



## Memorandum

To: Ms. Ellen Anselone, AIA, LEED AP  
Finegold Alexander Architects  
77 North Washington Street  
Boston, MA 02114

Date: April 9, 2021

Project #: 15113.00

From: Vinod K. Kalikiri, PE, PTOE  
Jason R. Plourde, PE, PTP

Re: **Traffic Impact Evaluation**  
440 Granite Avenue Mixed-Use Redevelopment  
Milton, Massachusetts

VHB has prepared this Traffic Impact Evaluation (the Study) to summarize the anticipated transportation impacts associated with a proposed redevelopment of the properties located at 426, 434, and 440 Granite Avenue and at 29 and 33 Mechanic Street with a mixed-use development at 440 Granite Avenue in Milton, Massachusetts. The subject site is a corner lot that is bound by Granite Avenue to the west and Mechanic Street to the east. The site is currently fully developed with multiple buildings and associated parking. Specifically, the existing uses comprise of approximately 2,500 square feet (sf) of commercial use and five residential units. As proposed, the existing structures would be razed and the site would be redeveloped with 4,155 sf of street level commercial space and 33 residential units, supported by predominantly structured parking.

Access is currently provided by way of three driveways along Granite Avenue and four driveways along Mechanic Street. As proposed, the curb cuts along Granite Avenue would be closed and the Mechanic Street curb cuts would be reduced to three, with only one of the future curb cuts serving as a predominant vehicular access for the development. The site location in relation to the surrounding roadways is shown on Figure 1. This evaluation has been conducted to summarize the anticipated traffic impacts associated with the proposed redevelopment project.

The analysis summarized in this memorandum indicates that the proposed development is projected to generate 11 to 16 additional new vehicle trips on area roadways during the weekday morning and weekday afternoon peak hours. When compared to 900 to 1,000 vehicle trips per hour that travel on Granite Avenue and Mechanic Street during the same peak hours, the estimated additional trips do not represent a noticeable addition to the roadway system. In fact, the estimated increase falls within the range of hourly and day-to-day fluctuations in roadway traffic volumes on Granite Avenue and Mechanic Street. The proposed access management plan for the project, which involves eliminating multiple curb cuts, and designing garage access onto Mechanic Street, as well as the thoughtful site plan for loading, trash pick-up, and availability of convenient on-street parking on Granite Avenue in front of the site will all contribute to more streamlined and efficient traffic flow for the site when compared to the current conditions.

### Trip Generation

To determine the vehicular trips that would be generated by the existing and proposed uses, trip-generation rates published by the Institute of Transportation Engineers (ITE)<sup>1</sup> were researched. The site currently consists of Compass Kitchens (440 Granite Avenue), The Milton Flower Shop (426 Granite Avenue), and four residences (426 and

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<sup>1</sup> Institute of Transportation Engineers. Trip Generation Manual, 10th ed. Washington, DC. 2017.

120 Front Street  
Suite 500

\\vhb\gbl\proj\Worcester\15113.00 FAA Traffic Consulting\Reports\Traffic\15113.00 Granite Ave Mixed Use Dev - Traffic Memo 040921.docx Worcester, MA 01608  
P 508.752.1001

434 Granite Avenue, and 29 and 33 Mechanic Street). The estimated site trips are summarized in Table 1 and the trip-generation calculations are provided in the Appendix.

As shown in Table 1, the ITE trip-generation estimates indicate that the proposed redevelopment project is estimated to generate 11 additional vehicle trips (3 entering and 8 exiting) during the weekday morning peak hour and 18 additional vehicle trips (10 entering and 8 exiting) during the weekday afternoon peak hour. These nominal increases in peak hour trips fall within the hourly fluctuations of traffic volumes on the nearby roadway system and may not be perceived as an increase to an average driver traveling through the area.



Study Area Location Map

Figure 1



0 50 100 Feet

Milton, MA

**Table 1 – Trip-Generation Comparison Summary**

Time Period/Direction	Existing Trips <sup>a</sup>	Proposed Trips <sup>b</sup>	Additional Trips <sup>c</sup>
<b>Weekday Morning Peak Hour</b>			
Enter	2	5	3
Exit	3	11	8
<b>Total</b>	<b>5</b>	<b>26</b>	<b>11</b>
<b>Weekday Afternoon Peak Hour</b>			
Enter	8	18	10
Exit	6	14	8
<b>Total</b>	<b>14</b>	<b>32</b>	<b>18</b>

<sup>a</sup> ITE Land Use Code 820 (Retail/Shopping Center) for 2,466 sf, Land Use Code 210 (Single-Family Detached Housing) for 3 dwelling units, and Land Use Code 220 (Multifamily Housing [Low-Rise]) for 1 dwelling unit

<sup>b</sup> ITE Land Use Code 820 (Retail/Shopping Center) for 4,155 sf and Land Use Code 221 (Multifamily Housing [Mid-Rise]) for 33 dwelling units

<sup>c</sup> Proposed Trips minus Existing Trips

### **Trip-Generation Characteristics**

Not all of the vehicle trips expected to be generated by the proposed commercial portion of the development represent new trips on the roadway system. Studies have shown that a substantial portion of the site trips for retail establishments are already present in the adjacent passing traffic stream. The ITE Trip Generation Handbook indicates that the average pass-by trip percentages for a shopping center are 34% during the weekday afternoon peak hour.<sup>2</sup> For the proposed commercial space, these pass-by trips would be drawn from existing traffic on Granite Avenue and Mechanic Street. Table 2 summarizes the expected peak-hour pass-by trip-generation characteristics of the proposed redevelopment project. The corresponding calculations are provided in the Appendix.

As shown in Table 2, the ITE trip-generation methodology indicates that the proposed redevelopment is projected to generate 11 additional new vehicle trips (3 entering and 8 exiting) during the weekday morning peak hour and 16 additional new vehicle trips (9 entering and 7 exiting) during the weekday afternoon peak hour.

It is noted that the vehicle trips calculated for each of the proposed uses represent single-use trips to the site on the study area system. Based on the ITE Trip Generation Handbook, studies have shown that for developments of mixed-use or multi-use sites, it is realistic to assume that there will be some internal trips within the site itself. This means that some of the residents within the proposed development could also visit the proposed retail space without needing to drive onto the adjacent roadway system. For conservative (worse-case) purposes, no internal trip capture was accounted for within this traffic evaluation.

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<sup>2</sup> Institute of Transportation Engineers. Trip Generation Handbook



**Table 2 – Proposed Trip-Generation Characteristics Summary**

<b>Time Period/Direction</b>	<b>Total Additional Trips <sup>a</sup></b>	<b>Pass-By Trips <sup>b</sup></b>	<b>New Trips <sup>c</sup></b>
<b>Weekday Morning Peak Hour</b>			
Enter	3	0	3
Exit	8	0	8
Total	11	0	11
<b>Weekday Afternoon Peak Hour</b>			
Enter	10	1	9
Exit	8	1	7
Total	18	2	16

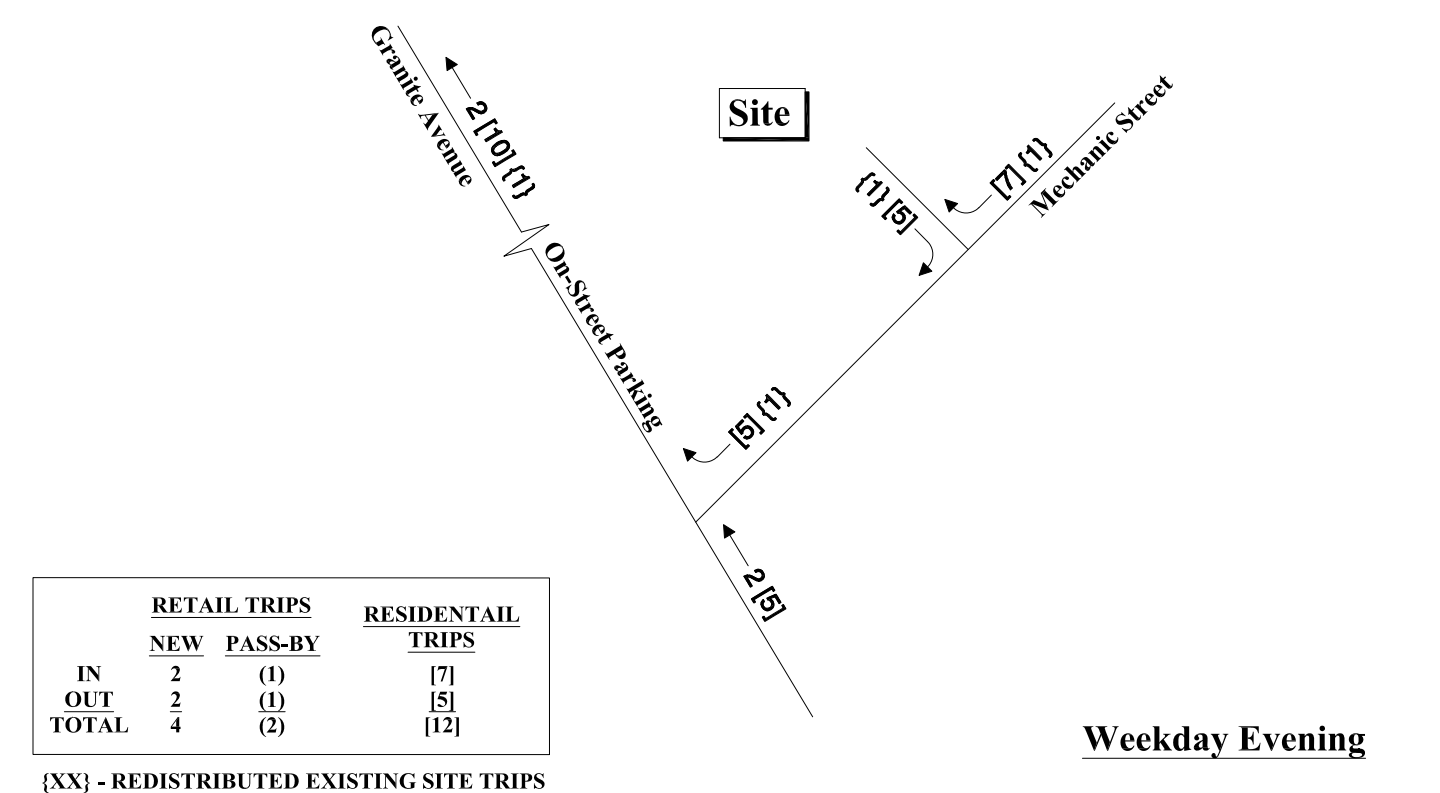
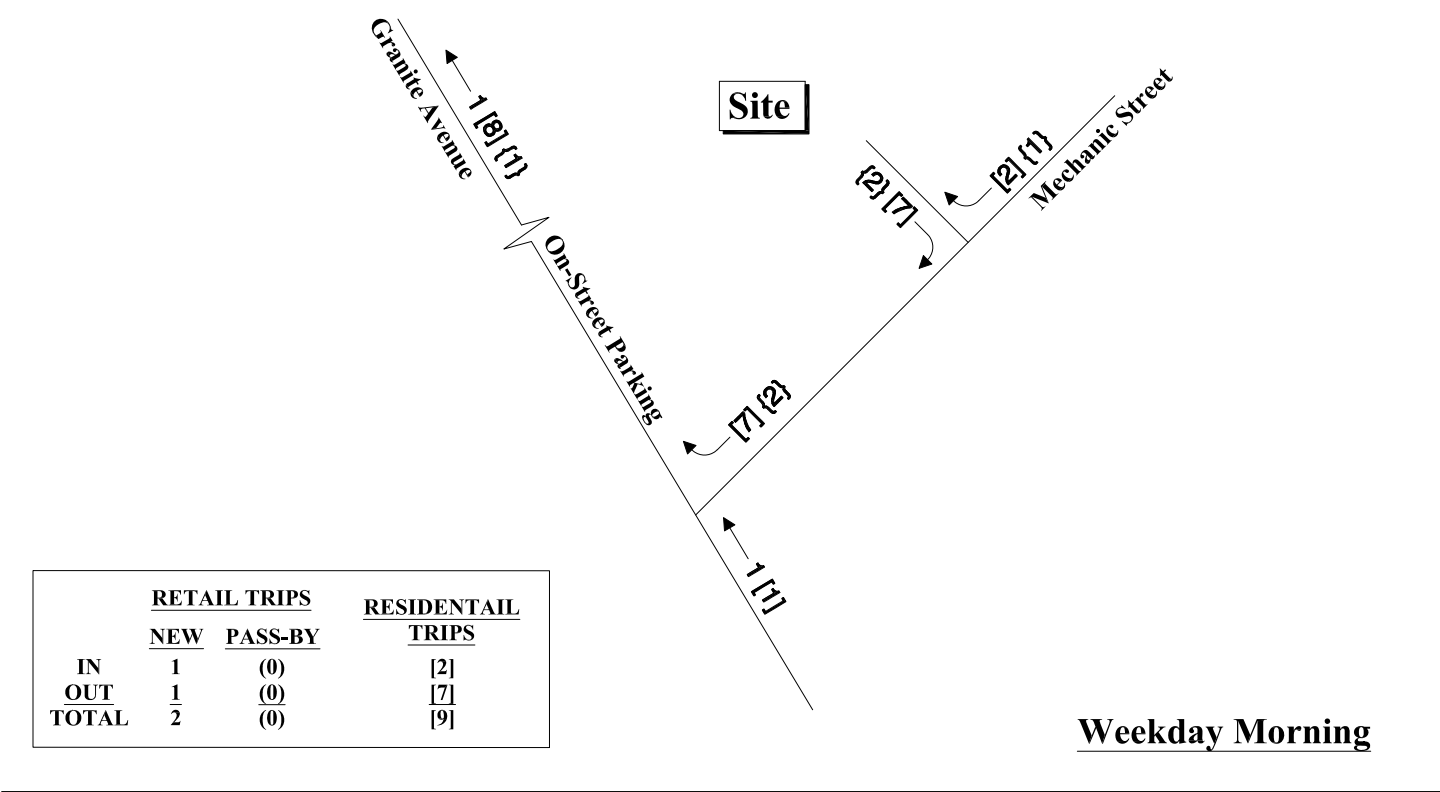
#### **Trip Distribution Assignment**

After project-generated vehicle trips have been estimated, the next step in the traffic study is to determine the distribution of project traffic and assign these trips to the local roadway network. Due to the type of development proposed, the directional distribution of the estimated site traffic was developed upon evaluation of existing travel patterns and site access routes. Based on the traffic-generation and trip-distribution estimates for the proposed redevelopment project, the additional site trips were assigned to the local roadway network as reflected on Figure 2 for the weekday morning and weekday afternoon midday peak hours.

The ITE Transportation Impact Analyses for Site Development states, "In lieu of other locally preferred thresholds, it is suggested that a transportation impact study be conducted whenever a proposed development will generate 100 or more added (new) trips during the adjacent roadways' peak hour or the development's peak hour." The Massachusetts Department of Transportation's (MassDOT's) Transportation Impact Assessment Guidelines suggest that an intersection should be evaluated when site-generated trips are projected to increase peak-hour traffic volumes by 100 vehicles or more. Based on the site-generated traffic volumes shown on Figure 2, the ITE and MassDOT guidelines suggest that a traffic study may not be required for the proposed redevelopment project due to the low estimated increase in traffic volumes. Nonetheless, this evaluation has been prepared to quantify the limited impact of the project as well as to document its transportation characteristics in comparison to the current usage of the site.

#### **On-Site Traffic Evaluation**

Granite Avenue abuts the site to the west, provides one-way northbound traffic flow, consists of two travel lanes, and includes on-street parking and a sidewalk along the east side of the roadway (i.e., along the site frontage). Mechanic Street abuts the site to the east, provides one-way southbound travel flow, and includes sidewalks along both sides of the roadway.



↑  
Not to Scale



Additional Site Generated  
Peak Hour Traffic Volumes

Figure 2

The site is triangular in shape with the Granite Avenue and Mechanic Street intersection representing the southern point of the triangle, 426 Granite Avenue as the north-western point, and 29 Mechanic Street as the north-eastern point. At the Granite Avenue and Mechanic Street intersection, the Granite Avenue northbound approach provides two through lanes and the Mechanic Street approach provides one right-turn lane that is under STOP-sign control.

### **Access**

The site currently provides three curb cuts along Granite Avenue and four curb cuts along Mechanic Street. As proposed, the Granite Avenue curb cuts would be closed, and the Mechanic Street curb cuts would be reduced to three. With the elimination of the Granite Avenue driveways, vehicular access to the proposed residential uses would be provided by way of the Mechanic Street driveways. The northern Mechanic Street curb cut would provide for access to four on-site parking spaces. The middle Mechanic Street driveway would be for access to an on-site structured parking. The southern Mechanic Street driveway would provide access to a trash receptacle area located within the proposed building.

### **Sight Distances**

Access design requires that sight lines should be provided for vehicles exiting the site that meet or exceed the minimum distances required for approaching vehicles to safely stop. Accordingly, and to encourage safe and efficient flow of traffic to and from the site, proposed plantings, vegetation, landscaping, and signing along the site frontage and at the site driveway would be kept low to the ground or set back sufficiently from the edge of the roadways so as not to inhibit the available sight lines.

### **Parking**

As proposed, parking for the development would be provided within the site and within on-street parking spaces along Granite Avenue. As currently planned, the northern Mechanic Street curb cut would provide access to 4 outdoor parking spaces and the middle Mechanic Street driveway would provide access to 42 enclosed parking spaces. In addition, the proposed closure of the existing Granite Avenue curb cuts would increase the 7 marked on-street parking spaces to 12 parking stalls adjacent to the site. The last two spaces (spaces 11 and 12 on the conceptual site graphic included in the Appendix) will be designated for loading, resident pick-up/drop off, etc. Specific hours of the day when the drop-off designation will be imposed through signage will be discussed with the Town during the Project permitting process. Outside of the designated loading times, the spaces would serve as regular parking spaces.

## **Capacity and Queue Analyses**

Intersection operational analyses were performed for the Granite Avenue and Mechanic Street intersections as well as the proposed site driveways based on the concepts and procedures in the Highway Capacity Manual (HCM).<sup>3</sup> Due to COVID-19 pandemic conditions, traffic volumes may not be representative of normal travel conditions on area roadways. Therefore, consistent with MassDOT's guidelines for conducting traffic studies in COVID-19 conditions,

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<sup>3</sup> Transportation Research Board. Highway Capacity Manual, 6th ed. 2016

recent traffic volumes that were previously developed by others<sup>4</sup> were used in performing the intersection operational analyses for the Project.

### **Traffic Volumes**

For the purposes of this study, the 2027 Build traffic volumes developed as part of the Residences at East Milton Traffic Impact Study were used to represent future base traffic volumes (i.e., 2027 No-Build) for the Project. The site trips for the proposed mixed-use redevelopment project shown in Figure 2 were added to the 2027 No-Build traffic volumes to develop the 2027 Build peak-hour traffic-volume networks. The 2027 No-Build weekday morning and weekday afternoon peak-hour traffic volumes are illustrated on Figure 3. The 2027 Build weekday morning and weekday afternoon peak-hour traffic volumes are illustrated on Figure 4.

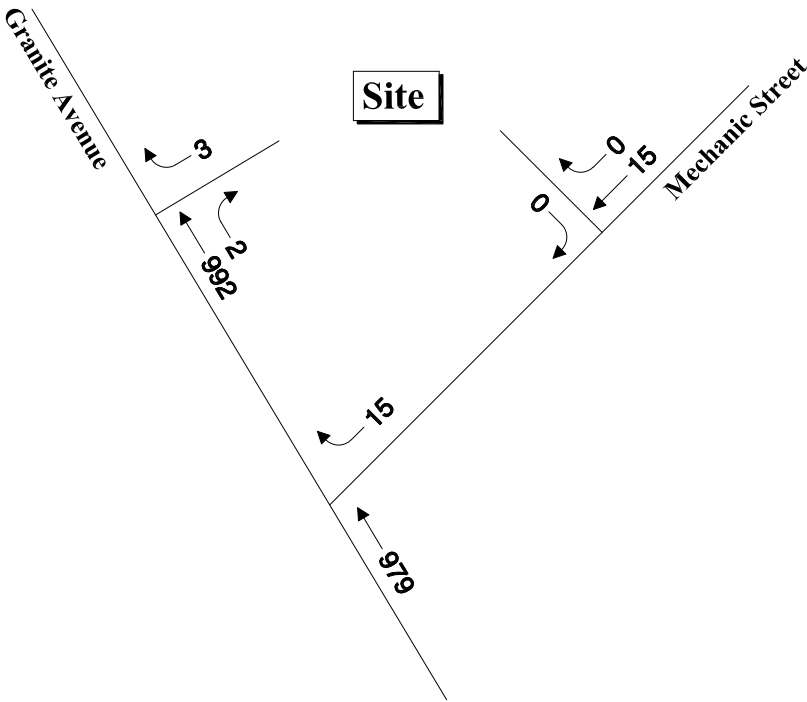
### **Intersection Analysis Methodology**

Capacity analyses were performed for the Granite Avenue and Mechanic Street intersections as well as the proposed site driveways under the 2027 No-Build and 2027 Build traffic volumes during the weekday morning and weekday afternoon peak hours. The analysis results are categorized in terms of Level of Service (LOS), which describes the qualitative intersection operational conditions based on the calculated average delay per vehicle. In addition, the study area intersections were evaluated with respect to vehicle queuing. For unsignalized intersections, the quantitative measure of vehicle queue length is defined as the 95<sup>th</sup> percentile queue. The 95<sup>th</sup> percentile queue represents the percent of time during the peak period being analyzed that the calculated maximum back of queue would be equal to or less than the percentile estimate (i.e., the maximum queue length that would be exceeded only 5% of the time). The intersection operational analysis results are summarized in Table 3. The analysis worksheets are provided in the Appendix.

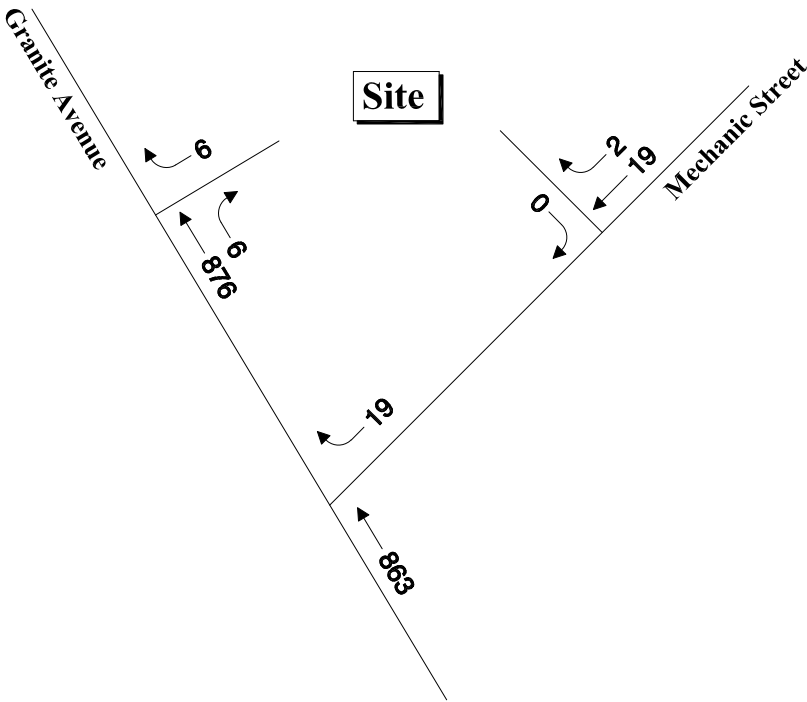
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<sup>4</sup> Howard Stein Hudson. Residences at East Milton Traffic Impact Study. November 2020



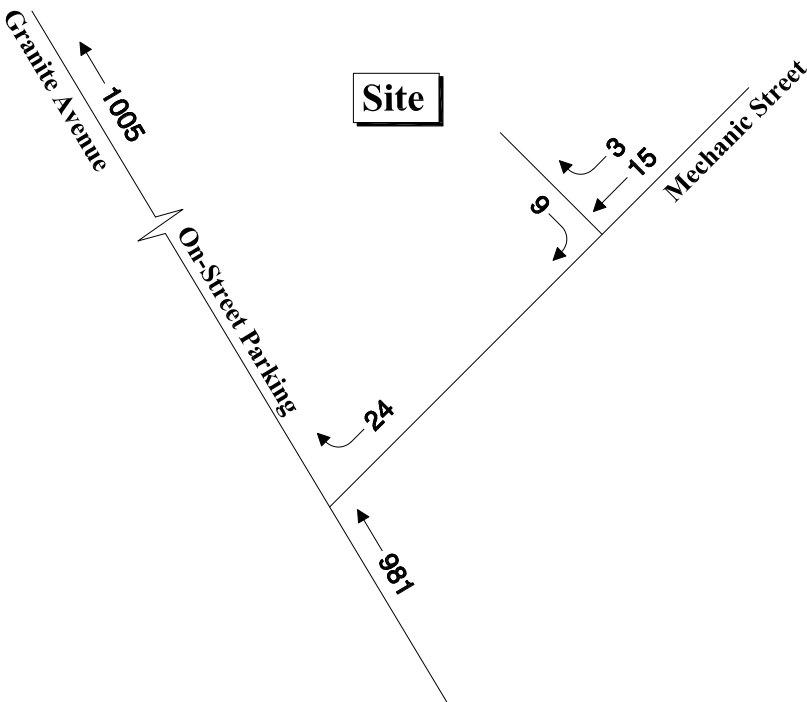


Weekday Morning

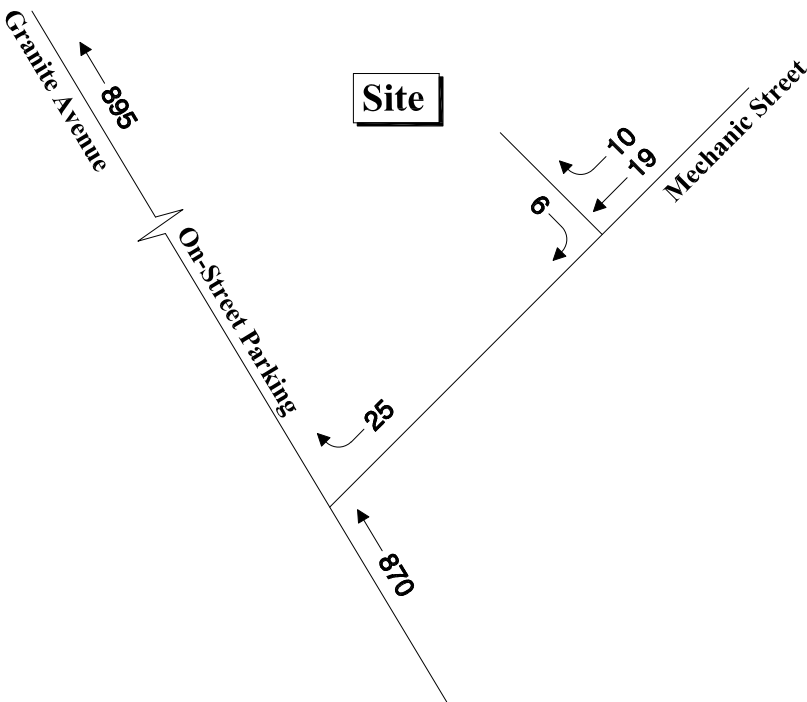


Weekday Evening





Weekday Morning



Weekday Evening

↑  
Not to Scale



**Table 3 – Capacity Analysis Summary**

Intersection/Peak Hour/ Critical Movement or Lane Group	2027 No-Build				2027 Build			
	v/c	Delay	LOS	95 <sup>th</sup> % Queue	v/c	Delay	LOS	95 <sup>th</sup> % Queue
<b>Granite Avenue and Mechanic Street</b>								
<i>Weekday morning:</i>								
Mechanic Street SWB Approach	0.04	12.7	B	0.1	0.06	12.9	B	0.2
<i>Weekday afternoon:</i>								
Mechanic Street SWB Approach	0.04	12.0	B	0.1	0.05	12.2	B	0.2
<b>Mechanic Street at Proposed Site Driveways</b>								
<i>Weekday morning:</i>								
Site Driveway EB Approaches	0.00	0.0	A	0.0	0.01	8.4	A	0.0
<i>Weekday afternoon:</i>								
Site Driveway EB Approaches	0.00	0.0	A	0.0	0.01	8.4	A	0.0

V/C = volume-to-capacity ratio

Delay in seconds

Queue lengths in vehicles (values shown are average numbers over the course of the peak hour). The small fractional queues imply that no queues are expected to be formed during most of the peak hour

Based on the 2027 No-Build and Build traffic volume conditions, the Mechanic Street right turns at Granite Avenue are projected to operate at LOS B during the weekday morning and weekday afternoon peak hours. The impacts associated with the proposed redevelopment project are anticipated to be minimal with an increase of between 2 and 9 vehicles on each approach during the weekday morning and weekday afternoon peak hours, equating to 1 additional vehicle every 6 to 30 minutes. The impacts on the minor street approach are shown to be negligible with increases in delays of 0.2 seconds during the weekday morning peak hour and weekday afternoon peak hour. In addition, the exiting movements from the site onto Mechanic Street are projected to operate at LOS A during the 2027 No-Build (traffic from current uses) and 2027 Build (future traffic from the Project) weekday morning and weekday afternoon peak hour traffic-volume conditions.

## Summary of Findings

Existing and future conditions in the study area have been described and evaluated with respect to traffic operations. As proposed, the existing commercial and residential structures on the site will be razed and the site would be redeveloped with new street level commercial space with residential units on upper floors. The existing curb cuts along Granite Avenue would be removed and additional on-street parking spaces would be provided.

Site design has focused on access management by proposing the residential parking access on Mechanic Street and maintaining pedestrian connectivity on both Mechanic Street as well as Granite Avenue. Detailed analysis shows that the proposed redevelopment will have a negligible effect on traffic flow in the area.

## Appendices

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Conceptual Site Layout

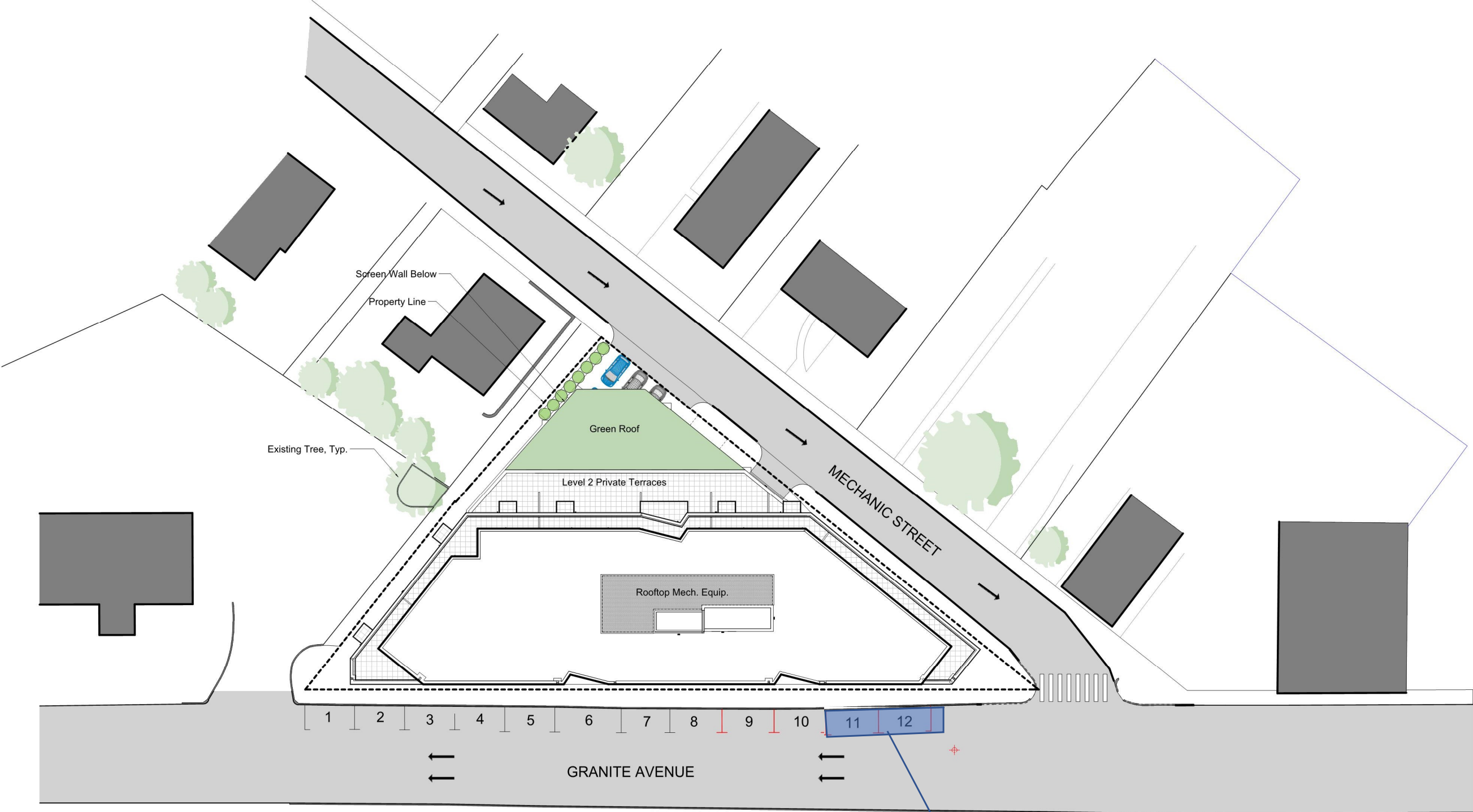
Trip Generation Calculations

Capacity and Queue Analysis Worksheets

## Conceptual Site Layout

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CONCEPTUAL SITE LAYOUT EXHIBIT

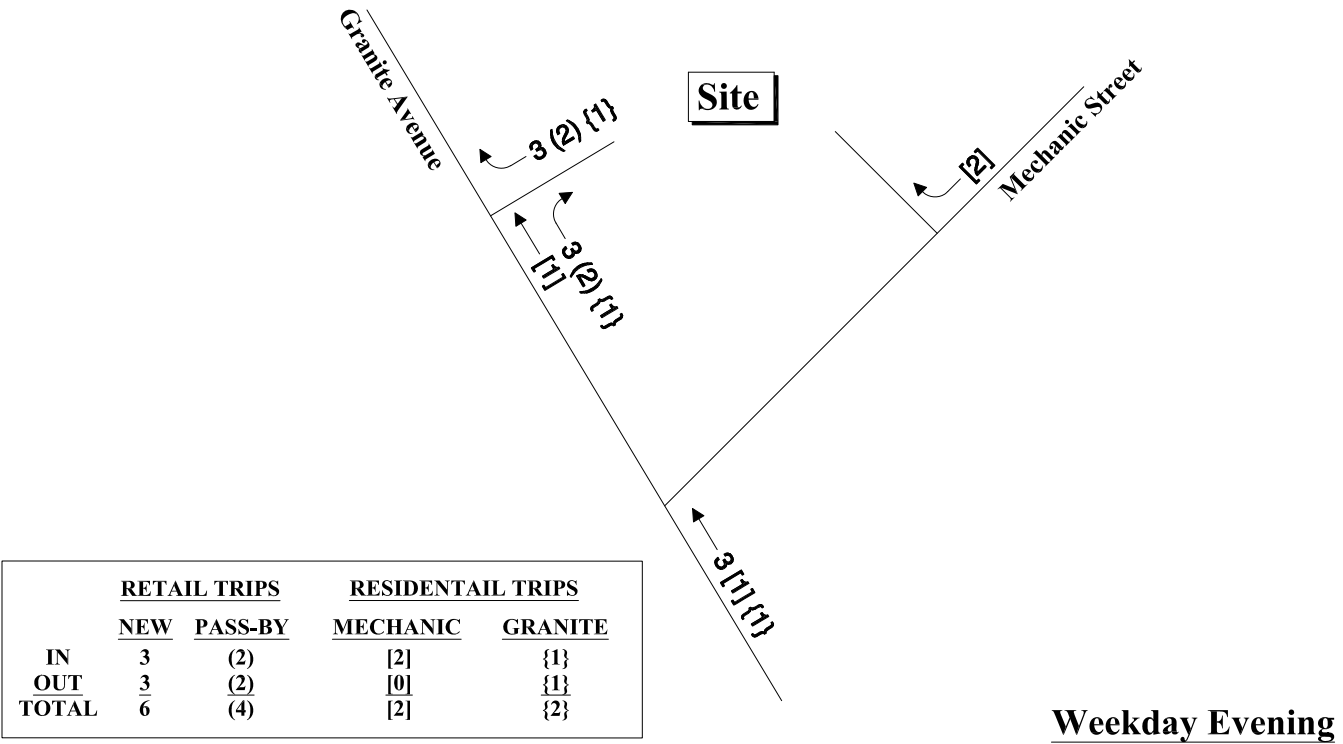
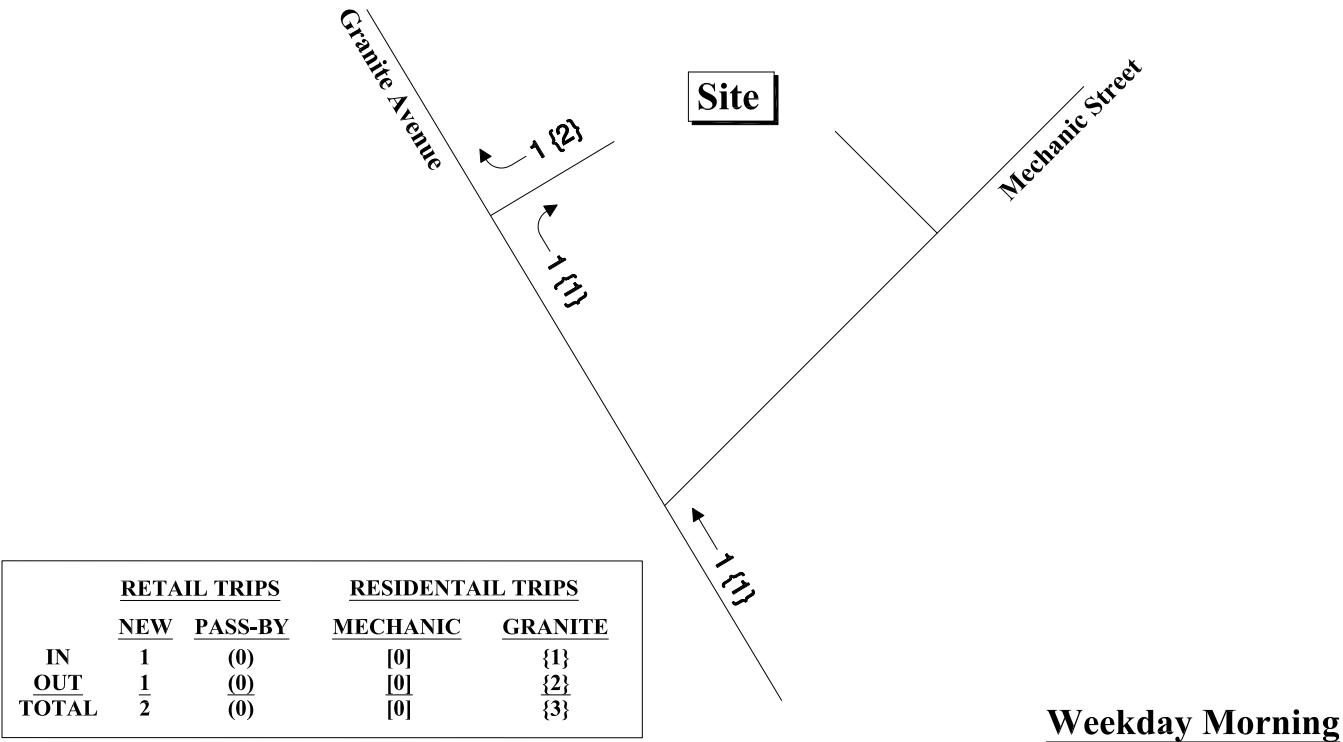


Proposed Loading / pick-up/drop off Zone (Time Restricted with signs). Spaces can be used for regular parking outside of the restricted times



## **Trip Generation Calculations**

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\* - TRIPS BASED ON ITE TRIP GENERATION METHODOLOGIES

↑  
Not to Scale



Existing Use Site Trips  
Peak Hour Traffic Volumes

Figure A-1

### Trip Generation Summary - Existing Uses

Time Period/Direction	Retail Space <sup>a</sup>	Single-Family Homes <sup>b</sup>	Multi-Family Residences <sup>c</sup>	Total
Weekday AM Peak Hour:				
Enter	1	1	0	2
Exit	<u>1</u>	<u>2</u>	<u>0</u>	<u>3</u>
Total	2	3	0	5
Weekday PM Peak Hour:				
Enter	5	2	1	8
Exit	<u>5</u>	<u>1</u>	<u>0</u>	<u>6</u>
Total	10	3	1	14

<sup>a</sup> ITE Land Use Code 820 (Shopping Center) for 2,466 sf.

<sup>b</sup> ITE Land Use Code 210 (Single-Family Detached Housing) for 3 dwelling units.

<sup>c</sup> ITE Land Use Code 220 (Multifamily Housing [Low-Rise]) for 1 dwelling unit.

### Trip Generation Summary - Proposed Uses

Time Period/Direction	Retail Space <sup>a</sup>	Residential Homes <sup>b</sup>	Total
Weekday AM Peak Hour:			
Enter	2	3	5
Exit	<u>2</u>	<u>9</u>	<u>11</u>
Total	4	12	16
Weekday PM Peak Hour:			
Enter	8	10	18
Exit	<u>8</u>	<u>6</u>	<u>14</u>
Total	16	16	32

<sup>a</sup> ITE Land Use Code 820 (Shopping Center) for 4,155 sf.

<sup>b</sup> ITE Land Use Code 221 (Multifamily Housing [Mid-Rise]) for 33 dwelling units.

### Trip Generation Comparison Summary

Time Period/Direction	Existing Uses	Proposed Uses	Trip Increases
Weekday AM Peak Hour:			
Enter	2	5	3
Exit	<u>3</u>	<u>11</u>	<u>8</u>
Total	5	16	11
Weekday PM Peak Hour:			
Enter	8	18	10
Exit	<u>6</u>	<u>14</u>	<u>8</u>
Total	14	32	18

### Trip Generation Characteristics Comparison Summary

Time Period/Direction	Existing Uses			Proposed Uses			Trip Increases	
	Retail Pass-By Trips <sup>a</sup>	Retail New Trips <sup>b</sup>	Residential Trips <sup>c</sup>	Retail Pass-By Trips <sup>d</sup>	Retail New Trips <sup>e</sup>	Residential Trips <sup>f</sup>	Pass-By Trips	New Trips
Weekday AM Peak Hour:								
Enter	0	1	1	0	2	3	0	3
Exit	0	1	2	0	2	9	0	8
Total	0	2	3	0	4	12	0	11
Weekday PM Peak Hour:								
Enter	2	3	3	3	5	10	1	9
Exit	2	3	1	3	5	6	1	7
Total	4	6	4	6	10	16	2	16

<sup>a</sup> 34% during weekday PM peak hour of ITE Land Use Code 820 (Shopping Center) trips for 2,466 sf.

<sup>b</sup> ITE Land Use Code 820 (Shopping Center) trips for 2,466 sf minus Existing Retail Pass-By Trips.

<sup>c</sup> ITE Land Use Code 210 (Single-Family Detached Housing) for 3 dwelling units and Land Use Code 220 (Multifamily Housing [Low-Rise]) for 1 dwelling unit.

<sup>d</sup> 34% during weekday PM peak hour of ITE Land Use Code 820 (Shopping Center) trips for 4,155 sf.

<sup>e</sup> ITE Land Use Code 820 (Shopping Center) trips for 4,155 sf minus Proposed Retail Pass-By Trips.

<sup>f</sup> ITE Land Use Code 221 (Multifamily Housing [Mid-Rise]) for 40 dwelling units.

ITE TRIP GENERATION WORKSHEET  
(10th Edition, Updated 2017)

LANDUSE: Shopping Center  
LANDUSE CODE: 820  
SETTING/LOCATION: General Urban/Suburban  
JOB NAME:  
JOB NUMBER:

Independent Variable ---  
FLOOR AREA (KSF): 2.466

WEEKDAY

RATES:		# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
				Average	Low	High	Average	Low	High	Enter	Exit
	DAILY	147	0.76	37.75	7.42	207.98	453	9	1,510	50%	50%
	AM PEAK OF GENERATOR	47	0.71	3.00	0.70	23.74	323	8	1,320	54%	46%
	PM PEAK OF GENERATOR	53	0.76	4.21	0.78	27.27	298	7	1,320	50%	50%
	AM PEAK (ADJACENT ST)	84	0.50	0.94	0.18	23.74	351	9	1,510	62%	38%
	PM PEAK (ADJACENT ST)	261	0.82	3.81	0.74	18.69	327	2	2,200	48%	52%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	94	47	47	486	243	243
AM PEAK OF GENERATOR	7	4	3	84	45	39
PM PEAK OF GENERATOR	12	6	6	40	20	20
AM PEAK (ADJACENT ST)	2	1	1	153	95	58
PM PEAK (ADJACENT ST)	10	5	5	35	17	18

SATURDAY

RATES:		# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
				Average	Low	High	Average	Low	High	Enter	Exit
	DAILY	58	0.71	46.12	13.07	167.89	602	56	1,510	50%	50%
	PEAK OF GENERATOR	119	0.87	4.50	1.42	15.10	416	4	1,510	52%	48%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	114	57	57	898	449	449
PEAK OF GENERATOR	11	6	5	33	17	16

SUNDAY

RATES:		# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
				Average	Low	High	Average	Low	High	Enter	Exit
	DAILY	30	-	21.10	4.15	148.15	509	47	1,510	50%	50%
	PEAK OF GENERATOR	24	-	2.79	0.39	12.40	382	47	1,268	49%	51%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	54	27	27	--	--	--
PEAK OF GENERATOR	7	3	4	--	--	--

ITE TRIP GENERATION WORKSHEET  
(10th Edition, Updated 2017)

LANDUSE: Single-Family Detached Housing

LANDUSE CODE: 210

SETTING/LOCATION: General Urban / Suburban

JOB NAME:

JOB NUMBER:

Independent Variable --- Number of Units

3 units

WEEKDAY

RATES:		# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
				Average	Low	High	Average	Low	High	Enter	Exit
	DAILY	159	0.95	9.44	4.81	19.39	264	10	2,900	50%	50%
	AM PEAK OF GENERATOR	157	0.89	0.76	0.36	2.27	231	10	2,900	26%	74%
	PM PEAK OF GENERATOR	165	0.92	1.00	0.49	2.98	217	10	2,900	64%	36%
	AM PEAK (ADJACENT ST)	173	0.89	0.74	0.33	2.27	219	10	2,900	25%	75%
	PM PEAK (ADJACENT ST)	190	0.92	0.99	0.44	2.98	242	10	2,900	63%	37%
TRIPS:											
				BY AVERAGE			BY REGRESSION				
				Total	Enter	Exit	Total	Enter	Exit		
DAILY				30	15	15	42	21	21		
AM PEAK OF GENERATOR				3	1	2	3	1	2		
PM PEAK OF GENERATOR				3	2	1	4	3	1		
AM PEAK (ADJACENT ST)				3	1	2	7	2	5		
PM PEAK (ADJACENT ST)				3	2	1	3	2	1		

SATURDAY

RATES:		# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
				Average	Low	High	Average	Low	High	Enter	Exit
	DAILY	52	0.91	9.54	5.32	15.25	207	10	1,000	50%	50%
	PEAK OF GENERATOR	31	0.87	0.93	0.64	1.75	188	10	650	54%	46%
TRIPS:											
				BY AVERAGE			BY REGRESSION				
				Total	Enter	Exit	Total	Enter	Exit		
DAILY				30	15	15	38	19	19		
PEAK OF GENERATOR				3	2	1	21	11	9		

SUNDAY

RATES:		# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
				Average	Low	High	Average	Low	High	Enter	Exit
	DAILY	51	0.94	8.55	4.74	11.82	209	10	1,000	50%	50%
	PEAK OF GENERATOR	31	0.91	0.85	0.60	1.45	193	10	650	53%	47%
TRIPS:											
				BY AVERAGE			BY REGRESSION				
				Total	Enter	Exit	Total	Enter	Exit		
DAILY				26	13	13	-40	-20	-20		
PEAK OF GENERATOR				2	1	1	13	7	6		



ITE TRIP GENERATION WORKSHEET  
(10th Edition, Updated 2017)

LANDUSE: Multi-Family Housing (Low-Rise): 1-2 Story  
LANDUSE CODE: 220  
SETTING/LOCATION: General Urban/Suburban  
JOB NAME:  
JOB NUMBER:

Independent Variable --- Number of Units

1 units

**WEEKDAY**

RATES:		# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
				Average	Low	High	Average	Low	High	Enter	Exit
	DAILY	29	0.96	7.32	4.45	10.97	168	5	590	50%	50%
	AM PEAK OF GENERATOR	36	0.91	0.56	0.34	0.97	161	5	495	28%	72%
	PM PEAK OF GENERATOR	35	0.94	0.67	0.41	1.25	146	5	495	59%	41%
	AM PEAK (ADJACENT ST)	42	0.90	0.46	0.18	0.74	199	5	650	23%	77%
	PM PEAK (ADJACENT ST)	50	0.86	0.56	0.18	1.25	187	5	650	63%	37%

TRIPS:		BY AVERAGE			BY REGRESSION		
		Total	Enter	Exit	Total	Enter	Exit
	DAILY	8	4	4	-34	-17	-17
	AM PEAK OF GENERATOR	1	0	1	1	0	1
	PM PEAK OF GENERATOR	1	1	0	2	1	1
	AM PEAK (ADJACENT ST)	0	0	0	1	0	1
	PM PEAK (ADJACENT ST)	1	1	0	1	1	0

**SATURDAY**

RATES:		# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
				Average	Low	High	Average	Low	High	Enter	Exit
	DAILY	5	0.93	8.14	3.36	11.40	89	48	148	50%	50%
	PEAK OF GENERATOR	5	0.92	0.70	0.41	0.93	89	48	148	50%	50%

TRIPS:		BY AVERAGE			BY REGRESSION		
		Total	Enter	Exit	Total	Enter	Exit
	DAILY	10	5	5	-508	-254	-254
	PEAK OF GENERATOR	2	1	1	-34	-17	-17

**SUNDAY**

RATES:		# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
				Average	Low	High	Average	Low	High	Enter	Exit
	DAILY	5	0.96	6.28	2.61	8.22	89	48	148	50%	50%
	PEAK OF GENERATOR	5	0.93	0.67	0.36	0.93	89	48	148	50%	50%

TRIPS:		BY AVERAGE			BY REGRESSION		
		Total	Enter	Exit	Total	Enter	Exit
	DAILY	6	3	3	-332	-166	-166
	PEAK OF GENERATOR	2	1	1	-40	-20	-20

ITE TRIP GENERATION WORKSHEET  
(10th Edition, Updated 2017)

LANDUSE: Shopping Center  
LANDUSE CODE: 820  
SETTING/LOCATION: General Urban/Suburban  
JOB NAME:  
JOB NUMBER:

Independent Variable ---  
FLOOR AREA (KSF): 4.155

WEEKDAY

RATES:		# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
				Average	Low	High	Average	Low	High	Enter	Exit
	DAILY	147	0.76	37.75	7.42	207.98	453	9	1,510	50%	50%
	AM PEAK OF GENERATOR	47	0.71	3.00	0.70	23.74	323	8	1,320	54%	46%
	PM PEAK OF GENERATOR	53	0.76	4.21	0.78	27.27	298	7	1,320	50%	50%
	AM PEAK (ADJACENT ST)	84	0.50	0.94	0.18	23.74	351	9	1,510	62%	38%
	PM PEAK (ADJACENT ST)	261	0.82	3.81	0.74	18.69	327	2	2,200	48%	52%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	158	79	79	692	346	346
AM PEAK OF GENERATOR	12	6	6	89	48	41
PM PEAK OF GENERATOR	18	9	9	58	29	29
AM PEAK (ADJACENT ST)	4	2	2	154	95	59
PM PEAK (ADJACENT ST)	16	8	8	52	25	27

SATURDAY

RATES:		# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
				Average	Low	High	Average	Low	High	Enter	Exit
	DAILY	58	0.71	46.12	13.07	167.89	602	56	1,510	50%	50%
	PEAK OF GENERATOR	119	0.87	4.50	1.42	15.10	416	4	1,510	52%	48%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	192	96	96	1,242	621	621
PEAK OF GENERATOR	19	10	9	50	26	24

SUNDAY

RATES:		# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
				Average	Low	High	Average	Low	High	Enter	Exit
	DAILY	30	-	21.10	4.15	148.15	509	47	1,510	50%	50%
	PEAK OF GENERATOR	24	-	2.79	0.39	12.40	382	47	1,268	49%	51%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	88	44	44	--	--	--
PEAK OF GENERATOR	12	6	6	--	--	--

**ITE TRIP GENERATION WORKSHEET**  
**(10th Edition, Updated 2017)**

**LANDUSE:** Multifamily Housing (Mid-Rise): 3-10 stories  
**LANDUSE CODE:** 221 Independent Variable --- Number of Units  
**SETTING/LOCATION:** General Urban/Suburban  
**JOB NAME:** 33 units  
**JOB NUMBER:**

**WEEKDAY**

RATES:		# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
				Average	Low	High	Average	Low	High	Enter	Exit
	DAILY	27	0.77	5.44	1.27	12.50	205	21	494	50%	50%
	AM PEAK OF GENERATOR	48	0.69	0.32	0.06	0.77	225	21	1,168	27%	73%
	PM PEAK OF GENERATOR	47	0.66	0.41	0.09	1.26	211	21	1,168	60%	40%
	AM PEAK (ADJACENT ST)	53	0.67	0.36	0.06	1.61	207	26	703	26%	74%
	PM PEAK (ADJACENT ST)	60	0.72	0.44	0.15	1.11	208	26	703	61%	39%

**TRIPS:**

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	180	90	90	180	90	90
AM PEAK OF GENERATOR	12	3	9	14	4	10
PM PEAK OF GENERATOR	14	8	6	18	11	7
AM PEAK (ADJACENT ST)	12	3	9	12	3	9
PM PEAK (ADJACENT ST)	16	10	6	16	10	6

**SATURDAY**

RATES:		# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
				Average	Low	High	Average	Low	High	Enter	Exit
	DAILY	6	0.73	4.91	4.03	8.51	224	111	336	50%	50%
	PEAK OF GENERATOR	8	0.89	0.44	0.34	0.73	264	111	462	49%	51%

**TRIPS:**

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	164	82	82	518	259	259
PEAK OF GENERATOR	16	8	8	22	11	11

**SUNDAY**

RATES:		# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
				Average	Low	High	Average	Low	High	Enter	Exit
	DAILY	6	--	4.09	3.06	8.41	224	111	336	50%	50%
	PEAK OF GENERATOR	6	--	0.39	0.26	1.07	224	111	336	62%	38%

**TRIPS:**

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	136	68	68	--	--	--
PEAK OF GENERATOR	14	9	5	--	--	--

## Capacity and Queue Analysis Worksheets

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## 2: Granite Ave & Mechanic St HCM 6th TWSC

2027 No-Build  
Weekday AM

### Intersection

Int Delay, s/veh	0.2					
Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations	↑↑					↑
Traffic Vol, veh/h	979	0	0	0	0	15
Future Vol, veh/h	979	0	0	0	0	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	16979	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	0	0	0	0	2
Mvmt Flow	1088	0	0	0	0	17

Major/Minor	Major1	Minor1
Conflicting Flow All	0	- 544
Stage 1	-	-
Stage 2	-	-
Critical Hdwy	-	- 6.94
Critical Hdwy Stg 1	-	-
Critical Hdwy Stg 2	-	-
Follow-up Hdwy	-	- 3.32
Pot Cap-1 Maneuver	- 0	0 483
Stage 1	- 0	0 -
Stage 2	- 0	0 -
Platoon blocked, %	-	
Mov Cap-1 Maneuver	-	- 483
Mov Cap-2 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-

Approach	NB	SW
HCM Control Delay, s	0	12.7
HCM LOS		B

Minor Lane/Major Mvmt	NBTSWLn1
Capacity (veh/h)	- 483
HCM Lane V/C Ratio	- 0.035
HCM Control Delay (s)	- 12.7
HCM Lane LOS	- B
HCM 95th %tile Q(veh)	- 0.1



6: Mechanic St & Site  
HCM 6th TWSC

2027 No-Build  
Weekday AM

Intersection

Int Delay, s/veh 0

Movement EBL EBR NEL NET SWT SWR

Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	15	0
Future Vol, veh/h	0	0	0	0	15	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	17742	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	2	0
Mvmt Flow	0	0	0	0	17	0

Major/Minor Minor2 Major2

Conflicting Flow All	-	17	-	0
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	6.2	-	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	3.3	-	-
Pot Cap-1 Maneuver	0	1068	-	-
Stage 1	0	-	-	-
Stage 2	0	-	-	-
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	-	1068	-	-
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach EB SW

HCM Control Delay, s	0	0
HCM LOS	A	

Minor Lane/Major Mvmt EBLn1 SWT SWR

Capacity (veh/h)	-	-	-
HCM Lane V/C Ratio	-	-	-
HCM Control Delay (s)	0	-	-
HCM Lane LOS	A	-	-
HCM 95th %tile Q(veh)	-	-	-



## 2: Granite Ave & Mechanic St HCM 6th TWSC

2027 No-Build

Weekday PM

### Intersection

Int Delay, s/veh	0.3					
Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations	↑↑					↑
Traffic Vol, veh/h	863	0	0	0	0	19
Future Vol, veh/h	863	0	0	0	0	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	16979	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	0	0	0	0	2
Mvmt Flow	959	0	0	0	0	21

Major/Minor	Major1	Minor1
Conflicting Flow All	0	- 480
Stage 1	-	-
Stage 2	-	-
Critical Hdwy	-	- 6.94
Critical Hdwy Stg 1	-	-
Critical Hdwy Stg 2	-	-
Follow-up Hdwy	-	- 3.32
Pot Cap-1 Maneuver	- 0	0 532
Stage 1	- 0	0 -
Stage 2	- 0	0 -
Platoon blocked, %	-	
Mov Cap-1 Maneuver	-	- 532
Mov Cap-2 Maneuver	-	-
Stage 1	-	-
Stage 2	-	-

Approach	NB	SW
HCM Control Delay, s	0	12
HCM LOS		B

Minor Lane/Major Mvmt	NBTSWLn1
Capacity (veh/h)	- 532
HCM Lane V/C Ratio	- 0.04
HCM Control Delay (s)	- 12
HCM Lane LOS	- B
HCM 95th %tile Q(veh)	- 0.1



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Intersection

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Int Delay, s/veh            0

Movement	EBL	EBR	NEL	NET	SWT	SWR
----------	-----	-----	-----	-----	-----	-----

Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	19	2
Future Vol, veh/h	0	0	0	0	19	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	17742	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	2	0
Mvmt Flow	0	0	0	0	21	2

Major/Minor	Minor2	Major2
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Conflicting Flow All	-	22	-	0
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	6.2	-	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	3.3	-	-
Pot Cap-1 Maneuver	0	1061	-	-
Stage 1	0	-	-	-
Stage 2	0	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	-	1061	-	-
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	EB	SW
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HCM Control Delay, s	0	0
HCM LOS	A	

Minor Lane/Major Mvmt	EBLn1	SWT	SWR
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Capacity (veh/h)	-	-	-
HCM Lane V/C Ratio	-	-	-
HCM Control Delay (s)	0	-	-
HCM Lane LOS	A	-	-
HCM 95th %tile Q(veh)	-	-	-

## 2: Granite Ave & Mechanic St HCM 6th TWSC

2027 Build  
Weekday AM

### Intersection

Int Delay, s/veh	0.3					
Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations	↑↑					↑
Traffic Vol, veh/h	982	0	0	0	0	27
Future Vol, veh/h	982	0	0	0	0	27
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	16979	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	0	0	0	0	2
Mvmt Flow	1091	0	0	0	0	30

Major/Minor	Major1	Minor1				
Conflicting Flow All	0	-	-	-	546	
Stage 1	-	-	-	-	-	
Stage 2	-	-	-	-	-	
Critical Hdwy	-	-	-	-	6.94	
Critical Hdwy Stg 1	-	-	-	-	-	
Critical Hdwy Stg 2	-	-	-	-	-	
Follow-up Hdwy	-	-	-	-	3.32	
Pot Cap-1 Maneuver	-	0	-	0	482	
Stage 1	-	0	-	0	-	
Stage 2	-	0	-	0	-	
Platoon blocked, %	-	-	-	-	-	
Mov Cap-1 Maneuver	-	-	-	-	482	
Mov Cap-2 Maneuver	-	-	-	-	-	
Stage 1	-	-	-	-	-	
Stage 2	-	-	-	-	-	

Approach	NB	SW
HCM Control Delay, s	0	13
HCM LOS		B

Minor Lane/Major Mvmt	NBTSWLn1
Capacity (veh/h)	- 482
HCM Lane V/C Ratio	- 0.062
HCM Control Delay (s)	- 13
HCM Lane LOS	- B
HCM 95th %tile Q(veh)	- 0.2



6: Mechanic St & Site  
HCM 6th TWSC

2027 Build  
Weekday AM

Intersection

Int Delay, s/veh 3.3

Movement EBL EBR NEL NET SWT SWR

Lane Configurations						
Traffic Vol, veh/h	0	12	0	0	15	4
Future Vol, veh/h	0	12	0	0	15	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	17742	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	2	0
Mvmt Flow	0	13	0	0	17	4

Major/Minor Minor2 Major2

Conflicting Flow All	-	19	-	0
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	6.2	-	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	3.3	-	-
Pot Cap-1 Maneuver	0	1065	-	-
Stage 1	0	-	-	-
Stage 2	0	-	-	-
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	-	1065	-	-
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach EB SW

HCM Control Delay, s	8.4	0
HCM LOS	A	

Minor Lane/Major Mvmt EBLn1 SWT SWR

Capacity (veh/h)	1065	-	-
HCM Lane V/C Ratio	0.013	-	-
HCM Control Delay (s)	8.4	-	-
HCM Lane LOS	A	-	-
HCM 95th %tile Q(veh)	0	-	-

## 2: Granite Ave & Mechanic St HCM 6th TWSC

2027 Build  
Weekday PM

### Intersection

Int Delay, s/veh	0.4					
Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations	↑↑					↑
Traffic Vol, veh/h	871	0	0	0	0	26
Future Vol, veh/h	871	0	0	0	0	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	16979	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	0	0	0	0	2
Mvmt Flow	968	0	0	0	0	29

Major/Minor	Major1	Minor1				
Conflicting Flow All	0	-	-	-	484	
Stage 1	-	-	-	-	-	
Stage 2	-	-	-	-	-	
Critical Hdwy	-	-	-	-	6.94	
Critical Hdwy Stg 1	-	-	-	-	-	
Critical Hdwy Stg 2	-	-	-	-	-	
Follow-up Hdwy	-	-	-	-	3.32	
Pot Cap-1 Maneuver	-	0	-	0	529	
Stage 1	-	0	-	0	-	
Stage 2	-	0	-	0	-	
Platoon blocked, %	-	-	-	-	-	
Mov Cap-1 Maneuver	-	-	-	-	529	
Mov Cap-2 Maneuver	-	-	-	-	-	
Stage 1	-	-	-	-	-	
Stage 2	-	-	-	-	-	



Approach	NB	SW
HCM Control Delay, s	0	12.2
HCM LOS		B

Minor Lane/Major Mvmt	NBTSWLn1
Capacity (veh/h)	- 529
HCM Lane V/C Ratio	- 0.055
HCM Control Delay (s)	- 12.2
HCM Lane LOS	- B
HCM 95th %tile Q(veh)	- 0.2

Intersection

Int Delay, s/veh 1.6

Movement EBL EBR NEL NET SWT SWR

Lane Configurations						
Traffic Vol, veh/h	0	7	0	0	19	11
Future Vol, veh/h	0	7	0	0	19	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	17742	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	2	0
Mvmt Flow	0	8	0	0	21	12

Major/Minor Minor2 Major2

Conflicting Flow All	-	27		-	0
Stage 1	-	-		-	-
Stage 2	-	-		-	-
Critical Hdwy	-	6.2		-	-
Critical Hdwy Stg 1	-	-		-	-
Critical Hdwy Stg 2	-	-		-	-
Follow-up Hdwy	-	3.3		-	-
Pot Cap-1 Maneuver	0	1054		-	-
Stage 1	0	-		-	-
Stage 2	0	-		-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	-	1054		-	-
Mov Cap-2 Maneuver	-	-		-	-
Stage 1	-	-		-	-
Stage 2	-	-		-	-

Approach EB SW

HCM Control Delay, s	8.4	0
HCM LOS	A	

Minor Lane/Major Mvmt EBLn1 SWT SWR

Capacity (veh/h)	1054	-	-
HCM Lane V/C Ratio	0.007	-	-
HCM Control Delay (s)	8.4	-	-
HCM Lane LOS	A	-	-
HCM 95th %tile Q(veh)	0	-	-



October 27, 2021

Tim Czerwienski  
Director of Planning and Community Development  
Town of Milton  
525 Canton Avenue  
Milton, MA 02186

**Re: Traffic Impact Evaluation  
440 Granite Avenue Mixed-Use Redevelopment  
Milton, Massachusetts**

Dear Mr. Czerwienski,

BETA Group, Inc. (BETA) has reviewed the second round of transportation response to comments Memo submitted by VHB dated October 19, 2021. The VHB responses addressed the transportation comments made in the BETA letter dated October 5, 2021. VHB responses are shown in **bold** and comments from BETA to VHB responses are provided in [blue text](#). For completeness, all comments and responses are provided below.

## BASIS OF REVIEW

BETA reviewed the following documents:

- **Response to October 5, 2021, BETA Traffic Comments Memo, 440 Granite Avenue Mixed Use Redevelopment**, dated October 19, 2021, prepared by VHB

## PROJECT DESCRIPTION

Oranmore Enterprises, LLC (Proponent) has proposed a mixed use, multi-unit residential and commercial building at 426 & 440 Granite Avenue and 29 Mechanic Street. The site currently contains two commercial buildings and five residential units. The proposed project would include 33 residential units and 3 commercial units (4,155 SF) with 46 parking spaces on site.

The site is located on the corner of Granite Avenue and Mechanic Street in Milton. Access to the site is currently provided by three driveways on Granite Avenue and four driveways on Mechanic Street. The project proposes to close the three curb cuts on Granite Avenue and reduce the number of curb cuts on Mechanic Street from four to three. These three driveways will serve as the vehicular access points.

BETA Group, Inc.'s (BETA) review consists of the following key components:

- Traffic
- Parking
- Roadway Improvements

## TRAFFIC IMPACT EVALUATION REVIEW

### STUDY AREA

The following location, within the Town of Milton was identified as the study intersection in the Transportation Impact Study (TIS):

- Granite Avenue at Mechanic Street - unsignalized

**T1.** The proposed project area is located within a congested intersection network. BETA recommends the following intersections be fully evaluated as part of the traffic study:

- Granite Avenue at Adams Street & Boulevard Street
- Adams Street at Mechanic Street

**VHB:** The Institute of Transportation Engineers (ITE) methodologies<sup>1</sup> and Massachusetts Department of Transportation's (MassDOT's) guidelines<sup>2</sup> suggest that an intersection should be evaluated when site trips are projected to experience a noticeable increase in peak hour traffic volumes (i.e.,  $\geq 100$  vehicles and/or  $> 5$  percent). The rationale is that an increase of 100 vehicles per hour or 5 percent could impact the vehicular operations on an intersection approach. As summarized in Table 1 of the Traffic Impact Evaluation prepared for the Project, redevelopment of the site is projected to generate minimal site trips and is not anticipated to meet these thresholds at any location. However, for planning purposes, VHB had evaluated the impacts of the Project at the Granite Avenue and Mechanic Street intersection along with a detailed review of site access/circulation. To address BETA's comment, VHB has conducted operational analyses at the Granite Avenue intersections with Boulevard Street/Adams Street and at the Adams Street intersection with Mechanic Street/Church Street for 2027 No-Build and 2027 Build traffic volume conditions. In accordance with MassDOT's guidelines for conducting traffic studies in COVID-19 conditions, recent traffic volumes that were previously developed by others<sup>3</sup> were used in performing the intersection operational analyses for the Project at these supplemental locations rather than perform new counts in the pandemic conditions. Specifically, the 2027 Build traffic volumes developed as part of the Residences at East Milton Traffic Impact Study were used to represent future base traffic volumes (i.e., 2027 No-Build) for the two additional study locations. The traffic signal input parameters were also obtained from the same data source. The 2027 No-Build weekday morning and weekday afternoon peak-hour traffic volumes are illustrated on Figure 1. The additional site trips for the Project were distributed through the intersections based on existing travel patterns as reflected on Figure 2 for the weekday morning and weekday afternoon midday peak hours. These site trips were then added to the 2027 No-Build traffic volumes to develop the 2027 Build peak-hour traffic-volume networks. The 2027 Build weekday morning and weekday afternoon peak-hour traffic volumes are illustrated on Figure 3. Intersection operational analyses were performed for the supplemental intersections based on the concepts and procedures in the Highway Capacity Manual (HCM).<sup>4</sup> Since the HCM 2010 methodology does not support the signal configurations at the additional study locations included in this response, HCM 2000 methodology was used to evaluate intersections' operations. The intersection operational analysis results are summarized in Table 1. The analysis worksheets are provided in the Appendix. Consistent with ITE and MassDOT methodologies, the minimal

**traffic-volume increases along the adjacent roadway network associated with the proposed redevelopment project result in negligible impacts to the supplemental intersections. As shown in Table 1, the Project would result in negligible change (0.1 second increase) in overall delays at the Granite Avenue signalized intersections with Boulevard Street and Adams Street and no change in overall delays at the Adams Street signalized intersection with Mechanic Street and Church Street during the weekday morning and weekday afternoon peak hours.**

**BETA: Comment Addressed.**

## **PEDESTRIAN AND ROADWAY FACILITIES**

Sidewalks exist along both sides of Mechanic Street and on the east side of Granite Avenue. There are no bicycle facilities in the vicinity of the project.

- T2.** BETA staff conducted a site visit on 7/13/21 and observed poor sidewalk and roadway conditions on Mechanic Street in area of the project. BETA suggests repairing the sidewalk on both sides of Mechanic Street, coupled with new pavement.

**VHB: The existing sidewalk along the site frontages on Mechanic Street and Granite Avenue will be improved as part of the Project, by widening and by adding granite curbing. Repairs to the existing sidewalk on the far side (south side) of Mechanic Street are not included in the scope of the Project.**

**BETA: Comment Addressed. It is noted that the sidewalk condition is poor on both sides of Mechanic Street and the south side sidewalk will also need improvement.**

**VHB:**

**Response:** As noted in VHB's September 16, 2021 response, the existing sidewalk along the Site frontages on Mechanic Street and Granite Avenue will be improved as part of the Project, by widening and by adding granite curbing. Repairs to the existing sidewalk on the far side (south side) of Mechanic Street are not included in the scope of the Project.

Improvement of public sidewalks are typically undertaken by the Town as part of scheduled maintenance/repair projects and is generally preceded by utility repairs/replacement in the street when necessary. The Developer will coordinate the proposed improvements along the Site frontages that are shown on the site plans with any repairs that the Department of Public Works (DPW) may plan for sections of the roadway that are beyond the scope of the development project's improvements.

**BETA: Comment Addressed.**

- T3.** ADA-compliant pedestrian ramps should be upgraded at the crosswalk on Granite Avenue at Mechanic Street as well as the driveway openings on Mechanic Street.

**VHB:**

**Response:** AN ADA complaint pedestrian ramp will be constructed on the near side (north side) of Mechanic Street at its intersection with Granite Avenue. Site driveway opening on Mechanic Street will also be furnished with ADA compliant pedestrian ramps. Repairs to ramps on the far side (south side) of Mechanic Street and at other locations beyond the Project limits are not included in the scope.

**BETA:** The pedestrian ramp on the south side is not ADA-compliant and should also be reconstructed as it connects with the north side ramp via the crosswalk.

**VHB:**

**Response:** Reconstruction of the pedestrian ramp at the south end of the crosswalk across Mechanic Street can be completed by the Developer as part of the development project. The Town would be responsible for the design of the southerly ramp and gaining permission from the abutter to reconstruct the ramp should the ramp fall fully or partially on private property.

**BETA:** Comment Addressed.

## TRAFFIC DATA

Traffic turning movement counts (TMCs) used for the TIS were taken from the *Residences at East Milton Traffic Impact Study*, dated November 2020. Roadway traffic volume data was obtained in September 2017 and used to develop the Existing (2019) conditions for the Residences at East Milton Traffic Impact Study.

- T4.** The reference traffic data utilized for the study was not provided for our review. Please provide existing conditions traffic data for the study area from the East Milton Traffic Study.

**VHB:** A copy of the traffic counts and traffic-volume networks from the Residences at East Milton Traffic Impact Study are provided in the Appendix. An electronic copy of that traffic study is on file with the Town of Milton.

**BETA:** Comment Addressed.

- T5.** All backup traffic, pedestrian and bicycle volumes should be provided for our review for the following intersections:

- Granite Avenue at Mechanic Street
- Granite Avenue at Adams Street & Boulevard Street
- Adams Street at Mechanic Street

**VHB:** As noted in response to Comment T4, a copy of the traffic counts from the Residences at East Milton Traffic Impact Study is provided in the Appendix. Those counts include automobiles and non-motorized modes of transportation.

**BETA:** Comment Addressed.

## PARKING

The conceptual plans show a total of 46 parking spaces on the site (40 compact, 4 standard, 2 accessible). Four outdoor spaces will be accessed from Mechanic Street, two of which are compact and

in tandem. There will be 42 spaces inside the building also accessed from Mechanic Street. The design includes a “semi-automated lift/slide puzzle system” provided by “Park Plus” which consists of 38 compact spaces. Inside the building there will also be 2 standard spaces and 2 accessible spaces. For on-street parking, the project proposes to close the existing three curb cuts on Granite Avenue which will allow for 3 new parking spaces. The two spaces closest to Mechanic Street will operate as a loading zone during specified times and days.

- T6.** The number of off-street parking spaces (1 space per 250 SF of retail) [17 spaces] required by Milton Zoning Bylaws Section VII for the proposed commercial square footage is not met in the plans. The parking deficit needs to be addressed. Where will visitors to the site park?

**VHB:** The site plan calls for four on-site parking spaces off of Mechanic Street and 11 spaces on Granite Avenue, in front of the proposed building, to accommodate the proposed 3,750 SF of commercial space. The Applicant has requested a Variance from the Town of Milton’s off-street parking requirements.

**BETA:** It is noted that the proposed four on-site parking spaces would not accommodate the parking demand for the project commercial space and that public on-street spaces would be needed to accommodate this demand. Indicate the types of businesses that will occupy the commercial space and if the proposed parking supply (on-site + on-street) is expected to accommodate projected demand for these spaces. Will the project remove any existing on-street parking spaces on the north side of Mechanic Street?

**VHB:**

**Response:** The Developer is evaluating the potential for eliminating two of the proposed commercial spaces in addition to reducing the size of the commercial space to the current level (approximately 1,500 sf) or even less than the current SF. The proposed on-site spaces are similar to what are now available for the existing commercial space. It is also noted that the prior East Milton Square parking studies have shown that Granite Avenue parking spaces have been underutilized in the past.

The proposed development will create three more parking spaces on Granite Avenue than what currently exists through the elimination of curb cuts on Granite Avenue, as well as a double loading zone on Granite Avenue that does not exist. The combination of reduced commercial space, four on-site spaces, and three new Granite Avenue on-street spaces can accommodate approximately 1,750 sf of commercial space, which exceeds the final proposal for commercial space in the development plan. The Developer has applied for variances for the on-site parking space requirement.

**BETA:** Will the project remove any existing on-street parking spaces on the north side of Mechanic Street?

- T7.** 40 of the 46 (87%) proposed parking spaces are compact. Milton Zoning Bylaws Section VII allows 25% of the required off-street parking spaces to be compact vehicles. The proposed compact spaces exceed the Town’s zoning bylaw and needs to be addressed.

**VHB:** The Town of Milton Zoning By-Laws do not address automated parking systems which accommodate cars, including SUVs, in spaces with the proposed dimensions. The Applicant has requested a Variance from the Board of Appeals for this type of parking.

BETA: The Town will need to determine if the definition of compact spaces applies to vehicle stacking systems.

VHB:

**Response:** The Developer has applied for a variance related to the above requirement.

BETA: Comment Addressed.

**T8.** The functionality and daily operations of the stacked parking system need to be defined. For instance:

- a. How long does it take for a vehicle to load into the system?
- b. How do residents enter and exit their vehicle when they are retrieving it in the stacking system?
- c. "There will be two entrance/exit bays to the parking area to reduce waiting times." Please elaborate.

VHB: The development team is working closely with the vendor of the stacked parking system to ensure that the development needs align with the operational characteristics of the system. The following information was provided by the vendor related to the system they are proposing at this site. The specific system that is proposed for the project is referred to as Semi-Automated Lift Slide/Puzzle with no attendant required. The Lift Slide model allows independent and remote access by the user, eliminating the need for valets or attendants. The user commands the module from the LED screen, or by pressing a FOB from up to 100 feet away. Either method activates the system to lift, lower, and traverse bringing autos to the ground level where a user can access their own vehicle. Unlike a typical stacker where one second tier space is available for every surface space, the Lift Slide system involves the loss of one space for each upper tier level, to allow for mechanical maneuverability. The flexibility of the system design allows for two to 15 levels of efficient stacked parking and up to two levels of pit level (below grade) parking. The system has fail- and fall-safe mechanisms in place, such as gravity locks, cable guards, sensors that will not allow the upper level vehicle to lower on the car below, overrun systems that will cease operation should the vehicle be too large, infrared that can detect movement, as well as security measures that will not allow the system to operate should an auto be misaligned or simply doesn't fit. As an additional protective measure, gates are installed across each module bay entry that will lift vertically when a vehicle is summoned. The system is chain/cable and motor driven. Final design of the system will determine the retrieval and dwell times for the project. Approximately times identified by the vendor, for discussion purposes, are outlined below. These times are subject to change based on the final design that takes into consideration vertical heights and platform width. User familiarity with the system will also affect retrieval times.

**Park & Vehicle retrieval times:**

- Gate to open= 8 seconds
- Traversing time 11-15 seconds
- Lift/lower time= 12-16 seconds



BETA: Will there be the potential for vehicles to queue onto Mechanic Street if multiple users want to enter the stacker at the same time? How will the two entrance/exit bays reduce waiting times? Has the Milton Fire Department reviewed the proposed stacker system?

VHB:

**Response:** Based on the estimated parking times indicated by the vendor of the system for a 2-bay operation and the anticipated space usage within the site, it was determined that approximately five cars would be able to park/wait at a time without interfering with the entering operations. Based on the total parking supply proposed, this processing capacity is expected to be adequate for the project. The stacker parking system has been reviewed by the Milton Fire Department.

BETA: Comment Addressed.

- T9. Provide more information on how the tandem parking spaces at the Mechanic Street curb cut will be used or managed. Milton Zoning Bylaws Section VII state “required parking areas shall be designed so that each motor vehicle may proceed to and from its parking space without requiring the movement of another vehicle.”

**VHB: The Applicant expect that the tandem spaces will be designated for use by the business owners. The tandem spaces will be designated to a single business.**

BETA: These spaces should be signed to restrict parking to businesses owners/employees.

VHB: Comment Acknowledged.

BETA: Comment Addressed.

- T10. Describe parking and delivery operations (times and designation) at the proposed loading zone on Granite Avenue. Are rideshare vehicles allowed to use this zone?

**VHB: The designed curb side area on Granite Avenue is intended for delivery and ride-share vehicles. If desired by the Town, the Applicant is willing to discuss imposing a time restriction for large trucks that may serve the site.**

The Milton Zoning Bylaws Section VIII – Administration, D-Site Plan Approval, Section 3.d. indicates that adequate space for off-street vehicle loading and unloading shall be provided. The project does not provide any off-street loading space. How does the Applicant plan to address this issue?

VHB:

**Response:** The Developer expects that the determination of the adequacy of the loading and delivery plan is an element of site plan approval by the Planning Board under the provision cited. As discussed in the project submittals, the proposal is to locate the loading zone on Granite Avenue closer to the commercial space and the front door of the condominium which will also serve deliveries. This design eliminates the need for site related delivery trucks to stop on Mechanic Street for loading/unloading, which in turn protects the views from the residences on Mechanic Street.

BETA: Comment Addressed.

## SAFETY EVALUATION

**T11.** A crash analysis should be conducted for the following intersections:

- Granite Avenue at Mechanic Street
- Granite Avenue at Adams Street & Boulevard Street
- Adams Street at Mechanic Street

**VHB:** Crash data for the study area intersections were obtained from MassDOT for the most recent five-year period available (between 2016 and 2020). In addition, crash rates were calculated for each study area intersection and compared with the statewide and district-wide (MassDOT District 6) averages. For signalized intersections, the statewide average is 0.78 collisions per million entering vehicles (c/mev) and the district-wide average is 0.71 c/mev. For unsignalized intersections, the statewide average is 0.57 c/mev and the district-wide average is 0.52 c/mev. The crash rate worksheets are provided in the Appendix. A summary of the MassDOT crash data at the study area intersections is provided in Table 2. Based on the MassDOT IMPACT website, no crashes were reported at the Granite Avenue and Mechanic Street intersection between 2016 and 2020. In addition, there were 2 collisions reported at the Adams Street, Mechanic Street, and Church Street signalized intersection. The crash rate was calculated to be 0.09 c/mev, which is less than the district-wide and statewide averages for signalized intersections. The reported incidents do not suggest a safety deficiency. The Granite Avenue signalized intersections with Boulevard Street and Adams Street have experienced an average of 2.6 reported collisions per year during the 5-year period. Based on this information, the crash rate was determined to be 0.36 c/mev, which is less than the district-wide and statewide averages for signalized intersections. Approximately 85 percent (11 of 13) of the incidents resulted in property damage only and approximately 46 percent (6 of 13) were identified as rear-end-type collisions. The wet roadway surface condition was identified to be a contributing factor in one of the reported collisions. The reported incidents do not suggest a safety deficiency.

[BETA: Comment addressed.](#)

## FUTURE NO-BUILD TRAFFIC CONDITIONS

### *BACKGROUND TRAFFIC GROWTH*

The TIS evaluated a seven-year buildout to represent future year 2027. The 2027 No-Build conditions were developed as part of the Residences at East Milton Traffic Impact Study. These conditions were used to represent the future base traffic volumes for the site. The Residences at East Milton Traffic Study applied a traffic growth rate of 1% per year, compounded annually. The growth rate was determined by a review of recent and historic traffic data collection.

### *SITE-SPECIFIC DEVELOPMENT PROJECTS*

The Residences at East Milton Traffic Impact Study reviewed the Town of Milton and MassDOT Project websites to identify potential traffic growth from future developments. The following projects were identified but were determined to be either outside the study area or have negligible impact. Therefore, the future traffic growth from these projects was captured in the background growth rate.

- *Wolcott Woods*



- 131 Eliot Street
- 245 Highland Street
- Town Farm/Governor Stoughton Property
- Wentworth Farms
- 227 Pleasant Street
- 25 Bryant Avenue
- Woodmere at Brush Hill Road
- MassDOT Central Maintenance Facility and Highway Operations Center Relocation and Construction

**T12.** In addition to the above project list, we recommend that the proponent traffic consultant should consult the Town of Milton and MassDOT Project websites to confirm if there are any new developments which should be included in the traffic study.

**VHB:** The traffic study for the Residences at East Milton project was identified as a suitable source of record information for traffic analysis purposes by the Town prior to preparing the study. As demonstrated in the original study and this response memorandum, the estimated incremental impact associated with the Project (i.e., different between the No-Build and Build conditions) would not be influenced by the addition of more background projects into the analysis. For example, 0.1 or less seconds of increased delay associated with the Project at the additional study locations will continue to be representative of the Project's net increase in impact.

**BETA:** Comment Addressed. It is noted that additional background projects could impact incremental project impacts if the background trips increase overall intersection delay to or near capacity.

## PROPOSED FUTURE CONDITIONS

### TRIP GENERATION

Project generated trips were estimated based on ITE's Trip Generation, 10th Edition, for Land Use Code 820 – Shopping Center (4,155 SF) and Land Use Code (LUC) 221 – Multifamily Housing [Mid-Rise] (33 Dwelling Units). Trips associated for the existing use were estimated based on LUC 820 (2,466 SF), LUC 210 – Single Family Detached Housing (3 Dwelling Units) and LUC 220 – Multifamily Housing [Low-Rise] (1 Dwelling Unit) for the weekday morning and evening peak hours. This methodology estimated the existing site generates approximately 5 vehicle trips (2 enter/3 exit) in the morning and 14 vehicle trips (8 enter/6 exit) in the evening. A similar exercise was performed for the proposed redevelopment, which estimated 16 vehicle trips (5 enter/11 exit) in the morning and 32 vehicle trips (18 enter/14 exit) in the evening. To determine the net new trips generated by the Project, the existing office trips were subtracted from the proposed trips. This yielded a net increase in entering/exiting trips during the morning and evening peak hours. The net new trips are 11 vehicle trips (3 enter/8 exit) in the morning and 18 vehicle trips (10 enter/8 exit) in the evening. BETA finds this methodology to be in accordance with industry standards.

### TRIP ASSIGNMENT

Trips were assigned upon evaluation of existing travel patterns and site access routes.

- T13.** Project related trips should be assigned to Granite Avenue at Adams Street & Boulevard Street and Adams Street & Mechanic Street intersections.

**VHB:** A supplemental evaluation has been conducted at these requested intersections in response to Comment T1. The analysis indicates that the site trips associated with the proposed redevelopment project would result in negligible impacts at these additional intersections.

**BETA:** Comment Addressed.

#### *PARKING GENERATION*

- T14.** All back-up material related to the estimated parking generation evaluation should be provided for review.

**VHB:** It is expected that most condominium owners will be limited to a single car and single parking space. Some owners may wish to have two spaces, which will be written into condominium agreements, whereas some owners may choose to not own a car. The proposed parking supply was based on the Applicant's understanding of the target demographic for the type of development that is being proposed.

**BETA:** No data provided. Will parking agreements be in perpetuity with the condo agreement, or will they be able to change when ownership changes? That is, if some condos have no parking spaces, can that change in the future as units change hands and spaces become available? Will the cost of a parking space(s) be separated from the cost of the condominium?

**VHB:**

**Response:** The method of allocating parking spaces will be described in the Master Deed and Rules and Regulations of the condominium. One method is to designate the parking area as a limited common area and to grant a right to use one parking space with each unit deed.

The right to park is provided by giving each unit owner an electronic key that controls the entrance into the parking. The master deed and rules can allow leasing of parking spaces by one condominium owner to another condominium owner. In this development, however, the documents will not allow leasing of a parking space to anyone without property ownership. For example, an owner without a vehicle will have the right to lease the one allotted space to another unit owner. Specific leasing details will be described in detail within the condominium documents and in each deed.

**BETA:** Comment Addressed.

#### **TRAFFIC OPERATIONS**

Intersection Level of Service (LOS) capacity analyses were performed for the study intersections with the 2027 No-Build and 2027 Build traffic volumes during the weekday AM and PM peak hours. All the unsignalized study intersection movements would operate at LOS B or better under the No-Build and Build conditions.

- T15.** The capacity analysis for the existing conditions was not provided for review. Please provide.

**VHB:** As described in VHB's April 9, 2021 Traffic Impact Evaluation, existing traffic volumes are currently impacted by the COVID-19 pandemic, and therefore, the study was based on pre-

**COVID-19 data from the Residences at East Milton Traffic Impact Study that is on file at Town Hall. The existing conditions analysis from the record study remains unchanged and was therefore not duplicated for the current effort. The analysis focus was on the future scenarios that demonstrate the effect of the Project (i.e., comparison of the No-Build and Build conditions).**

**BETA: Comment Addressed.**

- T16.** The capacity analysis does not replicate existing conditions for Granite Avenue at Mechanic Street due to downstream queueing from the signalized intersection Granite Avenue at Adams Street & Boulevard Street. Vehicles entering Granite Avenue from Mechanic Street often require a courtesy gap during the AM peak hour. A gap study should be performed to validate the analysis.

**VHB: Motorist on a minor street approach (i.e., under STOP or YIELD control) at an unsignalized intersection must decide when there is a sufficient gap in the mainline traffic stream to enter an intersection. When a minor street vehicle selects an opportunity to cross or turn into an intersection, this event is considered ‘gap acceptance.’ The ‘critical gap’ or ‘critical headway’ is the minimum length of time within the mainline traffic stream that a minor street vehicle accepts to enter an intersection. Based on the concepts and procedures in the Highway Capacity Manual (HCM), the basic critical headway for a right-turning vehicle from Mechanic Street onto Granite Avenue is 6.22 seconds. As requested, a vehicle gap study was conducted along Granite Avenue at Mechanic Street on August 17 and 18, 2021. The vehicle gap data are provided in the Appendix. For conservative purposes, the available gaps in the Granite Avenue mainline equal to and above 7.00 seconds were noted as compared to the HCM’s basic critical headway for right-turning vehicles from a minor street approach of 6.22 seconds. During the weekday morning peak period, there were between 74 and 82 gaps per hour observed in the Granite Avenue traffic stream to be equal to or greater than 7.00 seconds. During the weekday afternoon peak period, there were 159 and 163 gaps per hour observed within the mainline traffic stream equal to or greater than 7.00 seconds. Based on the available gaps in the Granite Avenue traffic stream during the weekday morning and weekday afternoon peak periods, there are anticipated to be sufficient gaps in the mainline to process the additional site trips turning right from Mechanic Street onto Granite Avenue northbound.**

**BETA: The gap study results indicate there are sufficient gaps to process right-turning vehicles from Mechanic Street onto Granite Avenue northbound. However, it is noted that at times the northbound vehicle queue on Granite Avenue at Adams Street extends back to Mechanic Street and may temporarily block right-turning vehicles from Mechanic Street.**

**VHB:**

**Response:** Comment noted. This occurrence is common at most curb cuts in the area that are located in proximity to traffic signals. As noted in the comment, the data does indicate that the number of available gaps exceeds the demand for the gaps, which is the key finding related to operational capacity of the intersection.

**BETA: Comment Addressed.**

## GENERAL COMMENTS

### CONSTRUCTION MANAGEMENT

**T17.** A traffic management plan should be provided for review. Traffic and parking impacts associated with construction, delivery, contractor parking and material staging should be discussed and identified.

**VHB: Comment acknowledged. A traffic management plan will be prepared for review by the Town prior to start of construction.**

**BETA: Comment Addressed.**

If we can be of any further assistance regarding this matter, please contact us at our office.

Very truly yours,  
BETA Group, Inc.



Jeff Maxtutis  
Senior Associate

cc:  
Kien Ho, PE, PTOE, Vice President  
Liam Feeney EIT, Staff Engineer

November 4, 2021

Tim Czerwienski  
Director of Planning and Community Development  
Town of Milton  
525 Canton Avenue  
Milton, MA 02186

**Re: Traffic Impact Evaluation  
440 Granite Avenue Mixed-Use Redevelopment  
Milton, Massachusetts**

Dear Mr. Czerwienski,

BETA Group, Inc. (BETA) has reviewed the third round of transportation response to comments Memo submitted by VHB dated October 27, 2021. The VHB responses addressed the transportation comments made in the BETA letter dated October 27, 2021. VHB responses are shown in **bold** and comments from BETA to VHB responses are provided in [blue text](#). For conciseness, this memorandum only responds to the last remaining item that requires a response.

## TRAFFIC IMPACT EVALUATION REVIEW

### PARKING

The conceptual plans show a total of 46 parking spaces on the site (40 compact, 4 standard, 2 accessible). Four outdoor spaces will be accessed from Mechanic Street, two of which are compact and in tandem. There will be 42 spaces inside the building also accessed from Mechanic Street. The design includes a “semi-automated lift/slide puzzle system” provided by “Park Plus” which consists of 38 compact spaces. Inside the building there will also be 2 standard spaces and 2 accessible spaces. For on-street parking, the project proposes to close the existing three curb cuts on Granite Avenue which will allow for 3 new parking spaces. The two spaces closest to Mechanic Street will operate as a loading zone during specified times and days.

T6: [Will the project remove any existing on-street parking spaces on the north side of Mechanic Street?](#)

#### VHB

**Response:** The existing site frontage along Mechanic Street is approximately 207 linear feet of which approximately 136 feet can be used for public on-street parking and the remaining 71 feet is associated with three curb cuts. As proposed, the three existing curb cuts would be reduced to two driveways and there would be approximately 147 feet available for public on-street parking. The proposed development would result in an increase of approximately 11 feet in length for public on-street parking along the Mechanic Street site frontage.

[BETA: Comment addressed.](#)

Tim Czerwinski, Director of Planning and Community Development

July 16, 2021

Page 2 of 2

If we can be of any further assistance regarding this matter, please contact us at our office.

Very truly yours,  
BETA Group, Inc.



Jeff Maxtutis  
Senior Associate

cc:

Kien Ho, PE, PTOE, Vice President

Liam Feeney EIT, Staff Engineer



November 29, 2022

Ref: 15113.00

Mr. Tim Czerwienski  
Director of Planning and Community Development  
Town of Milton Office Building  
525 Canton Avenue  
Milton, MA 02186

Re: Traffic Evaluation Update  
440 Granite Avenue Mixed-Use Development  
Milton, Massachusetts

Dear Mr. Czerwienski:

During the local permitting process for the proposed mixed-use development at 440 Granite Avenue, VHB previously prepared and submitted an April 9, 2021 Traffic Impact Evaluation and subsequent traffic memoranda (collectively referred to as the original traffic study) to respond to comments from the Town of Milton's traffic peer review consultant, BETA Group, Inc. (BETA). As evaluated in the original traffic study, the build program consisted of replacing the existing 2,500 square foot (sf) commercial use and the five residential units with 4,155 sf of street level commercial space and 33 residential units. At this time, design changes evolving from the Town and community feedback resulted in a reduced development program consisting of 1,500 sf of commercial space and 26 multifamily residential units. This letter has been prepared to summarize the estimated site trips for the revised build program as well as a description of the proposed parking plan.

## Trip Generation

Similar to the methodology used in the original traffic study, the volume of traffic to be generated by the proposed project was estimated using trip rates published in the ITE Trip Generation Manual.<sup>1</sup> The trip-generation calculations are attached to this letter. To determine the additional site trips to be generated by the revised development program, a comparison of the estimated site trips for the existing and proposed uses is provided in Table 1.

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<sup>1</sup> Institute of Transportation Engineers. Trip Generation Manual, 11th ed. Washington, DC, Sept. 2021.



**Table 1 Additional Site Trip Summary**

Peak Hour/Direction	Existing Site Trips <sup>a</sup>	Proposed Site Trips <sup>b</sup>	Additional Site Trips <sup>c</sup>
<b>Weekday Morning</b>			
Enter	2	4	2
Exit	3	10	7
Total	5	14	9
<b>Weekday Afternoon</b>			
Enter	8	13	5
Exit	6	10	4
Total	14	23	9

a From Table 1 of the April 9, 2021 Traffic Impact Evaluation.

b ITE Land Use Code 822 (Strip Retail Plaza [ $<40,000$  sf]) for 1,500 sf and Land Use Code 221 (Multifamily Housing [Mid-Rise]) for 26 dwelling units.

c Proposed Site Trips minus Existing Site Trips.

As shown in Table 1, the ITE trip-generation estimates indicate that the proposed redevelopment project is estimated to generate 9 additional vehicle trips (2 entering and 7 exiting) during the weekday morning peak hour and 9 additional vehicle trips (5 entering and 4 exiting) during the weekday afternoon peak hour. These nominal increases in peak hour trips fall within the hourly fluctuations of traffic volumes on the nearby roadway system and may not be perceived as an increase to an average driver traveling through the area. In addition, ITE methodologies<sup>2</sup> and Massachusetts Department of Transportation's (MassDOT's) guidelines<sup>3</sup> suggest that an intersection should be evaluated when site trips are projected to experience a noticeable increase in peak hour traffic volumes (i.e.,  $\geq 100$  vehicles and/or  $>5$  percent). The rationale is that an increase of 100 vehicles per hour or 5 percent could impact the vehicular operations at an intersection. As shown in Table 1, the proposed development is projected to generate significantly less trips than the ITE and MassDOT threshold.

Table 2 has been prepared to summarize a trip comparison of the currently proposed build program to the previous development evaluated within the April 9, 2021 Traffic Impact Evaluation. As shown, the current build program is projected to generate fewer site trips during the weekday morning and afternoon peak hours than previously evaluated. Therefore, the project impacts presented in the April 9, 2021 Traffic Impact Evaluation represent a conservative (worse-case) scenario.

<sup>2</sup> Institute of Transportation Engineers. Transportation Impact Analyses for Site Development: An ITE Proposed Recommended Practice. Washington, DC. 2010.

<sup>3</sup> Massachusetts Department of Transportation. "Transportation Impact Assessment (TIA) Guidelines." MassDOT Development Review – Planning Process. Commonwealth of Massachusetts. 13 Mar. 2014.





**Table 2 Trip Generation Comparison Summary**

Peak Hour/Direction	Previous Build Program Site Trips <sup>a</sup>	Current Build Program Site Trips <sup>b</sup>	Additional Site Trips <sup>c</sup>
<b>Weekday Morning</b>			
Enter	5	4	(1)
Exit	11	10	(1)
Total	16	14	(2)
<b>Weekday Afternoon</b>			
Enter	18	13	(5)
Exit	14	10	(4)
Total	32	23	(9)

a From Table 1 of the April 9, 2021 Traffic Impact Evaluation.

b From Table 2 of this letter.

c Current Build Program Site Trips minus Previous Build Program Site Trips.

## Parking

Parking for the development will be provided within the site and within on-street parking spaces along Granite Avenue. As currently planned, 6 outdoor parking spaces are proposed on Mechanic Street and the proposed Mechanic Street driveway will provide access to 41 enclosed parking spaces. The outdoor parking spaces along Mechanic Street will also be available for visitor parking between 6 PM and 7 AM. The enclosed parking spaces will provide for 38 spaces through a stacker parking structure, 2 accessible spaces, and 1 visitor space. In addition, the three existing driveways along Granite Avenue will be closed and the 7 existing marked on-street parking spaces will be increased to 12 parking stalls adjacent to the site. The three spaces closest to the Mechanic Street intersection will be designated for loading and resident pick-up/drop off. Specifics of the site layout and the parking configuration are shown in the revised plans.

Overall, the trip generation update presented in this letter indicates that the revised development program, when compared to the development plan analyzed in the original traffic study, will generate less traffic. The revised site design for the smaller development program allows for further efficiencies in parking and circulation for the Project. The follow-up review of the revised plan continue to support the finding of the original traffic study that the Project will have relatively minimal effect on the operations of Mechanic Street and Granite Avenue.

Sincerely,

VHB

Jason R. Plourde, PE, PTP  
Project Manager

Attachments

## **Attachments**

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Trip-Generation Calculations

**ITE TRIP GENERATION WORKSHEET**  
**(11th Edition, Updated 2021)**

**LANDUSE:** Strip Retail Plaza (<40k)  
**LANDUSE CODE:** 822  
**SETTING/LOCATION:** General Urban/Suburban  
**JOB NAME:**  
**JOB NUMBER:**

Independent Variable ---

**FLOOR AREA (KSF):** 1.500

**WEEKDAY**

RATES:	# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	4	0.96	54.45	47.86	65.07	19	9	35	50%	50%
AM PEAK OF GENERATOR	6	--	7.60	2.40	21.30	16	8	24	50%	50%
PM PEAK OF GENERATOR	5	--	13.24	6.27	24.11	16	8	24	54%	46%
AM PEAK (ADJACENT ST)	5	0.57	2.36	1.60	3.73	18	9	35	60%	40%
PM PEAK (ADJACENT ST)	25	0.56	6.59	2.81	15.20	21	3	39	50%	50%

TRIPS:	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	82	41	41	294	147	147
AM PEAK OF GENERATOR	12	6	6	--	--	--
PM PEAK OF GENERATOR	20	11	9	--	--	--
AM PEAK (ADJACENT ST)	4	2	1	8	5	3
PM PEAK (ADJACENT ST)	10	5	5	22	11	11

**SATURDAY**

RATES:	# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	--	--	--	--	--	--	--	--	--	--
PEAK OF GENERATOR	12	--	6.57	1.88	14.23	27	8	39	51%	49%

TRIPS:	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	--	--	--	--	--	--
PEAK OF GENERATOR	10	5	5	--	--	--

**SUNDAY**

RATES:	# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	--	--	--	--	--	--	--	--	--	--
PEAK OF GENERATOR	--	--	--	--	--	--	--	--	--	--

TRIPS:	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	--	--	--	--	--	--
PEAK OF GENERATOR	--	--	--	--	--	--

# ITE TRIP GENERATION WORKSHEET

(11th Edition, Updated 2021)

**LANDUSE:** Multi-Family Housing (Low-Rise): 2-3 Story - Not Close to Rail Transit  
**LANDUSE CODE:** 220 Independent Variable --- Number of Dwelling Units  
**SETTING/LOCATION:** General Urban/Suburban  
**JOB NAME:** \_\_\_\_\_ 26 units  
**JOB NUMBER:** \_\_\_\_\_

## WEEKDAY

RATES:		# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
				Average	Low	High	Average	Low	High	Enter	Exit
	DAILY	22	0.86	6.74	2.46	12.50	229	33	494	50%	50%
	AM PEAK OF GENERATOR	40	0.76	0.47	0.25	0.98	234	12	1,103	24%	76%
	PM PEAK OF GENERATOR	38	0.80	0.57	0.25	1.26	231	12	1,103	62%	38%
	AM PEAK (ADJACENT ST)	49	0.79	0.40	0.13	0.73	249	12	1,103	24%	76%
	PM PEAK (ADJACENT ST)	59	0.84	0.51	0.08	1.04	241	12	1,103	63%	37%

### TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	176	88	88	242	121	121
AM PEAK OF GENERATOR	12	3	9	37	9	28
PM PEAK OF GENERATOR	15	9	6	46	28	17
AM PEAK (ADJACENT ST)	10	2	8	31	7	23
PM PEAK (ADJACENT ST)	13	8	5	32	20	12

## SATURDAY

RATES:		# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
				Average	Low	High	Average	Low	High	Enter	Exit
	DAILY	1	--	4.55	4.55	4.55	282	282	282	50%	50%
	PEAK OF GENERATOR	1	--	0.41	0.41	0.41	282	282	282	51%	49%

### TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	120	60	60	--	--	--
PEAK OF GENERATOR	11	5	5	--	--	--

## SUNDAY

RATES:		# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
				Average	Low	High	Average	Low	High	Enter	Exit
	DAILY	1	--	3.86	3.86	3.86	282	282	282	50%	50%
	PEAK OF GENERATOR	1	--	0.36	0.36	0.36	282	282	282	55%	45%

### TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	102	51	51	--	--	--
PEAK OF GENERATOR	9	5	4	--	--	--

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TO: Milton Board of Appeals  
FROM: Marion McEttrick  
RE: 440 Granite Avenue Parking Management Plan,  
DATE: December 28, 2022

At the continued hearing for the 440 Granite Avenue application with the Board of Appeals on November 30, 2022, the applicant was asked to provide a parking demand management plan for the proposed mixed-use development. We have reviewed descriptions of such plans as well as recent Board of Appeals decisions and understand that the objective is to explain how parking spaces will be offered to owners of the 26 condominium units, so as to reduce the use of cars and encourage travelers to use public transportation, in order to improve mobility, reduce congestion and lower vehicle emissions. These are goals of the design for this development proposal.

The following is a description of components of a transportation management plan for this development, to show how these objectives can be implemented. These terms are subject to review by the Planning Board during Site Plan Review, as well as to review and approval by the Board of Appeals.

Available Development Parking

Number of parking spaces for the use of condominium owners: 41, three of which are within the garage but outside automated parking; two of these spaces are handicapped accessible spaces and one of the spaces is a temporary loading zone for residents; 38 of the spaces will be within the automated, enclosed garage.

Number of residential units: 26, 2 one bedroom and 24 two bedroom units

Number of permanent guest parking spaces overnight: 6 in ground level parking on site outside garage, 6 pm – 7 am.

Number of parking spaces available on site, outside garage: six. From 7 am to 6 pm, these parking spaces will be for use by the commercial unit (1500 sf) on the ground floor of the

building. From 6 pm until 7 am, these spaces will be guest parking spaces for guests of condominium owners.

The accessible parking spaces have been designed in compliance with Town of Milton's Zoning Bylaws and Architectural Access Board (AAB) requirements, as applicable.

#### Marketing Plan, Parking

Marketing of condominium units and parking spaces will be separate, but parking spaces will only be made available with ownership of a condominium unit in this development.

Each condominium purchaser will be offered the opportunity to purchase one parking space. One bedroom unit owners will be limited to purchasing only one parking space. During initial sale of units, 26 spaces will be set aside for the initial parking space purchase by each unit owner. The remaining spaces, 12 spaces in the automated parking structure, will be offered to purchasers of the two-bedroom units on a first come, first serve basis. No two-bedroom condominium owner will be allowed to purchase more than two parking spaces. Any parking spaces in the automated structure not sold initially will be managed as surplus guest parking for condominium owners. These terms will be in the Declaration of Trust and Rules and Regulations for the condominium.

Any parking space not purchased at the ratio of 1 space/each unit will be available for purchase by two bedroom condominium owners. Parking spaces will be separately priced from unit prices so as to provide a significant incentive for persons not owning a car, or not owning two cars, to live here. The terms of re-sale for each parking space will be a deed restriction in the deed for each parking space.

#### Incentives to use Public Transportation

The condominium management will provide an electronic lobby display for real-time status of public transportation. At the present time in East Milton Square there are two bus lines connecting to the MBTA at Ashmont, Mattapan Square, Quincy Center and North Quincy. Currently this consists of two bus lines. Although many of us today look up such information on our cell phones, older residents in particular, a target group for this condominium design, will benefit from easy access to this information.

#### Incentives to Use Bicycles

The condominium design includes 40 indoor bicycle parking spaces and one outdoor bicycle rack on Granite Avenue. Each condominium with its unit deed will have the right to use a designated indoor bicycle parking space. A bicycle parking rack will be located as allowed by the Town at the edge of the sidewalk close to the condominium.

### Parking for Commercial Customers and Employees

The lease for the commercial space will require that the business purchase a yearly sticker for any employee using a car to get to work, to park in designated parking spaces throughout East Milton Square. This added cost is an incentive to hire employees who can walk or bike to work.

There will be six on-site parking spaces for business customers, clearly marked with signs, for the hours 7 am to 6 pm. Business tenants will be limited to those hours by the terms of the lease.

### Parking for Loading, Unloading, and Deliveries

#### *Moving In and Out of a Condominium*

As part of the redesign of this lot, three curb cuts have been closed, allowing more public parking spaces to be created on Granite Avenue in front of the proposed building. The applicant proposes that the three of the public parking spaces on Granite Avenue be marked as delivery spaces, as shown on the Site Plan, subject to approval by the Town. There is sufficient space in back of these parking spaces to open and unload a truck as necessary. This allows sufficient length for a moving van. Move-in will be scheduled by the applicant, as units are sold, to be during designated hours outside of the rush hours. After the Condominium Association manages the condominium, when all units have been sold, the Association will provide for the assignment of scheduled move-in times for new owners.

#### *Unloading from Unit Owner Cars before entering Automated Parking Space*

The Site Plan design designates one ground level space inside the garage as a temporary loading and unloading area, limited to 15 minutes.

#### *Uber, Taxi, and Delivery Trips*

Parking for these trips will be in the three-space loading zone on Granite Avenue, subject to approval by the Town. While there will certainly be deliveries during the rush hour, the volume of traffic on Granite Avenue during the rush hour is likely to deter such deliveries during the rush hour.

#### *Packages and Mail*

The lobby entrance will have a room for packages and mail to be stored; deliveries for unit owners need only be into this lobby mail room.

### *Refuse Pick-up*

Garbage and Recycling trucks will pick up from a side entrance on Mechanic Street just as takes place for residences on Mechanic Street.



**From:** Christopher Madden <[cmadden@townofmilton.org](mailto:cmadden@townofmilton.org)>  
**Sent:** Tuesday, November 29, 2022 5:48 PM  
**To:** Ellen Anselone <[eka@faainc.com](mailto:eka@faainc.com)>  
**Cc:** Steve Mattaliano <[smattaliano@townofmilton.org](mailto:smattaliano@townofmilton.org)>  
**Subject:** RE: 440 Granite Ave

Hi Ellen, I did not forget about you. I wanted to talk to Lt. Mattaliano from our Fire Prevention Office about this building, namely the parking.

We feel comfortable moving forward with the proposed parking system. We had the opportunity to look at it and understand how it works. We do have concerns as to “how to make it the safest”. We will be working with Joe Prondak, Milton’s Building inspector , also our public safety partners at The Massachusetts Department of Fire Services Code Compliance Office as well as other fire departments that have these systems in place.

I look forward to working with your team to make a great and safe building.

Thank You

Chief Madden