August 11, 2023

Ms. Sarah Stine
Development Manager
O'Connell Development Group
800 Kelly Way
Holyoke, MA 01040

Re: Traffic Impact and Parking Study
Evergreen Walk Unit 5 Development Full Buildout
Cedar Avenue and Buckland Road
South Windsor, Connecticut
SLR # 141.21167.00001

Dear Ms. Stine,

SLR International Corporation (SLR) has prepared this study to evaluate the traffic-related implications of your proposal to build out the Unit 5 parcel of the Promenade Shops at Evergreen Walk in South Windsor, Connecticut, with nearly 11,000 square feet (SF) of additional restaurant and retail space and 191 parking spaces. The site is located on the southwestern corner of Buckland Road and Cedar Avenue comprising nearly six acres of land. Presently, there is a bank in operation, and the rest of the site is undeveloped. The full-build development will include the 2,325 SF restaurant with a mobile drive-up lane, a 2,400 SF restaurant with a drive-through plus 1,000 SF of retail space, and a 5,000 SF restaurant (without a drive-through). A drive-up lane refers to mobile order-ahead and pick-up-only operation, compared to a drive-through being the more traditional menu board order operation. The location of the site is illustrated in **Figure 1**.

EXISTING CONDITIONS

Site Environs

The Unit 5 site is bounded by Buckland Road to the east, Cedar Avenue to the north, and Tamarack Avenue to the west, south of the existing LA Fitness and Costco buildings. Tamarack Avenue will be renamed "Cottonwood Lane" and will be referred to as such within this document. Buckland Road is classified by the Connecticut Department of Transportation (CTDOT) as a minor arterial with a posted speed limit of 40 miles per hour (mph). It runs north-south, connecting Manchester to the south with South Windsor to the north. It has four travel lanes plus turning lanes at intersections and sidewalk along the west side of the road in the vicinity of the site. Segments of sidewalk have been installed along the east side of the road piecemeal with new development. CTtransit bus-stops serving bus route 92 are provided along Buckland Road including at the southern leg of the Cedar Avenue intersection. Cedar Avenue and Cottonwood Lane

are private roads that serve the Evergreen Walk complex. The intersection of Buckland Road at Cedar Avenue is signalized with dedicated turn lanes. Cedar Avenue at Cottonwood Lane is stop-sign controlled on the Cedar Avenue approach.

Traffic Data Collection

Turning movement counts were conducted at the Buckland Road-Cedar Avenue signalized intersection and the Cedar Avenue-Cottonwood Lane stop-controlled intersection from 4:00 p.m. to 6:00 p.m. on Thursday, March 16, 2023, and from 11:00 a.m. to 1:00 p.m. on Saturday, March 18, 2023, to capture peak weekday afternoon commuter activity and peak weekend/commercial activity. For analysis, the highest single peak-hour volume for each time period was extracted from the count data. The study area peak hours were found to be from 4:30 p.m. to 5:30 p.m. during the weekday afternoon, and from 11:45 a.m. to 12:45 p.m. during the Saturday midday period. The on-site bank was not operational at this time; traffic associated with the bank was therefore estimated with industry data and added to the future background traffic volumes, as discussed later in this document. The existing peak-hour traffic volumes are shown in **Figure 2**.

Traffic volume data hosted by CTDOT was also reviewed to determine historic traffic volumes along Buckland Road. The most recent, non-COVID-19 epoch, average daily traffic (ADT) volume along Buckland Road was recorded to be 19,600 vehicles in 2016.

Crash History

Traffic crash data was evaluated from the Connecticut Crash Data Repository for the most recent five-year period (August 08, 2018, to August 09, 2023) along the study area including Buckland Road at Cedar Avenue, Cedar Avenue itself, and Cedar Avenue at Cottonwood Lane. Seven total crashes reportedly occurred during this period, all at the signalized intersection. Rear-end crashes are common at signalized intersections and were found to be the most common crash type. No uncommon crash patterns were apparent from the data. **Table 1** summarizes the crash data by location, type, and severity.

Table 1 Crash History Summary

Location	Type Of Collision				Crash Severity		
	Angle	Rear-End	Sideswipe – Same Direction	Total	Property Damage Only	Suspected Minor Injury	Total
Buckland Road at Cedar Avenue	2	4	1	**7**	6	1	**7**
Cedar Avenue between Buckland Road and Cottonwood Lane	-	-	-	**0**	-	-	**0**
Cedar Avenue at Cottonwood Lane	-	-	-	**0**	-	-	**0**
Cottonwood Lane Along Site Frontage	-	-	-	**0**	-	-	**0**
Grand Total	**2**	**4**	**1**	**7**	**6**	**1**	**7**

PROPOSED DEVELOPMENT

Site Characteristics and Operations

The site comprises nearly six acres of land and presently consists of a 2,000 SF bank. The rest of the site is undeveloped. Nearly 11,000 square feet of additional restaurant and retail space is proposed. The site will have 191 parking spaces. Full driveway access will be provided to and from Cottonwood Lane, south of Cedar Avenue, and a right-in/right-out driveway will be provided along the eastbound side of Cedar Avenue toward Buckland Road. Both driveway egresses will be stop-controlled.

The 2,325 SF restaurant drive-up lane will be pick-up-only, meaning there will be no ordering and no payments there. Food ordering and payment will have occurred ahead of time via online/mobile place-ahead ordering. Based on data provided by the Applicant, there is an average of 25 drive-up lane customers during peak hour conditions, or around one drive-up lane customer every 2 to 3 minutes during the busiest hour of the day; this equates to an average queue of two vehicles, and a 98th-percentile queue of four vehicles. There will also be dine-in service and the ability for patrons to order within the restaurant to-go. The 2,400 SF restaurant will be a coffee/café restaurant and will have a more traditional style drive-through. A 1,000 SF retail building will be attached. The 5,000 SF restaurant will be sit-down style and will not have a drive-through.

Sight Lines

Intersection sight distance (ISD) accounts for a driver's ability to identify an appropriate gap in oncoming traffic when egressing a driveway or side street, in accordance with the CTDOT *Highway Design Manual*. When determining ISD, the length of the gap, which is dependent on speed and number of lanes a motorist needs to cross to make a turn, should allow a vehicle to turn safely without necessitating a significant change in the speed of approaching vehicles already traveling on the roadway.

The ISD sight lines from the Cottonwood Lane full-access driveway were reviewed according to the CTDOT *Highway Design Manual.* With a motorist speed of 25 mph along Cottonwood Lane, a motorist preparing to exit the site driveway should have 280 feet of ISD. Looking to the right along Cottonwood Lane, sightlines are clear in excess of 400 feet. Looking to the left along Cottonwood Lane, approximately 290 feet of ISD is available with some minor vegetation clearing within the property. The Cottonwood Lane driveway sight lines, therefore, are expected to be sufficient. The sight line from the right-out egress to Cedar Avenue is expected to be sufficient as it was previously approved with the bank building development.

Parking Analysis

Parking was also reviewed relative to the number of parking spaces that are required per the Town Zoning Regulations and the number of spaces proposed to be built versus the actual parking demands that could be expected over the course of a typical day based on industry data.

Town Parking Requirements

Per the Zoning Regulations, 212 parking spaces are required, under Section 6.4.9 of the Town of South Windsor Zoning Regulations. A 10% reduction is requested based upon the parking study provided here in reducing the required parking to 191 parking spaces for this proposed development. 191 parking spaces are proposed to be built.

Industry Data on Parking Demands

To review this from another angle, statistical data published by ITE in their latest *Parking Generation Manual* was reviewed. This data notably is based on parking counts from numerous different types of land uses and also includes detailed data on hourly variation in parking demands to understand how parking at different land uses and types of business peak and fluctuate over the course of a day; in essence to understand in more detail the shared-parking compatibility across different kinds of land uses. For example, coffee shops and their parking demands are busiest in the morning while restaurants tend to peak during lunchtime and in the evening.

Also worth noting is that the ITE statistics show that parking usage at some land uses is not as intense as the zoning requirements would indicate. For example, while the town regulations require 1 parking space for every 50 square feet of restaurant, the ITE statistics indicate that actual peak parking demands generated by restaurants tend to range from around 1 space for every 70 square feet to 1 space for every

185 square feet. The ITE statistics also better take into account things like drive-throughs at different types of establishments such as what is proposed with this site plan for the proposed Starbucks and Chipotle. Drive-throughs tend to lessen the need for parking.

The parking demands based on the ITE data are illustrated in Exhibits 1 and 2. As shown, even at the busiest times of day, only around half to two-thirds of the 191 parking spaces at the site may be needed on a typical day.

Exhibit 1

ESTIMATED FUTURE PARKING USE
Evergreen Walk Unit 5 Commercial Development

WEEKDAY / FRIDAY

	Peak Demand	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM
Existing Bank (2,000 sq ft) [1]	8 spaces	0% 0	24% 2	62% 5	87% 7	90% 7	85% 7	88% 7	87% 7	100% 8	87% 7	0% 0	0% 0	0% 0
Proposed Chipotle (2,325 sq ft) [2]	29 spaces	0% 0	0% 0	0% 0	28% 8	60% 17	100% 29	86% 25	57% 17	43% 13	45% 13	59% 17	62% 18	18% 5
Proposed Starbucks (2,400 sq ft) [2]	13 spaces	100% 13	100% 13	100% 13	88% 12	73% 10	73% 10	77% 10	58% 8	62% 8	62% 8	50% 7	40% 5	30% 4
Proposed Restaurant TBD (5,000 sq ft) [2]	71 spaces	1% 1	3% 2	5% 4	9% 6	15% 11	100% 71	82% 58	54% 38	33% 24	26% 19	64% 46	90% 64	100% 71
Proposed General Retail (1,000 sq ft) [2]	4 spaces	32% 1	32% 1	50% 2	74% 3	87% 4	97% 4	100% 4	92% 4	85% 3	84% 3	78% 3	75% 3	63% 3
TOTAL NUMBER OF PARKED VEHICLES		15	18	24	36	48	120	104	74	56	51	72	90	83
NUMBER OF PARKING SPACES ONSITE		191												
TOTAL PARKING UTILIZATION		8%	9%	12%	19%	25%	63%	54%	39%	29%	26%	38%	47%	43%

1) Estimated parking based on *Parking Generation 5th Ed.* - Institute of Transportation Engineers - 2019, Land Use: 912 (Drive-in Bank), as well as People Bank's Hours of Operation.
2) Estimated parking based on *Parking Generation 5th Ed.* - Institute of Transportation Engineers - 2019. Land Uses: 820 (Retail/December), 934 (Fast Food with drive-thru), 937 (Coffee with drive-thru), 932 (High-Turnover Sit Down Restaurant), and supplemented with information from known/expected tenants (the bank, Chipotle, and Starbucks).

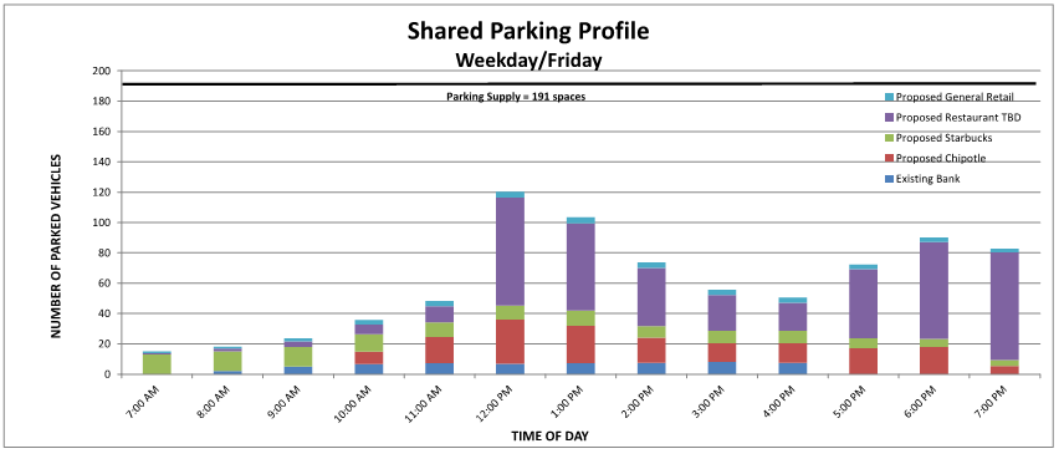


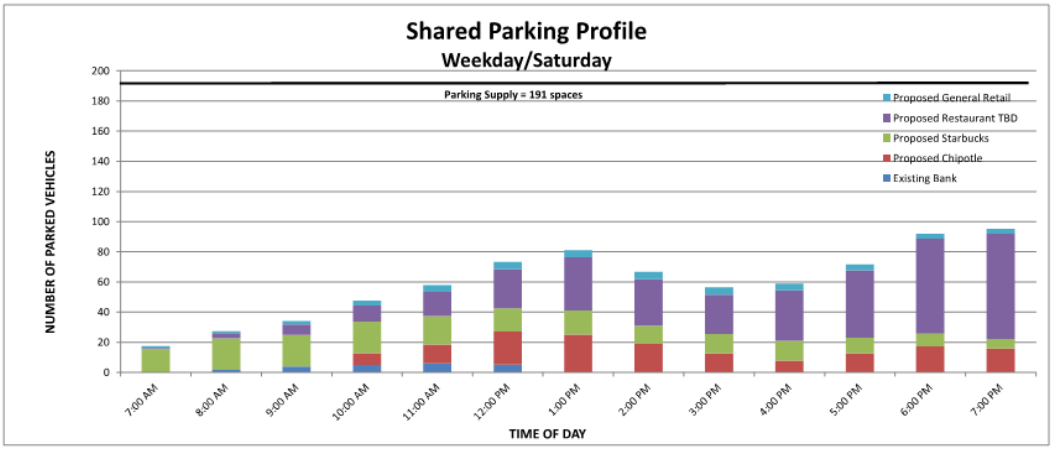
Exhibit 2

ESTIMATED FUTURE PARKING USE
Evergreen Walk Unit 5 Commercial Development

WEEKEND / SATURDAY

	Peak Demand	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM
Existing Bank (2,000 sq ft) [1]	6 spaces	0% 0	24% 2	62% 4	82% 5	100% 6	85% 5	0% 0	0% 0	0% 0	0% 0	0% 0	0% 0	0% 0
Proposed Chipotle (2,325 sq ft) [2]	25 spaces	0% 0	0% 0	0% 0	31% 8	50% 13	88% 22	100% 25	75% 19	50% 13	31% 8	50% 13	69% 17	63% 16
Proposed Starbucks (2,400 sq ft) [2]	21 spaces	73% 15	100% 21	100% 21	100% 21	90% 19	73% 15	77% 16	58% 12	62% 13	62% 13	50% 11	40% 8	30% 6
Proposed Restaurant TBD (5,000 sq ft) [2]	70 spaces	1% 1	5% 4	10% 7	15% 11	23% 16	37% 26	50% 35	44% 31	37% 26	48% 34	64% 45	90% 63	100% 70
Proposed General Retail (1,000 sq ft) [2]	5 spaces	27% 1	27% 1	46% 2	67% 3	85% 4	97% 5	98% 5	100% 5	97% 5	88% 4	77% 4	64% 3	64% 3
TOTAL NUMBER OF PARKED VEHICLES		18	27	34	48	58	73	81	67	56	59	72	92	95
NUMBER OF PARKING SPACES ONSITE		191												
TOTAL PARKING UTILIZATION		9%	14%	18%	25%	30%	38%	42%	35%	30%	31%	38%	48%	50%

1) Estimated parking based on *Parking Generation 5th Ed.* - Institute of Transportation Engineers - 2019, Land Use: 912 (Drive-in Bank), as well as People Bank's Hours of Operation.
2) Estimated parking based on *Parking Generation 5th Ed.* - Institute of Transportation Engineers - 2019. Land Uses: 820 (Retail/December), 934 (Fast Food with drive-thru), 937 (Coffee with drive-thru), 932 (High-Turnover Sit Down Restaurant), and supplemented with information from known/expected tenants (the bank, Chipotle, and Starbucks).



Trip Generation and Distribution

The peak-hour traffic to be generated by the proposed site was estimated using statistical data published by the Institute of Transportation Engineers (ITE). Based on the data collected by ITE, many of the generated trips will be pass-by trips that are not new to the transportation network. ITE defines a pass-by trip as "an intermediate stop on the way from an origin to a primary trip destination without a route diversion. Pass-by trips are attracted from traffic passing the site on an adjacent street or roadway that offers direct access to the generator." CTDOT preference allows a maximum of 20 percent pass-by in trip generation analysis to be conservative, although data within the ITE *Trip Generation Handbook, 3rd Edition,* suggests average pass-by rates in excess of 30 percent. Additionally, a 10 percent reduction, per CTDOT guidance, was applied to the trip generation to account for internal capture (the traffic that will be on-site already, travelling from one internal location to another without leaving the site). **Table 2** summarizes that, while the proposed development will generate 223 total vehicle trips during the weekday afternoon peak

hour and 403 total vehicle trips during the Saturday midday peak hour, 155 trips during the weekday afternoon peak hour and 282 trips during the Saturday midday peak hour will be new traffic to the greater Buckland Road transportation system; the remainder will be existing Buckland Road traffic or traffic that is already on-site.

Table 2 Trip Generation Summary

Use	Size	Afternoon Peak Hour			Saturday Peak Hour		
		In	Out	Total	In	Out	Total
LUC 932 High-Turnover (Sit-Down) Restaurant	5,000 SF	28	17	45	29	27	56
LUC 937 Coffee/Donut Shop with Drive-Through Window	2,400 SF	47	47	94	105	106	211
LUC 934 Fast-Food Restaurant with Drive-Through Window	2,325 SF	40	37	77	66	63	129
LUC 822 Strip Retail Plaza (<40k)	1,000 SF	3	4	7	3	4	7
Total		118	105	223	203	200	403
Pass-By Traffic		*(24)*	*(21)*	*(45)*	*(41)*	*(40)*	*(81)*
Internal Capture Traffic		*(12)*	*(11)*	*(23)*	*(20)*	*(20)*	*(40)*
Net-New Traffic		**82**	**73**	**155**	**142**	**140**	**282**

Source: *Trip Generation, 11th Edition*. Institute of Transportation Engineers, 2021

The geographic distribution of the site-generated traffic volumes was based on a review of the existing traffic volumes, patterns, and access points to key roadways in the vicinity of the site. The site trip distribution percentages are presented graphically in **Figure 3**. The net-new trips were then assigned to the study area intersections based on the distribution for the weekday afternoon and Saturday peak-hour study periods, as shown in **Figure 4**. The pass-by site trips were similarly assigned to the study area intersections based on the distribution of existing traffic volumes (approximately 50 percent to/from each the north and south), shown in **Figure 5**. The total site trips are the result of adding the net-new and pass-by traffic, shown in **Figure 6**.

FUTURE TRAFFIC ANALYSIS

To evaluate the impact of the proposed restaurant on the surrounding roadway network, an analysis was conducted comparing future traffic volumes *without* versus *with* the proposed restaurant in place.

Future Traffic Volumes

Traffic growth in a given area is attributed to new development and broader regional transportation trends. Future traffic volumes were estimated for two scenarios: future traffic volumes *without* the estimated traffic generated by the proposed site (*before* it is open) and future traffic volumes with the traffic generated by the proposed site (after it is open for business). These are labelled the background and combined scenarios, respectively.

The CTDOT Bureau of Policy and Planning advised to use the "Build Peak-Hour Traffic Volumes" contained within the "Traffic Impact Study for Proposed Grocer/Retail at the Promenade Shops at Evergreen Walk (Unit 2)" by Langan, dated June 2021, for the 801 Evergreen Way Whole Foods development, as a starting point for the background/no-build traffic volumes for the analysis herein. These traffic volumes are included in the Appendix. CTDOT additionally advised to apply a growth rate of 0.5 percent per year to account for ambient traffic growth.

The Langan report traffic volumes included traffic to be generated by other developments in the area that were not open at the time: the Residences at Oakland Road, 175 Oakland Road (78 units); Buckland Commons, 340-350 Buckland Road (17,232±-SF mixed-use building); Aldi and Chase Bank, 200 and 205 Gateway Boulevard; and Gateway, opposite Cedar Avenue along Buckland Road (38,000 SF of retail space and 85,700 SF of medical office). The first three developments are now open, and the traffic associated with them is included in the March 2023 traffic count collection conducted for this study. The Gateway development has yet to be constructed. The Langan study "Build" traffic volumes additionally contain the traffic that would be generated by the proposed grocery store and retail/Whole Foods development that is under construction.

The traffic associated with the on-site bank was distributed through the study intersections, shown in **Figure 7**, and included in the background conditions traffic volumes. The trip generation for the bank is included in the Appendix.

The sum of the Langan report "Build" traffic volumes, the on-site bank traffic volumes, and 0.5 percent ambient growth, results in the 2024 background traffic volumes, shown in **Figure 8.** The site-generated traffic previously calculated was then added to the 2024 background traffic volumes to result in the 2024 combined traffic volumes, as shown in **Figure 9.**

Capacity Analysis

Capacity analysis was performed at the signalized Buckland Road intersection, the internal Evergreen Walk Cedar Avenue/Cottonwood Lane intersection, the right-in/right-out driveway onto Cedar Avenue, and the full access driveway from Cottonwood Lane to evaluate the impact of the proposed restaurant on the surrounding roadway network.

Intersection capacity results are expressed as a level of service (LOS) letter. LOS provides an evaluation of the efficiency of operations of an intersection in terms of delay and inconvenience based on certain quantitative calculations. LOS A describes operations with very low average control delay per vehicle while LOS F describes operations with very long average delays. In many communities, LOS D or even LOS E during peak hours may be considered acceptable and an appropriate tradeoff between traffic flow and the amount of land devoted to the movement of motor vehicles.

The study intersections were evaluated using *Synchro 11* (*Trafficware*) traffic analysis software comparing the background and combined traffic scenarios. The signalized intersection was evaluated assuming dual-quad phasing, and optimized timings reflecting eventual signal upgrades that would take place with the construction of Gateway opposite Cedar Avenue. **Table 3** summarizes the capacity analysis results for the weekday afternoon and Saturday midday peak hours. The *Synchro* analysis output sheets are included in the Appendix.

Table 3 Intersection Capacity Analysis

Intersection / Lane Group	Level of Service			
	Weekday Afternoon Peak Hour		Saturday Midday Peak Hour	
	Background	Combined	Background	Combined
Buckland Road at Cedar Avenue and Gateway Development				
Cedar Avenue Eastbound Left	C	D	D	E (D)
Cedar Avenue Eastbound Thru/Right	B	B	B	C
Gateway Westbound Left	C	C	C	C (D)
Gateway Westbound Thru/Right	B	B	B	B (C)
Buckland Road Northbound Left	C	C	C	D
Buckland Road Northbound Thru/Right	B	B	B	B
Buckland Road Southbound Left	A	A	A	A
Buckland Road Southbound Thru	C	C	C	C
Buckland Road Southbound Right	A	A	A	A
Overall Intersection	B	C	C	C
Cedar Avenue at Cottonwood Lane [1]				
Cedar Avenue Westbound Left	D	F	E	F
Cedar Avenue Westbound Right	B	B	B	B
Cottonwood Lane Southbound Left/Thru	A	A	A	A
Cedar Avenue at Site Right-In/Right-Out Driveway				
Site Driveway Northbound Right	B	B	B	B
Cottonwood Lane at Site Full Access Driveway				
Site Driveway Westbound Left/Right	A	A	A	A
Cottonwood Lane Southbound Left/Thru	A	A	A	A

( ): Indicates with signal timing adjustment.
1. See Table 4 for recommended mitigation.

Traffic operations at the Buckland Road signalized intersection show some degradation in LOS with the full site buildout in place but remain within acceptable peak-hour LOS ranges for most lane group movements. The most notable impact to LOS is during the Saturday peak when the Cedar Avenue left-turn lane at the signal degrades to LOS E. Signal timing adjustments are possible to maintain this location at LOS D, but at

the expense of degrading the future Gateway approach to LOS D. This case would be the favorable option since LOS D is considered acceptable during peak hour conditions, and all lane group movements would operate at LOS D or better. In either case, vehicle queueing on Cedar Avenue at the signal is shown to remain within the available lane storage.

Presently, Cedar Avenue at Cottonwood Lane is stop-controlled only on Cedar Avenue. With the full buildout of the Unit 5 site, the capacity analysis results show that the intersection in this configuration will not be able to accommodate the new resulting traffic. The Cedar Avenue stop-approach degrades to LOS F with significant delays and queueing beyond the available storage during both the weekday afternoon and Saturday peak hours.

It is recommended that signing and pavement markings be installed to convert the intersection of Cedar Avenue at Cottonwood Lane into an all-way-stop-controlled intersection. Under these conditions, Cottonwood Lane traffic would be required to stop at the intersection, allowing more frequent opportunities for Cedar Avenue traffic to turn onto Cottonwood Lane. Capacity analysis shows the intersection would operate at LOS C overall, with the southbound Cottonwood Lane approach operating at LOS D at worst. Queueing would be significantly reduced along Cedar Avenue to three to four vehicles. Cottonwood Lane queues southbound from Costco would increase to approximately seven to eight vehicles, but surplus queueing storage is available. **Table 4** summarizes this all-way-stop scenario, and the *Synchro* analysis output sheets are included in the Appendix.

Table 4 Intersection Capacity Analysis – All-Way-Stop-Control Scenario

Intersection / Lane Group	Level of Service			
	Weekday Afternoon Peak Hour		Saturday Midday Peak Hour	
	Background	Combined	Background	Combined
Cedar Avenue at Cottonwood Lane All-Way-Stop-Control Scenario				
Cedar Avenue Westbound Left	-	B	-	C
Cedar Avenue Westbound Right	-	B	-	C
Cottonwood Lane Northbound Thru/Right	-	A	-	B
Cottonwood Lane Southbound Left/Thru	-	C	-	D
Overall Intersection	-	B	-	C

The right-out driveway onto Cedar Avenue and the full-access driveway along Cottonwood Lane will operate at favorable levels of service with minimal queueing (approximately one to two vehicles queued during peak conditions).

It should be noted that the analysis results are based on several conservative factors and present a worst-case scenario. Delays, level of service, and queueing would likely be less in reality. The recommendation to convert the Cedar Avenue-Cottonwood Lane intersection to an all-way-stop intersection remains nonetheless.

CONCLUSION

SLR has prepared this traffic impact study for the proposed full development of the Unit 5 parcel of Evergreen Walk. The results of this study indicate that future traffic generated by the proposed restaurant and retail space will not impact the surrounding roadway system if relatively low-cost measures are taken to convert the intersection of Cedar Avenue at Cottonwood Lane into an all-way-stop intersection from its current configuration. During the peak hours studied with the full site buildout, capacity analysis results showed a significant increase in delays and queueing at the current two-way-stop intersection. These conditions would ultimately be mitigated by making the intersection an all-way-stop intersection. It is recommended that appropriate signage and pavement markings be installed to accomplish this. At the signalized intersection of Cedar Avenue at Buckland Road, signal timing adjustments should be considered for the weekday afternoon period.

A parking analysis was conducted based on industry data and found that even at the busiest times of day, only around half to two-thirds of the 191 provided on-site parking spaces may be needed on a typical day.

Sight lines are expected to be sufficient, and no particular crash patterns were found that would warrant mitigation. To maintain sightlines, periodic trimming of vegetation will be necessary.

We hope this report is useful to you and the Town of South Windsor. If you have any questions or need anything further, please do not hesitate to contact the undersigned.

Sincerely,

SLR International Corporation

Neil C. Olinski, MS, PTP
Principal Transportation Planner

Carl Giordano, PE, CNU-A
Associate Transportation Engineer

Enclosures

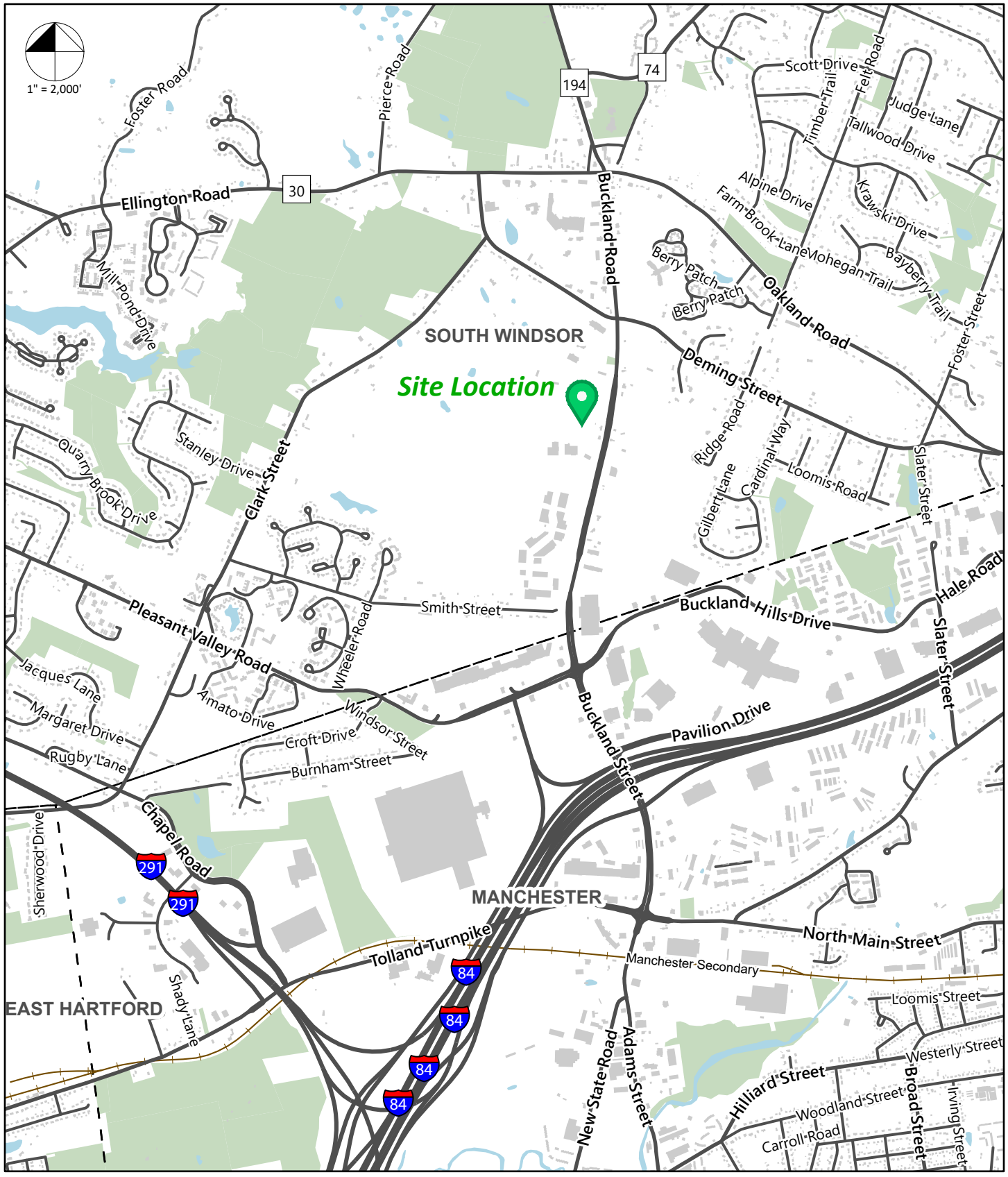


Figure 1
Site Location Map

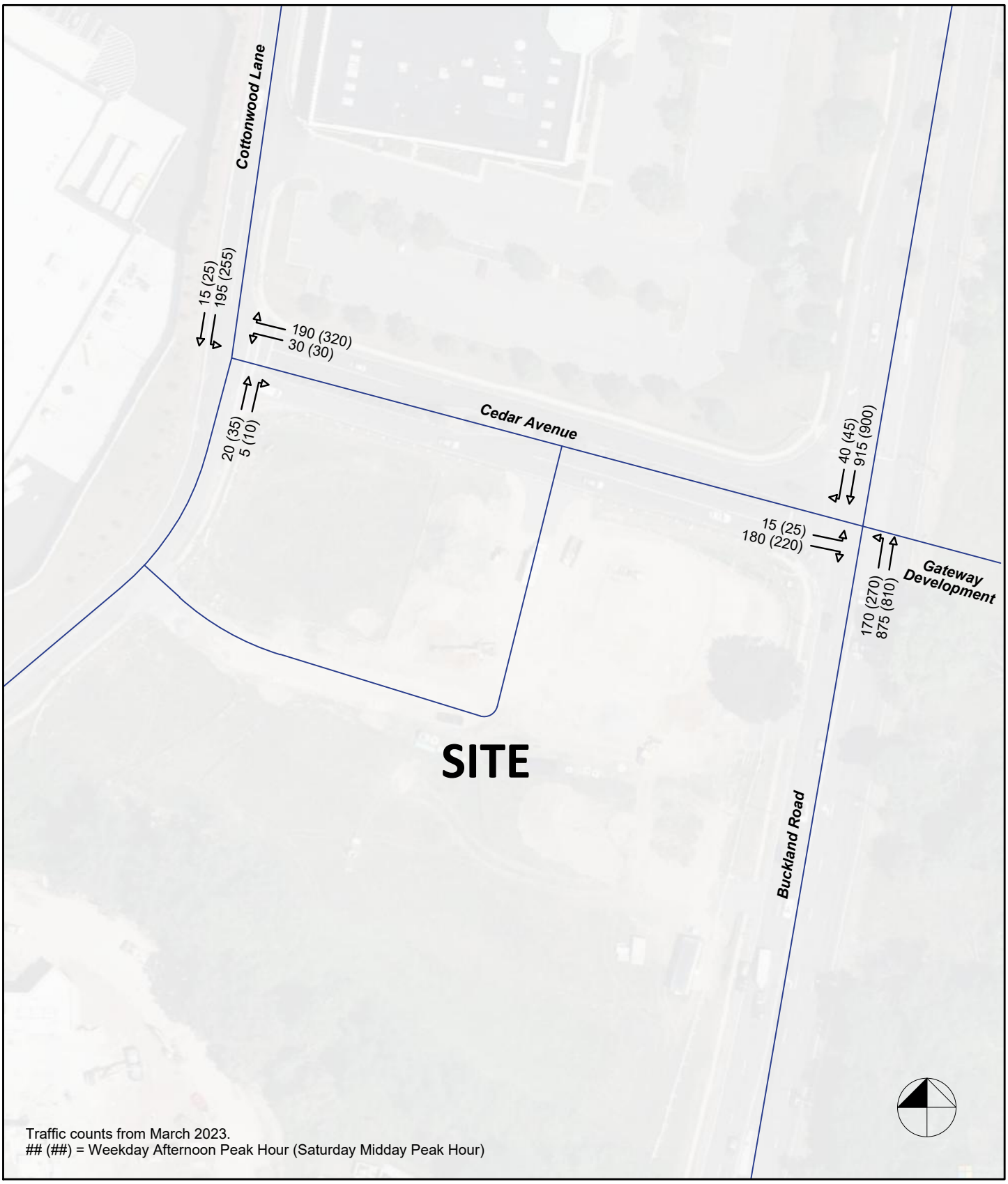


Figure 2
Existing (2023) Traffic Volumes

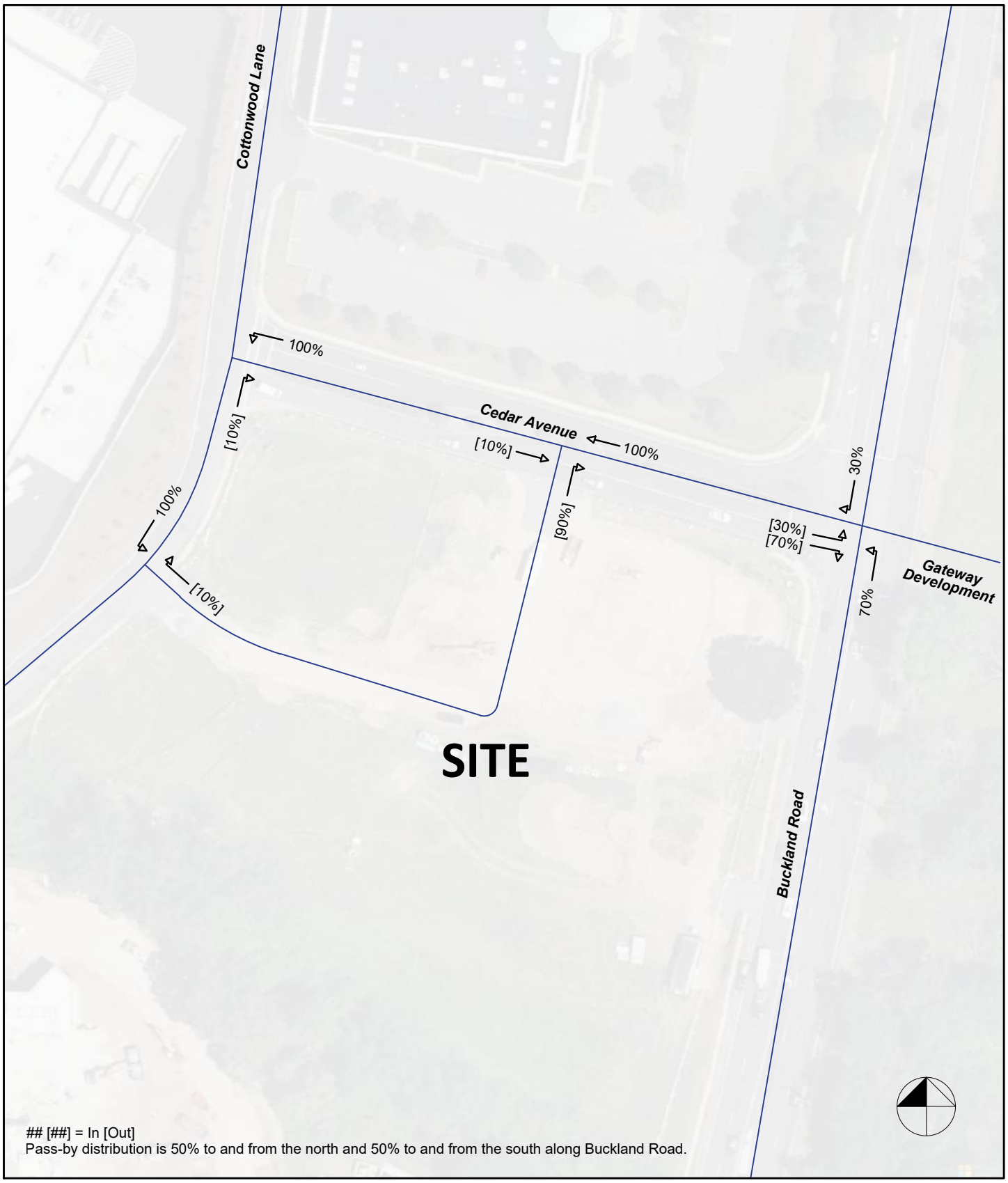


Figure 3
Site-Generated Traffic Distribution

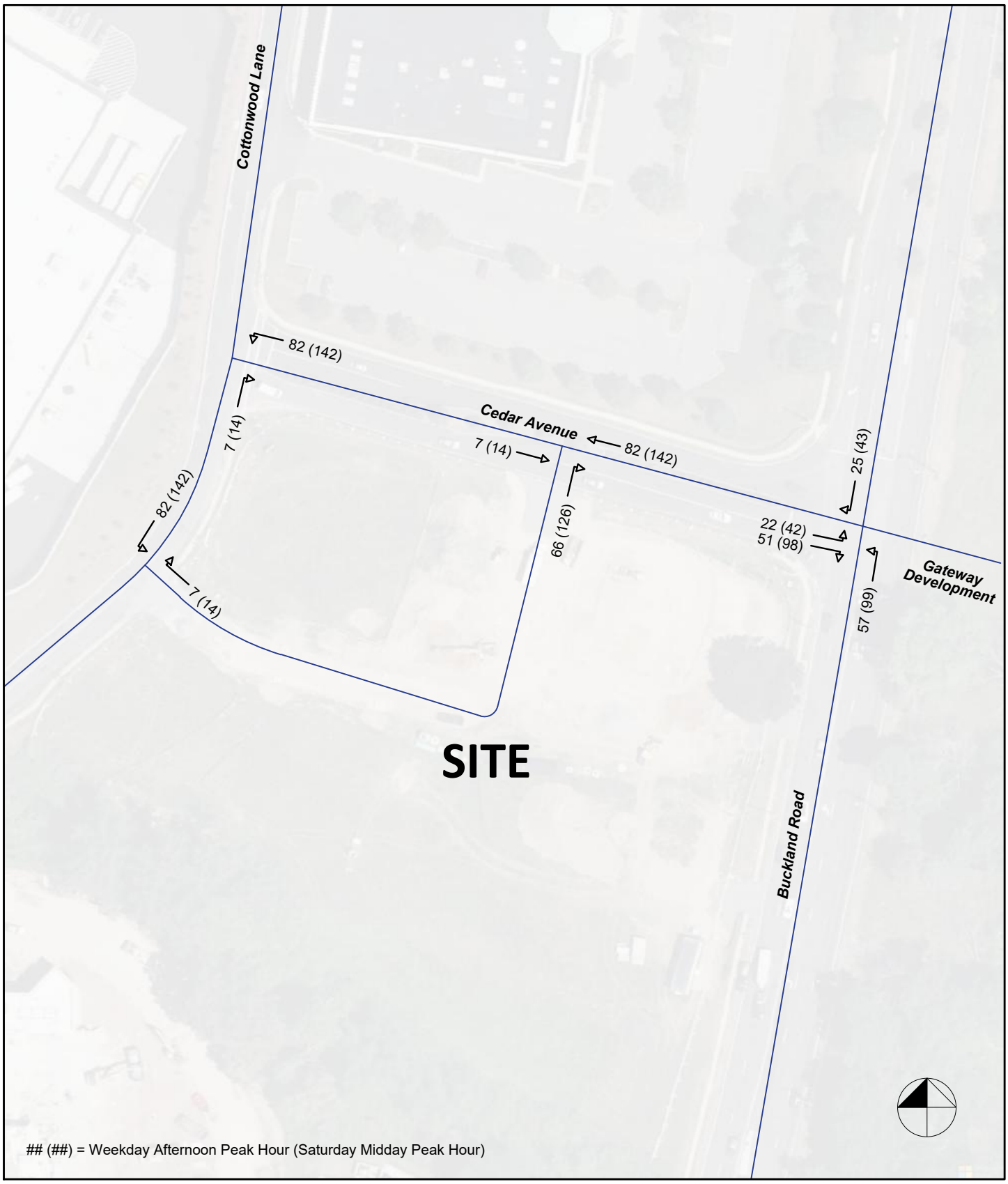


Figure 4
Site-Generated New Traffic

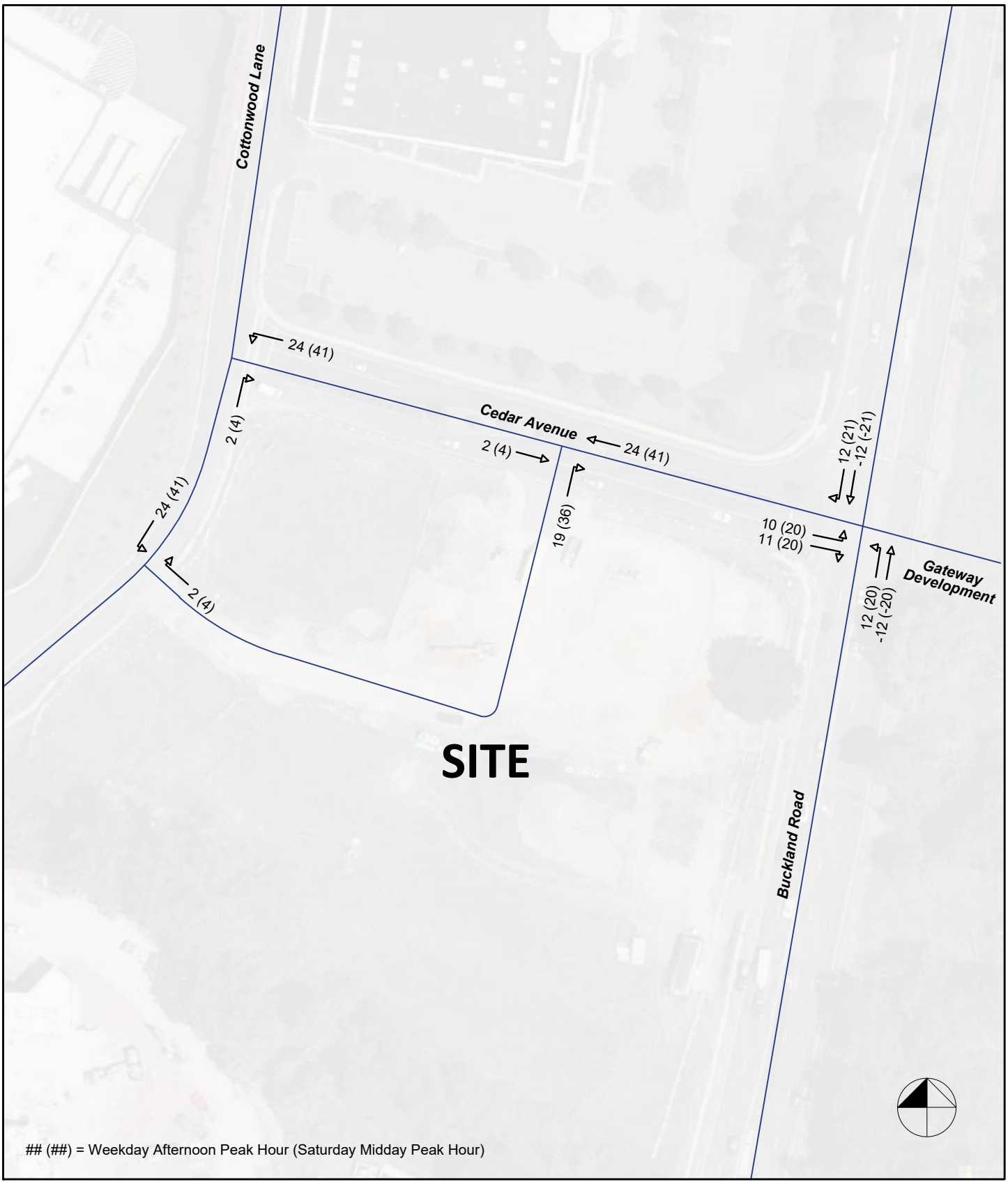


Figure 5
Site-Generated Pass-By Traffic

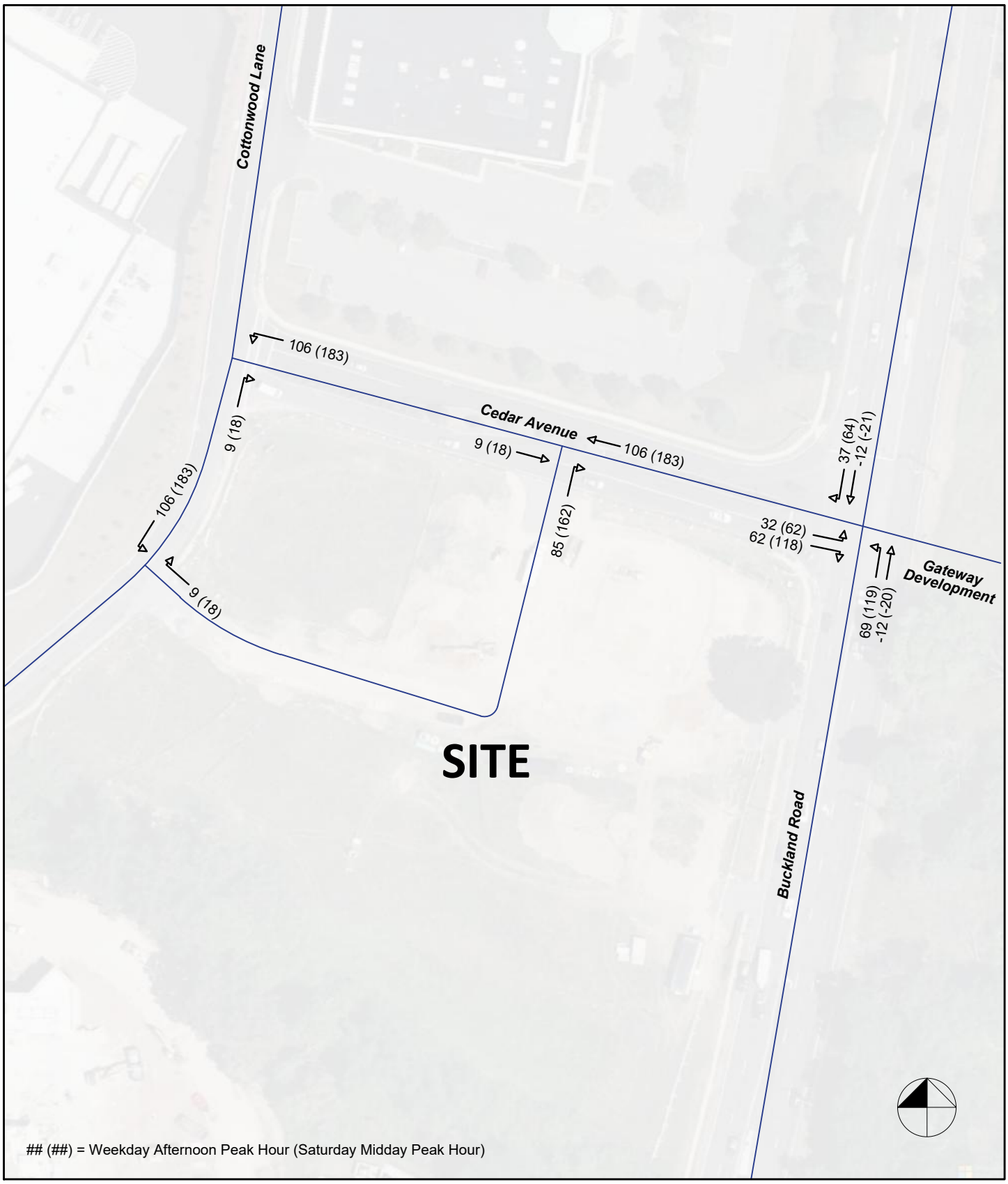


Figure 6
Site-Generated Total Traffic

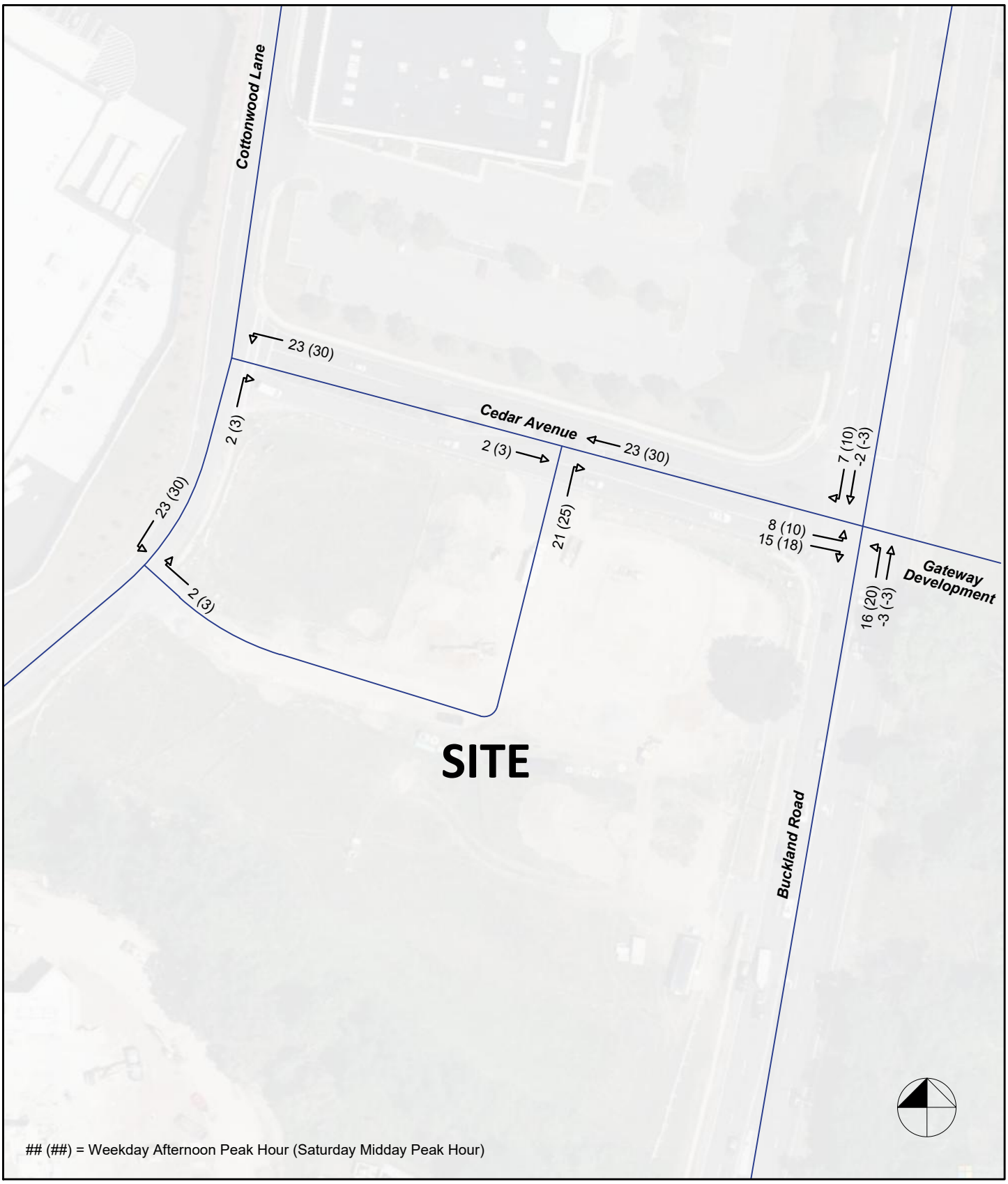


Figure 7
Existing Bank Total Traffic

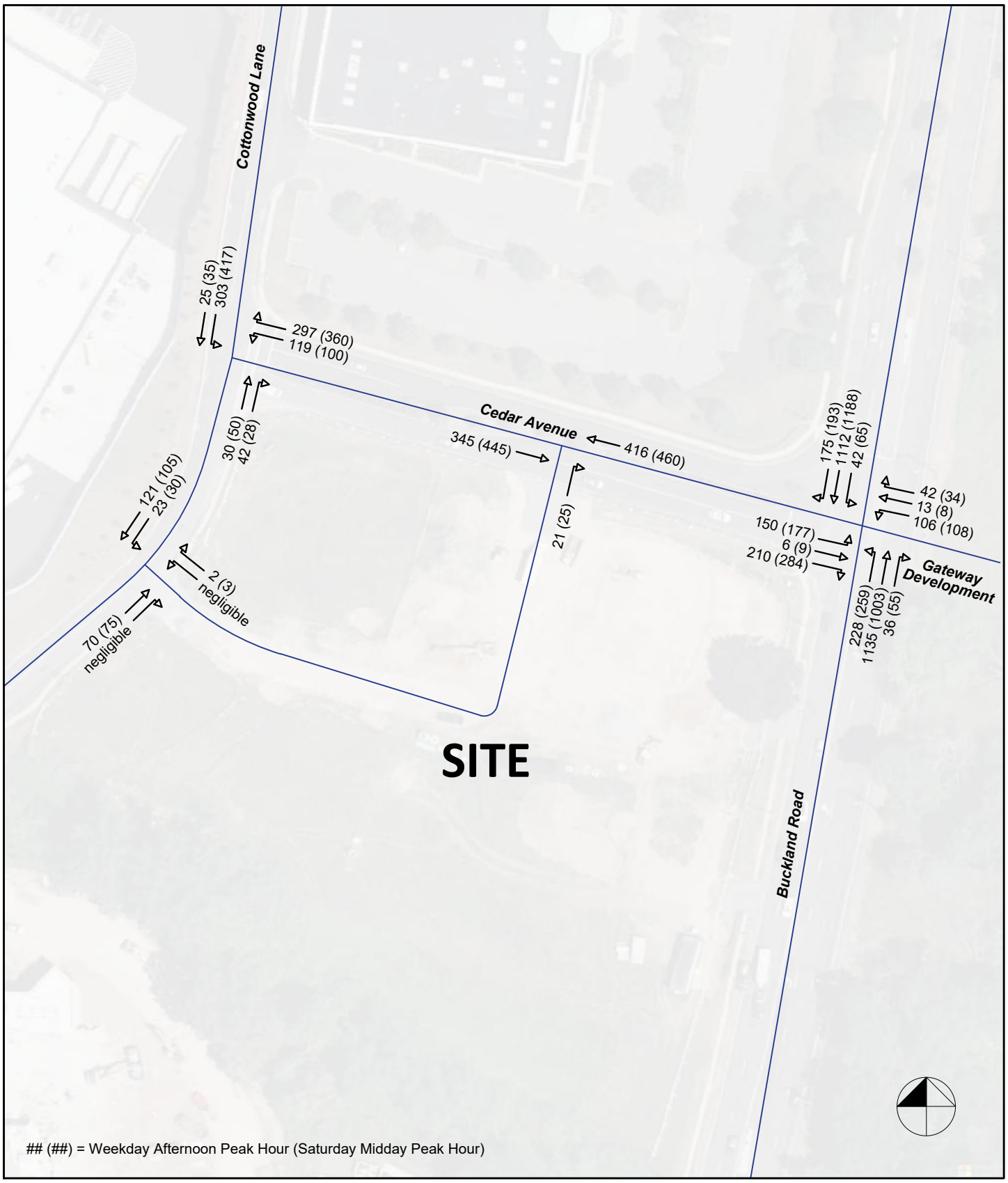


Figure 8
Background (2024) Traffic Volumes

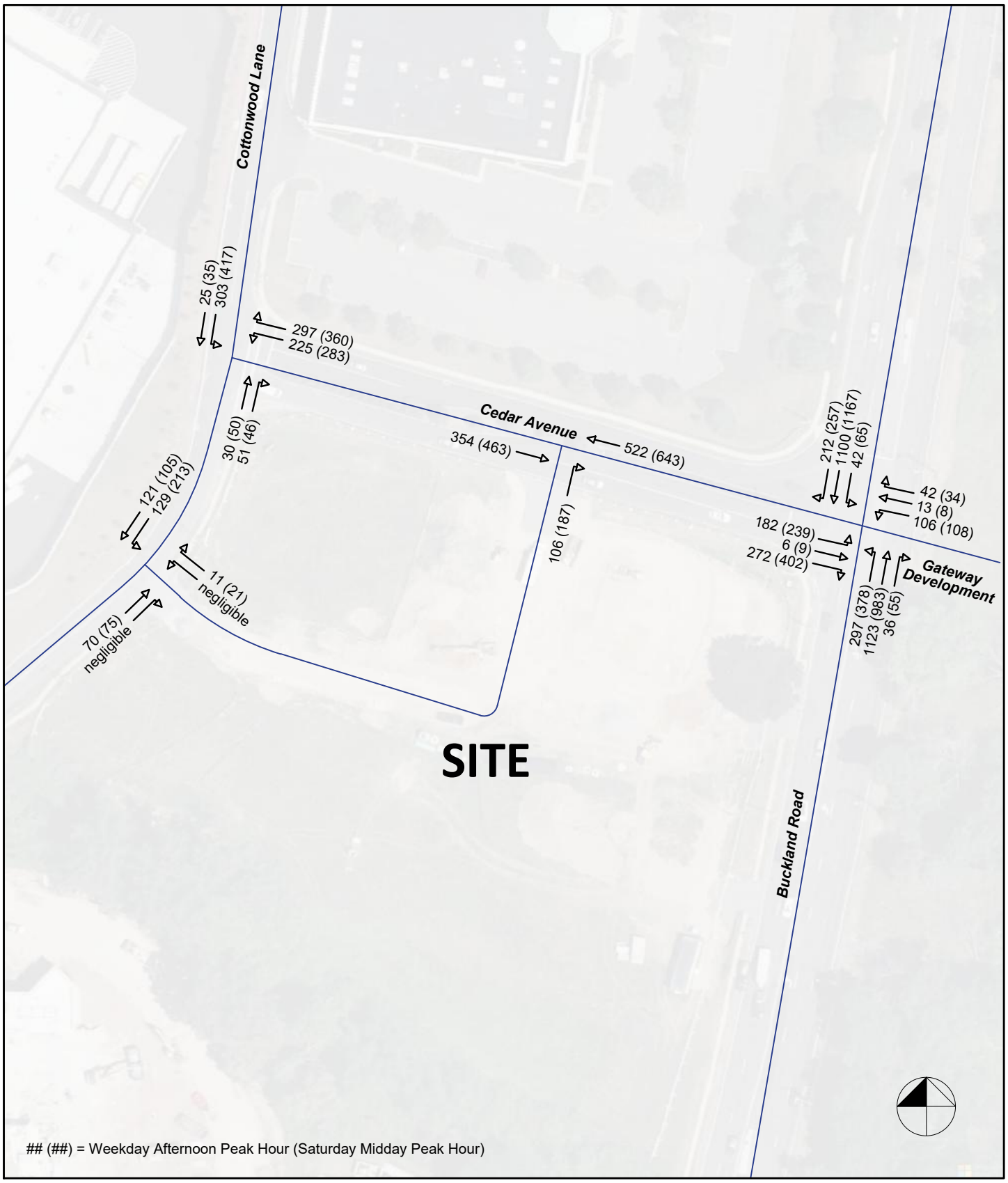
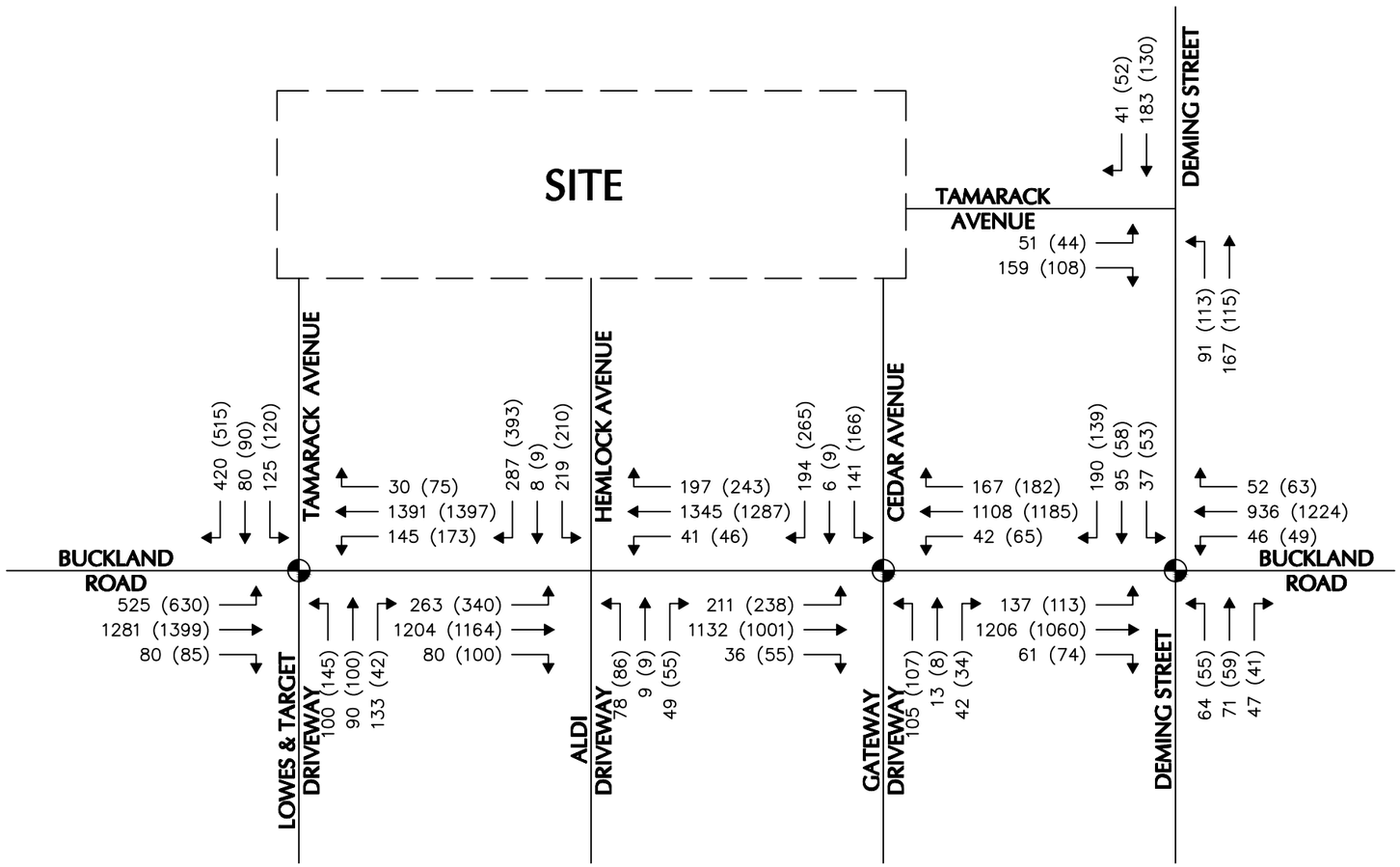


Figure 9
Combined (2024) Traffic Volumes

APPENDIX



NOTES:

1. WEEKDAY EVENING AND SATURDAY MID–DAY PEAK–HOUR TRAFFIC VOLUMES ARE BASED ON THE COMBINATION OF TRAFFIC VOLUMES FROM FIGURE 3 AND FIGURE 7 OF THIS REPORT.

LEGEND	
TRAFFIC SIGNAL	
PEAK–HOUR VOLUMES	PM (SAT)
DIRECTION OF TRAFFIC	

LANGAN
Langan CT, Inc.
555 Long Wharf Drive
New Haven, CT 06511
T: 203.562.5771 F: 203.789.6142 www.langan.com

Project: EVERGREEN WALK
SOUTH WINDSOR CONNECTICUT

Drawing Title: BUILD PEAK-HOUR TRAFFIC VOLUMES

Project No. 140222801
Date 2/23/2021
Drawn By CWA
Checked By CJM

Drawing No. FIG. 8
Sheet 3 of 1

Filename: c:\bms\langan-pw-01\dms58671\140222801-0502-KT001-0108.dwg Date: 6/10/2021 Time: 23:25 User: cmclean Style Table: Langan.stb Layout: Fig. 8

January 14, 2022

Mr. Jay Fisher
Chief Operating Officer
Accubranch
1137 Main Street
East Hartford, CT 06108

RE: Traffic Review
Evergreen Walk – Unit 5 – Proposed Bank
South Windsor, Connecticut
SLR #141.14899.00004

Dear Mr. Fisher:

At your request, we have reviewed the traffic-related materials associated with the mixed-use Evergreen Walk development on the western side of Buckland Road in South Windsor, Connecticut. The Evergreen Walk development has received master plan approval for approximately 1,500,000 square feet (SF) of retail, office, residential, and other commercial space and is partially built out.

Specifically, we have evaluated the proposed development of Unit 5, located on the southwest corner of Buckland Road and Cedar Avenue, opposite the proposed Gateway development. Unit 5 has received master plan approval for 50,000 SF of retail, split between several buildings. Proposed is a 2,200 SF bank building in place of 6,000 SF of retail space; the remaining 44,000 SF of retail space will remain. Proposed is a right-in, right-out driveway from Unit 5 to Cedar Avenue, approximately 170 feet west of Buckland Road. This letter compares the difference in trip generation associated with the change in land use from 6,000 SF of retail to a 2,200 SF bank.

The following materials have been reviewed:

- *Traffic Impact Study for Evergreen Walk* (June 13, 2007, revised December 2007), prepared by FA Hesketh & Associates
- *Traffic Impact Report for The Town Square at Evergreen Walk* (August 8, 2011), prepared by URS Corporation
- *Traffic Impact Study for Proposed Grocer/Retail at the Promenade Shops at Evergreen Walk* (June 2021), prepared by Langan

Initially, we reviewed the traffic impact studies from 2007 and 2011 for the Evergreen Walk development. Following this review, the Office of the State Traffic Administration (OSTA) provided the most recent traffic materials for Evergreen Walk. The project is currently undergoing review under OSTA #132-2108-01, which will replace 53,000± SF of retail space with 10,000± SF of retail space and a 40,000± SF grocery store. The traffic report for this development was prepared by Langan; the traffic volumes from this study have been approved by the Connecticut Department of Transportation (CTDOT) Bureau of Policy and Planning. It is

noted that Langan's traffic impact study included the proposed Gateway development, which will have access via a new driveway opposite Cedar Avenue at Buckland Road.

The analyses from these traffic reports all assume Unit 5 will be occupied by 50,000 SF of retail space. However, Unit 5 is proposed to replace 6,000 SF of retail space with a 2,200 SF bank. The net increase in site-generated traffic was estimated using statistical data published by the Institute of Transportation Engineers (ITE)[1]. ITE Land Use Codes (LUC) #820, Shopping Center, and #912, Drive-in Bank, were used to estimate the site traffic volumes, which are shown in Table 1.

TABLE 1
Trip Generation Comparison

LAND USE	ITE LAND USE #	NUMBER OF VEHICLE TRIPS								
		WEEKDAY MORNING PEAK HOUR			WEEKDAY AFTERNOON PEAK HOUR			SATURDAY PEAK HOUR		
		IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Shopping Center (6000 SF)	820	3	2	5	11	12	23	14	13	27
Drive-in Bank (2200 SF)	912	13	9	22	23	23	46	30	28	58
NET CHANGE IN SITE-GENERATED TRAFFIC		**+10**	**+7**	**+17**	**+12**	**+11**	**+23**	**+16**	**+15**	**+31**

Trip Generation, *11th Edition*. Institute of Transportation Engineers, 2021

The proposed bank is expected to generate a relatively small amount of additional traffic, which is not expected to materially change the conclusions of the review. It is expected that the impact of the proposed bank will remain consistent with those findings from the Langan traffic study. Furthermore, the net new traffic expected to be added during all the peak hours is less than the threshold required by the Office of the State Traffic Administration (OSTA) to conduct new traffic counts. We have also reviewed the additional traffic reports related to the Evergreen Walk development, provided by Steve Mitchell; based on our review of those materials, our findings as summarized in this letter remain the same.

We hope this letter is useful to you and the Town of South Windsor. If you have any questions or need anything further, please do not hesitate to contact the undersigned.

Sincerely,
SLR International Corporation

David G. Sullivan, PE
U.S. Manager of Traffic & Transportation Planning

Enclosures

141.14899.00004.j1422.ltr

[1] *Trip Generation, 11th Edition,* Institute of Transportation Engineers, 2021

LEVEL OF SERVICE
FOR
SIGNALIZED INTERSECTIONS
(MOTORIZED VEHICLE MODE)

Level of service for signalized intersections is defined in terms of control delay, which is a measure of driver discomfort, frustration, fuel consumption, and increased travel time. The delay experienced by a motorist is made up of a number of factors that relate to control, geometrics, traffic, and incidents. Total delay is the difference between the travel time actually experienced and the reference travel time that would result during base conditions: in the absence of traffic control, geometric delay, any incidents, and any other vehicles. Specifically, LOS criteria for traffic signals are stated in terms of the average control delay per vehicle, typically for a 15-min analysis period. Delay is a complex measure and depends on a number of variables, including the quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group. The criteria are given below.

LEVEL-OF SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS
MOTORIZED VEHICLE MODE

LOS By Volume-to-Capacity Ratio[1]		CONTROL DELAY (s/veh)
v/c ≤ 1.0	v/c > 1.0	
A	F	≤ 10
B	F	> 10 AND ≤ 20
C	F	> 20 AND ≤ 35
D	F	> 35 AND ≤ 55
E	F	> 55 AND ≤ 80
F	F	> 80

[1] For approach-based and intersection-wide assessments, LOS is defined solely by control delay.

Specific descriptions of each LOS for signalized intersections are provided below:

Level of Service A describes operations with a control delay of 10 s/veh and 20 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is low and either progression is exceptionally favorable or the cycle length is very short. If LOS A is the result of favorable progression, most vehicles arrive during the green indication and travel through the intersection without stopping.

Level of Service B describes operations with control delay between 10 and 20 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is low and either progression is highly favorable or the cycle length is short. More vehicles stop than with LOS A.

Level of Service C describes operations with control delay between 20 and 35 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when progression is favorable or the cycle length is moderate. Individual *cycle failures* (i.e., one or more queued vehicles are not able to depart as a result of insufficient capacity during the cycle) may begin to appear at this level. The number of vehicles stopping is significant, although many vehicles still pass through the intersection without stopping.

Level of Service D describes operations with control delay between 35 and 55 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is high and either progression is ineffective or the cycle length is long. Many vehicles stop and individual cycle failures are noticeable.

Level of Service E describes operations with control delay between 55 and 80 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is high, progression is unfavorable, and the cycle length is long. Individual cycle failures are frequent.

Level of Service F describes operations with control delay exceeding 80 s/veh or a volume-to-capacity ratio greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is very high, progression is very poor, and the cycle length is long. Most cycles fail to clear the queue.

Reference: Highway Capacity Manual 6, Transportation Research Board, 2016.

LEVEL OF SERVICE
FOR TWO-WAY
STOP SIGN CONTROLLED INTERSECTIONS

The level of service for a TWSC (two-way stop controlled) intersection is determined by the computed or measured control delay and is defined for each minor movement. Level of service is not defined for the intersection as a whole. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. LOS criteria are given in the Table**.** LOS criteria are given below:

LEVEL-OF SERVICE CRITERIA FOR AWSC INTERSECTIONS	
LOS[1]	**CONTROL DELAY (s/veh)**
A	**≤ 10**
B	**> 10 AND ≤ 15**
C	**> 15 AND ≤ 25**
D	**> 25 AND ≤ 35**
E	**> 35 AND ≤ 50**
F	**> 50**

Note: LOS criteria apply to each lane on a given approach and to each approach on the minor street.
LOS is not calculated for major-street approaches or for the intersection as a whole.
LOS F is assigned to a movement if the volume-to-capacity ratio exceeds 1.0, regardless of the control delay

Reference: Highway Capacity Manual Version 6.0, Transportation Research Board, 2016.

LEVEL OF SERVICE
FOR
UNSIGNALIZED INTERSECTIONS
ALL-WAY STOP-CONTROL (AWSC)

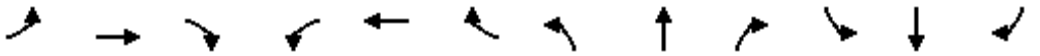
The criteria for AWSC intersections have different threshold values than do those for signalized intersections primarily because drivers expect different levels of performance from distinct types of transportation facilities. The expectation is that a signalized intersection is designed to carry higher traffic volumes than an AWSC intersection. Thus a higher level of control delay is acceptable at a signalized intersection for the same LOS. The level-of-service criteria are given below.

LEVEL-OF SERVICE CRITERIA FOR AWSC INTERSECTIONS	
LOS[1]	**CONTROL DELAY (s/veh)**
A	**≤ 10**
B	**> 10 AND ≤ 15**
C	**> 15 AND ≤ 25**
D	**> 25 AND ≤ 35**
E	**> 35 AND ≤ 50**
F	**> 50**

[1] For approaches and intersection-wide assessment, LOS is defined solely by control delay.

Note: LOS F is assigned to a movement if the volume-to-capacity ratio exceeds 1.0, regardless of the control delay.

Reference: Highway Capacity Manual Version 6.0, Transportation Research Board, 2016.

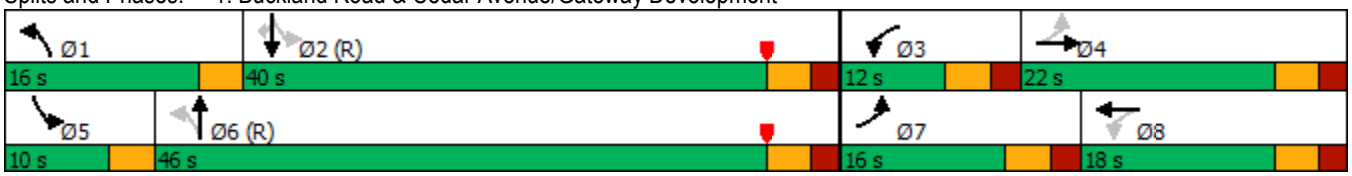


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	182	6	272	106	13	42	297	1123	36	42	1100	212
Future Volume (vph)	182	6	272	106	13	42	297	1123	36	42	1100	212
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	400		0	150		150
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.853			0.885			0.995				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1589	0	1770	1649	0	1770	3522	0	1770	3539	1583
Flt Permitted	0.460			0.494			0.107			0.199		
Satd. Flow (perm)	857	1589	0	920	1649	0	199	3522	0	371	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		280			43			5				168
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		243			322			448			389	
Travel Time (s)		5.5			7.3			7.6			6.6	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	188	6	280	109	13	43	306	1158	37	43	1134	219
Shared Lane Traffic (%)												
Lane Group Flow (vph)	188	286	0	109	56	0	306	1195	0	43	1134	219
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8			6			2		2
Detector Phase	7	4		3	8		1	6		5	2	2
Switch Phase												
Minimum Initial (s)	4.0	10.0		4.0	10.0		4.0	10.0		4.0	10.0	10.0
Minimum Split (s)	9.0	15.0		9.0	15.0		7.0	15.0		7.0	15.0	15.0
Total Split (s)	16.0	22.0		12.0	18.0		16.0	46.0		10.0	40.0	40.0
Total Split (%)	17.8%	24.4%		13.3%	20.0%		17.8%	51.1%		11.1%	44.4%	44.4%
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	2.0	2.0		2.0	2.0		0.0	2.0		0.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0		5.0	5.0		3.0	5.0		3.0	5.0	5.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	C-Min
Act Effct Green (s)	21.3	12.7		15.4	10.1		59.3	51.4		47.6	39.3	39.3
Actuated g/C Ratio	0.24	0.14		0.17	0.11		0.66	0.57		0.53	0.44	0.44
v/c Ratio	0.60	0.62		0.48	0.25		0.78	0.59		0.15	0.73	0.28
Control Delay	35.7	11.2		33.4	18.8		33.0	16.1		8.7	26.2	6.4
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	35.7	11.2		33.4	18.8		33.0	16.1		8.7	26.2	6.4
LOS	D	B		C	B		C	B		A	C	A
Approach Delay		20.9			28.4			19.6			22.5	
Approach LOS		C			C			B			C	
Stops (vph)	147	41		88	21		173	750		21	893	42
Fuel Used(gal)	2	1		1	0		5	15		0	18	1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
CO Emissions (g/hr)	173	97		103	32		322	1027		27	1226	87
NOx Emissions (g/hr)	34	19		20	6		63	200		5	238	17
VOC Emissions (g/hr)	40	22		24	7		75	238		6	284	20
Dilemma Vehicles (#)	0	0		0	0		0	64		0	61	0
Queue Length 50th (ft)	85	3		47	7		108	258		9	298	18
Queue Length 95th (ft)	144	73		88	42		#234	345		21	384	64
Internal Link Dist (ft)		163			242			368			309	
Turn Bay Length (ft)	200						400			150		150
Base Capacity (vph)	318	527		228	274		395	2013		309	1544	785
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.59	0.54		0.48	0.20		0.77	0.59		0.14	0.73	0.28

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Yellow			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 21.3		Intersection LOS: C	
Intersection Capacity Utilization 85.7%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 1: Buckland Road & Cedar Avenue/Gateway Development



Intersection	
Int Delay, s/veh	21.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	225	297	30	51	303	25
Future Vol, veh/h	225	297	30	51	303	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	100	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	250	330	33	57	337	28

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	764	62	0	0	90	0
Stage 1	62	-	-	-	-	-
Stage 2	702	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	372	1003	-	-	1505	-
Stage 1	961	-	-	-	-	-
Stage 2	491	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	288	1003	-	-	1505	-
Mov Cap-2 Maneuver	288	-	-	-	-	-
Stage 1	961	-	-	-	-	-
Stage 2	380	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	33.3	0	7.5
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	288	1003	1505	-
HCM Lane V/C Ratio	-	-	0.868	0.329	0.224	-
HCM Control Delay (s)	-	-	63.7	10.3	8.1	0
HCM Lane LOS	-	-	F	B	A	A
HCM 95th %tile Q(veh)	-	-	7.6	1.4	0.9	-

Intersection	
Int Delay, s/veh	1.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑		↱
Traffic Vol, veh/h	354	0	0	522	0	106
Future Vol, veh/h	354	0	0	522	0	106
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	385	0	0	567	0	115

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	-	-	-	385
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.318
Pot Cap-1 Maneuver	-	0	0	-	0	663
Stage 1	-	0	0	-	0	-
Stage 2	-	0	0	-	0	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	-	663
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBT
Capacity (veh/h)	663	-	-
HCM Lane V/C Ratio	0.174	-	-
HCM Control Delay (s)	11.6	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	0.6	-	-

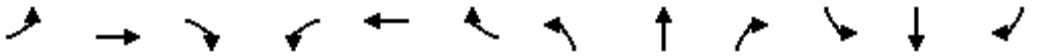
Intersection	
Int Delay, s/veh	3.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	1	11	70	1	129	121
Future Vol, veh/h	1	11	70	1	129	121
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	1	12	76	1	140	132

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	489	77	0	0	77	0
Stage 1	77	-	-	-	-	-
Stage 2	412	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	538	984	-	-	1522	-
Stage 1	946	-	-	-	-	-
Stage 2	669	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	485	984	-	-	1522	-
Mov Cap-2 Maneuver	485	-	-	-	-	-
Stage 1	946	-	-	-	-	-
Stage 2	603	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9	0	3.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	906	1522	-
HCM Lane V/C Ratio	-	-	0.014	0.092	-
HCM Control Delay (s)	-	-	9	7.6	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	0.3	-

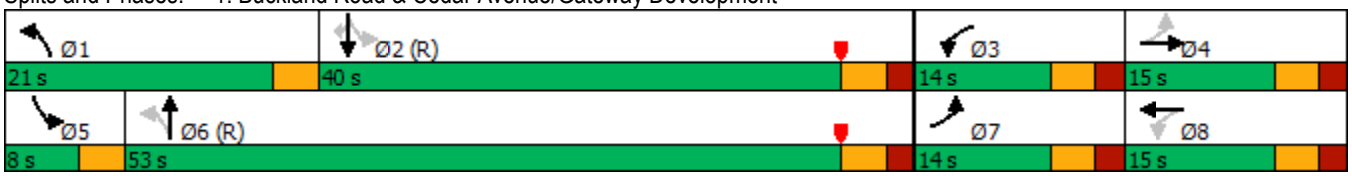


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	239	9	402	108	8	34	378	983	55	65	1167	257
Future Volume (vph)	239	9	402	108	8	34	378	983	55	65	1167	257
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	400		0	150		150
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.853			0.878			0.992				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1589	0	1770	1635	0	1770	3511	0	1770	3539	1583
Flt Permitted	0.405			0.667			0.100			0.269		
Satd. Flow (perm)	754	1589	0	1242	1635	0	186	3511	0	501	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		362			35			10				191
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		243			322			448			389	
Travel Time (s)		5.5			7.3			7.6			6.6	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	244	9	410	110	8	35	386	1003	56	66	1191	262
Shared Lane Traffic (%)												
Lane Group Flow (vph)	244	419	0	110	43	0	386	1059	0	66	1191	262
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8			6			2		2
Detector Phase	7	4		3	8		1	6		5	2	2
Switch Phase												
Minimum Initial (s)	5.0	7.0		4.0	7.0		4.0	10.0		4.0	10.0	10.0
Minimum Split (s)	10.0	12.0		9.0	12.0		7.0	15.0		7.0	15.0	15.0
Total Split (s)	14.0	15.0		14.0	15.0		21.0	53.0		8.0	40.0	40.0
Total Split (%)	15.6%	16.7%		15.6%	16.7%		23.3%	58.9%		8.9%	44.4%	44.4%
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	2.0	2.0		2.0	2.0		0.0	2.0		0.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0		5.0	5.0		3.0	5.0		3.0	5.0	5.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	C-Min
Act Effct Green (s)	18.0	9.8		14.6	8.8		61.0	52.4		46.2	38.9	38.9
Actuated g/C Ratio	0.20	0.11		0.16	0.10		0.68	0.58		0.51	0.43	0.43
v/c Ratio	0.85	0.85		0.44	0.23		0.91	0.52		0.20	0.78	0.33
Control Delay	60.2	24.7		34.3	18.8		48.5	13.5		9.0	27.8	7.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	60.2	24.7		34.3	18.8		48.5	13.5		9.0	27.8	7.1
LOS	E	C		C	B		D	B		A	C	A
Approach Delay		37.8			29.9			22.9			23.4	
Approach LOS		D			C			C			C	
Stops (vph)	194	72		89	17		244	601		31	957	57
Fuel Used(gal)	4	3		2	0		7	12		1	19	2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
CO Emissions (g/hr)	311	227		106	25		509	833		42	1334	112
NOx Emissions (g/hr)	61	44		21	5		99	162		8	259	22
VOC Emissions (g/hr)	72	53		25	6		118	193		10	309	26
Dilemma Vehicles (#)	0	0		0	0		0	58		7	64	0
Queue Length 50th (ft)	118	30		49	4		160	197		12	321	25
Queue Length 95th (ft)	#229	#183		92	35		#325	255		27	#422	78
Internal Link Dist (ft)		163			242			368			309	
Turn Bay Length (ft)	200						400			150		150
Base Capacity (vph)	286	503		260	212		442	2047		332	1528	792
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.85	0.83		0.42	0.20		0.87	0.52		0.20	0.78	0.33

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Yellow			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.91			
Intersection Signal Delay: 26.0		Intersection LOS: C	
Intersection Capacity Utilization 100.4%		ICU Level of Service G	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 1: Buckland Road & Cedar Avenue/Gateway Development



Intersection	
Int Delay, s/veh	83.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	283	360	50	46	417	35
Future Vol, veh/h	283	360	50	46	417	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	100	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	298	379	53	48	439	37

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	992	77	0	0	101	0
Stage 1	77	-	-	-	-	-
Stage 2	915	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	~ 272	984	-	-	1491	-
Stage 1	946	-	-	-	-	-
Stage 2	390	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 190	984	-	-	1491	-
Mov Cap-2 Maneuver	~ 190	-	-	-	-	-
Stage 1	946	-	-	-	-	-
Stage 2	~ 273	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	148.7	0	7.8
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	190	984	1491	-
HCM Lane V/C Ratio	-	-	1.568	0.385	0.294	-
HCM Control Delay (s)	-	-	$ 324	10.9	8.4	0
HCM Lane LOS	-	-	F	B	A	A
HCM 95th %tile Q(veh)	-	-	19.3	1.8	1.2	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	2.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑		↱
Traffic Vol, veh/h	463	0	0	643	0	187
Future Vol, veh/h	463	0	0	643	0	187
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	503	0	0	699	0	203

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	-	-	-	503
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.318
Pot Cap-1 Maneuver	-	0	0	-	0	569
Stage 1	-	0	0	-	0	-
Stage 2	-	0	0	-	0	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	-	569
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	14.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBT
Capacity (veh/h)	569	-	-
HCM Lane V/C Ratio	0.357	-	-
HCM Control Delay (s)	14.8	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	1.6	-	-

Intersection	
Int Delay, s/veh	4.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	1	21	75	1	213	105
Future Vol, veh/h	1	21	75	1	213	105
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	1	23	82	1	232	114

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	661	83	0	0	83	0
Stage 1	83	-	-	-	-	-
Stage 2	578	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	427	976	-	-	1514	-
Stage 1	940	-	-	-	-	-
Stage 2	561	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	357	976	-	-	1514	-
Mov Cap-2 Maneuver	357	-	-	-	-	-
Stage 1	940	-	-	-	-	-
Stage 2	469	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.1	0	5.2
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	905	1514	-
HCM Lane V/C Ratio	-	-	0.026	0.153	-
HCM Control Delay (s)	-	-	9.1	7.8	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.5	-

Intersection	
Intersection Delay, s/veh	13.8
Intersection LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	225	297	30	51	303	25
Future Vol, veh/h	225	297	30	51	303	25
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	250	330	33	57	337	28
Number of Lanes	1	1	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	2
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	2	0
HCM Control Delay	13.1	9.5	15.9
HCM LOS	B	A	C

Lane	NBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	0%	100%	0%	92%
Vol Thru, %	37%	0%	0%	8%
Vol Right, %	63%	0%	100%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	81	225	297	328
LT Vol	0	225	0	303
Through Vol	30	0	0	25
RT Vol	51	0	297	0
Lane Flow Rate	90	250	330	364
Geometry Grp	2	7	7	2
Degree of Util (X)	0.139	0.441	0.471	0.572
Departure Headway (Hd)	5.545	6.352	5.139	5.653
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	646	568	703	641
Service Time	3.58	4.081	2.868	3.653
HCM Lane V/C Ratio	0.139	0.44	0.469	0.568
HCM Control Delay	9.5	14	12.4	15.9
HCM Lane LOS	A	B	B	C
HCM 95th-tile Q	0.5	2.2	2.5	3.6

Intersection	
Intersection Delay, s/veh	19.9
Intersection LOS	C

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	283	360	50	46	417	35
Future Vol, veh/h	283	360	50	46	417	35
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	298	379	53	48	439	37
Number of Lanes	1	1	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	2
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	2	0
HCM Control Delay	16.7	10.4	26.6
HCM LOS	C	B	D

Lane	NBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	0%	100%	0%	92%
Vol Thru, %	52%	0%	0%	8%
Vol Right, %	48%	0%	100%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	96	283	360	452
LT Vol	0	283	0	417
Through Vol	50	0	0	35
RT Vol	46	0	360	0
Lane Flow Rate	101	298	379	476
Geometry Grp	2	7	7	2
Degree of Util (X)	0.172	0.56	0.585	0.778
Departure Headway (Hd)	6.116	6.773	5.555	5.886
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	585	533	648	614
Service Time	4.168	4.515	3.297	3.921
HCM Lane V/C Ratio	0.173	0.559	0.585	0.775
HCM Control Delay	10.4	17.8	15.9	26.6
HCM Lane LOS	B	C	C	D
HCM 95th-tile Q	0.6	3.4	3.8	7.3