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MEMORANDUM

DATE: December 17, 2018

TO: Mr. Douglas Hartnett, P.E.
Highpoint Engineering
Canton Corporate Place
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Canton, MA 02021

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

RE: **Proposed Mixed-Use Residential/Retail Project**
186 Bedford Street – Lexington, MA

MDM Transportation Consultants, Inc. (MDM) has prepared this initial transportation impact assessment (TIA) for the proposed mixed-use residential/retail project to be located at 186 Bedford Street in Lexington, Massachusetts. The location of the site relative to adjacent roadways is shown in **Figure 1**. This memorandum describes baseline traffic volumes and travel speeds for Bedford Street, evaluates sight lines to/from the site driveway, estimates trip generation characteristics of the proposed development, quantifies incremental traffic increases of the Site development on the adjacent roadways, and evaluates safety-related conditions at key study locations that provide access to the Site.

Key findings of the traffic assessment are as follows:

- *Traffic Volumes*. Bedford Street to the south of Sunny Knoll Avenue carries approximately 15,626 vehicles per day (vpd) on weekdays. Peak hour traffic flow on Bedford Street is approximately 7 to 8 percent of the daily flow with directional flow skewed southbound during both the weekday morning and weekday evening peak traffic hours. These travel patterns are consistent with commuter travel patterns given the location of I-95 to the north and Lexington Center and Route 2 to the south.

- *Measured Travel Speeds*. The posted (regulatory) travel speeds along Bedford Street in the immediate project area are 30 mph northbound and 35 mph southbound. The observed 85th percentile travel speeds were 37 mph in both the northbound and southbound directions. The regulatory and observed travel speeds provide an appropriate basis for determining driveway sight lines based on sight line criteria published by AASHTO.

- *Safety Characteristics*. A review of the crash data indicated that no immediate safety countermeasures are warranted based on the crash history at the study intersections. The available sight lines looking north and south onto Bedford Street from the proposed site driveways will meet the minimum recommended sight line requirements from AASHTO.

- *Modest Trip Generation*. Based on ITE trip generation rates, the proposed development is estimated to generate approximately 15 vehicle trips during the weekday morning peak hour and 40 vehicle trips during the weekday evening peak hour. On a daily basis the project is estimated to generate approximately 400 trips with half entering and half exiting over a 24-hour period. When compared to historical uses of the property, the project is expected to generate a net increase of 9 vehicle trips or less during peak hours. This represents a modest net traffic increase in traffic activity relative to historic site use (approximately 1 additional vehicle trip every six minutes) which will not materially impact traffic flow on area roadways.

- *Adequate Roadway Capacity*. Away from the site driveway the project will result in less than 1-percent change in traffic volumes at the study intersections during the weekday morning peak hour and less than 2-percent change in traffic volumes at the study intersections during the weekday evening peak hour. Relative traffic increases for the proposed project represents an inconsequential change in area roadway volumes - a level of change that falls well within normal day-to-day fluctuations in traffic entering and exiting the intersections and is immaterial to traffic operations along Bedford Street.

In summary, trip generation for the development is projected to be modest. MDM finds that incremental traffic associated with the proposed development is not expected to materially impact operating conditions at the study intersections. The study intersections exhibit below-average crash rates based on historic crash data; safety countermeasures are therefore not warranted. Likewise, the available sight lines at the Site Driveway intersections with Bedford Street exceed the recommended sight line requirements from AASHTO. Implementation of access/egress improvements, proposed pedestrian, and bicycle improvements along with a Transportation Demand Management (TDM) program will establish a framework of minimizing Site traffic impacts by encouraging non-motorized travel modes and pedestrian/bicycle accommodation that is compatible with other projects in the area.

PROJECT DESCRIPTION

The existing Site consists of approximately 1.36± acres of land located at 186 Bedford Street which includes a former 7,500 square foot (sf) Clinic building, barn, and parking lot. Access is currently provided via two driveways along Bedford Street. Under the proposed mixed-use site programming, the existing clinic building will be expanded and converted to 13 apartments; 6,450± sf of first floor retail space, 1,900± sf of Salon space, and the barn will be retained and converted to 1,500 sf of office space. A 49± space shared parking lot will be constructed to accommodate the site uses. The proposed access/egress will remain via two full-access/egress driveways along Bedford Street. A preliminary site plan prepared by Highpoint Engineering, Inc. is presented in **Figure 2**.

EXISTING TRAFFIC & SAFETY CHARACTERISTICS

An overview of existing roadway conditions, traffic volumes, and safety characteristics is provided below.

Bedford Street

Bedford Street is classified as an urban principal arterial roadway by the Massachusetts Department of Transportation (MassDOT) that runs in a north-south direction under State (MassDOT) jurisdiction to the north of Vaille Avenue and under Town jurisdiction south of Vaille Avenue In the immediate study area, Bedford Street provides a single travel lane in each direction with dedicated bicycle lanes. Bedford Street provides a connection between I-95 to the north and Massachusetts Avenue to the south. The posted (regulatory) speed limit on Bedford Street is 30 miles per hour (mph) in the northbound direction and 35 mph in the southbound direction. Sidewalks and bike lanes are provided along both sides of Bedford Street. Land uses along Bedford Street include residential homes, the Lexington Fire Department, Lexington Public Works Department, Alexander's Pizza, a Salon and Knight of Columbus.

Baseline Traffic Data

Peak Hour Traffic

Traffic volume data was collected in February 2018 during the weekday morning (7:00 – 9:00 AM) and weekday evening (4:00 – 6:00 PM) peak periods. Review of MassDOT permanent count station data indicates that February is a below average traffic month (approximately 7 percent below average month conditions). Thus, the traffic counts were adjusted by 7% (increase) to represent average conditions. The resulting Baseline weekday morning and weekday evening peak-hour traffic volumes for the study intersections are depicted in **Figure 3** and **Figure 4**. Turning movement counts and permanent count station data are provided in the **Attachments**.

Daily Traffic Counts

Daily traffic volumes along Bedford Street to the south of Sunny Knoll Avenue were collected in February 2018 using an automatic traffic recorder (ATR) device with results summarized in **Table 1**.

TABLE 1
BASELINE TRAFFIC VOLUME SUMMARY
BEDFORD STREET JUST SOUTH OF SUNNY KNOLL AVENUE

Time Period	Daily Volume (vpd)[1]	Percent Daily Traffic[2]	Peak Hour Volume (vph)[3]	Peak Flow Direction[4]	Peak Hour Directional Volume (vph)
Weekday Morning Peak Hour	15,626	7%	1,125	61% SB	689
Weekday Evening Peak Hour	15,626	8%	1,261	52% SB	652

[1]Two-way daily traffic expressed in vehicles per day without seasonal adjustment.
[2]The percent of daily traffic that occurs during the peak hour.
[3]Two-way peak-hour volume expressed in vehicles per hour.
[4]NB = Northbound, SB = Southbound

As summarized in **Table 1**, Bedford Street to the south of Sunny Knoll Avenue carries approximately 15,626 vehicles per day (vpd) on weekdays. Peak hour traffic flow on Bedford Street is approximately 7 to 8 percent of the daily flow with directional flow skewed southbound during both the weekday morning and weekday evening peak traffic hours. These travel patterns are consistent with commuter travel patterns given the location of I-95 to the north and Lexington Center and Route 2 to the south.

Observed Travel Speeds

Vehicle speeds were obtained for the northbound and southbound travel directions on Bedford Street to the south of Sunny Knoll Avenue in February 2018 using an ATR machine equipped with speed radar. **Table 2** summarizes the average and 85th percentile speeds for the locations and time period studied. Speed data is provided in the **Attachments**.

TABLE 2
SPEED STUDY RESULTS – BEDFORD STREET

Travel Direction	Regulatory Speed Limit[1]	Travel Speed	
		Mean[2]	85th Percentile[3]
Northbound	30	31	37
Southbound	35	32	37

[1] Regulatory Speed limit in miles per hour (mph).
[2] Arithmetic mean
[3] The speed at or below which 85 percent of the vehicles are traveling

As summarized in **Table 2**, the mean (average) travel speed on Bedford Street traveling is 31 mph in the northbound direction and 32 mph in the southbound direction. The 85th percentile travel speed is 37 mph in both the northbound and southbound directions. The speed study results indicate that the observed travel speeds are slightly higher than the regulatory speed limit of 30 mph in the northbound direction along Bedford Street and slightly lower than the regulatory speed limit of 35 mph in southbound direction along Bedford Street in the immediate project area. The speed data sets the basis for the sight line evaluation presented in the following section.

Intersection Crash History

In order to identify crash trends and safety characteristics for study area intersections, crash data were obtained from MassDOT for the Town of Lexington for the three-year period 2014 through 2016 (the most recent data currently available from MassDOT). Crash data for the study intersections is summarized in **Table 3** with detailed data provided in the **Attachments.**

Crash rates were determined for each study area intersection. These rates quantify the number of crashes per million entering vehicles. MassDOT has determined the crash rates within the District 4 area (which includes the Town of Lexington) to be 0.57 for unsignalized intersections and 0.75 for signalized intersections. These rates represent MassDOT's "average" crash experience for District 4 communities and serve as a basis for comparing reported crash rates for study area intersections located within the district.

TABLE 3
INTERSECTION CRASH SUMMARY – 2014 THROUGH 2016[1]

	INTERSECTION		
Data Category	**Bedford Street at 189 Bedford Street Driveway**	**Bedford Street at Sunny Knoll Avenue/ Public Works Driveway**	**Bedford Street At Reed Street/ Larchmont Lane**
Traffic Control	UnsSignalized	Unsignalized	Unsignalized
Crash Rate[2]	**0.06**	**0.16**	**0.25**
MHD Dist. 4 Avg[2]	0.57	0.57	0.57
Year:			
2014	0	1	3
2015	1	1	2
2016	0	1	0
Total	1	3	5
Type:			
Angle	0	2	3
Rear-End	1	1	2
Head-On	0	0	0
Single-Vehicle	0	0	0
Sideswipe	0	0	0
Unknown/Other	0	0	0
Severity:			
P. Damage Only	1	3	3
Personal Injury	0	0	2
Fatality	0	0	0
Conditions:			
Dry	1	1	4
Wet	0	2	1
Snow	0	0	0
Unknown/Other	0	0	0
Time:			
7:00 to 9:00 AM	0	1	1
4:00 to 6:00 PM	0	0	0
Rest of Day	1	2	4

[1]Source: MassDOT Accident Database
[2]Crashes per million entering vehicles (MEV)
[3]District 4 Average Crash Rate

As summarized in **Table 3**:

- *Bedford Street at 189 Bedford Street Driveway.* There was one (1) crash reported at the intersection during the three-year study period resulting crash rate of 0.06. The crash involved a rear-end type collision resulting in property damage. The collision occurred under dry roadway conditions, outside of the peak travel times, and no pedestrians were involved.

- *Bedford Street at Sunny Knoll Avenue/Public Works Driveway.* There are a total of three (3) crashes reported at the intersection during the three-year study period resulting crash rate of 0.17. The crashes involved one (1) rear-end type collision and two (2) angle type collisions. All of the crashes resulted in property damage type collisions. Two of the collisions occurred under wet or snow roadway conditions. One of the collisions occurred during the weekday morning peak travel times and no pedestrians were involved.

- *Bedford Street at Reed Street/ Larchmont Lane.* There are a total of five (5) crashes reported at the intersection during the three-year study period resulting crash rate of 0.27. The crashes involved three (3) angle type collisions and two (2) rear-end type collisions. Sixty-percent (60%) resulted in property damage type collisions. One of the collisions occurred under wet or snow roadway conditions. One of the collisions occurred during the weekday morning peak travel times and no pedestrians were involved.

In summary, the study intersections experienced crash rates below the District 4 average and no immediate safety countermeasures are warranted based on the crash history at the study intersection.

Alternative Transportation

The Massachusetts Bay Transportation Authority (MBTA) operates in the area, the Town of Lexington operates a bus service in the area, and the Minuteman Commuter Bikeway is located just north of the Site. These services in Lexington allowing for alternative access/egress to and from the site. Specific route and schedule information is provided in the **Attachments**.

- *Minuteman Commuter Bikeway:* A mixed-use path known as the Minuteman Commuter Bikeway is located less than ¼ mile north of the Site with a signalized crossing of Bedford Street. Bike lanes are provided along Bedford Street between the site and the bikeway.

- *Lexpress Route 4:* This line is operated by the Town of Lexington's LEXPRESS bus line and provides service between the Depot Square in Lexington and Hayden Avenue via Spring Street and Bedford Street with a stop in the immediate area at Reed Street. Service is provided every hour during peak periods on weekdays.

- *MBTA Routes 62/76:* This line is operated by the MBTA and provides service among Alewife Station, Bedford V.A. Hospital, and Hanscom Air Force Base in Bedford. Service is provided via Lexington Center where passengers can transfer to/from the LexPress bus service. Service is provided every 10 to 15 minutes during the weekday morning peak period and every 15 minutes during the weekday evening peak period with a stop in the immediate area at Vaille Avenue.

In summary, several public transportation options are currently available that serve the site and immediate study area which provide connections to Lexington Center and the Alewife MBTA Station.

Sight Line Evaluation

An evaluation of sight lines was conducted to ensure that minimum recommended sight lines are available at the site driveway intersections with Bedford Street. The evaluation documents sight lines under proposed conditions for vehicles as they relate to these roadways with comparison to recommended guidelines.

The American Association of State Highway and Transportation Officials' (AASHTO) standards[1] reference two types of sight distance which are relevant at the site driveway intersections: stopping sight distance (SSD) and intersection sight distance (ISD). Sight lines for critical vehicle movements at the site driveway intersections along Bedford Street were compared to minimum SSD and ISD recommendations for the regulatory and observed travel speeds in the area.

Stopping Sight Distance

Sight distance is the length of roadway visible to the motorist to a fixed object. The minimum sight distance available on a roadway should be sufficiently long enough to enable a below-average operator, traveling at or near the design speed limit, to stop safely before reaching a stationary object in its path, in this case, a vehicle exiting onto Bedford Street. The SSD criteria are defined by AASHTO based on design and operating speeds, anticipated driver behavior and vehicle performance, as well as physical roadway conditions. SSD includes the length of roadway traveled during the perception and reaction time of a driver to an object, and the distance traveled during brake application on wet level pavement. Adjustment factors are applied to account for roadway grades when applicable.

[1] *A policy on Geometric Design of Highways and Streets*, American Association of State Highway and Transportation Officials (AASHTO), 2011.

SSD was estimated in the field using AASHTO standards for driver's eye (3.5 feet) and object height equivalent to the taillight height of a passenger car (2.0 feet) for the Bedford Street approaches to the proposed site driveways. **Table 4** presents a summary of the available SSD as they relate to Bedford Street and AASHTO's recommended SSD based on regulatory and observed speeds along Bedford Street.

TABLE 4
STOPPING SIGHT DISTANCE SUMMARY
BEDFORD STREET APPROACHES TO SITE DRIVEWAYS

Approach/ Travel Direction	Available SSD	AASHTO Recommended[1]	
		Regulatory Speed Limit[2]	85th Percentile Travel Speed[3]
Northern Site Driveway			
Northbound	>500 Feet	200 Feet	280 Feet
Southbound	>500 Feet	250 Feet	280 Feet
Southern Site Driveway			
Northbound	>500 Feet	200 Feet	280 Feet
Southbound	>500 Feet	250 Feet	280 Feet

[1]Recommended sight distance based on AASHTO, A Policy on Geometric Design of Highways and Streets. Based on driver height of eye of 3.5 feet to object height of 2.0 feet.
[2] Regulatory speed limit: 30 mph NB & 35 mph SB
[3]85th Percentile travel speed: 38 mph NB & SB.

As summarized in **Table 4,** analysis results indicate that the available sight lines will exceed AASHTO's recommended SSD criteria along Bedford Street for the posted and observed travel speeds. Stopping sight distance calculations are provided in the **Attachments**.

Intersection Sight Distance

Clear sight lines provide sufficient sight distance for a stopped driver on a minor-road approach to depart from the intersection and enter or cross the major road. As stated under AASHTO's Intersection Sight Distance (ISD) considerations, "*…If the available sight distance for an entering …vehicle is at least equal to the appropriate stopping sight distance for the major road, then drivers have sufficient sight distance to avoid collisions…To enhance traffic operations, intersection sight distances that exceed stopping sight distances are desirable along the major road*." AASHTO's ISD criteria are defined into several "cases". In this case, the site driveway approaches are under "STOP" control. The ISD in question relates to the ability to turn either right or left onto Bedford Street.

Available ISD was estimated in the field using AASHTO standards for driver's eye (3.5 feet), object height (3.5 feet) and decision point (8 to 14.5 feet from the edge of the travel lane) for the northbound and southbound travel directions on Bedford Street. **Table 5** presents a summary of the available ISD for the departures from the site driveway and AASHTO's recommended ISD assuming maintenance of vegetation within the sight line triangles.

TABLE 5
INTERSECTION SIGHT DISTANCE SUMMARY
SITE DRIVEWAY DEPARTURES TO BEDFORD STREET

Approach/ Travel Direction	Available ISD	AASHTO Minimum[1] 85th Percentile Travel Speed[3]	AASHTO Ideal[1] Regulatory Speed Limit[2]
Northern Site Driveway			
Looking North	>500 Feet	280 Feet	335 Feet
Looking South	>500 Feet	280 Feet	335 Feet
Southern Site Driveway			
Looking North	>500 Feet	280 Feet	335 Feet
Looking South	>500 Feet	280 Feet	335 Feet

[1]Recommended sight distance based on AASHTO, A Policy on Geometric Design of Highways and Streets. Based on driver height of eye of 3.5 feet to object height of 2.0 feet.
[2] Regulatory speed limit: 30 mph NB & 35 mph SB
[3]85th Percentile travel speed: 38 mph NB & SB.

The results of the ISD analysis presented in **Table 5** indicate that with clearing and grading associated with the construction of the proposed site driveway, the available sight lines looking north and south from the site driveways onto Bedford Street exceed the sight line requirements from AASHTO for the regulatory and 85th percentile travel speeds. MDM recommends that any new plantings (shrubs, bushes) or physical landscape features to be located within the sight lines should also be maintained at a height of 2 feet or less above the adjacent roadway grade to ensure unobstructed lines of sight.

TRIP GENERATION

The trip generation estimates for the proposed development of the Site are provided for the weekday morning and weekday evening periods, which correspond to the critical analysis periods for the proposed use and adjacent street traffic flow. New traffic generated by the project was estimated using trip rates published in ITE's *Trip Generation*[2] for the Land Use Code (LUC) 221 – Multifamily (Mid-Rise), LUC 820 – Shopping Center and LUC 710 – General Office Building. **Table 6** presents a summary of the site trip generation for the proposed use of the Site. To remain conservative no trip credits (reduction) were taken for alternative transportation modes or internal trip capture between the various used on-site and the more conservative general retail land use category was assumed for the Salon. Trip generation calculations are provided in the **Attachments.**

TABLE 6
TRIP-GENERATION SUMMARY

Period/Direction	Apartment (13 Units)[1]	Retail (8.35 ksf)[2]	Office (1.5 ksf)[3]	Total
Weekday Morning Peak Hour:				
Entering	1	5	2	8
Exiting	4	3	0	7
Total	5	8	2	15
Weekday Evening Peak Hour:				
Entering	4	15	0	19
Exiting	2	17	2	21
Total	6	32	2	40
Weekday Daily	70	316	14	400

Source: ITE *Trip Generation*, 10th Edition; 2017.
[1]Based on ITE LUC 221 Single-Family Detached Housing trip rates applied to 13 units.
[2]Based on ITE LUC 820 Shopping Center trip rates applied to 8,350 sf (1,900 sf Salon and 6,450sf retail).
[3]Based on ITE LUC 710 General Office Building trip rates applied to 1,500 sf.

As summarized in **Table 6**, the proposed development is estimated to generate approximately 15 vehicle trips (8 entering and 7 exiting) during the weekday morning peak hour and 40 vehicle trips (19 entering and 21 exiting) during the weekday evening peak hour. On a daily basis the project is estimated to generate approximately 400 trips with half entering and half exiting over a 24-hour period. Trip generation calculations are provided in the **Attachments**.

[2]*Trip Generation*, 10th Edition; Institute of Transportation Engineers; Washington, DC; 2017.

Trip Generation Comparison

For comparison purposes, the trip generation for historic (and recent) use of the Site for Clinic use was also estimated based on ITE trip rates for Clinic (LUC 630) use. **Table 7** presents a summary and comparison of the site trip generation for both the historical and proposed use of the Site. Trip generation calculations are provided in the **Attachments.**

TABLE 7
TRIP-GENERATION COMPARISON

Period/Direction	Proposed[1]	Historical[2]	Difference
Weekday Morning Peak Hour:			
Entering	8	22	-14
Exiting	7	6	+1
Total	15	28	-13
Weekday Evening Peak Hour:			
Entering	19	9	+10
Exiting	21	22	-1
Total	40	31	+9
Weekday Daily	400	286	+114

[1]Total Trips from **Table 6**.
[2]Based on ITE LUC 630 Clinic trip rates applied to 7,500 sf.

As summarized in **Table 7**, when compared to historical uses of the property, the project is expected to generate a net increase of 9 vehicle trips or less during peak hours. This represents a modest net traffic increase in traffic activity relative to historic site use (approximately 1 additional vehicle trip every six minutes) which will not materially impact traffic flow on area roadways.

Trip Distribution

Trip distribution patterns for the proposed residential development are based on existing travel patterns for the Reed Street neighborhood based on observed traffic patterns at the study intersections of Bedford Street with Sunny Knoll Avenue and Reed Street. The distribution pattern for the commercial uses at the Site (retail and office) was based on existing travel patterns along Bedford Street. The trip distribution percentages and new development-related trips at the study intersections for the weekday morning and weekday evening peak hours are quantified in **Figure 5** and **Figure 6**. Trip distribution calculations are provided in the **Attachments.**

Design Year Traffic Volumes

Design Year condition traffic volumes are derived by adding incremental traffic increases for the proposed mixed-use development to the Baseline traffic volume networks. The resulting Design Year condition traffic-volume networks for the weekday morning and weekday evening peak hours are displayed in **Figure 7** and **Figure 8**.

Qualitative Statement of Impact

This section provides a quantitative statement of impact and described trip increases associated with the development relative to existing/baseline conditions. A comparison of the total intersection entering volume for the two gateway study intersections during the weekday morning peak hour and weekday evening peak hour, are summarized in **Table 8**.

TABLE 8
INTERSECTION TOTAL ENTERING VOLUME

	Peak Hour	Baseline Entering Volume[1]	Project Impact	
			# of New Trips	%Δ
Bedford Street (Route 4) at Sunny Knoll Avenue/ Public Works Driveway	Weekday AM	1,512	8	0.5%
	Weekday PM	1,350	22	1.6%
Bedford Street (Route 4) at 189 Bedford Street Northern Driveway	Weekday AM	1432	10	0.7%
	Weekday PM	1317	28	2.1%
Bedford Street (Route 4) at 189 Bedford Street Southern Driveway	Weekday AM	1428	13	0.9%
	Weekday PM	1308	33	2.5%
Bedford Street (Route 4) at Reed Street/ Larchmon Street	Weekday AM	1,490	7	0.5%
	Weekday PM	1,454	18	1.2%

[1] Volumes based on traffic peak hour turning movement counts conducted in February 2018 adjusted to average season.

As summarized in **Table 8**, the project will result in a nominal increase in traffic of approximately 1 vehicle every 2-minute at the site driveways during the peak hours. Away from the site driveway the project will result in less than 1-percent change in traffic volumes at the study intersections during the weekday morning peak hour and less than 2-percent change in traffic volumes at the study intersections during the weekday evening peak hour. Relative traffic increases for the proposed project represents an inconsequential change in area roadway volumes - a level of change that falls well within normal day-to-day fluctuations in traffic entering and exiting the intersections and is immaterial to traffic operations along Bedford Street.

RECOMMENDATIONS AND CONCLUSIONS

Trip generation for the development is projected to be modest with approximately 15 vehicle trips during the weekday morning peak hour and 40 vehicle trips during the weekday evening peak hour. Compared to the historical use of the property, the project will result in 1 additional trip or less every 6 minutes during the peak commute hours. MDM finds that incremental traffic associated with the proposed development is not expected to materially impact operating conditions at the study intersections. The study intersections exhibit below-average crash rates based on historic crash data; safety countermeasures are therefore not warranted. Likewise, the available sight lines at the Site Driveway intersections with Bedford Street exceed the recommended sight line requirements from AASHTO.

Based on this TIA, MDM has identified several mitigation actions that are likely to be required through the local permitting process to support the project. These include (a) access-related improvements, (b) pedestrian and bicycle accommodations, and (c) a transportation demand management (TDM) program to enhance traffic operations and travel safety:

Access/Egress Improvements

- *Driveway Design.* The final curb radii between the proposed site driveways and Bedford Street will be designed to accommodate the Towns largest fire apparatus (ladder truck) and single unit delivery vehicles. The Site includes gated emergency egress to Vaille Avenue to ensure proper circulation of fire apparatus to exit the property.

- *Signage and Markings.* A STOP sign (R1-1) and STOP line pavement markings are recommended on the site driveway approaches to Bedford Street. The sign and pavement markings shall be compliant with the Manual on Uniform Traffic Control Devices (MUTCD).

- *Sight Line Triangles.* Plantings (shrubs, bushes) and structures (walls, fences, etc.) will be maintained at a height of 2 feet or less within the sight lines in vicinity of the Site driveway intersections with Bedford Street and internal site intersections to provide unobstructed sight lines.

Pedestrian and Bicycle Accommodations

- *Pedestrian Connections*. The Site Plan incorporates sidewalks that connect the proposed building to the sidewalk system along Bedford Street. The extensive system of contiguous sidewalks in the area connect the Site to various area land uses including MBTA bus stop (route 62) Lexpress bus stop (route 4), shopping opportunities, restaurants and multi-use path (Minuteman Commuter Bikeway).

- *Bicycle Amenities*. The Proponent will provide bicycle accommodations within the property including covered/secure bike racks and 7± "loop" racks near the building entranceways to encourage and facilitate this mode of transportation to/from the Site. The existing bike amenities in the area include dedicated bike lanes along Bedford Street and the multi-use path (Minuteman Commuter Bikeway) to the north.

Transportation Demand Management (TDM) Program

The Proponent is committed to reduce auto dependency by residents and commercial building tenants by implementing a TDM program. A preliminary list of potential TDM program elements may include the following, subject to refinement of the development program and further evaluation by the Proponent:

- *On-Site Employee Transportation Coordinator*. The Proponent will designate a member of the leasing staff as transportation coordinator responsible disseminating relevant TDM information to residents including posting of TDM information at appropriate locations within the buildings.

- *Public Transportation Information & Promotion*. Service and schedule information for MBTA services and Lexpress will be posted to promote the use of public transportation by residents, employees and visitors. The nearest MBTA stop is at Vaille Avenue and the nearest Lexpress stop is at Reed Street.

- *Bicycle Facilities*. Provide bicycle parking, including weather protected racks for residents and conveniently located racks for visitors and employees proximate to the building entrances.

- *Preferential Parking and Incentives for Low-Emission Vehicles.* Preferential parking locations for residents, who use low-emission vehicles, will be provided. A charging station for electric vehicles will also be provided on the Site.

- *Pedestrian Infrastructure*. Sidewalk connections within the property will be provided along primary pedestrian desire lines that connect building entrances with the public sidewalk network. The Proponent will also post area maps that highlight area walking/bicycle routes to promote walking and bicycle travel to/from the Site and area businesses, recreational facilities and transit stops.

In summary, trip generation for the development is projected to be modest. MDM finds that incremental traffic associated with the proposed development is not expected to materially impact operating conditions at the study intersections. The study intersections exhibit below-average crash rates based on historic crash data; safety countermeasures are therefore not warranted. Likewise, the available sight lines at the Site Driveway intersections with Bedford Street exceed the recommended sight line requirements from AASHTO. Implementation of access/egress improvements, proposed pedestrian, and bicycle improvements along with a Transportation Demand Management (TDM) program will establish a framework of minimizing Site traffic impacts by encouraging non-motorized travel modes and pedestrian/bicycle accommodation that is compatible with other projects in the area.