217	51	9	0	0	0	0	0	527	38	35
15:00	0	1	1	63	218	237	52	9	0	0	0	0	0	581	38	35
16:00	0	0	5	62	256	247	56	5	0	0	0	0	0	631	38	34
17:00	0	2	4	48	205	221	55	7	1	0	0	0	0	543	38	35
18:00	0	0	4	39	137	129	26	4	0	0	0	0	0	339	38	34
19:00	0	0	5	19	114	94	17	1	0	0	0	0	0	250	37	34
20:00	0	0	6	16	83	74	9	1	0	0	0	0	0	189	37	34
21:00	0	0	2	18	78	65	7	2	0	0	0	0	0	172	37	34
22:00	0	0	1	12	74	55	10	0	0	0	0	0	0	152	37	34
23:00	0	0	1	3	56	43	9	1	0	0	0	0	0	113	38	35
Total	1	24	161	814	2963	2911	649	76	5	2	0	0	0	7606		
%	0.0%	0.3%	2.1%	10.7%	39.0%	38.3%	8.5%	1.0%	0.1%	0.0%	0.0%	0.0%	0.0%			
AM Peak	08:00	06:00	06:00	08:00	07:00	07:00	08:00	09:00	06:00	06:00					07:00	
Vol.	1	4	26	70	219	202	48	7	1	1					546	
PM Peak		17:00	12:00	15:00	16:00	16:00	16:00	14:00	17:00						16:00	
Vol.		2	9	63	256	247	56	9	1						631	

Stats

15th Percentile : 29 MPH
 50th Percentile : 33 MPH
 85th Percentile : 38 MPH
 95th Percentile : 41 MPH

Mean Speed(Average) : 34 MPH
 10 MPH Pace Speed : 30-39 MPH
 Number in Pace : 5874
 Percent in Pace : 77.2%
 Number of Vehicles > 30 MPH : 6013
 Percent of Vehicles > 30 MPH : 79.1%



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Frontage Road SB
south of I-93 SB Ramps
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli
SB

165301 B SB Speed
Site Code:

Start Time	1	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th %ile	Ave Speed
10/08/	14	19	24	29	34	39	44	49	54	59	64	69	9999			
16	0	0	4	4	27	23	6	1	1	0	0	0	0	66	38	34
01:00	0	0	0	2	14	9	3	0	0	0	0	0	0	28	38	34
02:00	0	0	1	0	10	8	3	0	0	0	0	0	0	22	38	35
03:00	0	0	1	3	7	5	3	0	0	0	0	0	0	19	39	34
04:00	0	0	1	5	20	14	3	0	0	0	0	0	0	43	37	34
05:00	0	0	0	16	45	48	16	2	0	0	0	0	0	127	38	35
06:00	0	0	2	13	51	79	16	1	0	0	0	0	0	162	38	35
07:00	0	0	1	20	72	82	18	1	0	0	0	0	0	194	38	35
08:00	0	1	2	10	86	113	38	3	0	0	0	0	0	253	39	36
09:00	0	0	1	25	98	150	34	3	0	0	0	0	0	311	38	35
10:00	0	0	3	31	156	177	30	4	1	0	0	0	0	402	38	35
11:00	0	0	5	39	171	172	31	5	3	0	0	0	0	426	38	34
12 PM	0	0	0	20	136	170	44	7	2	0	0	0	0	379	38	36
13:00	0	0	5	17	162	174	31	2	0	0	0	0	0	391	38	35
14:00	0	0	3	31	186	176	21	2	0	0	0	0	0	419	37	34
15:00	1	0	5	30	190	152	39	3	1	0	0	0	0	421	38	34
16:00	0	1	3	21	167	150	18	4	0	0	0	0	0	364	37	34
17:00	0	0	3	25	152	116	29	1	0	0	0	0	0	326	38	34
18:00	0	0	5	16	129	112	14	2	1	0	0	0	0	279	37	34
19:00	0	0	0	33	103	86	10	4	0	0	0	0	0	236	37	34
20:00	0	1	0	22	94	63	12	2	0	0	0	0	0	194	37	34
21:00	0	0	0	22	81	64	4	1	0	0	0	0	0	172	37	34
22:00	0	0	4	24	80	32	1	0	0	0	0	0	0	141	35	32
23:00	0	0	1	21	69	32	2	1	0	0	0	0	0	126	36	33
Total	1	3	50	450	2306	2207	426	49	9	0	0	0	0	5501		
%	0.0%	0.1%	0.9%	8.2%	41.9%	40.1%	7.7%	0.9%	0.2%	0.0%	0.0%	0.0%	0.0%			
AM Peak		08:00	11:00	11:00	11:00	10:00	08:00	11:00	11:00					11:00		
Vol.		1	5	39	171	177	38	5	3					426		
PM Peak	15:00	16:00	13:00	19:00	15:00	14:00	12:00	12:00	12:00					15:00		
Vol.	1	1	5	33	190	176	44	7	2					421		

Stats

15th Percentile : 29 MPH
 50th Percentile : 33 MPH
 85th Percentile : 38 MPH
 95th Percentile : 41 MPH

Mean Speed(Average) : 34 MPH
 10 MPH Pace Speed : 30-39 MPH
 Number in Pace : 4513
 Percent in Pace : 82.0%
 Number of Vehicles > 30 MPH : 4536
 Percent of Vehicles > 30 MPH : 82.5%



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Frontage Road SB
south of I-93 SB Ramps
City, State: Andover, MA
Client: Lupoli Companies / S. Lupoli

165301 B SB Volume
Site Code:

Start Time	SB												Thu	
	A.M.	P.M.											10/6/201	
12:00	7	108											6	
12:15	6	92												
12:30	5	98												
12:45	5	23	102	400										
01:00	2	95												
01:15	4	92												
01:30	11	104												
01:45	3	20	108	399										
02:00	4	117												
02:15	8	105												
02:30	11	171												
02:45	8	31	146	539										
03:00	8	133												
03:15	9	144												
03:30	9	136												
03:45	24	50	128	541										
04:00	15	137												
04:15	24	151												
04:30	30	164												
04:45	62	131	165	617										
05:00	64	163												
05:15	57	158												
05:30	37	155												
05:45	71	229	150	626										
06:00	100	110												
06:15	123	107												
06:30	154	89												
06:45	175	552	98	404										
07:00	131	75												
07:15	167	58												
07:30	156	71												
07:45	145	599	71	275										
08:00	138	56												
08:15	133	43												
08:30	149	48												
08:45	143	563	50	197										
09:00	127	46												
09:15	115	50												
09:30	99	37												
09:45	95	436	34	167										
10:00	82	34												
10:15	80	43												
10:30	79	22												
10:45	91	332	28	127										
11:00	92	25												
11:15	81	18												
11:30	123	16												
11:45	122	418	15	74										
Total	3384		4366											
Percent			100.0 %		0.0%		0.0%							
Day Total			7750											
Peak	06:45	-	04:30	-	-	-	-	-	-	-	-	-	-	-
Vol.	629	-	650	-	-	-	-	-	-	-	-	-	-	-
P.H.F.	0.899		0.985											

Appendix E. Road Safety Audit References

Road Safety Audit References

Massachusetts Traffic Safety Toolbox, Massachusetts Highway Department,
www.mhd.state.ma.us/safetytoolbox.

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

Road Safety Audits. Institute of Transportation Engineers and U.S. Department of Transportation, Federal Highway Administration, www.roadwaysafetyaudits.org.

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

Road Safety Audit, 2nd edition. Austroads, 2000.

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

Safety Evaluation of Flashing Beacons at STOP-Controlled Intersections. U.S. Department of Transportation, Federal Highway Administration. April 2008.
<http://www.fhwa.dot.gov/publications/research/safety/08044/index.cfm>