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Traffic Impact Study

Prepared For
Multi Use Development
Fiske Hill Realty Trust
Located at

30 Main Street and 20 Fiske Hill Road
Sturbridge, Massachusetts

August 2020

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INTRODUCTION

Fiske Hill East Realty Trust, hereafter referred to as the applicant, is proposing the development of a parcel of land consisting of five lots totaling 134+/- acres to construct a multi-use development. The proposed development is located on the northeast side of Main Street (Route 131), between Fiske Hill Road and Hillcrest Street. The applicant is proposing to evaluate the impact of this development site on area traffic and consider any improvements that may be necessary in order to make this development feasible and acceptable. This traffic study is prepared in order to make this evaluation. The purpose of this traffic study is to develop an understanding of existing traffic operations and concerns, forecast future site generated traffic, assess the adequacy of the existing roadway system to accommodate the proposed development into the future, and to identify and recommend appropriate mitigation strategies, should any be deemed necessary. This is the second traffic study for the project site updating the original traffic study that was completed in 2007, as the overall size and the proposed land uses of the property has changed. As a point of history, this site was previously planned for subdivision in the early 2000s and had received approvals.

Project description

The applicant proposes to develop a 134+/- acre parcel of land and build a 65-unit manufactured housing community for people of 55+ years of age, a 120-unit assisted living facility, a 12,000 square foot urgent care center, a 14,500 square foot retail building, and finally, a 3,000 square foot office building. The housing community buildings will be single story comprised of two-bedroom units. The breakdown of all land uses is shown below.

- A 65 DUs 55+ Housing Community
- A 120 Units Assisted Living Facility
- A 12,000 SF Medical Arts/Urgent Care Facility
- A 14,500 SF Retail Building
- A 3,000 SF General Office Building

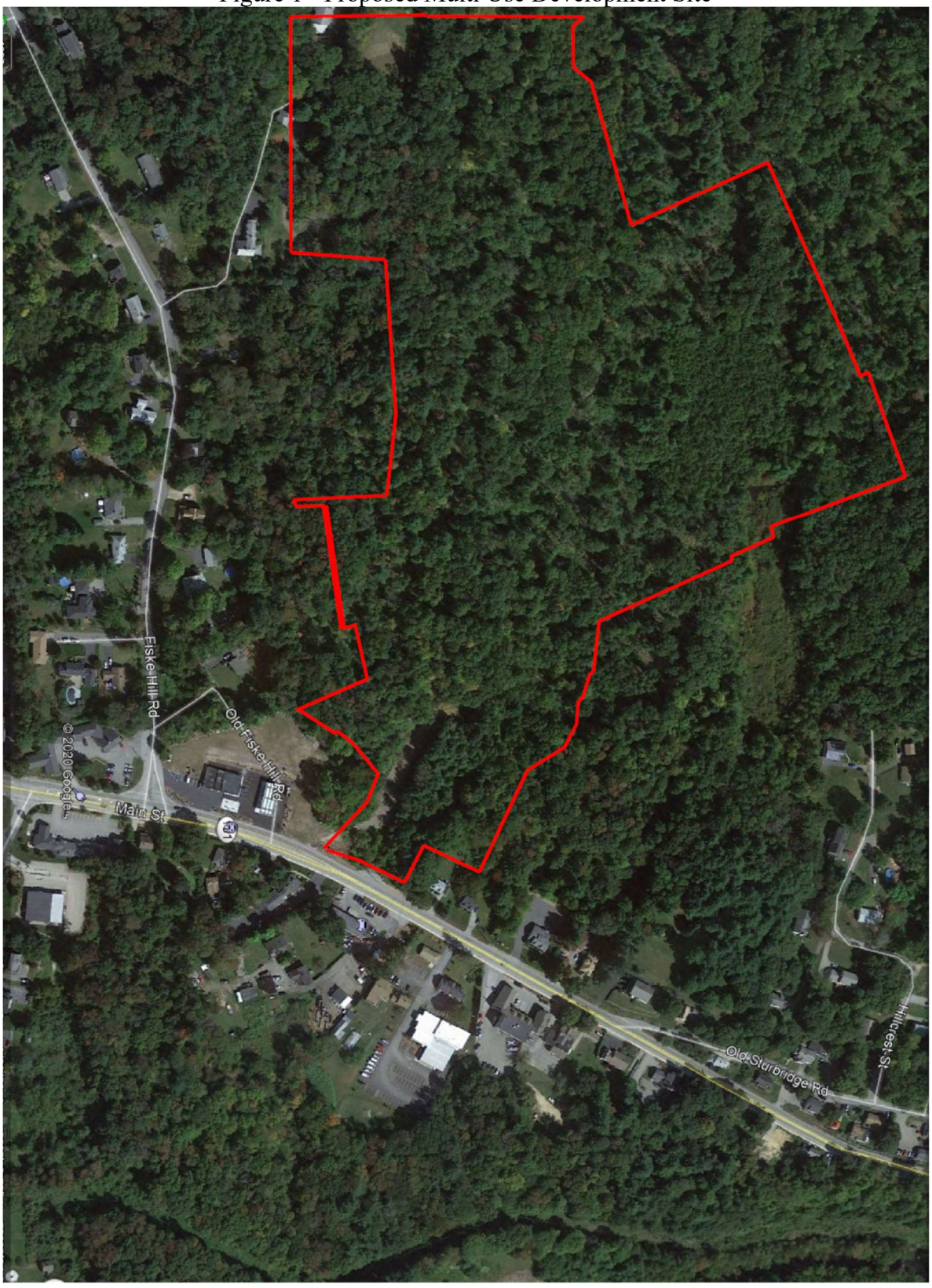
The site will be accessed via a primary access driveway that is 1,000’ long directly from Main Street approximately 500’ east of the Fiske Hill Road intersection, creating a 3-legged “T” intersection. This primary driveway has a 50’ Right-Of-Way (ROW) and a 24’ paved roadway. It also provides sidewalks on both sides of the road for about 450’ and one side of the road for the remaining 550’. The access driveways to the houses will be private driveways and vary in length. They connect the proposed houses and their associated parking spaces to the primary access driveway. The proposed access driveways provide entry to all off-street parking within individual driveways and garages. These driveways will have a 40’ ROW, though they are private, with a 20’ paved road. Each unit will have off-street parking for up to two vehicles. The proposed site is located in Rural, Suburban, and commercial zoning districts and is currently vacant as its approximate location is shown in the

aerial photograph in Figure 1.

As stated herein above, the housing units are designed and situated in such a way that they will all have access to off-street parking. This will eliminate the potential for on-street parking activities alongside the access drives, thus maintaining optimum safety for residents driving through the development.

Finally, an emergency egress/access is proposed through an existing access easement granted from the Town of Southbridge to the property owner in order to access the site via the corner of Idlewood Street and Crestwood Drive through the Town's property.

Figure 1 - Proposed Multi Use Development Site



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EXISTING CONDITIONS

Evaluation of the transportation impacts associated with the proposed multi use development project requires a thorough understanding of the existing transportation system in the immediate vicinity of the site. Evaluating existing roadway network operating conditions necessitates an examination of existing roadway traffic volumes, geometric features, and local community traffic- related issues. Each of these elements is described below.

Study Area Roadway Network

The study area for this traffic impact report has been defined to include the same area as in the original study that was determined in consultation with the massDOT District 3 Traffic Engineer. The study area includes the evaluation of the following intersections.

1) Route 131 (Main Street) at Fiske Hill Road
2) Route 131 (Main Street) at Wallace Road
3) Route 131 (Main Street) at the proposed primary access

Route 131 (Main Street) is a two-way roadway with one travel lane in each direction. The roadway width is approximately 34' in the area of the proposed development and provides a 4-foot shoulder on either side. However, the pavement width increases to 44' near the intersections of Main Street with Fiske Hill Road and Wallace Road where a dedicated left-turn lane is provided for each intersecting street. These dedicated left-turn lanes were not in place when the original study was prepared. The changes in the roadway cross section were made in/around 2012. Main Street has a sidewalk on the south side, and it intersects with Fiske Hill Road and Wallace Road at nearly 90 degrees. It is a rural arterial roadway. It traverses in easterly and westerly directions and provides access to other major highways in the area, including the Massachusetts Turnpike (I-90), Interstate 84, and Route 20 to the west, and Route 169 to the east, to name a few. Daily traffic volume in both directions for Route 131 in the vicinity of the proposed development was obtained from the massDOT website. In 2019, the Annual Average Daily Traffic along Route 131 was 15, 294 vehicles per day at a point west of the Southbridge Town line in Sturbridge, Massachusetts. Main Street intersects with Fiske Hill Road and Wallace Road approximately 500' and 800' west of the proposed primary access road, respectively.

Fiske Hill Road is a rural residential street that traverses in the northerly and southerly directions. Its pavement width varies from 20' to 22', except at/near its intersection with Main Street where the roadway width increases to 36' for a distance of 175'. Fiske Hill Road also connects Main Street to Route 20 at its northerly terminus and is posted at 35 miles per hour except for the southerly approach near the Main Street intersection where the speed limit is 25 miles per hour.

Wallace Road is another rural residential street that traverses in the northerly and southerly

directions. It connects to Breakneck Road, Off Street, and eventually connects to South Street. Its pavement is 22' wide except near its intersection with Main Street which is 26' wide. Wallace Street is posted with 30 miles per hour speed limit signs.

Intersection of Main Street and Fiske Hill Road is a three-legged "T" intersection with a two-lane approach for each leg except the westbound leg which has one lane. As stated earlier herein, in/around 2012 a dedicated left-turn lane was added to the eastbound approach of this intersection. Also added was a dedicated right-turn lane to the southbound approach (Fiske Hill Road) to separate left turning traffic from right turning traffic in order to minimize delays. Finally, the Fiske Hill approach of this intersection is controlled by a stop sign.

Intersection of Main Street and Wallace Road is also a three-legged intersection that has one lane in each direction except for the westbound approach which has two lanes, one for through movement and a second lane dedicated for left-turn movements. There is a striped crosswalk across the width of Wallace Road at this intersection. The Wallace Road (northbound) approach of this intersection is controlled by a stop sign.

Traffic Volumes

Due to the reductions in traffic volumes caused by the COVID-19 pandemic, taking new traffic counts in 2020 may severely undercount the baseline for which future years are based. Also, as per engineering directive by the massDOT, and as agreed upon by the town planner, the traffic counts that were collected for the original traffic impact study are considered acceptable for evaluation purposes as long as they are adjusted to the current year baseline, and are used in this revised report. To establish the present baseline volumes, the original intersection traffic movement counts were projected into the present year utilizing the massDOT Yearly Growth Rates which is based on historic traffic volume counts from a number of massDOT permanent counting stations. Permanent counting station #3989 is located on Main Street (Route 131) west of the Southbridge Town line in Sturbridge, Massachusetts.

The original manual turning movement volume counts (TMCs) were taken during the weeks of October 24th and October 27th in 2007 at both above-mentioned intersections. The TMCs were obtained during morning, evening, and Saturday peak traffic hours from 7:00 AM to 9:00 AM, 4:00 PM to 6:00 PM, and 11:00 AM to 1:00 PM, respectively. The counts revealed that the intersections generally experience peak traffic volumes between 7:30-8:30 AM, 4:30-5:30 PM during an average weekday, and between 11:45 AM and 12:45 PM on a Saturday.

As stated herein above, the counts in this revised report have been updated through the Average Annual Growth factor provided by the massDOT Data Management System. Also, due to the current global pandemic situation, overall traffic numbers are reduced since some businesses and schools are not fully opened yet. Extrapolating from previous counts shows a more accurate depiction of normal traffic conditions. A seven-year average daily traffic from the massDOT database showed little to no increase in traffic in the area. However, to stay within standard practice the massDOT yearly rates were used in order to extrapolate the existing baseline traffic

conditions.

The massDOT traffic counts at permanent station #3989, showed the daily traffic volumes on Route 131 at a point west of the Southbridge Town line fluctuated from 15,122 in 2013 to 15,294 in 2019. The following Table 1 shows this fluctuation.

Table 1
Average Daily Traffic Fluctuation
Main Street (Route 131)

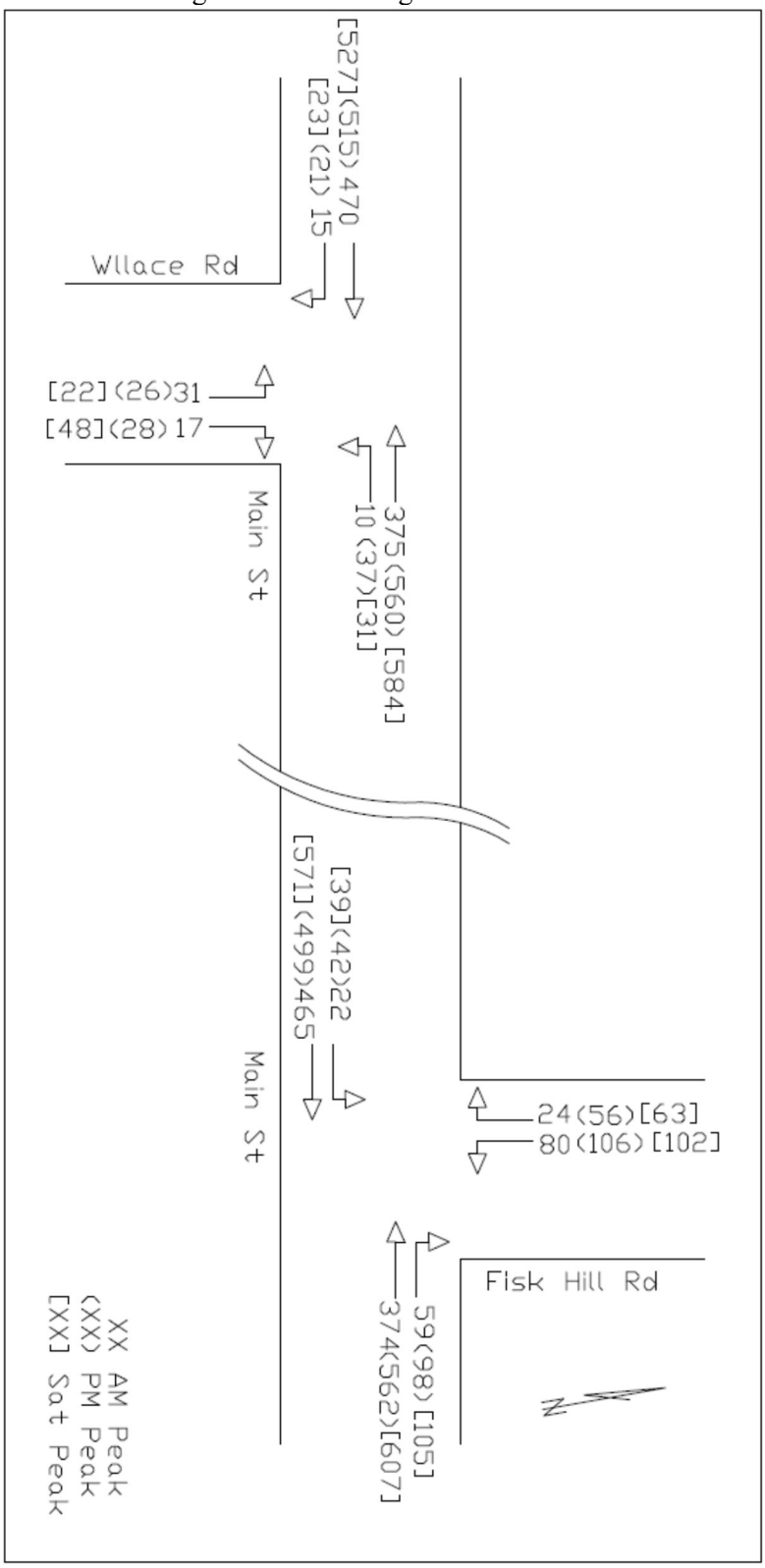
2013	2014	2015	2016	2017	2018	2019
15,122	15,954	16,129	16,523	16,705	16,632	15,294

A more concise method is using the massDOT guidance in their engineering directive. The massDOT Yearly Growth Rates for data from 2014 -2019 are shown in the appendix. Since the growth rates only go back to 2014, the rates were averaged and then expanded to a 13-year period. The average growth rate over a five-year period was calculated at 0.0034. This rate was multiplied by 13 to get the total increase rate of 0.0442. Therefore, the turning movement counts from the original study were increased by a factor of 0.0442. Again, as per massDOT guidance, this increase should also be used for all future traffic from any other additional developments that may take place along Main Street between now and 2027.

Additionally, the massDOT Highway Division provides statewide traffic data collection that includes weekday seasonal factors. To evaluate the potential for seasonal fluctuation of traffic volumes on roadways near the proposed site, weekday seasonal factors were obtained from the massDOT Statewide Traffic Data Collection. The data indicated that the seasonal factor for traffic collected during the month of October is 0.92 for R3 roadways. Usually the TMCs are multiplied by the factor of 0.92 to reflect those of the yearly average. Therefore, the extrapolated data were further adjusted to reflect those of an average year. A copy of adjustment factors is presented in the Technical Appendix section of this report.

Typically, the PM peak period has the higher volumes, and is considered the critical peak. However, in this case, higher traffic volumes occur during the Saturday peak period at these intersections. Percentage of truck traffic at permanent counting station #3989 along Main Street (Route131) was recorded by the massDOT at 1.7%. This value is considered average to slightly below average for roadways having similar characteristics. The following Figure 2 depicts the base line turning movement counts that were adjusted to reflect the year 2020 baseline.

Figure 2
Existing Baseline Turning Movement Counts



Safety Concerns

Sight Distances: The sight distances to the right (west) and left (east) of the proposed primary access driveway were measured in the field. The measured distances are those from a point 5' back of a stop bar (approximately 15' from the street line) and 3.5' above grade to represent drivers' eye height to an object 3.5' above roadway grade. The field review of Main Street showed that the available sight line for the traffic coming out of the proposed primary drive is approximately 500'+ to the right (west) beyond the Fiske Hill Road intersection and approximately 800' to the left (east). Both eastbound and westbound approaches of Main Street are posted with 35 miles per hour speed limit signs in the vicinity of the proposed development.

Based on Basic Design Controls for roadway design, the Stopping Sight Distance is calculated using the formula d=(V*V)/(30*f), plus the time required for perception and reaction by a driver (2.5 seconds). V is approach speed in mph, and f=0.28-0.35. The stopping sight distances are calculated and are provided in Exhibit 3-8 of the 2006 massDOT Project Development and Design Guide. A copy of this exhibit is presented in the Technical Appendix section of this report. The required stopping sight distance for 35 miles per hour on Main Street is 250'. The following photographs illustrate the available sight distances visually for both directions of Main Street at the proposed primary access driveway. Clearly, the utility pole in the photo will be removed from the proposed entrance and relocated.

From proposed Driveway looking to the right (west)

From proposed Driveway looking to the left (east)

As demonstrated herein above, available sight distances are significantly greater than the required values. Therefore, proper sight distances will be provided for both directions.

Accidents: The latest accident data compiled by the massDOT were obtained and reviewed for a five-year period of 2015-2019. This review summarizes the total number of accidents that occurred at each of the two unsignalized intersections during this five-year period, and is listed in Table 2, below. It is noted that no accidents were reported for the intersection of Main Street and Wallace Road during the five-year period of 2015-2019, while a total of 10 accidents were reported for the intersection of Main Street and Fiske Hill Road.

Of the ten accidents at the intersection of Main Street and Fiske Hill Road, three were reported during 2015, four during 2016, and three during 2017. There were no accidents reported during 2018 and 2019. Six of the accidents were of angle variety, two were rear-end type and two involved single vehicles. Also, six of the accidents resulted in property damage only, while four accidents involved injuries. There were no fatalities involved in these accidents. Finally, three of the accidents occurred during afternoon peak hours (between 4:00 PM and 6:00 PM) while the remaining seven accidents occurred outside peak traffic periods.

Using the turning movement counts compiled during traffic survey of these two intersections, accident rates were calculated in accidents per million vehicles entering each intersection. Utilizing the massDOT prescribed methodology, the accident rates for the intersection of Main Street and Fiske

Hill Road was calculated at 0.28, or much lower than the massDOT's latest available rate of 0.61 for unsignalized intersections on roadways in District 3, in which the Town of Sturbridge is located. Since there were no accidents reported for the intersection of Main Street and Wallace Road, the accident rate is 0.0 for this location. A copy of the accident rate calculation sheets is included in the Technical Appendix section of this report. Also included in the Technical Appendix section of this report is a copy of the massDOT Average Crash Rates for signalized and unsignalized intersections throughout the Commonwealth of Massachusetts.

It should be noted that the accident rates for these two intersections along the stretch of Main Street date to a five-year period after the Main Street corridor was improved in/around 2012. Therefore, these rates reflect the current conditions on this roadway. As stated earlier, improvements along Main Street included the implementation of a dedicated left-turn lane at each of these two intersections, as well as a dedicated right-turn lane on Fiske Hill Road.

Table 2 - Vehicle Crash Summary (2015-2019)

	Main Street At Fiske Hill Road	Main Street at Wallace Street
Intersection	Unsignalized	Unsignalized
Calculated Crash Rate	0.28	0.0
massDOT Average Crash Rate	0.61	0.61
Year		
2015	3	0
2016	4	0
2017	3	0
2018	0	0
2019	0	0
Collision Type		
Angle	6	0
Head-on		0
Rear-end	2	0
Single Vehicle	2	0
Severity		
Fatal Injury	0	0
Non-Fatal Injury	4	0
Property Damage	6	0
Time of Day		
7:00 AM to 9:00 AM	0	0
4:00 PM to 6:00 PM	3	0
Other Times	7	0
Pavement Conditions		
Dry	9	0
Wet		0
Snow	1	0

Source: massDOT Crash Portal 2017-2019

This accident analysis indicates there are no safety deficiencies associated with either of these two intersections.

Existing Conditions Summary

The Main Street (Route 131) corridor can be characterized as a two-way roadway with one travel lane in each direction along its length in the vicinity of the proposed multiuse development site except at its intersections with Fiske Hill Road and Wallace Road where dedicated left-turn lanes are provided. The roadway width is approximately 34' in the area of the proposed development and provides a 4-foot shoulder on either side. However, the pavement width increases to 44' near the intersections of Main Street with Fiske Hill Road and Wallace Road where dedicated left-turn lanes are provided for each intersection. It is a rural arterial roadway and has a combination of gentle horizontal and vertical curves on either side of the proposed primary driveway.

The current land use designation for the proposed multiuse development site is a combination of Rural, Suburban, and commercial, and the site is currently undeveloped.

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FUTURE CONDITIONS

Where possible, traffic volumes in the study area are projected to post-development levels. Projected traffic volumes include the existing traffic data obtained from the turning movement counts in the original traffic study, extrapolated into the year 2020 to represent the baseline, projected into the future 2027 year peak hour to reflect increases due to future area projects, and added to the new traffic expected to be generated by the proposed multiuse development site.

Site-Generated Traffic

The magnitude of traffic volumes that will be generated by the proposed development was projected by using the latest *Trip Generation*[1] *Manual* published by the Institute of Transportation Engineers (ITE) and its computer software.

Based on the 10th edition of the ITE *Trip Generation Manual*, the rates at which the proposed land uses generate traffic vary depending upon the time of day. These rates were used to calculate the number of trips expected to be generated by the proposed site during an average weekday morning, afternoon, and Saturday peak traffic periods. To obtain the most accurate forecast and to be consistent with the requirements of the massDOT procedures, when available, the fitted curves in the *Trip Generation Manual* were used to forecast trips to and from the proposed site daily and for all three peak hours. When trip rates are not available for certain peak periods for a land use, the rates for the next closest land use are used. The ITE trip tabulations outputs are presented in the Technical Appendix section ofthis report. The resulting trips and their directional distribution for this site are shown in the following Table 3.

TABLE 3
ITE Trip Generation for Multiuse Development

Land Use	Daily Trips	AM Peak Enter	AM Peak Exit	PM Peak Enter	PM Peak Exit	Sat Peak Enter	Sat Peak Exit
55+ Housing Community LU 251	385	9	20	21	13	7	8
Assisted Living Facility LU 254	312	14	9	12	19	29*	28*
Free-Standing Emergency Room LU 650	299	6	7	8	10	19**	20**
Retail Building/Shopping Center LU 820	1617	99	60	62	68	70	65
General Office Building LU 710	35	25	4	1	3	1	1
Total	2648	153	100	104	113	78	74

* Data from Continuing Care Retirement Community land use was substituted.
** Data from Hospital land use was substituted.

As can be seen in Table 3 above, the total number of new trips expected to be generated by the proposed multiuse development results in the highest traffic during AM peak period. Though typically, the PM peak period represents the critical peak traffic volume on roadways. In standard traffic engineering practice, the critical peak period trips are usually used to evaluate the worst-case scenario. However, all three peak traffic periods were evaluated for both intersections.

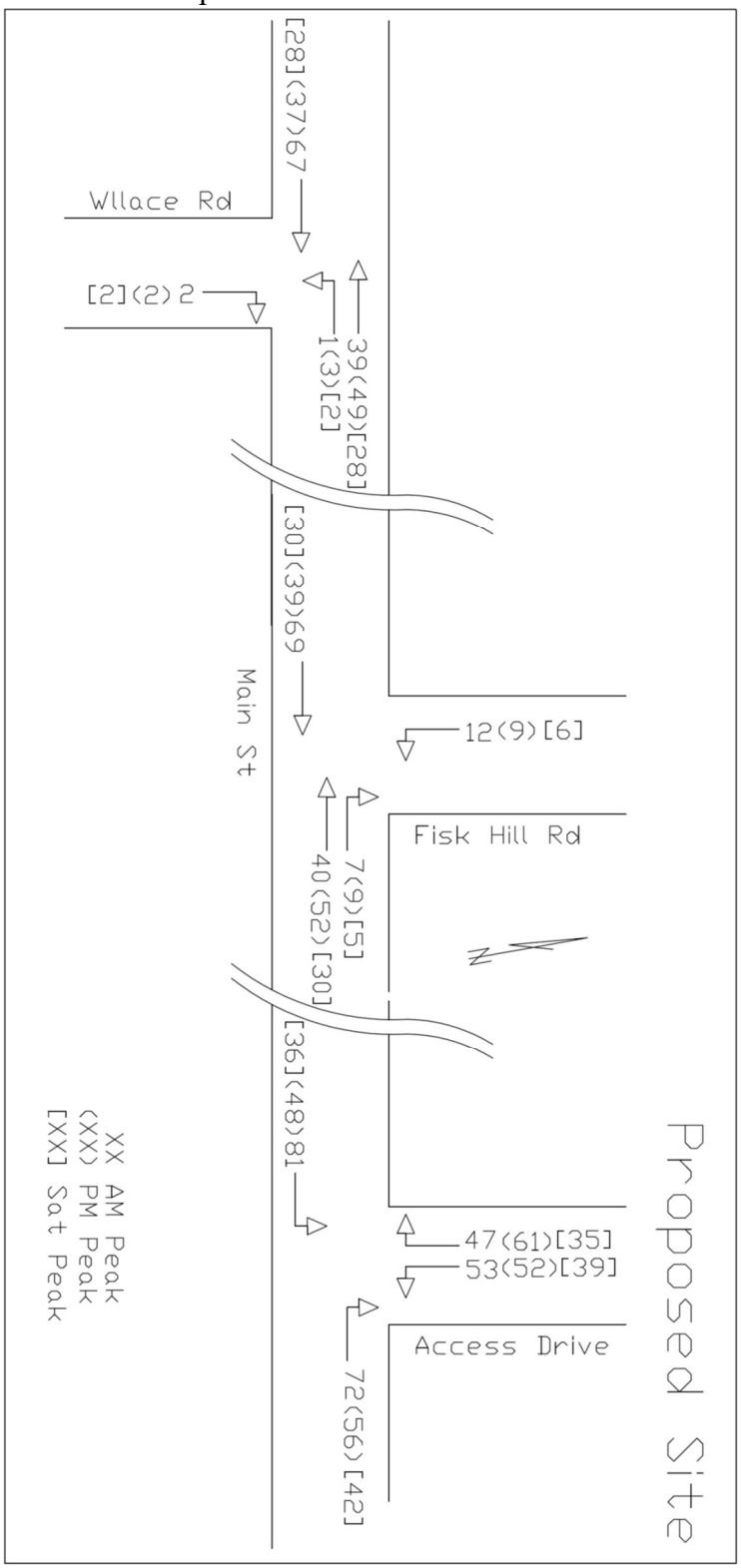
Trip Distribution and Assignment

Because such factors as population density, land use, availability of major highways in the area, and other demographics that make up the traffic patterns within a community, the directional distribution of the projected site-generated trips to and from the proposed multiuse development site was based on the existing travel traffic patterns within the immediate vicinity of the site and based on the knowledge of the local traffic patterns. The turning movement traffic counts for the intersection of Main Street, Fiske Hill and Wallace Roads, as shown in Figure 2, are good indicators of the traffic patterns in this area.

Using this information, the projected new site-generated trips are proportionally assigned to each approach of these intersections. As shown in Table 3 above and Figure 3 below, during AM peak period, a sum of 153 vehicles would be arriving at the proposed development site and 100 vehicles would be departing from the site in both directions along Main Street via the proposed access driveway. During PM peak period, a total of 104 vehicles are expected to arrive at and 113 vehicles would depart from the proposed site via the proposed access driveway. Finally, a total of 78 vehicles will be arriving at and 74 vehicles will be departing from the proposed site during Saturday peak hour.

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

Figure 3
Trip Generation and Distribution



Site Access and Circulation

Site access and internal traffic circulation was evaluated as part of assessing the proposed development site. Access to the proposed site is achieved through the primary driveway located approximately 500' southeast of Fiske Hill Road. The proposed primary driveway provides full access to all land uses including the 65-unit housing development. The primary driveway is intended to accommodate all traffic to and from the proposed access driveways leading up to the residential housing units in a safe and efficient manner. The primary driveway is 24' in width with sidewalks on both sides of the road for about 450' and one side of the road for the remaining 550' to accommodate pedestrian activities.

The access driveways provide connection from Main Street to all residential housing units and their garages and driveways. The access driveways' pavement width is 20'.

Also, as stated earlier, each unit will have off-street parking for two vehicles. This will eliminate the potential for on-street parking activities alongside the access driveways, thus maintaining optimum safety for residents driving through the development.

Finally, an emergency egress/access is proposed through an existing access easement granted from the Town of Southbridge to the applicant in order to access the site from the corner of Idlewood Street and Crestwood Drive through the Town's property.

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TRAFFIC OPERATIONS

Measuring existing traffic volumes and projecting future traffic volumes quantify traffic flow within the study area. To assess the quality of traffic flow, intersection capacity analyses were performed to measure existing baseline conditions and for projected future design year (2027) conditions with and without the implementation of the proposed residential development project. Intersection capacity analyses provide an indication of how well roadway facilities and their components serve the traffic demands placed upon them. This section includes potential on-site and off-site mitigation improvements should any be deemed necessary to minimize the impact of the proposed multiuse development site on the surrounding roadways.

Traffic operations measures

Level of service (LOS) is the term used to demonstrate the different operating conditions which occur on a given roadway segment or at an intersection under different traffic volume conditions. LOS is a qualitative measure of the effect of several other factors including roadway geometry, speed, travel delay, signal timing, freedom to maneuver and safety. The criteria used to analyze the intersections within proximity of the proposed development site are based on the Highway Capacity Manual and its computer software, Synchro. The computer output sheets are presented in the Technical Appendix section of this report.

The LOS concept is an indicator of the operational qualities of a roadway or an intersection. Six LOSs are defined for each type of facility. They are given letter designations from “A” to “F”. LOS “A” represents the best operating conditions, while LOS “F” represents the worst. Typically, LOS “D” is considered acceptable during peak hour conditions, but LOS ”E” may also be acceptable under some circumstances.

The LOS designation is reported differently for signalized and unsignalized intersections. For signalized intersections, the analysis considers the operation of all traffic entering the intersection, and a LOS designation can be calculated for overall conditions at the intersection. For an unsignalized intersection, however, the analysis assumes that through traffic on major roadways is not affected by traffic on side streets (streets with lower volumes and/or ones under stop sign control). Therefore, a LOS designation is typically calculated for the controlled movements (minor street approaches and major street left-turn movements). As described in the following paragraphs, capacity or LOS analyses were considered for year 2020 existing, year 2027 future no build, and year 2027 future build conditions for morning, evening and Saturday peak hour periods at the above-mentioned intersections and the intersection of Main Street with the proposed primary driveway.

Existing Conditions

Intersection capacity analyses were performed for both intersections during morning, evening, and Saturday peak traffic periods. These intersections are the only locations in the immediate vicinity of the proposed development site that may be affected by the traffic expected to be generated by the proposed development site.

The analysis concluded that LOS "C" or better is calculated for all approaches of these intersections during AM, PM, and Saturday peak periods. A summary of intersection analyses results for existing conditions is shown below in Table 4.

Future Conditions

Capacity analyses for the future year peak hour traffic operations were performed for the year 2027 volumes during all three peak periods with and without the proposed multiuse development project in place. A summary of intersection analyses results for both future no-build and future build conditions is also shown below in Table 4.

As noted earlier in this report, in projecting the year 2027 future no-build traffic volumes, the latest massDOT available statistics were used. As stated earlier under the **Traffic Volumes** section, the growth rates that go back to 2014 were averaged and then expanded to a seven-year period to represent the buildout year. The average annual growth rate over the past five-year period was calculated at 0.0034. Therefore, the baseline volumes were increased by that rate over seven years. Figure 4 shows the volumes for the future no-build conditions for both intersections within the study area. The projected future build year (2027) traffic should account for any future developments in the general area of the proposed site, including a valid comprehensive permit for 97 housing units located at 152 Main Street.

Build traffic volumes were determined by projecting site-generated traffic volumes and distributing those volumes over the intersections within the study area, and finally, adding them to the future no-build conditions volumes. Figure 5 shows future build conditions traffic volumes for both these intersections and the intersection of Main Street with the proposed primary driveway.

Figure 4
Turning Movement Counts, Future No Build Conditions

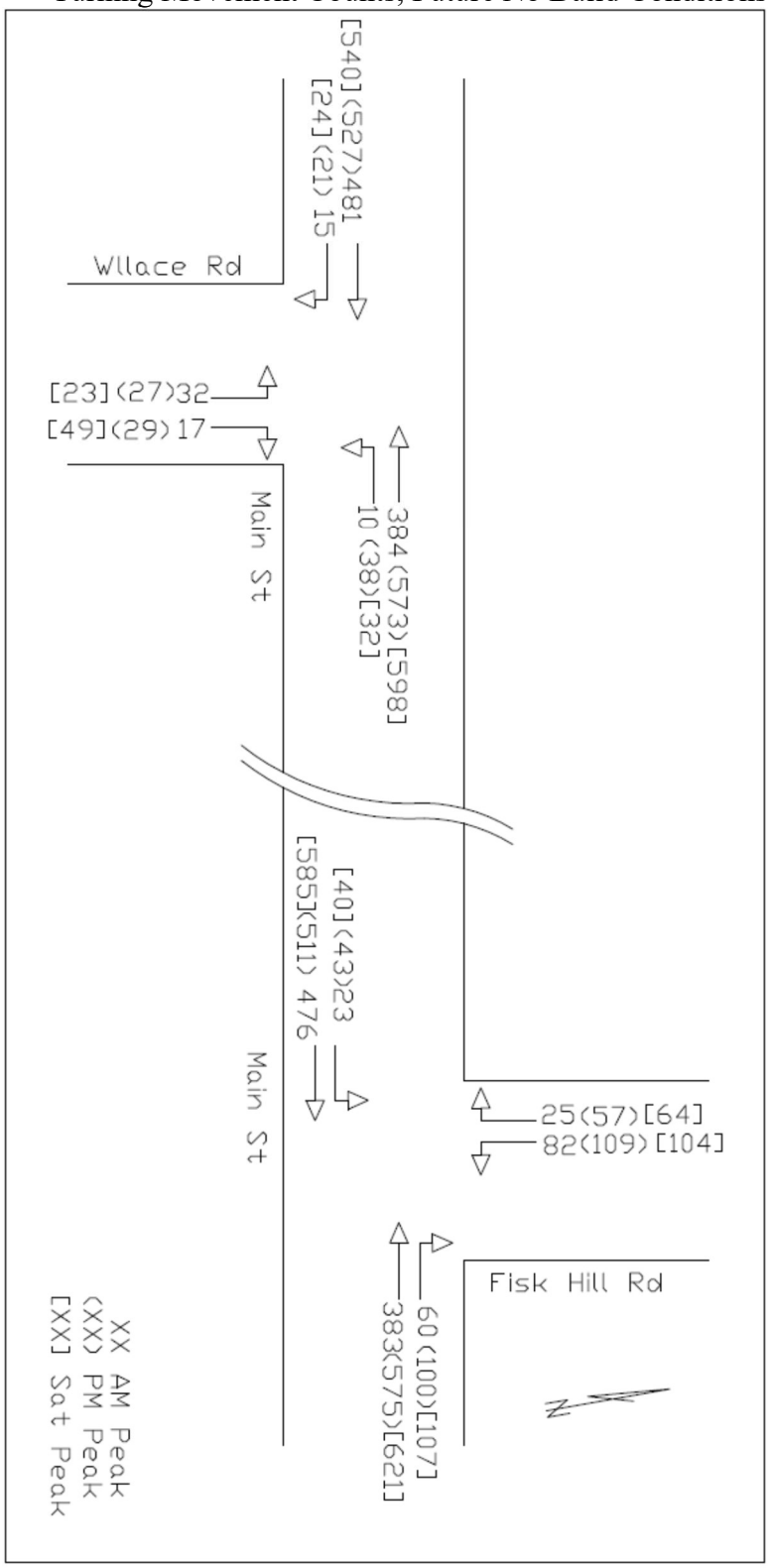
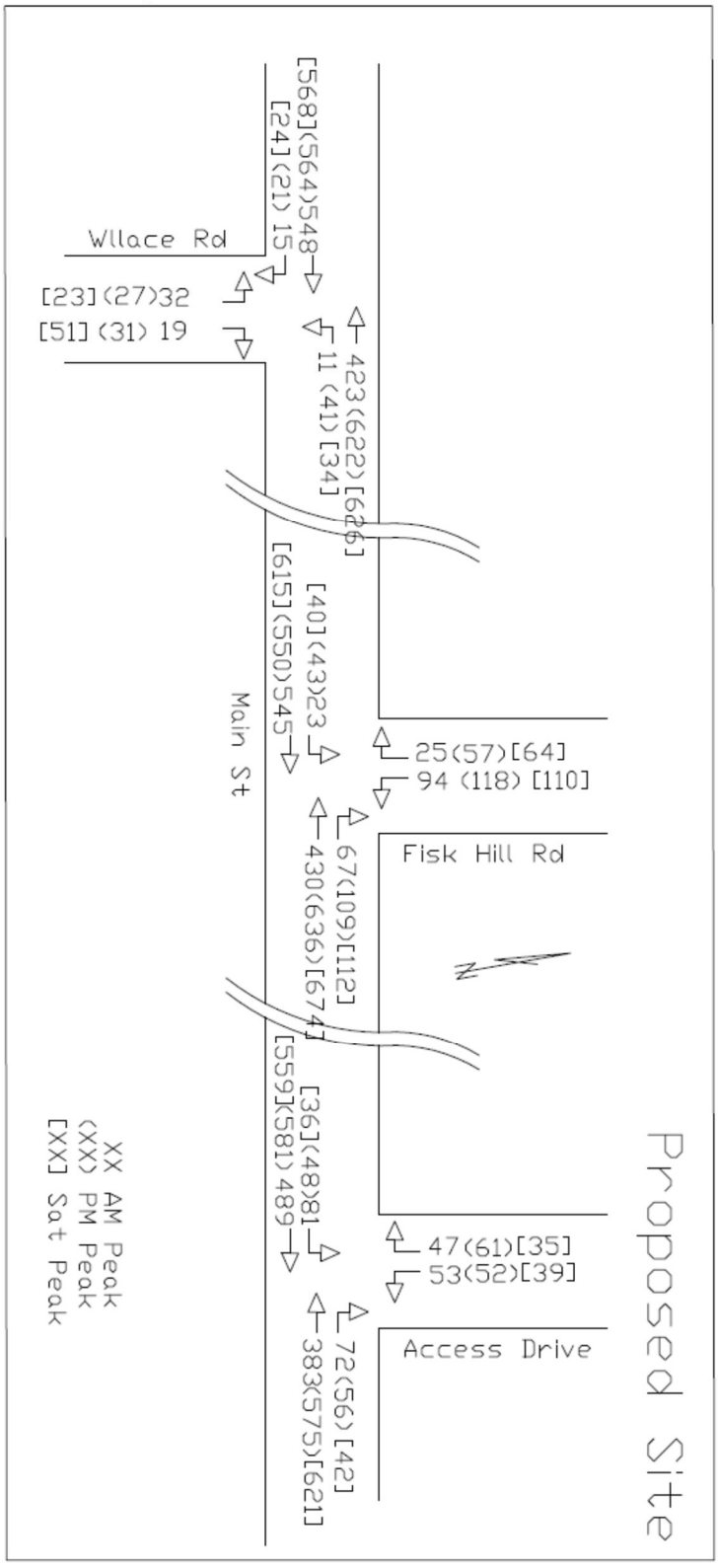


Figure 5
Turning Movement Counts, Future Build Conditions



The intersection LOSs for the year 2027 no-build conditions were calculated for the approaches of both intersections and are expected to be "D" or better during all three peak periods signifying a small increase in vehicular delays.

To assess the potential traffic impact of the proposed development on these intersections, all traffic from the site was distributed along Main Street and its two intersections. This will result in the assessment of two intersections for the worst-case scenario. The above Figures 2, 4 and 5 show the volumes at all intersections for the AM, PM, and Saturday peak hours under existing, future no-build, and future build conditions.

The intersection analysis for the year 2027 build conditions were performed for approaches of both intersections and approaches of the intersection of Main Street and the primary site driveway. The analysis revealed that under future build conditions, the two existing intersections will be operating the same as the future no-build with LOS “D” or better. The southbound approach of the primary access driveway, however, will be operating at LOS “D” during AM and Saturday peak periods and LOS “E” during PM Peak period.

To improve the flow of traffic out of the site, the possibility of adding a 100’-150’ long dedicated right-turn lane was evaluated. It was determined that if the southbound approach is designed with two lanes, one for turning left and another for turning right, the intersection is expected to be operating at LOS “B” during all three periods.

Again, the above-mentioned LOS “D” or better for both existing intersections for future no-build and build conditions are indicative of little or no impact associated with the development of the proposed multiuse development project.

A summary of intersection analyses for both locations, as well as for the intersection of Main Street and the proposed primary driveway is provided herein below in Table 4.

Table 4
Level Of Service Analysis Results Summary

	Main Street at Fiske Hill Road AM Peak								
	Existing 2020			No Build 2027			Build 2027		
Approach	EB	WB	SB	EB	WB	SB	EB	WB	SB
App Delay	0.6	0	10.3	0.6	0	10.5	0.5	0	11.5
v/c	0.04		0.17	0.04		0.18	0.04		0.22
App LOS	A		B	A	0	B	A		B
Int Av Dela	1.5			1.5			1.5		
Int LOS	A			A			A		

PM Peak	Existing 2020			No Build 2027			Build 2027		
Approach	EB	WB	SB	EB	WB	SB	EB	WB	SB
App Delay	0.8	0	13.6	0.9	0	13.9	0.8	0	17.6
v/c	0.07	0	0.31	0.07	0	0.32	0.07		0.41
App LOS	A		B	A		B	A		C
Int Sig Dela	1.9			2			2.4		
Int LOS	A			A			A		

Sat Peak	Existing 2020			No Build 2027			Build 2027		
Approach	EB	WB	SB	EB	WB	SB	EB	WB	SB
App Delay	0.6	0	14.9	0.6	0	19.6	0.6	0	16.6
v/c	0.05	0	0.35	0.06	0	0.46	0.06		0.39
App LOS	A		B	A		B	A		C
Int Sig Dela	1.9			1.9			2.1		
Int LOS	A			A			A		

	Main Street at Wallace Road AM Peak								
	Existing 2020			No Build 2027			Build 2027		
Approach	EB	WB	NB	EB	WB	NB	EB	WB	NB
App Delay	0	0.6	18.8	0.0	0.3	19.4	0	0.3	22.4
v/c		0.02	0.22		0.02	0.23		0.02	0.27
App LOS		A	C		A	C		A	C
Int Av Dela	1.5			1.5			1.6		
ICU LOS	A			A			A		

PM Peak	Existing 2020			No Build 2027			Build 2027		
Approach	EB	WB	NB	EB	WB	NB	EB	WB	NB
App Delay	0	0.7	23.8	0	0.7	25.2	0	0.7	29
v/c		0.05	0.28		0.05	0.3		0.06	0.35
App LOS		A	C		A	D		A	D
Int Sig Dela	1.7			1.7			1.9		
Int LOS	A			A			A		

Sat Peak	Existing 2020			No Build 2027			Build 2027		
Approach	EB	WB	NB	EB	WB	NB	EB	WB	NB
App Delay	0	0.7	24.6	0	0.7	26.3	0	0.7	29
v/c		0.06	0.31		0.06	0.33		0.07	0.37
App LOS		A	C		A	D		A	D
Int Sig Dela	1.7			1.8			1.9		
Int LOS	A			A			A		

Table 4 Continued

	Main Street at Primary Drive Future 2027 Build								
	AM Peak			PM Peak			Saturday Peak		
Approach	EB	WB	SB	EB	WB	SB	EB	WB	SB
App Delay	2.1	0	25.9	1.5	0	38.1	1.1	0	32
v/c	0.08		0.39	0.06		0.54	0.04		0.38
App LOS	A		D	A	0	E	A		D
Int Av Dela	3.3			3.8			2.3		
Int LOS	C			E			D		

	Main Street at Primary Drive Future 2027 Build With 2 Southbound Lanes								
	AM Peak			PM Peak			Saturday Peak		
Approach	EB	WB	SB	EB	WB	SB	EB	WB	SB
App Delay	2.1	0	10.2	1.5	0	12.4	1.1	0	12
v/c	0.08		0.14	0.06		0.20	0.04		0.14
App LOS	A		B	A	0	B	A		B
Int Av Dela	2			1.7			1.2		
Int LOS	C			D			D		

It should be noted that with the addition of a second southbound lane, LOS “B” could be achieved and vehicular delays are expected to be reduced by more than two thirds.

Finally, the computer printout of the above-mentioned analysis, including analysis that reflects the addition of a second southbound lane for the approach of the primary access driveway is included in the Technical Appendix of this report.

5
FINDINGS

This traffic study has been conducted to evaluate the potential traffic impacts associated with the proposed multiuse development site located north of Main Street in Sturbridge, Massachusetts. This study includes the evaluation of two unsignalized intersections in proximity of the proposed site which are likely to be impacted by the proposed development project. Evaluation of the area to identify capacity constraints was performed for existing, future no-build, and future build conditions. Future analyses have determined that the site-generated traffic volumes are not significant, and they can be accommodated with the existing roadways and the proposed primary access driveway. These analyses demonstrated that with the additional traffic volumes associated with the proposed multiuse development, the intersection LOS would be "D" or better. The analysis showed that the intersection of Main Street and the primary access driveway will be operating at LOS "E" during PM peak period. However, if a second southbound lane is provided for the intersection of Main Street and the primary access driveway, LOS "B" could be achieved for all approaches of this intersection.

As stated earlier, the percentage of truck traffic at permanent counting station #3989 along Main Street (Route131) was recorded by the massDOT at 1.7%. This value is considered average to slightly below average for roadways having similar characteristics.

Conclusion & Recommendations

It is concluded that the area roadways within close vicinity of the proposed development site have enough capacity to safely serve the anticipated additional traffic associated with the proposed multiuse development. The level of service evaluation presented herein above is an indicator of the quality of traffic flow through the area. This evaluation indicates that the LOS will not fall below "D" at either intersection studied. Also, it should be noted that, the applicant will need to make an effort to trim vegetation along the frontage of the proposed site along Main Street, particularly to the west, in order to further enhance these sight distances.

Therefore, to maintain optimum safety and efficiency, the following improvements are recommended.

1. The site frontage on the north side of Main Street to the west side of the intersection of Main Street and the primary access driveway should be regraded and cleared of tall vegetation to further improve the sight distance to the west.
2. Any landscaping along the frontage of the proposed site on Main Street should be limited to vegetation variety that does not grow higher than 2.5' to ensure best sight distances are provided.
3. It is recommended that a two-lane southbound approach be considered for the proposed primary driveway in order to achieve LOS "B" or better.

Technical Appendix

October 2007 Data

Turning Movement Counts

INTERSECTION OF MAIN ST AND FISKE HILL RD - AM PEAK

Time	EB Left Turn	EB Through	WB Right Turn	WB Through	SB Left Turn	SB Right Turn	Total
7:00-7:15 AM	3	77	16	90	22	7	215
7:17-7:30 AM	7	68	16	59	15	7	172
7:30-7:45 AM	**9**	**140**	**20**	**80**	**20**	**2**	**271**
7:45-8:00 AM	**2**	**114**	**13**	**103**	**17**	**2**	**251**
8:00-8:15 AM	**2**	**115**	**11**	**94**	**22**	**13**	**257**
8:15-8:30 AM	**10**	**115**	**17**	**113**	**24**	**8**	**287**
8:30-8:45 AM	4	109	22	97	21	14	267
8:45-9:00 AM	6	102	14	86	20	9	237

INTERSECTION OF MAIN ST AND WALLACE RD - AM PEAK

Time	EB Through	EB Right Turn	WB Left Turn	WB Through	NB Left Turn	NB Right Turn	Total
7:00-7:15 AM	70	2	4	82	2	7	167
7:17-7:30 AM	72	4	2	65	5	4	152
7:30-7:45 AM	**125**	**3**	**3**	**82**	**8**	**7**	**228**
7:45-8:00 AM	**131**	**2**	**5**	**108**	**12**	**3**	**261**
8:00-8:15 AM	**110**	**6**	**1**	**86**	**9**	**3**	**215**
8:15-8:30 AM	**122**	**4**	**2**	**115**	**4**	**5**	**252**
8:30-8:45 AM	111	5	3	90	3	4	216
8:45-9:00 AM	100	3	1	85	6	1	196

INTERSECTION OF MAIN ST AND FISKE HILL RD - PM PEAK

Time	EB Left Turn	EB Through	WB Right Turn	WB Through	SB Left Turn	SB Right Turn	Total
4:00-4:15 AM	9	105	18	111	14	10	267
4:15-4:300 AM	8	98	16	109	19	8	258
4:30-4:45 AM	**9**	**131**	**20**	**147**	**27**	**13**	**347**
4:45-5:00 PM	**12**	**120**	**31**	**141**	**24**	**16**	**344**
5:00-5:15 PM	**15**	**120**	**21**	**159**	**32**	**13**	**360**
5:15-5:30 PM	**8**	**148**	**32**	**137**	**27**	**16**	**368**
5:30-5:45 PM	9	119	17	130	15	12	302
5:45-6:00 PM	10	115	18	121	17	10	291

October 2007 Data

Turning Movement Counts

INTERSECTION OF MAIN ST AND WALLACE RD - PM PEAK

Time	EB Through	EB Right Turn	WB Left Turn	WB Through	NB Left Turn	NB Right Turn	Total
4:00-4:15 AM	112	4	8	109	3	4	240
4:15-4:300 AM	120	5	11	129	2	5	272
4:30-4:45 AM	**145**	**6**	**10**	**134**	**9**	**3**	**307**
4:45-5:00 PM	**127**	**2**	**13**	**149**	**9**	**9**	**309**
5:00-5:15 PM	**121**	**7**	**6**	**161**	**3**	**10**	**308**
5:15-5:30 PM	**143**	**7**	**9**	**139**	**6**	**7**	**311**
5:30-5:45 PM	122	4	9	135	2	10	282
5:45-6:00 PM	123	4	13	132	2	11	285

INTERSECTION OF MAIN ST AND FISKE HILL RD - SAT PEAK

Time	EB Left Turn	EB Through	WB Right Turn	WB Through	SB Left Turn	SB Right Turn	Total
11:00-11:15 AM	9	124	23	166	23	8	353
11:15-11300 AM	12	146	28	148	23	11	368
11:30-11:45 AM	5	150	19	150	15	12	351
11:45-12:00 PM	**12**	**136**	**31**	**161**	**24**	**15**	**379**
12:00-12:15 PM	**11**	**175**	**21**	**151**	**28**	**11**	**397**
12:15-12:30 PM	**11**	**135**	**31**	**168**	**27**	**18**	**390**
12:30-12:45 PM	**6**	**149**	**26**	**152**	**27**	**21**	**381**
12:45-1:00 PM	8	139	18	150	22	18	355

INTERSECTION OF MAIN ST AND WALLACE RD - SAT PEAK

Time	EB Through	EB Right Turn	WB Left Turn	WB Through	NB Left Turn	NB Right Turn	Total
11:00-11:15 AM	102	6	12	140	8	11	279
11:15-11300 AM	139	11	11	157	4	10	332
11:30-11:45 AM	131	8	9	136	12	9	305
11:45-12:00 PM	**119**	**12**	**14**	**148**	**5**	**14**	**312**
12:00-12:15 PM	**169**	**4**	**9**	**143**	**7**	**12**	**344**
12:15-12:30 PM	**118**	**4**	**5**	**166**	**5**	**14**	**312**
12:30-12:45 PM	**143**	**4**	**5**	**151**	**6**	**10**	**319**
12:45-1:00 PM	130	6	7	141	8	9	301

Exhibit 3-8
Motor Vehicle Stopping Sight Distances

	Stopping Sight Distance (ft) by Percent Grade (%)						
		Downgrade			Upgrade		
Design Speed	0	3	6	9	3	6	9
20	115	116	120	126	109	107	104
25	155	158	165	173	147	143	140
30	200	205	215	227	200	184	179
35	250	257	271	287	237	229	222
40	305	315	333	354	289	278	269
45	360	378	400	427	344	331	320
50	425	446	474	507	405	388	375
55	495	520	553	593	469	450	433
60	570	598	638	686	538	515	495
65	645	682	728	785	612	584	561
70	730	771	825	891	690	658	631
75	820	866	927	1003	772	736	704

Source: A Policy on Geometric Design of Streets and Highways, AASHTO, Washington DC, 2004. Chapter 3 Elements of Design

Massachusetts Highway Department
Statewide Traffic Data Collection
2019 Weekday Seasonal Factors

Factor Group	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Axle Factor
R1	1.22	1.14	1.12	1.06	1.00	0.96	0.87	0.85	0.96	0.99	1.04	1.12	0.85
R2	0.95	0.96	0.98	0.97	0.97	0.93	0.97	0.94	0.96	0.90	0.92	0.93	0.96
R3	1.15	1.06	1.07	1.00	0.89	0.88	0.89	0.89	0.95	0.92	1.02	1.01	0.97
R4-R7	1.09	1.09	1.11	1.02	0.96	0.92	0.89	0.89	0.99	0.98	1.09	1.13	0.98
U1-Boston	1.03	1.01	0.98	0.94	0.94	0.92	0.95	0.93	0.94	0.94	0.97	1.04	0.96
U1-Essex	1.09	1.06	1.03	0.99	0.94	0.90	0.88	0.86	0.93	0.94	0.99	1.06	0.93
U1-Southeast	1.06	1.05	1.01	0.97	0.95	0.93	0.93	0.90	0.94	0.94	0.98	1.04	0.98
U1-West	1.19	1.14	1.09	0.95	0.92	0.89	0.89	0.86	0.91	0.95	0.97	1.07	0.84
U1-Worcester	1.02	1.04	0.97	0.94	0.93	0.91	0.95	0.91	0.93	0.92	0.95	1.10	0.88
U2	1.01	1.00	0.94	0.93	0.91	0.89	0.93	0.90	0.90	0.91	0.94	1.02	0.99
U3	1.06	1.03	0.98	0.94	0.93	0.91	0.95	0.91	0.92	0.93	0.97	1.00	0.98
U4-U7	1.01	1.00	0.95	0.92	0.88	0.86	0.92	0.91	0.92	0.94	0.99	1.04	0.99
Rec - East	1.04	1.16	1.12	0.98	0.92	0.88	0.77	0.81	0.94	1.02	1.08	1.12	0.99
Rec - West	1.30	1.23	1.32	1.18	0.95	0.82	0.70	0.69	0.97	0.96	1.16	1.15	0.98

Round off:
0-999 = 10
>1000 = 100

U = Urban
R = Rural

1 - Interstate
2 - Freeway and Expressway
3 - Other Principal Arterial
4 - Minor Arterial
5 - Major Collector
6 - Minor Collector
7 - Local Road and Street

Recreational - East Group - Cape Cod (all towns) including the town of Plymouth south of Route 3A (stations 7014,7079,7080,7090,7091,7092,7093,7094,7095,7096,7097,7108 and 7178), Martha's Vineyard and Nantucket.
Recreational - West Group - Continuous Stations 2 and 189 including stations 1066,1067,1083,1084,1085,1086,1087,1088,1089,1090,1091,1092,1093,1094,1095,1096,1097,1098,1099,1100,1101,1102,1103,1104,1105,1106,1107,1108,1113,1114, 1116,2196,2197 and 2198.

MassDOT Yearly Growth Rates

for data from 2014 to 2018

Growth Factors					
Group	Grow 2014 to 2015	Grow 2015 to 2016	Grow 2016 to 2017	Grow 2017 to 2018	Grow 2018 to 2019
R1	0	0.023	0.004	0.018	0.016
R2	0.05	0.068	0.004	0.014	0.014
R3	-0.038	0.002	0.008	0.011	0.06
R4-7	-0.01	0.003	0.001	0.011	0.012
Rec - East		0.032	0.02	0.041	0.025
Rec - West		0.051	-0.008	0.029	0
U1-Boston	0.061	0.07	-0.003	0.012	0.006
U1-Essex	0.024	0.025	0.007	0.014	0.011
U1-Southeast	0.05	0.062	0.021	0.014	0
U1-West	0.03	-0.027	0.02	0.028	0.013
U1-Worcester	0.042	0.005	0.018	0.01	0.01
U2	0.04	0.048	0.008	0.01	0.02
U3	0.011	0.013	0.011	0.014	0.004
U4-7	0.023	0.062	0.017	0.003	-0.004

Average Crash Rates, per Million Entering Vehicles, by Intersection Type
(Based upon crash information queried on June 26, 2018)

Location	Signalized Intersections	Unsignalized Intersections
Statewide	0.78	0.57
District 1*	0.80*	0.44*
District 2	0.89	0.62
District 3	0.89	0.61
District 4	0.73	0.57
District 5	0.75	0.57
District 6	0.71	0.52

Location	Signalized Intersections

* - District 1 should use Statewide Rates due to low sample total

Moving Massachusetts Forward. massDOT Highway

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Sturbridge COUNT DATE : Oct-07

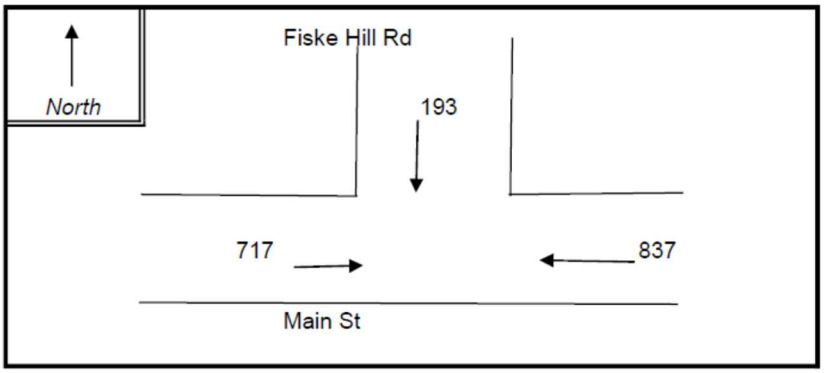
DISTRICT : 3 UNSIGNALIZED : X SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : Main Street (Route 131)

MINOR STREET(S) : Fiske Hill Road

INTERSECTION DIAGRAM (Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	SB			
PEAK HOURLY VOLUMES (AM/PM) :	717	837	193			1,747

" K " FACTOR : 0.090 INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : 19,411

TOTAL # OF CRASHES : 10 # OF YEARS : 5 AVERAGE # OF CRASHES PER YEAR (**A**) : 2.00

CRASH RATE CALCULATION : 0.28 RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : Much lower than the the 0.61 average rate for unsignalized intersections in Dist 3 of massDOT

Project Title & Date: Multi Use Development - Fiske Hill Realty Trust

Moving Massachusetts Forward. massDOT Highway

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Sturbridge COUNT DATE : Oct-07

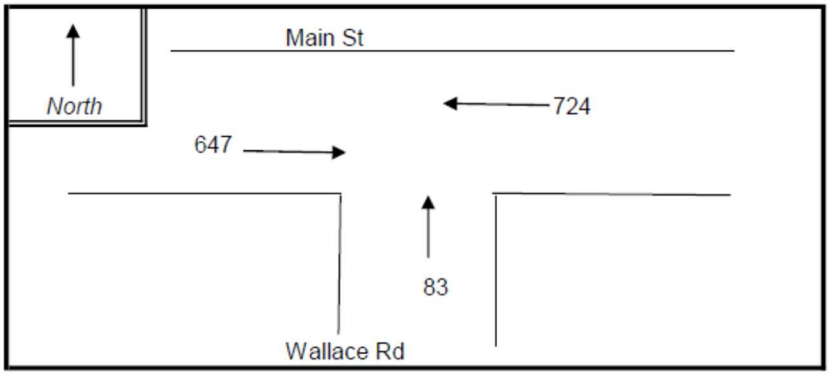
DISTRICT : 3 UNSIGNALIZED : X SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : Main Street (Route 131)

MINOR STREET(S) : Wallace Road

INTERSECTION DIAGRAM (Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB			
PEAK HOURLY VOLUMES (AM/PM) :	647	724	83			1,454

" K " FACTOR : 0.090 INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : 16,156

TOTAL # OF CRASHES : 0 # OF YEARS : 5 AVERAGE # OF CRASHES PER YEAR (**A**) : 0.00

CRASH RATE CALCULATION : 0.00 RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : 0 Accidents compared to the 0.61 average rate for unsignalized intersections in Dist 3

Project Title & Date: Multi Use Development - Fiske Hill Realty Trust

DATA STATISTICS

Land Use:
Senior Adult Housing - Detached (251)
Click for more details

Independent Variable:
Dwelling Units

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
14

Avg. Num. of Dwelling Units:
655

Average Rate:
4.27

Range of Rates:
2.90 - 6.66

Standard Deviation:
1.11

Fitted Curve Equation:
Ln(T) = 0.88 Ln(X) + 2.28

R^2:
0.92

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 278 (Total), 139 (Entry), 139 (Exit)
Fitted Curve: 385 (Total), 192 (Entry), 193 (Exit)

DATA STATISTICS

Land Use:
Senior Adult Housing - Detached (251)
Click for more details

Independent Variable:
Dwelling Units

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
29

Avg. Num. of Dwelling Units:
583

Average Rate:
0.24

Range of Rates:
0.13 - 0.84

Standard Deviation:
0.10

Fitted Curve Equation:
Ln(T) = 0.76 Ln(X) + 0.21

R^2:
0.89

Directional Distribution:
33% entering, 67% exiting

Calculated Trip Ends:
Average Rate: 16 (Total), 5 (Entry), 11 (Exit)
Fitted Curve: 29 (Total), 9 (Entry), 20 (Exit)

DATA STATISTICS

Land Use:
Senior Adult Housing - Detached (251)
Click for more details

Independent Variable:
Dwelling Units

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
30

Avg. Num. of Dwelling Units:
582

Average Rate:
0.30

Range of Rates:
0.17 - 0.95

Standard Deviation:
0.13

Fitted Curve Equation:
Ln(T) = 0.78 Ln(X) + 0.28

R^2:
0.87

Directional Distribution:
61% entering, 39% exiting

Calculated Trip Ends:
Average Rate: 20 (Total), 12 (Entry), 8 (Exit)
Fitted Curve: 34 (Total), 21 (Entry), 13 (Exit)

DATA STATISTICS

Land Use:
Senior Adult Housing - Detached (251)
Click for more details

Independent Variable:
Dwelling Units

Time Period:
Saturday
Peak Hour of Generator

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
3

Avg. Num. of Dwelling Units:
1547

Average Rate:
0.23

Range of Rates:
0.19 - 0.27

Standard Deviation:
0.05

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
48% entering, 52% exiting

Calculated Trip Ends:
Average Rate: 15 (Total), 7 (Entry), 8 (Exit)

DATA STATISTICS

Land Use:
Assisted Living (254)
Click for more details

Independent Variable:
Beds

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
2

Avg. Num. of Beds:
135

Average Rate:
2.60

Range of Rates:
1.86 - 4.14

Standard Deviation:
****

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 312 (Total), 156 (Entry), 156 (Exit)

DATA STATISTICS

Land Use:
Assisted Living (254)
Click for more details

Independent Variable:
Beds

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
9

Avg. Num. of Beds:
123

Average Rate:
0.19

Range of Rates:
0.08 - 0.43

Standard Deviation:
0.12

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
63% entering, 37% exiting

Calculated Trip Ends:
Average Rate: 23 (Total), 14 (Entry), 9 (Exit)

DATA STATISTICS

Land Use:
Assisted Living (254)
Click for more details

Independent Variable:
Beds

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
9

Avg. Num. of Beds:
123

Average Rate:
0.26

Range of Rates:
0.11 - 0.53

Standard Deviation:
0.13

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
38% entering, 62% exiting

Calculated Trip Ends:
Average Rate: 31 (Total), 12 (Entry), 19 (Exit)

DATA STATISTICS

Land Use:
Continuing Care Retirement Community (255)
Click for more details

Independent Variable:
Occupied Units

Time Period:
Saturday
Peak Hour of Generator

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
5

Avg. Num. of Occupied Units:
1504

Average Rate:
0.23

Range of Rates:
0.22 - 0.39

Standard Deviation:
0.03

Fitted Curve Equation:
$Ln(T) = 0.73 Ln(X) + 0.54$

R^2:
0.99

Directional Distribution:
52% entering, 48% exiting

Calculated Trip Ends:
Average Rate: 28 (Total), 14 (Entry), 14 (Exit)
Fitted Curve: 57 (Total), 29 (Entry), 28 (Exit)

DATA STATISTICS

Land Use:
General Office Building (710)
Click for more details

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
66

Avg. 1000 Sq. Ft. GFA:
171

Average Rate:
9.74

Range of Rates:
2.71 - 27.56

Standard Deviation:
5.15

Fitted Curve Equation:
Ln(T) = 0.97 Ln(X) + 2.50

R^2:
0.83

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 29 (Total), 14 (Entry), 15 (Exit)
Fitted Curve: 35 (Total), 17 (Entry), 18 (Exit)

DATA STATISTICS

Land Use:
General Office Building (710)
Click for more details

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
35

Avg. 1000 Sq. Ft. GFA:
117

Average Rate:
1.16

Range of Rates:
0.37 - 4.23

Standard Deviation:
0.47

Fitted Curve Equation:
T = 0.94(X) + 26.49

R^2:
0.85

Directional Distribution:
86% entering, 14% exiting

Calculated Trip Ends:
Average Rate: 3 (Total), 3 (Entry), 0 (Exit)
Fitted Curve: 29 (Total), 25 (Entry), 4 (Exit)

DATA STATISTICS

Land Use:
General Office Building (710)
Click for more details

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
32

Avg. 1000 Sq. Ft. GFA:
114

Average Rate:
1.15

Range of Rates:
0.47 - 3.23

Standard Deviation:
0.42

Fitted Curve Equation:
Ln(T) = 0.95 Ln(X) + 0.36

R^2:
0.88

Directional Distribution:
16% entering, 84% exiting

Calculated Trip Ends:
Average Rate: 3 (Total), 0 (Entry), 3 (Exit)
Fitted Curve: 4 (Total), 1 (Entry), 3 (Exit)

DATA STATISTICS

Land Use:
General Office Building (710)
Click for more details

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Saturday
Peak Hour of Generator

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
3

Avg. 1000 Sq. Ft. GFA:
82

Average Rate:
0.53

Range of Rates:
0.30 - 1.57

Standard Deviation:
0.52

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
54% entering, 46% exiting

Calculated Trip Ends:
Average Rate: 2 (Total), 1 (Entry), 1 (Exit)

DATA STATISTICS

Land Use:
Shopping Center (820)
Click for more details

Independent Variable:
1000 Sq. Ft. GLA

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
147

Avg. 1000 Sq. Ft. GLA:
453

Average Rate:
37.75

Range of Rates:
7.42 - 207.98

Standard Deviation:
16.41

Fitted Curve Equation:
Ln(T) = 0.68 Ln(X) + 5.57

R^2:
0.76

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 547 (Total), 273 (Entry), 274 (Exit)
Fitted Curve: 1617 (Total), 808 (Entry), 809 (Exit)

DATA STATISTICS

Land Use:
Shopping Center (820)
Click for more details

Independent Variable:
1000 Sq. Ft. GLA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
84

Avg. 1000 Sq. Ft. GLA:
351

Average Rate:
0.94

Range of Rates:
0.18 - 23.74

Standard Deviation:
0.87

Fitted Curve Equation:
T = 0.50(X) + 151.78

R^2:
0.50

Directional Distribution:
62% entering, 38% exiting

Calculated Trip Ends:
Average Rate: 14 (Total), 8 (Entry), 6 (Exit)
Fitted Curve: 159 (Total), 99 (Entry), 60 (Exit)

DATA STATISTICS

Land Use:
Shopping Center (820)
Click for more details

Independent Variable:
1000 Sq. Ft. GLA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
261

Avg. 1000 Sq. Ft. GLA:
327

Average Rate:
3.81

Range of Rates:
0.74 - 18.69

Standard Deviation:
2.04

Fitted Curve Equation:
Ln(T) = 0.74 Ln(X) + 2.89

R^2:
0.82

Directional Distribution:
48% entering, 52% exiting

Calculated Trip Ends:
Average Rate: 55 (Total), 26 (Entry), 29 (Exit)
Fitted Curve: 130 (Total), 62 (Entry), 68 (Exit)

DATA STATISTICS

Land Use:
Shopping Center (820)
Click for more details

Independent Variable:
1000 Sq. Ft. GLA

Time Period:
Saturday
Peak Hour of Generator

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
119

Avg. 1000 Sq. Ft. GLA:
416

Average Rate:
4.50

Range of Rates:
1.42 - 15.10

Standard Deviation:
1.88

Fitted Curve Equation:
Ln(T) = 0.79 Ln(X) + 2.79

R^2:
0.87

Directional Distribution:
52% entering, 48% exiting

Calculated Trip Ends:
Average Rate: 65 (Total), 34 (Entry), 31 (Exit)
Fitted Curve: 135 (Total), 70 (Entry), 65 (Exit)

DATA STATISTICS

Land Use:
Free-Standing Emergency Room (650)
Click for more details

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
4

Avg. 1000 Sq. Ft. GFA:
11

Average Rate:
24.94

Range of Rates:
15.49 - 37.57

Standard Deviation:
9.45

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 299 (Total), 149 (Entry), 150 (Exit)

DATA STATISTICS

Land Use:
Free-Standing Emergency Room (650)
Click for more details

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
4

Avg. 1000 Sq. Ft. GFA:
11

Average Rate:
1.12

Range of Rates:
0.71 - 1.72

Standard Deviation:
0.44

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 13 (Total), 6 (Entry), 7 (Exit)

DATA STATISTICS

Land Use:
Free-Standing Emergency Room (650)
Click for more details

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
4

Avg. 1000 Sq. Ft. GFA:
11

Average Rate:
1.52

Range of Rates:
1.13 - 2.26

Standard Deviation:
0.54

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
46% entering, 54% exiting

Calculated Trip Ends:
Average Rate: 18 (Total), 8 (Entry), 10 (Exit)

DATA STATISTICS

Land Use:
Hospital (610)
Click for more details

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Saturday
Peak Hour of Generator

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
2

Avg. 1000 Sq. Ft. GFA:
113

Average Rate:
3.26

Range of Rates:
0.92 - 5.98

Standard Deviation:
****

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 39 (Total), 19 (Entry), 20 (Exit)

DATA STATISTICS

Land Use:

Multifamily Housing (Low-Rise) (220)
Click for more details

Independent Variable:

Dwelling Units

Time Period:

Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:

General Urban/Suburban

Trip Type:

Vehicle

Number of Studies:

50

Avg. Num. of Dwelling Units:

187

Average Rate:

0.56

Range of Rates:

0.18 - 1.25

Standard Deviation:

0.16

Fitted Curve Equation:

Ln(T) = 0.89 Ln(X) - 0.02

R^2:

0.86

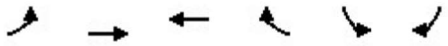
Directional Distribution:

63% entering, 37% exiting

Calculated Trip Ends:

Average Rate: 54 (Total), 34 (Entry), 20 (Exit)
Fitted Curve: 57 (Total), 36 (Entry), 21 (Exit)

Main at Fiske Hill Existing AM Peak

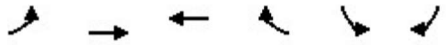


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	22	465	374	59	80	24
Peak Hour Factor	0.57	0.85	0.86	0.76	0.86	0.48
Hourly flow rate (veh/h)	39	547	435	78	93	50
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						7
Median type					None	
Median storage veh)						
vC, conflicting volume	513				1098	474
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				59	92
cM capacity (veh/h)	1053				227	591

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	39	547	513	143
Volume Left	39	0	0	93
Volume Right	0	0	78	50
cSH	1053	1700	1700	818
Volume to Capacity	0.04	0.32	0.30	0.17
Queue Length (ft)	3	0	0	16
Control Delay (s)	8.5	0.0	0.0	10.3
Lane LOS	A			B
Approach Delay (s)	0.6		0.0	10.3
Approach LOS				B

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	40.6%	ICU Level of Service	A

Main at Fiske Hill Existing PM Peak

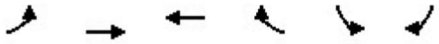


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	42	499	562	98	106	56
Peak Hour Factor	0.73	0.82	0.92	0.81	0.86	0.91
Hourly flow rate (veh/h)	58	609	611	121	123	62
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						7
Median type					None	
Median storage veh)						
vC, conflicting volume	732				1395	671
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	93				15	87
cM capacity (veh/h)	873				146	456

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	58	609	732	185
Volume Left	58	0	0	123
Volume Right	0	0	121	62
cSH	873	1700	1700	602
Volume to Capacity	0.07	0.36	0.43	0.31
Queue Length (ft)	5	0	0	32
Control Delay (s)	9.4	0.0	0.0	13.6
Lane LOS	A			B
Approach Delay (s)	0.8		0.0	13.6
Approach LOS				B

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	53.0%	ICU Level of Service	A

Main at Fiske Hill Existing Sat Peak



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	39	571	607	105	102	63
Peak Hour Factor	0.91	0.85	0.94	0.88	0.95	0.77
Hourly flow rate (veh/h)	43	672	646	119	107	82
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						7
Median type					None	
Median storage veh)						
vC, conflicting volume	765				1463	705
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				20	81
cM capacity (veh/h)	848				134	436

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	43	672	765	189
Volume Left	43	0	0	107
Volume Right	0	0	119	82
cSH	848	1700	1700	571
Volume to Capacity	0.05	0.40	0.45	0.33
Queue Length (ft)	4	0	0	36
Control Delay (s)	9.5	0.0	0.0	14.4
Lane LOS	A			B
Approach Delay (s)	0.6		0.0	14.4
Approach LOS				B

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	53.8%	ICU Level of Service	A

Main at Wallace Existing AM Peak

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	470	15	11	375	31	17
Peak Hour Factor	0.94	0.62	0.55	0.85	0.69	0.64
Hourly flow rate (veh/h)	500	24	20	441	45	27
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			524		993	512
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		83	95
cM capacity (veh/h)			1042		267	562

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	524	461	71
Volume Left	0	20	45
Volume Right	24	0	27
cSH	1700	1042	331
Volume to Capacity	0.31	0.02	0.22
Queue Length (ft)	0	1	20
Control Delay (s)	0.0	0.6	18.8
Lane LOS		A	C
Approach Delay (s)	0.0	0.6	18.8
Approach LOS			C

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	45.6%	ICU Level of Service	A

Main at Wallace Future Existing PM Peak

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	515	21	37	560	26	28
Peak Hour Factor	0.92	0.79	0.73	0.90	0.75	0.72
Hourly flow rate (veh/h)	560	27	51	622	35	39
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			586		1297	573
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		80	93
cM capacity (veh/h)			989		170	519

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	586	51	622	74
Volume Left	0	51	0	35
Volume Right	27	0	0	39
cSH	1700	989	1700	263
Volume to Capacity	0.34	0.05	0.37	0.28
Queue Length (ft)	0	4	0	28
Control Delay (s)	0.0	8.8	0.0	23.9
Lane LOS		A		C
Approach Delay (s)	0.0	0.7		23.9
Approach LOS				C

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	43.7%	ICU Level of Service	A

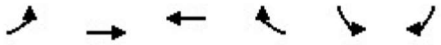
Main at Wallace Existing Sat Peak

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	527	23	31	584	22	48
Peak Hour Factor	0.81	0.50	0.59	0.92	0.82	0.89
Hourly flow rate (veh/h)	651	46	53	635	27	54
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			697		1413	674
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		81	88
cM capacity (veh/h)			899		143	455

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	697	53	635	81
Volume Left	0	53	0	27
Volume Right	46	0	0	54
cSH	1700	899	1700	264
Volume to Capacity	0.41	0.06	0.37	0.31
Queue Length (ft)	0	5	0	31
Control Delay (s)	0.0	9.3	0.0	24.6
Lane LOS		A		C
Approach Delay (s)	0.0	0.7		24.6
Approach LOS				C

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	48.5%	ICU Level of Service	A

Main at Fiske Hill Future No-Build AM Peak

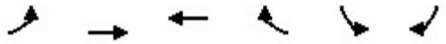


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	23	476	383	60	82	25
Peak Hour Factor	0.57	0.85	0.86	0.76	0.86	0.48
Hourly flow rate (veh/h)	40	560	445	79	95	52
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						7
Median type					None	
Median storage veh)						
vC, conflicting volume	524				1126	485
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				56	91
cM capacity (veh/h)	1042				218	582

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	40	560	524	147
Volume Left	40	0	0	95
Volume Right	0	0	79	52
cSH	1042	1700	1700	800
Volume to Capacity	0.04	0.33	0.31	0.18
Queue Length (ft)	3	0	0	17
Control Delay (s)	8.6	0.0	0.0	10.5
Lane LOS	A			B
Approach Delay (s)	0.6		0.0	10.5
Approach LOS				B

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	41.4%	ICU Level of Service	A

Main at Fiske Hill Future No-Build PM Peak

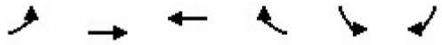


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	43	511	575	100	109	57
Peak Hour Factor	0.73	0.88	0.92	0.81	0.86	0.91
Hourly flow rate (veh/h)	59	581	625	123	127	63
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						7
Median type					None	
Median storage veh)						
vC, conflicting volume	748				1385	687
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	93				14	86
cM capacity (veh/h)	860				147	447

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	59	581	748	189
Volume Left	59	0	0	127
Volume Right	0	0	123	63
cSH	860	1700	1700	594
Volume to Capacity	0.07	0.34	0.44	0.32
Queue Length (ft)	6	0	0	34
Control Delay (s)	9.5	0.0	0.0	13.9
Lane LOS	A			B
Approach Delay (s)	0.9		0.0	13.9
Approach LOS				B

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	54.1%	ICU Level of Service	A

Main at Fiske Hill Future No-Build Sat Peak



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	40	585	621	107	104	64
Peak Hour Factor	0.91	0.85	0.94	0.88	0.95	0.77
Hourly flow rate (veh/h)	44	688	661	122	109	83
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						7
Median type					None	
Median storage veh)						
vC, conflicting volume	782				1498	721
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				14	81
cM capacity (veh/h)	836				128	427

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	44	688	782	193
Volume Left	44	0	0	109
Volume Right	0	0	122	83
cSH	836	1700	1700	555
Volume to Capacity	0.05	0.40	0.46	0.35
Queue Length (ft)	4	0	0	39
Control Delay (s)	9.5	0.0	0.0	14.9
Lane LOS	A			B
Approach Delay (s)	0.6		0.0	14.9
Approach LOS				B

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	54.9%	ICU Level of Service	A

Main at Wallace Future No Build AM Peak

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	481	15	10	384	32	17
Peak Hour Factor	0.94	0.62	0.55	0.85	0.69	0.64
Hourly flow rate (veh/h)	512	24	18	452	46	27
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			536		1012	524
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		82	95
cM capacity (veh/h)			1032		260	553

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	536	18	452	73
Volume Left	0	18	0	46
Volume Right	24	0	0	27
cSH	1700	1032	1700	323
Volume to Capacity	0.32	0.02	0.27	0.23
Queue Length (ft)	0	1	0	21
Control Delay (s)	0.0	8.6	0.0	19.4
Lane LOS		A		C
Approach Delay (s)	0.0	0.3		19.4
Approach LOS				C

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	39.3%	ICU Level of Service	A

Main at Wallace Future No Build PM Peak

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	527	21	38	573	27	29
Peak Hour Factor	0.92	0.79	0.73	0.90	0.75	0.72
Hourly flow rate (veh/h)	573	27	52	637	36	40
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			599		1327	586
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		78	92
cM capacity (veh/h)			978		162	510

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	599	52	637	76
Volume Left	0	52	0	36
Volume Right	27	0	0	40
cSH	1700	978	1700	254
Volume to Capacity	0.35	0.05	0.37	0.30
Queue Length (ft)	0	4	0	31
Control Delay (s)	0.0	8.9	0.0	25.2
Lane LOS		A		D
Approach Delay (s)	0.0	0.7		25.2
Approach LOS				D

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	44.6%	ICU Level of Service	A

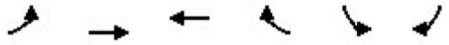
Main at Wallace Future No Build Sat Peak

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	540	24	32	598	23	49
Peak Hour Factor	0.81	0.50	0.59	0.92	0.82	0.89
Hourly flow rate (veh/h)	667	48	54	650	28	55
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			715		1449	691
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		79	88
cM capacity (veh/h)			886		136	445

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	715	54	650	83
Volume Left	0	54	0	28
Volume Right	48	0	0	55
cSH	1700	886	1700	251
Volume to Capacity	0.42	0.06	0.38	0.33
Queue Length (ft)	0	5	0	35
Control Delay (s)	0.0	9.3	0.0	26.3
Lane LOS		A		D
Approach Delay (s)	0.0	0.7		26.3
Approach LOS				D

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	49.6%	ICU Level of Service	A

Main at Fiske Hill Future Build AM Peak



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	23	545	430	67	94	25
Peak Hour Factor	0.57	0.85	0.86	0.76	0.86	0.48
Hourly flow rate (veh/h)	40	641	500	88	109	52
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						7
Median type					None	
Median storage veh)						
vC, conflicting volume	588				1266	544
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				39	90
cM capacity (veh/h)	987				179	539

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	40	641	588	161
Volume Left	40	0	0	109
Volume Right	0	0	88	52
cSH	987	1700	1700	718
Volume to Capacity	0.04	0.38	0.35	0.22
Queue Length (ft)	3	0	0	21
Control Delay (s)	8.8	0.0	0.0	11.5
Lane LOS	A			B
Approach Delay (s)	0.5		0.0	11.5
Approach LOS				B

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	46.5%	ICU Level of Service	A

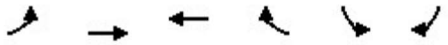
Main at Fiske Hill Future Build PM Peak

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	43	550	636	109	118	57
Peak Hour Factor	0.73	0.88	0.92	0.81	0.86	0.91
Hourly flow rate (veh/h)	59	625	691	135	137	63
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						7
Median type					None	
Median storage veh)						
vC, conflicting volume	826				1501	759
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	93				0	85
cM capacity (veh/h)	805				124	407

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	59	625	826	200
Volume Left	59	0	0	137
Volume Right	0	0	135	63
cSH	805	1700	1700	484
Volume to Capacity	0.07	0.37	0.49	0.41
Queue Length (ft)	6	0	0	50
Control Delay (s)	9.8	0.0	0.0	17.6
Lane LOS	A			C
Approach Delay (s)	0.8		0.0	17.6
Approach LOS				C

Intersection Summary				
Average Delay		2.4		
Intersection Capacity Utilization		58.8%	ICU Level of Service	A

Main at Fiske Hill Future Build Sat Peak



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	40	615	674	112	110	64
Peak Hour Factor	0.91	0.85	0.94	0.88	0.95	0.77
Hourly flow rate (veh/h)	44	724	717	127	116	83
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						7
Median type					None	
Median storage veh)						
vC, conflicting volume	844				1592	781
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	94				0	79
cM capacity (veh/h)	792				111	395

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	44	724	844	199
Volume Left	44	0	0	116
Volume Right	0	0	127	83
cSH	792	1700	1700	506
Volume to Capacity	0.06	0.43	0.50	0.39
Queue Length (ft)	4	0	0	46
Control Delay (s)	9.8	0.0	0.0	16.6
Lane LOS	A			C
Approach Delay (s)	0.6		0.0	16.6
Approach LOS				C

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	58.5%	ICU Level of Service	A

Main at Wallace Future Build AM Peak

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	548	15	11	423	32	19
Peak Hour Factor	0.94	0.62	0.55	0.85	0.69	0.64
Hourly flow rate (veh/h)	583	24	20	498	46	30
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			607		1133	595
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		79	94
cM capacity (veh/h)			971		220	504

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	607	20	498	76
Volume Left	0	20	0	46
Volume Right	24	0	0	30
cSH	1700	971	1700	282
Volume to Capacity	0.36	0.02	0.29	0.27
Queue Length (ft)	0	2	0	27
Control Delay (s)	0.0	8.8	0.0	22.4
Lane LOS		A		C
Approach Delay (s)	0.0	0.3		22.4
Approach LOS				C

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	43.2%	ICU Level of Service	A

Main at Wallace Future Build PM Peak

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	564	21	41	622	27	31
Peak Hour Factor	0.92	0.79	0.73	0.90	0.75	0.72
Hourly flow rate (veh/h)	613	27	56	691	36	43
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			640		1430	626
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		74	91
cM capacity (veh/h)			944		140	484

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	640	56	691	79
Volume Left	0	56	0	36
Volume Right	27	0	0	43
cSH	1700	944	1700	228
Volume to Capacity	0.38	0.06	0.41	0.35
Queue Length (ft)	0	5	0	37
Control Delay (s)	0.0	9.1	0.0	29.0
Lane LOS		A		D
Approach Delay (s)	0.0	0.7		29.0
Approach LOS				D

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	47.7%	ICU Level of Service	A

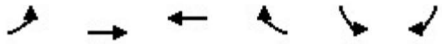
Main at Wallace Future Build Sat Peak

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	568	24	34	626	23	51
Peak Hour Factor	0.81	0.50	0.59	0.92	0.82	0.89
Hourly flow rate (veh/h)	701	48	58	680	28	57
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume			749		1521	725
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			93		77	87
cM capacity (veh/h)			860		122	425

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	749	58	680	85
Volume Left	0	58	0	28
Volume Right	48	0	0	57
cSH	1700	860	1700	234
Volume to Capacity	0.44	0.07	0.40	0.37
Queue Length (ft)	0	5	0	40
Control Delay (s)	0.0	9.5	0.0	29.0
Lane LOS		A		D
Approach Delay (s)	0.0	0.7		29.0
Approach LOS				D

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	51.6%	ICU Level of Service	A

Main at Primar Drive Future Build AM Peak

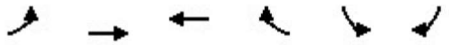


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	81	489	383	72	53	47
Peak Hour Factor	0.92	0.85	0.94	0.92	0.92	0.92
Hourly flow rate (veh/h)	88	575	407	78	58	51
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume	486				1198	447
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	92				69	92
cM capacity (veh/h)	1077				188	612

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	663	486	109
Volume Left	88	0	58
Volume Right	0	78	51
cSH	1077	1700	279
Volume to Capacity	0.08	0.29	0.39
Queue Length (ft)	7	0	44
Control Delay (s)	2.1	0.0	25.9
Lane LOS	A		D
Approach Delay (s)	2.1	0.0	25.9
Approach LOS			D

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	77.7%	ICU Level of Service	C

Main at Primar Drive Future Build PM Peak

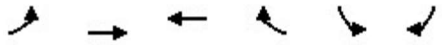


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	48	581	575	56	52	61
Peak Hour Factor	0.92	0.88	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	52	660	625	61	57	66
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume	686				1420	655
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	94				60	86
cM capacity (veh/h)	908				142	466

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	712	686	123
Volume Left	52	0	57
Volume Right	0	61	66
cSH	908	1700	227
Volume to Capacity	0.06	0.40	0.54
Queue Length (ft)	5	0	72
Control Delay (s)	1.5	0.0	38.1
Lane LOS	A		E
Approach Delay (s)	1.5	0.0	38.1
Approach LOS			E

Intersection Summary			
Average Delay		3.8	
Intersection Capacity Utilization		91.4%	ICU Level of Service
			E

Main at Primar Drive Future Build Sat Peak

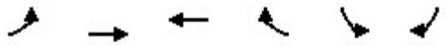


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	36	559	621	42	39	35
Peak Hour Factor	0.92	0.85	0.94	0.92	0.92	0.92
Hourly flow rate (veh/h)	39	658	661	46	42	38
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
vC, conflicting volume	706				1419	683
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				71	92
cM capacity (veh/h)	892				144	449

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	697	706	80
Volume Left	39	0	42
Volume Right	0	46	38
cSH	892	1700	212
Volume to Capacity	0.04	0.42	0.38
Queue Length (ft)	3	0	42
Control Delay (s)	1.1	0.0	32.0
Lane LOS	A		D
Approach Delay (s)	1.1	0.0	32.0
Approach LOS			D

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	89.0%	ICU Level of Service	D

Main at Primar Drive Future Build AM Peak 2 SB Lanes

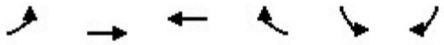


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	81	489	383	72	53	47
Peak Hour Factor	0.92	0.85	0.94	0.92	0.92	0.92
Hourly flow rate (veh/h)	88	575	407	78	58	51
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						4
Median type					None	
Median storage veh)						
vC, conflicting volume	486				1198	447
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	92				69	92
cM capacity (veh/h)	1077				188	612

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	663	486	109
Volume Left	88	0	58
Volume Right	0	78	51
cSH	1077	1700	800
Volume to Capacity	0.08	0.29	0.14
Queue Length (ft)	7	0	12
Control Delay (s)	2.1	0.0	10.2
Lane LOS	A		B
Approach Delay (s)	2.1	0.0	10.2
Approach LOS			B

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	74.7%	ICU Level of Service	C

Main at Primar Drive Future Build PM Peak 2 SB Lanes

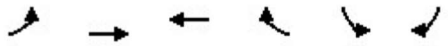


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	48	581	575	56	52	61
Peak Hour Factor	0.92	0.88	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	52	660	625	61	57	66
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						4
Median type					None	
Median storage veh)						
vC, conflicting volume	686				1420	655
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	94				60	86
cM capacity (veh/h)	908				142	466

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	712	686	123
Volume Left	52	0	57
Volume Right	0	61	66
cSH	908	1700	608
Volume to Capacity	0.06	0.40	0.20
Queue Length (ft)	5	0	19
Control Delay (s)	1.5	0.0	12.4
Lane LOS	A		B
Approach Delay (s)	1.5	0.0	12.4
Approach LOS			B

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	87.6%	ICU Level of Service	D

Main at Primar Drive Future Build Sat Peak 2 SB Lanes



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	36	559	621	42	39	35
Peak Hour Factor	0.92	0.85	0.94	0.92	0.92	0.92
Hourly flow rate (veh/h)	39	658	661	46	42	38
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						4
Median type					None	
Median storage veh)						
vC, conflicting volume	706				1419	683
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				71	92
cM capacity (veh/h)	892				144	449

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	697	706	80
Volume Left	39	0	42
Volume Right	0	46	38
cSH	892	1700	593
Volume to Capacity	0.04	0.42	0.14
Queue Length (ft)	3	0	12
Control Delay (s)	1.1	0.0	12.0
Lane LOS	A		B
Approach Delay (s)	1.1	0.0	12.0
Approach LOS			B

Intersection Summary			
Average Delay		1.2	
Intersection Capacity Utilization		87.6%	ICU Level of Service