



*AK* **Associates**

*Ali R. Khorasani, P.E.*

*Traffic, Transportation & Civil Engineering*

*P.O. Box 804, Spencer, MA 01562, Tel: (508) 560-4041*

July 26, 2024

Mr. George Bahnan, Esq.  
Assistant General Counsel  
Ferris Development Group, LLC  
118 Turnpike Road, Suite 300  
Southborough, MA 01772

RE: Responses to VAI's Comments  
Relative to Traffic Study for  
Residential Development Project at 120 Turnpike Road

Dear Mr. Bahnan:

In response to your request, I am pleased to forward this memorandum that contains my responses to the second set of comments submitted on Monday, June 3, 2024, by Mr. Jeffrey Dirk, PE, from the firm of Vanasse & Associates, Inc. (VAI), the peer reviewer for the town of Southborough, Massachusetts. In support of the comprehensive permit application to the town of Southborough, I am submitting the following responses relative to the comments pertaining to the Traffic Impact Study (TIS) dated September 2023 for the above referenced project. It should be noted, however, the following responses are to address the comments during our telephone conversation with Mr. Jeffrey Dirk of VAI.

### **Comment T1**

*The data collection effort was completed following accepted standards; however, the adjustments to the raw traffic count data do not follow current guidelines. First, the September traffic counts should not be adjusted downward. It is customary to retain traffic count data that is above-average without reduction and to adjust the data only in the case where the data was collected during a “below-average” month or when evaluating the warrants for the installation of a traffic control signal. Second, MassDOT has provided updated guidance that no longer requires pandemic-related adjustment of traffic counts performed after March 2022 except in locations where the predominant land use consists of offices or similar uses.<sup>1</sup> Given that the predominant land use that is accessed by way of the study area intersection is office uses, that traffic volumes entering and exiting the driveway that serves 118/120 Turnpike Road should be adjusted (increased) to account for the vacancy of the existing office buildings at the time that the traffic counts were performed.*

### **Response**

The Turning Movement Counts were readjusted to include an increase due to the 35% vacancy at 120 and 118 Turnpike Road by increasing traffic to and from the site by 35%. The following Table 1 and Table 2 show the raw data collected in September of 2023, as well as the adjusted data that shows increased traffic to and from the site due to 35% vacancy of the two office buildings.

Raw TMCs		Table 1 - Raw TMCs								
		Intersection of Turnpike Rd and Driveway to 118-120 Turnpike Rd			AM Peak			PM Peak		
Direction	Volume	EB-T	EB-R	NB-R	EB-T	EB-R	NB-R	EB-T	EB-R	NB-R
		1848	19	6	1737	14	25	1433	1	5

Raw TMCs		Table 2 - COVID Adjusted TMCs by increasing office traffic by 35%								
		Intersection of Turnpike Rd and Driveway to 118-120 Turnpike Rd			AM Peak			PM Peak		
Direction	Volume	EB-T	EB-R	NB-R	EB-T	EB-R	NB-R	EB-T	EB-R	NB-R
		1848	19	6	1737	14	25	1433	1	5

Also, as recommended by VAI, and since the seasonal factor for traffic collected on U3 Roads in the month of September is less than one, the volumes were not further adjusted (decreased).

### Comment T2

*A review of the MassDOT statewide High Crash Location List indicated that the Route 9 intersection with the driveway that serves 118/120 Turnpike Road is not identified as a Highway Safety Improvement Program (HSIP) eligible high crash location. Outside of the immediate intersection, the following intersections that will be impacted by the Project are identified as high crash cluster locations for the 2018-2020 reporting period and HSIP eligible:*

- Route 9/Breakneck Hill Road/White Bagley Road
- Route 9/Woodland Road
- Route 9/Oak Hill Road/Central Street

*Given that the Route 9/Breakneck Hill Road/White Bagley Road and Route 9/ Oak Hill Road/Central Street intersections are critical to facilitating access to the Project due to the median barrier along Route 9, a review of the motor vehicle crashes that are occurring at these intersections should be undertaken and potential remedial measures identified that are commensurate with the identified impact of the Project at these intersections.*

### Response

As per VAI's recommendation, a listing of all crashes during a 12-month period in 2023 for the town of Southborough was obtained from the official site of massDOT's Crash Data Portal. The number and types of accidents for the three intersections mentioned in the review were identified and evaluated. The evaluation centered, amongst other factors, on identifying crashes that may have involved vehicles making a U-Turn maneuver in order to change directions, as some of the residents of the proposed development may in fact make such a maneuver to go to or come from the proposed site. This evaluation revealed that there were no accidents involving U-Turn maneuvers at any of these three intersections. The following Table 3 shows the number of accidents for a full year during 2023. As shown in Table 3, the intersection of Route 9 at Oak Hill Road and Central Street had the highest number of accidents and the intersection of

Route 9 and Breakneck Hill Road and White Bagley Road had the second highest number of accidents among these three intersections. Most of the accidents were of Rear-End-type which are typical of the prominent type of accidents at intersections, and none involved vehicles making U-Turn maneuvers. Therefore, the proposed residential development is expected to have little or no impact on the area roads and intersections. A copy of the accidents that were reported by the *massDOT* for these three intersections is attached hereto.

**Table 3 - Vehicle Crash Summary (Jan 1, 2023-Dec 31, 2023)**

	Route 9 at Breakneck Hill and White Bagley	Route 9 at Woodland	Route 9 at Oak Hill/Central
<b>Intersection</b>	Signalized	Unsignalized	
<b>Signalized</b>			
<b>Collision Type</b>			
Angle	0	0	2
Head-On	0	0	0
Rear-end	7	4	5
Sideswipe	0	1	2
Single Vehicle	0	0	0
U Turn	0	0	0
Unknown	0	0	1
<b>Total</b>	<b>7</b>	<b>5</b>	<b>10</b>
<b>Severity</b>			
Fatal Injury	0	0	0
Non-Fatal Injury	2	2	2
Property Damage	5	3	8
<b>Total</b>	<b>7</b>	<b>5</b>	<b>10</b>
<b>Time of Day</b>			
7:00 AM to 9:00 AM	2	1	5
4:00 PM to 6:00 PM	1	0	3
Other Times	4	4	3
<b>Total</b>	<b>7</b>	<b>5</b>	<b>10</b>
<b>Pavement Conditions</b>			
Dry	4	3	7
Wet	2	2	3
Snow	1	0	0
<b>Total</b>	<b>7</b>	<b>5</b>	<b>10</b>

Source: *massDOT* Crash Portal Jan 1, 2023-Dec 31, 2023

### Comment T3

*MassDOT's Transportation Impact Assessment (TIA) Guidelines require that the future conditions analysis horizon be established as a 7-year projection from the date of publication of the assessment. As such, the future condition horizon year should be adjusted to 2030. We agree with the 1.0 percent per year compounded annual background traffic growth rate, but note that Route 9 in Southborough is considered an urban (U) roadway and the urban roadway adjustment factors and growth rates should be used.*

### Response

The existing (baseline) data were adjusted at a rate of 1% per year to reflect a seven-year horizon into the future (year 2030) as recommended by VAI's review. It should be noted that no seasonal adjustments were made (TMCs were not reduced) by either factor of 0.95 for traffic collected on R3 Roads in the month

September or factor of 0.92 for traffic collected on U3 Roads in the month of September. The future no build traffic is shown below in Table 4.

Table 4 – Future No Build (Year 2030) Traffic  
Increased TMCs Intersection of Turnpike Rd and Driveway to 118-120 Turnpike Rd

No Build 2030 Direction Volume	AM Peak			PM Peak			Sat Peak		
	EB-T	EB-R	NB-R	EB-T	EB-R	NB-R	EB-T	EB-R	NB-R
	1977	29	9	1859	20	36	1533	1	7

#### Comment T4

*The Town of Southborough and MassDOT should be consulted concerning potential future development projects by others that may impact future condition traffic volumes and traffic patterns beyond those accounted for by the general background traffic growth rate and to identify planned roadway improvement projects in the area.*

#### Response

Both District 3 of the *massDOT* office and the town of Southborough were consulted to identify any approved plans for any other developments that may have an impact on the area traffic, particularly in the vicinity of the proposed site. None were identified. However, there is one project at 250 Turnpike Road also proposed by Ferris Development Group LLC, that involves converting an office building into a self-storage facility and adding a 4-story building containing a total of 56 apartment units. However, it was established that this development will have negative net traffic compared to the existing office use. Table 5 below shows the traffic generation characteristics of the proposed development at 250 Turnpike Road when compared with continued office use.

Also, the Project Information was researched on the *massDOT* website, and no roadway improvement projects were identified for Route 9 in the general area of the proposed development project.

Table 5 – Trip Generation Characteristics of Proposed Development  
250 Turnpike Rod

Existing 55,000 SF Office Building (ITE Land Use 710)												
	Daily	%In	%Out	AM Peak	%In	%Out	PM Peak	%In	%Out	Sat Peak	%In	%Out
Rate Trips/1000 SF	9.74	50	50	1.16	86	14	1.15	16	84	0.53	54	46
Total LU 710 Trips	536	268	268	64	55	9	63	10	53	29	16	13
Proposed 69,400 SF Mini-Warehouse (ITE Land Use 151)												
	Daily	%In	%Out	AM Peak	%In	%Out	PM Peak	%In	%Out	Sat Peak	%In	%Out
Rate Trips/1000 SF	1.51	50	50	0.1	60	40	0.17	47	53	0.31	59	41
Total LU 151 Trips	105	53	52	7	4	3	12	6	6	22	13	9
Proposed 56 Units Multi-Family - Mid-Rise Housing LU Code 221												
	Daily	%In	%Out	AM Pk	%In	%Out	PM Pk	%In	%Out	Sat Pk	%In	%Out
Rate Trips/Unit	5.44	50	50	0.36	26	74	0.44	61	39	0.44	49	51
Total LU 221 Trips	305	152	153	20	5	15	25	15	10	25	12	13
Total New Trips	410	205	205	27	9	18	37	21	16	47	25	22
Differential	-126	-63	-63	-37	-46	9	-26	11	-37	18	9	9

### Comment T5

*The Build condition traffic volumes should be updated to reflect the changes to the No-Build condition traffic volumes and the 2030 horizon year.*

### Response

The build condition traffic volumes were updated to reflect the changes to the No-Build conditions traffic volumes and the 2030 horizon year. The following Table 6 below shows the new traffic when the site is developed and fully occupied.

Table 6 – Future Build (Year 2030) Traffic

Increased TMCs Intersection of Turnpike Rd and Driveway to 118-120 Turnpike Rd

Build 2030 Direction Volume	AM Peak			PM Peak			Sat Peak		
	EB-T	EB-R	NB-R	EB-T	EB-R	NB-R	EB-T	EB-R	NB-R
	1977	35	25	1859	36	46	1533	14	20

### Comment T6

*The traffic operations analysis should be revised to reflect the comments provided as a part of this assessment pertaining to the Existing, No-Build and Build condition traffic volumes.*

### Response

The traffic operation analysis was revised to reflect the comments as a part of this assessment relating to the Existing, future No-Build, and future Build condition traffic volumes. The analysis results are summarized in the following Table 7.

Intersection of Turnpike Rd and Driveway to 118-120 Turnpike Rd

Level Of Service Analysis - Existing Conditions

NB Approach Intersection ICU	AM Peak			PM Peak			Sat Peak		
	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
	0.02	14.4	B	0.11	14.5	B	0.03	12.3	B
	0	A		0.4	A		0.1	A	

Level Of Service Analysis - Future No Build Conditions

NB Approach Intersection ICU	AM Peak			PM Peak			Sat Peak		
	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
	0.03	15.3	C	0.13	15.3	C	0.03	12.7	B
	0.1	A		0.4	A		0.1	A	

Level Of Service Analysis - Future Build Conditions

NB Approach Intersection ICU	AM Peak			PM Peak			Sat Peak		
	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
	0.08	15.9	C	0.16	16	C	0.09	13.5	B
	0.2	A		0.5	A		0.3	A	

The intersection analyses for the existing, future year 2030 No-Build, and future year 2030 Build conditions were performed for the northbound approach of this intersection using the updated turning movements. The analysis revealed that under future Build conditions, this intersection will be operating at the same level as that under future No-Build conditions with Intersection Capacity Utilization LOS “A”. Also, the northbound approach of the site driveway will be operating at LOS “C”, the same as that under No-Build conditions. It should be noted that the delay for this

approach will increase ever so slightly from 15.3 seconds to 16 seconds per vehicle. This level of change in vehicular delays is considered inconsequential, and thus, negligible.

Again, the above-mentioned LOS “C” for the northbound approach of this intersection under both future No-Build and future Build conditions is indicative of average delay for traffic exiting the site and represents little or no impact associated with the development of the proposed multifamily residential project. Finally, the computer printout of the above-mentioned analysis is attached hereto.

### **Comment T7**

*We would suggest consideration of advancement of the following improvements as a part of the Project, which are commensurate with the predicted impact of the Project on the transportation infrastructure and are focused on safety and encouraging the use of alternative modes of transportation to single-occupancy vehicles:*

- 1. Define and implement safety-related improvements at the Route 9/Breakneck Hill Road/White Bagley Road and Route 9/Oak Hill Road/Central Street intersections that should be informed by a review of the MassDOT crash data for the intersections and limited to traffic signal timing adjustments and the installation of signs and pavement markings subject to receipt of all necessary rights, permits and approvals; and*
- 2. Implement a Transportation Demand Management (TDM) program that is inclusive of the following elements:*
  - Assign a transportation coordinator for the Project who may also have other responsibilities to coordinate the TDM program;*
  - Information regarding public transportation services should be made available to residents and include maps, schedules and fare information;*
  - A “welcome packet” should be provided to new residents providing the name and contact information for the transportation coordinator and detailing available public transportation services, bicycle and walking alternatives, and other commuting options;*
  - Work-at-home accommodations should be included within Project, and may take the form of meeting space and a business office in the common area;*
  - Secure bicycle parking should be provided consisting of both weather protected bicycle parking and exterior bicycle racks; and*
  - Consult with the MWRTA to discuss options to establish transit service to the Project.*

### **Response**

1. As per VAI’s recommendation, a listing of all crashes for the town of Southborough was obtained from the official site of *massDOT*’s Crash Data Portal. The number and types of accidents for the three intersections mentioned in the review were identified and evaluated. The evaluation centered, amongst other factors, around identifying crashes that may have involved vehicles making U-Turn maneuvers in order to change direction, as some of the residents of the proposed development may in fact make such a maneuver to go to or come

from the proposed site. This evaluation revealed that there were no accidents involving U-Turn maneuvers at any of these three intersections.

2. It is acknowledged that some components of the Transportation Demand Management (TDM) program will be beneficial at the proposed residential development site as recommended by VAI.
  - The assignment of a transportation coordinator or superintendent of the building should be considered. Such a coordinator could provide information relative to all forms of public transportation available, and information about biking and walking opportunities.
  - Although there are no MWRTA bus routes serving the area near the proposed project, information regarding MWRTA routes and MBTA service should be made available for residents who may want to make use of mass transit instead of driving their own cars to their final destinations.
  - Although there are no bike lanes or bicycling facilities on Route 9 in the vicinity of the proposed site, and since it is highly unlikely for bicyclists to ride on Route 9, it is recommended that both indoor and outdoor secure bicycle parking facilities be provided on site.
  - Although the COVID-19 pandemic is over, a measurable segment of the workforce and employers have become accustomed to the work-at-home concept. Therefore, it is agreed that some accommodation should be made for those who may conduct business at their place of residence.
  - As recommended by VAI, it would be advisable to consult with MWRTA to discuss the potential for providing a transit service to the site. However, since presently MWRTA does not have a service route in the vicinity of the proposed site, and since the proposed development generates little traffic, it is unlikely MWRTA would consider such a service to be feasible unless other nearby sites are amiable to explore such service and make it operationally feasible for MWRTA.

In conclusion, VAI's comments are generally accepted standard practice. However, they are intended for larger projects with much more significant traffic impact. The proposed development is one that will have little or no negative impact on the area roadways as its level of anticipated traffic generation is minimal. Nevertheless, the above responses to VAI's comments should provide a level of reassurance for the town of Southborough ZBA.

I trust the above responses will suffice. Please feel free to contact me should you have any questions or need additional information.

Sincerely,



Ali R. Khorasani, PE

Attachments

MassDOT Crash Report for SOUTHBOROUGH 2003, report created:																					
RMV Crash Number	City/Town Name	Crash Date	Crash Time	Crash Severity	Maximum Injury Severity Reported	Number of Fatal, Non-Fatal, and Injured	Manner of Collision	Vehicle Action Prior to Crash	Vehicle Travel Directions	Most Harmful Events	Vehicle Configuration	Road Surface Condition	Ambient Light	Weather Condition	Nearest Roadway Intersection	Distance From Nearest Roadway Intersection	Distance From Nearest Landmark	Distance From Nearest Street	Vehicle Type	Latitude	Longitude
1571778	SOUTHBO	06-Mar-2003	1:10 PM	Property damage only (none injured)	No injury	3 0 0	0 Rear-end	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic / V3: Traveling straight ahead	V1: E / V2: E / V3: E	V1:(Collsion with motor vehicle in traffic) / V2:(Passenger car) / V3:(Passenger car) /	Wet	Snowing	Daylight	TURNPIK E ROAD / BREAKN E ROAD / 9 E / BREAKN BREAKN ECK HILL ECK HILL ROAD	196279.5	893544.5	9390364	6240911			
1669263	SOUTHBO	04-Oct-2003	11:13 PM	Non-fatal injury	Non-fatal injury - Possible	2 1 0	0 Rear-end	V1: Not reported / V2: Slowing or stopped in traffic	V1: E / V2: E	V1:(Collsion with motor vehicle in traffic) / V2:(Passenger car) / V3:(Passenger car) /	Wet	Dark - lighted roadway	Cloudy/Rain	BREAKN ECK HILL ROAD / TURNPIK E ROAD	WHIT	196279.5	893544.5	9390364	6240911		
1669271	SOUTHBO	08-Oct-2003	7:50 AM	Property damage only (none injured)	No injury	2 0 0	0 Rear-end	V1: Traveling straight ahead / V2: Slowing or stopped in traffic	V1: E / V2: E	V1:(Collsion with motor vehicle in traffic) / V2:(Passenger car) / V3:(Passenger car) /	Wet	Dry	Daylight	Clear/Clear air	BREAKN ECK HILL ROAD / TURNPIK E ROAD	ES	196279.5	893544.5	9390364	6240911	
1609432	SOUTHBO	02-May-2003	9:39 PM	Non-fatal injury	Non-fatal injury - Non-Incapacitating	2 2 0	0 Rear-end	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: W / V2: W	V1:(Collsion with motor vehicle in traffic) / V2:(Collsion with motor vehicle in traffic)	Passenger car	Dry	Dark - lighted roadway	Cloudy/Clear	TURNPIK E ROAD / TURNPIK E ROAD / WHITE BAGLEY ROAD	196275.9	893559.8	0647963	1232913		
1780037	SOUTHBO	13-Jul-2003	2:20 AM	Non-fatal injury	Non-fatal injury - Incapacitating	2 5 0	0 Rear-end	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: E / V2: E	V1:(Light truck/van, minivan, pickup, sport utility) / V2:(Light truck/van, minivan, pickup, sport utility)	Passenger car	Dry	Dark - lighted roadway	Not Reported	TURNPIK E ROAD / Rte 9 / WHITE BAGLEY ROAD	196275.9	893559.8	0647963	1232913		
1766677	SOUTHBO	22-Aug-2003	6:00 PM	Property damage only (none injured)	No injury	2 0 0	0 Rear-end	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: W / V2: W	V1:(Passenger car) / V2:(Light truck/van, minivan, pickup, sport utility)	Wet	Dusk	Rain	TURNPIK E ROAD / Rte 9 / WHITE BAGLEY ROAD	196275.9	893559.8	0740274	1246846			
1548655	SOUTHBO	08-Jan-2003	9:40 AM	Non-fatal injury	Non-fatal injury - Possible	2 1 0	0 Rear-end	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: E / V2: E	V1:(Collsion with motor vehicle in traffic) / V2:(Light truck/van, minivan, pickup, sport utility) /	Passenger car	Wet	Daylight	Cloudy/Clear	TURNPIK E ROAD / Rte 9 E / WOODLA RD	199324.4	893730.6	6886561	8772128		

1544235 SOUTHBOROUGH 08-Jan-2003	9:40 AM	Non-fatal injury	Non-fatal injury - Possible	3 2 0	Rear-end	V1: Traveling straight ahead / V2: Traveling straight ahead / V3: Traveling straight ahead	V1: E / V2: E / V3: E	V1:(Colli) V1:(Passenger car) on with motor / V2:(Light vehicle in traffic) / mini-van, V2:(Colli) pickup, on with sport utility / V3:(Light vehicle in traffic) / truck/van, V3:(Colli) mini-van, on with pickup, motor sport vehicle in utility(traffic)	Wet Daylight	Cloudy/Cloudy	TURNPIK E ROAD Rte 9 E / WOODLA ND ROAD	199324.4 893730.6 6865661 8772128
1544370 SOUTHBOROUGH 17-Jan-2003	1:15 AM	Property damage only (none injured)	No injury	2 0 0	Rear-end	V1: Turning left / V2: Traveling straight ahead	V1: W / V2: W	V2:(Colli) V1:(Passenger car) on with motor / V2:(Light vehicle in traffic) / mini-van, V2:(Colli) pickup, on with sport utility(traffic)	Dry	Dark-lighted roadway	Clear/Clear TURNPIK E ROAD / E ROAD / WOODLA ND ROAD	199324.4 893730.6 6865661 8772128
1544011 SOUTHBOROUGH 18-Jan-2003	10:23 PM	Property damage only (none injured)	No injury	1 0 0	Single vehicle crash	V1: Traveling straight ahead	V1: S	V1:(Colli) V1:(Passenger car) on with utility pole(traffic)	Dry	Dark-lighted roadway	Clear/Clear WOODLA WOODLA ND ROAD / ROAD / RICHARD RICHARD S ROAD	199367.8 891718.6 5911972 8745341
1609436 SOUTHBOROUGH 13-May-2003	7:10 AM	Property damage only (none injured)	No injury	1 0 0	Rear-end	V1: Slowing or stopped in traffic	V1: E	V1:(Colli) V1:(Passenger car) on with motor vehicle in traffic(traffic)	Dry	Daylight	Cloudy/Cloudy TURNPIK E ROAD Rte 9 E / WOODLA ND ROAD	199324.4 893730.6 6865661 8772129
1689616 SOUTHBOROUGH 12-Feb-2003	4:30 PM	Property damage only (none injured)	No injury	2 0 0	Angle	V1: Turning left / V2: Traveling straight ahead	V1: N / V2: W	V1:(Colli) V1:(Passenger car) on with motor vehicle in traffic / V2:(Single unit truck) / V2:(Colli) (2-axle, 6-on with motor vehicle in traffic)	Dry	Daylight	Clear/Clear TURNPIK E ROAD / E ROAD / CENTRA CENTRA L L STREET / STREET / OAK HILL OAK HILL ROAD ROAD	199549.6 893801.3 8772882 1248935
1689523 SOUTHBOROUGH 15-Feb-2003	6:35 AM	Non-fatal injury	Non-fatal injury - Possible	2 4 0	Rear-end	V1: Turning right / V2: Traveling straight ahead	V1: W / V2: W	V1:(Colli) V1:(Passenger car) on with motor vehicle in traffic / V2:(Passenger car) / V2:(Colli) on with motor vehicle in traffic(traffic)	Dry	Daylight	Clear/Clear TURNPIK E ROAD / E ROAD / CENTRA CENTRA L L STREET STREET	199549.6 893801.3 8772882 1248935
1739884 SOUTHBOROUGH 28-Mar-2003	8:15 PM	Property damage only (none injured)	No injury	2 0 0	Rear-end	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic	V1: W / V2: W	V1:(Passenger car) / V2:(Light truck/van, mini-van, pickup, sport utility(traffic))	Dry	Dark-lighted roadway	Clear Rte 9 / Rte 9 / OAK HILL OAK HILL ROAD / ROAD / CENTRA CENTRA L L STREET STREET	199549.6 893801.3 8772882 1248935
1669920 SOUTHBOROUGH 19-Nov-2003	8:15 AM	Property damage only (none injured)	No injury	2 0 0	Sideswipe, same direction	V1: Turning left / V2: Turning left	V1: S / V2: E	V1:(Colli) V1:(Passenger car) on with motor vehicle in traffic / V2:(Passenger car) / V2:(Colli) on with motor vehicle in traffic(traffic)	Dry	Daylight	Cloudy/Cloudy CENTRA CENTRA L L STREET / STREET / TURNPIK TURNPIK E ROAD / E ROAD	199549.6 893801.3 8772882 1248935

1689585	SOUTHBO	19-Feb-2003	8:55 AM	Property damage only (none injured)	No injury	2	0	0	Rear-end	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1: E / V2: E	V1:(Collis V1:(Pass on with enginer car) motor / V2:(Pass traffic) / V2:(Collis on with motor vehicle in traffic)	Wet	Daylight	Clear/Clear air	TURNPIK E ROAD / E ROAD Rte 9 E / Rte 9 E / OAK HILL OAK HILL ROAD ROAD	199556.4	893790.1
1571886	SOUTHBO	13-Mar-2003	10:49 AM	Non-fatal injury - Possible	Non-fatal injury - Possible	2	1	0	Sideswipe, same direction	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: S / V2: S	V1:(Collis V1:(Pass on with enginer car) motor / V2:(Light vehicle in truck/van, traffic) / mini-van, V2:(Collis pickup, on with sport motor utility) vehicle in traffic)	Dry	Daylight	Clear/Clear air	TURNPIK E ROAD / E ROAD / OAK HILL OAK HILL ROAD ROAD	199556.4	893790.1
1609485	SOUTHBO	17-Jun-2003	5:30 PM	Property damage only (none injured)	No injury	2	0	0	Rear-end	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: E / V2: E	V1:(Collis V1:(Pass on with enginer car) motor / V2:(Light vehicle in truck/van, traffic) / mini-van, V2:(Collis pickup, on with sport motor utility) vehicle in traffic)	Dry	Daylight	Clear/Clear air	TURNPIK E ROAD Rte 9 / OAK HILL ROAD	199556.4	893790.1
1669368	SOUTHBO	21-Nov-2003	8:00 AM	Property damage only (none injured)	No injury	2	0	0	Angle	V1: Travelling straight ahead / V2: Turning left	V1: N / V2: S	V1:(Collis V1:(Pass on with enginer car) motor / V2:(Pass traffic) / V2:(Collis on with motor vehicle in traffic)	Wet	Daylight	Cloudy/Rain	TURNPIK E ROAD / E ROAD / OAK HILL OAK HILL ROAD ROAD	199556.4	893790.1
1778416	SOUTHBO	24-Dec-2003	8:40 AM	Property damage only (none injured)	No injury	3	0	0	Rear-end	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic	V1: E / V2: E / V3: E	V1:(Collis V1:(Pass on with enginer car) motor / V2:(Pass traffic) / V2:(Collis on with motor vehicle in traffic)	Wet	Daylight	Clear/Rain	TURNPIK E ROAD / E ROAD Rte 9 E / Rte 9 E / OAK HILL OAK HILL ROAD ROAD	199556.4	893790.1
1728789	SOUTHBO	30-Dec-2003	4:00 PM	Property damage only (none injured)	No injury	3	0	0	Not reported	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic / V3: Not reported	V1: E / V2: E / V3: E	V1:(Pass enginer car) / V2:(Pass enginer car) / V3:(Pass enginer car)	Dry	Daylight	Clear	TURNPIK E ROAD / E ROAD Rte 9 / Rte 9 / OAK HILL OAK HILL ROAD ROAD	199556.4	893790.1

Turnpike Rd at Driveway Existing AM Peak



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑				↑	
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	1848	27	0	0	0	6
Peak Hour Factor	0.92	0.68	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	2009	40	0	0	0	7
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage veh						
vC, conflicting volume		2048		2029	689	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)		4.1		6.8	6.9	
tC, 2 stage (s)						
tF (s)		2.2		3.5	3.3	
p0 queue free %		100		100	98	
cM capacity (veh/h)		271		50	388	
Direction, Lane #	EB 1	EB 2	EB 3	NB 1		
Volume Total	803	803	441	7		
Volume Left	0	0	0	0		
Volume Right	0	0	40	7		
cSH	1700	1700	1700	388		
Volume to Capacity	0.47	0.47	0.26	0.02		
Queue Length (ft)	0	0	0	1		
Control Delay (s)	0.0	0.0	0.0	14.4		
Lane LOS				B		
Approach Delay (s)	0.0			14.4		
Approach LOS				B		
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization	49.7%		ICU Level of Service		A	

Turnpike Rd at Driveway Existing PM Peak

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑					↑
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	1737	19	0	0	0	34
Peak Hour Factor	0.94	0.75	0.92	0.92	0.92	0.72
Hourly flow rate (veh/h)	1848	25	0	0	0	47
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage veh)						
vC, conflicting volume		1873		1861	629	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)		4.1		6.8	6.9	
tC, 2 stage (s)						
tF (s)		2.2		3.5	3.3	
p0 queue free %		100		100	89	
cM capacity (veh/h)		317		65	425	
Direction, Lane #	EB 1	EB 2	EB 3	NB 1		
Volume Total	739	739	395	47		
Volume Left	0	0	0	0		
Volume Right	0	0	25	47		
cSH	1700	1700	1700	425		
Volume to Capacity	0.43	0.43	0.23	0.11		
Queue Length (ft)	0	0	0	9		
Control Delay (s)	0.0	0.0	0.0	14.5		
Lane LOS				B		
Approach Delay (s)	0.0			14.5		
Approach LOS				B		
Intersection Summary						
Average Delay			0.4			
Intersection Capacity Utilization		46.3%		ICU Level of Service		A

Turnpike Rd at Driveway Existing Sat Peak

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑					↑
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	1433	1	0	0	0	7
Peak Hour Factor	0.94	0.25	0.92	0.92	0.92	0.50
Hourly flow rate (veh/h)	1524	4	0	0	0	14
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage veh)						
vC, conflicting volume		1528		1526	510	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	97
cM capacity (veh/h)			432		108	508
Direction, Lane #	EB 1	EB 2	EB 3	NB 1		
Volume Total	610	610	309	14		
Volume Left	0	0	0	0		
Volume Right	0	0	4	14		
cSH	1700	1700	1700	508		
Volume to Capacity	0.36	0.36	0.18	0.03		
Queue Length (ft)	0	0	0	2		
Control Delay (s)	0.0	0.0	0.0	12.3		
Lane LOS				B		
Approach Delay (s)	0.0			12.3		
Approach LOS				B		
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization		39.5%		ICU Level of Service		A

Turnpike Rd at Driveway Future No Build Conditions AM Peak

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑					↑
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	1977	29	0	0	0	9
Peak Hour Factor	0.92	0.68	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	2149	43	0	0	0	10
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage (veh)						
vC, conflicting volume		2192		2170	738	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)		4.1		6.8	6.9	
tC, 2 stage (s)						
tF (s)		2.2		3.5	3.3	
p0 queue free %		100		100	97	
cM capacity (veh/h)		238		40	361	
Direction, Lane #	EB 1	EB 2	EB 3	NB 1		
Volume Total	860	860	472	10		
Volume Left	0	0	0	0		
Volume Right	0	0	43	10		
cSH	1700	1700	1700	361		
Volume to Capacity	0.51	0.51	0.28	0.03		
Queue Length (ft)	0	0	0	2		
Control Delay (s)	0.0	0.0	0.0	15.3		
Lane LOS				C		
Approach Delay (s)	0.0		15.3			
Approach LOS				C		
Intersection Summary						
Average Delay		0.1				
Intersection Capacity Utilization		52.5%		ICU Level of Service		A

Turnpike Rd at Driveway Future No Build Conditions PM Peak

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑					↑
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	1859	20	0	0	0	36
Peak Hour Factor	0.94	0.75	0.92	0.92	0.92	0.72
Hourly flow rate (veh/h)	1978	27	0	0	0	50
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage (veh)						
vC, conflicting volume		2004		1991	673	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)		4.1		6.8	6.9	
tC, 2 stage (s)						
tF (s)		2.2		3.5	3.3	
p0 queue free %		100		100	87	
cM capacity (veh/h)		282		53	398	
Direction, Lane #	EB 1	EB 2	EB 3	NB 1		
Volume Total	791	791	422	50		
Volume Left	0	0	0	0		
Volume Right	0	0	27	50		
cSH	1700	1700	1700	398		
Volume to Capacity	0.47	0.47	0.25	0.13		
Queue Length (ft)	0	0	0	11		
Control Delay (s)	0.0	0.0	0.0	15.3		
Lane LOS				C		
Approach Delay (s)	0.0			15.3		
Approach LOS				C		
Intersection Summary						
Average Delay		0.4				
Intersection Capacity Utilization	48.8%		ICU Level of Service		A	

Turnpike Rd at Driveway Future No Build Conditions Sat Peak

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑					↑
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	1533	1	0	0	0	7
Peak Hour Factor	0.94	0.25	0.92	0.92	0.92	0.50
Hourly flow rate (veh/h)	1631	4	0	0	0	14
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage veh)						
vC, conflicting volume		1635		1633	546	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)		4.1		6.8	6.9	
tC, 2 stage (s)						
tF (s)		2.2		3.5	3.3	
p0 queue free %		100		100	97	
cM capacity (veh/h)		393		92	482	
Direction, Lane #	EB 1	EB 2	EB 3	NB 1		
Volume Total	652	652	330	14		
Volume Left	0	0	0	0		
Volume Right	0	0	4	14		
cSH	1700	1700	1700	482		
Volume to Capacity	0.38	0.38	0.19	0.03		
Queue Length (ft)	0	0	0	2		
Control Delay (s)	0.0	0.0	0.0	12.7		
Lane LOS				B		
Approach Delay (s)	0.0			12.7		
Approach LOS				B		
Intersection Summary						
Average Delay		0.1				
Intersection Capacity Utilization		41.6%		ICU Level of Service		A

Turnpike Rd at Driveway Future Build Conditions AM Peak

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑					↑
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	1977	35	0	0	0	25
Peak Hour Factor	0.92	0.68	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	2149	51	0	0	0	27
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage veh)						
vC, conflicting volume		2200		2175	742	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)		4.1		6.8	6.9	
tC, 2 stage (s)						
tF (s)		2.2		3.5	3.3	
p0 queue free %		100		100	92	
cM capacity (veh/h)		236		40	358	
Direction, Lane #	EB 1	EB 2	EB 3	NB 1		
Volume Total	860	860	481	27		
Volume Left	0	0	0	0		
Volume Right	0	0	51	27		
cSH	1700	1700	1700	358		
Volume to Capacity	0.51	0.51	0.28	0.08		
Queue Length (ft)	0	0	0	6		
Control Delay (s)	0.0	0.0	0.0	15.9		
Lane LOS				C		
Approach Delay (s)	0.0			15.9		
Approach LOS				C		
Intersection Summary						
Average Delay		0.2				
Intersection Capacity Utilization	52.7%		ICU Level of Service		A	

Turnpike Rd at Driveway Future Build Conditions PM Peak

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑					↑
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	1859	36	0	0	0	46
Peak Hour Factor	0.94	0.75	0.92	0.92	0.92	0.72
Hourly flow rate (veh/h)	1978	48	0	0	0	64
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage veh)						
vC, conflicting volume		2026		2002	683	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)		4.1		6.8	6.9	
tC, 2 stage (s)						
tF (s)		2.2		3.5	3.3	
p0 queue free %		100		100	84	
cM capacity (veh/h)		276		52	392	
Direction, Lane #	EB 1	EB 2	EB 3	NB 1		
Volume Total	791	791	444	64		
Volume Left	0	0	0	0		
Volume Right	0	0	48	64		
cSH	1700	1700	1700	392		
Volume to Capacity	0.47	0.47	0.26	0.16		
Queue Length (ft)	0	0	0	14		
Control Delay (s)	0.0	0.0	0.0	16.0		
Lane LOS				C		
Approach Delay (s)	0.0		16.0			
Approach LOS				C		
Intersection Summary						
Average Delay		0.5				
Intersection Capacity Utilization		49.9%		ICU Level of Service		A

Turnpike Rd at Driveway Future Build Conditions Sat Peak



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑					↑
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	1533	14	0	0	0	20
Peak Hour Factor	0.94	0.25	0.92	0.92	0.92	0.50
Hourly flow rate (veh/h)	1631	56	0	0	0	40
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage (veh)						
vC, conflicting volume		1687		1659	572	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)		4.1		6.8	6.9	
tC, 2 stage (s)						
tF (s)		2.2		3.5	3.3	
p0 queue free %		100		100	91	
cM capacity (veh/h)		375		88	463	
Direction, Lane #	EB 1	EB 2	EB 3	NB 1		
Volume Total	652	652	382	40		
Volume Left	0	0	0	0		
Volume Right	0	0	56	40		
cSH	1700	1700	1700	463		
Volume to Capacity	0.38	0.38	0.22	0.09		
Queue Length (ft)	0	0	0	7		
Control Delay (s)	0.0	0.0	0.0	13.5		
Lane LOS				B		
Approach Delay (s)	0.0			13.5		
Approach LOS				B		
Intersection Summary						
Average Delay		0.3				
Intersection Capacity Utilization	42.8%		ICU Level of Service		A	