


MEMORANDUM

TO: Taj Estates II of Franklin, LLC
c/o Mr. Mirajuddin Ahmed
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Westborough, MA 01581

FROM: Mr. Jeffrey S. Dirk, P.E., PTOE, FITE 
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DATE: January 19, 2022

RE: 9217

SUBJECT: Transportation Impact Assessment
TAJ Estates of Franklin II – 230 East Central Street (Route 140)
Franklin, Massachusetts

Vanasse & Associates, Inc. (VAI) has conducted a Transportation Impact Assessment (TIA) in order to determine the potential impacts on the transportation infrastructure associated with the proposed construction of the TAJ Estates of Franklin II mixed-use development to be located at 230 East Central Street (Route 140) in Franklin, Massachusetts (hereafter referred to as the “Project”). This study evaluates the following specific areas as they relate to the Project: i) access requirements; ii) potential off-site improvements; and iii) safety considerations; and identifies and analyzes existing traffic conditions and future traffic conditions, both with and without the Project along Route 140 and at the intersections of Route 140 at King Street and Chestnut Street, and Route 140 at the CVS/Pharmacy and Horace Mann Plaza Driveways. Based on this assessment, we have concluded the following with respect to the Project:

1. Using trip-generation statistics published by the Institute of Transportation Engineers (ITE)¹ for similar land uses as those proposed, the Project is expected to generate approximately 314 vehicle trips on an average weekday (two-way, 24-hour volume), with 36 vehicle trips expected during the weekday morning peak-hour and 38 vehicle trips expected during the weekday evening peak-hour;
2. The Project will not result in a significant impact (increase) on motorist delays or vehicle queuing over anticipated future conditions without the Project (No-Build condition), with the majority of the movements at the study intersections shown to continue to operate at a level-of-service (LOS) of D or better, where an LOS of “D” or better is defined as “acceptable” traffic operations;
3. Independent of the Project, it was noted that one or more movements at the Route 140/ King Street/Chestnut Street intersection are currently operating at or over capacity (defined as LOS “E” or “F”, respectively) during the weekday evening peak hour, with Project-related impacts at the intersection defined as an increase in average motorist delay of up to 10.7 seconds and in vehicle queuing of up to one (1) vehicle;

¹*Trip Generation*, 11th Edition; Institute of Transportation Engineers; Washington, DC; 2021.



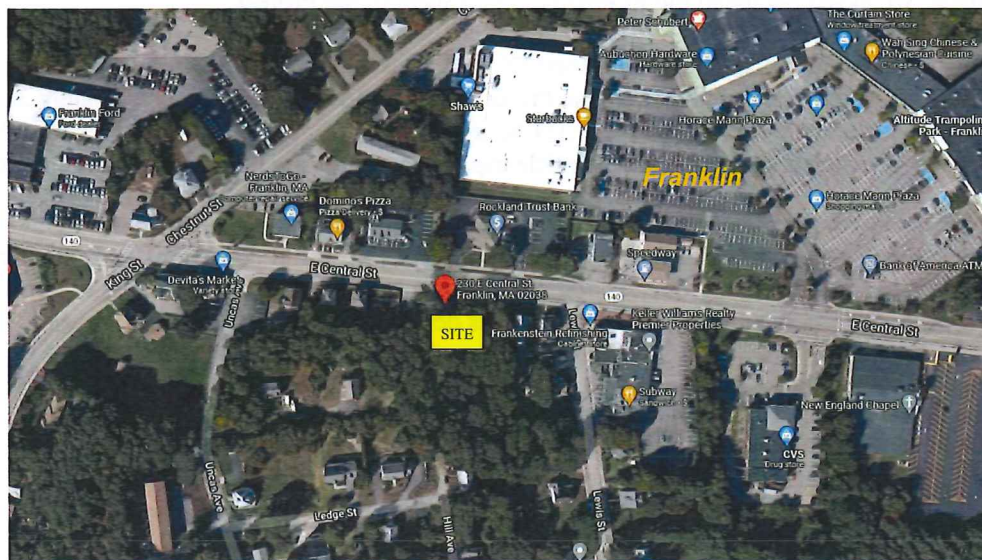
4. All movements exiting the Project site driveway are predicted to operate at LOS C during the weekday morning peak hour and at LOS D during the weekday evening peak hour, with vehicle queues of up to one (1) vehicle. All movements along Route 140 approaching the Project site driveway are expected to operate at LOS A with negligible vehicle queuing;
5. No apparent safety deficiencies were identified based on a review of MassDOT motor vehicle crash data for the study area intersections; and
6. Lines of sight at the Project site driveway intersection with Route 140 were found to exceed the recommended minimum distance for the intersection to operate in a safe and efficient manner based on the appropriate approach speed.

In consideration of the above, we have concluded that the Project can be accommodated within the confines of the existing transportation infrastructure in a safe and efficient manner with the implementation of the recommendations defined herein.

The following details our assessment of the Project.

PROJECT DESCRIPTION

The Project will entail the construction of a three-story building to be located at 230 East Central Street (Route 140) in Franklin, Massachusetts, which will contain 35 multifamily residential units and 900± square feet (sf) of office space on the ground floor. The Project site encompasses approximately 1.0± acres of land bound by Route 140 to the north and residential properties and areas of open and wooded space to the south, east, and west. The Project site currently contains single-family homes and associated appurtenances that will be removed to accommodate the Project. Access to the Project site will be provided by way of a new driveway that will intersect the south side of Route 140 approximately 10 feet east of the existing driveway that serves the Project site, which will be closed in conjunction with the Project.



Imagery ©2022 Google



On-site parking will be provided for 44 vehicles, 42 of which will be provided for the residential use, or a parking ratio of 1.26 parking spaces per unit, and two (2) of which will be provided to support the office use, or 1 parking space per 450 sf. These parking ratios are below those required for the proposed uses as specified in Section 185-21, *Parking, Loading, and Driveway Requirements*, of the Zoning Bylaws of the Town of Franklin.²

STUDY METHODOLOGY

This study was prepared in consultation with the MassDOT and the Town of Franklin; was performed in accordance with MassDOT's *Transportation Impact Assessment (TIA) Guidelines* and the standards of the Traffic Engineering and Transportation Planning professions for the preparation of such reports; and was conducted in three distinct stages.

The first stage involved an assessment of existing conditions in the study area and included an inventory of roadway geometrics; pedestrian and bicycle facilities; on-street parking; public transportation services; observations of traffic flow; and collection of pedestrian, bicycle, and vehicle counts.

In the second stage of the study, future traffic conditions were projected and analyzed. Specific travel demand forecasts for the Project were assessed along with future traffic demands due to expected traffic growth independent of the Project. A seven-year time horizon was selected for analyses consistent with MassDOT guidelines. The analysis conducted in stage two identifies existing or projected future capacity, safety, and access issues, as these areas relate to the transportation infrastructure.

The third stage of the study presents and evaluates measures to address deficiencies in the transportation infrastructure, if any, identified in stage two of the study.

EXISTING CONDITIONS

A comprehensive field inventory of existing conditions within the study area was conducted in January 2022. This inventory included the collection of traffic-volume data and vehicle travel speed measurements, as well as a review of existing pedestrian and bicycle accommodations, public transportation services, and motor vehicle crash data. The following summarizes existing conditions within the study area.

Roadways

East Central Street (Route 140)

East Central Street (Route 140) is a two-lane, urban principal arterial roadway that traverses a general east-west direction and is under Town jurisdiction from a point just east of East Street to a point just west of Lewis Street, and under MassDOT jurisdiction to the east and west of these limits. In the vicinity of the Project site, Route 140 is under Town jurisdiction and provides two 18-foot-wide lanes that are separated by a double-yellow centerline with 2-foot wide marked shoulders. The posted speed limit in the vicinity of the Project site is 40 miles per hour (mph), with prevailing travel speeds measured in January 2022 found to be 34 mph in both directions.³ Sidewalks are provided continuously along both sides of the roadway

²In the Commercial I Zoning District, 1.5 parking spaces per residential unit is required and 1.0 parking spaces per 500 sf of gross floor area is required for commercial space.

³The prevailing travel speed is also known as the 85th percentile vehicle travel speed or the speed at which 85 percent of the observed vehicles traveled at or below during the observation period.



within the study area and illumination is provided by way of streetlights mounted on wood poles. Land use along Route 140 within the study area consists of the Project site and residential and commercial properties.

Intersections

Table 1 and Figure 1 summarize existing lane use, traffic control, and pedestrian and bicycle accommodations at the study area intersections as observed in July 2021.

**Table 1
STUDY AREA INTERSECTION DESCRIPTION**

Intersection	Traffic Control Type ^a	No. of Travel Lanes Provided	Shoulder Provided? (Yes/No/Width)	Pedestrian Accommodations? (Yes/No/Description)	Bicycle Accommodations? (Yes/No/Description)
Rte. 140/ King St./ Chestnut St.	TS	1 left-turn lane and a shared through/right-turn lane on Rte. 140 approaches, with right-turn movements exiting prior to the intersection by way of a channelized lane; 1 shared left-turn/through lane and a right-turn lane on King St. northbound approach; 1 general-purpose travel lane on Chestnut St. southbound approach	Yes; 2 feet on Rte. 140; 4 feet on King St.	Yes – Sidewalks are provided along both sides of Rte. 140 and King St. and along the west side of Chestnut St. for approx. 200 ft; crosswalks provided across all legs of the intersection; pedestrian traffic signal equipment and phasing (exclusive) provided	Yes - Shared traveled-way ^b
Rte. 140/ Horace Mann Plaza Dwy/ CVS Dwy	TS	1 left-turn lane, 1 through travel lane and 1 right-turn lane on Rte. 140 approaches; 1 shared left-turn/through lane and a right-turn lane on Horace Mann Plaza Dwy. and CVS/Pharmacy Dwy.	Yes – 1 to 3 feet on all approaches	Yes – Sidewalks along both sides of Rte. 140 with crosswalks provided across the north, east and west legs of the intersection; pedestrian traffic signal equipment and phasing (exclusive) provided	Yes - Shared traveled-way

^aTS = traffic signal control.

^bCombined shoulder and travel lane width equal to or exceed 14 feet.

Existing Traffic Volumes

In order to determine existing traffic-volume demands within the study area, manual turning movement counts (TMCs) and vehicle classification counts were obtained from the May 2020 *Transportation Impact Assessment* that was prepared by VAI for the Central Square mixed-use development and included the study area intersections.⁴ The TMCs were collected on Thursday, March 5, 2020, while public schools were in regular session and prior to the implementation of the restrictions associated with the COVID-19 pandemic, and were performed during the weekday morning (7:00 to 9:00 AM) and evening (4:00 to 6:00 PM) peak

⁴*Transportation Impact Assessment*, Central Square Mixed-Use Development, 340 East Central Street, Franklin, Massachusetts; VAI; May 2020.



periods. These time periods were selected for analysis purposes as they are representative of the peak-traffic-volume hours for both the Project and the adjacent roadway network.

Traffic Volume Adjustments

As documented in the May 2020 *Transportation Impact Assessment* that was prepared for the Central Square mixed-use development, the March traffic volumes were adjusted upward by 7.0 percent in order to be representative of average-month conditions. This adjustment was determined based on a review of traffic-volume data from MassDOT Continuous Count Station No. 3180 located on Interstate 495 in Norfolk.⁵ In addition, the 2020 traffic volumes were adjusted to 2022 traffic-volume conditions by applying a background traffic growth rate of 1.0 percent per year (discussion follows in the *Future Conditions* section of this assessment). The 2022 Existing weekday morning and evening peak-hour traffic volumes are graphically depicted on Figure 1.

Pedestrian and Bicycle Facilities

Sidewalks are provided along both sides of Route 140, King Street, and Chestnut Street within the study area, with marked crosswalks provided for crossing one or more legs of the study area intersections that include pedestrian traffic signal equipment (pushbuttons and signal indications) and phasing. Formal bicycle facilities were not identified within the immediate study area; however, Route 140, King Street, and Chestnut Street generally provide sufficient width to accommodate bicycle travel in a shared traveled-way configuration (i.e., bicyclists and motor vehicles sharing the traveled way).⁶

Public Transportation

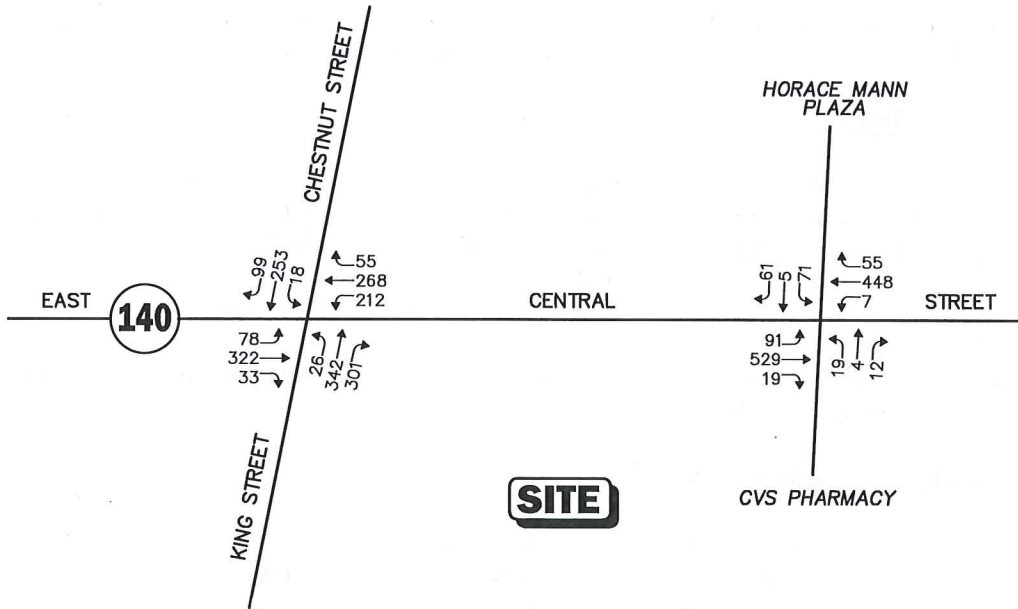
Regularly scheduled, fixed-route, public transportation services are not currently provided within the study area or to the Project site. The Greater Attleboro-Taunton Regional Transit Authority (GATRA) operates an on-demand microtransit service which allows transit riders to request a vehicle to pick them up for same-day service within the Town of Franklin through the GATRA GO United program. To the west of the Project site, the Massachusetts Bay Transportation Authority (MBTA) provides Commuter Rail service to South Station in Boston on the Franklin Line from Forge Park/495 Station, which is located at 1000 West Central Street (an approximate 9-minute driving distance from the Project site). Additionally, GATRA provides Dial-a-Ride paratransit services to eligible persons residing within the Town of Franklin who cannot use fixed-route transit all or some of the time due to a physical, cognitive, or mental disability in compliance with the Americans with Disabilities Act (ADA).

⁵MassDOT Traffic Volumes for the Commonwealth of Massachusetts; 2022.

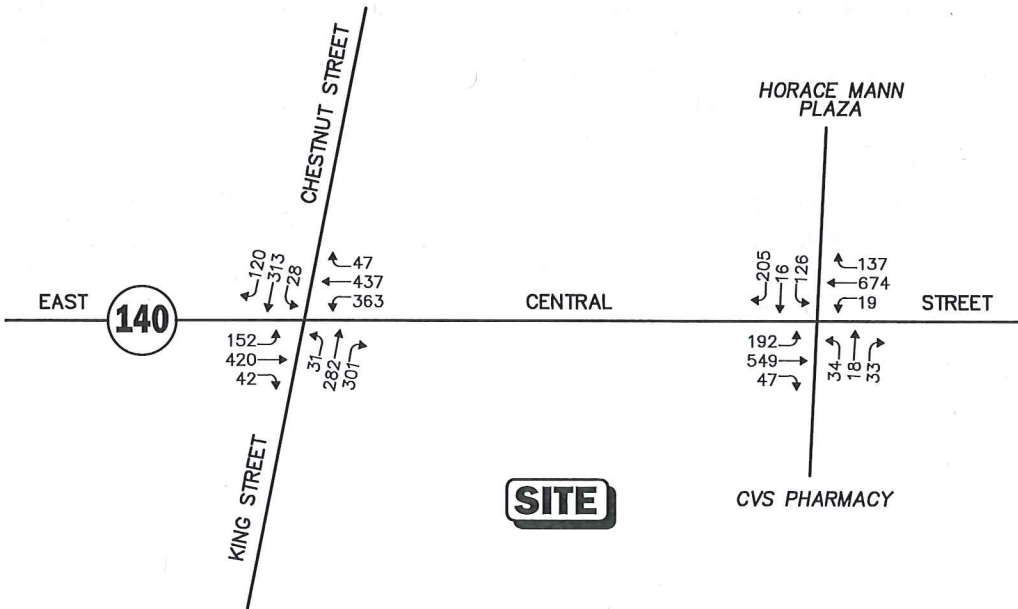
⁶A minimum combined travel lane and paved shoulder width of 14 feet is required to support bicycle travel in a shared traveled-way condition.



WEEKDAY MORNING PEAK HOUR (7:45 - 8:45 AM)



WEEKDAY EVENING PEAK HOUR (4:30 - 5:30 PM)



Not To Scale



Figure 1

2022 Existing Weekday Peak-Hour Traffic Volumes

Motor Vehicle Crash Data

Motor vehicle crash information for the study area intersections was provided by the MassDOT Highway Division Safety Management/Traffic Operations Unit for the most recent five-year period available (2015 through 2019, inclusive) to examine motor vehicle crash trends occurring within the study area. The data is summarized by intersection, type, severity, roadway and weather conditions, and day of occurrence, and is presented in Table 2.

As can be seen in Table 2, the study intersections experienced an average of approximately six (6) or fewer reported motor vehicle crashes per year over the five-year review period and were found to have a motor vehicle crash rate below both the MassDOT statewide and District averages for a signalized or unsignalized intersection, as appropriate, for the MassDOT Highway Division District in which the intersections are located (District 3). The majority of the reported crashes occurred on a weekday, under clear weather conditions during daylight, and involved rear-end or angle-type crashes that resulted in property damage only.

A review of the MassDOT statewide High Crash Location List indicated that none of the study intersections are included on MassDOT's Highway Safety Improvement Program (HSIP) listing as a high crash location. The detailed MassDOT Crash Rate Worksheets and high crash location mapping are provided in the Appendix.



Table 2
MOTOR VEHICLE CRASH DATA SUMMARY^a

	Route 140/ King St./ Chestnut St.	Route 140/ Horace Mann Plaza/ CVS/Pharmacy	Route 140/ 230 East Central Street
Traffic Control Type ^b	TS	TS	U
<i>Year:</i>			
2015	3	1	1
2016	10	6	4
2017	6	3	2
2018	4	2	0
<u>2019</u>	<u>6</u>	<u>2</u>	<u>1</u>
Total	29	14	8
Average	5.8	2.8	1.6
Crash Rate ^c	0.56	0.34	0.25
MassDOT Crash Rate: ^d	0.78/0.89	0.78/0.89	0.57/0.61
Significant? ^e	No	No	No
<i>Type:</i>			
Angle	8	4	4
Head-On	1	1	0
Rear-End	13	5	1
Rear-to-Rear	0	0	0
Sideswipe	5	1	2
Fixed Object	1	2	0
Pedestrian/Bicycle	1	0	1
<u>Unknown/Other</u>	<u>0</u>	<u>1</u>	<u>0</u>
Total	29	14	8
<i>Conditions:</i>			
Clear	19	12	6
Cloudy	4	0	2
Rain	3	2	0
Snow/Ice	1	0	0
<u>Not Reported/Other</u>	<u>2</u>	<u>0</u>	<u>0</u>
Total	29	14	8
<i>Lighting:</i>			
Daylight	22	14	7
Dawn/Dusk	2	0	0
Dark (Road Lit)	5	2	1
<u>Dark (Road Unlit)</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	29	14	8
<i>Day of Week:</i>			
Monday-Friday	25	12	7
Saturday	0	2	1
<u>Sunday</u>	<u>4</u>	<u>0</u>	<u>0</u>
Total	29	14	8
<i>Severity:</i>			
Property Damage Only	21	10	6
Non-fatal Injury	8	2	2
<u>Not Reported</u>	<u>0</u>	<u>2</u>	<u>0</u>
Total	29	14	8

^aSource: MassDOT Safety Management/Traffic Operations Unit records, 2015 through 2019.

^bTraffic Control Type: TS = traffic signal; U = unsignalized.

^cCrash rate per million vehicles entering the intersection.

^dStatewide/District crash rate.

^eThe intersection crash rate is significant if it is found to exceed the MassDOT crash rate for the MassDOT Highway Division District in which the Project is located (District 3).



FUTURE CONDITIONS

Traffic volumes in the study area were projected to the year 2029, which reflects a seven-year planning horizon consistent with MassDOT guidelines. Independent of the Project, traffic volumes on the roadway network in the year 2029 under No-Build conditions include all existing traffic and new traffic resulting from background traffic growth. Anticipated Project-generated traffic volumes superimposed upon the 2029 No-Build traffic volumes reflect 2029 Build traffic-volume conditions with the Project.

Future Traffic Growth

Future traffic growth is a function of the expected land development in the immediate area and the surrounding region. Several methods can be used to estimate this growth. A procedure frequently employed estimates an annual percentage increase in traffic growth and applies that percentage to all traffic volumes under study. The drawback to such a procedure is that some turning volumes may actually grow at either a higher or a lower rate at particular intersections.

An alternative procedure identifies the location and type of planned development, estimates the traffic to be generated, and assigns it to the area roadway network. This procedure produces a more realistic estimate of growth for local traffic; however, potential population growth and development external to the study area would not be accounted for in the resulting traffic projections.

To provide a conservative analysis framework, both procedures were used, the salient components of which are described below.

Specific Development by Others

The Town of Franklin Planning Department was consulted in order to determine if there were any projects planned within the study area that would have an impact on future traffic volumes at the study intersections. Based on this consultation, the following projects were identified for inclusion in this assessment:

- ***Central Square Mixed-Use Development, 340 East Central Street (Route 140), Franklin, Massachusetts.*** This project entails the construction of a mixed-use development that will include 104 multifamily residential units, 15,219± sf of retail space, and a 2,250± sf coffee shop with drive-through window. This project is currently under construction and portions are occupied; however, the project was not constructed at the time that the traffic counts that form the basis of this assessment were performed.
- ***Chestnut Senior Village, Chestnut Street, Franklin, Massachusetts.*** This project consists of the construction of 44 senior housing units to be located off Chestnut Street in Franklin, Massachusetts. Traffic volumes associated with this project within the study area are expected to be relatively minor and would be reflected in the general background traffic growth rate (discussion follows).

Traffic volumes associated with the Central Square mixed-use development were obtained from the TIA prepared for the project.⁷ No other developments were identified at this time that are expected to result in an increase in traffic within the study area beyond the general background traffic growth rate.

⁷Ibid 4.



General Background Traffic Growth

Traffic-volume data compiled by MassDOT from permanent count stations located in Franklin were reviewed in order to determine general traffic growth trends in the area. This data indicates that traffic volumes have fluctuated over the 10-year period between 2009 and 2019, with an average traffic growth rate of 0.57 percent per year. In order to provide a prudent planning condition for the Project, a slightly higher 1.0 percent per year compounded annual background traffic growth rate was used in order to account for future traffic growth, new trips associated with the Chestnut Village senior housing community and presently unforeseen development within the study area.

Roadway Improvement Projects

The Town of Franklin and MassDOT were contacted in order to determine if there were any planned future roadway improvement projects expected to be complete by 2029 within the study area. Based on these discussions, no roadway improvement projects aside from routine maintenance activities were identified to be planned within the study area at this time.

No-Build Traffic Volumes

The 2029 No-Build condition peak-hour traffic volumes were developed by applying the 1.0 percent per year compounded annual background traffic growth rate to the 2022 Existing peak-hour traffic volumes and then adding the peak-hour traffic volumes associated with the identified specific development project by others. The resulting 2029 No-Build weekday morning and evening peak-hour traffic volumes are shown on Figure 2.

Project-Generated Traffic

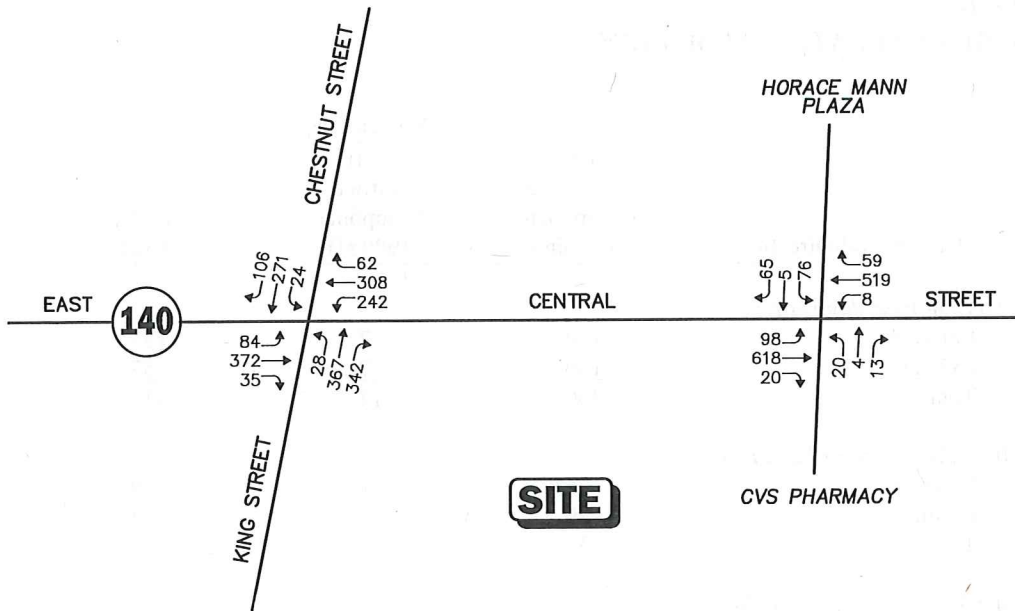
Design year (2029 Build) traffic volumes for the study area roadways were determined by estimating Project-generated traffic volumes and assigning those volumes on the study roadways. The following sections describe the methodology used to develop the anticipated traffic characteristics of the Project.

As proposed, the Project will entail the construction of a mixed-use building that will contain 35 multifamily residential units and 900± sf of office space on the ground floor. In order to develop the traffic characteristics of the Project, trip-generation statistics published by the ITE⁸ for a similar land use as that proposed were used. ITE Land Use Codes (LUCs) 220, *Multifamily Housing (Low-Rise)*, and 712, *Small Office Building*, were used to establish the traffic characteristics of the Project, the results of which are summarized in Table 3.

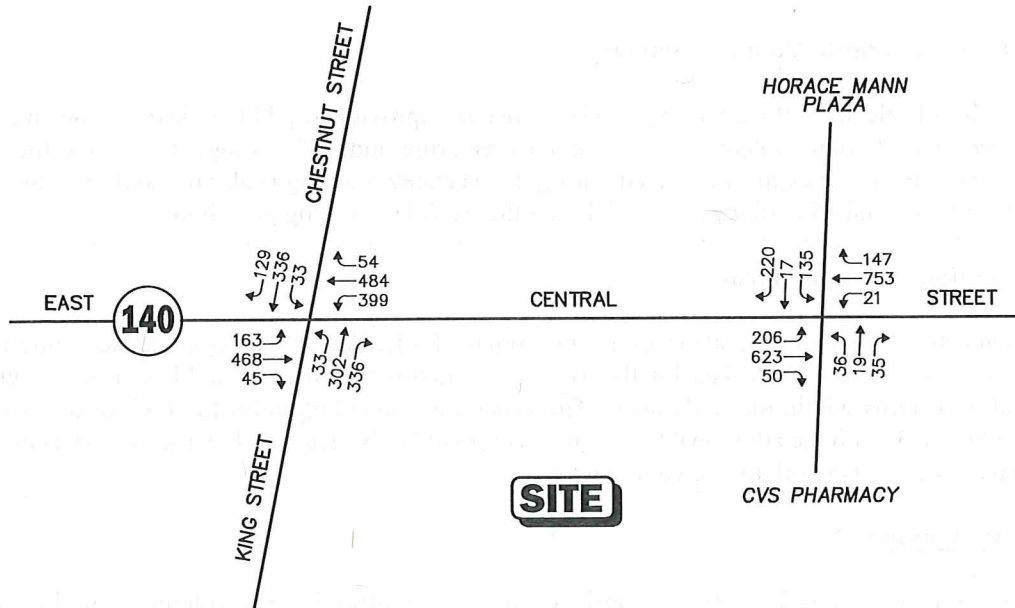
⁸Ibid 1.



WEEKDAY MORNING PEAK HOUR (7:45 - 8:45 AM)



WEEKDAY EVENING PEAK HOUR (4:30 - 5:30 PM)



Not To Scale



Figure 2

2029 No-Build
Weekday
Peak-Hour Traffic Volumes

Table 3
TRIP-GENERATION SUMMARY

Time Period/Direction	Vehicle Trips		
	(A) Residential Component (35 units) ^a	(B) Office Component (900 sf) ^a	(A+B) Total
<i>Average Weekday Daily:</i>			
Entering	150	7	157
<u>Exiting</u>	<u>150</u>	<u>7</u>	<u>157</u>
Total	300	14	314
<i>Weekday Morning Peak Hour:</i>			
Entering	8	1	9
<u>Exiting</u>	<u>26</u>	<u>1</u>	<u>27</u>
Total	34	2	36
<i>Weekday Evening Peak Hour:</i>			
Entering	22	1	23
<u>Exiting</u>	<u>14</u>	<u>1</u>	<u>15</u>
Total	36	2	38

^aBased on ITE LUC 220, *Multifamily Housing (Low-Rise)*.

^bBased on ITE LUC 712, *Small Office Building*.

Project-Generated Traffic-Volume Summary

As can be seen in Table 3, the Project is expected to generate approximately 314 vehicle trips on an average weekday (two-way, 24-hour volume, or 157 vehicles entering and 157 exiting), with 36 vehicle trips (9 vehicles entering and 27 exiting) expected during the weekday morning peak-hour and 38 vehicle trips (23 vehicles entering and 15 exiting) expected during the weekday evening peak-hour.

Trip Distribution and Assignment

The directional distribution of generated trips to and from the Project site was determined based on a review of U.S. Census Journey-to-Work data for the Town of Franklin and then refined based on a review of existing traffic patterns within the study area. The general trip distribution for the Project is graphically depicted on Figure 3, with the additional traffic that is expected to be generated by the Project assigned on the study area roadway network as shown on Figure 4.

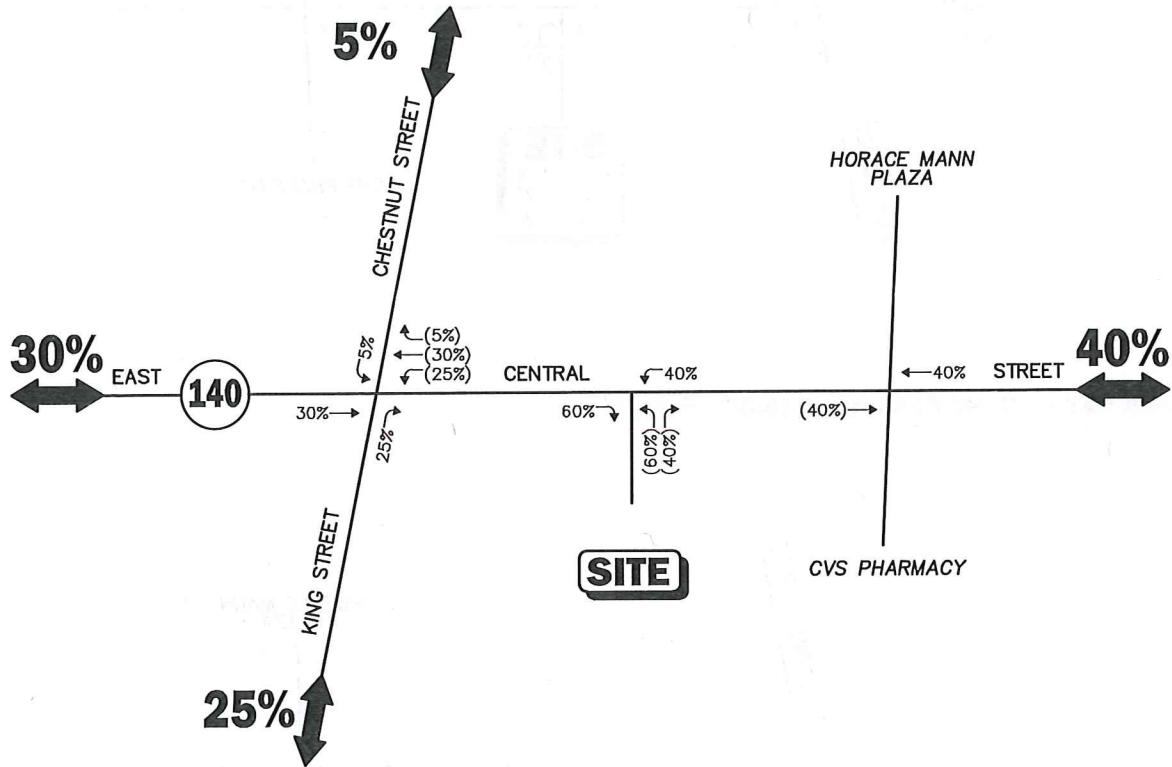
Build Traffic Volumes

The 2029 Build condition traffic volumes consist of the 2029 No-Build traffic volumes with the addition of the traffic expected to be generated by the Project. The 2029 Build weekday morning and evening peak-hour traffic volumes are graphically depicted on Figure 5.



Legend:

- XX Entering Trips
- (XX) Exiting Trips



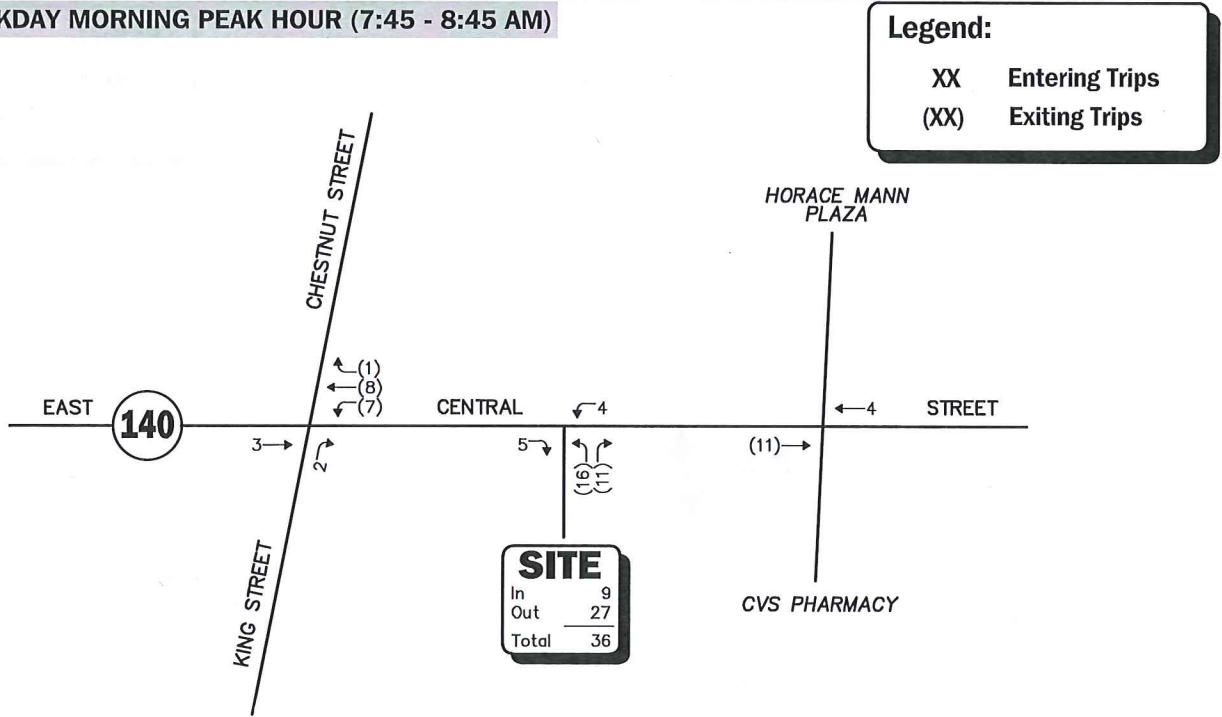
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Figure 3

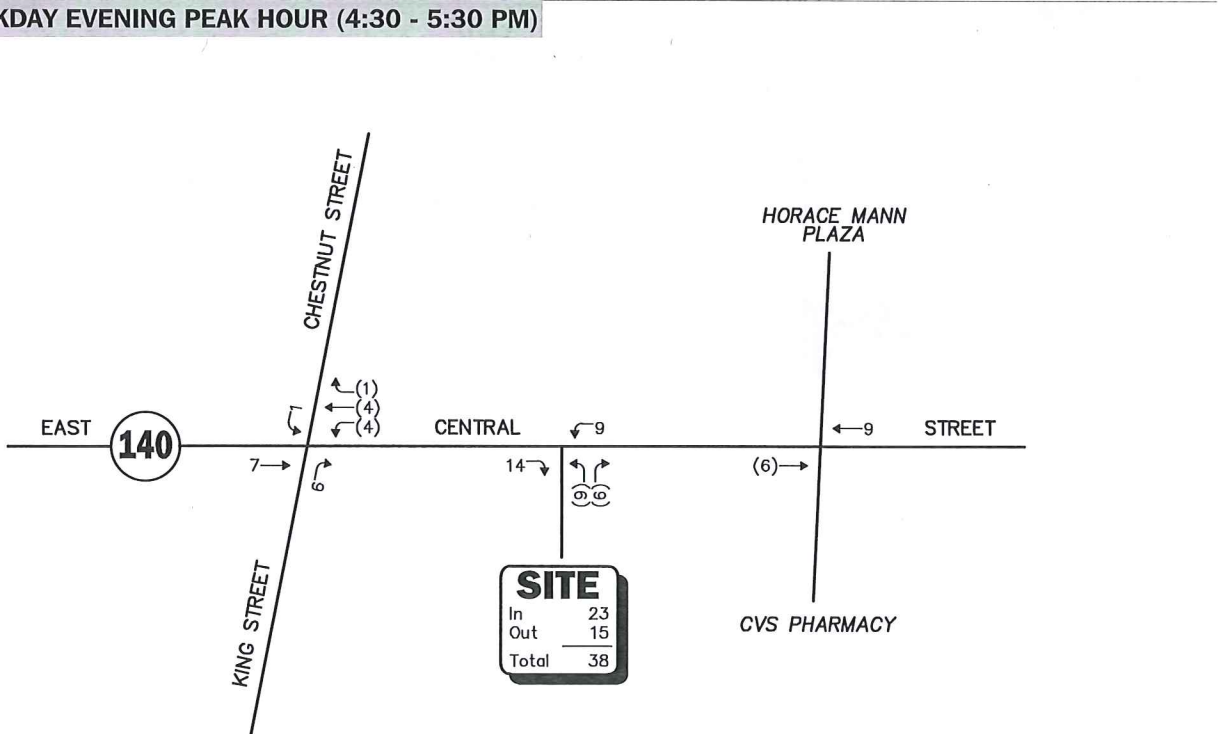
Trip Distribution Map



WEEKDAY MORNING PEAK HOUR (7:45 - 8:45 AM)



WEEKDAY EVENING PEAK HOUR (4:30 - 5:30 PM)



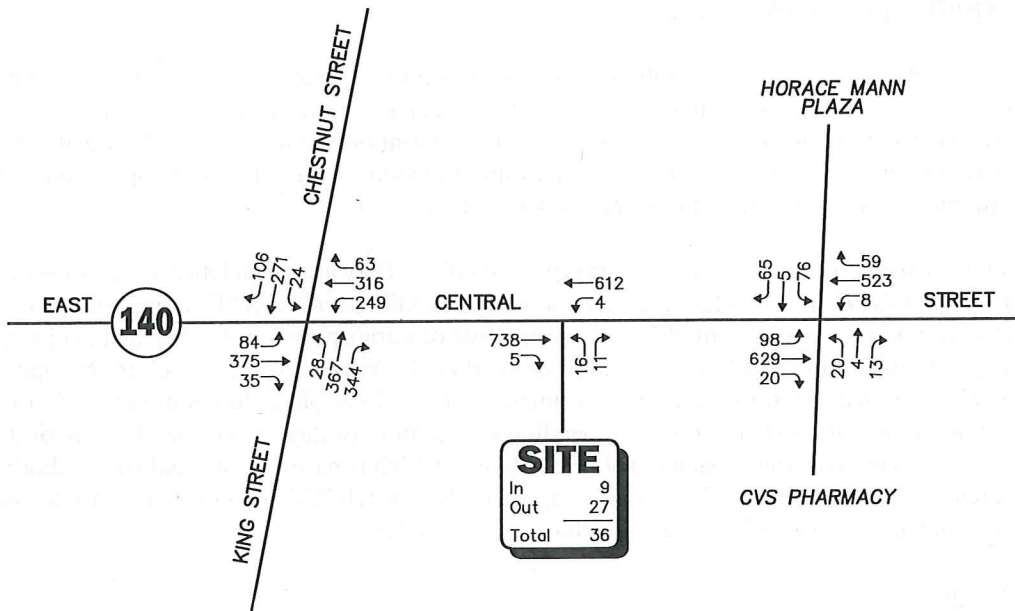
Not To Scale Figure 4



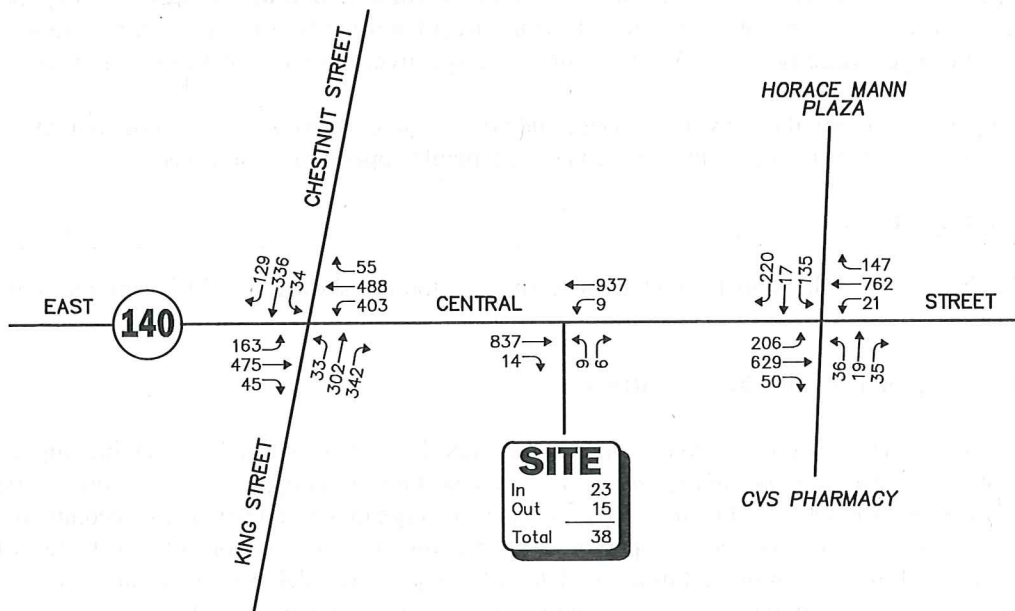
**Project-Generated
Weekday
Peak-Hour Traffic Volumes**

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WEEKDAY MORNING PEAK HOUR (7:45 - 8:45 AM)



WEEKDAY EVENING PEAK HOUR (4:30 - 5:30 PM)



Not To Scale Figure 5



2029 Build
Weekday
Peak-Hour Traffic Volumes

TRAFFIC OPERATIONS ANALYSIS

In order to assess the potential impact of the Project on the roadway network, a detailed traffic operations analysis (motorist delays, vehicle queuing, and level-of-service) was performed for the study intersections. Capacity analyses provide an indication of how well transportation facilities serve the traffic demands placed upon them, with vehicle queue analyses providing a secondary measure of the operational characteristics of an intersection or section of roadway under study.

In brief, six levels of service are defined for each type of facility. They are given letter designations ranging from A to F, with LOS “A” representing the best operating conditions and LOS “F” representing congested or constrained operations. An LOS of “E” is representative of a transportation facility that is operating at its design capacity with an LOS of “D” generally defined as the limit of “acceptable” traffic operations. Since the level-of-service of a traffic facility is a function of the flows placed upon it, such a facility may operate at a wide range of levels of service depending on the time of day, day of week, or period of the year. The Synchro® intersection capacity analysis software, which is based on the analysis methodologies and procedures presented in the 2010 *Highway Capacity Manual* (HCM)⁹ for unsignalized intersections, was used to complete the level-of-service and vehicle queue analyses.

Analysis Results

Level-of-service and vehicle queue analysis were conducted for 2022 Existing, 2029 No-Build, and 2029 Build conditions for the intersections within the study area. The results of the intersection capacity and vehicle queue analyses are summarized in Table 4, with the detailed analysis results attached.

The addition of Project-related traffic to the study area intersections is not predicted to result in a significant increase in motorist delays or vehicle queuing over No-Build conditions; however, independent of the Project, specific movements at the Route 140/King Street/Chestnut Street intersection were identified as operating at or over capacity (i.e., LOS of “E” or “F”, respectively) during weekday evening peak hour.

The following is a summary of the level-of-service and vehicle queue analysis results. For context, we note that an LOS of “D” or better is generally defined as “acceptable” operating conditions.

Signalized Intersections

Project-related impacts at the signalized study area intersection are shown in Table 4 and are defined as follows:

Route 140 at King Street and Chestnut Street

The addition of Project-related traffic to this intersection was shown to result in the following impacts over No-Build conditions: *weekday morning peak-hour* – the Chestnut Street approach was shown to degrade from LOS C to LOS D as a result of a predicted increase in average motorist delay of 1.4 seconds; *weekday evening peak-hour* – overall intersection operations were shown to degrade from LOS E to LOS F as a result of a predicted increase in overall motorist delay of 3.7 seconds. Vehicle queues at the intersection were shown to increase by up to one (1) vehicle with the addition of Project-related traffic.

⁹*Highway Capacity Manual*, Transportation Research Board; Washington, DC; 2010.



Route 140 at the Horace Mann Plaza Driveway and the CVS/Pharmacy® Driveway

No changes in overall level of service was shown to occur over No-Build conditions, with a minor change in level of service identified for Route 140 through movements during the weekday evening peak hour, where the level of service was shown to degrade from LOS C to LOS D as a result of a predicted increase in average motorist delay of 1.5 seconds. Vehicle queues at the intersection were shown to increase by up to one (1) vehicle with the addition of Project-related traffic.

Unsignalized Intersection

Project-related impacts at the unsignalized study area intersection are shown in Table 5, and are defined as follows:

Route 140 at the Project Site Driveway

All movements exiting the Project site driveway are predicted to operate at LOS C during the weekday morning peak hour and at LOS D during the weekday evening peak hour, with vehicle queues of up to one (1) vehicle. All movements along Route 140 approaching the Project site driveway are expected to operate at LOS A with negligible vehicle queuing.



**Table 4
SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Signalized Intersection/ Peak Hour/Movement	2022 Existing			2029 No-Build			2029 Build					
	V/C ^a	Delay ^b	LOS ^c	Queue ^d 50 th /95 th	V/C	Delay	LOS	Queue 50 th /95 th	V/C	Delay	LOS	Queue 50 th /95 th
Route 140 at King Street and Chestnut Street												
<i>Weekday Morning:</i>												
Route 140 EB LT	0.22	19.0	B	1/3	0.24	19.0	B	1/3	0.24	19.0	B	1/3
Route 140 EB TH/RT	0.76	35.7	D	7/15	0.80	37.8	D	8/19	0.80	38.1	D	9/19
Route 140 WB LT	0.59	19.0	B	3/6	0.67	22.0	C	3/7	0.69	22.8	C	3/8
Route 140 WB TH/RT	0.55	25.1	C	5/12	0.57	25.1	C	6/14	0.58	25.1	C	6/14
King Street NB LT/TH	0.66	26.4	C	7/19	0.77	33.4	C	8/21	0.77	34.3	C	8/21
King Street NB RT	0.29	13.2	B	1/6	0.35	15.2	B	2/7	0.35	15.4	B	2/7
Chestnut Street SB LT/TH/RT	0.57	23.7	C	138/385	0.77	33.9	C	8/22	0.79	35.3	D	8/22
Overall	--	24.3	C	--	--	28.4	C	--	--	29.0	C	--
<i>Weekday Evening:</i>												
Route 140 EB LT	0.48	20.2	C	2/5	0.54	21.1	C	2/5	0.55	21.2	C	2/5
Route 140 EB TH/RT	0.86	43.3	D	10/22	0.87	43.5	D	12/26	0.88	44.3	D	12/26
Route 140 WB LT	1.04	>80.0	F	7/20	1.20	>80.0	F	10/23	1.23	>80.0	F	10/24
Route 140 WB TH/RT	0.77	33.0	C	10/24	0.81	34.4	C	12/27	0.81	34.7	C	12/28
King Street NB LT/TH	0.72	34.8	C	7/17	0.86	50.0	D	8/19	0.87	50.7	D	8/19
King Street NB RT	0.27	15.4	B	1/5	0.32	17.8	B	2/16	0.32	18.0	B	2/6
Chestnut Street SB LT/TH/RT	0.97	63.1	E	13/24	1.29	>80.0	F	18/29	1.31	>80.0	F	18/30
Overall	--	45.5	D	--	--	79.4	E	--	--	>80.0	F	--

See notes at end of table.



Table 4 (Continued)
SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY

Signalized Intersection/ Peak Hour/Movement	2022 Existing			2029 No-Build			2029 Build					
	V/C ^a	Delay ^b	LOS ^c	Queue ^d 50 th /95 th	V/C	Delay	LOS	Queue 50 th /95 th	V/C	Delay	LOS	Queue 50 th /95 th
Route 140 at Horace Mann Plaza Driveway and CVS/Pharmacy Driveway												
<i>Weekday Morning:</i>												
Route 140 EB LT	0.23	5.9	A	1/2	0.26	6.4	A	1/3	0.26	6.4	A	1/3
Route 140 EB TH	0.61	10.0	A	3/17	0.65	10.2	B	4/24	0.66	10.4	B	4/25
Route 140 EB RT	0.01	6.2	A	0/0	0.01	6.2	A	0/0	0.01	6.2	A	0/0
Route 140 WB LT	0.02	8.1	A	0/1	0.03	8.1	A	0/1	0.03	8.1	A	0/1
Route 140 WB TH	0.61	13.1	B	5/15	0.62	13.1	B	6/19	0.62	13.1	B	6/19
Route 140 WB RT	0.04	8.9	A	0/0	0.04	8.9	A	0/1	0.04	8.9	A	0/1
CVS/Pharmacy Driveway NB LT/TH	0.18	24.7	C	1/2	0.20	30.1	C	1/2	0.20	30.4	C	1/2
CVS/Pharmacy Driveway NB RT	0.01	24.0	C	0/0	0.01	29.3	C	0/0	0.01	29.5	C	0/0
Horace Mann Plaza Driveway SB LT/TH	0.55	27.9	C	1/4	0.62	36.9	D	1/4	0.62	37.3	D	1/4
Horace Mann Plaza Driveway SB RT	0.04	19.3	B	0/1	0.05	24.2	C	0/1	0.05	24.5	C	0/1
Overall	--	12.6	B	--	--	13.3	B	--	--	13.3	B	--
<i>Weekday Evening:</i>												
Route 140 EB LT	0.55	13.9	B	1/6	0.68	27.2	C	2/8	0.68	27.5	C	2/8
Route 140 EB TH	0.53	10.3	B	4/19	0.60	11.7	B	5/23	0.61	11.8	B	5/23
Route 140 EB RT	0.03	7.0	A	0/0	0.03	7.2	A	0/0	0.03	7.2	A	0/0
Route 140 WB LT	0.05	10.1	B	0/1	0.06	10.6	B	0/1	0.06	10.6	B	0/1
Route 140 WB TH	0.81	24.4	C	12/53	0.91	34.4	C	14/38	0.92	35.9	D	15/39
Route 140 WB RT	0.12	12.1	B	1/3	0.14	12.5	B	1/3	0.14	12.5	B	1/3
CVS/Pharmacy Driveway NB LT/TH	0.31	34.8	C	1/3	0.32	34.8	C	1/3	0.32	34.8	C	1/3
CVS/Pharmacy Driveway NB RT	0.02	33.0	C	0/0	0.02	33.0	C	0/0	0.02	33.0	C	0/0
Horace Mann Plaza Driveway SB LT/TH	0.75	49.4	D	3/7	0.78	52.2	D	3/7	0.78	52.2	D	3/7
Horace Mann Plaza Driveway SB RT	0.13	24.4	C	0/2	0.14	24.4	C	0/2	0.14	24.4	C	0/2
Overall	--	20.4	C	--	--	25.5	C	--	--	26.0	C	--

^aVolume-to-capacity ratio.

^bControl (signal) delay per vehicle in seconds.

^cLevel of service.

^dQueue length in vehicles.

NB = northbound; SB = southbound; EB = eastbound; WB = westbound; UT = u-turning movements; LT = left-turning movements; TH = through movements; RT = right-turning movements.



**Table 5
UN SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Unsignalized Intersection/Peak Hour/Movement	2022 Existing			2029 No-Build			2029 Build			
	Demand ^a	Delay ^b	Queue ^d 95 th	Demand	Delay	LOS	Demand	Delay	LOS	Queue 95 th
Route 140 at the Project Site Driveway										
Weekday Morning:										
Route 140 EB TH RT	--	--	--	--	--	--	743	0.0	A	0
Route 140 WB LT/TH	--	--	--	--	--	--	616	0.1	A	0
Project Driveway NB LT/RT	--	--	--	--	--	--	27	18.3	C	1
Weekday Evening:										
Route 140 EB TH RT	--	--	--	--	--	--	851	0.0	A	0
Route 140 WB LT/TH	--	--	--	--	--	--	946	0.5	A	0
Project Driveway NB LT/RT	--	--	--	--	--	--	15	27.7	D	1

^aDemand in vehicles per hour.

^bAverage control delay per vehicle (in seconds).

^cLevel of service.

^dQueue length in vehicles.

NB = northbound; EB = eastbound; WB = westbound; LT = left-turning movements; TH = through movements; RT = right-turning movements.



SIGHT DISTANCE ASSESSMENT

Sight distance measurements were performed at the Project site driveway intersection with Route 140 in accordance with MassDOT and American Association of State Highway and Transportation Officials (AASHTO)¹⁰ requirements. Both stopping sight distance (SSD) and intersection sight distance (ISD) measurements were performed. In brief, SSD is the distance required by a vehicle traveling at the design speed of a roadway, on wet pavement, to stop prior to striking an object in its travel path. ISD or corner sight distance (CSD) is the sight distance required by a driver entering or crossing an intersecting roadway to perceive an oncoming vehicle and safely complete a turning or crossing maneuver with on-coming traffic. In accordance with AASHTO standards, if the measured ISD is at least equal to the required SSD value for the appropriate design speed, the intersection can operate in a safe manner. Table 6 presents the measured SSD and ISD at the subject intersection.

**Table 6
SIGHT DISTANCE MEASUREMENTS^a**

Intersection/Sight Distance Measurement	Feet		Measured
	Required Minimum (SSD)	Desirable (ISD) ^b	
<i>Route 140 at the Project Site Driveway</i>			
<i>Stopping Sight Distance:</i>			
Route 140 approaching from the east	305	--	650+
Route 140 approaching from the west	305	--	650+
<i>Intersection Sight Distance:</i>			
Looking to the east from the driveway	305	445	650+
Looking to the west from the driveway	305	390	650+

^aRecommended minimum values obtained from *A Policy on Geometric Design of Highways and Streets*, 7th Edition; American Association of State Highway and Transportation Officials (AASHTO); 2018; and based on a 40 mph approach speed on Route 140.

^bValues shown are the intersection sight distance for a vehicle turning right or left exiting a roadway under STOP control such that motorists approaching the intersection on the major street should not need to adjust their travel speed to less than 70 percent of their initial approach speed.

As can be seen in Table 6, the available lines of sight at the Project site driveway intersection were found to exceed the recommended minimum sight distance to function in a safe (SSD) and efficient (ISD) manner based on a 40 mph approach speed along Route 140, which is consistent with the posted speed limit in the vicinity of the Project site (40 mph) and is 6 mph above the measured 85th percentile vehicle travel speed (34 mph).

¹⁰*A Policy on Geometric Design of Highway and Streets*, 7th Edition; American Association of State Highway and Transportation Officials (AASHTO); Washington D.C.; 2018.



SUMMARY

VAI has completed a detailed assessment of the potential impacts on the transportation infrastructure associated with the proposed construction of the TAJ Estates of Franklin II mixed-use development to be located at 230 East Central Street (Route 140) in Franklin, Massachusetts. The following specific areas have been evaluated as they relate to the Project: i) access requirements; ii) potential off-site improvements; and iii) safety considerations; under existing and future conditions, both with and without the Project. Based on this assessment, we have concluded the following with respect to the Project:

1. Using trip-generation statistics published by the ITE¹¹ for similar land uses as those proposed, the Project is expected to generate approximately 314 vehicle trips on an average weekday (two-way, 24-hour volume), with 36 vehicle trips expected during the weekday morning peak-hour and 38 vehicle trips expected during the weekday evening peak-hour;
2. The Project will not result in a significant impact (increase) on motorist delays or vehicle queuing over anticipated future conditions without the Project (No-Build condition), with the majority of the movements at the study intersections shown to continue to operate at LOS D or better, where an LOS of “D” or better is defined as “acceptable” traffic operations;
3. Independent of the Project, it was noted that one or more movements at the Route 140/King Street/Chestnut Street intersection are currently operating at or over capacity (defined as LOS “E” or “F”, respectively) during the weekday evening peak hour, with Project-related impacts at the intersection defined as an increase in average motorist delay of up to 10.7 seconds and in vehicle queuing of up to one (1) vehicle;
4. All movements exiting the Project site driveway are predicted to operate at LOS C during the weekday morning peak hour and at LOS D during the weekday evening peak hour, with vehicle queues of up to one (1) vehicle. All movements along Route 140 approaching the Project site driveway are expected to operate at LOS A with negligible vehicle queuing;
5. No apparent safety deficiencies were identified based on a review of MassDOT motor vehicle crash data for the study area intersections; and
6. Lines of sight at the Project site driveway intersection with Route 140 were found to exceed the recommended minimum distance for the intersection to operate in a safe and efficient manner based on the appropriate approach speed.

In consideration of the above, we have concluded that the Project can be accommodated within the confines of the existing transportation infrastructure in a safe and efficient manner with the implementation of the recommendations that follow.

RECOMMENDATIONS

A detailed transportation improvement program has been developed that is designed to provide safe and efficient access to the Project site and address any deficiencies identified as a part of this assessment. The following improvements have been recommended as a part of this evaluation and, where applicable, will be completed in conjunction with the Project subject to receipt of all necessary rights, permits, and approvals.

¹¹Ibid 1.



Project Access

Access to the Project site will be provided by way of a new driveway that will intersect the south side of Route 140 approximately 10 feet east of the existing driveway that serves the Project site, which will be closed in conjunction with the Project. The following recommendations are offered with respect to the design and operation of the Project site access and internal circulation, many of which are reflected on the Site Plans:

- The Project site driveway and internal circulating drives should be 24 feet in width and designed to accommodate the turning and maneuvering requirements of the largest anticipated responding emergency vehicle.
- Vehicles exiting the Project site should be placed under STOP-sign control with a marked STOP-line provided.
- Where perpendicular parking is proposed, the drive aisle behind the parking should be a minimum of 23-feet in width.
- All signs and pavement markings to be installed within the Project site should conform to the applicable standards of the *Manual on Uniform Traffic Control Devices (MUTCD)*.¹²
- A sidewalk has been provided within the Project site that links the proposed building to the sidewalk along Route 140.
- Americans with Disabilities Act (ADA)-compliant wheelchair ramps should be provided for crossing the Project site driveway and at pedestrian crossing within the Project site, or the driveway should be designed so that the sidewalk crosses the driveway (i.e., pan-type driveway).
- Signs and landscaping to be installed as a part of the Project within the intersection sight triangle areas of Athens Street and at intersections internal to the Project site should be designed and maintained so as not to restrict lines of sight.
- Snow accumulations (windrows) within sight triangle areas should be promptly removed where such accumulations would impede sightlines.

Off-Site

Route 140 at King Street and Chestnut Street

Independent of the Project, one or more movements at the Route 140/King Street/Chestnut Street intersection are currently operating at or over capacity (defined as LOS “E” or “F”, respectively) during the weekday evening peak hour, with Project-related impacts at the intersection defined as an increase in average motorist delay of up to 10.7 seconds and in vehicle queuing of up to one (1) vehicle, neither of which are significant. In order to improve operating conditions at the intersection, an optimal traffic signal timing plan should be considered for advancement independent of the Project. As can be seen in Table 7, with implementation of an optimal traffic signal timing plan, overall intersection operations were shown to improve to LOS E (from LOS F) during the weekday evening peak hour, with a general reduction in motorist delay.

¹²*Manual on Uniform Traffic Control Devices (MUTCD)*; Federal Highway Administration; Washington, D.C.; 2009.



**Table 7
MITIGATED SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Signalized Intersection/ Peak Hour/Movement	2029 No-Build			2029 Build			2029 Build with Mitigation					
	V/C ^a	Delay ^b	LOS ^c	Queue ^d 50 th /95 th	V/C	Delay	LOS	Queue 50 th /95 th	V/C	Delay	LOS	Queue 50 th /95 th
<i>Route 140 at King Street and Chestnut Street</i>												
<i>Weekday Morning:</i>												
Route 140 EB LT	0.24	19.0	B	1/3	0.24	19.0	B	1/3	0.24	19.0	B	1/3
Route 140 EB TH/RT	0.80	37.8	D	8/19	0.80	38.1	D	9/19	0.80	38.1	D	9/19
Route 140 WB LT	0.67	22.0	C	3/7	0.69	22.8	C	3/8	0.69	22.8	C	3/8
Route 140 WB TH/RT	0.57	25.1	C	6/14	0.58	25.1	C	6/14	0.58	25.1	C	6/14
King Street NB LT/TH	0.77	33.4	C	8/21	0.77	34.3	C	8/21	0.77	34.3	C	8/21
King Street NB RT	0.35	15.2	B	2/7	0.35	15.4	B	2/7	0.35	15.4	B	2/7
Chestnut Street SB LT/TH/RT	0.77	33.9	C	8/22	0.79	35.3	D	8/22	0.79	35.3	D	8/22
Overall	--	28.4	C	--	--	29.0	C	--	--	29.0	C	--
<i>Weekday Evening:</i>												
Route 140 EB LT	0.54	21.1	C	2/5	0.55	21.2	C	2/5	0.59	24.4	C	2/5
Route 140 EB TH/RT	0.87	43.5	D	12/26	0.88	44.3	D	12/26	0.98	68.9	E	13/28
Route 140 WB LT	1.20	>80.0	F	10/23	1.23	>80.0	F	10/24	1.15	>80.0	F	10/24
Route 140 WB TH/RT	0.81	34.4	C	12/27	0.81	34.7	C	12/28	0.86	40.9	D	12/30
King Street NB LT/TH	0.86	50.0	D	8/19	0.87	50.7	D	8/19	0.78	40.0	D	8/18
King Street NB RT	0.32	17.8	B	2/6	0.32	18.0	B	2/6	0.30	15.6	B	2/5
Chestnut Street SB LT/TH/RT	1.29	>80.0	F	18/29	1.31	>80.0	F	18/30	1.16	>80.0	F	17/28
Overall	--	79.4	E	--	--	>80.0	F	--	--	70.1	E	--

^aVolume-to-capacity ratio.

^bControl (signal) delay per vehicle in seconds.

^cLevel of service.

^dQueue length in vehicles.

NB = northbound; SB = southbound; EB = eastbound; WB = westbound; UT = u-turning movements; LT = left-turning movements; TH = through movements; RT = right-turning movements.



Transportation Demand Management

Regularly scheduled, fixed-route, public transportation services are not currently provided within the study area or to the Project site. GATRA operates an on-demand microtransit service which allows transit riders to request a vehicle to pick them up for same-day service within the Town of Franklin through the GATRA GO United program. To the west of the Project site, the MBTA provides Commuter Rail service to South Station in Boston on the Franklin Line from Forge Park/495 Station, which is located at 1000 West Central Street (an approximate 9-minute driving distance from the Project site). Additionally, GATRA provides Dial-a-Ride paratransit services to eligible persons residing within the Town of Franklin who cannot use fixed-route transit all or some of the time due to a physical, cognitive, or mental disability in accordance ADA requirements.

In an effort to reduce the overall number of automobile trips in the area and to integrate the Project into the available transportation resources, the following Transportation Demand Management (TDM) measures will be implemented as a part of the Project:

- A transportation coordinator, who may also have other operations/management responsibilities, will be assigned for the Project to coordinate the TDM program;
- Information regarding public transportation services, maps, schedules, and fare information will be posted in a central location and/or otherwise made available to residents and employees;
- A “welcome packet” will be provided to residents and employees detailing available public transportation services, bicycle and walking alternatives, and commuter options;
- Pedestrian accommodations will be incorporated into the Project and consist of sidewalks and ADA-compliant wheelchair ramps at all pedestrian crossings where a sidewalk is present;
- An internal mailroom will be provided; and
- Secure bicycle parking will be provided within the Project site consisting of: i) exterior bicycle parking conveniently located proximate to building entrance; and ii) weather protected bicycle parking located in a secure area within the building.

With the implementation of the above recommendations, safe and efficient access can be provided to the Project site and the Project can be accommodated within the confines of the existing transportation infrastructure.

cc: File



