

ROAD SAFETY AUDIT

Route 20 (Boston Post Road) at Landham Road

Town of Sudbury

June 10, 2015



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Engineering and Construction Services

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Background

The Federal Highway Administration defines a Road Safety Audit (RSA) as the formal safety examination of an existing or future road or intersection by an independent, multidisciplinary team. The purpose of an RSA is to identify potential safety issues and possible opportunities for safety improvements, in consideration of all roadway users. Specific objectives of an RSA include, but are not limited to, minimizing the risk and severity of road crashes that may be affected by the existing or future roadway infrastructure at a specific location or nearby network, and improving the awareness of safe design practices which are likely to result in safety benefits based upon potential safety concerns. The Massachusetts Department of Transportation (MassDOT) has embraced the RSA program as a low cost opportunity to make significant safety improvements at any number of stages ranging from project development and planning through existing operation.

A Road Safety Audit was scheduled for the intersection of Route 20 (Boston Post Road) at Landham Road as part of the intersection improvement project (MassDOT Project Number 607249; Contract Number 77846). The project limits on Route 20 may exceed 1,000 feet east and west of the Landham Road intersection. The project limits on Landham Road may extend approximately 500 feet south of Route 20. This intersection falls within a 2011 Highway Safety Improvement Program (HSIP) cluster and therefore is subject to a required RSA.

Project Data

A Road Safety Audit for the unsignalized intersection of Boston Post Road (Route 20) at Landham Road was held on Thursday, May 21, 2015 at the Flynn Building (278 Old Sudbury Road) in Sudbury, Massachusetts. **Table 1** provides a list of the participating audit team members and their associated affiliations. As shown, the team represents a multidisciplinary group ranging from planning, to engineering, to local and state officials. Detailed crash history data from both MassDOT and the Town of Sudbury Police Department, and associated collision diagrams were reviewed prior to an in-field visit to the intersection. Additionally, traffic volume data, including Automatic Traffic Recorder (ATR) counts and Turning Movement Counts (TMC), was made available. These data are provided in the Appendix for reference.

Table 1- Participating Audit Team Members

Audit Team Member	Agency/Affiliation
Jody Kablack	Town of Sudbury- Planning
Jim Kupfer	Town of Sudbury- Planning
Scott Nix	Town of Sudbury- Police Department
William Place	Town of Sudbury- Engineering
John Whalen	Town of Sudbury- Fire Department
Chenyuan Wang	CTPS- Boston MPO
David Loutzenheiser	MAPC
Lola Campbell	MassDOT- District 3
Richard Conard	MassDOT – Traffic Engineering and Safety
John Mastera	MassDOT – Traffic Engineering and Safety
William Ullom	MassDOT – Traffic Engineering and Safety
Joseph Johnson	Greenman-Pedersen, Inc.
Nicole Rogers	Greenman-Pedersen, Inc.

Project Location and Description

The Road Safety Audit was conducted at the intersection of Boston Post Road (Route 20) and Landham Road in the Town of Sudbury, Massachusetts. A Study Area Location Map is provided in **Figure 1**.

Boston Post Road (Route 20)

Boston Post Road, signed as Massachusetts State Route 20, generally runs in an east-west direction and is maintained by the Massachusetts Department of Transportation. The roadway is classified as an urban principal arterial roadway and provides regional connection to multiple arterials (Route 126 and Route 27) to the east in the Town of Wayland. The roadway also provides regional connection to Interstate 495 in the City of Marlborough to the west and Route 128 in the City of Waltham to the east. It should be noted that this is a predominant commuter route.

Boston Post Road (Route 20) is approximately 34-feet wide in the vicinity of Landham Road with varying 2- to 5-foot shoulders. Directional flow along Boston Post Road (Route 20) is separated by a double-yellow centerline. The posted speed limit is 30 miles per hour (mph) and is consistent with speed regulations for the roadway obtained from the Massachusetts Department of Transportation. In the vicinity of Landham Road, the Boston Post Road (Route 20) roadway alignment consists of a horizontal curve. Land uses along Boston Post Road (Route 20) within the study area are generally commercial, office, residential and retail uses. New large residential developments were recently constructed on Route 20 east of the intersection and include a 32 unit family residential development to the north and a 64 unit restricted senior residential development to the south.

Landham Road

Landham Road generally runs in a north-south direction and is maintained by the Town of Sudbury. The roadway is classified as an urban minor arterial within the study area. Landham Road terminates at the intersection at Boston Post Road (Route 20) in the north and provides regional connection to multiple arterials to the south in the Town of Framingham.

Landham Road is approximately 32-feet wide immediately south of Boston Post Road (Route 20). The posted speed limit is 35 mph. However, the speed regulation on file obtained from the Massachusetts Department of Transportation states that the speed limit at which motor vehicles may be operated is 25 mph for northbound motor vehicles approaching the intersection at Boston Post Road (Route 20). The speed limit for northbound motor vehicles changes from 35 mph to 25 mph 0.08 miles south of the intersection with Boston Post Road (Route 20). Land uses along Landham Road include primarily residential uses.

Route 20 (Boston Post Road) at Landham Road

Route 20 (Boston Post Road) and Landham Road intersect to form a three-way unsignalized intersection. The Route 20 (Boston Post Road) westbound approach provides a single general purpose travel lane operating under free-flowing conditions. The Route 20 (Boston Post Road) eastbound approach provides a through travel lane operating under free-flowing conditions as well as a channelized right run lane onto Landham Road that is under YIELD control. Directional travel along Route 20 (Boston Post Road) is separated by a double-yellow centerline. The Landham Road northbound approach provides a left turn lane and a channelized right turn lane. The left turn lane is under STOP-sign control while travelers in the channelized right run lane must yield to eastbound traffic on Route 20 (Boston Post Road). Directional travel is separated by a double-yellow centerline. Sidewalk is present along the northern side of Route 20 and is in fair condition west of the intersection but in good condition east of the intersection. A new hot mix asphalt sidewalk was installed with the construction of the restricted senior living residential development. This sidewalk is in good condition and is present along the southern side of Route 20 east of the intersection and terminates at the senior residential development. There is also a sidewalk along the western side of Landham Road in good condition. There is a crosswalk available across Landham Road right at the intersection and is broken up by three center island medians which all provide pedestrian refuge. Detectable warning panels are present within concrete wheelchair ramps that serve each crosswalk. There are no marked bicycle accommodations in the vicinity of the intersection and the widths of the striped shoulders do not appear sufficient for bicycle travel.

Sudbury Automotive Inc. is located at 209 Boston Post Road in the southwest corner of the intersection. The gas station provides two extensive curb-cuts (\pm 40-feet wide) along the Boston Post Road (Route 20) eastbound approach. The two curb-cuts are separated by a narrow raised island that is offset from the roadway by approximately 7-feet. There are two sets of fuel pumps on the property as well as multiple service bays. Town staff indicated that the underground fuel storage tanks will be replaced within the near future as part of a site improvement project.

Figure 2 presents an aerial view of the intersection.

Crash Analysis

Crash data were provided by the Sudbury Police Department for the most recent complete five-year period (2010-2014) available. A total of 52 collisions were reported at the intersection according to the police crash reports. Of these 52 crashes, 25 were angle collisions and 16 were rear-end collisions. Based on these collision trends and the intersection control, it is reasonable to conclude that a majority of the incidents at the intersection are the result of heavy left turn maneuvers on the northbound and westbound approaches. The next most frequent crash-type were single vehicle crashes (five reported), followed by two sideswipe (same direction) collisions, two head-on collisions, one sideswipe (opposite direction) collision, and one rear-to-rear collision. Of the total 52 crashes reported, 34 crashes (approximately 65 percent) had reported severity as being limited to property damage, with the remaining 18 crashes reporting injury. It should be noted that there was a fatality reported at this intersection on May 26, 2011. This collision is displayed on the collision diagram, included in the Appendix of this report, as collision No. 13. This was an angle collision in which motor vehicle 1 was traveling northbound on Landham Road and attempting to turn left on Route 20 but was struck by motor vehicle 2 traveling eastbound on Route 20.

Of the total 52 reported collisions, four collisions occurred at the eastern driveway of Sudbury Automotive located in the southwest corner of the intersection. Three of these collisions involved an eastbound Route 20 vehicle and vehicles exiting the driveway. The remaining collision involved an eastbound Route 20 vehicle and a westbound Route 20 vehicle trying to turn left into Sudbury Automotive. One of the four collisions resulted in an injury. An additional four collisions occurred within the parking lot of Sudbury Automotive and therefore, were unable to be mapped on the collision diagram included within the Appendix of this report.

It should be stated that a number of the collisions which occurred at this intersection were “courtesy crashes” in which a mainline vehicle stopped to allow a vehicle to exit Landham Road or a commercial driveway or allow a westbound vehicle to turn left into Landham Road. Once the mainline driver stopped in traffic to permit a vehicle in the opposite direction to turn left into or out of Landham Road or Sudbury Automotive, they were subsequently rear-ended due to the sudden unexpected stoppage or inattention by a driver following too closely.

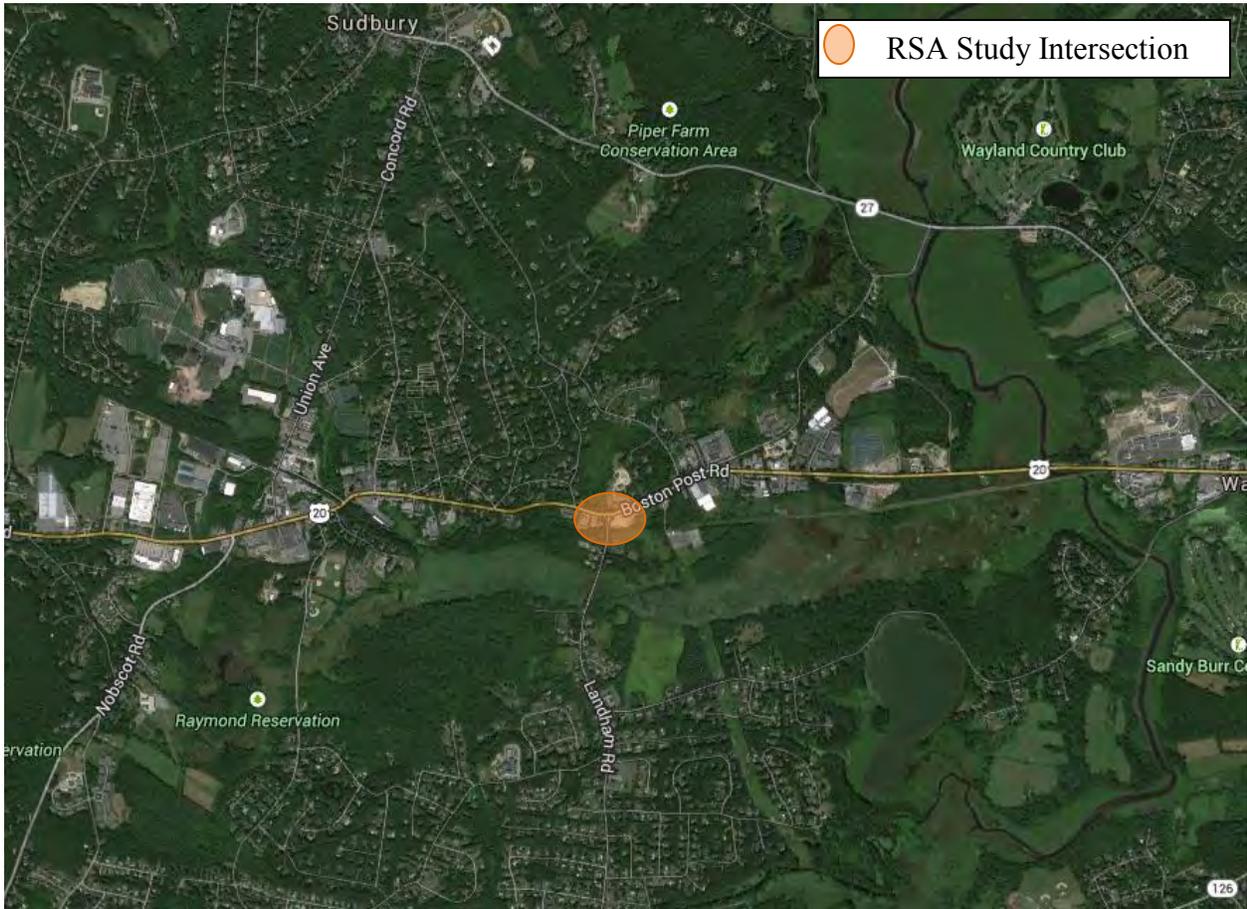
In addition to the collision summary, crash occurrence also is compared to the volume of traffic through a particular intersection. Accordingly, the crash rate is compared to the district-wide average crash rate for an unsignalized intersection. An intersection crash rate is a measure of the frequency of collisions compared to the volume of traffic through an intersection and is presented in crashes per million entering vehicles (c/mev). For unsignalized intersections, the statewide average is 0.60 c/mev and the district-wide (MassDOT District 3) average is 0.66 c/mev. A comparison of the calculated crash rate to this average rate can be used to establish the significance of collision occurrence. The calculated crash rate for Boston Post Road (Route 20) at Landham Road is 1.11 c/mev, which is well above both the statewide and district-wide averages. This rate was determined based on the 52 reported crashes at the unsignalized intersection, over the course of five years, utilizing counts from June 2014. Crash data summaries, a collision diagram and a crash rate worksheet are included in the Appendix of this report.

Speed Regulations

Speed regulations maintained by MassDOT Highway Division establish a 30 MPH speed limit on Boston Post Road (Route 20) in both directions in the vicinity of the intersection. Speed regulations along Landham Road show a 25 MPH speed limit in the northbound direction and a 35 MPH speed limit in the southbound direction in the vicinity of the intersection.

Complete speed regulations are included in the Appendix.

Figure 1 - Locus Map



Source: Google Maps

Figure 2 - Boston Post Road (Route 20) at Landham Road



Source: Bing Maps

GPI Greenman-Pedersen, Inc.

Engineering and Construction Services

Audit Observations

Following an introduction to the RSA process and a summary of existing geometry, operations and crash and speed data, the audit participants were asked to discuss safety concerns at the subject intersection. Audit team members then drove to the intersection as a team, at which time observations were offered in the field. A summary of those in-field safety observations and potential deficiencies is provided below:

Boston Post Road (Route 20) at Landham Road

- **Pavement Conditions** – At the time of the audit, high severity cracking on Boston Post Road (Route 20) and within the intersection was observed. Utility maintenance has been performed in the past and therefore, the Boston Post Road (Route 20) has evidence of pavement ‘trenching’ which indicates where access to underground utilities was required. Both approaches of Route 20 have utility trenches where the pavement has settled causing an uneven travel surface for vehicles. This may be a result of poor compaction in the soil beneath the trench asphalt which has since settled and caused the pavement above to do the same. Very slight pavement rutting was noticed at all approaches to the intersection as well. Pavement rutting can promote rear-end crashes as asphalt bleeding usually occurs around the ruts. This issue could have contributed to the numerous rear-end type crashes which



Poor pavement conditions along Boston Post Road.

occurred along all approaches to the intersection. Approximately 31 percent of the total queried crashes at this intersection were rear-end crashes. Additionally, the ruts can collect standing water during rain events/melting snow or be locations with ice in the winter. Town officials reiterated the fact that Boston Post Road (Route 20) at this location has not been re-paved in several years. There are potholes present along both approaches on Boston Post Road (Route 20), causing motorists to essentially “dodge” these hazards to preserve the integrity of their vehicles. This poses a significant safety concern as vehicles may swerve into an opposing traffic lane or off the side of the roadway to avoid these potholes increasing the possibility of a head-on collision or single vehicle collision respectively. Referring to the crash data summary and the collision diagram within the Appendix of this RSA, crashes 54 (a head-on collision) and 20 (a sideswipe, opposite direction) may have resulted from drivers maneuvering around potentially detrimental potholes. Just like all pavement, over time this pavement surface has started to wear down and lose its friction resistance. Poor roadway conditions, especially wet pavement, have been identified by the Federal Highway Administration as a major factor in roadway departure crashes. Approximately 17 percent of collisions to occur at this intersection happened under wet, snowy, or icy pavement surface conditions.

- Pavement Markings – Pavement markings on both Boston Post Road (Route 20) and Landham Road were slightly faded along all approaches of the intersection, with some significant fading in specific areas. The crosswalks across Landham Road were severely faded along with the STOP bar at this approach and the “shark teeth” yield markings along the channelized right turn lanes to and from Landham Road. It should be noted that the crosswalks at this location were the standard parallel crosswalk markings which can often times be confused with the STOP bar. The faded “shark teeth” yield markings, specifically those along the eastbound right turn lane pose a significant safety concern as turning speeds along this approach tend to be higher. Any additional warning of a yield control at this location is necessary and aids in driver yielding rates. It should be noted that there are two sets of “shark teeth” markings on the northbound channelized right turn lane, one before the crosswalk and one beyond the crosswalk. Both sets are faded and in poor condition. In general, pavement markings provide clarity to motorists and assist in the reduction of nighttime crashes of which approximately 15% of the queried crashes were reported to have occurred.



Faded pavement markings along eastbound channelized right turn lane.

- Lighting – Audit members agreed that lighting at this intersection is inadequate. Although the intersection receives some lighting from the cobra head mounted on a utility pole, the nearby gas station in the southwest corner and the Coolidge residential development in the southeast corner of the intersection, lighting still seems to be a concern. The collision data shows that approximately 13% of the collisions to occur at this intersection occurred during nighttime hours with lighted roadway conditions. However, there was one collision that reported poor lighting conditions along the roadway.
- Speeding – While speed limits are posted along both approaches on Boston Post Road (Route 20), it was noted by the Sudbury Police Department, as well as other members of the audit team, that many vehicles travel along Boston Post Road (Route 20) well in excess of the posted speed limit of 30 MPH, specifically along the eastbound approach. According to the Route 20 Corridor Study prepared by Vanasse Hangen Brustlin, Inc. (VHB) in June 2012, the 85th percentile speed along Boston Post Road (Route 20) was 38 MPH, 8 MPH above the posted speed limit within the vicinity of Landham Road. The speed regulations, included within the Appendix of this report, indicate that there is no sudden change in speed on Boston Post Road (Route 20) that would explain excessive speeds along this roadway. Referring to the crash data summary and the collision diagram within the Appendix of this RSA, crashes 3 and 5 may have been attributed to excessive speeds in which the motorists lost control of the vehicle.

Although speed does not appear to be an issue along Landham Road, the speed regulations do state that the speed limit changes from 35 MPH to 25 MPH within 0.08 miles of the intersection. It should be noted that there is no 25 MPH speed limit sign posted just south of the intersection with Boston Post Road (Route 20) to indicate this change in speed along the northbound approach.

- **Signage** – The STOP sign on the right side of the northbound approach on Landham Road has been hit and is tilted over to the left side.

Typically, the visibility of a traffic sign will diminish if not vertically straight. Since the sign is leaning in towards the roadway, it puts the sign in jeopardy of being hit again and causing property damage to a vehicle since the lateral clearance is no longer sufficient.



STOP sign on the right has been hit and it tilting into the roadway.



Existing W1-10b sign along westbound approach that does not properly portray horizontal alignment of roadway.

It was also observed during the field visit that the green destination signs located in the most eastern center island median are incorrectly located due to the existing intersection geometry. These signs direct drivers to either continue on Boston Post Road (Route 20) or take Landham Road towards Framingham. Generally, signs are located immediately after the required turn. However, the location of this sign promotes vehicles unfamiliar with the intersection to enter Landham Road at the wrong opening. Therefore, vehicles traveling

The intersection warning signs (W1-10b) with supplemental road name plaques (W16-8P) located on both the eastbound and westbound approaches do not properly reflect the horizontal curvature of the roadway on Boston Post Road (Route 20). These signs indicate that the thinner section extending straight is Landham Road. These signs should be updated to properly reflect the intersection geometry.



Green destination sign currently located in the eastern most island falsely directs motorists to enter Landham Road at wrong opening.

westbound on Boston Post Road (Route 20) may be misled and access Landham Road via the northbound channelized right turn lane while vehicles traveling eastbound on Boston Post Road (Route 20) may enter Landham Road via the northbound left turn lane on Landham Road rather than utilizing the channelized right turn lane on Boston Post Road (Route 20). The latter of these two actually occurred during the site visit on May 21st in which an eastbound motorist entered Landham Road via the northbound left turn lane and continued on Landham Road the wrong way. This occurrence is exacerbated due to the lack of do not enter signs to prohibit vehicles on Boston Post Road (Route 20) from entering the northbound left turn approach lane on Landham Road. Referring to the collision summary and the collision diagram included within the Appendix of this RSA, collision 26 involved a westbound motorist on Boston Post Road (Route 20) who executed a left turn onto Landham Road and entered via the northbound left turn lane resulting in a head on collision.



There is only one yield sign present for eastbound right turn lane which is typically a fast turning movement.

Audit team members also pointed out that there is only one YIELD sign present for the eastbound right turn lane on Boston Post Road (Route 20), located on the left side of the roadway. Typically, YIELD signs would be located on the right side of the roadway. Since this is such a heavy conflict point, consideration should be made to install retro-reflective YIELD signs on both sides of the roadway to increase driver awareness.

There are deer crossing signs within the vicinity of the intersection but only on the departure lanes of the intersection. Audit team members indicated that deer crossings are common within the vicinity of the intersection. Referring to the collision summary and collision diagram included within the Appendix of this report, collision No. 19 resulted in a single vehicle collision with a deer west of the intersection on Boston Post Road (Route 20). Audit team members stated that deer crossings are more prevalent along Landham Road.

- **Sight Distance** – There is a slight horizontal curve along Boston Post Road (Route 20) which restricts sight distance for both northbound and westbound left turning vehicles to see approaching vehicles from the eastbound approach. The restricted sight distance becomes more of an issue when eastbound vehicles are traveling at high rates of speed in excess of the posted speed limit. The Route 20 Corridor Study prepared by VHB in June 2012 indicated that the measured sight distance along Boston Post Road (Route 20) does not meet the AASHTO intersection sight distance (ISD) minimum of 445 feet by approximately 45 feet. Since it is difficult for these left turning vehicles to see approaching eastbound vehicles, they may make the left turn thinking that there is an adequate gap, at which point the eastbound vehicle arrives and cannot stop in time resulting in an angle collision at the intersection. As previously mentioned, angle type collisions accounted for approximately 48 percent of the total amount of collisions

experienced at this intersection over the five year study period. A total of 11 angle type collisions to occur at the intersection involved a northbound or westbound left turning vehicle and an eastbound through vehicle, indicating that sight distance is a potential issue at this location.

- Drainage – Although drainage did not appear to be problematic at the intersection, it should be noted that regular maintenance of the drainage structures has not occurred in several years according to Town Officials. Poor maintenance can lead to failing drainage structures and result in flooding and ponding issues on the roadway.
- Intersection Geometry – As mentioned previously, Landham Road intersects Boston Post Road (Route 20) from the south to form a “T” intersection. There are three center island medians which separate northbound vehicles on Landham Road wishing to execute a left turn onto Boston Post Road (Route 20) westbound and westbound left turning vehicles on Boston Post Road (Route 20) wishing to continue onto Landham Road. As previously mentioned, the destination signs located at the intersection could confuse motorists unfamiliar with the intersection and they may enter Landham Road via the wrong entrance. These islands also create slip lanes for both northbound and eastbound right turning vehicles. Slip lanes are generally designed with very large corner radii that put an emphasis on easy and fast vehicle travel. This can have a negative effect for pedestrians, especially at slip lanes controlled by a YIELD sign rather than a signal or STOP sign. Since motorists tend to focus more so on merging with oncoming traffic, they may not see pedestrians entering the crosswalk. For pedestrians waiting to cross at the southeastern side of the intersection, sight distance is a concern because of the large radii and is compounded by the overgrown vegetation along the western side of Landham Road. It is also common at YIELD controlled slip lanes for vehicles to already be looking left for oncoming traffic and accidentally rear-end the driver in front of them when they think there is an adequate gap. Referring to the collision summary and collision diagram included within the Appendix of this RSA, collisions 42 and 52 can be attributed to this common tendency.



Slip lanes generally promote high speed turns which pose significant conflicts for pedestrians waiting to cross at these locations.

Vehicles traveling eastbound on Boston Post Road (Route 20) and turning right onto Landham Road via the slip lane tend to travel at a higher rate of speed because they are coming from a free flowing roadway. These vehicles must then yield to westbound left turning vehicles from Boston Post Road (Route 20). Although the collision diagram does not show many collisions at this

location, this is a significant conflict point. During peak hours, adequate gaps are rare for pedestrians to cross safely at this location.

The island located in the middle of the intersection creates narrow passages for northbound left turning vehicles and westbound left turning vehicles wishing to continue onto Landham Road. Since there is a moderate amount of truck activity present in this area, these specific turns may be difficult for trucks to maneuver. Referring to the collision summary and collision diagram included within the Appendix of this RSA, collision 7 involved a heavy vehicle on Boston Post Road (Route 20) westbound who took a wide turn and hit the utility pole located in the western median island.

The intersection is also located on a slight horizontal curve, which as mentioned previously, creates poor sight lines for left turning vehicles on both the northbound and westbound approaches to see approaching eastbound vehicles on Boston Post Road (Route 20), generally traveling in excess of the speed limit. Poor sight distance increases the possibility of angle type collisions at this intersection, in which 48 percent of the reported crashes were.

- Excessive Queuing – The intersection of Boston Post Road (Route 20) and Landham Road experiences heavy congestion especially during the peak commuter periods. As the traffic counts indicate, there are heavy left turn volumes on both the northbound and westbound approaches to the intersection. There is also heavy through movement volume on the eastbound approach which makes it difficult for left turning vehicles to find adequate gaps in traffic to execute a safe left turn maneuver. This results in significant queuing on both the northbound and westbound approaches. The lack of sufficient gaps in traffic on Boston



Queues develop along westbound approach on Route 20 as a result of left turning vehicle waiting for adequate gap in opposing traffic.

Post Road (Route 20) increases the potential for aggressive and distracted driving. It was also suggested that eastbound mainline motorists on Boston Post Road (Route 20) stop to let vehicles turn left into and out of Landham Road. However, this ‘courtesy’ gap often increases backups on Boston Post Road (Route 20) eastbound and is also a safety hazard for people using the intersection, resulting in potential rear-end collisions. Referring to the collision summary and diagram included within the Appendix of this RSA, a total of four rear-end collisions (33, 39, 41, and 45) occurred on the eastbound approach to the intersection.

- Bicycle Accommodations – There are no bicycle accommodations within the vicinity of the intersection. Striped shoulders, where provided, are of an inadequate width for accommodation. It should be noted that a rail trail is proposed along the railroad tracks south of the intersection underneath Landham Road. Although direct access to this trail is not proposed within the vicinity of the intersection, the addition of a trail in the area may increase the bicycle activity within the overall Boston Post Road (Route 20) corridor.
- Pedestrian Accommodations – Currently sidewalk is present along the northern side of Boston Post Road (Route 20) and is in fair condition west of the intersection but in good condition east of the intersection. A new hot mix asphalt sidewalk was installed with the construction of the restricted senior living residential development. This sidewalk is in good condition and is present along the southern side of Boston Post Road (Route 20) east of the intersection and terminates at the senior residential development. There is also a sidewalk along the western side of Landham Road in good condition. There is a crosswalk available across Landham Road at the intersection and is broken up by three center island medians which all provide pedestrian refuge. At the time of the audit,



Crosswalks are significantly faded and debris is present within pedestrian refuge islands.

there was significant debris located within the walkways at these locations making it difficult to navigate through the intersection as a pedestrian. ADA compliance is satisfied at each of the crossing locations which are equipped with cement concrete wheelchair ramps and associated detectable warning panels. It was suggested that crosswalks are fading and not visible, presenting safety concerns for pedestrians. These crosswalks are also parallel marking crosswalks which can often times be confused with the STOP bar. Pedestrian crossing assemblies (W11-2 in conjunction with W16-7P supplemental arrow plaques) are located at the Landham Road crosswalk informing vehicles traveling on Boston Post Road (Route 20) of the pedestrian crossing.

It should be noted that there has been an increase in pedestrian activity in this area because of the recent residential developments constructed along Boston Post Road (Route 20) east of the intersection. There is a demand for a crosswalk perpendicular to Boston Post Road (Route 20). However, poor sightlines and heavy vehicular traffic pose a challenge in determining a safe location given the existing intersection volumes and control.

As mentioned previously, slip lanes tend to be negative facilities for pedestrians as often time there is more of an emphasis on unimpeded vehicular travel. Pedestrians are challenged with inadequate gaps, high speed turns, and poor sight lines at these locations.

- Access Management – Sudbury Automotive, Inc. located in the southwest corner of the intersection has two wide and undefined driveways on Boston Post Road (Route 20). These wide curb cuts may be crossed by pedestrians, causing a longer period in which pedestrian/vehicle conflicts could occur. The close proximity of the driveways to the intersection creates conflicts with the Boston Post Road (Route 20) eastbound queues. Referring to the collision summary and diagram included within the Appendix of this report, there were four angle collisions involving vehicles entering and exiting the eastern driveway. This driveway is located very close to the eastbound right turn slip lane. Vehicles exiting the driveway may not expect vehicles to travel around the queue to the right which can increase the possibility of an angle type collision at this location. The close proximity of this driveway may also be confusing for westbound left turning vehicles on Boston Post Road (Route 20) if they see a right blinker indication because they may be unsure as to whether that eastbound vehicle is going to continue onto Landham Road or turn right into the gas station.



The wide and vague eastern driveway of Sudbury Auto. Inc. is located close to intersection adding additional conflict points.

- Vegetation – Although vegetation within the center island medians had been trimmed back, it should be noted that proper maintenance should be performed at this location to ensure that overgrowth is not restricting sight lines at the intersection.

- Intersection Control - Route 20 (Boston Post Road) and Landham Road intersect to form a three-way unsignalized intersection. The Route 20 (Boston Post Road) westbound approach provides a single general purpose travel lane operating under free-flowing conditions. This approach does not efficiently serve the heavy volume of left turning vehicle at this approach. Since the lane is fairly narrow, vehicles try to pass left turning vehicles on the right which may result in a sideswipe collision. Referring to the collision summary and diagram



Westbound vehicles trying to pass left turning vehicles on the right which is very narrow and may result in a sideswipe collision.

included within the Appendix of this report, collision number 18 was a sideswipe collision in which a westbound through moving vehicle tried to pass a westbound left turning vehicle on the right and did not have enough room resulting in the collision. During heavy peak periods, left turning westbound vehicles queue which may promote rear-end collisions on this approach as following motorists may not be paying attention to the sudden stops in traffic. Referring to the collision summary and diagram included within the Appendix of this report, there were eight rear-end collisions along the westbound approach. The Route 20 (Boston Post Road) eastbound approach provides a through travel lane operating under free-flowing conditions as well as a channelized right run lane onto Landham Road that is under YIELD control. As mentioned previously, vehicles in this eastbound right turn slip lane must yield to westbound a left turning vehicle, which creates a conflict point. Since there are significant eastbound right turn volumes, if a vehicle is yielding to a westbound left turning vehicle, a following vehicle may not expect a sudden stop, resulting in a rear-end collision.

The Landham Road northbound approach provides a left turn lane and a channelized right turn lane. The left turn lane is under STOP-sign control while travelers in the channelized right turn lane must yield to eastbound traffic on Route 20 (Boston Post Road). Rear-ends are a common tendency at right turn slip lanes because motorists often look left before they look ahead of them. For vehicles turning left out of Landham Road, there are insufficient adequate gaps in traffic because of the free flowing conditions on Boston Post Road (Route 20), resulting in potential frustrating driver behavior particularly during peak commuting hours.

Once there is a sufficient gap in eastbound Boston Post Road (Route 20) traffic, vehicles turning left on both the northbound and westbound approaches may be unsure of who has the right-of-way and both enter the intersection at the same time resulting in an angle collision. Referring to the collision summary and diagram included within the Appendix of this RSA, collisions 14, 22, 28, 30, 31 and 37 may have been a result of this situation.

Potential Safety Enhancements

After the intersection in-field visit, audit participants returned to the Flynn Building at 278 Old Sudbury Road to discuss the safety issues and consider potential short-term and long-term improvements. Many of the potential enhancements identified during the RSA have already been considered as part of the design process, although further design work and consideration may be necessary to determine the feasibility of making some of the improvements moving forward. A summary of potential safety-related enhancements discussed at the RSA is provided below:

Boston Post Road (Route 20) at Landham Road

- **Pavement Conditions** – It is recommended that the pavement structure be evaluated and proper measures be taken to rehabilitate pavement to eliminate rutting, settlement, and dangerous potholes. This improvement will provide vehicles with an even travel way and improved friction resistance. This may decrease the potential of rear-end crashes in wet or icy roadway conditions as well as reduce the possibility of a head-on, sideswipe, or single vehicle crash due to vehicles intentionally avoiding dangerous potholes.
- **Pavement Markings** – Markings should be refreshed to be visible, clear and reflective. New retro reflective pavement markings can increase visibility during both daytime and nighttime conditions which can decrease the possibility of a lane departure collision or head-on collision. It should be noted that this can be done prior to the project as a part of maintenance.

The refreshment of the yield markings on both slip lanes will provide more awareness to the driver of the yield condition which may decrease the possibility of a rear-end or angle type collision.

It was also suggested by audit team members that the eastbound approach lane width is striped excessively wide which may increase speeds at this approach. Therefore a perceived narrowing of the roadway by installing white edge lines west of the intersection for eastbound drivers should be considered. A narrower travel lane provides a constricted feeling which typically leads to reduced travel speed and therefore a potential reduction in the number and severity of crashes caused by excessive speed.

Crosswalks should be refreshed as well, utilizing the continental design with the intent to draw more attention to the pedestrian crossing location. The continental crosswalk design has been documented by the Federal Highway Administration as the most visible crosswalk treatment.

Sharrows may be incorporated along all four approaches to provide accommodations to bicyclists in the short term. Sharrows alert motorists that bicyclists are likely to be within the traveled way as well. The sharrows will also assist bicyclists with a safe lateral positioning in lanes that are too narrow to accommodate both a motor vehicle and a bicycle to travel side by side in the same traffic lane.

- Lighting – A lighting study should be performed at this intersection. Should the study indicate that lighting is inadequate at this location; an additional cobra head should be installed at the intersection to increase driver visibility during night time conditions.
- Speeding – Although it was indicated that speeding is heavily enforced at this location, additional police presence may decrease the occurrence of speeding. It is understood that staffing and funding may be an issue; therefore, perhaps a speed trailer should be installed to visually display drivers' real-time speeds compared to the speed limit. If any, the speed trailer should be installed along the eastbound approach which audit members identified as the high speed approach. A speed trailer could potentially reduce speeds and increase awareness of local speed limits.

It was previously mentioned that a perceived narrowing of the roadway be considered. This can be achieved by installing a white edge line west of the intersection for eastbound drivers. A narrow travel lane provides a constricted feeling which typically leads to reduced travel speeds and therefore a potential reduction in the number and severity of crashes caused by excessive speeds.

Although speeds do not appear to be an issue on Landham Road, speed regulations included within the Appendix of this report indicate a change in speed from 35 mph to 25 mph 0.08 miles in advance of the intersection for northbound vehicles. A 25 mph speed limit sign is not present at this location. Therefore, one should be provided to alert vehicles of this change in speed regulation.

- Signage – The STOP sign on the right side of the northbound approach on Landham Road should be fixed so that it is vertically straight. Correctly installed signs are more visible to approaching vehicles.

The intersection warning signs (W1-10B) with supplemental (W16-8P) road name plaques located on both the eastbound and westbound approaches should be replaced with W1-10 signs which better depict the actual horizontal alignment. The supplemental road name plaques should remain at these locations for advanced warning to approaching vehicles on Boston Post Road (Route 20).

The placement of the green destination signs located within the most eastern median should be revisited. Destination signs for both eastbound and westbound approaches should be relocated to the most western island. This will ensure that the arrow directing vehicles to Framingham points will guide vehicles to the correct entry way onto Landham Road. This will reduce the possibility of a head on collisions caused by drivers unfamiliar with the intersection entering the wrong way on Landham Road.

Do Not Enter (R2-1) signs should also be installed at the northbound left turn lane to inform vehicles on Boston Post Road (Route 20) that they should not enter Landham Road at this location? This too will reduce the possibility of a head on collision caused by drivers unfamiliar with the intersection entering the wrong way on Landham Road.

It was observed that only one YIELD sign is installed for the eastbound right turn lane and is located on the left side of the road. Audit team members suggest that an additional YIELD sign be installed on the right side of the roadway to increase driver awareness of the YIELD control at this location. This may reduce the potential of an angle or rear-end type collision at this conflict point.

- Sight Distance - There is a slight horizontal curve along Boston Post Road (Route 20) which restricts sight distance for both northbound and westbound left turning vehicles to see approaching vehicles from the eastbound approach. The restricted sight distance becomes more of an issue when eastbound vehicles are traveling at high rates of speed in excess of the posted speed limit. The Route 20 Corridor Study prepared by VHB in June 2012 indicated that the measured sight distance along Boston Post Road (Route 20) does not satisfy the AASHTO intersection sight distance (ISD) minimum of 445 feet by approximately 45 feet. The intersection could be realigned more towards the south to address this which would require land takings. It is recommended that the Sudbury Automotive, Inc. be contacted to work with the owner to relocate the curb line south of its existing location to provide ample sight distance for left turning vehicles. It was mentioned that the owner is currently in the permitting process to replace the underground tanks and therefore, potential relocation of the pumps could be considered to better accommodate improved intersection geometry.

Consideration should also be made for an intersection reconfiguration which could include a modern roundabout. A roundabout at this location would eliminate the sight distance issue by significantly reducing vehicle speeds at the intersection and reducing the number of conflict points at this location. Although a roundabout has the potential to increase crashes due to drivers' unfamiliarity, the severity of these crashes is diminished relative to a signalized or STOP sign controlled intersection. Given the proven safety benefits of modern roundabouts, the Federal Highway Administration (FHWA) included roundabouts as one of the nine "Proven Safety Countermeasures" to address crashes occurring at intersections.

- Drainage – Although drainage did not appear to be an issue at this intersection, proper regular maintenance should be required to decrease the possibility of flooding or ponding within the roadway.
- Intersection Geometry – As noted previously, the horizontal alignment of Boston Post Road (Route 20) contributes to constrained sight distance particularly for westbound vehicles taking a left turn to Landham Road. The 'flattening' of this curve may be difficult given the constraints of right-of-way on the north side of Boston Post Road (Route 20). However, it may be possible to trim back vegetation on the north side of Boston Post Road (Route 20) to improve the sight distance. Also, as noted previously, the channelized movements to/from Landham Road allow for a 'softer' turn which is more conducive to turns at a higher rate of speed. Although this may be viewed as desirable for motorists, the islands create more pedestrian crossings and more opportunity for rear end collisions. The potential to eliminate these islands could be considered to 'tighten up' the intersection geometry and force slower turning movements. The control for the right turn movement from Landham Road would need to be revised from YIELD to STOP control.

Long term geometric improvements will be highly dependent on traffic operations. It is believed that current traffic volumes warrant a traffic signal installation at this location. If so, exclusive turn lanes would need to be considered to optimize and accommodate the anticipated queuing.

A roundabout configuration should also be evaluated given the many benefits this type of intersection can provide. Roundabouts provide 24-hour traffic calming since they are designed to slow entering vehicles to approximately 20 MPH. They also have the potential to enhance a neighborhood given the opportunity for landscaping within the center and splitter islands. One drawback is that a roundabout requires a larger footprint at the intersection in order to accommodate truck turns. This may be problematic when right-of-way is limited. However, these are considerations that need to be vetted through the public process when developing a long term solution since the community may prefer this treatment even though right-of-way may be required.

- Excessive Queuing – Should the State/Town wish to make long term reconstructive efforts in the future, they may want to consider installing a modern roundabout or full signal at the intersection to provide a safe, controlled movement through the intersection and to reduce the occurrence of angle crashes. This may require land taking and easements as well as acceptance from the local community. A traffic signal would provide adequate gaps in traffic for turning vehicles and potentially reduce the excessive queuing that currently exists at the intersection especially along the northbound and westbound approaches.
- Bicycle Accommodations – In the short term, sharrows can be implemented within the corridor. Sharrows are used in order to alert to vehicle users that bicyclists are likely to be within the traveled way as well. The sharrows will also assist bicyclists with a safe lateral positioning in lanes that are too narrow to accommodate both a motor vehicle and a bicycle to travel side by side in the same traffic lane.

Long term reconstructive efforts should widen the roadway to provide either designated bicycle lanes or ample shoulder widths for bicycle travel. Should a signal be installed at the intersection, a dedicated bicycle lane (i.e., 5' shoulder) would be installed along Boston Post Road (Route 20) in accordance with MassDOT policy. Bicycle detectors would be installed at the approaches. If a roundabout were to be installed at this intersection, bicyclists can proceed through the intersection either as a motor vehicle or exit the roadway and utilize the sidewalk and marked crosswalks. If the cyclist feels comfortable entering the roundabout as a motor vehicle, they must obey the rules of the road. Should the cyclist decide to exit the roadway, the cyclists would have to dismount his/her bike and walk the bicycle in the sidewalk and along the crosswalk as a pedestrian. A shared use path could be installed along the perimeter of the roundabout so that bicyclists would not have to dismount their bicycles and can continue around the roundabout rather than within the traffic stream.

- Pedestrian Accommodations – In the short term, crosswalks should be refreshed utilizing the continental crosswalk design. This design has been documented by the Federal Highway Administration as the most high visibility crosswalk treatment. ADA compliant sidewalks should be provided along all approach and departure lanes of the intersection to improve the sidewalk

network. Since demand is high for a crosswalk east of the intersection, a study should be conducted to determine a safe location for a crosswalk. Should a mid-block crosswalk be installed, consideration should be made for the installation of rectangular rapid flashing beacons (RRFBs). RRFBs are pedestrian actuated and studies have shown positive results in yielding driver rates.

Should a signal be installed at this intersection, crosswalks shall extend across all approaches and be equipped with pedestrian signal indications. Pedestrian signal equipment at this intersection should include 16" LED countdown timers in conjunction with audio, vibro-tactile pedestrian push buttons with locator tone and LED confirmation light. All pedestrian phasing should take into account the restricted senior living residences located in the southeast corner of the intersection and be timed to accommodate slower crossing speeds.

Should a roundabout be installed at the intersection, splitter islands would be installed and act as a pedestrian refuge islands allowing pedestrians to cross one direction of traffic at a time. The installation of spare conduit at the splitter islands may be considered in the event that future pedestrian crossing enhancements become warranted in the future.

- Access Management – Work with the owner of the Sudbury Automotive, Inc. to better formalize driveways, narrow the curb cuts, and ideally, close the driveway closest to the intersection (or restrict to right turn out only). Also, to reduce cut-through traffic through the gas station, coordinate with the owner to implement strategies to discourage cut-through traffic such as making one driveway entrance-only, installing speed humps along the cut through route, or narrowing the curb cut.
- Vegetation – Although vegetation did not seem to be a major issue at the intersection, regular trimming and plant control should be required especially within the medians to ensure overgrowth is not restricting sight lines. Consider trimming back vegetation along the north side of Boston Post Road (Route 20) to improve sight distance for westbound traffic turning left to Landham Road.
- Intersection Control – Given the congestion that exists at this intersection, a detailed analysis of traffic volumes should be conducted to determine the best control at this location. The Corridor study prepared by VHB provided such recommendations and MassDOT will re-evaluate as part of an independent final design project. Traffic signal control or a roundabout configuration will both provide more safe operations. With improved safety, there is potential to have a tradeoff in capacity. For instance, Boston Post Road (Route 20) currently has the right-of way throughout the day relative to Landham Road. A traffic signal will require stops in the Boston Post Road (Route 20) traffic which may aggravate drivers. This could result in cut-through traffic seeking another route which may be viewed as a benefit to the Town and abutters. As long term intersection control is evaluated, the pedestrian accommodations will need to be seriously considered given the new developments in close proximity and the planned multi-use path construction project.

Summary of Road Safety Audit

Based on observations and discussions, the RSA team identified the issues and possible enhancements that could improve safety at the intersection of Boston Post Road (Route 20) and Landham Road in Sudbury, Massachusetts. Many of the enhancements identified will be studied to determine feasibility as part of the design process for the MassDOT intersection improvement project at this intersection.

Table 2 summarizes the existing safety issues, possible enhancements, estimated safety payoff, time frame, cost, and responsible agency for Boston Post Road (Route 20) and Landham Road. Safety payoff estimates are subjective and based on engineering judgment and are categorized as low, medium, and high. The time frame is categorized as short-term (<1 year), mid-term (1 to 3 years), or long-term (>3 years). The costs are categorized as low (<\$10,000), medium (\$10,001 to \$50,000), or high (>\$50,001).

Table 2 - Potential Safety Enhancement Summary – Boston Post Road (Route 20) at Landham Road

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Responsible Agency
Pavement Conditions	It is recommended that the pavement structure be evaluated and proper measures be taken to rehabilitate pavement to eliminate rutting, settlement, and dangerous potholes.	Medium	Long-term	High	MassDOT
Pavement Markings	Install new retro reflective pavement markings which will increase visibility during both daytime and nighttime conditions which can decrease the possibility of a lane departure collision or head-on collision.	Low	Short-term	Low	MassDOT
Pavement Markings	Install new retro reflective yield markings on both slip lanes will provide more awareness to the driver of the yield condition which may decrease the possibility of a rear-end or angle type collision.	Low	Short-term	Low	MassDOT
Pavement Markings	Restripe white edge line on eastbound approach on Boston Post Road (Route 20) to provide a narrower lane.	Low	Short-term	Low	MassDOT
Pavement Markings	Install new retro reflective crosswalks utilizing the continental design, with the intent to draw more attention to the pedestrian.	Low	Short-term	Low	MassDOT
Pavement Markings	Install sharrows along all four approaches to provide accommodations to bicyclists.	Low	Medium-term	Low	MassDOT
Lighting	Conduct a lighting study at the intersection. Should the study indicate that lighting is inadequate at this location; additional cobra heads should be installed at the intersection to increase driver visibility during night time conditions.	Medium	Medium-term	Medium	Town of Sudbury
Speeding	Increase police activity and enforcement at and within the vicinity of the intersection.	Medium	Short-term	High	Town of Sudbury
Speeding	Restripe white edge line on eastbound approach on Boston Post Road (Route 20) to provide a narrower lane.	Low	Short-term	Low	MassDOT
Speeding	Install speed trailer to visually display drivers' real-time speeds compared to the speed limit. If any, the speed trailer should be installed along the eastbound approach which audit members identified as the higher speed approach.	Medium	Medium-term	Medium	Town of Sudbury

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Responsible Agency
Speeding	Install a 25 MPH speed limit sign to alert motorists of quick change in speed on the northbound approach on Landham Road.	Low	Short-term	Low	Town of Sudbury
Signage	Repair STOP sign on the right side of the northbound approach on Landham Road so that it is vertically straight. Correctly installed signs are more visible to approaching vehicles.	Low	Short-term	Low	MassDOT
Signage	The intersection warning signs (W1-10B) with supplemental (W16-8P) road name plaques located on both the eastbound and westbound approaches should be replaced with W1-10 signs which better depict the horizontal alignment. The supplemental road name plaques should remain at these locations for advanced warning to approaching vehicles on Boston Post Road (Route 20).	Low	Short-term	Low	MassDOT
Signage	Destination signs for both eastbound and westbound approaches should be relocated to the most western island.	Medium	Short-term	Low	MassDOT
Signage	Install Do Not Enter (R2-1) Signs at the northbound left turn lane to inform vehicles on Boston Post Road (Route 20) that they should not enter Landham Road at this location. This too will reduce the possibility of a head on collisions cause by drivers unfamiliar with the intersection entering the wrong way on Landham Road.	Medium	Short-term	Low	MassDOT
Signage	Install an additional YIELD sign on the right side of the channelized right turn from Boston Post Road (Route 20) eastbound to increase driver awareness of the YIELD control at this location.	Low	Short-term	Low	MassDOT

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Responsible Agency
Sight Distance	The intersection could be realigned more towards the south which would require land takings. It is recommended that the Sudbury Automotive, Inc. be contacted to work with the owner to relocate the curb line south of its existing location to provide ample sight distance for left turning vehicles. It was mentioned that the owner is currently in the permitting process to replace underground tanks and this could be a good time to coordinate other potential site circulation improvements.	High	Long-term	High	MassDOT and Town of Sudbury
Sight Distance	Consideration should also be made for an intersection reconfiguration which could include a modern roundabout. A roundabout at this location would eliminate the sight distance issue by significantly reducing vehicle speeds at the intersection and reducing the number of conflict points at this location. Roundabouts have been proven to reduce the severity of crashes relative to signalized or STOP controlled intersections.	High	Long-term	High	MassDOT
Drainage	Although drainage did not appear to be an issue at this intersection, regular maintenance should be performed to decrease the possibility of flooding or ponding within the roadway.	Low	Mid-term	Low	MassDOT
Intersection Geometry	Potentially eliminate the channelized turn islands to 'tighten up' the intersection geometry and force slower turning movements. The control for the right turn movement from Landham Road would need to be revised from YIELD to STOP control.	High	Mid-term	Medium	MassDOT
Excessive Queuing	Consider installing a modern roundabout or full signal at the intersection to provide a safe, controlled movement through the intersection and to reduce the occurrence of angle crashes. Both options could incorporate an exclusive left turn lane for both the northbound and westbound approaches.	High	Long-term	High	MassDOT
Bicycle Accommodations	Implement sharrows within the corridor to enhance driver awareness.	Low	Mid-term	Low	MassDOT

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Responsible Agency
Bicycle Accommodations	Long term reconstructive efforts may widen the roadway to provide either designated bicycle lanes or ample shoulder widths for bicycle travel. Should a signal be installed at the intersection, a dedicated bicycle lane would be installed along Boston Post Road (Route 20). Bicycle detectors would be installed at the approaches.	Medium	Long-term	High	MassDOT
Bicycle Accommodations	If a roundabout were to be installed at this intersection, bicyclists can proceed either as a motor vehicle or as a pedestrian using the sidewalk and marked crosswalks. If the cyclist feels comfortable entering the roundabout as a motor vehicle, they must obey the rules of the road. Should the cyclist decide to exit the roadway, the cyclists would have to dismount his/her bike and walk the bicycle in the sidewalk and along the crosswalk as a pedestrian. A shared use path could be installed along the perimeter of the roundabout so that bicyclists would not have to dismount their bicycles.	Medium	Long-term	High	MassDOT
Pedestrian Accommodations	Install new retro reflective crosswalks utilizing the continental crosswalk design.	Medium	Short-term	Low	MassDOT
Pedestrian Accommodations	Install ADA compliant sidewalks along all approach and departure lanes of the intersection to improve the sidewalk network.	Medium	Long-term	High	MassDOT
Pedestrian Accommodations	Since demand is high for a crosswalk east of the intersection, a study should be conducted to determine a safe location for a crosswalk. Should a mid-block crosswalk be installed, consideration should be made for the installation of actuated rectangular rapid flashing beacons (RRFBs).	Medium	Mid-term	Medium	MassDOT

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Responsible Agency
Pedestrian Accommodations	Should a signal be intalled at this intersection, crosswalks shall extend across all approaches and be equipped with pedestrian signal indications. Pedestrian signal equipment at this intersection should include 16" LED countdown timers in conjunction with audio, vibro-tactile pedestrian push buttons with locator tone and LED confirmation light. All pedestrian phasing should take into account the restricted senior living residences located in the southeast corner of the intersection and be timed to accommodate slower crossing speeds.	High	Long-term	High	MassDOT
Pedestrian Accommodations	Should a roundabout be installed at the intersection, splitter islands would be installed and act as a pedestrian refuge island allowing pedestrians to cross one direction of traffic at a time.	High	Long-term	High	MassDOT
Access Management	Work with the owner of the Sudbury Automotive, Inc. to better formalize driveways, narrow the curb cuts, and ideally, close the driveway closest to the intersection (or make a right turn exit only). Also, to reduce cut-through traffic through the gas station, coordinate with the owner to implement strategies to discourage cut-through traffic such as making one driveway entrance-only, installing speed humps along the cut through route, or narrowing the curb cuts.	High	Long-term	High	Town of Sudbury
Vegetation	Although vegetation did not seem to be a major issue at the intersection, regular trimming and plant control should be required especially within the medians to ensure overgrowth is not restrict sight lines. Also potentially along the North side of Boston Post Road (Route 20).	Low	Short-term	Low	MassDOT
Intersection Control	The excessive crash rate at this location indicates that the existing intersection control is problematic. Traffic signal control or a roundabout configuration should be explored as a long term solution.	High	Long-term	High	MassDOT

Appendix A. RSA Meeting Agenda

Agenda

Road Safety Audit Boston Post Road (Route 20) at Landham Road Sudbury, Massachusetts

Meeting Location: Flynn Building
278 Old Sudbury Road, Sudbury, MA 01776
Thursday, May 21, 2015
10:00 AM – 12:00 noon

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

10:00 AM Welcome and Introductions

10:15 AM Review of Site Specific Material

- Crash, Speed & Volume Summaries– provided in advance
- Existing Geometries and Conditions

11:00 AM Visit the Site

- Drive to Boston Post Road (Route 20) at Landham Road
- As a group, identify areas for improvement

11:30 AM Post Visit Discussion / Completion of RSA

- Discuss observations and finalize findings
- Discuss potential improvements and finalize recommendations

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

Instructions for Participants:

- Before attending the RSA on Thursday, May 21, 2015 participants are encouraged to drive through the intersection and complete/consider elements on the RSA Prompt List with a focus on safety.
- All participants will be actively involved in the process throughout. Participants are encouraged to come with thoughts and ideas, but are reminded that the synergy that develops and respect for others' opinions are key elements to the success of the overall RSA process.
- After the RSA meeting, participants will be asked to comment and respond to the document materials to assure it is reflective of the RSA completed by the multidisciplinary team.

Safety Review Prompt List

The Safety Review Prompt List provides basic safety-related questions to use when evaluating a given roadway location. The prompt list should be considered when evaluating a roadway to design improvements or conduct a Road Safety Audit. The primary purpose of the prompt list is to identify potential road safety hazards. The list is meant to be general and should be used to prompt an evaluator as to specific matters identified in the field that may have an adverse effect on road safety. The Safety Review Prompt List is not a check of compliance with design standards.

This Prompt List represents the minimum that should be considered when exploring safety opportunities and is not intended to address all aspects of safety.

A summary of the responses should be prepared to highlight potential safety improvement opportunities.

Speed

- Are posted speed limits consistent with speed regulations; are they adequate?
- Are design features consistent with the posted speed (passing opportunities, sight distance, warning signs for horizontal and vertical curves, clearance intervals, sign placement, etc.)
- Are adequate controls in place for driver compliance with speed limits?

Multi-modal

- Have accommodations been provided for safe movement of pedestrians, bicycles, emergency vehicles, public transportation, and commercial vehicles?
- What design features could be improved, added, or removed to enhance the safe mobility of the various modes?

Pavement Markings

- Are there highly visible and retro reflective edge lines, center lines, and other pavement markings?
- Do the pavement markings provide sufficient guidance to the road users? Can the placement of the pavement markings be modified to improve guidance to road users?

Signs

- Are all signs retro reflective and visible for all roadway conditions, including placed free from obstructions?
- Are signs located to maximize perception and reaction while minimizing intrusion in clear zones?

- Does the signage provide adequate guidance to road users for given road conditions?
- Are pavement markings and signs consistent in effectively guiding road users?

Intersection Control

- Do all signs (stop signs, lane assignments, street names, etc.) provide visible, clear, non-conflicting messages?
- Is there clear, non-conflicting visibility of traffic control (signal heads, signs, and markings) from all approach lanes?
- Has the potential of misrepresentation of intersection control been considered (at closely spaced intersections or through control that is against expectation)?
- For signalized intersections, have the implications on safety been considered for the signal phasing?
- Is there a safe means by which all modes can travel through the intersection?

Lighting

- Is lighting (from headlights and/or streetlights) adequate for specific roadway conditions and/or use?
- If glare exists from sunlight or opposing headlights, are there countermeasures that can be implemented to minimize potentially detrimental effects?

Obstructions

- Are there obstructions to sight lines or roadway guidance (signs, markings, etc.) that can be removed, relocated, or minimized as part of this project?
- If obstructions or fixed objects exist but cannot be moved, can they be shielded (with guardrails, etc.) or delineated (with reflectors) to improve road user safety? If so, what can be done?

Pavement

- Could the condition of the pavement impact mobility and safety (potholes, edge drop-offs, skid resistance, etc)?
- What improvements can be made to minimize safety impacts?

Access Points and Traffic Generators

- Is the access control sufficient for the road's function?
- Are site access points located to maximize safety while still providing adequate access?

- Have impacts of site developments been adequately accommodated for safe mobility of all road users?

Parking

- Is parking clearly delineated and in conformance with signs, markings, and regulations?
- Might parking obstruct mobility/safety of pedestrians and other roadway users?

Weather Conditions

- Have accommodations been made for impacts from adverse weather condition (storage of snow, removal of ponding, adequate drainage, signage of low salt areas, maintenance program for snow removal, and catch basin clearing, etc.)?

Auxiliary Lanes

- Could taper locations and/or alignments contribute to safety challenges?
- Could lack of climbing lanes or passing zones cause driver frustration?
- Do acceleration/deceleration lane lengths necessitate additional signage and/or markings?

Animals

- Do animal migrations impact safety?
- Can measures be taken to reduce animal-vehicle conflicts?

Appendix B. RSA Audit Team Contact List

Participating Audit Team Members

Date: May 21, 2015 Location: Flynn Building, 278 Old Sudbury Road, Sudbury, MA

Audit Team Members	Agency/Affiliation	Email Address	Phone Number
Jody Kablack	Town of Sudbury – Planning	kablackj@sudbury.ma.us	978-639-3387
Jim Kupfer	Town of Sudbury – Planning	kupferj@sudbury.ma.us	978-639-3387
Scott Nix	Town of Sudbury – Police Department	nixs@sudbury.ma.us	978-443-1042
William Place	Town of Sudbury – Engineering	placeb@sudbury.ma.us	978-448-5490
John Whalen	Town of Sudbury – Fire Department	whalenj@sudbury.ma.us	978-443-2239-1215
Chenyuan Wang	CTPS – Boston MPO	cwang@ctps.org	857-702-3698
David Loutzenheiser	MAPC	dloutzenheiser@mapc.org	617-933-0743
Lola Campbell	MassDOT – District 3	alolade.campbell@state.ma.us	508-929-3887
Richard Conard	MassDOT – Traffic Engineering and Safety	richard.conard@state.ma.us	857-368-9649
John Mastera	MassDOT – Traffic Engineering and Safety	john.mastera@state.ma.us	857-368-9648
William Ullom	MassDOT – Traffic Engineering and Safety	William.ullom@state.ma.us	857-368-9622
Joseph Johnson	Greenman-Pedersen, Inc.	jjohnson@gpinet.com	978-570-2960
Nicole Rogers	Greenman-Pedersen, Inc.	nrogers@gpinet.com	978-570-2985

Appendix C. Detailed Crash Data

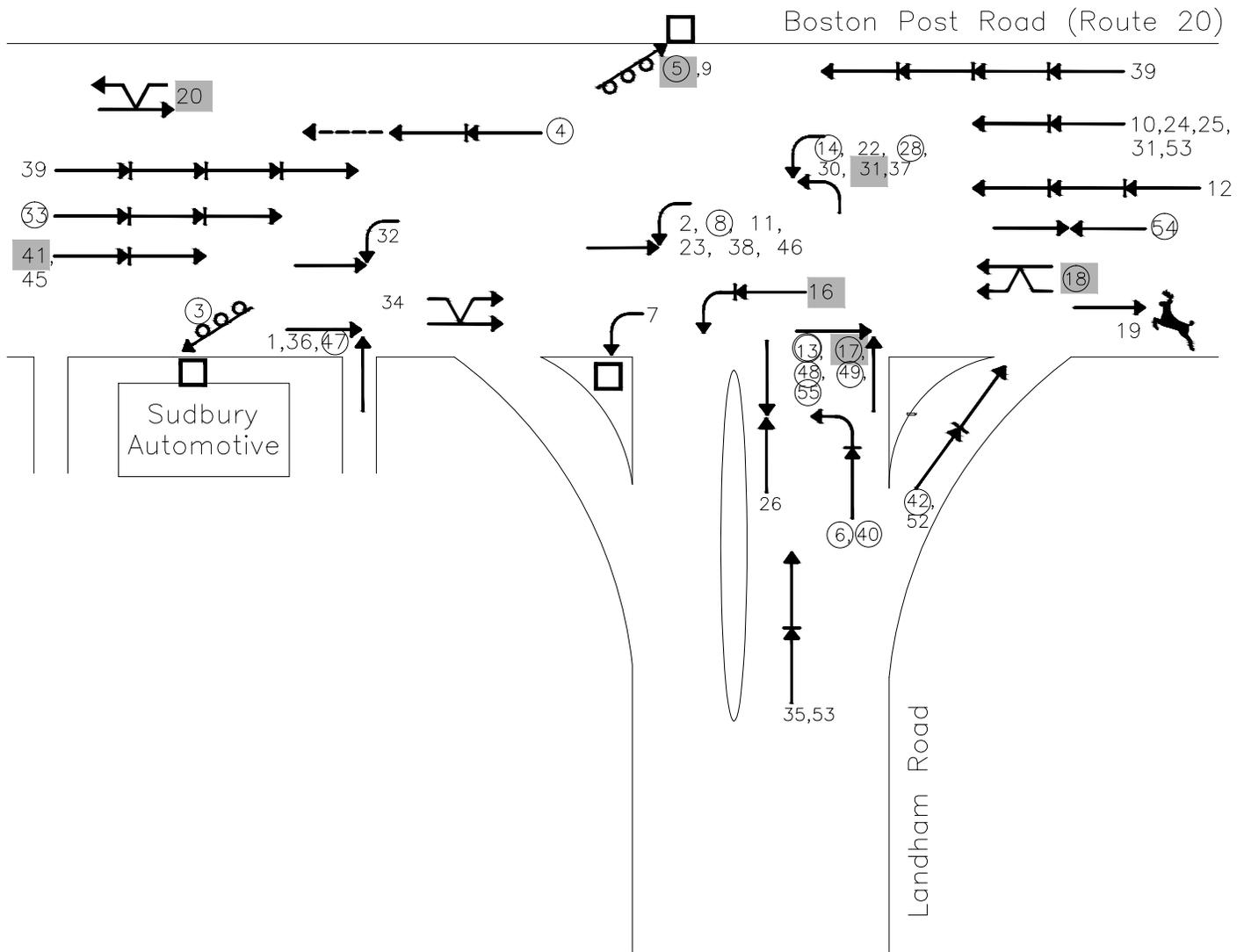
#	Crash Date	Crash Day	Time of Day	Manner of Collision	Light Condition	Weather Condition	Road Surface	Driver Contributing Code	Ages	Comments
Sudbury Local Crash Data (2010-2014)										
1	3/17/2010	Wednesday	11:13	Angle	Daylight	Clear	Dry	Failed to yield the right of way	66 52	MV1 exits from Sudbury Auto and collides with MV2, easterly on Rte. 20
2	5/13/2010	Thursday	15:13	Angle	Daylight	Clear	Dry	Failed to yield the right of way	33 27	MV1 west on Rte. 20 tries to turn left collides with Rte. 20 EB MV2
3	7/18/2010	Sunday	6:05	Single Vehicle Crash	Daylight	Clear	Dry	Unknown		WB MV1 lost control and hit Sudbury Auto
4	7/28/2010	Wednesday	9:22	Rear-end	Daylight	Clear	Dry	Followed too closely	44 42	MV 3 turning to gas when MV 1 rear-ended MV 2, all westbound
5	8/8/2010	Sunday	0:03	Single Vehicle Crash	Dark - lighted roadway	Clear	Dry	Unknown	43	MV1 fleeing police at high rate of speed lost control of vehicle
6	8/13/2010	Friday	11:02	Rear-end	Daylight	Clear	Dry	Followed too closely	34 18	MV1 traveling NB on Landham Road turning left when rear-ended by MV2
7	9/30/2010	Thursday	14:44	Single Vehicle Crash	Daylight	Cloudy	Dry	Failure to keep in proper lane or running off road	63	MV1 EB on Boston Post took wide left and hit utility pole
8	10/21/2010	Thursday	16:36	Angle	Daylight	Clear	Dry	Failed to yield the right of way	18	MV1 attempting to make left turn to Landham Road collides with EB MV2
9	12/12/2010	Sunday	7:10	Single Vehicle Crash	Dawn	Sleet, Hail, Freezing Rain	Ice	No Improper Driving	53	MV1 traveling EB on Route 20 lost control due to ice and struck mailbox
10	12/15/2010	Wednesday	10:07	Rear-end	Daylight	Clear	Dry	Followed too closely	45 39	MV1 traveling WB stopped for traffic when MV2 Rear-end MV1
11	12/20/2010	Monday	15:14	Angle	Daylight	Snow	Snow	Failed to yield the right of way	63 17	MV1 attempting to turn left onto Landham Rd collided with EB MV2
12	5/26/2011	Thursday	9:36	Rear-end	Daylight	Clear	Dry	Followed too closely	29 44 20	MV1, MV2, MV3 all traveling WB. MV3 rear-ends MV2 and then MV1.
13	5/26/2011	Thursday	9:52	Angle	Daylight	Clear	Dry	Failed to yield the right of way		MV1 traveling NB on Landham Rd attempts to turn left and collides with EB MV2
14	7/22/2011	Friday	8:28	Angle	Daylight	Clear	Dry	Failed to yield the right of way	26 33	MV1 WB on Rte. 20 turning left to Landham Rd. MV2 NB turning left to Rte. 20.
15	9/9/2011	Thursday	14:48	Angle	Daylight	Clear	Dry	Operating vehicle in erratic, reckless manner	80 28 41	Elderly man hits 4 parked cars in Sudbury Auto Parking Lot
16	10/4/2011	Tuesday	21:13	Rear-End	Dark - lighted roadway	Rain	Wet	Inattention	25 49	MV2 turning left onto Landham Rd when struck from behind by MV1. WB
17	11/17/2011	Monday	18:05	Angle	Dark - lighted roadway	Clear	Dry	Failed to yield the right of way	19 80	MV2 attempting to turn left onto Route 20 when struck by EB Rte. 20 MV1
18	11/18/2011	Friday	18:12	Sideswipe, same direction	Dark - lighted roadway	Clear	Dry	Failed to yield the right of way	66 23	MV2 tried to shut off heat and then swerved to try to avoid MV1 but collided
19	12/12/2011	Monday	6:47	Single Vehicle Crash	Daylight	Cloudy	Dry	No Improper Driving	46	MV1 collided with deer
20	12/27/2011	Tuesday	17:13	Sideswipe, opposite direction	Dark - roadway not lighted	Rain	Wet	Unknown		MV2 traveling EB on Rte. 20 crossed lane and into MV1 traveling WB.
21	2/7/2012	Tuesday	9:11	Angle	Daylight	Clear	Dry	Unknown	32 39	MV1 hits MV2 in Sudbury Auto Parking Lot.
22	3/8/2012	Thursday	15:55	Angle	Daylight	Clear	Dry	Failed to yield the right of way	40	MV1 WB on Rte. 20 turning left to Landham Rd. MV2 NB turning left to Rte. 20.
23	3/29/2012	Thursday	17:57	Angle	Daylight	Cloudy	Dry	Failed to yield the right of way	32 30	MV1 west on Rte. 20 tries to turn left collides with Rte. 20 EB MV2
24	3/29/2012	Thursday	18:10	Rear-end	Daylight	Cloudy	Dry	Followed too closely	47 39	MV1 traveling WB stopped for traffic when MV2 Rear-end MV1
25	6/18/2012	Monday	16:52	Rear-end	Daylight	Clear	Dry	Unknown		MV1 traveling WB stopped for traffic when MV2 Rear-end MV1
26	6/20/2012	Wednesday	15:31	Head On	Daylight	Clear	Dry	Inattention	33 55	MV1 turning left onto Landham Road misjudged turn and hit MV2 NB head on
27	9/17/2012	Monday	12:21	Angle	Daylight	Clear	Dry	Failed to yield the right of way	44 41	MV1 traveling west on Rte. 20, MV12 hits MV1 when exiting housing complex
28	9/22/2012	Saturday	12:29	Angle	Daylight	Clear	Dry	No Improper Driving	74 25	MV1 WB on Rte. 20 turning left to Landham Rd. MV2 NB turning left to Rte. 20.
30	10/21/2012	Sunday	11:51	Angle	Daylight	Clear	Dry	Failed to yield the right of way	98 26	MV2 WB on Rte. 20 turning left to Landham Rd. MV1 NB turning left to Rte. 20.
31	12/2/2012	Sunday	20:30	Angle	Dark - lighted roadway	Rain	Wet	Failed to yield the right of way	29 23	MV2 WB on Rte. 20 turning left to Landham Rd. MV1 NB turning left to Rte. 20.
32	12/11/2012	Tuesday	11:17	Angle	Daylight	Clear	Dry	Failed to yield the right of way	55 82	MV2 WB trying to turn left into Sudbury Auto struck by MV1
33	2/13/2013	Wednesday	8:02	Rear-end	Daylight	Clear	Wet	Followed too closely	53 27 50	MV 1,2,3 traveling eastbound when uninvolved vehicle took unexpected left out of Landham R
34	2/22/2013	Friday	10:12	Sideswipe, same direction	Daylight	Clear	Dry	Unknown	28 30	MV1 EB turning right onto Landham Road. MV2 though MV1 turning left and tried to pass on right
35	4/12/2103	Friday	12:53	Rear-end	Daylight	Rain	Wet	Followed too closely	48 68	MV1 stopped in traffic NB on Landham Road, MV2 accidently pressed gas
36	5/14/2013	Tuesday	16:43	Angle	Daylight	Clear	Dry	Inattention	82 47	MV1 attempting to turn left out of 209 Boston Post Road, struck by EB MV2
37	6/14/2013	Friday	15:23	Angle	Daylight	Cloudy	Dry	Failed to yield the right of way	39 37	MV2 WB on Rte 20 turning left to Landham Rd. MV1 NB turning left to Rte. 20.
38	6/22/2013	Saturday	15:01	Angle	Daylight	Clear	Dry	Failed to yield the right of way	45 32	MV2 WB attempting to turn left to Landham Road struck by MV1 EB on Rte. 20.
39	7/22/2013	Monday	17:37	Rear-end	Daylight	Clear	Dry	Followed too closely	52 53 39	MV1,2,3, traveling WB on BPR stop for heavy traffic, MV 4 hit rear of MV3 and so forth
40	8/5/2013	Monday	11:07	Rear-end	Daylight	Clear	Dry	Followed too closely	19 60	MV2 traveling NB on Landham Road turning left when rear-ended by MV1
41	9/27/2013	Friday	21:39	Angle	Dark - lighted roadway	Clear	Dry	Failed to yield the right of way	16 19	MV1 WB on Rte. 20 turning left to Landham Rd. MV2 NB turning left to Rte. 20.
42	10/16/2013	Wednesday	11:48	Rear-end	Daylight	Cloudy	Dry	Followed too closely	78 54	MV1 NB on Landham Road stopped at yield sign when rear-ended by MV2.
45	2/16/2014	Sunday	14:54	Rear-end	Daylight	Clear	Dry	Followed too closely	89 29	MV1EB Stopped in traffic, rear-ended by MV2
46	3/11/2014	Tuesday	6:40	Angle	Daylight	Cloudy	Dry	Unknown	57 31	MV1 WB on BPR attempting to turn left. MV1 EB on BPR strikes MV2
47	5/27/2014	Tuesday	8:28	Angle	Daylight	Clear	Dry	Unknown	21 90	MV1 traveling EB on BPR struck MV2 turning right out of Sudbury Auto
48	6/1/2014	Sunday	17:04	Angle	Daylight	Clear	Dry	Failed to yield the right of way	18 92	MV1 NB on Landham Road attempt to turn left o BPR and struck by MV2
49	10/1/2014	Wednesday	16:17	Angle	Daylight	Rain	Wet	Failed to yield the right of way	22 47	MV1 NB on Landham Road attempt to turn left o BPR and struck by MV2
50	10/11/2014	Saturday	16:17	Rear-end	Daylight	Cloudy	Dry	Followed too closely	19 24	MV1 WB on BPR stopped in traffic when struck from rear from MV2 also WB on BPR
51	11/18/2014	Tuesday	9:22	Rear to rear	Daylight	Clear	Dry	Unknown	67 41	MV1 backed into rear of MV2 in Sudbury Auto PL
52	7/9/2010	Friday	16:27	Rear-end	Daylight	Clear	Dry	Followed too closely	30 49	MV1 yielding in traffic NB on Landham Road turning right, MV2 rear-ended
53	4/19/2012	Thursday	16:46	Rear-end	Daylight	Clear	Dry	Followed too closely	30 40	MV1 stopped in traffic NB on Landham Road, MV2 rear-end MV1
54	4/27/2012	Friday	15:27	Head-on	Daylight	Cloudy	Dry	Failure to keep in proper lane or running off road	33 61	MV1 crossed centerline and hit MV2 head on just east of intersection
55	4/10/2014	Thursday	18:19	Angle	Daylight	Clear	Dry	Failed to yield the right of way	40 25	MV1 (NB) trying to turn left onto Rte 20 WB when struck by MV2(EB on Rte 20)

*Please note: Collisions 29, 43, and 44 have been deleted from the records due to their location outside of the study area.

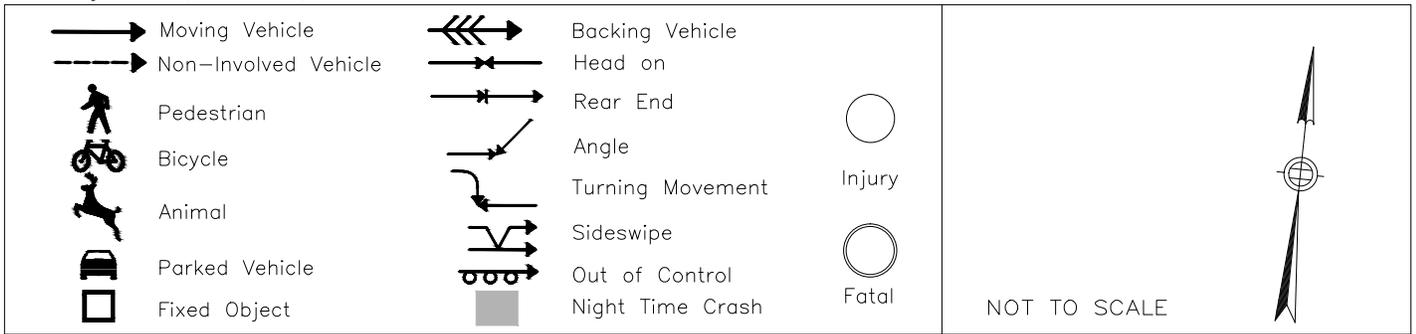
COLLISION DIAGRAM

Sudbury, Massachusetts

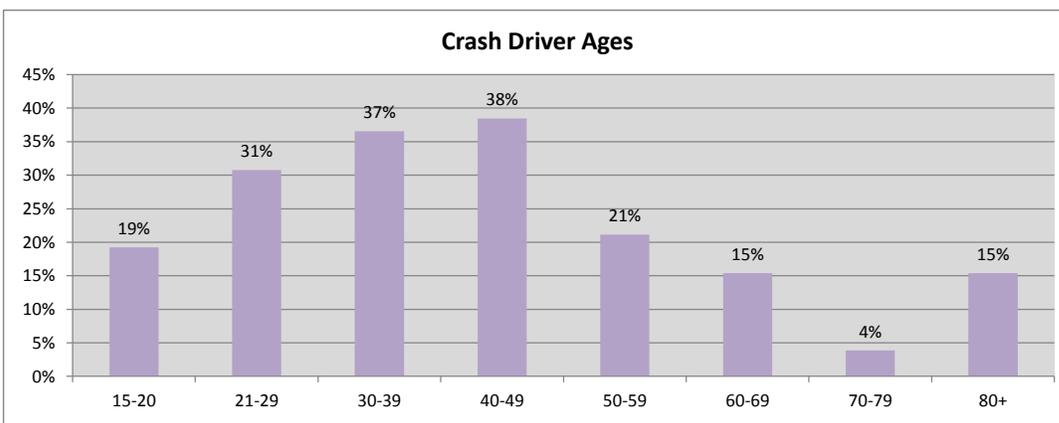
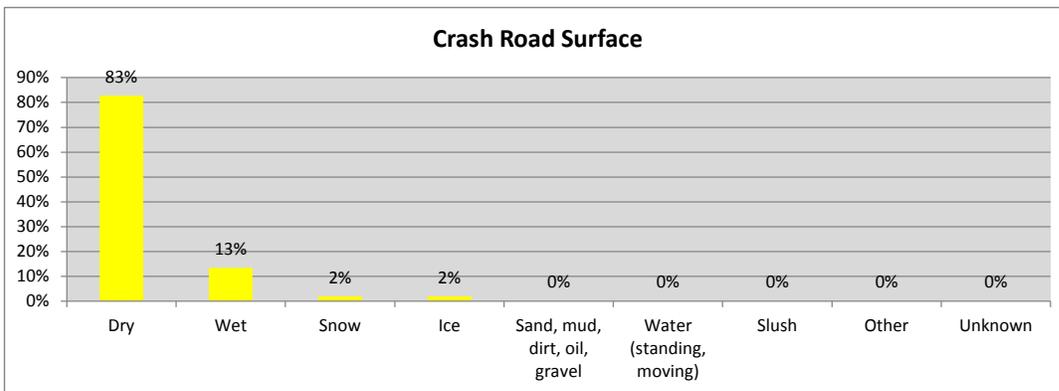
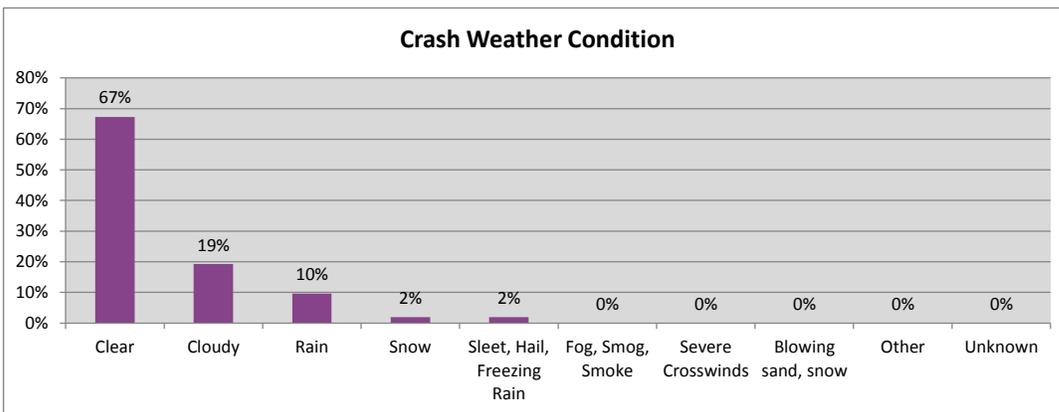
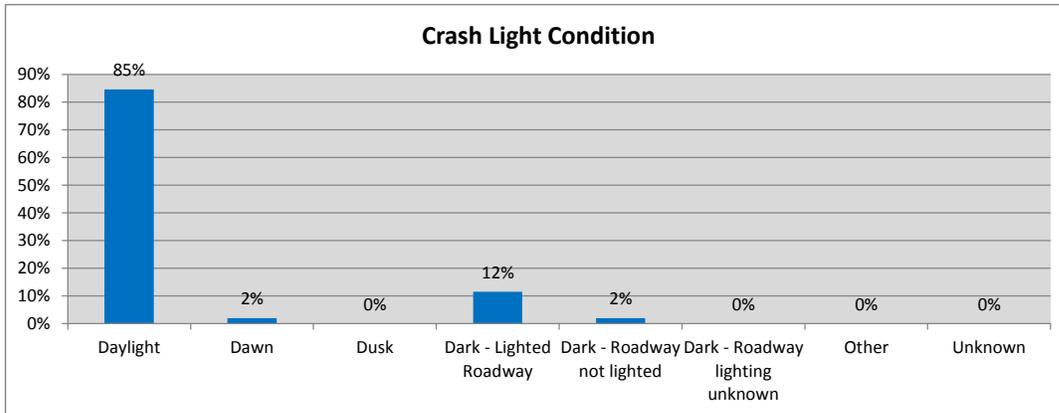
Unable to be mapped: 15, 21, 27, 51



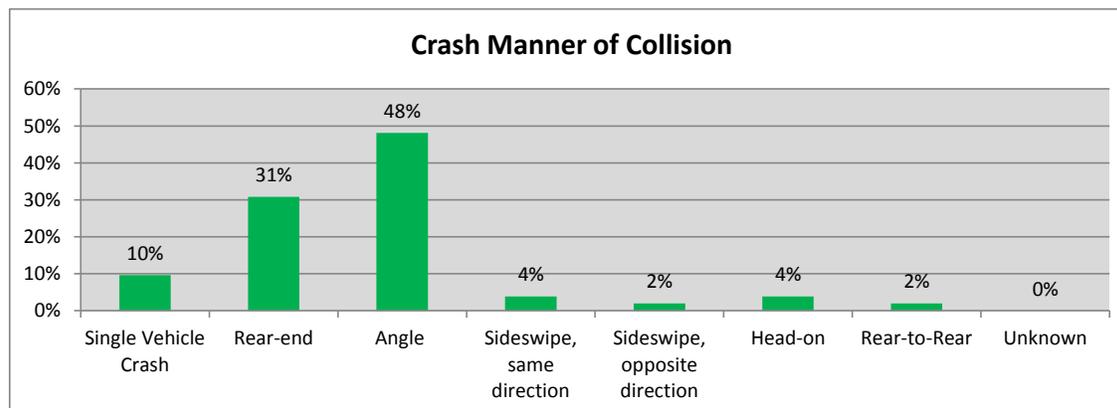
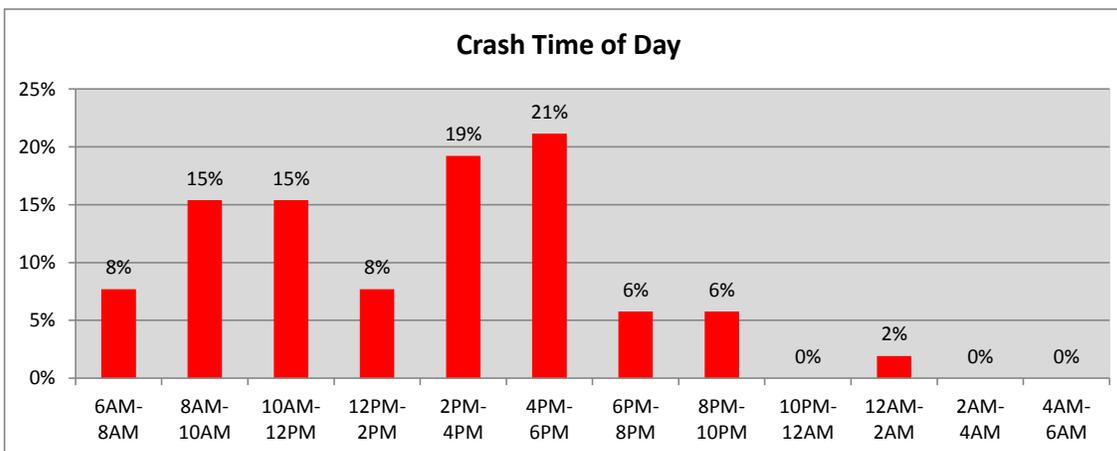
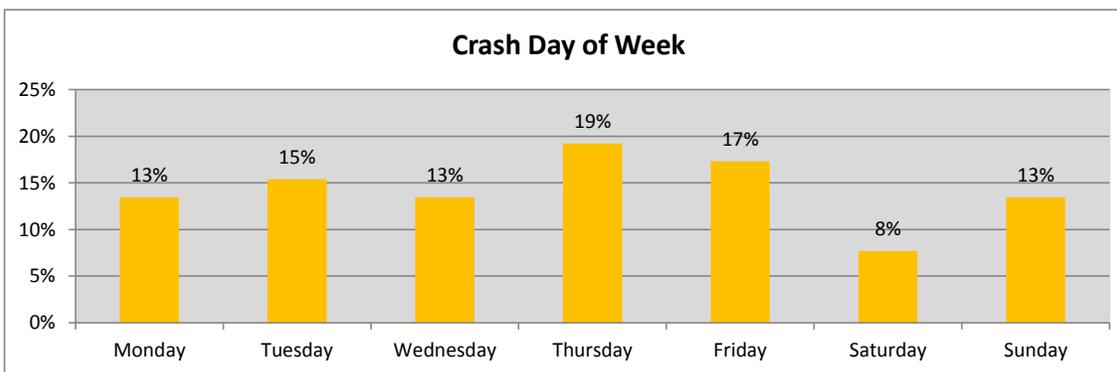
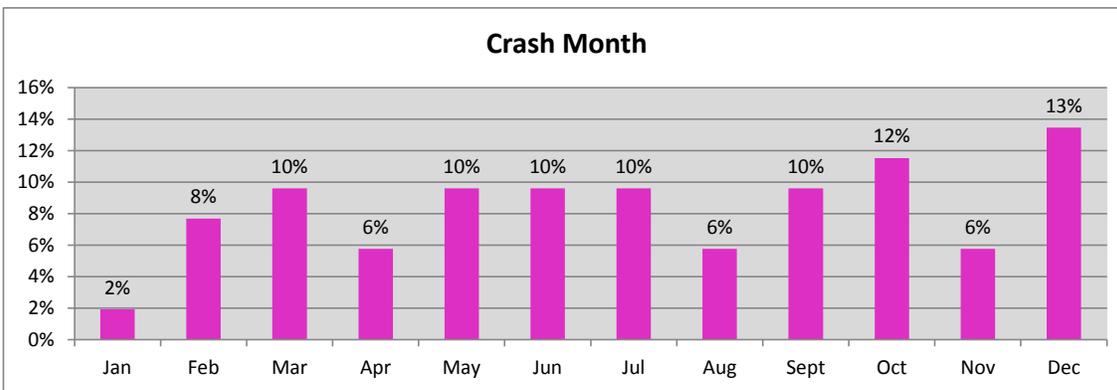
Source of Crash Reports:
Sudbury Police (2010-2014)



Crash Data Summary Charts
 Boston Post Road (Route 20) at Landham Road - Sudbury, Massachusetts



Crash Data Summary Charts
Boston Post Road (Route 20) at Landham Road - Sudbury, Massachusetts



INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Sudbury

COUNT DATE : Jun-14

DISTRICT : 3

UNSIGNALIZED :

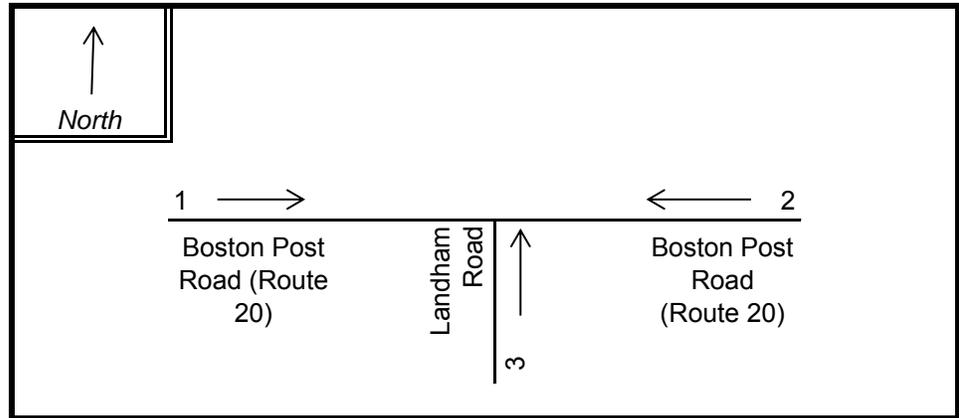
SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : Boston Post Road (Route 20)

MINOR STREET(S) : Landham Road

**INTERSECTION
 DIAGRAM**
 (Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB			
PEAK HOURLY VOLUMES (AM/PM):	831	901	417			2,149

" K " FACTOR :

0.084

INTERSECTION ADT (**V**) = TOTAL DAILY
 APPROACH VOLUME :

25,583

TOTAL # OF CRASHES :

52

OF YEARS :

5

AVERAGE # OF
 CRASHES PER YEAR (**A**) :

10.40

CRASH RATE CALCULATION :

1.11

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Project Title & Date: Boston Post Road (Route 20) at Landham Road

MAX-2013034.02 Boston Post Road (Route 20) at Landham Road – Sudbury, Massachusetts

Location	Number of Collisions			Severity ^a			Collision Type ^b						Percent During	
	Total	Average per Year	Crash Rate ^c	PD	PI	F	CM	RE	HO	FO	Ped	Other	Commuter Peak ^d	Wet/Icy Conditions
Sudbury Police Department (2010-2014)														
Boston Post Road (Route 20) at Landham Road	52	10.4	1.11	34	18	-	25	16	2	4	-	5	14.8 %	17.6%

Source: Sudbury Police Department Records (2010-2014)

^aPD = property damage only; PI = personal injury; F = fatality.

^bCM = cross movement/angle; RE = rear end; HO = head on; FO = fixed object; Ped = pedestrian.

^cMeasured in crsahes per million entering vehicles.

^dPercent of vehicle collisions that occurred during the weekday AM and weekday PM commuter peak periods.

Appendix D. Speed Regulations

March 5, 1990

THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

SPECIAL SPEED REGULATION NO. 7470

HIGHWAY LOCATION: MARLBOROUGH-WATERTOWN-RTE. 20

Authority in Control: COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

Name of Highway: MARLBOROUGH-STATE HIGHWAY-RTE.20
FRAMINGHAM " " " "
SUDBURY " " " "
WAYLAND " " " "
WESTON " " " "
WALTHAM " " " "
WATERTOWN " " " "

In accordance with the provisions of Section 18 Chapter 90 of the General Laws (Ter. Ed.) the following Special Speed Regulation is hereby promulgated:

Special Speed Regulations numbered 340-C, 340-D, 340-E, and 340-F dated April 4, 1975, December 19, 1977, May 24, 1978, and March 12, 1985 respectively are hereby amended by striking out the Regulation in their entireties and inserting in place thereof the following revision and addenda.

The following designated speed limits are established at which motor vehicles may be operated in the areas described.

EASTBOUND

Beginning at the Northborough-Marlborough Line
Thence easterly in Marlborough
0.47 miles at 45 miles per hour
0.66 " " 40 " " "
0.18 " " 35 " " "
0.57 " " 40 " " "
0.38 " " 35 " " "
0.23 " " 25 " " " ending at the end of State
Highway west of the City.

And beginning again in Marlborough 50 feet east of the beginning of State Highway

Thence easterly in Marlborough

0.42 miles at 30 miles per hour
0.22 " " 25 " " "
1.89 " " 35 " " "
0.59 " " 45 " " "
0.11 " " 50 " " " to the Framingham Town Line.

Thence easterly in Framingham

0.04 miles at 50 miles per hour to the Sudbury Town Line.

Thence easterly in Sudbury

1.07 miles at 50 miles per hour
0.88 " " 45 " " "
0.61 " " 40 " " "
0.45 " " 35 " " "
1.44 " " 30 " " "
0.48 " " 40 " " " to the Wayland Town Line.

Thence easterly in Wayland

0.06 miles at 40 miles per hour
0.11 " " 45 " " " to the Sudbury Town Line.

Thence easterly in Sudbury

0.22 miles at 45 miles per hour to the Wayland Town Line.

Thence easterly in Wayland

0.56 miles at 45 miles per hour
0.28 " " 35 " " "
0.44 " " 25 " " "
1.48 " " 35 " " " to the Weston Town Line.

Thence easterly in Weston

0.02 miles at 35 miles per hour
1.02 " " 40 " " "
0.75 " " 45 " " "
1.17 " " 40 " " "
0.36 " " 35 " " " to the Waltham City Line.

Thence easterly in Waltham

0.06 miles at 35 miles per hour
0.20 " " 30 " " "
0.70 " " 35 " " " ending at the end of State

Highway in Waltham.

And beginning again in Watertown 105 feet east of the beginning of State Highway

Thence easterly in Watertown

0.39 miles at 35 miles per hour
0.44 " " 30 " " " ending at the end of State

Highway; the total distance being 18.95 miles.

WESTBOUND

Beginning in Watertown at the beginning of State Highway
Thence westerly in Watertown
0.47 miles at 30 miles per hour
0.38 " " 35 " " " ending at the end of State
Highway in Watertown.

And beginning again in Waltham 82 feet west of the beginning of
State Highway.

Thence westerly in Waltham
0.65 miles at 35 miles per hour
0.14 " " 30 " " "
0.21 " " 35 " " " to the Weston Town Line.

Thence westerly in Weston
0.38 miles at 35 miles per hour
1.15 " " 40 " " "
0.77 " " 45 " " "
1.04 " " 40 " " " to the Wayland Town Line.

Thence westerly in Wayland
1.49 miles at 35 miles per hour
0.43 " " 25 " " "
0.34 " " 35 " " "
0.51 " " 45 " " " to the Sudbury Town Line.

Thence westerly in Sudbury
0.23 miles at 45 miles per hour to the Wayland Town Line.

Thence westerly in Wayland
0.11 miles at 45 miles per hour
0.06 " " 40 " " " to the Sudbury Town Line.

Thence westerly in Sudbury
0.37 miles at 40 miles per hour
1.48 " " 30 " " "
0.47 " " 35 " " "
0.63 " " 40 " " "
0.88 " " 45 " " "
1.05 " " 50 " " " to the Framingham Town Line.

Thence westerly in Framingham
0.04 miles at 50 miles per hour to the Marlborough City
Line.

Thence westerly in Marlborough
0.14 miles at 50 miles per hour
0.56 " " 45 " " "
1.89 " " 35 " " "
0.19 " " 25 " " "
0.45 " " 30 " " " ending at the end of State
Highway east of the City.

And beginning again in Marlborough at the beginning of State
Highway west of the City.

Thence westerly in Marlborough
0.23 miles at 25 miles per hour
0.39 " " 35 " " "
0.54 " " 40 " " "
0.21 " " 35 " " "
0.66 " " 40 " " "
0.47 " " 45 " " " ending at the Northborough
Town Line; the total distance being 19.06 miles.

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

The provisions of this regulation shall not, however, abrogate in
any sense, Section 14 of Chapter 90.

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

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

DATE: March 5, 1990

FOR THE DEPARTMENT OF PUBLIC WORKS

BY: Robert L. Shea
Traffic Engineer

FOR THE REGISTRY OF MOTOR VEHICLE

BY: William T. Huteh
Chief Deputy Registrar

THE COMMONWEALTH OF MASSACHUSETTS
HIGHWAY DEPARTMENT
SPECIAL SPEED REGULATION # 7470-A

HIGHWAY LOCATION: MARLBOROUGH-WATERTOWN-RTE. 20
Authority in Control: COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS
Name of Highway (s): MARLBOROUGH-STATE HIGHWAY-RTE.20

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

Special Speed Regulations Number 7470 dated March 5, 1990 is hereby amended by striking out all clauses pertaining to Marlborough east of the City and inserting in place thereof the following revisions and addenda:

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

EASTBOUND - MARLBOROUGH

And beginning again in Marlborough 50 feet east of the beginning of State Highway

Thence easterly in Marlborough

0.42 miles at 35 miles per hour

0.22 miles at 25 miles per hour

2.48 miles at 40 miles per hour

0.11 miles at 50 miles per hour ending at the Framingham

Town Line.

WESTBOUND - MARLBOROUGH

Thence westerly in Marlborough

0.14 miles at 50 miles per hour

2.45 miles at 40 miles per hour

0.22 miles at 25 miles per hour

0.42 miles at 35 miles per hour ending at the End of State

Highway east of the City.

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

The provisions of this regulation shall not, however, abrogate in any sense, Section 14 of Chapter 90.

The Highway Department and the Registry of Motor Vehicles, acting jointly, do hereby certify that this regulation is consistent with the public interest.

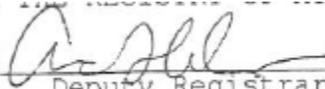
Standard sign must be erected at the beginning of each zone.

DATE: January 7, 2002

FOR THE HIGHWAY DEPARTMENT

BY: 
Traffic Engineer

FOR THE REGISTRY OF MOTOR VEHICLE

BY: 
Deputy Registrar

April 6, 1990

TOWN OF SUDBURY
SPECIAL SPEED REGULATION NO. 7471

Highway Location: SUDBURY
Authority in Control: TOWN OF SUDBURY
Name of Highway: LANDHAM ROAD-PEAKHAM ROAD
HORSEPOND ROAD-DUTTON ROAD

In accordance with the provisions of Chapter 90, Section 18, of the General Laws (Ter. Ed.) as amended, the following Special Speed Regulation is hereby adopted by the Board of Selectman of the Town of Sudbury

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

LANDHAM ROAD - NORTHBOUND

Beginning at the Framingham Town Line
Thence northerly on Landham Road
1.29 miles at 35 miles per hour
0.08 " " 25 " " " ending at Route 20; the total
distance being 1.37 miles.

LANDHAM ROAD - SOUTHBOUND

Beginning at a point 130' from Route 20
Thence southerly on Landham Road
1.35 miles at 35 miles per hour ending at the Framingham
Town Line; the total distance being 1.35 miles.

PEAKHAM ROAD - NORTHBOUND

Beginning at a point 60' from Route 20
Thence northerly on Peakham Road
2.16 miles at 25 miles per hour
0.74 " " 35 " " "
0.06 " " 25 " " " ending at Route 27; the total
distance being 2.96 miles.

PEAKHAM ROAD - SOUTHBOUND

Beginning at Route 27
Thence southerly on Peakham Road
0.80 miles at 35 miles per hour
2.17 " " 25 " " " ending at Route 20; the total
distance being 2.97 miles.

HORSEPOND ROAD - NORTHBOUND

Beginning at a point 150' from Route 20
Thence northerly on Horsepond Road
0.55 miles at 35 miles per hour
0.36 " " 25 " " "
0.23 " " 35 " " "
0.04 " " 25 " " " ending at Peakham Road; the
total distance being 1.18 miles.

HORSEPOND ROAD- SOUTHBOUND

Beginning at Peakham Road
Thence southerly on Horsepond Road
0.26 miles at 35 miles per hour
0.36 " " 25 " " "
0.52 " " 35 " " "
0.06 " " 25 " " " ending at Route 20; the total
distance being 1.20 miles.

DUTTON ROAD - NORTHBOUND

Beginning at Wayside Inn Road
Thence northerly on Dutton Road
1.98 miles at 25 miles per hour
0.41 " " 30 " " "
0.41 " " 25 " " " ending at Hudson Road; the
total distance being 2.80 miles.

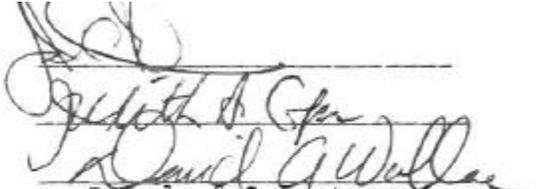
DUTTON ROAD - SOUTHBOUND

Beginning at Hudson Road
Thence southerly on Dutton Road
0.41 miles at 25 miles per hour
0.41 " " 30 " " "
1.98 " " 25 " " " ending at Wayside Inn Road;
the total distance being 2.80 miles.

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

The provisions of this regulation shall not, however, abrogate in any sense, Section 14 of Chapter 90.

Date of Passage February 26, 1990


Board of Selectmen

Attest 
Town Clerk

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

SPECIAL SPEED REGULATION NO. 7471

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

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

DATE: April 6, 1990

FOR THE DEPARTMENT OF PUBLIC WORKS

BY: 
Traffic Engineer

FOR THE REGISTRY OF MOTOR VEHICLES

BY: 
Chief Deputy Registrar

Appendix E. MassDOT Count Data

Massachusetts Highway Department
 WEEKLY SUMMARY FOR LANE
 Starting: 6/10/2014

Page: 3

STA. 1
 TOTAL

Site Reference: 1402900000053
 Site ID: 110000000103
 Location: RTE. 20, EAST OF LANDHAM RD.
 Direction: ROAD TOTAL

File: 10304-CLC.prn
 City: SUDBURY
 County: CLASS E&W

TIME	MON	TUE 10	WED 11	THU 12	FRI 13	WKDAY AVG	SAT 14	SUN 15	WEEK AVG	TOTAL
01:00		52	58	76	66	63	119	145	86	516
02:00		31	41	41	41	38	76	73	50	303
03:00		22	26	27	19	23	31	30	25	155
04:00		25	31	26	37	29	26	16	26	161
05:00		83	88	78	65	78	26	28	61	368
06:00		420	399	398	378	398	134	93	303	1822
07:00		1230	1220	1216	1093	1189	379	196	889	5334
08:00		1663	1612	1683	1433	1597	694	332	1236	7417
09:00		1598	1543	1537	1368	1511	967	506	1253	7519
10:00		1364	1415	1357	1256	1348	1171	729	1215	7292
11:00		1287	1312	1296	1254	1287	1480	832	1243	7461
12:00		1314	1375	1391	1248	1332	1564	1131	1337	8023
13:00		1390	1441	1440	1356	1406	1635	1259	1420	8521
14:00		1442	1428	1442	1327	1409	1530	1178	1391	8347
15:00		1598	1500	1572	1365	1508	1581	1200	1469	8816
16:00		1593	1586	1619	1545	1585	1417	1158	1486	8918
17:00		1731	1611	1607	1557	1626	1210	1027	1457	8743
18:00		1659	1671	1702	1625	1664	1133	925	1452	8715
19:00		1528	1565	1532	1417	1510	973	814	1304	7829
20:00		985	1080	1011	944	1005	775	773	928	5568
21:00		719	732	749	603	700	657	663	687	4123
22:00		509	568	575	522	543	530	428	522	3132
23:00		323	340	304	359	331	437	217	330	1980
24:00		164	161	189	230	186	292	112	191	1148
TOTALS	0	22730	22803	22868	21108	22366	18837	13865	20361	122211
% AVG WKDY		101.6	101.9	102.2	94.3		84.2	61.9		
% AVG WEEK		111.6	111.9	112.3	103.6		92.5	68		
AM Times		08:00	08:00	08:00	08:00	08:00	12:00	12:00	12:00	
AM Peaks		1663	1612	1683	1433	1597	1564	1131	1337	
PM Times		17:00	18:00	18:00	18:00	18:00	13:00	13:00	16:00	
PM Peaks		1731	1671	1702	1625	1664	1635	1259	1486	
D%		50	50	55	55		50	50		
K%		8	7	7	8		9	9		

U3

$T_{pk} = 1\%$
 $T_{ad} = 3\%$

COMB AWD 22366
 FAC .90
 COMB ADT 20,100

Massachusetts Highway Department
 WEEKLY SUMMARY FOR LANE 1
 Starting: 6/10/2014

Page: 1

STA. 1 EB

Site Reference: 140290000053
 Site ID: 110000000103
 Location: RTE. 20, EAST OF LANDHAM RD.
 Direction: EAST

File: 10304-CLC.prn
 City: SUDBURY
 County: CLASS E&W

TIME	MON	TUE	WED	THU	FRI	WKDAY	SAT	SUN	WEEK	TOTAL
		10	11	12	13	AVG	14	15	AVG	
01:00		16	13	34	16	19	51	68	33	198
02:00		14	20	23	20	19	32	29	23	138
03:00		11	16	13	10	12	13	13	12	76
04:00		16	22	16	24	19	14	8	16	100
05:00		56	66	55	49	56	15	19	43	260
06:00		308	283	279	267	284	88	61	214	1286
07:00		922	913	901	802	884	281	144	660	3963
08:00		1136	1101	1165	973	1093	447	216	839	5038
09:00		1051	1006	998	862	979	575	309	800	4801
10:00		835	833	799	728	798	602	441	706	4238
11:00		679	722	695	666	690	825	464	675	4051
12:00		651	740	729	622	685	804	591	689	4137
13:00		695	792	711	706	726	833	641	729	4378
14:00		743	706	759	675	720	794	579	709	4256
15:00		793	767	764	661	746	808	596	731	4389
16:00		737	764	751	719	742	731	570	712	4272
17:00		845	744	771	726	771	574	517	696	4177
18:00		841	812	806	733	798	537	426	692	4155
19:00		633	664	702	562	640	463	384	568	3408
20:00		357	410	416	396	394	388	359	387	2326
21:00		295	313	292	258	289	320	316	299	1794
22:00		183	212	212	276	220	232	183	216	1298
23:00		114	118	109	159	125	202	78	130	780
24:00		44	52	53	84	58	116	37	64	386
<hr/>										
TOTALS	0	11975	12089	12053	10994	11767	9745	7049	10643	63905
% AVG WKDY		101.7	102.7	102.4	93.4		82.8	59.9		
% AVG WEEK		112.5	113.5	113.2	103.2		91.5	66.2		
AM Times		08:00	08:00	08:00	08:00	08:00	11:00	12:00	08:00	
AM Peaks		1136	1101	1165	973	1093	825	591	839	
PM Times		17:00	18:00	18:00	18:00	18:00	13:00	13:00	15:00	
PM Peaks		845	812	806	733	798	833	641	731	

Massachusetts Highway Department
 WEEKLY SUMMARY FOR LANE 2
 Starting: 6/10/2014

Page: 2

STA. 1 WB

Site Reference: 140290000053
 Site ID: 110000000103
 Location: RTE. 20, EAST OF LANDHAM RD.
 Direction: WEST

File: 10304-CLC.prn
 City: SUDBURY
 County: CLASS E&W

TIME	MON	TUE	WED	THU	FRI	WKDAY	SAT	SUN	WEEK	TOTAL
		10	11	12	13	AVG	14	15	AVG	
01:00		36	45	42	50	43	68	77	53	318
02:00		17	21	18	21	19	44	44	27	165
03:00		11	10	14	9	11	18	17	13	79
04:00		9	9	10	13	10	12	8	10	61
05:00		27	22	23	16	22	11	9	18	108
06:00		112	116	119	111	114	46	32	89	536
07:00		308	307	315	291	305	98	52	228	1371
08:00		527	511	518	460	504	247	116	396	2379
09:00		547	537	539	506	532	392	197	453	2718
10:00		529	582	558	528	549	569	288	509	3054
11:00		608	590	601	588	596	655	368	568	3410
12:00		663	635	662	626	646	760	540	647	3886
13:00		695	649	729	650	680	802	618	690	4143
14:00		699	722	683	652	689	736	599	681	4091
15:00		805	733	808	704	762	773	604	737	4427
16:00		856	822	868	826	843	686	588	774	4646
17:00		886	867	836	831	855	636	510	761	4566
18:00		818	859	896	892	866	596	499	760	4560
19:00		895	901	830	855	870	510	430	736	4421
20:00		628	670	595	548	610	387	414	540	3242
21:00		424	419	457	345	411	337	347	388	2329
22:00		326	356	363	246	322	298	245	305	1834
23:00		209	222	195	200	206	235	139	200	1200
24:00		120	109	136	146	127	176	75	127	762

TOTALS	0	10755	10714	10815	10114	10592	9092	6816	9710	58306
% AVG WKDY		101.5	101.1	102.1	95.4		85.8	64.3		
% AVG WEEK		110.7	110.3	111.3	104.1		93.6	70.1		
AM Times		12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	
AM Peaks		663	635	662	626	646	760	540	647	
PM Times		19:00	19:00	18:00	18:00	19:00	13:00	13:00	16:00	
PM Peaks		895	901	896	892	870	802	618	774	

Massachusetts Highway Department
 WEEKLY SUMMARY FOR LANE
 Starting: 6/17/2014

Page: 3

STA. 2
 TOTAL

Site Reference: 140290000876
 Site ID: 110000000201
 Location: LANDHAM RD., SOUTH OF RTE. 20
 Direction: ROAD TOTAL

File: 20102-CLC.prn
 City: SUDBURY
 County: CLASS N&S

TIME	MON	TUE 17	WED 18	THU 19	FRI 20	WKDAY AVG	SAT 21	SUN 22	WEEK AVG	TOTAL
01:00			37	44	39	40	61	60	48	241
02:00			14	21	25	20	35	30	25	125
03:00			11	8	4	7	13	17	10	53
04:00			8	16	17	13	23	9	14	73
05:00			47	56	42	48	21	16	36	182
06:00			129	110	126	121	75	40	96	480
07:00			376	379	343	366	172	100	274	1370
08:00			802	810	728	780	331	156	565	2827
09:00			841	831	798	823	488	250	641	3208
10:00			710	689	659	686	654	375	617	3087
11:00			620	627	606	617	716	508	615	3077
12:00			642	708	698	682	772	591	682	3411
13:00		645	723	712	741	705	757	634	702	4212
14:00		637	652	755	710	688	734	634	687	4122
15:00		756	727	740	783	751	720	669	732	4395
16:00		788	746	866	855	813	745	565	760	4565
17:00		873	793	900	904	867	675	634	796	4779
18:00		1002	940	1033	934	977	632	528	844	5069
19:00		814	806	809	781	802	612	425	707	4247
20:00		543	593	555	567	564	484	346	514	3088
21:00		393	451	514	453	452	353	321	414	2485
22:00		281	328	330	389	332	310	217	309	1855
23:00		170	139	195	243	186	237	130	185	1114
24:00		69	64	67	134	83	136	70	90	540

TOTALS	0	6971	11199	11775	11579	11423	9756	7325	10363	58605
% AVG WKDY		61	98	103	101.3		85.4	64.1		
% AVG WEEK		67.2	108	113.6	111.7		94.1	70.6		
AM Times			09:00	09:00	09:00	09:00	12:00	12:00	12:00	
AM Peaks			841	831	798	823	772	591	682	
PM Times		18:00	18:00	18:00	18:00	18:00	13:00	15:00	18:00	
PM Peaks		1002	940	1033	934	977	757	669	844	
D%		55	60	60	60		55	55		
K%		14	8	9	8		8	9		

u5

$Tph = 1\%$
 $Tad = 1\%$

COMB AWD 11423
 FAC .90
 COMB APT 10,300

Massachusetts Highway Department
 WEEKLY SUMMARY FOR LANE 1
 Starting: 6/17/2014

Page: 1

STA. 2NB

Site Reference: 140290000876
 Site ID: 110000000201
 Location: LANDHAM RD., SOUTH OF RTE. 20
 Direction: NORTH

File: 20102-CLC.prn
 City: SUDBURY
 County: CLASS N&S

TIME	MON	TUE 17	WED 18	THU 19	FRI 20	WKDAY AVG	SAT 21	SUN 22	WEEK AVG	TOTAL
01:00			19	20	15	18	27	28	21	109
02:00			4	6	11	7	20	9	10	50
03:00			6	4	3	4	6	5	4	24
04:00			5	9	8	7	11	4	7	37
05:00			25	30	24	26	12	11	20	102
06:00			73	63	66	67	39	21	52	262
07:00			212	211	190	204	94	47	150	754
08:00			414	421	394	409	181	88	299	1498
09:00			423	421	377	407	247	142	322	1610
10:00			320	322	301	314	316	164	284	1423
11:00			281	295	272	282	310	213	274	1371
12:00			281	322	310	304	341	240	298	1494
13:00		264	319	326	356	316	323	278	311	1866
14:00		299	296	361	329	321	310	302	316	1897
15:00		355	364	351	360	357	363	287	346	2080
16:00		385	367	447	402	400	352	267	370	2220
17:00		411	358	428	425	405	306	299	371	2227
18:00		436	389	436	382	410	274	261	363	2178
19:00		358	349	344	292	335	248	213	300	1804
20:00		242	250	240	223	238	237	158	225	1350
21:00		166	215	224	222	206	162	142	188	1131
22:00		137	156	161	207	165	179	90	155	930
23:00		76	67	77	134	88	112	63	88	529
24:00		27	27	28	53	33	71	36	40	242
TOTALS	0	3156	5220	5547	5356	5323	4541	3368	4814	27188
% AVG WKDY		59.2	98	104.2	100.6		85.3	63.2		
% AVG WEEK		65.5	108.4	115.2	111.2		94.3	69.9		
AM Times			09:00	08:00	08:00	08:00	12:00	12:00	09:00	
AM Peaks			423	421	394	409	341	240	322	
PM Times		18:00	18:00	16:00	17:00	18:00	15:00	14:00	17:00	
PM Peaks		436	389	447	425	410	363	302	371	

Massachusetts Highway Department
 WEEKLY SUMMARY FOR LANE 2
 Starting: 6/17/2014

Page: 2

STA. 2 SB

Site Reference: 140290000876
 Site ID: 110000000201
 Location: LANDHAM RD., SOUTH OF RTE. 20
 Direction: SOUTH

File: 20102-CLC.prn
 City: SUDBURY
 County: CLASS N&S

TIME	MON	TUE	WED	THU	FRI	WKDAY	SAT	SUN	WEEK	TOTAL
		17	18	19	20	AVG	21	22	AVG	
01:00			18	24	24	22	34	32	26	132
02:00			10	15	14	13	15	21	15	75
03:00			5	4	1	3	7	12	5	29
04:00			3	7	9	6	12	5	7	36
05:00			22	26	18	22	9	5	16	80
06:00			56	47	60	54	36	19	43	218
07:00			164	168	153	161	78	53	123	616
08:00			388	389	334	370	150	68	265	1329
09:00			418	410	421	416	241	108	319	1598
10:00			390	367	358	371	338	211	332	1664
11:00			339	332	334	335	406	295	341	1706
12:00			361	386	388	378	431	351	383	1917
13:00		381	404	386	385	389	434	356	391	2346
14:00		338	356	394	381	367	424	332	370	2225
15:00		401	363	389	423	394	357	382	385	2315
16:00		403	379	419	453	413	393	298	390	2345
17:00		462	435	472	479	462	369	335	425	2552
18:00		566	551	597	552	566	358	267	481	2891
19:00		456	457	465	489	466	364	212	407	2443
20:00		301	343	315	344	325	247	188	289	1738
21:00		227	236	290	231	246	191	179	225	1354
22:00		144	172	169	182	166	131	127	154	925
23:00		94	72	118	109	98	125	67	97	585
24:00		42	37	39	81	49	65	34	49	298
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TOTALS	0	3815	5979	6228	6223	6092	5215	3957	5538	31417
% AVG WKDY		62.6	98.1	102.2	102.1		85.6	64.9		
% AVG WEEK		68.8	107.9	112.4	112.3		94.1	71.4		
AM Times			09:00	09:00	09:00	09:00	12:00	12:00	12:00	
AM Peaks			418	410	421	416	431	351	383	
PM Times		18:00	18:00	18:00	18:00	18:00	13:00	15:00	18:00	
PM Peaks		566	551	597	552	566	434	382	481	

Massachusetts Highway Department
 WEEKLY SUMMARY FOR LANE
 Starting: 6/10/2014

Page: 3

STA. 3
 TOTAL

Site Reference: 140290000961
 Site ID: 110000000303
 Location: RTE. 20, WEST OF LANDHAM RD.
 Direction: ROAD TOTAL

File: 30304-CLC.prn
 City: SUDBURY
 County: CLASS E&W

TIME	MON	TUE 10	WED 11	THU 12	FRI 13	WKDAY AVG	SAT 14	SUN 15	WEEK AVG	TOTAL
01:00		50	58	73	68	62	115	129	82	493
02:00		26	37	33	37	33	79	75	47	287
03:00		19	24	23	22	22	28	32	24	148
04:00		22	26	28	30	26	26	16	24	148
05:00		86	86	74	64	77	36	23	61	369
06:00		396	391	380	359	381	131	87	290	1744
07:00		1172	1170	1191	1044	1144	346	186	851	5109
08:00		1568	1558	1608	1400	1533	717	311	1193	7162
09:00		1568	1564	1572	1391	1523	934	511	1256	7540
10:00		1418	1411	1451	1322	1400	1140	742	1247	7484
11:00		1243	1320	1315	1261	1284	1374	857	1228	7370
12:00		1376	1404	1410	1331	1380	1534	1124	1363	8179
13:00		1414	1400	1533	1392	1434	1637	1281	1442	8657
14:00		1465	1483	1473	1365	1446	1544	1204	1422	8534
15:00		1537	1509	1536	1389	1492	1548	1192	1451	8711
16:00		1519	1515	1523	1525	1520	1479	1163	1454	8724
17:00		1638	1552	1517	1515	1555	1294	1055	1428	8571
18:00		1489	1572	1619	1526	1551	1162	969	1389	8337
19:00		1461	1434	1398	1358	1412	996	856	1250	7503
20:00		1012	1086	1067	994	1039	838	794	965	5791
21:00		725	771	755	656	726	688	680	712	4275
22:00		523	589	574	561	561	519	419	530	3185
23:00		322	338	307	388	338	451	242	341	2048
24:00		166	155	187	212	180	321	108	191	1149

TOTALS	0	22215	22453	22647	21210	22119	18937	14056	20241	121518
% AVG WKDY		100.4	101.5	102.3	95.8		85.6	63.5		
% AVG WEEK		109.7	110.9	111.8	104.7		93.5	69.4		
AM Times		08:00	09:00	08:00	08:00	08:00	12:00	12:00	12:00	
AM Peaks		1568	1564	1608	1400	1533	1534	1124	1363	
PM Times		17:00	18:00	18:00	18:00	17:00	13:00	13:00	16:00	
PM Peaks		1638	1572	1619	1526	1555	1637	1281	1454	
D%		50	55	50	55		55	50		
K%		7	7	7	7		9	9		

Tph = 1%
 Tad = 3%

COMB AWD 22119
 FAC .90
 COMB ADT 19,900

Massachusetts Highway Department
WEEKLY SUMMARY FOR LANE 1
Starting: 6/10/2014

Page: 1

STA. 3 EB

Site Reference: 140290000961
Site ID: 110000000303
Location: RTE. 20, WEST OF LANDHAM RD.
Direction: EAST

File: 30304-CLC.prn
City: SUDBURY
County: CLASS E&W

TIME	MON	TUE	WED	THU	FRI	WKDAY	SAT	SUN	WEEK	TOTAL
		10	11	12	13	AVG	14	15	AVG	
01:00		15	14	30	13	18	45	61	29	178
02:00		14	20	19	17	17	34	28	22	132
03:00		10	16	11	11	12	9	10	11	67
04:00		13	18	15	19	16	11	6	13	82
05:00		53	57	48	41	49	19	13	38	231
06:00		282	267	255	240	261	74	49	194	1167
07:00		858	846	842	748	823	239	125	609	3658
08:00		1053	1019	1090	938	1025	485	181	794	4766
09:00		1035	1003	1001	871	977	535	288	788	4733
10:00		863	840	840	789	833	583	445	726	4360
11:00		671	733	711	711	706	775	473	679	4074
12:00		698	766	737	688	722	839	617	724	4345
13:00		741	744	796	726	751	867	669	757	4543
14:00		761	763	776	706	751	794	614	735	4414
15:00		745	751	748	683	731	809	613	724	4349
16:00		702	706	717	708	708	772	586	698	4191
17:00		824	765	751	751	772	642	532	710	4265
18:00		795	826	822	723	791	539	465	695	4170
19:00		648	655	680	579	640	472	391	570	3425
20:00		423	454	488	431	449	414	373	430	2583
21:00		306	337	304	288	308	317	342	315	1894
22:00		193	237	221	260	227	205	198	219	1314
23:00		110	118	110	161	124	194	95	131	788
24:00		50	52	61	74	59	141	42	70	420

TOTALS	0	11863	12007	12073	11176	11770	9814	7216	10681	64149
% AVG WKDY		100.7	102	102.5	94.9		83.3	61.3		
% AVG WEEK		111	112.4	113	104.6		91.8	67.5		
AM Times		08:00	08:00	08:00	08:00	08:00	12:00	12:00	08:00	
AM Peaks		1053	1019	1090	938	1025	839	617	794	
PM Times		17:00	18:00	18:00	17:00	18:00	13:00	13:00	13:00	
PM Peaks		824	826	822	751	791	867	669	757	

Massachusetts Highway Department
 WEEKLY SUMMARY FOR LANE 2
 Starting: 6/10/2014

STA. 3 WB

Site Reference: 140290000961
 Site ID: 110000000303
 Location: RTE. 20, WEST OF LANDHAM RD.
 Direction: WEST

File: 30304-CLC.prn
 City: SUDBURY
 County: CLASS E&W

TIME	MON	TUE 10	WED 11	THU 12	FRI 13	WKDAY AVG	SAT 14	SUN 15	WEEK AVG	TOTAL
01:00		35	44	43	55	44	70	68	52	315
02:00		12	17	14	20	15	45	47	25	155
03:00		9	8	12	11	10	19	22	13	81
04:00		9	8	13	11	10	15	10	11	66
05:00		33	29	26	23	27	17	10	23	138
06:00		114	124	125	119	120	57	38	96	577
07:00		314	324	349	296	320	107	61	241	1451
08:00		515	539	518	462	508	232	130	399	2396
09:00		533	561	571	520	546	399	223	467	2807
10:00		555	571	611	533	567	557	297	520	3124
11:00		572	587	604	550	578	599	384	549	3296
12:00		678	638	673	643	658	695	507	639	3834
13:00		673	656	737	666	683	770	612	685	4114
14:00		704	720	697	659	695	750	590	686	4120
15:00		792	758	788	706	761	739	579	727	4362
16:00		817	809	806	817	812	707	577	755	4533
17:00		814	787	766	764	782	652	523	717	4306
18:00		694	746	797	803	760	623	504	694	4167
19:00		813	779	718	779	772	524	465	679	4078
20:00		589	632	579	563	590	424	421	534	3208
21:00		419	434	451	368	418	371	338	396	2381
22:00		330	352	353	301	334	314	221	311	1871
23:00		212	220	197	227	214	257	147	210	1260
24:00		116	103	126	138	120	180	66	121	729
TOTALS	0	10352	10446	10574	10034	10344	9123	6840	9550	57369
% AVG WKDY		100	100.9	102.2	97		88.1	66.1		
% AVG WEEK		108.3	109.3	110.7	105		95.5	71.6		
AM Times		12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	
AM Peaks		678	638	673	643	658	695	507	639	
PM Times		16:00	16:00	16:00	16:00	16:00	13:00	13:00	16:00	
PM Peaks		817	809	806	817	812	770	612	755	

Massachusetts Department of Transportation
Highway Division

Sudbury
Route 20 and Landham Road
Counted by Miovision
S14-029 Sat

File Name : S14-029 Sudbury Sat
Site Code : 169190
Start Date : 6/14/2014
Page No : 1

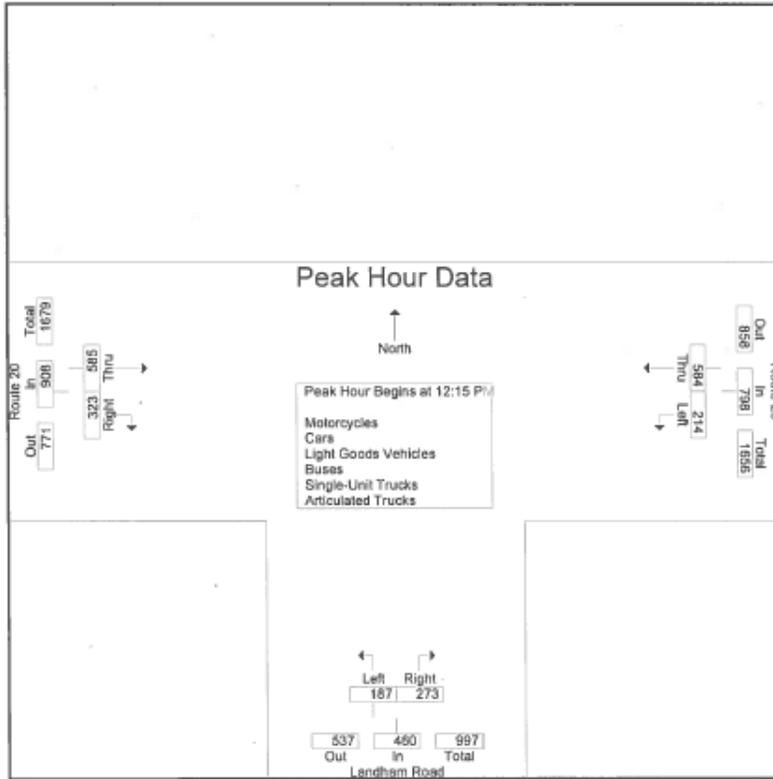
Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks

Start Time	Route 20 From East			Landham Road From South			Route 20 From West			Int. Total
	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	
11:00 AM	142	66	208	85	38	123	75	126	201	532
11:15 AM	133	68	201	64	57	121	58	147	205	527
11:30 AM	113	56	169	60	40	100	72	152	224	493
11:45 AM	136	63	199	56	41	97	68	138	206	502
Total	524	253	777	265	176	441	273	563	836	2054
12:00 PM	141	60	201	29	45	74	71	123	194	469
12:15 PM	161	53	214	64	39	103	90	151	241	558
12:30 PM	153	55	208	57	42	99	81	146	227	534
12:45 PM	147	57	204	73	51	124	77	155	232	560
Total	602	225	827	223	177	400	319	575	894	2121
01:00 PM	123	49	172	79	55	134	75	133	208	514
01:15 PM	148	41	189	77	53	130	59	135	194	513
01:30 PM	133	45	178	62	45	107	80	126	206	491
01:45 PM	157	52	209	58	36	94	71	124	195	498
Total	561	187	748	276	189	465	285	518	803	2016
Grand Total	1687	665	2352	764	542	1306	877	1656	2533	6191
Approch %	71.7	28.3		58.5	41.5		34.8	65.4		
Total %	27.2	10.7	38	12.3	8.8	21.1	14.2	26.7	40.9	
Motorcycles	0	1	1	1	3	4	0	6	6	11
% Motorcycles	0	0.2	0	0.1	0.6	0.3	0	0.4	0.2	0.2
Cars	1515	601	2116	739	501	1240	863	1508	2371	5727
% Cars	89.8	90.4	90	96.7	92.4	94.9	98.4	91.1	93.6	92.5
Light Goods Vehicles	129	53	182	22	28	50	8	101	109	341
% Light Goods Vehicles	7.6	8	7.7	2.9	5.2	3.8	0.9	6.1	4.3	5.5
Buses	2	0	2	0	0	0	1	1	2	4
% Buses	0.1	0	0.1	0	0	0	0.1	0.1	0.1	0.1
Single-Unit Trucks	38	10	48	2	10	12	5	38	43	103
% Single-Unit Trucks	2.3	1.5	2	0.3	1.8	0.9	0.6	2.3	1.7	1.7
Articulated Trucks	3	0	3	0	0	0	0	2	2	5
% Articulated Trucks	0.2	0	0.1	0	0	0	0	0.1	0.1	0.1

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Start Time	Route 20 From East			Landham Road From South			Route 20 From West			Int. Total
	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	
Peak Hour Analysis From 11:00 AM to 01:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 12:15 PM										
12:15 PM	161	53	214	64	39	103	90	151	241	558
12:30 PM	153	55	208	57	42	99	81	146	227	534
12:45 PM	147	57	204	73	51	124	77	155	232	560
01:00 PM	123	49	172	79	55	134	75	133	208	514
Total Volume	584	214	798	273	187	460	323	585	908	2166
% App. Total	73.2	26.8		59.3	40.7		35.6	64.4		
PHF	.907	.939	.932	.864	.850	.858	.897	.944	.942	.967



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Sudbury
Route 20 and Landham Road
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Start Time	Route 20 From East			Landham Road From South			Route 20 From West			Int. Total
	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	
11:00 AM	137	66	203	85	36	121	74	121	195	519
11:15 AM	129	67	196	64	56	120	58	144	202	518
11:30 AM	113	56	169	60	40	100	71	150	221	490
11:45 AM	128	61	189	55	39	94	67	132	199	482
Total	507	250	757	264	171	435	270	547	817	2009
12:00 PM	139	60	199	29	44	73	71	120	191	463
12:15 PM	157	53	210	64	38	102	89	150	239	551
12:30 PM	147	54	201	57	42	99	79	137	216	516
12:45 PM	141	56	197	72	49	121	77	150	227	545
Total	584	223	807	222	173	395	316	557	873	2075
01:00 PM	122	47	169	79	55	134	75	133	208	511
01:15 PM	145	41	186	77	53	130	59	132	191	507
01:30 PM	132	43	175	62	44	106	80	123	203	484
01:45 PM	154	51	205	58	36	94	71	123	194	493
Total	553	182	735	276	188	464	285	511	796	1995
Grand Total	1644	655	2299	762	532	1294	871	1615	2486	6079
Apprch %	71.5	28.5		58.9	41.1		35	65		
Total %	27	10.8	37.8	12.5	8.8	21.3	14.3	26.6	40.9	
Motorcycles	0	1	1	1	3	4	0	6	6	11
% Motorcycles	0	0.2	0	0.1	0.6	0.3	0	0.4	0.2	0.2
Cars	1515	601	2116	739	501	1240	863	1508	2371	5727
% Cars	92.2	91.8	92	97	94.2	95.8	99.1	93.4	95.4	94.2
Light Goods Vehicles	129	53	182	22	28	50	8	101	109	341
% Light Goods Vehicles	7.8	8.1	7.9	2.9	5.3	3.9	0.9	6.3	4.4	5.6

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Groups Printed- Buses - Unit Trucks - Articulated Trucks

Start Time	Route 20 From East			Landham Road From South			Route 20 From West			Int. Total
	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	
11:00 AM	5	0	5	0	2	2	1	5	6	13
11:15 AM	4	1	5	0	1	1	0	3	3	9
11:30 AM	0	0	0	0	0	0	1	2	3	3
11:45 AM	8	2	10	1	2	3	1	6	7	20
Total	17	3	20	1	5	6	3	16	19	45
12:00 PM	2	0	2	0	1	1	0	3	3	6
12:15 PM	4	0	4	0	1	1	1	1	2	7
12:30 PM	6	1	7	0	0	0	2	9	11	18
12:45 PM	6	1	7	1	2	3	0	5	5	15
Total	18	2	20	1	4	5	3	18	21	46
01:00 PM	1	2	3	0	0	0	0	0	0	3
01:15 PM	3	0	3	0	0	0	0	3	3	6
01:30 PM	1	2	3	0	1	1	0	3	3	7
01:45 PM	3	1	4	0	0	0	0	1	1	5
Total	8	5	13	0	1	1	0	7	7	21
Grand Total	43	10	53	2	10	12	6	41	47	112
Approch %	81.1	18.9		16.7	83.3		12.8	87.2		
Total %	38.4	8.9	47.3	1.8	8.9	10.7	5.4	36.6	42	
Buses	2	0	2	0	0	0	1	1	2	4
% Buses	4.7	0	3.8	0	0	0	16.7	2.4	4.3	3.6
Single-Unit Trucks	38	10	48	2	10	12	5	38	43	103
% Single-Unit Trucks	88.4	100	90.6	100	100	100	83.3	92.7	91.5	92
Articulated Trucks	3	0	3	0	0	0	0	2	2	5
% Articulated Trucks	7	0	5.7	0	0	0	0	4.9	4.3	4.5

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Groups Printed- Bicycles on Road

Start Time	Route 20 From East			Landham Road From South			Route 20 From West			Int. Total
	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	
11:15 AM	0	0	0	0	0	0	1	0	1	1
11:30 AM	0	1	1	4	0	4	0	0	0	5
Total	0	1	1	4	0	4	1	0	1	6
12:15 PM	1	0	1	0	0	0	0	0	0	1
Total	1	0	1	0	0	0	0	0	0	1
Grand Total	1	1	2	4	0	4	1	0	1	7
Apprch %	50	50		100	0		100	0		
Total %	14.3	14.3	28.6	57.1	0	57.1	14.3	0	14.3	

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Groups Printed- Pedestrians

Start Time	From East	From South	From West	Int. Total
	App. Total	App. Total	App. Total	
Grand Total	0	0	0	0
Apprch %				
Total %				

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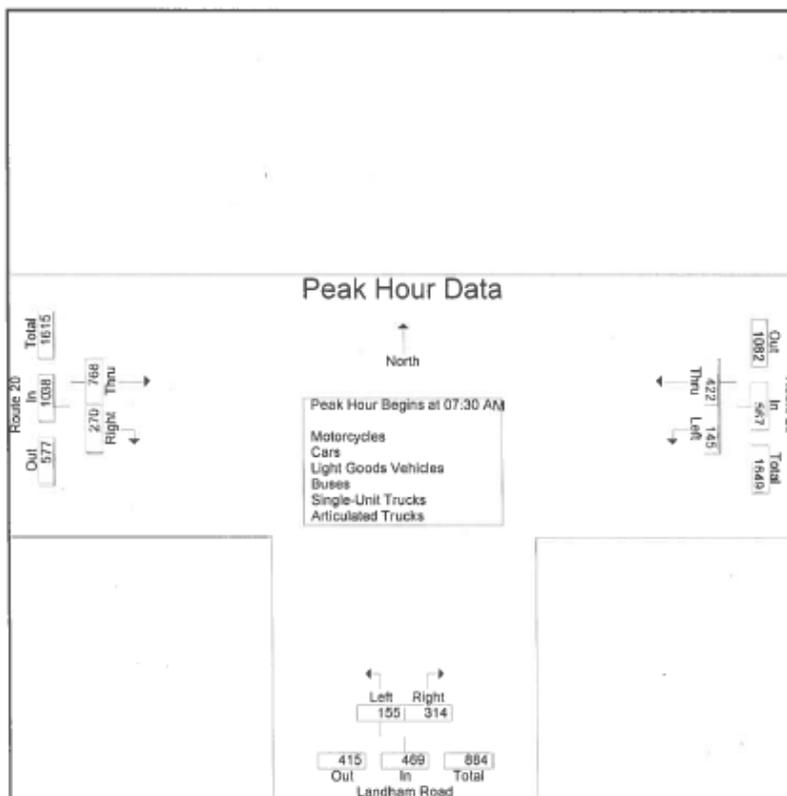
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Groups Printed - Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks										
Start Time	Route 20 From East			Landham Road From South			Route 20 From West			Int. Total
	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	
07:00 AM	90	23	113	69	25	94	43	207	250	457
07:15 AM	103	14	117	70	27	97	51	215	266	480
07:30 AM	113	29	142	96	31	127	54	187	241	510
07:45 AM	101	44	145	71	35	106	67	206	273	524
Total	407	110	517	306	110	424	215	815	1030	1971
08:00 AM	108	43	151	88	39	127	92	180	272	550
08:15 AM	100	29	129	59	50	109	57	195	252	490
08:30 AM	97	28	125	61	37	98	61	179	240	463
08:45 AM	116	29	145	58	31	89	54	183	237	471
Total	421	129	550	266	157	423	264	737	1001	1974
02:00 PM	161	35	196	42	32	74	41	148	189	459
02:15 PM	158	47	205	58	35	93	52	139	191	489
02:30 PM	158	43	201	39	39	78	62	130	192	471
02:45 PM	160	56	216	61	50	111	46	135	181	508
Total	637	181	818	200	156	356	201	552	753	1927
03:00 PM	150	56	206	67	45	112	62	133	195	513
03:15 PM	174	56	230	59	39	98	49	131	180	508
03:30 PM	172	58	230	64	45	109	50	120	170	509
03:45 PM	145	57	202	53	51	104	58	127	185	491
Total	641	227	868	243	180	423	219	511	730	2021
04:00 PM	144	58	202	60	52	112	54	130	184	498
04:15 PM	152	50	202	64	38	102	55	137	192	496
04:30 PM	171	73	244	54	37	91	59	136	195	530
04:45 PM	135	57	192	71	37	108	48	136	184	484
Total	602	238	840	249	164	413	216	539	755	2008
05:00 PM	172	63	235	65	39	104	73	133	206	545
05:15 PM	156	78	234	74	40	114	72	144	216	564
05:30 PM	158	75	233	54	33	87	74	136	210	530
05:45 PM	152	47	199	63	49	112	59	140	199	510
Total	638	263	901	256	161	417	278	553	831	2149
Grand Total	3346	1148	4494	1520	936	2456	1393	3707	5100	12050
Approch %	74.5	25.5		61.9	38.1		27.3	72.7		
Total %	27.8	9.5	37.3	12.0	7.8	20.4	11.6	30.8	42.3	
Motorcycles	3	3	6	1	0	1	0	4	4	11
% Motorcycles	0.1	0.3	0.1	0.1	0	0	0	0.1	0.1	0.1
Cars	2830	989	3819	1391	811	2202	1292	3270	4562	10583
% Cars	84.6	86.1	85	91.5	86.6	89.7	92.7	88.2	89.5	87.8
Light Goods Vehicles	352	120	472	98	96	194	67	300	367	1033
% Light Goods Vehicles	10.5	10.5	10.5	6.4	10.3	7.9	4.8	8.1	7.2	8.6
Buses	4	7	11	12	4	16	7	3	10	37
% Buses	0.1	0.6	0.2	0.8	0.4	0.7	0.5	0.1	0.2	0.3
Single-Unit Trucks	140	29	169	17	22	39	25	115	140	348
% Single-Unit Trucks	4.2	2.5	3.8	1.1	2.4	1.6	1.8	3.1	2.7	2.9
Articulated Trucks	17	0	17	1	3	4	2	15	17	38
% Articulated Trucks	0.5	0	0.4	0.1	0.3	0.2	0.1	0.4	0.3	0.3

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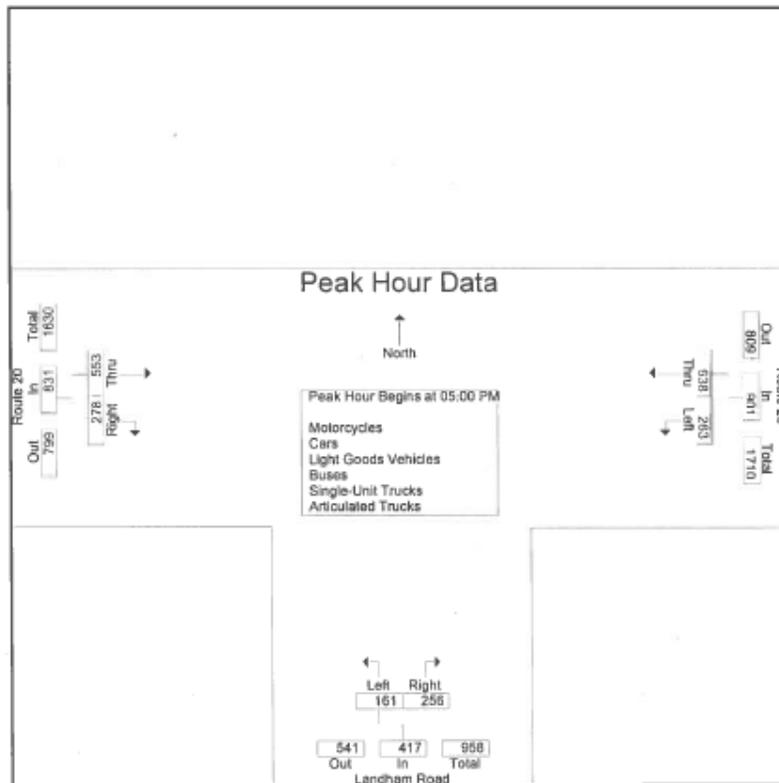
Start Time	Route 20 From East			Landham Road From South			Route 20 From West			Int. Total
	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30 AM										
07:30 AM	113	29	142	96	31	127	54	187	241	510
07:45 AM	101	44	145	71	35	106	67	206	273	524
08:00 AM	108	43	151	88	39	127	92	180	272	550
08:15 AM	100	29	129	89	50	109	57	195	252	490
Total Volume	422	145	567	314	155	469	270	766	1038	2074
% App. Total	74.4	25.6		67	33		26	74		
PHF	.934	.824	.939	.818	.775	.923	.734	.932	.951	.943



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Start Time	Route 20 From East			Landham Road From South			Route 20 From West			Int. Total
	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	172	63	235	65	39	104	73	133	206	545
05:15 PM	156	78	234	74	40	114	72	144	216	564
05:30 PM	158	75	233	54	33	87	74	136	210	530
05:45 PM	152	47	199	63	49	112	59	140	199	510
Total Volume	638	263	901	256	161	417	278	553	831	2149
% App. Total	70.8	29.2		61.4	38.6		33.5	66.5		
PHF	.927	.843	.959	.865	.821	.914	.939	.960	.962	.953



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Groups Printed- Motorcycles - Cars - Light Goods Vehicles

Start Time	Route 20 From East			Landham Road From South			Route 20 From West			Int. Total
	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	
07:00 AM	82	21	103	67	24	91	41	201	242	436
07:15 AM	92	12	104	68	25	93	49	205	254	451
07:30 AM	102	29	131	96	31	127	53	183	236	494
07:45 AM	95	43	138	71	33	104	65	198	263	505
Total	371	105	476	302	113	415	208	787	995	1886
08:00 AM	103	40	143	86	39	125	87	172	259	527
08:15 AM	95	27	122	57	45	102	57	185	242	466
08:30 AM	86	26	112	57	37	94	60	170	230	436
08:45 AM	107	28	135	56	30	86	52	178	230	451
Total	391	121	512	256	151	407	256	705	961	1880
02:00 PM	150	35	185	42	31	73	37	142	179	437
02:15 PM	142	45	187	54	35	89	50	133	183	459
02:30 PM	147	41	188	38	38	76	61	117	178	442
02:45 PM	152	55	207	61	45	106	45	129	174	487
Total	591	176	767	195	149	344	193	521	714	1825
03:00 PM	138	54	192	67	43	110	59	127	186	488
03:15 PM	170	56	226	57	38	95	46	128	174	495
03:30 PM	169	56	225	62	45	107	49	117	186	498
03:45 PM	140	54	194	50	49	99	56	123	179	472
Total	617	220	837	236	175	411	210	495	705	1953
04:00 PM	139	54	193	57	51	108	54	124	178	479
04:15 PM	146	46	192	64	36	100	55	134	189	481
04:30 PM	168	72	240	53	36	89	57	135	192	521
04:45 PM	132	55	187	71	36	107	48	129	177	471
Total	585	227	812	245	159	404	214	522	736	1952
05:00 PM	170	63	233	65	39	104	73	133	206	543
05:15 PM	153	78	231	74	40	114	72	142	214	559
05:30 PM	157	75	232	54	32	86	74	132	206	524
05:45 PM	150	47	197	63	49	112	59	137	196	505
Total	630	263	893	256	160	416	278	544	822	2131
Grand Total	3185	1112	4297	1490	907	2397	1359	3574	4933	11627
Apprch %	74.1	25.9		62.2	37.8		27.5	72.5		
Total %	27.4	9.6	37	12.8	7.8	20.6	11.7	30.7	42.4	
Motorcycles	3	3	6	1	0	1	0	4	4	11
% Motorcycles	0.1	0.3	0.1	0.1	0	0	0	0.1	0.1	0.1
Cars	2830	989	3819	1391	811	2202	1292	3270	4562	10583
% Cars	88.9	88.9	88.9	93.4	89.4	91.9	95.1	91.5	92.5	91
Light Goods Vehicles	352	120	472	98	96	194	67	300	367	1033
% Light Goods Vehicles	11.1	10.8	11	6.6	10.6	8.1	4.9	8.4	7.4	8.9

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Groups Printed- Buses - Unit Trucks - Articulated Trucks

Start Time	Route 20 From East			Landham Road From South			Route 20 From West			Int. Total
	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	
07:00 AM	8	2	10	2	1	3	2	6	8	21
07:15 AM	11	2	13	2	2	4	2	10	12	29
07:30 AM	11	0	11	0	0	0	1	4	5	16
07:45 AM	6	1	7	0	2	2	2	8	10	19
Total	36	5	41	4	5	9	7	28	35	65
08:00 AM	5	3	8	2	0	2	5	8	13	23
08:15 AM	5	2	7	2	5	7	0	10	10	24
08:30 AM	11	2	13	4	0	4	1	9	10	27
08:45 AM	9	1	10	2	1	3	2	5	7	20
Total	30	8	38	10	6	16	8	32	40	94
02:00 PM	11	0	11	0	1	1	4	6	10	22
02:15 PM	16	2	18	4	0	4	2	6	8	30
02:30 PM	11	2	13	1	1	2	1	13	14	29
02:45 PM	8	1	9	0	5	5	1	6	7	21
Total	46	5	51	5	7	12	8	31	39	102
03:00 PM	12	2	14	0	2	2	3	6	9	25
03:15 PM	4	0	4	2	1	3	3	3	6	13
03:30 PM	3	2	5	2	0	2	1	3	4	11
03:45 PM	5	3	8	3	2	5	2	4	6	19
Total	24	7	31	7	5	12	9	16	25	68
04:00 PM	5	4	9	3	1	4	0	6	6	19
04:15 PM	6	4	10	0	2	2	0	3	3	15
04:30 PM	3	1	4	1	1	2	2	1	3	9
04:45 PM	3	2	5	0	1	1	0	7	7	13
Total	17	11	28	4	5	9	2	17	19	56
05:00 PM	2	0	2	0	0	0	0	0	0	2
05:15 PM	3	0	3	0	0	0	0	2	2	5
05:30 PM	1	0	1	0	1	1	0	4	4	6
05:45 PM	2	0	2	0	0	0	0	3	3	5
Total	8	0	8	0	1	1	0	9	9	18
Grand Total	161	36	197	30	29	59	34	133	167	423
Apprch %	81.7	18.3		50.8	49.2		20.4	79.6		
Total %	38.1	8.5	46.6	7.1	6.9	13.9	8	31.4	39.5	
Buses	4	7	11	12	4	16	7	3	10	37
% Buses	2.5	19.4	5.6	40	13.8	27.1	20.6	2.3	6	8.7
Single-Unit Trucks	140	29	169	17	22	39	25	115	140	348
% Single-Unit Trucks	87	80.6	85.8	56.7	75.9	66.1	73.5	86.5	83.8	82.3
Articulated Trucks	17	0	17	1	3	4	2	15	17	38
% Articulated Trucks	10.6	0	8.6	3.3	10.3	6.8	5.9	11.3	10.2	9

*Massachusetts Department of Transportation
Highway Division*

Sudbury
Route 20 and Landham Road
Counted by Miovision
S14-029

File Name : S14-029 Sudbury
Site Code : 169190
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Groups Printed- Bicycles on Road

Start Time	Route 20 From East			Landham Road From South			Route 20 From West			Int. Total
	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	
07:30 AM	0	0	0	0	0	0	0	1	1	1
Total	0	0	0	0	0	0	0	1	1	1
08:45 AM	0	1	1	0	0	0	0	0	0	1
Total	0	1	1	0	0	0	0	0	0	1
02:45 PM	0	0	0	1	0	1	1	0	1	2
Total	0	0	0	1	0	1	1	0	1	2
03:15 PM	0	0	0	1	0	1	0	0	0	1
Total	0	0	0	1	0	1	0	0	0	1
04:45 PM	0	0	0	0	0	0	0	1	1	1
Total	0	0	0	0	0	0	0	1	1	1
05:15 PM	1	0	1	0	0	0	0	0	0	1
05:30 PM	0	0	0	0	0	0	0	1	1	1
05:45 PM	1	0	1	0	0	0	0	0	0	1
Total	2	0	2	0	0	0	0	1	1	3
Grand Total	2	1	3	2	0	2	1	3	4	9
Approch %	66.7	33.3		100	0		25	75		
Total %	22.2	11.1	33.3	22.2	0	22.2	11.1	33.3	44.4	

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Sudbury
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Groups Printed- Pedestrians

Start Time	From East App. Total	From South App. Total	From West App. Total	Int. Total
Grand Total	0	0	0	0
Apprch %				
Total %				