

MEMORANDUM

DATE: January 6, 2016

TO: Ms. Karen Galligan
Town of Southborough DPW
147 Cordaville Road
Southborough, MA

FROM: Robert J. Michaud, P.E. – Managing Principal
Daniel A. Dumais, P.E. – Senior Project Manager

RE: **Preliminary Truck Exclusion Evaluation – Deerfoot Road**
Southborough, Massachusetts



MDM Transportation Consultants, Inc. (MDM) has conducted a preliminary evaluation of existing/baseline data to support a Heavy Commercial Vehicle Exclusion (HCVE) for the Deerfoot Road corridor north of Route 9 in Southborough, Massachusetts. Massachusetts General Laws (MGL) Chapter 85 Section 2 establishes the authority of the MassDOT to approve certain traffic regulations and standards for roadways in the Commonwealth including but not limited to HCVE's¹. This initial evaluation concludes that baseline traffic data collected in December 2016 fall below applicable warrants and criteria for establishing a HCVE under Section 10A-9 of the Massachusetts Amendments to the 2009 Manual on Uniform Traffic Control Devices (MUTCD) and the Standard Municipal Traffic Code.

Key aspects of the HCVE study include the following data and exhibits which are expanded upon throughout this study:

- *Traffic Counts:* 24-hour consecutive weekday count of all vehicles using Deerfoot Road (3 locations), broken down by 15-minute interval and by vehicle classification.
- *Area Map:* An orthophoto/MassGIS area map, **Figure 1**, delineates the excluded street, Deerfoot Road between Route 9 and Route 30, in red and the alternate route in green, Cordaville Road (Route 85).

¹ The official standards of MassDOT are documented in the Massachusetts Amendments to the 2009 Manual on Uniform Traffic Control Devices and the Standard Municipal Traffic Code and addenda.

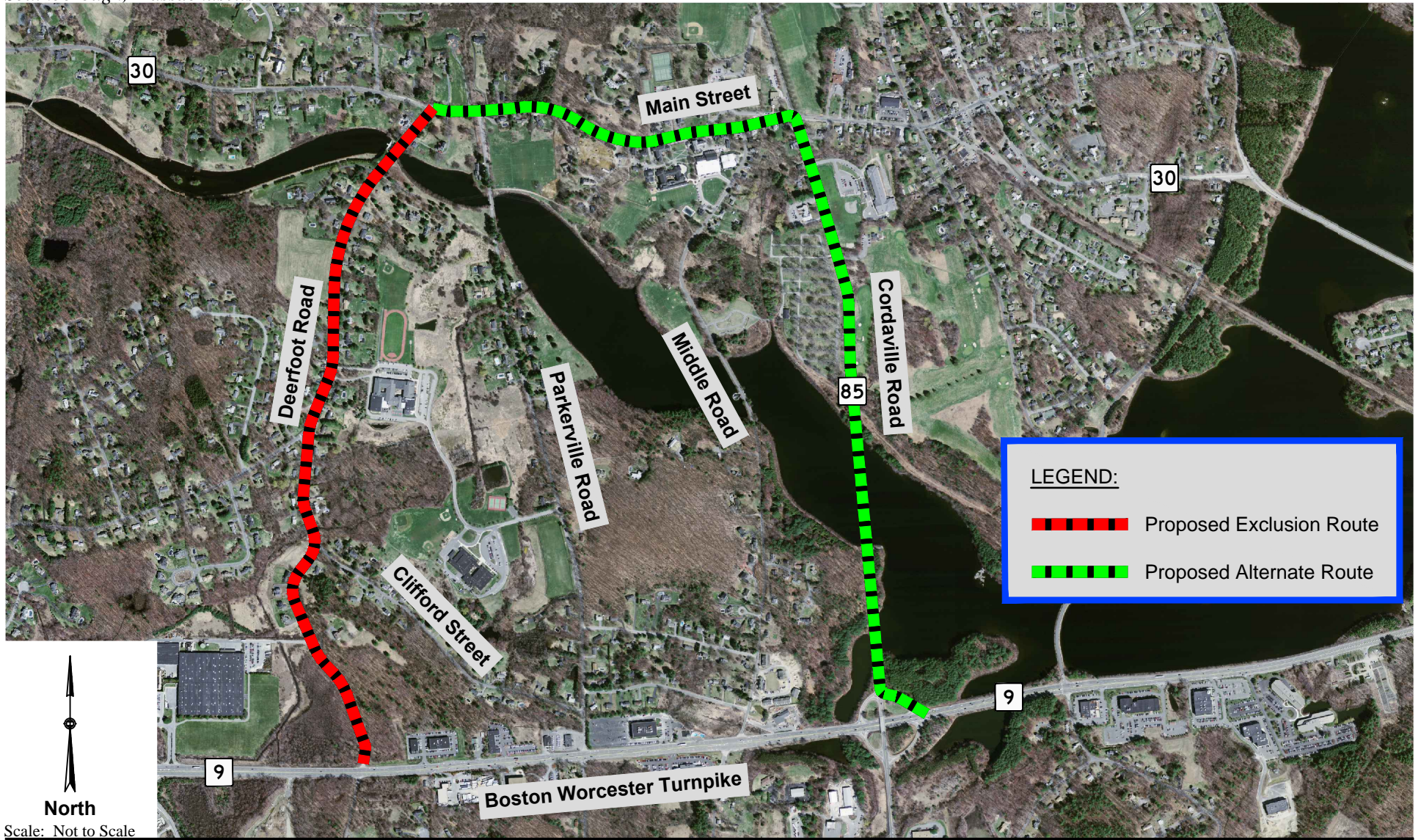


Figure 1

- *Traffic Volume Histogram*: Histogram exhibits (**Figure 2, Figure 3, and Figure 4**) that plots recorded vehicle activity for three (3) locations along Deerfoot Road for a 24-hour consecutive period in 30-minute increments by vehicle classification. Note that commercial vehicles with a carrying capacity of over 2-1/2 tons are specifically identified and separate from school buses for the corridor².

MDM has reviewed the alternate route to using Deerfoot Road between Route 30 and Route 9 via Route 85 (Cordaville Road) and deem this alternate route as appropriately designed for heavy commercial vehicles. A HCVE along Deerfoot Road would represent a modest traffic shift that will not present a material impact to traffic activity on the affected public roadways. However, review of the traffic data and HCVE warrant criteria indicates that Deerfoot Road between Route 9 and Route 30 generally does not satisfy warrants outlined by MassDOT for truck exclusion. This finding is based on the limited number of heavy commercial vehicles currently using the roadway which account for less than 3 percent of daily traffic and/or range from 20 to 49 daily trips and the lack of nighttime truck activity.

Existing Traffic Characteristics

An overview of existing roadway conditions, traffic volumes along Deerfoot Road is provided below.

Deerfoot Road

Deerfoot Road is classified by the Massachusetts Department of Transportation (MassDOT) as an urban collector roadway under local (Town) jurisdiction in Southborough, Massachusetts. Deerfoot Road includes one travel lane in each direction and is a 1.2-mile stretch of road connecting Main Street (Route 30) to the north and Boston Worcester Turnpike (Route 9) to the south. The roadway is approximately 18 feet wide between Route 9 and Clifford Street, 19 feet wide between Clifford Street and Flagg Road, and 24 feet wide between Flagg Road and Route 30. The pavement is generally in good condition with no marked centerline or edge lines. The regulatory speed limit along Deerfoot Road is 25 mph with a 20-mph school zone located near the driveway for the Neary Elementary School and Trottier Middle School. There are no sidewalks along Deerfoot Road. Land uses along Deerfoot Road include two schools, residential homes, the Sudbury Reservoir, the Southborough Veterinary Hospital and a warehouse building (Barrett Distribution Center).

² School buses are specifically excluded from consideration of a HCVE under under Section 10A-9 of the Massachusetts Amendments to the 2009 Manual on Uniform Traffic Control Devices (MUTCD) and the Standard Municipal Traffic Code.

Daily Traffic Volumes

Daily traffic volume data was collected using video traffic recorder devices along Deerfoot Road on a typical weekday (24 hours) on Tuesday, November 22, 2016. The counts were broken down by 15-minute interval and by vehicle classification. The counts were performed at three (3) locations along Deerfoot Road; to the north near Main Street (Route 30), between Clifford Street and Flagg Road and to the south between Clifford Street and Route 9 and the results can be found summarized in **Table 1**.

**TABLE 1
EXISTING TRAFFIC VOLUME SUMMARY – DEERFOOT ROAD**

Time Period	Daily	Percent	Peak Hour	Peak Flow	Peak Hour
	Volume (vpd) ¹	Daily Traffic ²	Volume (vph) ³	Direction ⁴	Directional Volume (vph)
<i>Northern Section: South of Route 30</i>					
Weekday Morning Peak Hour	1,740	13%	224	59% SB	133
Weekday Evening Peak Hour	1,740	10%	179	60% NB	107
<i>Central Section: Between Clifford Street and Flagg Road</i>					
Weekday Morning Peak Hour	720	8%	59	54% SB	32
Weekday Evening Peak Hour	720	13%	96	76% NB	73
<i>Southern Section: Between Clifford Street and Route 9</i>					
Weekday Morning Peak Hour	400	7%	26	50% SB	13
Weekday Evening Peak Hour	400	14%	55	61% NB	34

¹Two-way daily traffic expressed in vehicles per day without seasonal adjustment.

²The percent of daily traffic that occurs during the peak hour.

³Two-way peak-hour volume expressed in vehicles per hour.

⁴NB = Northbound, SB = Southbound

As summarized in **Table 1**:

- *Northern Section: South of Route 30.* The weekday daily traffic volume on this section of Deerfoot Road is the highest out of any section with approximately 1,740 vehicles per day (vpd) on a weekday with peak hour traffic flow ranging from 179 to 224 vehicles per hour (vph) representing 10 to 13 percent of daily traffic flow. Vehicle flow is skewed in the southbound direction during the weekday morning peak hour and skewed in the northbound direction during the weekday evening peak hour.
- *Central Section: Between Clifford Street and Flagg Road.* The weekday daily traffic volume on this section of Deerfoot Road is approximately 720 vehicles per day (vpd) on a weekday with peak hour traffic flow ranging from 59 to 96 vehicles per hour (vph) representing 8 to 13 percent of daily traffic flow. Vehicle flow is skewed in the southbound direction during the weekday morning peak hour and heavily skewed in the northbound direction during the weekday evening peak hour.

- *Southern Section: Between Clifford Street and Route 9.* The weekday daily traffic volume on this section of Deerfoot Road is the lowest out of any section with approximately 400 vehicles per day (vpd) on a weekday with peak hour traffic flow ranging from 26 to 55 vehicles per hour (vph) representing 7 to 14 percent of daily traffic flow. Vehicle flow is evenly split during the weekday morning peak hour and heavily skewed in the northbound direction during the weekday evening peak hour.

Traffic Volume Histograms

The daily traffic count data outlined above has been used to create hourly histograms which have been broken down by vehicle classification. Specifically, the graphs include a breakdown of standard passenger vehicles, school buses and heavy vehicles (commercial vehicles with a carrying capacity of over 2-1/2 tons) and are provided in **Figure 2**, **Figure 3**, and **Figure 4** for the three survey locations along Deerfoot Road.

As shown in **Figure 2**, **Figure 3** and **Figure 4**:

- *Heavy Vehicles.* Daily heavy commercial vehicle use along Deerfoot Road ranges from 49 trucks north of Flagg Road, and 20 to 25 trucks between Route 9 and Flagg Road. The heavy vehicles include only medium trucks with no articulated tractor trailer trucks identified in the count. Heavy vehicle activity was generally observed to occur between 6:30 am and 3:30 pm. Heavy vehicle activity represents less than 3% of the total trip activity along Deerfoot Road and/or indicate modest activity levels that generally range from 1 to 3 trucks per hour during daytime periods.
- *School Buses.* School bus activity was observed along Deerfoot Road between 6:00 am and 9:00am for school drop-off and between 2:00 pm and 4:00 pm for school pick-up activity. In total, between 7 and 14 bus trips were observed along Deerfoot Road. The bus traffic represented approximately 2% of the total trip activity along Deerfoot Road.

Observed Travel Speeds

Vehicle speeds were obtained for the northbound and southbound travel directions on Deerfoot Road to the south of Route 30 in November 2016 using an ATR machine equipped with speed radar. **Table 2** summarizes the average and 85th percentile speeds for the location. Detailed speed data is provided in the **Attachments**.

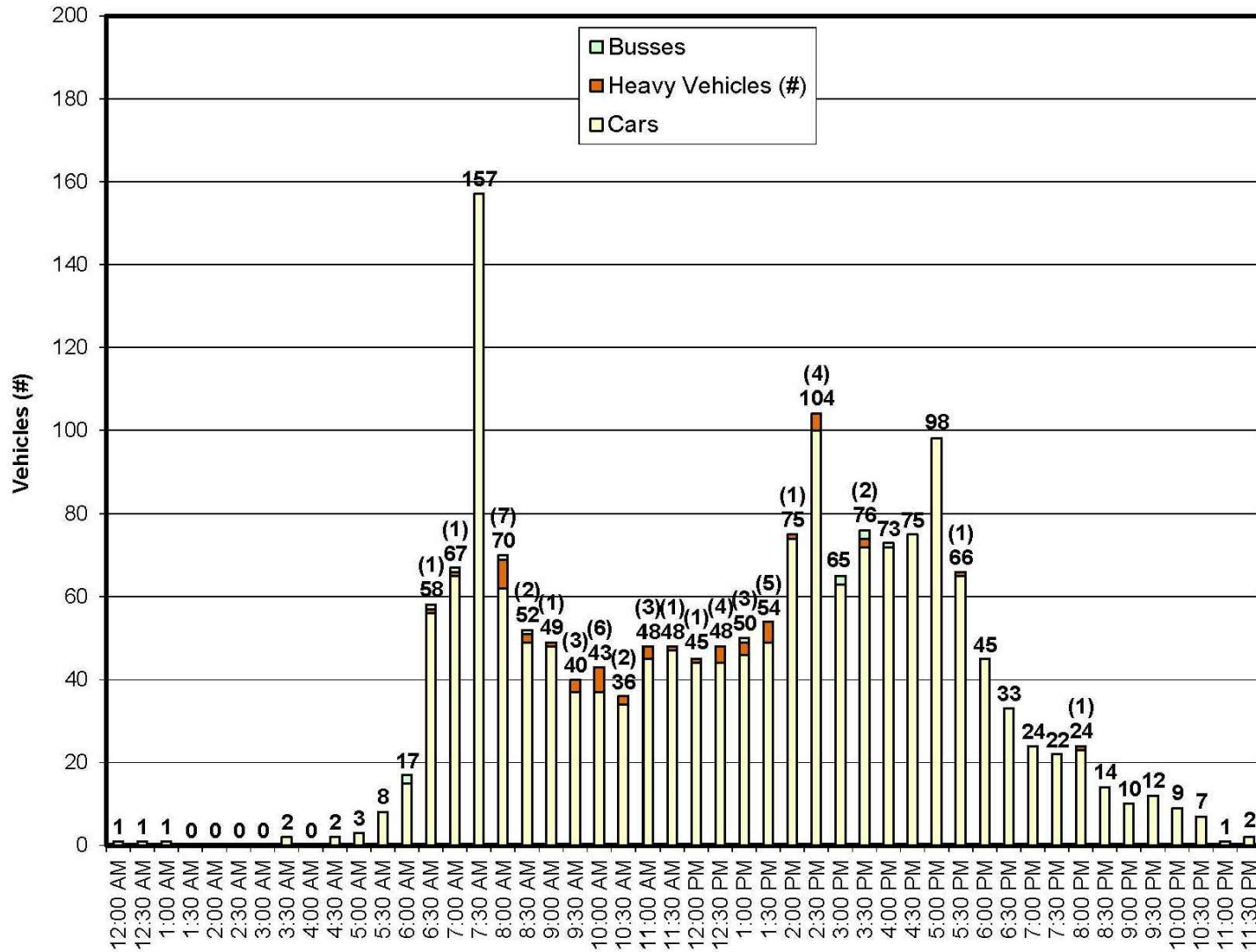


Figure 2

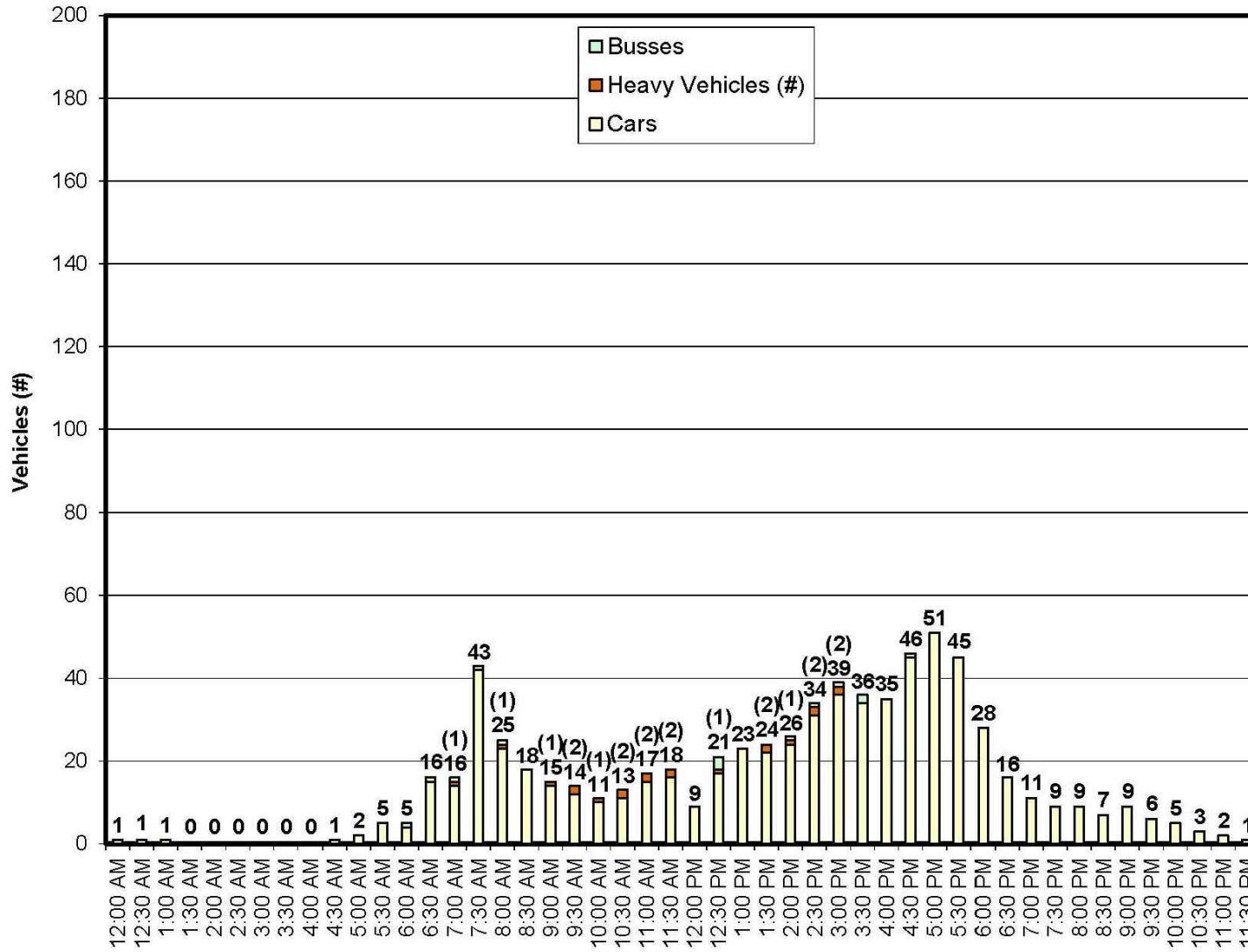


Figure 3

**Deerfoot Road Traffic Volumes
 (Between Flagg Road & Clifford Street)**

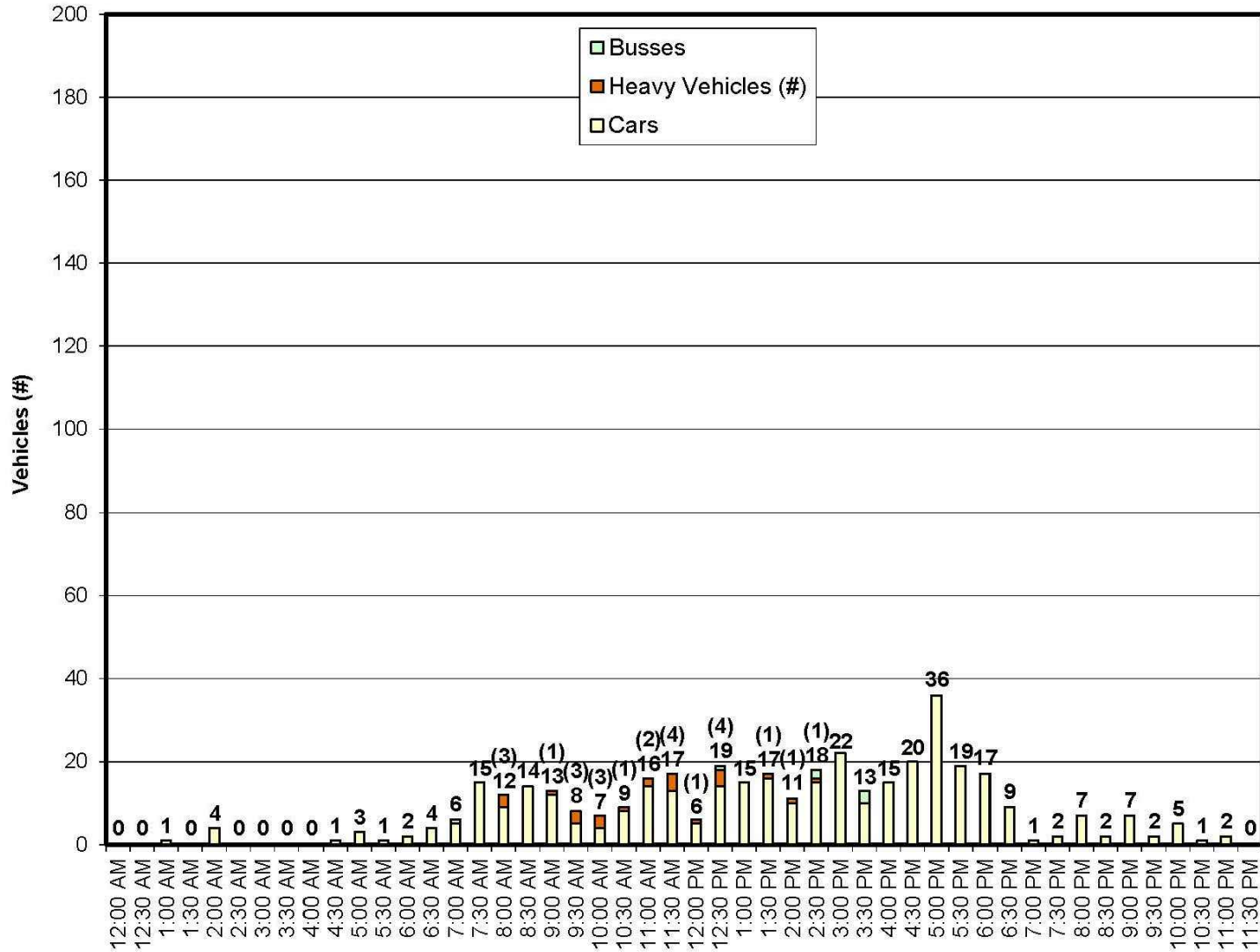


Figure 4

TABLE 2
SPEED STUDY RESULTS – DEERFOOT ROAD

Travel Direction	Posted Speed Limit	Travel Speed	
		Average ¹	85 th Percentile ²
Northbound	25	33	37
Southbound	25	31	36

¹ Arithmetic Mean.

² The speed at or below which 85 percent of the vehicles are traveling.

As summarized in **Table 2**, the mean (average) travel speed on Deerfoot Road in the study area is 33 mph traveling northbound and 31 mph traveling southbound. The 85th percentile travel speed was observed to be 37 mph and 36 mph in the northern and southern travel directions, respectively. The observed travel speeds are considerably higher than the posted (regulatory) speed limit of 25 mph on Deerfoot Road.

Alternative Commercial Vehicle Route (Via Route 85)

The alternative travel route was reviewed to ensure that, if selected, it can reasonably accommodate the burden of additional truck traffic. MDM has conducted a field review of the alternative truck route to verify existing pavement conditions, traffic controls, pavement markings, pavement widths, signs, posted/regulatory travel speeds, and land uses. As outlined by the Massachusetts Amendments to the 2009 MUTCD:

“A truck exclusion from a municipality way may be authorized provided a suitable alternative route is available. The alternative route shall have an effective width and pavement structure which can safely accommodate the additional truck traffic. In addition, the alternative route must meet one of the following conditions:

- (1) Lie wholly within the community making application,
- (2) Lie partially in an adjacent community but only on State Highway, or
- (3) Lie partially in an adjacent community but have the adjacent community’s written approval.

Numbered routes are ineligible for heavy commercial vehicle exclusions, per the Board of Commissioners, November 22, 1995.”

Cordaville Road (Route 85)

Cordaville Road between Route 9 and Route 30 is classified by the Massachusetts Department of Transportation (MassDOT) as an urban minor arterial roadway under both local (Town) and MassDOT jurisdiction and is located fully within the Town of Southborough, Massachusetts. The section of Cordaville Road within the study area includes one travel lane in each direction

and is a 1.0-mile stretch of road connecting Main Street (Route 30) to the north and Boston Worcester Turnpike (Route 9) to the south. Signs are posted on both the northbound and southbound approach to Route 30 indicating an existing truck exclusion along Route 30. The roadway is approximately 30 feet wide along its entire length and the pavement is generally in good condition. Pavement markings include a double yellow centerline and white edge lines. The regulatory speed limit along Cordaville Road varies between is 25 mph and 40 mph with a 20 mph school zone located near the Woodward School. Land uses along Cordaville Road include several residential homes near Route 30, athletic fields, the Woodward School, a Senior Center/ Town Offices, the Sudbury Reservoir, and the Southborough Rural Cemetery.

Upon review, Cordaville Road is a suitable alternative route that lies wholly within the Town of Southborough and has an effective width and pavement structure which can safely accommodate the additional truck traffic.

HCVE Warrants

As outlined by the Massachusetts Amendments to the 2009 MUTCD:

“...one or more of the following may be sufficient justification for truck exclusion:

1. Warrants
 - A. A volume of heavy commercial vehicles, which usually is in the range of five (5) to eight (8) percent, reduces the utilization of the facility and is cause for a substantial reduction in capacity or safety.
 - B. The condition of the pavement structure of the route to be excluded indicates that further repeated heavy wheel loads will result in severe deterioration of the roadway. (subject to Department review).
 - C. Notwithstanding the foregoing, in certain instances where land use is primarily residential in nature and a municipality has requested exclusion only during hours of darkness, a specific night exclusion may be granted.”

A review of the typical HCVE warrants indicates that Deerfoot Road between Route 9 and Route 30 generally does NOT satisfy applicable warrants for a truck exclusion based on the following:

- *HCVE Vehicles.* Forty-nine (49) heavy vehicles use Deerfoot Road north of Trotier School on a daily basis which represents less than 3 percent of the total trip activity (1,740 adt). Likewise, heavy commercial vehicles total twenty (20) per day along the central portion of Deerfoot Road representing less than 3 percent of all daily trips (720 adt). The portion of Deerfoot Road just north of Route 9 to Clifford Street carries 25

daily truck trips which is considered a modest level of activity with hourly activity ranging from 1 to 3 trucks, all of which occurs between 8 AM and 3 PM.

- *Adequate Pavement Structure.* A field review of the pavement condition along Deerfoot Road indicated that the roadway is in good condition with no significant rutting due to heavy vehicle use. The roadway provides access to two schools and thus school buses which are exempt from any HCVE exclusions are prevalent during school drop-off/pick-up periods. The roadway generally includes rolling terrain with both vertical and horizontal curves and a narrow pavement width along portions of the roadway (particularly south of Flagg Road), which is not ideal for heavy vehicle travel but is not expected to materially impact safety and/or contribute to substantial roadway deterioration.

- *Nighttime Exclusion Not Warranted.* The heavy vehicle activity was generally observed to occur between 6:30 am and 6:00 pm (or earlier); therefore, an overnight exclusion would not currently be warranted or beneficial.

Conclusions

Review of traffic data and comparison to HCVE warrants indicates that Deerfoot Road between Route 9 and Route 30 does not generally satisfy warrants outlined by MassDOT for truck exclusion. This finding is based on the limited number and types of heavy commercial vehicles currently using the roadway which comprise medium box trucks, service vehicles and utility trucks, adequate pavement structure and lack of overnight truck activity.