



# TRAFFIC IMPACT STUDY

## PROPOSED MULTIFAMILY DEVELOPMENT

Proposed Multifamily  
Residential Development  
Block 303, Lot 4  
Township of Verona,  
Block 301, Lot 5  
Block 401, Lot 1  
Township of Montclair,  
Essex County, New Jersey

Prepared For:  
Verona Sunset Urban Renewal,  
LLC.

Date: October 24, 2022  
**Revised: May 3, 2023**  
SE&D Job No. S-19187



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**STONEFIELD**

92 Park Avenue, Rutherford, NJ 07070

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Intersection of Bloomfield Avenue, Sunset Avenue, and Claremont Avenue

## **EXECUTIVE SUMMARY**

1. The project title on the Cover Page was revised to “Proposed Multifamily Development” instead of “Proposed QuickChek Development”.
2. The typo in the Introduction section of the previous report which stated that “existing turn restrictions would be removed” was corrected. The existing turn restrictions at the site driveways would be maintained under the proposed condition.
3. The date of the referenced Site Plan in the Site Circulation/Parking Supply section was updated.
4. Traffic Counts associated with the existing school driveway were added to the Technical Appendix.

## INTRODUCTION

This Traffic Impact Study was prepared to investigate the potential impacts of the proposed multifamily residential development on the adjacent roadway network. The subject property is located at the southwesterly quadrant of the intersection of Bloomfield Avenue and Sunset Avenue in the Township of Verona, Essex County, New Jersey. The site location is shown on appended **Figure I**.

The subject property is designated as Block 303, Lot 4 as depicted on the Township of Verona Tax Map, and as Block 301, Lot 5 and Block 401, Lot 1 as depicted on the Township of Montclair Tax Map. The site has approximately 540 feet of frontage along Sunset Avenue and approximately 210 feet of frontage along Bloomfield Avenue. The existing site is occupied by a private school known as “Spectrum 360” that provides kindergarten-12<sup>th</sup> grade education for special needs students. Access is presently provided via two (2) driveways along Sunset Avenue with turn restrictions. Under the proposed development program, the existing structures would be razed and a multi-story residential building consisting of 200 apartments units and a parking garage would be constructed along with an accessory surface parking lot. Access is proposed via the existing two (2) driveways along Sunset Avenue and the existing turn restrictions would be maintained.

## METHODOLOGY

Stonefield Engineering & Design, LLC has prepared this Traffic Impact Study in accordance with the recommended guidelines and practices outlined by the Institute of Transportation Engineers (ITE) within Transportation Impact Analyses for Site Development. A detailed field investigation was performed to assess the existing conditions of the adjacent roadway network. A data collection effort was completed to identify the existing traffic volumes at the study intersections to serve as a base for the traffic analyses. Capacity analysis, a procedure used to estimate the traffic-carrying ability of roadway facilities over a range of defined operating conditions, was performed using the Highway Capacity Manual, 6<sup>th</sup> Edition (HCM) and the Synchro II software for all study conditions to assess the roadway operations.

For an unsignalized intersection, Level of Service (LOS) A indicates operations with delay of less than 10 seconds per vehicle, while LOS F describes operations with delay in excess of 50 seconds per vehicle. For a signalized intersection, LOS A indicates operations with delay of less than 10 seconds per vehicle, while LOS F describes operations with delay in excess of 80 seconds per vehicle. The Technical Appendix contains the Highway Capacity Analysis Detail Sheets for the study intersections analyzed in this assessment. The traffic signal timing utilized within the signalized analysis is based on timing directives provided by Essex County.

## 2022 EXISTING CONDITION

### 2022 EXISTING ROADWAY CONDITIONS

The proposed multifamily housing development is located at the southwesterly quadrant of the intersection of Bloomfield Avenue and Sunset Avenue in the Township of Verona, Essex County, New Jersey. The subject property is designated as Block 303, Lot 4 as depicted on the Township of Verona Tax Map, and as Block 301, Lot 5 and Block 401, Lot 1 as depicted on the Township of Montclair Tax Map. The site has approximately 540 feet of frontage along Sunset Avenue and approximately 210 feet of frontage along Bloomfield Avenue. Land uses in the area are predominantly residential, educational, and commercial uses.

Sunset Avenue is a local roadway with a general east-west orientation and is under the jurisdiction of the Township of Verona. Along the site frontage, the roadway provides one (1) lane of travel in each direction and has a posted speed limit of 25 mph. Curb and sidewalk are provided, shoulders are not provided, and on-street parking is not permitted. Sunset Avenue provides east-west mobility within the Township of Verona for predominantly residential uses along its length.

Bloomfield Avenue (CR 506) is classified as an Urban Principal Arterial roadway with a general east-west orientation and is under the jurisdiction of Essex County. Along the site frontage, the roadway provides two (2) lanes of travel in each direction within an additional left-turn lane in the northbound direction, has a posted speed limit of 35 mph. Curb and sidewalk are provided along the westerly side of the roadway, a narrow shoulder is provided along the easterly side of the roadway, and on-street parking is not permitted. Bloomfield Avenue provides mobility throughout Essex County for a mix of residential, commercial, and educational uses along its length.

Sunset Avenue, Bloomfield Avenue, and Claremont Avenue intersect to form a signalized intersection controlled by a three (3)-phase traffic signal operating on a 120-second background cycle during the weekday morning and weekday evening peak hours. The eastbound approach of Sunset Avenue provides one (1) full-movement lane. The northbound approach of Bloomfield Avenue provides one (1) exclusive left-turn lane and two (2) exclusive through lanes, and the southeastbound approach of Bloomfield Avenue provides one (1) exclusive through lane and one (1) shared through/right-turn lane. The northwestbound approach of Claremont Avenue provides one (1) exclusive left-turn lane to merge with Bloomfield Avenue and one (1) right-turn lane towards Crestmont Road. Crosswalks and pedestrian signals are provided across all the intersection legs except the northbound approach.

**2022 EXISTING TRANSIT SERVICE**

The subject site is located within 0.2 miles (5-minute walk) from bus stops that service two (2) NJ Transit bus routes and one (1) charter bus route, with the nearest stop located at the intersection of Bloomfield Avenue and Sunset Avenue. NJ Transit Bus Routes 11 and 29 provide service to Newark Penn Station, Broad Station, and various points of interest throughout Essex County and Morris County. The charter bus Decamp #33 provides service to New York City and various points of interest throughout Essex County. The non-vehicular transportation modes available in the general vicinity of the subject site are summarized on **Table I**.

**TABLE I – MULTI-MODAL TRANSPORTATION OPTIONS**

<b>Travel Mode</b>	<b>Proximity to Site</b>	<b>Peak Commuter Period Headways</b>	<b>Destination(s)</b>	<b>Time Travel to Major Destination</b>
DeCamp #33	0.2 miles	Inbound: 60 minutes Outbound: 60 minutes	NYC Port Authority, Bloomfield, Clifton, Montclair, West Orange, Caldwell	New York City: 57 minutes
NJ Transit Bus Route 11	0.2 miles	Inbound: 15 minutes Outbound: 15 minutes	Newark Broad Station, Willowbrook Mall, Little Falls, Montclair, Bloomfield, Cedar Grove	Newark Broad Station: 30 minutes
NJ Transit Bus Route 29	0.2 miles	Inbound: 15 minutes Outbound: 15 minutes	Newark Penn Station, West Caldwell, Verona, Montclair, Glen Ridge, Parsippany	Newark Penn Station: 35 minutes

**2022 EXISTING TRAFFIC VOLUMES**

Turning movement counts were collected during the typical weekday morning and weekday evening time periods to evaluate existing traffic conditions and identify the specific hours when traffic activity on the adjacent roadways is at a maximum and could be potentially impacted by the development of the site. Turning movement counts were collected at the intersection of Bloomfield Avenue, Sunset Avenue, and Claremont Avenue. Specifically, turning movement counts were conducted on Thursday, September 22, 2022, from 7:00 a.m. to 9:00 a.m. and from 4:00 p.m. to 7:00 p.m.

The study time periods were chosen as they are representative of the peak periods of the proposed development and based on consultation with the Essex County Traffic Engineer. The traffic volume data was collected and analyzed to identify the design peak hour in accordance with HCM and ITE guidelines. Based on the review of the count data the weekday morning peak hour occurred from 7:45 a.m. to 8:45 a.m. and the weekday evening peak hour occurred from 5:15 p.m. to 6:15 p.m. The Technical Appendix contains a summary of the turning movement count data. The 2022 Existing weekday morning and weekday evening peak-hour volumes are summarized on appended **Figure 2**.

## 2022 EXISTING LOS/CAPACITY ANALYSIS

A Level of Service and Volume/Capacity analysis was conducted for the 2022 Existing Condition during the weekday morning and weekday evening peak hours at the study intersection. Under the existing condition, the signalized intersection of Bloomfield Avenue, Sunset Avenue, and Claremont Avenue is calculated to operate at overall Level of Service A during the weekday morning and weekday evening peak hours, with individual movements operating at acceptable Level of Service E or better.

## **2025 NO-BUILD CONDITION**

### BACKGROUND GROWTH

The 2022 Existing Condition traffic volume data was grown to a future horizon year of 2025, which is a conservative estimate for when the proposed multifamily residential development is expected to be fully constructed. In accordance with industry guidelines, the existing traffic volumes at the study intersections were increased by 1.50% annually for three (3) years. The 1.50% background growth rate was obtained from the New Jersey Department of Transportation (NJDOT) Annual Background Growth Rate Table.

### OTHER PLANNED DEVELOPMENT PROJECTS

To evaluate the future traffic conditions, it is important to consider the potential site-generated traffic of other projects that could influence the traffic volume at the study intersections. Other planned development projects include those that are either in the entitlement process or have recently been approved for building permits in proximity to the proposed development. Based on consultations with the Township of Verona and the Township of Montclair, there are no planned development projects within the area of the subject site. As such, the application of the background growth rate would be adequate to account for background traffic growth.

### 2025 NO-BUILD TRAFFIC VOLUMES

The background growth rate was applied to the 2022 Existing Traffic Volumes to calculate the 2025 No-Build Traffic Volumes for the weekday morning and weekday evening peak hours. These volumes are summarized on appended **Figure 3**.

### 2025 NO-BUILD LOS/CAPACITY ANALYSIS

A Level of Service and Volume/Capacity analysis was also conducted for the 2025 No-Build Condition during the weekday morning and weekday evening peak hours at the study intersection. The signalized intersection of Bloomfield Avenue, Sunset Avenue, and Claremont Avenue is calculated to operate generally

consistently with the findings of the Existing Condition during the weekday morning and weekday evening peak hours.

## 2025 BUILD CONDITION

The site-generated traffic volume of the proposed development was estimated to identify the potential impacts of the project. For the purpose of this analysis, a complete project “build out” is assumed within three (3) years of the preparation of this study.

### TRIP GENERATION

Trip generation projections for the proposed multifamily residential development were prepared utilizing ITE's Trip Generation Manual, 11<sup>th</sup> Edition. Trip generation rates associated with Land Use 221 “Multifamily Housing (Mid-Rise)” were cited for the 200-unit residential development. **Table 2** provides the weekday morning and weekday evening peak-hour trip generation volumes associated with the proposed development.

**TABLE 2 – PROPOSED TRIP GENERATION**

Land Use	Weekday Morning Peak Hour			Weekday Evening Peak Hour		
	Enter	Exit	Total	Enter	Exit	Total
200 Units Multifamily Housing (Mid-Rise) <i>ITE Land Use 221</i>	17	57	74	48	30	78

Factors such as transit use and walkability have been found to significantly decrease the trip generation of residential developments located proximate to transit. Based on American Community Survey data provided by the U.S. Census Bureau, approximately 14% of the Township of Verona residents living in Census Tract 212, where the site is located, use public transportation, walk, carpool or use means other than single-passenger vehicles to commute to work. Based on the available transit options within walking distance to the subject site and commuter characteristic data provided by the U.S. Census Bureau, a portion of the site-generated trips would be expected to utilize public transit thus reducing the vehicular trip generation of the project. However, in order to conduct a conservative analysis, no transit trip reduction was applied in the analysis.

### TRIP ASSIGNMENT/DISTRIBUTION

The trips generated by the proposed development were distributed evenly along both directions of Bloomfield Avenue and the access management plan of the site, which prohibits left-turns out of the site driveways. The Site-Generated Traffic Volumes are illustrated on **Figure 4**.

### 2025 BUILD TRAFFIC VOLUMES

Traffic volumes associated with the existing school, which are illustrated on appended **Figure 5**, were removed from the 2025 No-Build Traffic Volumes, and the site-generated trips were added to calculate the 2025 Build Traffic Volumes as shown on appended **Figure 6**.

### 2025 BUILD LOS/CAPACITY ANALYSIS

A Level of Service and Volume/Capacity analysis was also conducted for the 2025 Build Condition during the weekday morning and weekday evening peak hours at the study intersection and proposed site driveways. **Tables 3** through **6** compare the Existing, No-Build, and Build Conditions Level of Service and delay values.

The signalized intersection of Bloomfield Avenue, Sunset Avenue, and Claremont Avenue is calculated to operate generally consistently with the finding on the No-Build Condition during the weekday morning peak hour and is calculated to operate at overall Level of Service A, with individual tuning movements operating at acceptable Level of Service E or better during the weekday evening peak hour.

**COMPARATIVE LEVEL OF SERVICE (DELAY) TABLES****BLOOMFIELD AVENUE, SUNSET AVENUE & CLAREMONT AVENUE**

EB (Eastbound) and WB (Westbound) approaches are the Bloomfield Avenue approaches

NB (Northbound) approach is the Sunset Avenue approach

SB (Southbound) approach is the Claremont Avenue approach

X (n) = Level of Service (seconds of delay)

**TABLE 3 – WEEKDAY MORNING PEAK HOUR**

Lane Group	2022 Existing	2025 No-Build	2025 Build
EB Through/Right	A (8.9)	A (9.7)	A (8.9)
WB Left	B (18.0)	C (29.9)	B (13.2)
WB Through	A (1.9)	A (2.0)	A (2.5)
NB Left/Through/Right	E (56.4)	E (57.3)	E (62.0)
SB Bear Right	A (3.6)	A (3.8)	A (4.6)
SB Hard Right	A (1.5)	A (1.6)	A (2.0)
<b>Intersection</b>	<b>A (7.6)</b>	<b>A (8.5)</b>	<b>A (8.4)</b>

**TABLE 4 – WEEKDAY EVENING PEAK HOUR**

Lane Group	2022 Existing	2025 No-Build	2025 Build
EB Through/Right	A (5.8)	A (6.1)	A (7.1)
WB Left	A (5.1)	A (6.2)	A (8.8)
WB Through	A (1.9)	A (1.9)	A (2.2)
NB Left/Through/Right	D (54.1)	D (54.1)	E (57.9)
SB Bear Right	A (3.4)	A (3.6)	A (4.0)
SB Hard Right	A (1.6)	A (1.6)	A (1.9)
<b>Intersection</b>	<b>A (4.9)</b>	<b>A (5.1)</b>	<b>A (6.3)</b>

**SUNSET AVENUE & ACCESSORY SITE DRIVEWAY**

WB (Westbound) approach is the accessory site driveway approach

SB (Southbound) approach is the Sunset Avenue approach

X (n) = Level of Service (seconds of delay)

**TABLE 5 – 2025 BUILD CONDITION**

Lane Group	Weekday Morning Peak Hour	Weekday Evening Peak Hour
WB Right	A (8.9)	A (8.7)
SB Left	No Volume	A (7.4)

**SUNSET AVENUE & MAIN SITE DRIVEWAY**

WB (Westbound) approach is the main site driveway approach

SB (Southbound) approach is the Sunset Avenue approach

X (n) = Level of Service (seconds of delay)

**TABLE 6 – 2025 BUILD CONDITION**

Lane Group	Weekday Morning Peak Hour	Weekday Evening Peak Hour
WB Right	A (8.8)	A (8.6)
SB Left	A (7.3)	A (7.4)

## **SITE CIRCULATION/PARKING SUPPLY**

A review was conducted of the proposed multifamily residential development using the Site Plan prepared by Matrix New World Engineering, dated January 11, 2023. In completing this review, particular attention was focused on the site access, circulation, and parking supply.

Access is proposed via the existing two (2) driveways along Sunset Avenue. The existing turn restrictions would be maintained. The proposed building would be located within the Township of Verona portion of the site and would contain a number of amenities reserved for residents' use. The northerly site driveway ("accessory site driveway") would provide access to a surface parking lot and loading area with counter-clockwise circulation facilitated via a minimum of 24-foot-wide two-way drive-aisle and 20-foot-wide one-way drive aisle. The southerly site driveway ("main site driveway") would provide access to a pickup/drop-off area located adjacent to the main lobby of the building, as well as access to a gated multi-level parking garage. The drive aisle leading to the garage and pickup/drop-off area would be a minimum of 20-feet-wide for one-way circulation and 26-feet-wide for two-way circulation. The drive aisle internal to the parking garage would be 24-feet-wide to facilitate two-way vehicle circulation and parking maneuvers. A trash storage area would be located interior to the building.

Regarding the parking requirements for the proposed development, the Sunset Avenue Redevelopment Plan, in which the site is located, requires 1.9 spaces per unit for one- two- and three-bedroom apartments. For the proposed development consisting of 92 one-bedroom, 105 two-bedroom, and three (3) three-bedroom units, this equates to 381 required spaces. The site would provide 381 total parking spaces. The surface parking lot would provide eight (8) parking spaces inclusive of one (1) ADA-accessible stall, and the parking garage would provide 373 parking spaces inclusive of eight (8) ADA-accessible stalls, which meets the parking requirement as well as the Residential Site Improvement Standards (RSIS) standards and would be sufficient to support this project's parking demand. The spaces would be nine (9) feet wide by 18 feet deep in accordance with the Redevelopment Plan and industry standards.

As per P.L. 2021, c.171 (C.40:55D-66.18 et al.), all projects involving multifamily dwellings with more than five (5) units must have 15% of the parking supply be pre-wired for electric vehicle charging stations ("make-ready"). Of the make-ready spaces, 5% must be ADA compliant. For the proposed parking supply of 381 parking spaces, this equates to 58 make-ready spaces with three (3) being ADA-accessible. The proposed development would comply with the required number of make-ready spaces. It is noted that the electric vehicle requirements consider electric vehicle spaces as a minimum of two (2) parking spaces for the purpose of satisfying parking requirements, up to a 10% reduction of total requirement. As such, the development plan would be considered to provide 419 (381+38) total parking spaces, whereas 381 are required.

The parking supply was evaluated with respect to data published within the ITE's Parking Generation, 5<sup>th</sup> Edition, for Land Use 221 "Multifamily Housing (Mid-Rise)." Specifically, parking generation rates for General Urban/Suburban locations were utilized. The 85<sup>th</sup> percentile parking demand rate during the peak weekday overnight period is 1.47 vehicles per unit. For the proposed 200-unit multifamily residential development, this equates to 294 parking spaces. As such, based on published ITE parking demand rates, the proposed parking supply of 381 spaces would be sufficient to support the parking demand of the site.

## CONCLUSIONS

This report was prepared to examine the potential traffic and parking impacts of the proposed 200-unit multifamily residential development. The analysis findings, which have been based on industry-standard guidelines, indicate that the proposed development would not have a significant impact on the traffic operations of the adjacent roadway network. The site driveways and on-site layout have been designed to provide for effective access to and from the subject property. Based on the Sunset Avenue Redevelopment Plan parking requirements and published ITE parking demand rates, the parking supply would be sufficient to support this project.

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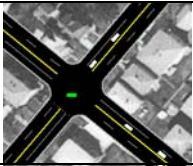
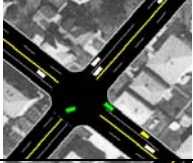



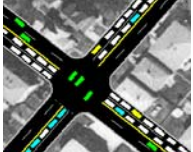
## **TECHNICAL APPENDIX**

**LEVEL OF SERVICE/AVERAGE CONTROL DELAY CRITERIA**

## LEVEL OF SERVICE /AVERAGE CONTROL DELAY CRITERIA

The ability of a roadway to effectively accommodate traffic demand is determined through an assessment of the volume-to-capacity ratio, delay and Level of Service of the lane group and/or intersection. The volume-to-capacity ratio is the ratio of traffic flow rate to capacity for a given transportation facility. As defined within the Highway Capacity Manual (HCM), intersection delay is the total additional travel time experienced by drivers, passengers, or pedestrians as a result of control measures and interaction with other users of the facility, divided by the volume departing from the corresponding cross section of the facility. Level of service is a qualitative measure describing operational conditions within a traffic stream, based on service measures such as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience.

For an unsignalized intersection, LOS A indicates operations with delay less than 10 seconds per vehicle, while LOS F describes operations with delay in excess of 50 seconds per vehicle. For a signalized intersection, LOS A indicates operations with delay less than 10 seconds per vehicle and LOS F denotes operations with delay in excess of 80 seconds per vehicle.

	Level Of Service (LOS)	Signalized Delay Range (average control delay in sec/veh)	Unsignalized Delay Range (average control delay in sec/veh)	Roundabout Delay Range (average control delay in sec/veh)
	A	$\leq 10$	$\leq 10$	$\leq 10$
	B	$> 10$ and $\leq 20$	$> 10$ and $\leq 15$	$> 10$ and $\leq 15$
	C	$> 20$ and $\leq 35$	$> 15$ and $\leq 25$	$> 15$ and $\leq 25$
	D	$> 35$ and $\leq 55$	$> 25$ and $\leq 35$	$> 25$ and $\leq 35$
	E	$> 55$ and $\leq 80$	$> 35$ and $\leq 50$	$> 35$ and $\leq 50$
	F	$> 80$	$> 50$	$> 50$

Source: Highway Capacity Manual

## **TURNING MOVEMENT COUNT DATA**

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Intersection of Bloomfield Avenue/Claremont Avenue (E/W)

and Sunset Avenue (N/S)

Verona, Essex County, New Jersey

Thursday, September 22, 2022

File Name : S-19187

Site Code : 00019187

Start Date : 9/22/2022

Page No : 1

## Groups Printed- Auto - HV - B/SB

	Bloomfield Avenue Eastbound					Bloomfield Avenue/Claremont Avenue Westbound*					Sunset Avenue Northbound					
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Thru 2	Right	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total
07:00 AM	0	168	6	0	174	2	67	68	5	142	1	0	2	0	3	319
07:15 AM	0	341	7	0	348	8	141	125	4	278	1	0	6	0	7	633
07:30 AM	0	432	10	0	442	9	140	155	15	319	4	0	6	0	10	771
07:45 AM	0	479	12	0	491	19	185	178	15	397	5	0	7	1	13	901
Total	0	1420	35	0	1455	38	533	526	39	1136	11	0	21	1	33	2624
08:00 AM	0	450	35	0	485	40	175	189	12	416	2	0	10	0	12	913
08:15 AM	0	442	45	0	487	35	162	183	16	396	13	0	6	0	19	902
08:30 AM	0	495	25	0	520	20	160	155	4	339	5	0	15	0	20	879
08:45 AM	0	373	15	0	388	19	188	173	7	387	6	0	11	0	17	792
Total	0	1760	120	0	1880	114	685	700	39	1538	26	0	42	0	68	3486
*** BREAK ***																
04:00 PM	0	331	11	0	342	5	208	153	28	394	3	0	9	0	12	748
04:15 PM	0	303	6	0	309	8	149	152	35	344	0	0	8	0	8	661
04:30 PM	0	297	8	0	305	11	142	136	33	322	5	0	3	0	8	635
04:45 PM	0	263	12	0	275	4	119	119	31	273	7	0	5	0	12	560
Total	0	1194	37	0	1231	28	618	560	127	1333	15	0	25	0	40	2604
05:00 PM	0	291	5	0	296	14	188	128	38	368	6	0	4	0	10	674
05:15 PM	0	378	11	0	389	6	175	142	38	361	5	0	13	0	18	768
05:30 PM	0	399	2	0	401	12	228	183	28	451	3	0	9	0	12	864
05:45 PM	0	470	10	0	480	11	199	177	36	423	3	0	4	0	7	910
Total	0	1538	28	0	1566	43	790	630	140	1603	17	0	30	0	47	3216
06:00 PM	0	414	11	0	425	14	152	172	38	376	3	0	5	0	8	809
06:15 PM	0	336	5	0	341	12	181	137	27	357	3	0	6	0	9	707
06:30 PM	0	385	2	0	387	7	143	140	23	313	6	0	9	0	15	715
06:45 PM	0	349	3	0	352	8	129	126	33	296	3	0	6	0	9	657
Total	0	1484	21	0	1505	41	605	575	121	1342	15	0	26	0	41	2888
Grand Total	0	7396	241	0	7637	264	3231	2991	466	6952	84	0	144	1	229	14818
Apprch %	0	96.8	3.2	0		3.8	46.5	43	6.7		36.7	0	62.9	0.4		
Total %	0	49.9	1.6	0	51.5	1.8	21.8	20.2	3.1	46.9	0.6	0	1	0	1.5	
Auto	0	7301	230	0	7531	254	3158	2968	464	6844	80	0	138	1	219	14594
% Auto	0	98.7	95.4	0	98.6	96.2	97.7	99.2	99.6	98.4	95.2	0	95.8	100	95.6	98.5
HV	0	53	8	0	61	9	43	12	1	65	0	0	4	0	4	130
% HV	0	0.7	3.3	0	0.8	3.4	1.3	0.4	0.2	0.9	0	0	2.8	0	1.7	0.9
B/SB	0	42	3	0	45	1	30	11	1	43	4	0	2	0	6	94
% B/SB	0	0.6	1.2	0	0.6	0.4	0.9	0.4	0.2	0.6	4.8	0	1.4	0	2.6	0.6

\* The "Thru 2" and "Right" movements are associated with the Claremont Avenue approach

# Stonefield Engineering & Design, LLC

92 Park Avenue, Rutherford, NJ 07070

201.340.4468 t. 201.340.4472 f.

Intersection of Bloomfield Avenue/Claremont Avenue (E/W)

and Sunset Avenue (N/S)

Verona, Essex County, New Jersey

Thursday, September 22, 2022

File Name : S-19187

Site Code : 00019187

Start Date : 9/22/2022

Page No : 2

	Bloomfield Avenue Eastbound					Bloomfield Avenue/Claremont Avenue Westbound*					Sunset Avenue Northbound					
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Thru 2	Right	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 07:45 AM																
07:45 AM	0	479	12	0	491	19	185	178	15	397	5	0	7	1	13	901
08:00 AM	0	450	35	0	485	40	175	189	12	416	2	0	10	0	12	913
08:15 AM	0	442	45	0	487	35	162	183	16	396	13	0	6	0	19	902
08:30 AM	0	495	25	0	520	20	160	155	4	339	5	0	15	0	20	879
Total Volume	0	1866	117	0	1983	114	682	705	47	1548	25	0	38	1	64	3595
% App. Total	0	94.1	5.9	0		7.4	44.1	45.5	3		39.1	0	59.4	1.6		
PHF	.000	.942	.650	.000	.953	.713	.922	.933	.734	.930	.481	.000	.633	.250	.800	.984
Auto	0	1832	111	0	1943	110	657	698	46	1511	24	0	37	1	62	3516
% Auto	0	98.2	94.9	0	98.0	96.5	96.3	99.0	97.9	97.6	96.0	0	97.4	100	96.9	97.8
HV	0	18	4	0	22	4	10	2	0	16	0	0	0	0	0	38
% HV	0	1.0	3.4	0	1.1	3.5	1.5	0.3	0	1.0	0	0	0	0	0	1.1
B/SB	0	16	2	0	18	0	15	5	1	21	1	0	1	0	2	41
% B/SB	0	0.9	1.7	0	0.9	0	2.2	0.7	2.1	1.4	4.0	0	2.6	0	3.1	1.1
Peak Hour Analysis From 12:00 PM to 06:45 PM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 05:15 PM																
05:15 PM	0	378	11	0	389	6	175	142	38	361	5	0	13	0	18	768
05:30 PM	0	399	2	0	401	12	228	183	28	451	3	0	9	0	12	864
05:45 PM	0	470	10	0	480	11	199	177	36	423	3	0	4	0	7	910
06:00 PM	0	414	11	0	425	14	152	172	38	376	3	0	5	0	8	809
Total Volume	0	1661	34	0	1695	43	754	674	140	1611	14	0	31	0	45	3351
% App. Total	0	98	2	0		2.7	46.8	41.8	8.7		31.1	0	68.9	0		
PHF	.000	.884	.773	.000	.883	.768	.827	.921	.921	.893	.700	.000	.596	.000	.625	.921
Auto	0	1651	34	0	1685	43	741	673	140	1597	14	0	31	0	45	3327
% Auto	0	99.4	100	0	99.4	100	98.3	99.9	100	99.1	100	0	100	0	100	99.3
HV	0	7	0	0	7	0	12	1	0	13	0	0	0	0	0	20
% HV	0	0.4	0	0	0.4	0	1.6	0.1	0	0.8	0	0	0	0	0	0.6
B/SB	0	3	0	0	3	0	1	0	0	1	0	0	0	0	0	4
% B/SB	0	0.2	0	0	0.2	0	0.1	0	0	0.1	0	0	0	0	0	0.1

\* The "Thru 2" and "Right" movements are associated with the Claremont Avenue approach

# STONEFIELD

## Existing School Driveways Turning Movement Counts - Thursday, September 22, 2022

	Main Driveway				
Start Time	EBR	WBL	NBR	NBL	Interval
7:45	1	29	5	0	35
8:00	0	35	5	0	40
8:15	0	20	2	0	22
8:30	2	28	2	0	32
<b>Hourly Total</b>	<b>3</b>	<b>112</b>	<b>14</b>	<b>0</b>	<b>129</b>
Bus %	0%	10%	0%	0%	9%
PHF					0.81

	Accessory Driveway				
Start Time	EBR	WBL	NBR	NBL	Interval
7:45	0	2	0	0	2
8:00	2	9	0	0	11
8:15	1	7	0	0	8
8:30	0	2	0	0	2
<b>Hourly Total</b>	<b>3</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>23</b>
Bus %	0%	0%	0%	0%	0%
PHF					0.52

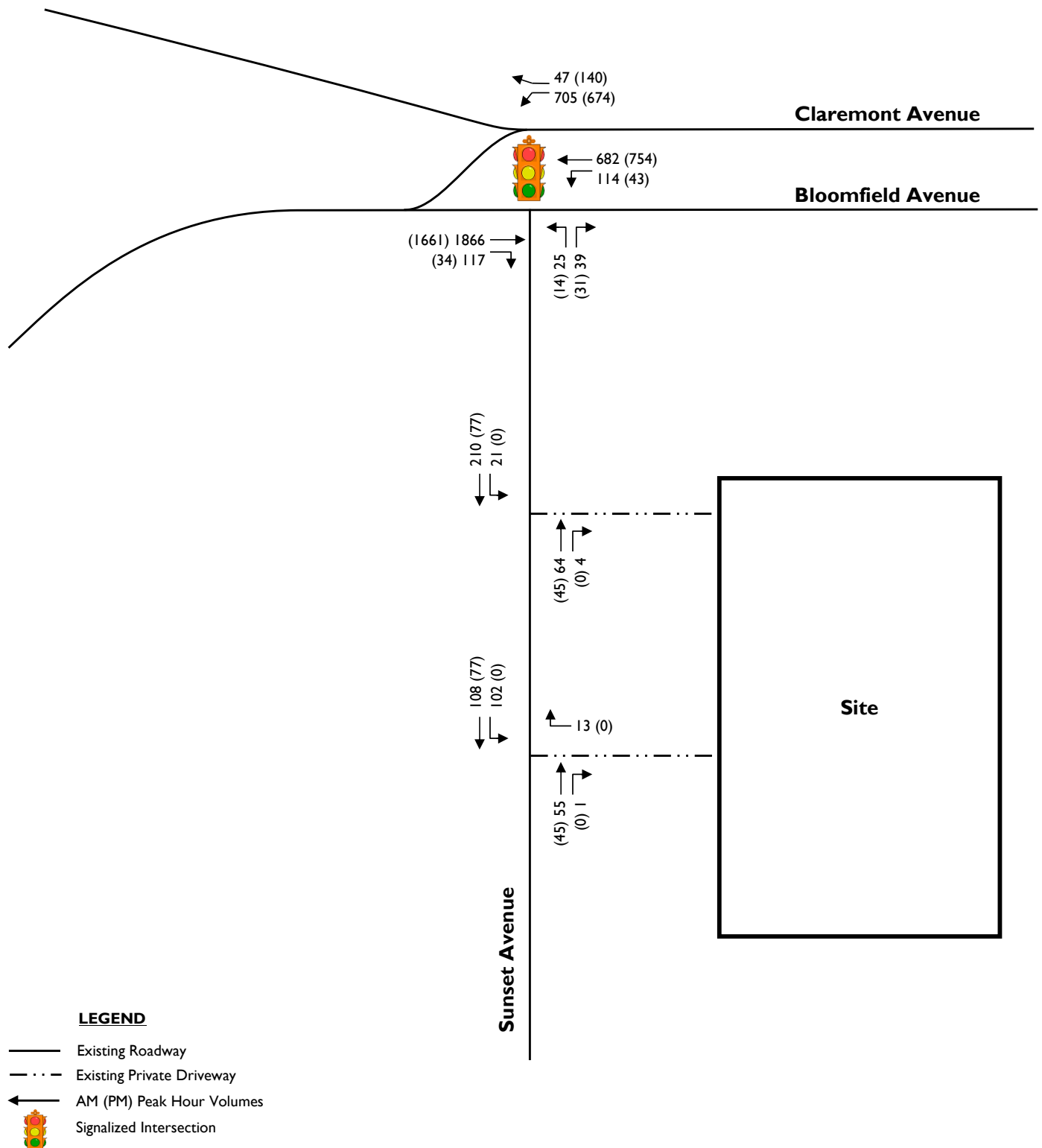
## FIGURES



**STONEFIELD**

**Proposed Multifamily Residential Development  
I Sunset Avenue  
Township of Verona, Essex County, New Jersey  
Traffic Impact Study**

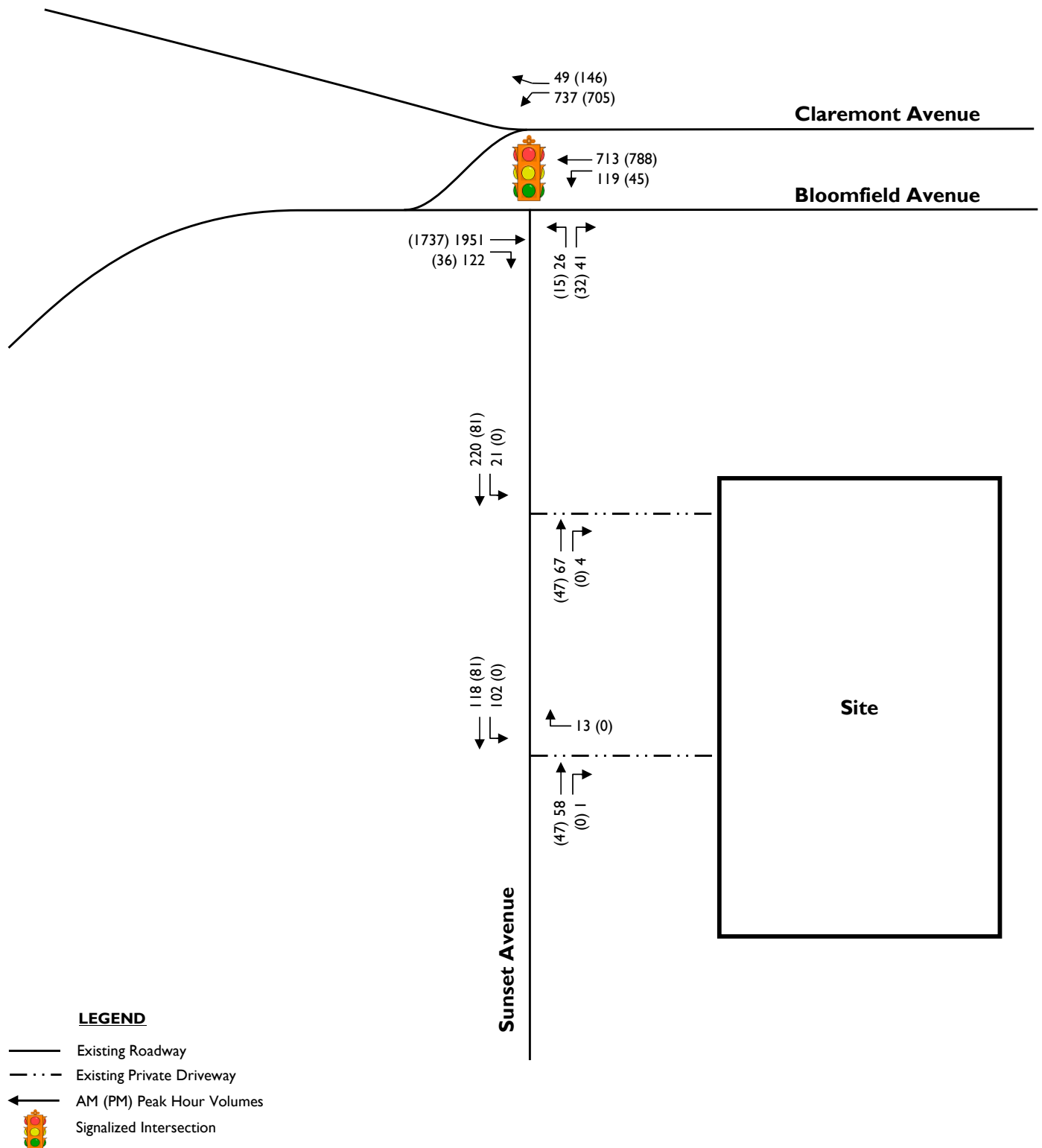
**FIGURE I  
Site Location Map**



**STONEFIELD**

**Proposed Multifamily Residential Development  
I Sunset Avenue  
Township of Verona, Essex County, New Jersey  
Traffic Impact Study**

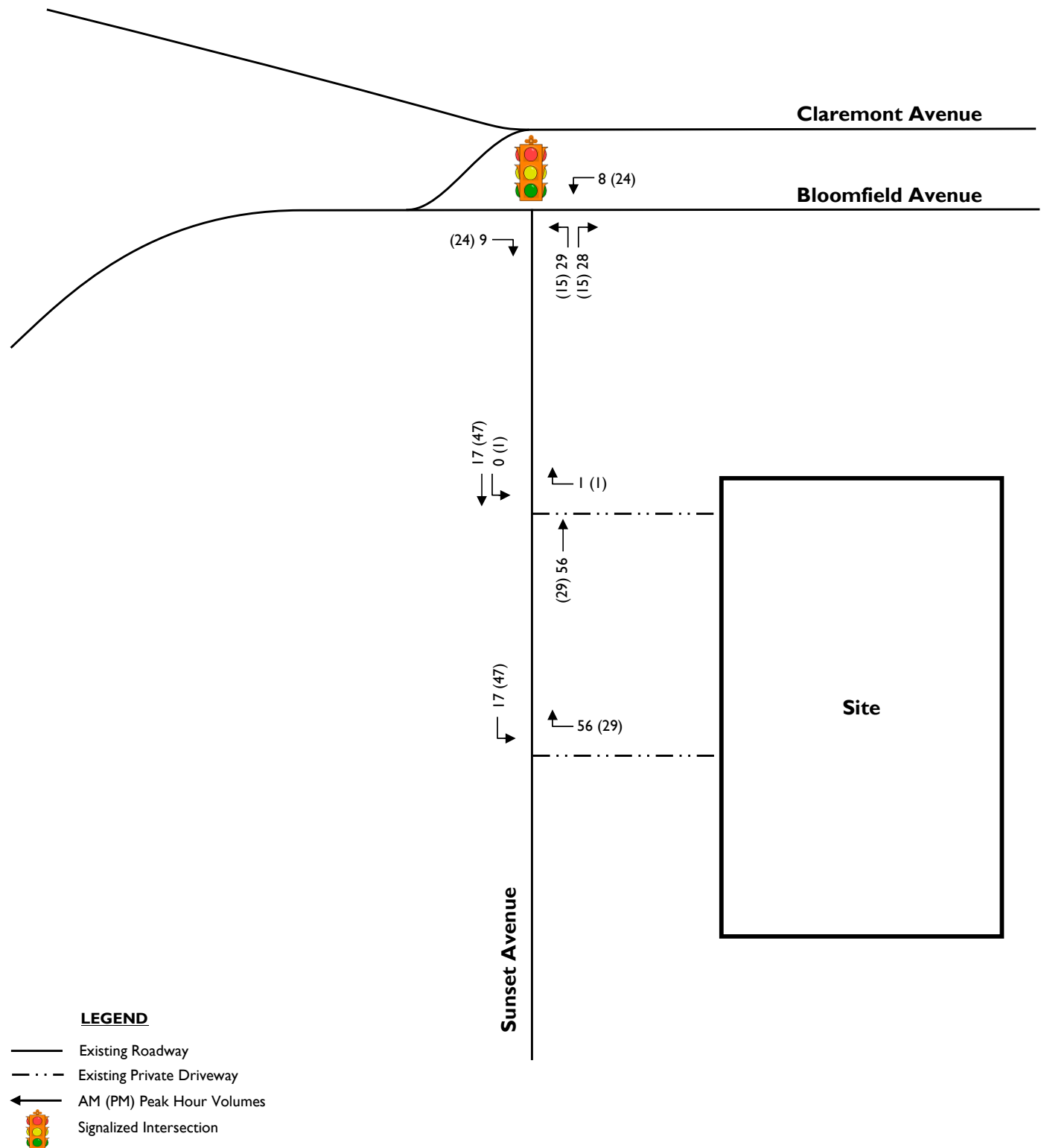
**FIGURE 2  
2022 Existing Traffic  
Volumes**



**STONEFIELD**

**Proposed Multifamily Residential Development  
I Sunset Avenue  
Township of Verona, Essex County, New Jersey  
Traffic Impact Study**

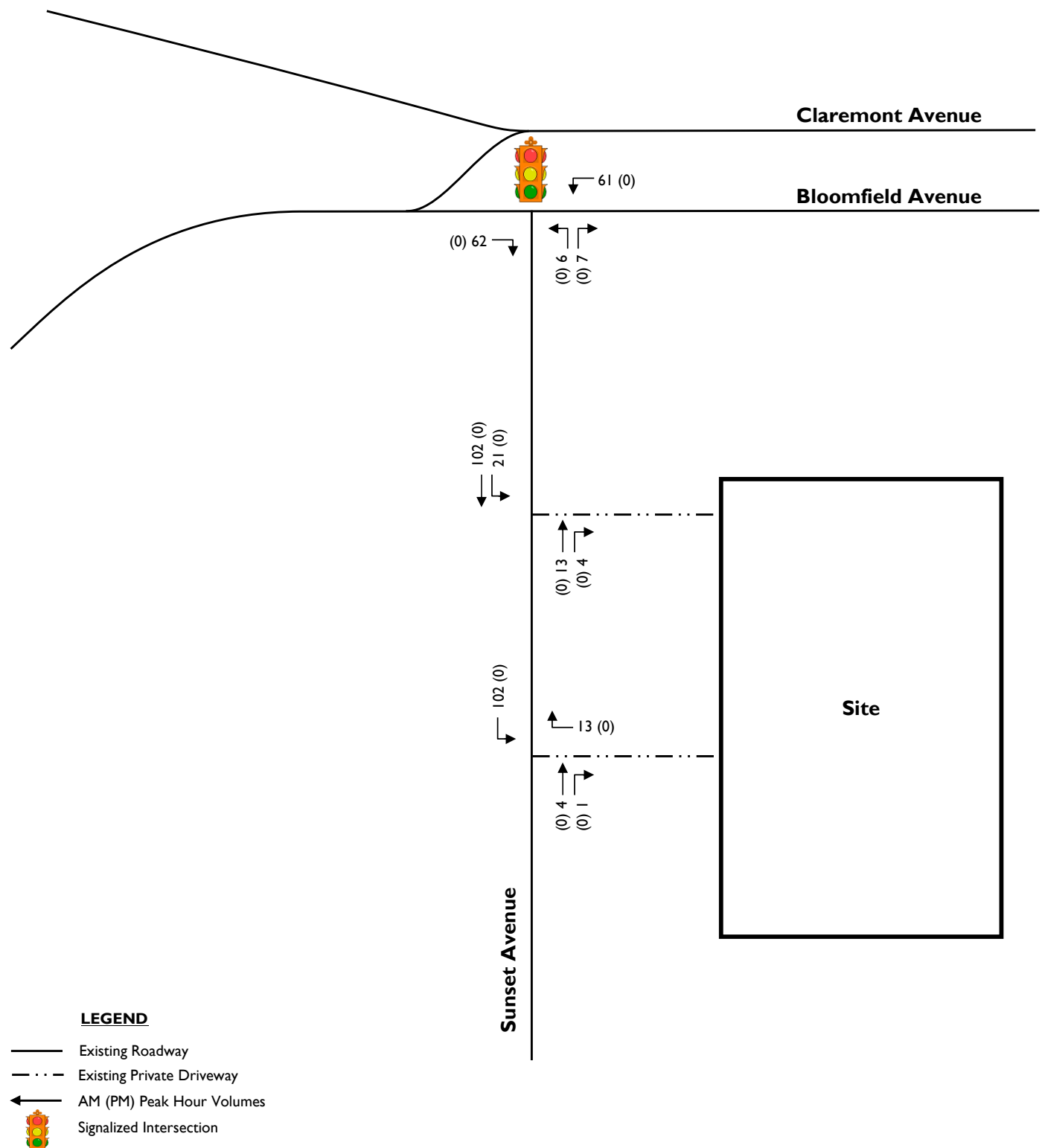
**FIGURE 3  
2025 No-Build Traffic  
Volumes**



**STONEFIELD**

**Proposed Multifamily Residential Development  
I Sunset Avenue  
Township of Verona, Essex County, New Jersey  
Traffic Impact Study**

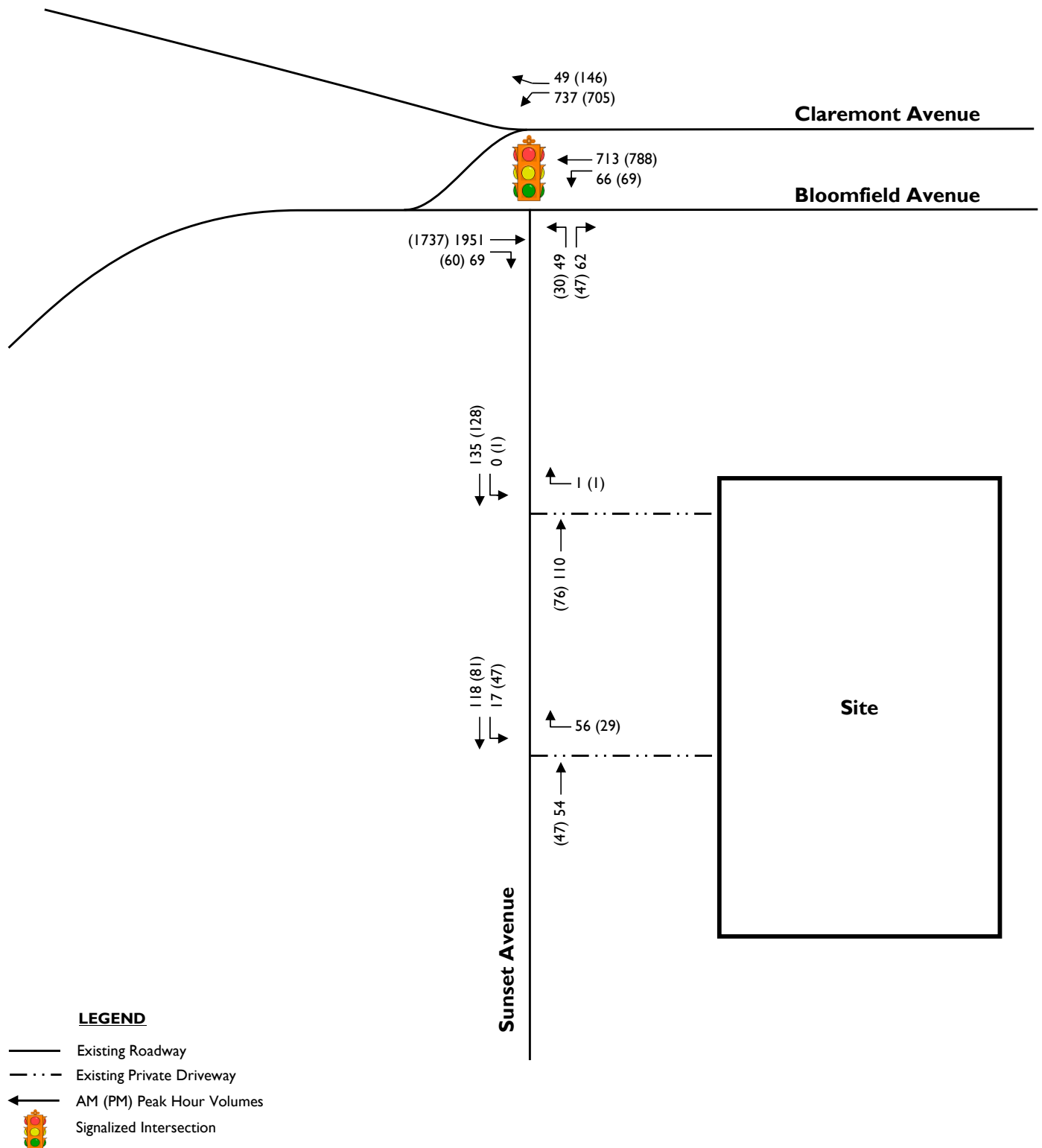
**FIGURE 4  
Site-Generated Traffic  
Volumes**



**STONEFIELD**

**Proposed Multifamily Residential Development  
I Sunset Avenue  
Township of Verona, Essex County, New Jersey  
Traffic Impact Study**

**FIGURE 5  
Existing Site Volumes**



**STONEFIELD**

**Proposed Multifamily Residential Development  
I Sunset Avenue  
Township of Verona, Essex County, New Jersey  
Traffic Impact Study**

**FIGURE 6  
2025 Build Traffic Volumes**

## **HIGHWAY CAPACITY ANALYSIS DETAIL SHEETS**

# HCM Signalized Intersection Capacity Analysis

## 1: Sunset Avenue & Bloomfield Avenue & Claremont Avenue

2022 Existing Condition  
Weekday Morning Peak Hour

	→	↘	↙	←	↖	↑	↗	↘	↙
Movement	EBT	EBR	WBL	WBT	NBL2	NBT	NBR	SBR	SBR2
Lane Configurations	↑↑		↘	↑↑		↑↓		↘	↘
Traffic Volume (vph)	1866	117	114	682	25	0	39	705	47
Future Volume (vph)	1866	117	114	682	25	0	39	705	47
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100	2100	2100	2100
Total Lost time (s)	6.0		3.0	6.0		5.0		6.0	6.0
Lane Util. Factor	0.95		1.00	0.95		1.00		1.00	1.00
Frt	0.99		1.00	1.00		0.92		0.85	0.85
Flt Protected	1.00		0.95	1.00		0.98		1.00	1.00
Satd. Flow (prot)	3871		1918	3837		1829		1767	1750
Flt Permitted	1.00		0.06	1.00		0.98		1.00	1.00
Satd. Flow (perm)	3871		117	3837		1829		1767	1750
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	1904	119	116	696	26	0	40	719	48
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	2023	0	116	696	0	66	0	719	48
Heavy Vehicles (%)	2%	5%	4%	4%	4%	0%	3%	1%	2%
Turn Type	NA		pm+pt	NA	Perm	NA		Perm	Perm
Protected Phases	6		5	2		4			
Permitted Phases			2		4			2	2
Actuated Green, G (s)	86.9		97.3	97.3		7.4		97.3	97.3
Effective Green, g (s)	86.9		97.3	97.3		7.4		97.3	97.3
Actuated g/C Ratio	0.75		0.84	0.84		0.06		0.84	0.84
Clearance Time (s)	6.0		3.0	6.0		5.0		6.0	6.0
Vehicle Extension (s)	2.0		2.0	2.0		2.0		2.0	2.0
Lane Grp Cap (vph)	2907		213	3226		116		1485	1471
v/s Ratio Prot	c0.52		c0.03	0.18					
v/s Ratio Perm			0.42			0.04		0.41	0.03
v/c Ratio	0.70		0.54	0.22		0.57		0.48	0.03
Uniform Delay, d1	7.5		16.5	1.8		52.6		2.5	1.5
Progression Factor	1.00		1.00	1.00		1.00		1.00	1.00
Incremental Delay, d2	1.4		1.5	0.2		3.8		1.1	0.0
Delay (s)	8.9		18.0	1.9		56.4		3.6	1.5
Level of Service	A		B	A		E		A	A
Approach Delay (s)	8.9			4.2		56.4			
Approach LOS	A			A		E			
<b>Intersection Summary</b>									
HCM 2000 Control Delay			7.6			HCM 2000 Level of Service		A	
HCM 2000 Volume to Capacity ratio			0.68						
Actuated Cycle Length (s)			115.7			Sum of lost time (s)		14.0	
Intersection Capacity Utilization			170.0%			ICU Level of Service		H	
Analysis Period (min)			15						
c Critical Lane Group									

# HCM Signalized Intersection Capacity Analysis

## 1: Sunset Avenue & Bloomfield Avenue & Claremont Avenue

2022 Existing Condition  
Weekday Evening Peak Hour

	→	↘	↙	←	↖	↑	↗	↘	↙
Movement	EBT	EBR	WBL	WBT	NBL2	NBT	NBR	SBR	SBR2
Lane Configurations	↑↑		↘	↑↑		↑↓		↘	↘
Traffic Volume (vph)	1661	34	43	754	14	0	31	674	140
Future Volume (vph)	1661	34	43	754	14	0	31	674	140
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100	2100	2100	2100
Total Lost time (s)	6.0		3.0	6.0		5.0		6.0	6.0
Lane Util. Factor	0.95		1.00	0.95		1.00		1.00	1.00
Frt	1.00		1.00	1.00		0.91		0.85	0.85
Flt Protected	1.00		0.95	1.00		0.98		1.00	1.00
Satd. Flow (prot)	3939		1995	3912		1877		1785	1785
Flt Permitted	1.00		0.09	1.00		0.98		1.00	1.00
Satd. Flow (perm)	3939		186	3912		1877		1785	1785
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.97	0.92	0.92
Adj. Flow (vph)	1805	37	47	820	15	0	32	733	152
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	1842	0	47	820	0	47	0	733	152
Heavy Vehicles (%)	1%	0%	0%	2%	0%	0%	0%	0%	0%
Turn Type	NA		pm+pt	NA	Perm	NA		Perm	Perm
Protected Phases	6		5	2		4			
Permitted Phases			2		4			2	2
Actuated Green, G (s)	91.5		98.6	98.6		6.6		98.6	98.6
Effective Green, g (s)	91.5		98.6	98.6		6.6		98.6	98.6
Actuated g/C Ratio	0.79		0.85	0.85		0.06		0.85	0.85
Clearance Time (s)	6.0		3.0	6.0		5.0		6.0	6.0
Vehicle Extension (s)	2.0		2.0	2.0		2.0		2.0	2.0
Lane Grp Cap (vph)	3101		221	3319		106		1514	1514
v/s Ratio Prot	c0.47		0.01	0.21					
v/s Ratio Perm			0.17			0.03		c0.41	0.09
v/c Ratio	0.59		0.21	0.25		0.44		0.48	0.10
Uniform Delay, d1	4.9		4.9	1.7		53.0		2.3	1.5
Progression Factor	1.00		1.00	1.00		1.00		1.00	1.00
Incremental Delay, d2	0.8		0.2	0.2		1.1		1.1	0.1
Delay (s)	5.8		5.1	1.9		54.1		3.4	1.6
Level of Service	A		A	A		D		A	A
Approach Delay (s)	5.8			2.0		54.1			
Approach LOS	A			A		D			
<b>Intersection Summary</b>									
HCM 2000 Control Delay			4.9			HCM 2000 Level of Service		A	
HCM 2000 Volume to Capacity ratio			0.58						
Actuated Cycle Length (s)			116.2			Sum of lost time (s)		14.0	
Intersection Capacity Utilization			173.3%			ICU Level of Service		H	
Analysis Period (min)			15						
c Critical Lane Group									

# HCM Signalized Intersection Capacity Analysis

## 1: Sunset Avenue & Bloomfield Avenue & Claremont Avenue

2025 No-Build Condition  
Weekday Morning Peak Hour

	→	↘	↙	←	↖	↑	↗	↘	↙
Movement	EBT	EBR	WBL	WBT	NBL2	NBT	NBR	SBR	SBR2
Lane Configurations	↑↑		↘	↑↑		↕		↘	↘
Traffic Volume (vph)	1951	122	119	713	26	0	41	737	49
Future Volume (vph)	1951	122	119	713	26	0	41	737	49
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100	2100	2100	2100
Total Lost time (s)	6.0		3.0	6.0		5.0		6.0	6.0
Lane Util. Factor	0.95		1.00	0.95		1.00		1.00	1.00
Frt	0.99		1.00	1.00		0.92		0.85	0.85
Flt Protected	1.00		0.95	1.00		0.98		1.00	1.00
Satd. Flow (prot)	3871		1918	3837		1828		1767	1750
Flt Permitted	1.00		0.05	1.00		0.98		1.00	1.00
Satd. Flow (perm)	3871		94	3837		1828		1767	1750
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	1991	124	121	728	27	0	42	752	50
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	2115	0	121	728	0	69	0	752	50
Heavy Vehicles (%)	2%	5%	4%	4%	4%	0%	3%	1%	2%
Turn Type	NA		pm+pt	NA	Perm	NA		Perm	Perm
Protected Phases	6		5	2		4			
Permitted Phases			2		4			2	2
Actuated Green, G (s)	86.7		97.3	97.3		7.5		97.3	97.3
Effective Green, g (s)	86.7		97.3	97.3		7.5		97.3	97.3
Actuated g/C Ratio	0.75		0.84	0.84		0.06		0.84	0.84
Clearance Time (s)	6.0		3.0	6.0		5.0		6.0	6.0
Vehicle Extension (s)	2.0		2.0	2.0		2.0		2.0	2.0
Lane Grp Cap (vph)	2898		198	3224		118		1484	1470
v/s Ratio Prot	c0.55		c0.04	0.19					
v/s Ratio Perm			0.47			0.04		0.43	0.03
v/c Ratio	0.73		0.61	0.23		0.58		0.51	0.03
Uniform Delay, d1	8.1		26.0	1.8		52.6		2.6	1.5
Progression Factor	1.00		1.00	1.00		1.00		1.00	1.00
Incremental Delay, d2	1.7		3.9	0.2		4.7		1.2	0.0
Delay (s)	9.7		29.9	2.0		57.3		3.8	1.6
Level of Service	A		C	A		E		A	A
Approach Delay (s)	9.7			6.0		57.3			
Approach LOS	A			A		E			
<b>Intersection Summary</b>									
HCM 2000 Control Delay			8.5			HCM 2000 Level of Service		A	
HCM 2000 Volume to Capacity ratio			0.71						
Actuated Cycle Length (s)			115.8			Sum of lost time (s)		14.0	
Intersection Capacity Utilization			170.0%			ICU Level of Service		H	
Analysis Period (min)			15						
c Critical Lane Group									

# HCM Signalized Intersection Capacity Analysis

## 1: Sunset Avenue & Bloomfield Avenue & Claremont Avenue

2025 No-Build Condition  
Weekday Evening Peak Hour

	→	↘	↙	←	↖	↑	↗	↘	↙
Movement	EBT	EBR	WBL	WBT	NBL2	NBT	NBR	SBR	SBR2
Lane Configurations	↑↑		↘	↑↑		↕		↘	↘
Traffic Volume (vph)	1737	36	45	788	15	0	32	705	146
Future Volume (vph)	1737	36	45	788	15	0	32	705	146
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100	2100	2100	2100
Total Lost time (s)	6.0		3.0	6.0		5.0		6.0	6.0
Lane Util. Factor	0.95		1.00	0.95		1.00		1.00	1.00
Frt	1.00		1.00	1.00		0.91		0.85	0.85
Flt Protected	1.00		0.95	1.00		0.98		1.00	1.00
Satd. Flow (prot)	3939		1995	3912		1878		1785	1785
Flt Permitted	1.00		0.08	1.00		0.98		1.00	1.00
Satd. Flow (perm)	3939		163	3912		1878		1785	1785
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.97	0.92	0.92
Adj. Flow (vph)	1888	39	49	857	16	0	33	766	159
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	1927	0	49	857	0	49	0	766	159
Heavy Vehicles (%)	1%	0%	0%	2%	0%	0%	0%	0%	0%
Turn Type	NA		pm+pt	NA	Perm	NA		Perm	Perm
Protected Phases	6		5	2		4			
Permitted Phases			2		4			2	2
Actuated Green, G (s)	91.5		98.6	98.6		6.7		98.6	98.6
Effective Green, g (s)	91.5		98.6	98.6		6.7		98.6	98.6
Actuated g/C Ratio	0.79		0.85	0.85		0.06		0.85	0.85
Clearance Time (s)	6.0		3.0	6.0		5.0		6.0	6.0
Vehicle Extension (s)	2.0		2.0	2.0		2.0		2.0	2.0
Lane Grp Cap (vph)	3099		202	3316		108		1513	1513
v/s Ratio Prot	c0.49		0.01	0.22					
v/s Ratio Perm			0.20			0.03		c0.43	0.09
v/c Ratio	0.62		0.24	0.26		0.45		0.51	0.11
Uniform Delay, d1	5.2		6.0	1.7		53.0		2.4	1.5
Progression Factor	1.00		1.00	1.00		1.00		1.00	1.00
Incremental Delay, d2	0.9		0.2	0.2		1.1		1.2	0.1
Delay (s)	6.1		6.2	1.9		54.1		3.6	1.6
Level of Service	A		A	A		D		A	A
Approach Delay (s)	6.1			2.1		54.1			
Approach LOS	A			A		D			
<b>Intersection Summary</b>									
HCM 2000 Control Delay			5.1			HCM 2000 Level of Service		A	
HCM 2000 Volume to Capacity ratio			0.61						
Actuated Cycle Length (s)			116.3			Sum of lost time (s)		14.0	
Intersection Capacity Utilization			173.3%			ICU Level of Service		H	
Analysis Period (min)			15						
c Critical Lane Group									

# HCM Signalized Intersection Capacity Analysis




## 1: Sunset Avenue & Bloomfield Avenue & Claremont Avenue

2025 Build Condition  
Weekday Morning Peak Hour

	→	↘	↙	←	↖	↑	↗	↘	↙
Movement	EBT	EBR	WBL	WBT	NBL2	NBT	NBR	SBR	SBR2
Lane Configurations	↑↑		↘	↑↑		↕		↘	↘
Traffic Volume (vph)	1951	69	66	713	49	0	62	737	49
Future Volume (vph)	1951	69	66	713	49	0	62	737	49
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100	2100	2100	2100
Total Lost time (s)	6.0		3.0	6.0		5.0		6.0	6.0
Lane Util. Factor	0.95		1.00	0.95		1.00		1.00	1.00
Frt	0.99		1.00	1.00		0.92		0.85	0.85
Flt Protected	1.00		0.95	1.00		0.98		1.00	1.00
Satd. Flow (prot)	3891		1918	3837		1900		1767	1750
Flt Permitted	1.00		0.05	1.00		0.98		1.00	1.00
Satd. Flow (perm)	3891		110	3837		1900		1767	1750
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	1991	70	67	728	50	0	63	752	50
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	2061	0	67	728	0	113	0	752	50
Heavy Vehicles (%)	2%	3%	4%	4%	0%	0%	0%	1%	2%
Turn Type	NA		pm+pt	NA	Perm	NA		Perm	Perm
Protected Phases	6		5	2		4			
Permitted Phases			2		4			2	2
Actuated Green, G (s)	90.1		97.7	97.7		10.3		97.7	97.7
Effective Green, g (s)	90.1		97.7	97.7		10.3		97.7	97.7
Actuated g/C Ratio	0.76		0.82	0.82		0.09		0.82	0.82
Clearance Time (s)	6.0		3.0	6.0		5.0		6.0	6.0
Vehicle Extension (s)	2.0		2.0	2.0		2.0		2.0	2.0
Lane Grp Cap (vph)	2946		160	3150		164		1450	1436
v/s Ratio Prot	c0.53		0.02	0.19					
v/s Ratio Perm			0.33			0.06		c0.43	0.03
v/c Ratio	0.70		0.42	0.23		0.69		0.52	0.03
Uniform Delay, d1	7.5		12.6	2.4		52.8		3.3	2.0
Progression Factor	1.00		1.00	1.00		1.00		1.00	1.00
Incremental Delay, d2	1.4		0.6	0.2		9.2		1.3	0.0
Delay (s)	8.9		13.2	2.5		62.0		4.6	2.0
Level of Service	A		B	A		E		A	A
Approach Delay (s)	8.9			3.4		62.0			
Approach LOS	A			A		E			
<b>Intersection Summary</b>									
HCM 2000 Control Delay			8.4			HCM 2000 Level of Service		A	
HCM 2000 Volume to Capacity ratio			0.69						
Actuated Cycle Length (s)			119.0			Sum of lost time (s)		14.0	
Intersection Capacity Utilization			170.1%			ICU Level of Service		H	
Analysis Period (min)			15						
c Critical Lane Group									




HCM 6th TWSC  
2: Sunset Avenue & Accessory Site Driveway

2025 Build Condition  
Weekday Morning Peak Hour

Intersection						
Int Delay, s/veh	0					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	1	110	0	0	135
Future Vol, veh/h	0	1	110	0	0	135
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, %	0	2	2	0	2	2
Mvmt Flow	0	1	120	0	0	147
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	-	120	0	0	120	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	4.12	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	0	931	-	-	1468	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	931	-	-	1468	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	8.9	0		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBL	SBT	
Capacity (veh/h)	-	- 931		1468	-	
HCM Lane V/C Ratio	-	- 0.001		-	-	
HCM Control Delay (s)	-	- 8.9		0	-	
HCM Lane LOS	-	- A		A	-	
HCM 95th %tile Q(veh)	-	- 0		0	-	

HCM 6th TWSC  
3: Sunset Avenue & Main Site Driveway

2025 Build Condition  
Weekday Morning Peak Hour

Intersection						
Int Delay, s/veh	2.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	56	54	0	17	118
Future Vol, veh/h	0	56	54	0	17	118
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, %	0	0	2	0	0	2
Mvmt Flow	0	61	59	0	18	128
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	-	59	0	0	59	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.2	-	-	4.1	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	0	1012	-	-	1558	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	1012	-	-	1558	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	8.8	0		0.9		
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBL	SBT	
Capacity (veh/h)	-	- 1012		1558	-	
HCM Lane V/C Ratio	-	- 0.06		0.012	-	
HCM Control Delay (s)	-	- 8.8		7.3	0	
HCM Lane LOS	-	- A		A	A	
HCM 95th %tile Q(veh)	-	- 0.2		0	-	

# HCM Signalized Intersection Capacity Analysis




## 1: Sunset Avenue & Bloomfield Avenue & Claremont Avenue

2025 Build Condition  
Weekday Evening Peak Hour

	→	↘	↙	←	↖	↑	↗	↘	↙
Movement	EBT	EBR	WBL	WBT	NBL2	NBT	NBR	SBR	SBR2
Lane Configurations	↑↑		↘	↑↑		↑↓		↘	↘
Traffic Volume (vph)	1737	60	69	788	30	0	47	705	146
Future Volume (vph)	1737	60	69	788	30	0	47	705	146
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100	2100	2100	2100
Total Lost time (s)	6.0		3.0	6.0		5.0		6.0	6.0
Lane Util. Factor	0.95		1.00	0.95		1.00		1.00	1.00
Frt	1.00		1.00	1.00		0.92		0.85	0.85
Flt Protected	1.00		0.95	1.00		0.98		1.00	1.00
Satd. Flow (prot)	3932		1995	3912		1893		1785	1785
Flt Permitted	1.00		0.07	1.00		0.98		1.00	1.00
Satd. Flow (perm)	3932		148	3912		1893		1785	1785
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.97	0.92	0.92
Adj. Flow (vph)	1888	65	75	857	33	0	48	766	159
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	1953	0	75	857	0	81	0	766	159
Heavy Vehicles (%)	1%	0%	0%	2%	0%	0%	0%	0%	0%
Turn Type	NA		pm+pt	NA	Perm	NA		Perm	Perm
Protected Phases	6		5	2		4			
Permitted Phases			2		4			2	2
Actuated Green, G (s)	88.5		95.9	95.9		8.0		95.9	95.9
Effective Green, g (s)	88.5		95.9	95.9		8.0		95.9	95.9
Actuated g/C Ratio	0.77		0.83	0.83		0.07		0.83	0.83
Clearance Time (s)	6.0		3.0	6.0		5.0		6.0	6.0
Vehicle Extension (s)	2.0		2.0	2.0		2.0		2.0	2.0
Lane Grp Cap (vph)	3028		194	3265		131		1489	1489
v/s Ratio Prot	c0.50		0.01	0.22					
v/s Ratio Perm			0.31			0.04		c0.43	0.09
v/c Ratio	0.64		0.39	0.26		0.62		0.51	0.11
Uniform Delay, d1	6.0		8.3	2.0		52.0		2.8	1.7
Progression Factor	1.00		1.00	1.00		1.00		1.00	1.00
Incremental Delay, d2	1.1		0.5	0.2		6.0		1.3	0.1
Delay (s)	7.1		8.8	2.2		57.9		4.0	1.9
Level of Service	A		A	A		E		A	A
Approach Delay (s)	7.1			2.7		57.9			
Approach LOS	A			A		E			
<b>Intersection Summary</b>									
HCM 2000 Control Delay			6.3			HCM 2000 Level of Service		A	
HCM 2000 Volume to Capacity ratio			0.64						
Actuated Cycle Length (s)			114.9			Sum of lost time (s)		14.0	
Intersection Capacity Utilization			173.3%			ICU Level of Service		H	
Analysis Period (min)			15						
c Critical Lane Group									




HCM 6th TWSC  
2: Sunset Avenue & Accessory Site Driveway

2025 Build Condition  
Weekday Evening Peak Hour

Intersection						
Int Delay, s/veh	0.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	1	76	0	1	128
Future Vol, veh/h	0	1	76	0	1	128
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, %	0	2	2	0	2	2
Mvmt Flow	0	1	83	0	1	139
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	-	83	0	0	83	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	4.12	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	0	976	-	-	1514	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	976	-	-	1514	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	8.7	0	0.1			
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	976	1514	-	
HCM Lane V/C Ratio	-	-	0.001	0.001	-	
HCM Control Delay (s)	-	-	8.7	7.4	0	
HCM Lane LOS	-	-	A	A	A	
HCM 95th %tile Q(veh)	-	-	0	0	-	

HCM 6th TWSC  
3: Sunset Avenue & Main Site Driveway

2025 Build Condition  
Weekday Evening Peak Hour

Intersection						
Int Delay, s/veh	2.9					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	29	47	0	47	81
Future Vol, veh/h	0	29	47	0	47	81
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, %	0	0	0	0	0	0
Mvmt Flow	0	32	51	0	51	88
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	-	51	0	0	51	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.2	-	-	4.1	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	0	1023	-	-	1568	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	1023	-	-	1568	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	8.6	0		2.7		
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBL	SBT	
Capacity (veh/h)	-	- 1023		1568	-	
HCM Lane V/C Ratio	-	- 0.031		0.033	-	
HCM Control Delay (s)	-	- 8.6		7.4	0	
HCM Lane LOS	-	- A		A	A	
HCM 95th %tile Q(veh)	-	- 0.1		0.1	-	

**SIGNAL TIMING & PLAN**

**TIMING SEQUENCE**  
(Without Pedestrian Actuation)

**Bloomfield Avenue and  
Sunset Ave. / Claremont Ave.**  
Essex County  
Verona, New Jersey

PHASES	SIGNAL FACES								TIME (SECS.)		
	1-3	4-6	7	8-10	11-13	14, 15	16, 17	18, 19	AM	PM	OFF
1. Bloomfield Ave./Claremont Ave. Change	R R	G/ G/ G/Y-	G G	G G	R R	DW DW	DW DW	DW DW	5-12 3	5-8 3	5-7 3
2. Bloomfield Ave./Claremont Ave. Pedestrian Clearance Change Clear	G G Y R	G G Y R	G G Y R	G G Y R	R R R R	W FDW DW DW	DW DW DW DW	DW DW DW DW	84-72 10 4 2	84-74 10 4 2	64-57 10 4 2
3. Sunset Ave. Change Clear	R R R	R R R	R R R	R R R	G Y R	DW DW DW	DW DW DW	DW DW DW	7-12 3 2	7-14 3 2	7-12 3 2
EMERGENCY FLASH	Y	Y	Y	Y	R	DARK	DARK	DARK	-	-	-

**TIMING SEQUENCE**  
(With Pedestrian Actuation)

**Bloomfield Avenue and  
Sunset Ave. / Claremont Ave.**  
Essex County  
Verona, New Jersey

PHASES	SIGNAL FACES								TIME (SECS.)	
	1-3	4-6	7	8-10	11-13	14, 15	16, 17	18, 19	AM	PM
1. Bloomfield Ave./Claremont Ave. Change	R R	G/<G- G/<Y-	G G	G G	R R	DW DW	DW DW	DW DW	5-12 3	5-8 3
2. Bloomfield Ave./Claremont Ave. Pedestrian Clearance Change Clear	G G Y R	G G Y R	G G Y R	G G Y R	R R R R	W FDW DW DW	DW DW DW DW	DW DW DW DW	47-35 10 4 2	47-37 10 4 2
3. Sunset Ave. Change Clear	R R R	R R R	R R R	R R R	G Y R	DW DW DW	DW DW DW	DW DW DW	7-12 3 2	7-14 3 2
4. Pedestrian Phase Pedestrian Clearance Clear	R R R	R R R	R R R	R R R	R R R	DW DW DW	W FDW DW	W FDW DW	10 24 3	10 24 3
EMERGENCY FLASH	Y	Y	Y	Y	R	DARK	DARK	DARK	-	-

NOTES:

- LOCKING MEMORY OFF FOR ALL PHASES.
- VEHICLE INTERVAL TO BE 2 SECONDS.
- THE CONTROLLER SHALL REST IN PHASE 2.
- AM OPERATION, 120 SECONDS CYCLE, 6:30 - 9:00 AM, MON. - FRI.
- PM OPERATION, 120 SECONDS CYCLE, 4:00 - 7:00 PM, MON. - FRI.
- OFF PEAK OPERATION, 100 SECONDS CYCLE, ALL OTHER TIMES
- THE TRAFFIC SIGNAL SYSTEM SHALL BE COORDINATED WITH THE ADJACENT SIGNAL INTERSECTIONS ON BLOOMFIELD AVE.
- THE OFFSETS MEASURED FROM THE BEGINNING OF GREEN FOR BLOOMFIELD AVE. AT POMPTON AVE./MT. PROSPECT AVE. ARE AS FOLLOWS:  
AM - 6 SEC., PM - 5 SEC., MD - 7 SEC.

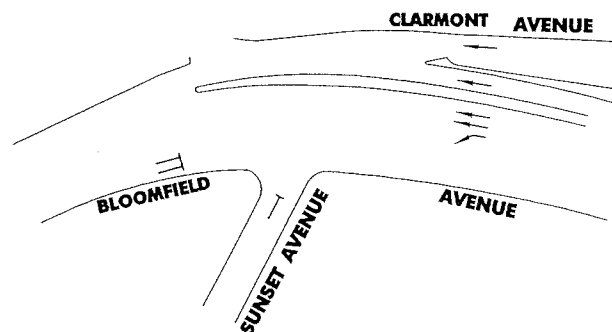
66

Intersection of Bloomfield Avenue  
with Claremont Avenue  
Township of Verona  
Essex County, New Jersey

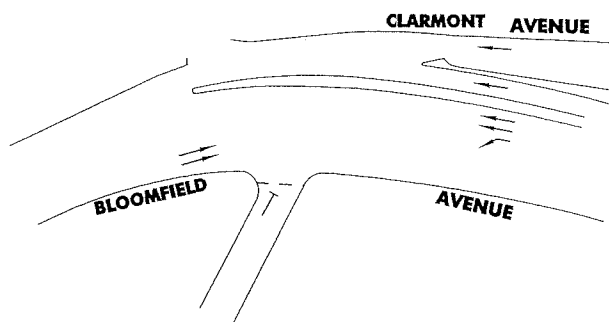
## PHASING DIAGRAM

(N.T.S.)

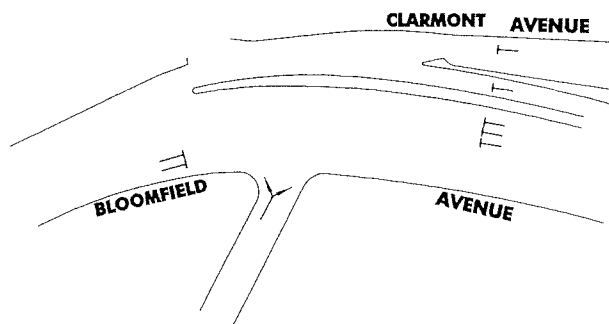
### PHASE 1



### PHASE 2



### PHASE 3

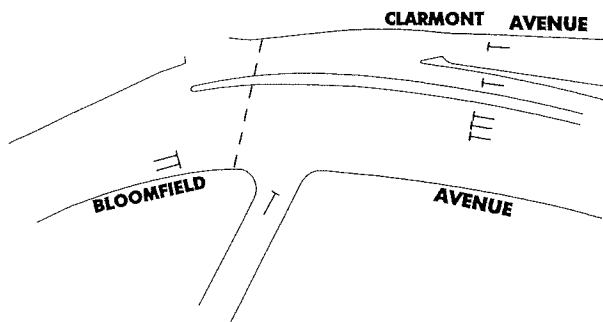


**Intersection of Bloomfield Avenue  
with Claremont Avenue  
Township of Verona  
Essex County, New Jersey**

**PHASING DIAGRAM**

**(N.T.S.)**

**PHASE 4**



NOTES:

- 1) TRAFFIC STRIPS FOR CROSSLINKS, STOPLINES, CROSSHATCHING AND ARROWS SHALL BE LONG LIFE THERMOPLASTIC. ALL OTHER TRAFFIC STRIPPING SHALL BE LONG LIFE EPOXY RESIN.
- 2) 4" DY TO HAVE 6" SEPARATION.
- 3) ALL EXISTING TRAFFIC SIGNALS SHALL BE REMOVED.



### SIGNAL LEGEND

DATE	REVISION
11-3-04	INCORPORATE NJDOT COMMENTS

**NOTE:**

**-NOTICE-**

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<b>JAMES M. GIELIN</b> PROFESSIONAL ENGINEER		<b>N.J. LIC.NO. 24755</b>	
<b>DWG. NO.</b> 9.2	<b>SCALE</b> 1" = 30'	<b>DATE</b>	<b>DATE</b> 

ESSEX COUNTY DEPARTMENT OF PUBLIC WORKS  
DIVISION OF ENGINEERING  
900 BLOOMFIELD AVENUE, VERONA, NEW JERSEY 07044  
PHONE NO. (973) 226-8500 FAX NO. (973) 226-7469  
IMPROVEMENTS TO TWO (2) EXISTING  
SIGNALIZED INTERSECTIONS  
TOWNSHIP OF VERONA

**TRAFFIC SIGNAL, SIGNING AND STRIPING PLANS**  
BLOOMFIELD AVE. AND SUNSET AVE./CLAREMONT AVE.  
BLOOMFIELD AVE. AND MT. PROSPECT AVE./POMPTON AVE.