MEMORANDUM

TO:	Mr. Michael Aldi Eskar Arlington LLC 9 Wildwood Road Arlington, MA 01949	**FROM:**	Scott W. Thornton, P.E. *Principal* and Andrew Arseneault, *Transportation Engineer* Vanasse & Associates, Inc. 35 New England Business Center Drive, Suite 140 Andover, MA 01810
DATE:	November 30, 2020	**RE:**	8641
SUBJECT:	Response to Traffic Advisory Committee Comments Proposed Retail Marijuana Dispensary 21 Broadway, Arlington, Massachusetts		

As requested, Vanasse & Associates, Inc. (VAI) has provided responses to comments raised by the Arlington Transportation Advisory Committee (TAC). For ease of review, we have provided the comment followed by our response.

Comment: *The TAC Executive Committee concurs with the overall recommendations of the TIA to implement the following recommendations:*

a. *Access to the Project will continue to be provided by way of one entrance-only driveway along Broadway and one exit-only driveway onto Sunnyside Avenue.*
b. *The adoption of a comprehensive Transportation Demand Management (TDM) strategy.*
c. *Development of an Opening Conditions Operations Plan in cooperation with the Arlington Police Department.*

Each of these recommendations includes several detailed recommendations. The Executive Committee recommends that the developer provide signage and pavement marking designating the exit driveway on Sunnyside Avenue as right-turn only in accordance with DPW requirements (add this to the Access to the Project Recommendations). This will help eliminate any additional traffic through the Sunnyside neighborhood. The traffic analysis assumed all exiting traffic would turn right.

Response: No comment required.

Comment: *The TIA uses standard Institute of Transportation Engineers (ITE) trip generation rates for projecting traffic volumes from the proposed project. However, If possible the report should be using trip generation data from dispensary sites in Massachusetts as was done in the final TIA for the Apothca dispensary. This is because the ITE data are based on a small number of data points from two western states with wide variations of trip production. The transportation consultant also could consider using an additional source of trip generation data from a firm called Spack Consulting.*

Response: Trip and parking observations were taken at an adult use dispensary site in Millbury, Massachusetts. A comparison of the estimated weekday evening and Saturday midday peak hour trips using the ITE rates and the observed rates is provided on Table 1A below.

Table 1A
Trip Generation Comparison

Time Period/Direction	Proposed Marijuana Dispensary (3,000 sf) ITE[a]	Observed
Weekday Evening Peak Hour		
Entering	33	41
Exiting	33	43
Total	66	84
Saturday Midday Peak Hour		
Entering	51	42
Exiting	58	45
Total	109	87

[a]Based on ITE LUC 882, *Marijuana Dispensary*

As shown on Table 1A, using the trip generation rates observed in Millbury, Massachusetts, the Project is expected to generate 84 vehicle trips (41 entering and 43 exiting) during the weekday evening peak hour, and 87 vehicle trips (42 entering and 45 exiting) during the Saturday midday peak hour. These trips are graphically depicted on Figure 6R using the same methodology presented in the July 2020 Transportation Impact Assessment (the "July 2020 TIA"), with the resulting 2027 Build traffic volumes are graphically depicted on Figure 7R.

Revised intersection analysis is presented on Tables 8R and 9R. There was not a substantial change in overall intersection operations between the two trip generation models.

Comment: *On Figure 7, it does not appear that all the projected project-generated trips have been added correctly to the No-Build trips. The Build trips should be recalculated and the intersection level of service analysis rerun with the correct volumes. The Build volumes may also need to be recalculated based on the issue described above regarding use of the ITE trip generation rates. The conclusions of the report should be modified as appropriate based on the reanalysis.*

Response: The volumes shown on Figure 7 of the July 2020 TIA have been confirmed. In brief, those volumes were created by first removing the volumes expected to be generated by the backfill of the existing bank on site (Presented on Figure A-5) and then incorporating the volumes expected to be generated by the Project (Figures 6 and 6R) from the No Build volumes (Figure 4).

Comment: *The Executive Committee concluded that following major factors in the TIA analyses are appropriate for the Existing, No-Build and Build Conditions:*

a. *Analysis of only the weekday evening peak hour, assuming the dispensary is not open during the morning peak hour.*
b. *Adjustment of traffic volume counts taken in June of this year by 2.05 to account for lower volumes due to the effect of the COVID-19 pandemic. The adjustment was based on the ratio of the 2016 traffic volume on Broadway west of Alewife Brook Parkway (increased by 1.02 for growth in traffic to 2020) to the June 2020 volume on Broadway east of Sunnyside Ave.*
c. *Use of a future design year of 2027.*
d. *Use of an annual growth rate of 0.05 percent over seven years for a total adjustment of 4.0 percent for background traffic based on existing traffic growth trends in the region.*
e. *Including traffic that would be generated by proposed new development in the area of the project in future No-Build traffic volumes.*
f. *Distribution of project generated traffic based on the distribution of existing traffic in the area.*

Response: No comment required.

Comment: *Column 3 in Table 1 is incorrectly labeled as Main St at Clarks Rd. It should read Broadway at Sunnyside Ave. Please confirm the data are correct for that location.*

Response: Noted, the header should read "Broadway at Sunnyside Ave." The data presented is correct.

Comment: *The footnote on Table 2 should be corrected to refer to the appropriate ITE land use.*

Response: Noted, the footnote should read "Based on ITE LUC 882, *Marijuana Dispensary*". The data presented is correct.

Comment: *The discussion of Table 4 on the bottom of page 17 incorrectly states that volume increases from No-Build to Build are anticipated to be 1.2 percent or less during the Saturday midday peak-hour. The percent increase on Broadway east of Sunnyside Ave is shown in the table as 90 vehicles or 8.6 percent. The table does not include the volume increase on Broadway east of Sunnyside Ave in the evening peak hour. This information should be included in Table 4.*

Response: Saturday midday peak hour traffic volume information was not available at the intersection of Route 16 at Broadway. That being said, Saturday midday peak hour traffic volumes appear comparable to the weekday evening peak hour traffic volumes along Broadway and at the Broadway at Sunnyside Avenue intersection. As a point of reference, the weekday evening peak hour traffic volume increase (utilizing the ITE trip rates) along Broadway east of Sunnyside Avenue is expected to be 23 vehicles, or approximately a 2.0% increase. A revised Table 4R is provided below, using the data from the observed trip generation rates.

Table 4R
PEAK HOUR TRAFFIC-VOLUME INCREASES

Location/Peak Hour	2027 No-Build	2027 Build	Traffic Volume Increase Over No-Build	Percent Increase Over No-Build
Broadway, east of Alewife Brook Parkway:				
Weekday Evening	997	1,005	8	0.8%
Broadway, east of Sunnyside Avenue:				
Weekday Evening	1,131	1,169	38	3.4%
Saturday Midday	1,041	1,114	73	7.0%
Broadway, west of the Project Site Driveway:				
Weekday Evening	1,065	1,075	10	0.9%
Saturday Midday	1,002	1,009	7	0.7%
Alewife Brook Parkway, north of Broadway:				
Weekday Evening	2,111	2,125	14	0.7%
Alewife Brook Parkway, south of Broadway:				
Weekday Evening	2,123	2,139	16	0.8%

Comment: *The discussion of Table 5 on page 18 incorrectly states that "the available lines of sight for motorists exiting onto Sunnyside Avenue in both directions exceed the recommended minimum sight distance". The 110' sight distance reported to the south is less than the stated minimum of 155' shown in Table 5. It is also not indicated if that sight distance calculation considers the two street trees and two parked cars on the street between the driveway and Broadway. This may not be a significant issue based on the projection of all traffic exiting the driveway turning right and this memorandum's recommendation of restricting the driveway to right turns only.*

Response: The available 110 foot is the distance to Broadway from the site driveway, and a clear line of sight is available through the intersection. It should be noted that any motorist approaching from Broadway would be performing a left-turning or right-turning maneuver, and would therefore be travelling at a speed less than 25 mph.

Comment: *The Parking section starting on page 25 does not indicate the expected Saturday or weekday parking demand, or the parking requirements in the Town's zoning bylaw. The Parking section should reference both ITE parking demand (or similar sites in Massachusetts) and the zoning bylaw. Also, it does not indicate how employee parking will be addressed. The TIA should show how the rideshare spaces in front of the building would be signed and marked. This would require Select Board approval. The TIA should clarify if the project will pay for the signing and marking.*

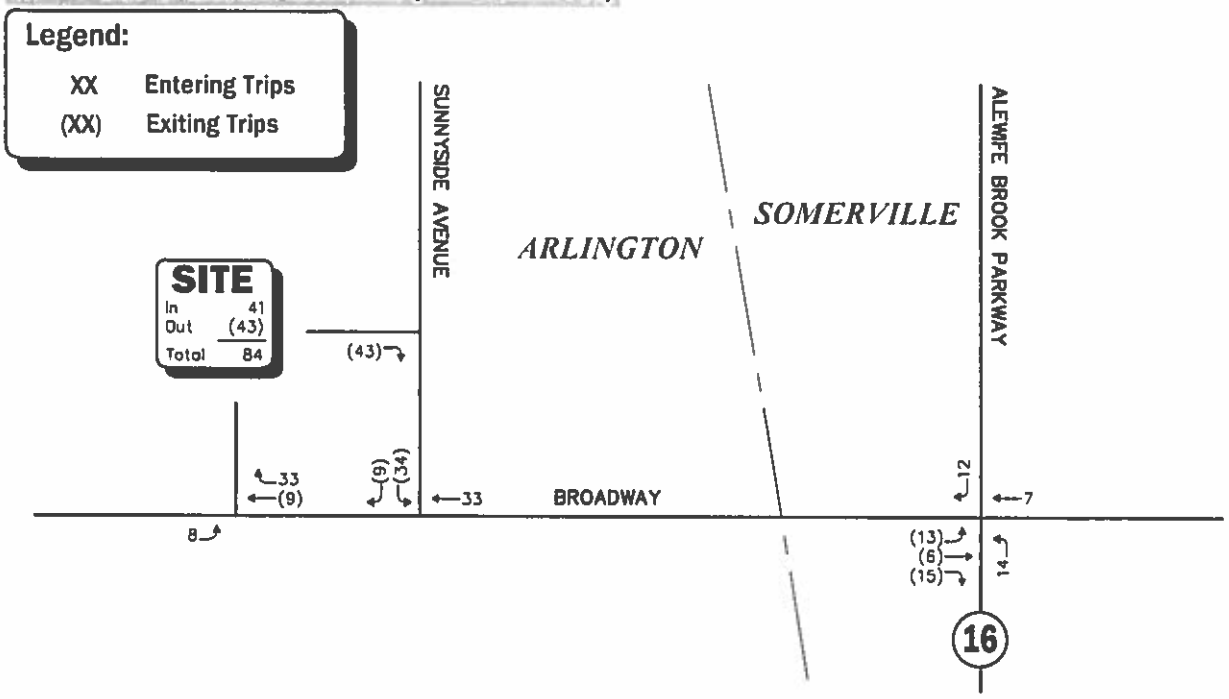
Response: As mentioned previously, overall (employee and patron) parking observations were conducted at the Millbury, Massachusetts dispensary site. These observations showed a maximum parking rate of 5.68 per thousand square feet (approximately 17 spaces) during a weekday, with a maximum rate of 5.14 (approximately 15 spaces) expected during a

Saturday. As noted in the July 2020 TIA, 12 of the parking spaces on the Project site will be allocated for dispensary use, with approximately 62 on-street parking spaces currently provided along Broadway.

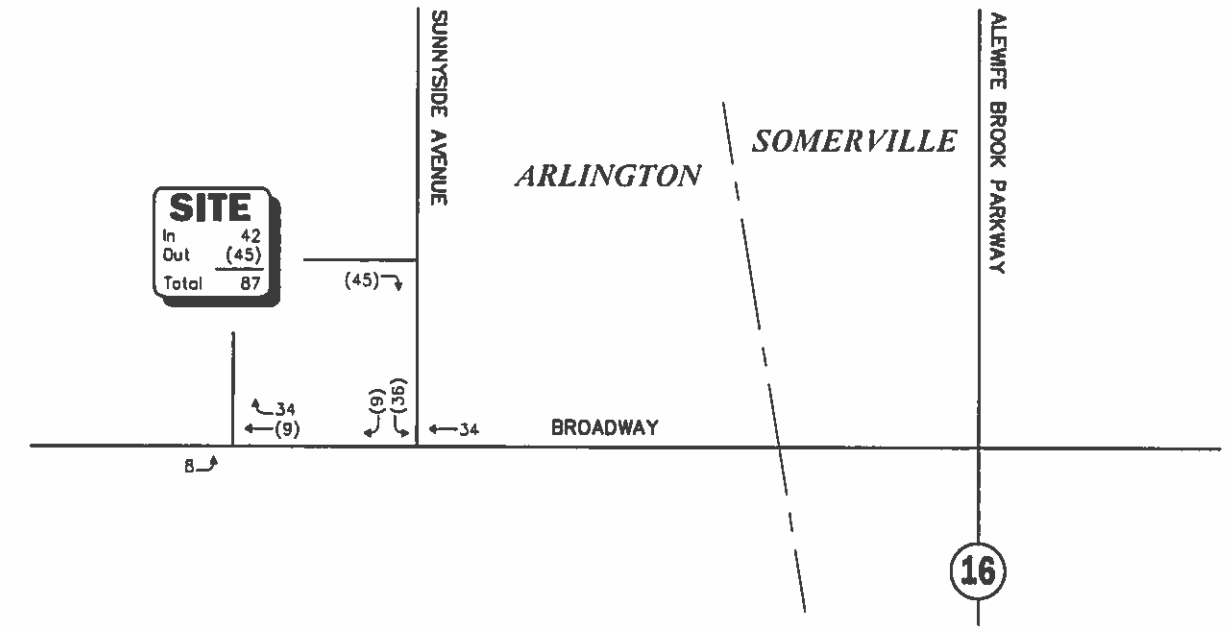
Employee parking will be accommodated within the 12 on-site spaces, with any patron parking accommodated byway of the on-street parking. A conceptual plan showing the recommended parking signage within the area has been provided as an attachment. The proponent will provide up to $2,500 for the pavement markings and signage enhancements within the immediate area.

We trust that these responses adequately addresses the comments and we are available for further clarification if needed.

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



SATURDAY MIDDAY PEAK HOUR (12:00 - 1:00 PM)



Not To Scale

Figure 6R

Project Generated Peak Hour Traffic Volumes

Vanasse & Associates inc

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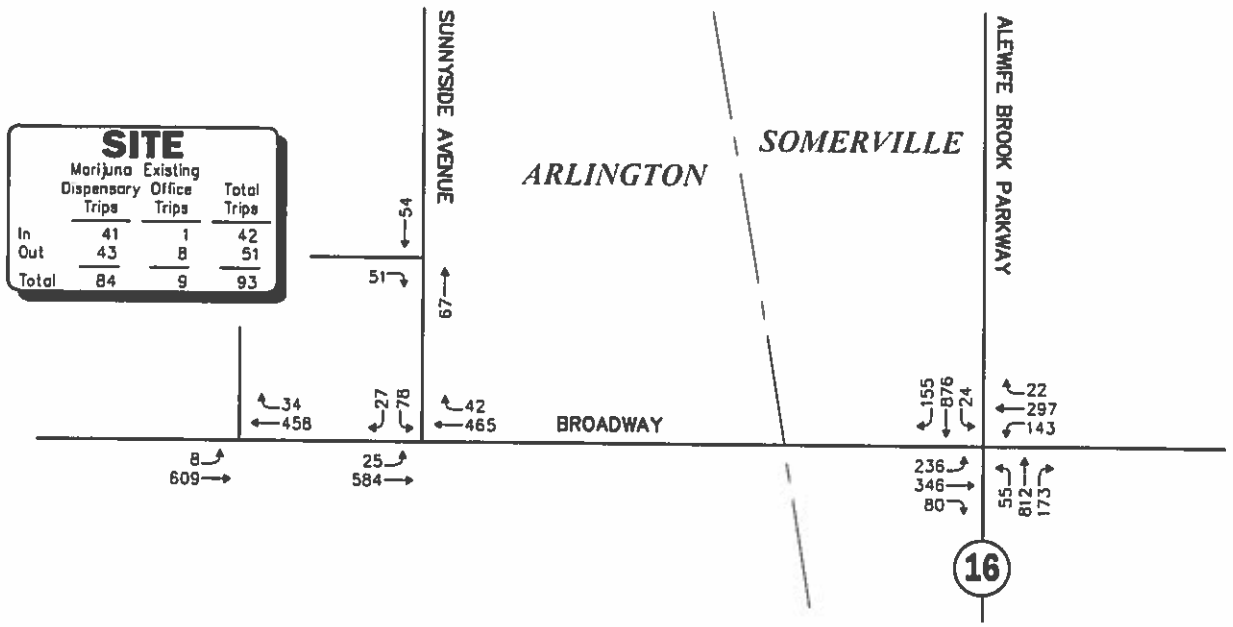
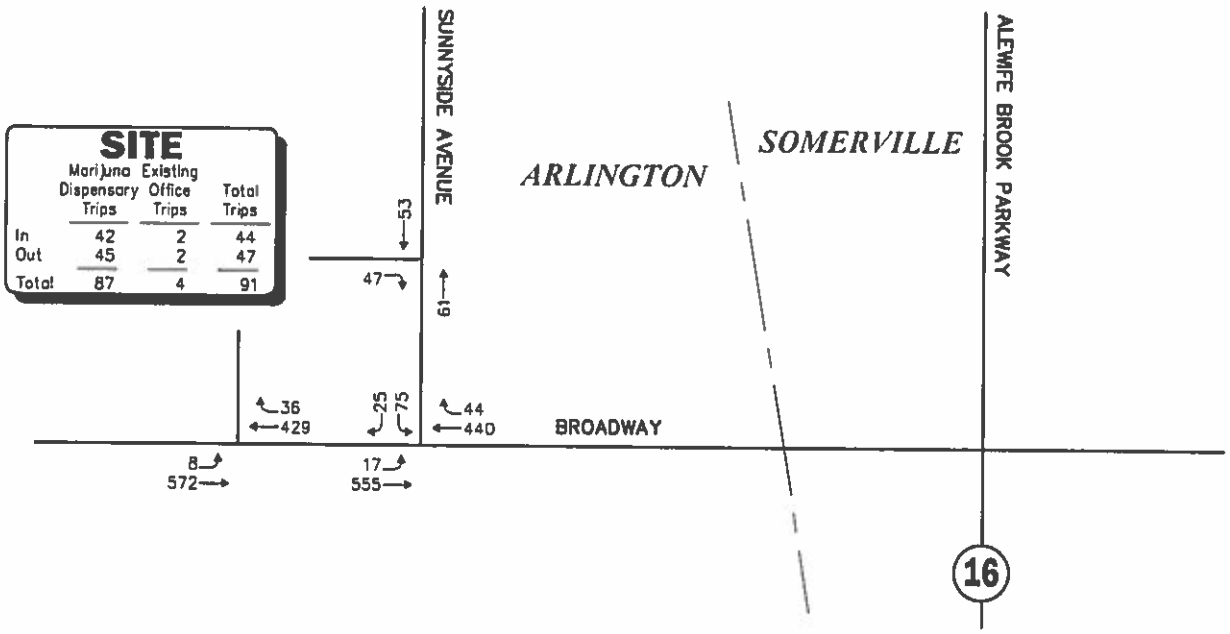
WEEKDAY EVENING PEAK HOUR (4:30 - 5:30 PM)



SATURDAY MIDDAY PEAK HOUR (12:00 - 1:00 PM)



Not To Scale

Figure 7R

2027 Build
Peak Hour Traffic Volumes

Vanasse & Associates inc

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Table 8R
SIGNALIZED INTERSECTION LEVEL-OF-SERVICE SUMMARY

Signalized Intersection/Peak Hour	2020 Existing				2027 No-Build				2027 Build			
	V/C[a]	Delay[b]	LOS[c]	Queue[d] Avg/95th	V/C	Delay	LOS	Queue Avg/95th	V/C	Delay	LOS	Queue Avg/95th
Route 16 at Broadway												
Weekday Evening:												
Broadway EB LT	4.46	>80.0	F	386/495	4.93	>80.0	F	431/544	5.07	>80.0	F	445/561
Broadway EB TH RT	1.20	>80.0	F	458/626	1.33	>80.0	F	543/713	1.36	>80.0	F	564/736
Broadway WB LT TH RT	1.11	>80.0	F	235/348	1.19	>80.0	F	262/377	1.21	>80.0	F	267/383
Route 16 NB LT TH RT	1.11	>80.0	F	523/661	1.33	>80.0	F	634/773	1.40	>80.0	F	658/798
Route 16 SB LT TH RT	1.02	73.7	E	521/660	1.15	>80.0	F	610/750	1.17	>80.0	F	618/760
Overall	--	**>80.0**	**F**	--	--	**>80.0**	**F**	--	--	**>80.0**	**F**	--

[a]Volume-to-capacity ratio.
[b]Control (signal) delay per vehicle in seconds.
[c]Level-of-Service
[d]Queue length in feet
NB = northbound, SB = southbound, EB = eastbound, WB = westbound; LT = left-turning movements, TH = through movements, RT = right-turning movements.

Table 9R
UNSIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY

Unsignalized Intersection/ Peak Hour/Movement	2020 Existing				2027 No-Build				2027 Build			
	Demand[a]	Delay[b]	LOS[c]	Queue 95th Percentile	Demand	Delay	LOS	Queue 95th Percentile	Demand	Delay	LOS	Queue 95th Percentile
Broadway at Sunnyside Avenue												
Weekday Evening												
Broadway EB LT TH	583	0.3	A	0	609	0.4	A	0	609	0.4	A	0
Broadway WB TH RT	444	0.0	A	0	487	0.0	A	0	507	0.0	A	0
Sunnyside Ave SB LT RT	32	20.6	C	1	82	31.1	D	2	105	38.9	E	3
Saturday Midday												
Broadway EB LT TH	545	0.2	A	0	572	0.3	A	0	572	0.3	A	0
Broadway WB TH RT	413	0.0	A	0	469	0.0	A	0	484	0.0	A	0
Sunnyside Ave SB LT RT	32	19.0	C	1	78	26.4	D	2	100	31.3	D	2
Broadway at the Project Site Driveway												
Weekday Evening												
Broadway EB LT TH	583	0.0	A	0	612	0.0	A	0	617	0.1	A	0
Broadway WB TH RT	429	0.0	A	0	467	0.0	A	0	492	0.0	A	0
Saturday Midday												
Broadway EB LT TH	545	0.0	A	0	577	0.1	A	0	580	0.1	A	0
Broadway WB TH RT	404	0.0	A	0	446	0.0	A	0	465	0.0	A	0
Sunnyside Avenue at the Project Site Driveway												
Weekday Evening												
Project Site Driveway EB LT RT	8	8.5	A	0	28	8.7	A	0	51	8.8	A	0
Sunnyside Avenue NB TH	48	0.0	A	0	67	0.0	A	0	67	0.0	A	0
Sunnyside Avenue SB TH	24	0.0	A	0	54	0.0	A	0	54	0.0	A	0
Saturday Midday												
Project Site Driveway EB LT RT	2	8.5	A	0	25	8.7	A	0	47	8.8	A	0
Sunnyside Avenue NB TH	33	0.0	A	0	61	0.0	A	0	61	0.0	A	0
Sunnyside Avenue SB TH	30	0.0	A	0	53	0.0	A	0	53	0.0	A	0

[a]Volume-to-capacity ratio
[b]Control (signal) delay per vehicle in seconds
[c]Level-of-Service
[d]Queue length in vehicles
NB = northbound, SB = southbound, EB = eastbound, WB = westbound; LT = left-turning movements; TH = through movements; RT = right-turning movements.

ATTACHMENTS

TRIP-GENERATION AND PARKING CALCULATIONS
INTERSECTION CAPACITY ANALYSIS
CONCEPTUAL IMPROVEMENT PLAN

TRIP-GENERATION AND PARKING CALCULATIONS

Empirical Weekday Evening Peak Hour Rate = 27.84

$T = 27.84 \times (3.000) = 83.52$
$T \approx 84\ [41\ Enter - 43\ Exit]$

Empirical Saturday Midday Peak Hour Rate = 28.92

$T = 28.92 \times (3.000) = 86.76$
$T \approx 87\ [42\ Enter - 45\ Exit]$

VAI Calculations

Job:	Millbury	Job Number:	8667
Location:	266 N. Main Street	Date:	7/29/20
Title:	Traffic Count (Weekday)	Sheet:	1 of 1
Calculated by:	SRF	Size:	3,700 SF

Start Time	Ins	Outs	Total	Hourly Total	Trip Rate Hourly Total	Parking Demand	Parking Demand Ratio
7:00AM	0	0	0		0.00	1	0.27
7:15	1	0	1		0.00	2	0.54
7:30	1	0	1		0.00	3	0.81
7:45	2	0	2	4	1.08	5	1.35
8:00	1	0	1	5	1.35	6	1.62
8:15	3	0	3	7	1.89	9	2.43
8:30	1	0	1	7	1.89	10	2.70
8:45	0	0	0	5	1.35	10	2.70
9:00	1	0	1	5	1.35	11	2.97
9:15	0	0	0	2	0.54	11	2.97
9:30	0	0	0	1	0.27	11	2.97
9:45	2	0	2	3	0.81	13	3.51
10:00	7	5	12	14	3.78	15	4.05
→ 10:15	11	7	18	32	8.65	19	5.14
10:30	11	15	26	58	15.68	15	4.05
10:45	10	7	17	73	19.73	18	4.86
11:00	7	10	17	78	21.08	15	4.05
11:15	10	8	18	78	21.08	17	4.59
11:30	6	8	14	66	17.84	15	4.05
11:45	7	6	13	62	16.76	16	4.32
12:00	9	10	19	64	17.30	15	4.05
12:15	7	6	13	59	15.95	16	4.32
12:30	13	7	20	65	17.57	22	5.95
12:45	8	15	23	75	20.27	15	4.05
1:00	10	9	19	75	20.27	16	4.32
1:15	9	5	14	76	20.54	20	5.41
1:30	5	8	13	69	18.65	17	4.59
1:45	7	5	12	58	15.68	19	5.14
2:00	10	9	19	58	15.68	20	5.41
2:15	5	7	12	56	15.14	18	4.86
2:30	4	3	7	50	13.51	19	5.14
2:45	7	6	13	51	13.78	20	5.41
3:00	10	9	19	51	13.78	21	5.68
3:15	8	12	20	59	15.95	17	4.59
3:30	11	11	22	74	20.00	17	4.59
3:45	7	9	16	77	20.81	15	4.05
→ 4:00	11	10	21	79	21.35	16	4.32
4:15	11	13	24	83	22.43	14	3.78
4:30	17	10	27	88	23.78	21	5.68
4:45	11	20	31	103	27.84	12	3.24
5:00	10	10	20	102	27.57	12	3.24
5:15	11	13	24	102	27.57	10	2.70
5:30	6	7	13	88	23.78	9	2.43
5:45	12	7	19	76	20.54	14	3.78
6:00	9	11	20	76	20.54	12	3.24
6:15	15	12	27	79	21.35	15	4.05
6:30	8	12	20	86	23.24	11	2.97
6:45	10	8	18	85	22.97	13	3.51
Total	342	330	672				
Pk Hr Total	50	53	103				

1 car in lot at 7:00 am / 13 cars in lot at 7 pn

VAI Calculations

Job:	Millbury	Job Number:	8667
Location:	266 N. Main Street	Date:	7/25/20
Title:	Traffic Count (Saturday)	Sheet:	1 of 1
Calculated by:	SRF	Checked by:	
		Size:	3,700 SF

Start Time	Ins	Outs	Total	Hourly Total	Trip Rate Hourly Total	Parking Demand	Parking Demand Ratio
11:00AM	14	14	28		0.00	18	4.86
11:15	12	14	26		0.00	16	4.32
11:30	11	13	24		0.00	14	3.78
11:45	15	14	29	107	28.92	15	4.05
12:00	8	10	18	97	26.22	13	3.51
12:15	14	11	25	96	25.95	16	4.32
12:30	13	11	24	96	25.95	18	4.86
12:45	10	10	20	87	23.51	18	4.86
1:00	10	11	21	90	24.32	17	4.59
1:15	9	8	17	82	22.16	18	4.86
1:30	10	9	19	77	20.81	19	5.14
1:45	6	11	17	74	20.00	14	3.78
Total	132	136	268				
Pk Hr Total	52	55	107				

* 17 cars and 1 box truck in lot at 11:00 am.

*** 14 cars in lot at 2:00 pm.

** 1 of the outs in interval 1 (11:00-11:15) was the box truck

INTERSECTION CAPACITY ANALYSIS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	236	346	80	143	297	22	55	812	173	24	876	155
Future Volume (vph)	236	346	80	143	297	22	55	812	173	24	876	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	10	10	10	10	10	10
Storage Length (ft)	0		125	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Frt		0.972			0.993			0.975			0.978	
Flt Protected	0.950				0.985			0.997			0.999	
Satd. Flow (prot)	1745	1771	0	0	3391	0	0	3275	0	0	3292	0
Flt Permitted	0.160				0.701			0.599			0.761	
Satd. Flow (perm)	294	1771	0	0	2414	0	0	1968	0	0	2508	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			3			20			17	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		175			307			364			295	
Travel Time (s)		4.0			7.0			8.3			6.7	
Peak Hour Factor	0.86	0.86	0.86	0.96	0.96	0.96	0.96	0.96	0.96	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	274	402	93	149	309	23	57	846	180	26	952	168
Shared Lane Traffic (%)												
Lane Group Flow (vph)	274	495	0	0	481	0	0	1083	0	0	1146	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		11			11			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.09	1.09	1.09	1.09	1.09	1.09
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	31.0	31.0		26.0	26.0		56.0	56.0		56.0	56.0	
Total Split (%)	23.1%	23.1%		19.4%	19.4%		41.8%	41.8%		41.8%	41.8%	
Maximum Green (s)	25.0	25.0		20.0	20.0		50.0	50.0		50.0	50.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	-2.0			-2.0			-2.0			-2.0	
Total Lost Time (s)	6.0	4.0			4.0			4.0			4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	25.0	27.0			22.0			52.0			52.0	
Actuated g/C Ratio	0.19	0.20			0.16			0.39			0.39	
v/c Ratio	5.07	1.36			1.21			1.40			1.17	
Control Delay	1885.6	220.3			161.7			219.3			122.7	
Queue Delay	0.0	0.0			0.0			0.0			0.0	
Total Delay	1885.6	220.3			161.7			219.3			122.7	
LOS	F	F			F			F			F	
Approach Delay		813.6			161.7			219.3			122.7	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	~445	~564			~267			~658			~618	
Queue Length 95th (ft)	#561	#736			#383			#798			#760	
Internal Link Dist (ft)		95			227			284			215	
Turn Bay Length (ft)												
Base Capacity (vph)	54	363			398			775			983	
Starvation Cap Reductn	0	0			0			0			0	
Spillback Cap Reductn	0	0			0			0			0	
Storage Cap Reductn	0	0			0			0			0	
Reduced v/c Ratio	5.07	1.36			1.21			1.40			1.17	

Intersection Summary

Area Type: Other
Cycle Length: 134
Actuated Cycle Length: 134
Natural Cycle: 135
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 5.07
Intersection Signal Delay: 310.9 Intersection LOS: F
Intersection Capacity Utilization 108.9% ICU Level of Service G
Analysis Period (min) 15

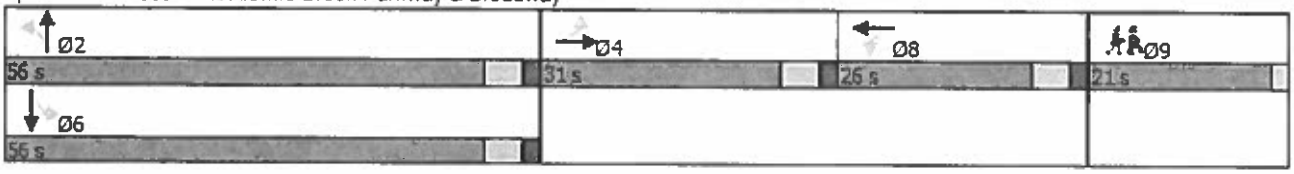
Lane Group	Ø9
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	21.0
Total Split (s)	21.0
Total Split (%)	16%
Maximum Green (s)	19.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	Ped
Walk Time (s)	13.0
Flash Dont Walk (s)	6.0
Pedestrian Calls (#/hr)	64
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Alewife Brook Parkway & Broadway



Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		⋔	
Traffic Vol, veh/h	25	584	465	42	78	27
Future Vol, veh/h	25	584	465	42	78	27
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	84	84	92	92
Heavy Vehicles, %	0	1	2	0	0	0
Mvmt Flow	27	635	554	50	85	29

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	604	0	-	0	1268	579
Stage 1	-	-	-	-	579	-
Stage 2	-	-	-	-	689	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	984	-	-	-	188	519
Stage 1	-	-	-	-	564	-
Stage 2	-	-	-	-	502	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	984	-	-	-	180	519
Mov Cap-2 Maneuver	-	-	-	-	180	-
Stage 1	-	-	-	-	540	-
Stage 2	-	-	-	-	502	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	38.9
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	984	-	-	-	216
HCM Lane V/C Ratio	0.028	-	-	-	0.528
HCM Control Delay (s)	8.8	0	-	-	38.9
HCM Lane LOS	A	A	-	-	E
HCM 95th %tile Q(veh)	0.1	-	-	-	2.8

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑	↑↱		⅄	
Traffic Vol, veh/h	17	555	440	44	75	25
Future Vol, veh/h	17	555	440	44	75	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	89	89	92	92
Heavy Vehicles, %	0	3	7	0	0	0
Mvmt Flow	19	631	494	49	82	27

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	543	0	-	0	1188	519
Stage 1	-	-	-	-	519	-
Stage 2	-	-	-	-	669	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1036	-	-	-	210	561
Stage 1	-	-	-	-	601	-
Stage 2	-	-	-	-	513	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1036	-	-	-	204	561
Mov Cap-2 Maneuver	-	-	-	-	204	-
Stage 1	-	-	-	-	584	-
Stage 2	-	-	-	-	513	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	31.3
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1036	-	-	-	243
HCM Lane V/C Ratio	0.019	-	-	-	0.447
HCM Control Delay (s)	8.5	0	-	-	31.3
HCM Lane LOS	A	A	-	-	D
HCM 95th %tile Q(veh)	0.1	-	-	-	2.2

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		⋔	
Traffic Vol, veh/h	8	609	458	34	0	0
Future Vol, veh/h	8	609	458	34	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	9	662	498	37	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	535	0	-	0	1197	517
Stage 1	-	-	-	-	517	-
Stage 2	-	-	-	-	680	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1033	-	-	-	205	558
Stage 1	-	-	-	-	598	-
Stage 2	-	-	-	-	503	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1033	-	-	-	202	558
Mov Cap-2 Maneuver	-	-	-	-	202	-
Stage 1	-	-	-	-	590	-
Stage 2	-	-	-	-	503	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1033	-	-	-	-
HCM Lane V/C Ratio	0.008	-	-	-	-
HCM Control Delay (s)	8.5	0	-	-	0
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰↑	↑↱		⅄	
Traffic Vol, veh/h	8	572	429	36	0	0
Future Vol, veh/h	8	572	429	36	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	9	622	466	39	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	505	0	-	0	1126	486
Stage 1	-	-	-	-	486	-
Stage 2	-	-	-	-	640	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1060	-	-	-	227	581
Stage 1	-	-	-	-	618	-
Stage 2	-	-	-	-	525	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1060	-	-	-	224	581
Mov Cap-2 Maneuver	-	-	-	-	224	-
Stage 1	-	-	-	-	610	-
Stage 2	-	-	-	-	525	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1060	-	-	-	-
HCM Lane V/C Ratio	0.008	-	-	-	-
HCM Control Delay (s)	8.4	0	-	-	0
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				↑	↑	
Traffic Vol, veh/h	0	51	0	67	54	0
Future Vol, veh/h	0	51	0	67	54	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	55	0	73	59	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	132	59	-	0	-	0
Stage 1	59	-	-	-	-	-
Stage 2	73	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	-	-
Pot Cap-1 Maneuver	862	1007	0	-	-	0
Stage 1	964	-	0	-	-	0
Stage 2	950	-	0	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	862	1007	-	-	-	-
Mov Cap-2 Maneuver	862	-	-	-	-	-
Stage 1	964	-	-	-	-	-
Stage 2	950	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.8	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT
Capacity (veh/h)	-	1007	-
HCM Lane V/C Ratio	-	0.055	-
HCM Control Delay (s)	-	8.8	-
HCM Lane LOS	-	A	-
HCM 95th %tile Q(veh)	-	0.2	-

Intersection	
Int Delay, s/veh	2.6

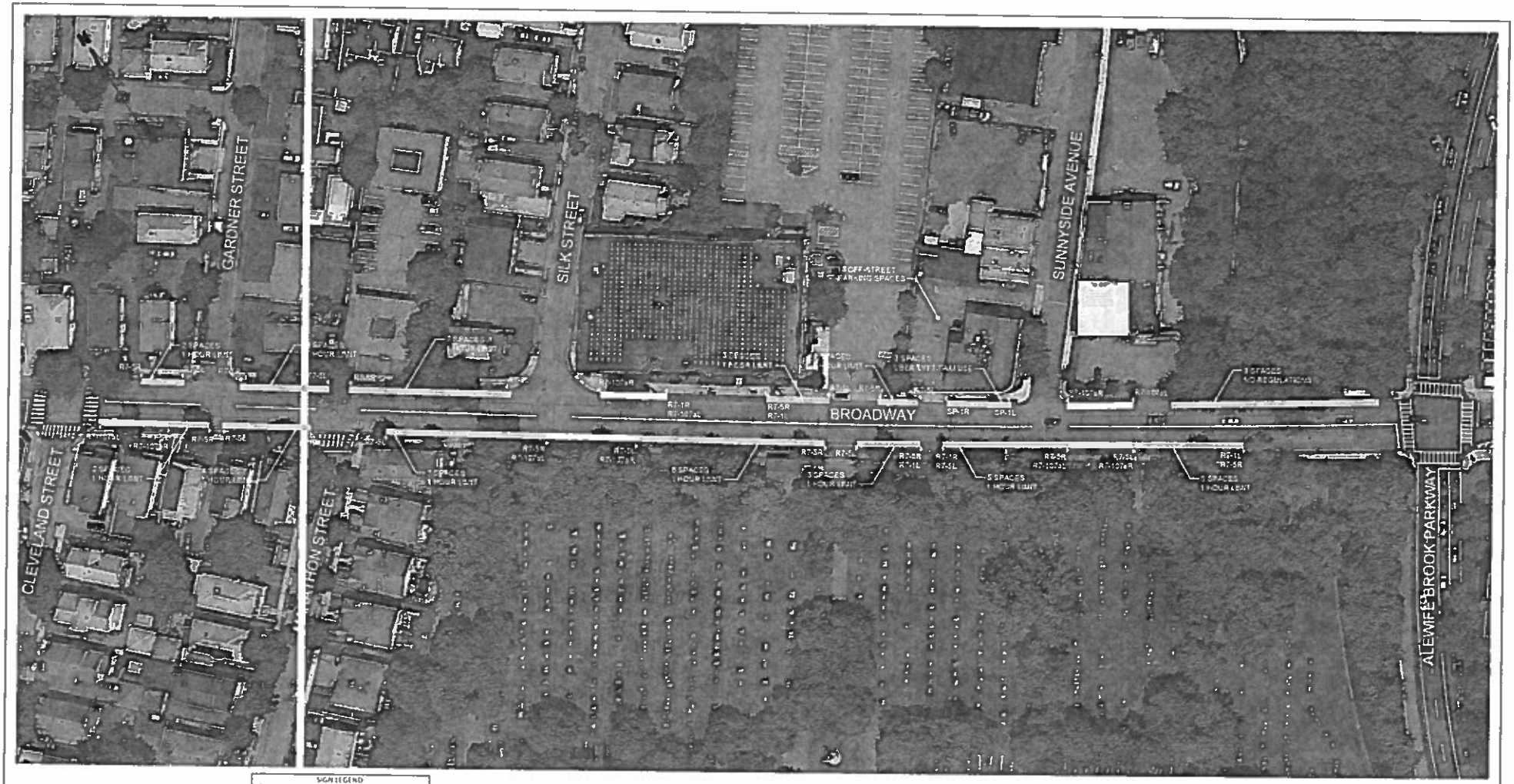
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				↑	↑	
Traffic Vol, veh/h	0	47	0	61	53	0
Future Vol, veh/h	0	47	0	61	53	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	51	0	66	58	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	124	58	-	0	-	0
Stage 1	58	-	-	-	-	-
Stage 2	66	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	-	-
Pot Cap-1 Maneuver	871	1008	0	-	-	0
Stage 1	965	-	0	-	-	0
Stage 2	957	-	0	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	871	1008	-	-	-	-
Mov Cap-2 Maneuver	871	-	-	-	-	-
Stage 1	965	-	-	-	-	-
Stage 2	957	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.8	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT
Capacity (veh/h)	-	1008	-
HCM Lane V/C Ratio	-	0.051	-
HCM Control Delay (s)	-	8.8	-
HCM Lane LOS	-	A	-
HCM 95th %tile Q(veh)	-	0.2	-

CONCEPTUAL IMPROVEMENT PLAN



SIGN LEGEND			
R7-1L	NO PARKING ANYTIME	SP-1L	
R7-1R	NO PARKING ANYTIME	SP-1R	
R7-5L		R7-107aL	TOW-AWAY ZONE
R7-5R		R7-107aR	TOW-AWAY ZONE

LEGEND
- PARKING ALLOWED
- NO PARKING ALLOWED
- BUS STOP

NOTES:
1. SIGN REGULATIONS TO BE REVIEWED WITH TOWN OFFICIALS.
2. THIS PLAN IS FOR REVIEW PURPOSES ONLY AND IS NOT INTENDED FOR CONSTRUCTION.
3. BASE MAP INFORMATION OBTAINED FROM GOOGLE EARTH.

40 0 40 80
SCALE IN FEET

PROPOSED ON-STREET PARKING REGULATIONS

PROPOSED RETAIL MARIJUANA DISPENSARY
21 BROADWAY, ARLINGTON, MASSACHUSETTS

ESKAR ARLINGTON LLC
ARLINGTON, MASSACHUSETTS

NO.	REVISIONS	DATE

Vanasse & Associates inc
Transportation Engineers & Planners

AJA	06/25/2020
AJA	1"=40'