

Ref: 9053

September 7, 2021

Mr. Philip Eugene, Chairman
Economic Development Committee
Town of Lancaster
701 Main Street
Lancaster, MA 01523

Re: Traffic Engineering Peer Review
Capital Commerce Center – Lunenburg Road (Route 70) and McGovern Boulevard
Lancaster, Massachusetts

Dear Phil:

Vanasse & Associates, Inc. (VAI) has completed a review of the materials submitted on behalf of Capital Group Properties (the “Applicant”) in support of the proposed Capital Commerce Center to be located off Lunenburg Road (Route 70) and McGovern Boulevard in Lancaster, Massachusetts (hereafter referred to as the “Project”). Our review focused on the following specific areas as they relate to the Project: i) vehicle and pedestrian access and circulation; ii) Massachusetts Department of Transportation (MassDOT) design standards; iii) Town Zoning requirements as they relate to access, parking and circulation; and iv) accepted Traffic Engineering and Transportation Planning practices. The Applicant has submitted the following supporting materials which are the subject of this review:

1. *Traffic Impact and Access Study*, Capital Commerce Center, Lancaster, Massachusetts; The Engineering Corp., Inc.; May 5, 2021, revised July 28, 2021;
2. *40R Zoning Use Map*, Capital Commerce Center, Capital Group Properties, Lancaster, MA; and
3. August 5, 2021 presentation titled: *Capital Commerce Center, Traffic Impact & Off-Site Improvements, Town of Lancaster, MA*, prepared by TEC.

In addition, VAI reviewed the site locus in order to validate the existing conditions context of the Project and to observe factors related to the design and location of the access to the Project site, internal circulation and potential off-site improvements.

Based on our review of the aforementioned materials that have been submitted in support of the Project, we have determined that the materials were prepared in a professional manner and following the applicable standards of care. That being said, the Applicant should address the following comments that were identified as a part of our review, a summary of which follows:

July 2021 TIA

- T1: The Applicant's engineer should consult with the Town of Lunenburg to determine if there are any planned development projects by others that may result in an increase in traffic within the study area that may exceed the background traffic growth rate.
- T2: Additional information is required to substantiate the trip-generation calculations for Building A. The type of warehouse should be identified (i.e., non-sortation or sortation fulfillment center, or other) and a traffic flow profile for an average weekday and Saturday should be provided that superimposes the 24-hour traffic flow profile of Building A onto the traffic volumes along Lunenburg Road. This composite traffic flow profile should identify traffic volumes during the peak-hour of the roadway, the peak-hour of the generator (Building A) and the traffic volumes during the design hours that were assessed in the July 2021 TIAS.
- T3: The Applicant should affirm that the retail use will consist of dry goods retailers and will not include restaurants or a coffee shop. If restaurant uses are planned or are being considered, the trip-generation calculations for the retail component of the Project would be higher than presented in the July 2021 TIAS.
- T4: A summary table should be provided for the truck trips that will be associated with the Project and a separate trip distribution pattern and trip assignment network should be created for truck trips. This will allow for a better understanding of the truck routes for the Project and inform the traffic operations analysis and design of the improvements that are planned as a part of the Project.
- T5: Based on the volume of turning traffic at the Lunenburg Road/McGovern Boulevard intersection, the trucking dependent nature of the uses and the planned installation of a traffic control signal at the intersection, the installation of both a northbound left-turn lane and a southbound right turn lane are justified and have been recommended by the Applicant's engineer. This should be clarified.
- T6: The traffic operations analysis should be reviewed and revised as necessary to reflect the increase in truck volumes that will result from the Project. In particular, the impacts to vehicle queuing on the Route 2 off-ramps and within the turn lanes at the study area intersections should be evaluated to determine if there is a need to extend the vehicle queue storage that is (or will be) available.
- T7: A plan showing the sight triangle areas for the Lunenburg Road/McGovern Boulevard intersection should be provided and include a note stating: "Signs, landscaping and other features located within sight triangle areas shall be designed, installed and maintained so as not to exceed 2.5-feet in height. Snow windrows located within sight triangle areas that exceed 3.5-feet in height or that would otherwise inhibit sight lines shall be promptly removed."
- T8: The Applicant should commit to reviewing and adjusting the traffic signal timing at the intersections of Main Street at Lunenburg Road and Main Street at Seven Bridge Road based on the results of the annual traffic monitoring program, which should be expanded to include the Main Street/Seven Bridge Road intersection.
- T9: The Applicant should define how the pedestrian crossings will operate at the Lunenburg Road/McGovern Road intersection prior to the installation of a traffic control signal given the high speed nature of traffic along Lunenburg Road.



- T10: The Applicant should review alternative traffic control measures for the Lunenburg Road/Fort Pond Road/Woods Lane intersection, including the installation of a modern roundabout. The traffic operations analysis indicated limited benefit to traffic operations resulting from the installation of a traffic signal at the intersection.
- T11: The traffic monitoring program should be expanded/revised to include the following:
- The Main Street/Seven Bridge Road intersection should be included.
 - Motor vehicle crash data should be obtained for the most recent one-year period from the Lancaster Police Department to ascertain changes in crash frequency, patterns or severity at the monitored intersections
 - The data collection period should include the Saturday midday peak period (11:00 AM to 2:00 PM).
 - The automatic traffic recorder counts on McGovern Boulevard should be extended to include a complete 7-day, weeklong period.
 - The parking demand observations should be conducted between 5 and 9 AM for the multifamily residential development and from 10 AM to 1 PM for the office, retail and industrial uses. For Building A, the parking demand observations should include the period with the largest shift. Additional parking observations may be required during the peak shipping season for Building A.
 - A traffic signal warrants analysis should be performed for the intersections of Lunenburg Road at McGovern Boulevard and Lunenburg Road at Fort Pond Road and Woods Lane following the methodology defined in the MUTCD¹ to include a 12-hour manual turning movement count at each intersection on an average weekday.
 - The thresholds for determining the need for additional mitigation should be defined as follows:

To the extent that any of the following are evidenced by the results of the Annual Traffic Monitoring Program: i) the measured traffic volumes for the Project exceed the projected traffic volumes established in the July 2021 TIAS by more than 10 percent (i.e., 110 percent of the projected traffic volumes); ii) one or more of the movements at a monitored intersection is identified to be operating at or over capacity (defined by a volume-to-capacity (v/c) ratio that equals or exceeds 1.0); and/or iii) there is a pronounced increase in the frequency of occurrence of motor vehicle crashes at a monitored intersection and the calculated motor vehicle crash rate exceed the MassDOT average crash rate for similar intersections; corrective actions to reduce the unmitigated impact of the Project should be proposed and implemented. The corrective actions should be documented in the traffic monitoring report and undertaken by the Applicant subject to receipt of all necessary rights permits and approvals.

¹Manual on Uniform Traffic Control Devices (MUTCD); Federal Highway Administration; Washington, D.C.; 2009.



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This concludes our review of the materials that have been submitted to date in support of the Project. If you should have any questions regarding our review, please feel free to contact me.

Sincerely,

VANASSE & ASSOCIATES, INC.



Jeffrey S. Dirk, P.E., PTOE, FITE
Managing Partner

Professional Engineer in CT, MA, ME, NH, RI and VA

Attachment

JSD/jsd



**TRAFFIC ENGINEERING PEER REVIEW
CAPITAL COMMERCE CENTER
LUNENBURG ROAD (ROUTE 70) AND MCGOVERN BOULEVARD
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The following details Vanasse & Associates, Inc.'s (VAI's) review of the Traffic Impact and Access Study as revised through July 28, 2021 (the "July 2021 TIAS") prepared by The Engineering Corp, Inc. (TEC) in support of the proposed Capital Commerce Center to be located off Lunenburg Road (Route 70) and McGovern Boulevard in Lancaster, Massachusetts (hereafter referred to as the "Project"). Detailed Site Plans were not available for our review. Our comments on the July 2021 TIAS are indicated in *italicized* text, with those requiring responses or additional information **bolded**.

PROJECT DESCRIPTION

The Project will entail the construction of a mixed-use development that will include residential, office, retail and industrial uses to be known as the Capital Commerce Center and located off Lunenburg Road (Route 70) and McGovern Boulevard in Lancaster, Massachusetts. The Project site is currently occupied by a number of existing uses that include: three (3) outdoor soccer fields (FC Stars); an 11,800± square foot (sf) J.B. Hunt Transport Services; a 2,300± sf Dunkin' Restaurant; a 5,000± sf Mobil gas station with a convenience store; and a soil/gravel yard operated by Central Mass Sand & Gravel. In conjunction with the Project, the soccer fields, the Dunkin' Restaurant and the Mobil gas station/convenience store will be retained and integrated into the Project, with the remaining uses to be removed to allow for the construction of 2,484,400± sf of industrial space, 37,600± sf of professional office space, 41,300± sf of additional retail space and 150 multifamily residential units.

The Project site is bounded by residential and commercial properties, and areas of open and wooded space to the north; commercial properties and areas of open and wooded space to the south; Lunenburg Road, commercial properties and areas of open and wooded space to the east; and residential properties and areas of open and wooded space to the west. Access to the Project site will be provided by way of Lunenburg Road and McGovern Boulevard, with driveways and roadways intersecting these roadways to serve individual buildings or groups of buildings.

July 2021 TIAS

General

Comment: *The July 2021 TIAS was prepared in a professional manner and following the applicable standards of care, and was prepared under the responsible charge of Samuel W. Gregorio, P.E., PTOE RSP₁ (MA P.E. No. 51109, Civil).*

Existing Conditions

Study Area

The study area that was assessed in the July 2021 TIAS included Lunenburg Road (Route 70), Main Street (Route 70/117) and Old Union Turnpike, and the following specific intersections:



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1. Main Street (Route 70/117)/Seven Bridge Road (Route 117)/Driveway
2. Main Street (Route 70/117)/Lunenburg Road (Route 70)
3. Lunenburg Road (Route 70)/McGovern Boulevard
4. Lunenburg Road (Route 70)/Old Union Turnpike
5. Lunenburg Road (Route 70)/Woods Lane / Fort Pond Road
6. Old Union Turnpike/Route 2 (Interchange 103) Eastbound Ramps
7. Fort Pond Road/Route 2 (Interchange 103) Westbound Ramps

Comment: This study area is sufficient to evaluate the potential impact of the Project on the transportation infrastructure and includes all intersections where the Project is predicted to result in an increase in peak hour traffic volumes by: a) five (5) percent or more, or b) by more than 100 vehicles per hour.

Traffic Volumes and Data Collection

Traffic volume data was collected by means of: i) automatic traffic recorder counts (ATRs) conducted along Lunenburg Road in the vicinity of the Project site on December 18th through 19th, 2018 (Wednesday through Thursday, inclusive) that included vehicle travel speed measurements; and ii) manual turning movement counts (TMCs) and vehicle classification counts conducted on Thursday, December 19, 2018 during the weekday morning (7:00 to 9:00 AM) and evening (4:00 to 6:00 PM) peak periods, and on Saturday, August 17, 2019 during the midday peak period (11:00 AM to 2:00 PM). A review of seasonal adjustment data available from MassDOT indicated that traffic volume conditions within the study area during the month of December are representative of conditions that are below average, with traffic volumes during the month of August representative of above-average conditions. As such, the December traffic volumes were adjusted upward to represent average-month conditions, with no adjustment applied to the August traffic volumes in order to provide a conservative (above-average) analysis condition.

In addition to the seasonal adjustment (December traffic volumes), the 2018 traffic volumes were adjusted upward by an additional 0.5 percent in order to be representative of 2019 traffic volume conditions. All traffic volume data was collection prior to the COVID-19 pandemic and, as such, no adjustment was required to account for the impacts on traffic volumes and trip patterns resulting from the COVID-19 pandemic.

Comment: The data collection effort and seasonal adjustments were completed following MassDOT standards and the guidance for Transportation Impact Assessments (TIAs) conducted during the COVID-19 pandemic,² and we are in general agreement with the resulting traffic volumes. This guidance recommends use of historic (pre COVID-19) traffic count data and considers 2019 traffic volumes to representative of existing conditions.

²Guidance on Traffic Count Data; MassDOT; revised April 2020.



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Pedestrian and Bicycle Facilities

A description of pedestrian facilities along Lunenburg Road and at the study area intersections was presented in the July 2021 TIAS. As described therein, sidewalks and formal bicycle accommodations are not provided along Lunenburg Road and are intermittent or not at all provided at the study area intersections. As a part of MassDOT's Main Street improvement project (MassDOT Project No. 608779), bicycle lanes and a shared-use path will be installed along Main Street and bicycle lanes will be installed along Lunenburg Road.

Comment: We concur with the description of existing and planned future pedestrian and bicycle accommodations within the study area.

Public Transportation

A description of public transportation services that are available within the study area was presented in the July 2021 TIAS. As described therein, public transportation services are provided to the area by the Montachusett Regional Transit Authority (MART), but are not currently available at the Project site.

Comment: We concur with the description of public transportation services.

Motor Vehicle Crash Summary

Motor vehicle crash information for the study area was obtained from MassDOT for the five-year period 2014 through 2018 or 2015 through 2019, inclusive, in order to assess motor vehicle crash trends occurring at the study intersections. Additional crash data was obtained from the Functional Design Report (FDR) that was prepared for the Main Street (Route 70/117) improvement project.³ Based on a review of the MassDOT data and subsequent coordination with MassDOT regarding the crashes occurring within the Route 2/Route 70 interchange (Exit 103), the Main Street/Lunenburg Road intersection was found to have a calculated motor vehicle crash rate (i.e., number of motor vehicle crashes per million vehicles entering (MEV) the intersection) that was above the MassDOT average crash rate for similar intersections. In addition, the Main Street/Lunenburg Road and the Route 2/Route 70 interchange were indicated as being included on MassDOT's Highway Safety Improvement Program (HSIP) listing as high crash cluster locations for 2015-2017. A Road Safety Audit (RSA) has been performed for the Main Street/Lunenburg Road intersection⁴ and improvements are being advanced at the intersection that include safety-related measures. The Route 2/Route 70 interchange has since been removed from the HSIP listing as noted in the July 2021 TIAS.

Comment: The motor vehicle crash analysis was completed in accordance with MassDOT standards and following accepted Traffic Engineering and Transportation Planning practices, and we are in agreement with the findings of the analysis. This analysis has indicated that, with the exception of the Main Street/Lunenburg Road intersection, no inherent safety deficiencies were identified within the study area based on the MassDOT crash data. As

³Functional Design Report, Main Street (Route 70/117) Improvements, Lancaster, MA; TEC, Inc.; Revised April 1, 2019.

⁴Road Safety Audit, Main Street (Route 70/117)/Lunenburg Road (Route 70), Town of Lancaster, Massachusetts; TEC, Inc.; May 27, 2017.



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*indicated in the July 2021 TIAS, improvements are planned at the Main Street/
Lunenburg Road intersection that should enhance safety and improve traffic operations.*

Future Conditions

No-Build Conditions

Traffic volumes within the study area were projected to 2028, which represents a 9-year planning horizon from the existing conditions base year (2019) that was presented in the July 2021 TIAS. The future condition traffic volume projections were developed by: i) applying a background traffic growth rate to the 2019 Existing traffic volumes; and ii) adding traffic associated with specific development projects by others that may increase traffic volumes within the study area beyond that accounted for by the background traffic growth rate.

A review of historic traffic count data available through MassDOT indicated that traffic volumes in the area have experienced a general increase of approximately 0.5 percent per year over the past several years. The Applicant's engineer consulted with Lancaster Community Development and Planning Department in order to ascertain if there were any specific development projects by others that would result in an increase in traffic volumes within the study area that would exceed the background traffic growth rate. Based on this consultation, the Fort Pond Industrial Development (1.087 million sf of industrial space and a solar panel array) was identified for inclusion in the future condition traffic volumes. In addition, traffic volume projections were developed for the FC Soccer Complex (three (3) playing fields) that were added to the weekday morning and evening peak-hour traffic volumes as the soccer fields were not in use at the time that the weekday traffic counts that form the basis of the July 2021 TIAS were performed (December).

The Applicant's engineer also researched planned future roadway improvement projects that are proposed within the study area. Based on this research, the following roadway improvement projects were identified:

- Main Street Traffic Signal Project (MassDOT Project No. 608779) – This project is being undertaken by the Town and MassDOT and will entail roadway and intersection improvements along Main Street between Lunenburg Road and Seven Bridge Road, to include the installation of traffic signals with accompanying geometric improvements at the Main Street/Lunenburg Road and Main Street/Seven Bridge Road intersections, as well as the addition of pedestrian and bicycle accommodations and sign, pavement marking and drainage improvements. This project is in the final design stage and construction is expected to commence in 2022.
- Route 2 Interchange Improvements – MassDOT has completed an initial evaluation of alternatives for several interchanges along Route 2, including at the Route 2/Route 70 interchange. These alternatives would include the relocation and reconstruction of the existing ramp system, as well as associated improvements to Route 2, in an effort to improve both traffic operations and safety. A preferred alternative has not been selected for advancement and the improvements are not currently programmed for funding on the State Transportation Improvement Program (TIP) list.

The improvements that are associated with Main Street Traffic Signal Project are reflected in the future condition (No-Build and Build) traffic operations analysis.



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Comment: We are in agreement with the methodology that was used to develop the future No-Build condition traffic volume projections, including the background traffic growth rate (0.5 percent) and inclusion of the identified specific development projects by others (Fort Pond Industrial Development) and roadway improvements (Main Street Traffic Signal Project).

Comment T1: *The Applicant’s engineer should consult with the Town of Lunenburg to determine if there are any planned development projects by others that may result in an increase in traffic within the study area that may exceed the background traffic growth rate.*

Build Conditions

The traffic characteristics of the Project were developed by the Applicant’s engineer using trip-generation statistics published by the Institute of Transportation Engineers (ITE)⁵ for similar land uses as those proposed and operational data provided by the prospective tenant for the large warehouse building designated as “Building A” (1,182,000 sf). ITE Land Use Codes (LUCs) 130, *Industrial Park* (applied to 1,302,400 sf); 221, *Multifamily Housing (Mid-Rise)* (applied to 150 residential units); 710, *General Office Building* (applied to 37,600 sf), and 820, *Shopping Center* (applied to 41,300 sf); were used to develop the traffic characteristics of the respective components of the Project. For the industrial park component, the ITE data set that was used was limited to data obtained from sites with more than 1.0 million sf of space.

For “Building A”, traffic volume data provided by the prospective tenant for the building was used and was based on two (2) employee shifts of 499 employees each and assuming a one-hour overlap of the shift change with the peak-hours of Lunenburg Road (shift changes are purposely scheduled so as not to occur coincidental with the roadway peak hours).

Table A summarizes the base trip-generation calculations for the Project using the methodology described above.

⁵*Trip Generation*, 10th Edition; Institute of Transportation Engineers; Washington, DC; 2017.



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**Table A
TRIP GENERATION CALCULATIONS BY LAND USE**

Time Period	Land Use					Total
	Industrial Park (1,302,400 sf) ^a	Building A (1,182,000 sf) ^b	Multifamily Housing (150 units) ^c	Office (37,600 sf) ^d	Retail (41,300 sf) ^e	
<i>Average Weekday:</i>						
Enter	1,783	1,183	408	183	780	4,337
Exit	<u>1,783</u>	<u>1,183</u>	<u>408</u>	<u>183</u>	<u>780</u>	<u>4,337</u>
Total	3,556	2,366	816	366	1,560	8,674
<i>Weekday Morning Peak-Hour:</i>						
Enter	308	390	14	38	25	775
Exit	<u>82</u>	<u>116</u>	<u>40</u>	<u>6</u>	<u>15</u>	<u>259</u>
Total	390	506	54	44	40	1,034
<i>Weekday Evening Peak-Hour:</i>						
Enter	74	253	40	7	76	450
Exit	<u>264</u>	<u>253</u>	<u>26</u>	<u>37</u>	<u>82</u>	<u>662</u>
Total	338	506	66	44	158	1,112
<i>Saturday:</i>						
Enter	0	1,183	437	42	952	2,614
Exit	<u>0</u>	<u>1,183</u>	<u>437</u>	<u>42</u>	<u>952</u>	<u>2,614</u>
Total	0	2,366	874	84	1,904	5,228
<i>Saturday Midday Peak-Hour:</i>						
Enter	0	100	34	11	97	242
Exit	<u>0</u>	<u>100</u>	<u>36</u>	<u>9</u>	<u>89</u>	<u>234</u>
Total	0	200	70	20	186	476

^aBased on ITE LUC 130, *Industrial Park*.

^bBased on empirical data provided by the prospective tenant.

^cBased on ITE LUC 221, *Multifamily Housing (Mid-Rise)*.

^dBased on ITE LUC 710, *General Office Building*.

^eBased on ITE LUC 820, *Shopping Center*.

Given the mix of uses that are planned and that currently exist and will be retained as a part of the Project, the following adjustments we applied to the base ITE trip-generation calculations:

- Internal Trips: internal trips are trips that are made between uses within a development that remain "internal" to a development site and are common in mixed-use developments where there are appropriate connections to accommodate such trips and there is a supporting relationship between the uses, such as a coffee shop or convenience store in an office park. Performing the trip-generation calculations on an individual land use basis does not account for internal trips and may overstate the volume of traffic that is generated by a mixed-use development. The ITE has a developed a methodology that is used to estimate the volume of internal trips that may be generated



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by a mixed-use development.⁶ The ITE methodology was used to estimate the number of internal trips that may be generated by the Project.

- Pass-By Trips – Pass-by trips are trips that are derived from the adjacent roadway and that are “passing-by” a use for other purposes that will patronize the use before continuing to their intended destination. Pass-by trips may constitute a portion of the trips that are generated by a retail, service or restaurant use. Pass-by trips are not new trips on the roadway network, but are new trips to a development site and increase or add conflicting turning movements to a driveway or roadway where a new use is added. MassDOT limits pass-by trips to the lesser of: i) the ITE pass-by trip rate for the use under study; or ii) 15% of the traffic volume on the roadway adjacent to the project site. The Applicant’s engineer applied the ITE pass-by trip rates to the retail component of the Project (34% on a weekday and 26% on a Saturday) and confirmed that the resulting traffic volumes were less than 15% of the volume of traffic passing the Project site along Lunenburg Road.

In addition, trips associated with the existing uses that occupy the Project site and will be removed to accommodate the development were estimated and subtracted from the volume of traffic that is expected to be generated by the new uses that will be added as a result of the Project.

Separate trip-generation calculations were provided for truck trips. Truck trip rates obtained from ITE for a fulfillment center warehouse were used to estimate the total volume of truck trips that may be associated with the Project, which indicated that 13% of the trips generated on an average weekday and during the weekday morning peak-hour and 7% of the trips generated during the weekday evening peak-hour may consist of truck trips. The prospective tenant of “Building A” has indicated that 15% of the trips associated with their operation will consist of truck trips. The ITE truck trip rates (between 7% and 13%) were applied to the trips associated with the other industrial uses that are to be located within the Project site in order to estimate the balance of the truck trips that may be associated with the Project.

Table B summarizes the trip generation calculations for the Project with consideration of the aforementioned adjustments to the base ITE trip-generation calculations:

⁶*Trip Generation Handbook*, 3rd Edition, A recommended Practice of the Institute of Transportation Engineers; Institute of Transportation Engineers; Washington, D.C.; September 2017.



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**Table B
TRIP GENERATION SUMMARY**

Time Period	Vehicle Trips				
	(A) Base (Unadjusted) Trips	(B) Internal Trips	(C) Existing Uses to be Removed	(D) Pass-By Trips (Retail Uses)	(A-B-C-D) NewTrips
<i>Average Weekday:</i>					
Enter	4,337	304	208	168	3,657
<u>Exit</u>	<u>4,337</u>	<u>304</u>	<u>208</u>	<u>168</u>	<u>3,657</u>
Total	8,674	608	416	336	7,314
<i>Weekday Morning Peak-Hour:</i>					
Enter	775	20	42	3	710
<u>Exit</u>	<u>259</u>	<u>20</u>	<u>20</u>	<u>3</u>	<u>216</u>
Total	1,034	40	62	6	926
<i>Weekday Evening Peak-Hour:</i>					
Enter	450	47	20	20	363
<u>Exit</u>	<u>662</u>	<u>47</u>	<u>42</u>	<u>20</u>	<u>553</u>
Total	1,112	94	62	40	916
<i>Saturday:</i>					
Enter	2,614	302	12	212	2,088
<u>Exit</u>	<u>2,614</u>	<u>302</u>	<u>12</u>	<u>212</u>	<u>2,088</u>
Total	5,228	604	24	424	4,176
<i>Saturday Midday Peak-Hour:</i>					
Enter	242	26	2	21	193
<u>Exit</u>	<u>234</u>	<u>26</u>	<u>2</u>	<u>21</u>	<u>185</u>
Total	476	52	4	42	378

Traffic volumes associated with the Project were assigned to the study area roadways and intersections using Journey-to-Work data obtained from the U.S. Census for persons employed in the Town of Lancaster for the office, warehouse and industrial uses, and for persons residing in the Town for the residential use. A population based gravity model was used to develop the trip distribution pattern for the retail use. A separate trip distribution pattern was not developed for truck trips. Based on this approach, Project-generated traffic was assigned to the study area roadway as shown in Table C:



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**Table C
TRIP DISTRIBUTION PATTERN**

Roadway	Industrial	Office	Residential	Retail
<i>Route 2 to/from east</i>	6%	6%	12%	18%
<i>Route 2 to/from west</i>	42%	42%	23%	7%
<i>Mechanic St. to/from west</i>	8%	8%	2%	2%
<i>Fort Pond Rd. to/from east</i>	1%	1%	1%	1%
<i>Old Union Tpk. to/from east</i>	1%	1%	1%	1%
<i>Route 117 to/from east</i>	7%	7%	28%	23%
<i>Route 117 to/from west</i>	4%	4%	3%	5%
<i>Route 70 to/from north</i>	6%	6%	3%	28%
<i>Route 70 to/from south</i>	25%	25%	27%	15%
TOTAL:	100%	100%	100%	100%

Comment T2: *Additional information is required to substantiate the trip-generation calculations for Building A. The type of warehouse should be identified (i.e., non-sortation or sortation fulfillment center, or other) and a traffic flow profile for an average weekday and Saturday should be provided that superimposes the 24-hour traffic flow profile of Building A onto the traffic volumes along Lunenburg Road. This composite traffic flow profile should identify traffic volumes during the peak-hour of the roadway, the peak-hour of the generator (Building A) and the traffic volumes during the design hours that were assessed in the July 2021 TIAS.*

Comment T3: *The Applicant should affirm that the retail use will consist of dry goods retailers and will not include restaurants or a coffee shop. If restaurant uses are planned or are being considered, the trip-generation calculations for the retail component of the Project would be higher than presented in the July 2021 TIAS.*

Comment T4: *A summary table should be provided for the truck trips that will be associated with the Project and a separate trip distribution pattern and trip assignment network should be created for truck trips. This will allow for a better understanding of the truck routes for the Project and inform the traffic operations analysis and design of the improvements that are planned as a part of the Project.*

Left-Turn Lane Warrants

A left-turn lane warrants analysis was performed for the intersection of Lunenburg Road at McGovern Boulevard in order to determine if the predicted volume of traffic at the intersection with the completion of the Project with consideration of speed of traffic along Lunenburg Road would justify the installation of a left-turn lane on the Lunenburg Road northbound approach to the intersection. Guidance



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provided by MassDOT in the MassHighway *Project Development and Design Guide*⁷ was used to complete this analysis. Based on a review of the left-turn lane criteria, it was determined that the installation of a left-turn lane on the Lunenburg Road northbound approach to McGovern Boulevard was not warranted.

Comment T5: Based on the volume of turning traffic at the Lunenburg Road/McGovern Boulevard intersection, the trucking dependent nature of the uses and the planned installation of a traffic control signal at the intersection, the installation of both a northbound left-turn lane and a southbound right turn lane are justified and have been recommended by the Applicant's engineer. This should be clarified.

Traffic Signal Warrants

A traffic signal warrants analysis was performed for the intersections of Lunenburg Road at McGovern Boulevard and Lunenburg Road at Fort Pond Road and Woods Lane in order to determine if the installation of a traffic signal is an appropriate traffic control measure at the subject intersections. The warrants analysis was performed following the methodology defined in the Manual on Uniform Traffic Control Devices (MUTCD).⁸ Based on this analysis, it was concluded that both intersections met one or more warrants for the installation of a traffic signal.

Comment: We agree that the installation of a traffic control signal is warranted at the Lunenburg Road/McGovern Boulevard and Lunenburg Road/Fort Pond Road/Woods Lane intersections and should be designed and constructed as a part of the Project (discussion follows).

Traffic Operations Analysis

In order to assess the potential impact of the Project on the transportation infrastructure, a detailed traffic operations analysis was performed for the study intersections under 2021 Existing, 2028 No-Build (without the Project) and 2028 Build (with the Project) conditions. In brief, traffic operations are described by six “levels of service” which are defined by letter grades from “A” through “F”, with a level-of-service (LOS) “A” representing the best operating conditions (average motorist delays of less than 10 seconds and little or no apparent vehicle queuing) and a LOS “F” representing constrained operating conditions (average motorist delays of 50 to 80 seconds or more and often with apparent vehicle queuing). A LOS of “E” is representative of an intersection or traffic movement that is operating at its design capacity, with a LOS of “D” typically representing the limit of acceptable traffic operations.

Based on this analysis, it is apparent that the Project will have a pronounced impact (increase) on motorist delays and vehicle queuing that will require that improvements be advanced as a condition of any approvals that me be granted for the Project. The following is a summary of those movements at the study area intersections that are currently or are predicted to operate at or over capacity (i.e., LOS “E” or “F”):

- Main Street/Seven Bridge Road/Driveway – Main Street northbound approach degrades from LOS C/D to LOS F during the weekday peak-hours, with overall LOS F operating conditions

⁷*Project Development and Design Guide*; MassHighway; 2006.

⁸*Manual on Uniform Traffic Control Devices (MUTCD)*; Federal Highway Administration; Washington, D.C.; 2009.



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predicted to continue during the Saturday midday peak-hour. The Applicant's engineer has recommended optimizing the traffic signal timing and phasing after completion of the MassDOT improvements at the intersection.

- Main Street/Lunenburg Road – Lunenburg Road southbound left-turn movement degrades from LOS D to LOS F during the weekday evening peak-hour. The Applicant's engineer has recommended optimizing the traffic signal timing and phasing after completion of the MassDOT improvements at the intersection.
- Lunenburg Road/McGovern Boulevard – With the installation of a traffic control signal at the intersection in conjunction with the Project, all movements at the improved intersection are predicted to operate at LOS B or better during the peak hours.
- Lunenburg Road/Old Union Turnpike – One or more movements degrade from LOS B/C to LOS E/F during the weekday morning and evening peak hours. The Applicant's engineer noted that the volume-to-capacity ratio (v/c) for all movements at this roundabout controlled intersection are below 1.0, indicating that no movement is operating over its design capacity. No improvements are proposed by the Applicant at this intersection.
- Lunenburg Road/Fort Pond Road/Woods Lane – Fort Pond Road westbound through/right-turn movements will continue to operate at LOS F during the weekday evening peak-hour with left-turn movements predicted to degrade from LOS D to LOS E during the Saturday midday peak-hour. The Applicant's engineer has recommended the installation of a traffic control signal at this intersection.
- Old Union Turnpike/Route 2 EB Ramps (Exit 103) – Left-turn movements from the Route 2 eastbound off-ramp were shown to continue to operate at LOS E during the weekday morning peak-hour. No improvements are proposed by the Applicant at this intersection.
- Fort Pond Road/Route 2 Westbound Ramps (Exit 103) – Left-turn movements from the Route 2 westbound off-ramp were shown to continue to operate at LOS E during the weekday evening peak-hour. The Applicant's engineer noted that the installation of a traffic control signal at the Lunenburg Road/Fort Pond Road/Woods Lane as a part of the Project will create gaps in the flow of traffic along Lunenburg Road that will allow traffic to exit from the off-ramp with less delay than predicted by the analysis model. In addition, the Applicant's engineer has recommended extending the vehicle queue storage on the off-ramp.

An analysis of traffic operations at the Lunenburg Road/Old Union Turnpike intersections assuming no overlap of shifts for the Building A tenant was undertaken and indicated that operating conditions for all movements would be acceptable (i.e., LOS D or better).

Comment T6: The traffic operations analysis should be reviewed and revised as necessary to reflect the increase in truck volumes that will result from the Project. In particular, the impacts to vehicle queuing on the Route 2 off-ramps and within the turn lanes at the study area intersections should be evaluated to determine if there is a need to extend the vehicle queue storage that is (or will be) available.



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Sight Distance

An evaluation of sight lines at the intersection of Lunenburg Road at McGovern Boulevard was performed using the measured 85th percentile vehicle travel speeds along Lunenburg Road (52 mph northbound and 55 mph southbound), which were found to be slightly above the posted speed limit in this area (50 mph). This evaluation concluded that the available lines of sight approaching McGovern Boulevard along Lunenburg Road and for motorists exiting McGovern Boulevard exceed the recommended minimum sight distance for safe operation based on the measured 85th percentile vehicle travel speeds (a minimum line of sight of 455 feet is required for safe operation at an approach speed of 52 mph and 495 feet is required for 55 mph).

Comment: We are in agreement with the methodology that was used to complete the sight distance analysis, the resulting values and the conclusion that the available sight lines exceed the recommended minimum sight distance for safe operation.

Comment T7: A plan showing the sight triangle areas for the Lunenburg Road/McGovern Boulevard intersection should be provided and include a note stating: “Signs, landscaping and other features located within sight triangle areas shall be designed, installed and maintained so as not to exceed 2.5-feet in height. Snow windrows located within sight triangle areas that exceed 3.5-feet in height or that would otherwise inhibit sight lines shall be promptly removed.”

Recommendations

The following roadway/intersection improvements, Transportation Demand Management (TDM) measures and traffic monitoring were offered as a part of the July 2021 TIAS:

- Main Street/Seven Bridge Road/Driveway – Design and implement an optimal traffic signal timing and phasing after completion of the MassDOT improvements at the intersection after the completion of the Project or at specific occupancy intervals.
- Main Street/Lunenburg Road – Design and implement an optimal traffic signal timing and phasing after completion of the MassDOT improvements at the intersection after the completion of the Project or at specific occupancy intervals. In addition, the short-term improvement measures that were suggested in the RSA that are not included as a part of the MassDOT intersection improvement project will be implemented.
- Lunenburg Road/McGovern Boulevard – Design and construct the intersection to accommodate the installation of a traffic control signal when warranted based on the volume of traffic generated by the Project to include the following geometric improvements:
 - McGovern Boulevard – 4 lanes to include separate left and right-turn lanes approaching Lunenburg Road and 2 lane departing from the intersection
 - Lunenburg Road – Provide a northbound left-turn lane and a southbound right-turn lane
 - Pedestrian/Bicycle Accommodations – Maintain 5 foot shoulders along Lunenburg Road to accommodate bicycle travel; construct a 10-foot wide shared-use path along the west side of Lunenburg Road north of the intersection within the limits of the improvements; construct a



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- 5-foot wide sidewalk along the west side of Lunenburg Road south of the intersection within the limits of the improvements; construct 5-foot wide sidewalks along both sides of McGovern Boulevard between Lunenburg Road and the internal (to the Project site) roundabout adjacent to Building A. Marked crosswalks will be provided for crossing Lunenburg Road and McGovern Boulevard.
- Lunenburg Road/Fort Pond Road/Woods Lane – Design and install a temporary traffic control signal if and when warranted based on the volume of traffic generated by the Project.
 - Fort Pond Road/Route 2 Westbound Ramps (Exit 103) – Reconstruct and widen the Route 2 westbound off-ramp to increase the vehicle queue storage and modify the pavement markings on Route 2 within the transition area to the off-ramp.
 - On-Site Bicycle Accommodations – Bicycle racks will be provided throughout the Project site
 - Public Transportation Accommodations – MART has approved bus service to the Project site by way of an extension of the Route 8 service. In order to accommodate bus services, MART has recommended and the Applicant has agreed to install two (2) bus stops with shelters within the Project site, one (1) proximate to the multifamily residential area and one (1) proximate to Building A.
 - Transportation Demand Management (TDM) Measures – A comprehensive TDM program is proposed that includes measures specifically designed to encourage the use of alternative modes of transportation to single-occupancy vehicles (SOVs).
 - Transportation Monitoring Program – A monitoring program has been proposed that includes: monitoring traffic volumes and assessing traffic operations (motorist delays, levels of service and vehicle queuing) at the study intersections; documenting the actual volume of traffic produced by the Project; observing parking demands; and evaluating the effectiveness of the TDM program. Monitoring will commence six months after issuance of the first Occupancy Certificate and will continue for a period of five years following full occupancy.

Comment T8: The Applicant should commit to reviewing and adjusting the traffic signal timing at the intersections of Main Street at Lunenburg Road and Main Street at Seven Bridge Road based on the results of the annual traffic monitoring program, which should be expanded to include the Main Street/Seven Bridge Road intersection.

Comment T9: The Applicant should define how the pedestrian crossings will operate at the Lunenburg Road/McGovern Road intersection prior to the installation of a traffic control signal given the high speed nature of traffic along Lunenburg Road.

Comment T10: The Applicant should review alternative traffic control measures for the Lunenburg Road/Fort Pond Road/Woods Lane intersection, including the installation of a modern roundabout. The traffic operations analysis indicated limited benefit to traffic operations resulting from the installation of a traffic signal at the intersection.



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Comment T11: The traffic monitoring program should be expanded/ revised to include the following:

- The Main Street/Seven Bridge Road intersection should be included.*
- Motor vehicle crash data should be obtained for the most recent one-year period from the Lancaster Police Department to ascertain changes in crash frequency, patterns or severity at the monitored intersections.*
- The data collection period should include the Saturday midday peak period (11:00 AM to 2:00 PM).*
- The automatic traffic recorder counts on McGovern Boulevard should be extended to include a complete 7-day, weeklong period.*
- The parking demand observations should be conducted between 5 and 9 AM for the multifamily residential development and from 10 AM to 1 PM for the office, retail and industrial uses. For Building A, the parking demand observations should include the period with the largest shift. Additional parking observations may be required during the peak shipping season for Building A.*
- A traffic signal warrants analysis should be performed for the intersections of Lunenburg Road at McGovern Boulevard and Lunenburg Road at Fort Pond Road and Woods Lane following the methodology defined in the MUTCD⁹ to include a 12-hour manual turning movement count at each intersection on an average weekday.*
- The thresholds for determining the need for additional mitigation should be defined as follows:*

To the extent that any of the following are evidenced by the results of the Traffic Monitoring Program: i) the measured traffic volumes for the Project exceed the projected traffic volumes established in the July 2021 TIAS by more than 10 percent (i.e., 110 percent of the projected traffic volumes); ii) one or more of the movements at a monitored intersection is identified to be operating at or over capacity (defined by a volume-to-capacity (v/c) ratio that equals or exceeds 1.0); and/or iii) there is a pronounced increase in the frequency of occurrence of motor vehicle crashes at a monitored intersection and the calculated motor vehicle crash rate exceed the MassDOT average crash rate for similar intersections; corrective actions to reduce the unmitigated impact of the Project should be proposed and implemented. The corrective actions should be documented in the traffic monitoring report and undertaken by the Applicant subject to receipt of all necessary rights permits and approvals.

⁹Ibid 9.

