

TRAFFIC IMPACT STUDY

For

Dalton Construction Services Proposed Multi-Family Residential Development

Property Located at:

557-565 Morris Avenue (CR 651)
Block 404 – Lots 5, 6, 7, 8 & 9
City of Summit, Union County, NJ

Prepared by:



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3692-99-001T

INTRODUCTION

It is proposed to construct a 3-story multi-family building with fifty-two (52) residential dwelling units (The Project) on a parcel of land located along the north side of Morris Avenue just east of its intersection with River Road in the City of Summit, Union County, New Jersey, see Figure 1, in Appendix A. The site is designated as Block 404 – Lots 5, 6, 7, 8 and 9 on the City Tax Maps. The site is currently developed with four (4) residential dwellings, one (1) commercial building and an overflow parking lot associated with the Volvo car dealership located along River Road. Access to the site is currently provided via four (4) driveways along Morris Avenue. It is proposed to close the existing access points and construct one (1) new full movement driveway along Morris Avenue. Parking will be provided via fifteen (15) surface spaces and one hundred twenty-three (123) garage spaces for a total on-site parking supply of one hundred thirty-eight (138) spaces. The garage spaces will be accessible via a mechanical vehicle lift system.

Dynamic Traffic, LLC has been retained to prepare this study to assess the traffic impact associated with the construction of The Project on the adjacent roadway network. This study documents the methodology, analyses, findings and conclusions of our study and includes:

- A detailed field inspection was conducted to obtain an inventory of existing roadway geometry, traffic control, and location and geometry of existing driveways and intersections.
- Existing traffic data was collected via manual turning movement (MTM) counts during the weekday morning and weekday evening peak periods at the intersection of River Road with Morris Avenue/ the Sunrise Driveway.
- Projections of traffic to be generated by The Project were prepared utilizing trip generation data as published by the Institute of Transportation Engineers. Site traffic was then assigned to the adjacent street system based upon the anticipated directional distribution.
- Capacity analyses were conducted for the Existing, No Build, and Build conditions for the study intersection and the site driveway.
- The proposed site driveway was inspected for adequacy of geometric design, spacing and/or alignment to streets and driveways on the opposite side of the street, relationship to other driveways adjacent to the development, and conformance with accepted design standards.
- The parking layout and supply was assessed based on accepted design standards and demand experienced at similar developments.

EXISTING CONDITIONS

A review of the existing roadway conditions near the proposed site was conducted to provide the basis for assessing the traffic impact of the development. This included field investigations of the surrounding roadways and intersections, collection of traffic volume data, and extensive analyses.

Existing Roadway Conditions

The following are descriptions of the roadways in the study area:

River Road (CR 649) is an Urban Minor Arterial roadway under the jurisdiction of Union County. In the vicinity of the site the posted speed limit is 40 MPH and the roadway generally provides one travel lane in each direction with a north/south orientation. On-street parking is not permitted along either side of the roadway. Curb is provided along both sides of the roadway while sidewalk is provided along the west side of the roadway and portions of the east side of the roadway. River Road provides a curved horizontal alignment and an uphill vertical alignment from south to north. The land uses along River Road in the vicinity of The Project are primarily commercial.

Morris Avenue (CR 651) is an Urban Minor Arterial roadway under the jurisdiction of Union County. In the vicinity of the site the posted speed limit is 35 MPH and the roadway provides one travel lane in each direction. It should be noted that Morris Avenue is designated as a north/south roadway; however, it was assumed to have an east/west orientation for the purposes of this report. On-street parking is not permitted along either side of the roadway while curb and sidewalk is provided along both sides of the roadway. Morris Avenue provides a straight horizontal alignment and an uphill vertical alignment from west to east. The land uses along Morris Avenue in the vicinity of The Project are primarily commercial.

Existing Traffic Volumes

Manual turning movement (MTM) counts were conducted on Wednesday, February 17, 2021 between 7:00 – 9:00 AM and between 4:30 – 6:30 PM at the intersection of River Road with Morris Avenue/the Sunrise Driveway.

It should be noted that traffic conditions associated with the COVID-19 pandemic were in effect as of the time of preparation of this report. As a result, current traffic volumes on the surrounding roadways are atypically low at this time and would not be representative of “existing” traffic conditions. Therefore, historical traffic data was obtained from NJDOT via automatic traffic recorder (ATR) counts collected along River Road in April 2017. The volumes were then grown utilizing an annual growth rate contained within the NJDOT Annual Background Growth Rate Table, which indicates a growth rate of 1% per year, for a period of four (4) years in order to develop traffic volumes along River Road representative of “existing” conditions.

Once the projected 2021 volumes were established for the previous ATR data, the individual movements counted at the intersection of River Road and Morris Avenue/Sunrise Driveway were utilized to calculate the February 2021 through movements along River Road at the ATR location. The eastbound left turn, westbound right turn and northbound through movements were utilized to calculate the northbound volumes, while the southbound left turn, through and right turn movements were utilized to calculate the southbound volumes.

Upon comparing the projected traffic volumes along River Road to the February 2021 MTM data, adjustment factors of 1.48 and 1.50 were calculated during the respective AM and PM peak hours. These adjustment factors were then applied to the MTM count data in order to normalize the traffic volumes to reflect typical conditions. Review of the collected traffic data reveals that the weekday morning peak street hour (PSH) occurs between 7:45 – 8:45 AM and the weekday evening PSH occurs between 4:30 – 5:30 PM. Figure 2, located in Appendix A, shows the existing peak hour traffic volumes at the study intersections. All traffic counts are contained in Appendix B.

Existing Capacity Analysis

The methodology utilized in the capacity analyses is based on the *Highway Capacity Manual 2010*, published by the Transportation Research Board. In general, the term Level of Service (LOS) is used to provide a “qualitative” evaluation of capacity based upon certain “quantitative” calculations related to empirical values, such as traffic volume and intersection control.

At the signalized intersections, factors that affect the various approach capacities include width of approach, number of lanes, signal “green time”, turning percentages, truck volumes, etc. However, delays cannot be related to capacity in a simple one-to-one fashion. For example, it is possible to have delays in the Level of Service “F” range without exceeding roadway capacity. Substantial delays can exist without exceeding capacity if one or more of the following conditions exist: long signal cycle lengths; a particular traffic movement experiences a long red time; or progressive movement for a particular lane group is poor. Table I describes the Level of Service ranges for signalized intersections.

When analyzing an unsignalized intersection, it is assumed that both the major street through and right turn movements are unimpeded and have the right-of-way over all side street traffic and left turns from the major street. All other turning movements in the intersection cross, merge with, or are otherwise impeded by major street movements. Traffic delays at unsignalized intersections are determined by sequentially processing these impeded movements. Table II describes the Level of Service ranges for unsignalized (stop controlled) intersections.

**Table I
Level of Service Criteria
for Signalized Intersections**

Level of Service	Average Control Delay (seconds per vehicle)
A	0.0 to 10.0
B	10.1 to 20.0
C	20.1 to 35.0
D	35.1 to 55.0
E	55.1 to 80.0
F	greater than 80.0

**Table II
Level of Service Criteria
for Unsignalized Intersections**

Level of Service	Average Control Delay (seconds per vehicle)
a	0.0 to 10.0
b	10.1 to 15.0
c	15.1 to 25.0
d	25.1 to 35.0
e	35.1 to 50.0
f	greater than 50.0

It should be noted that the analyses within the *Highway Capacity Manual* assume a random arrival for all the movements. All capacity analyses were performed utilizing the Synchro software package (Synchro 11). Table III summarizes the existing Levels of Service (LOS) and delays. All capacity analysis calculation worksheets are contained in Appendix C.

**Table III
Existing Levels of Service**

Intersection	Direction/ Movement		AM PSH	PM PSH
	River Road and Morris Avenue/ Sunrise Driveway	EB	LTR	A (0)
WB		L	C (22)	C (22)
		LT	C (22)	C (22)
		R	C (23)	C (22)
NB		LT	C (26)	D (35)
		R	B (14)	B (14)
SB		L	C (32)	C (22)
		TR	C (24)	C (23)
Overall		C (24)	C (26)	

A (#) - Signalized Intersection Level of Service (seconds of delay per vehicle)

The following are discussions pertaining to each of the existing intersections analyzed.

River Road and Morris Avenue/Sunrise Driveway

Morris Avenue/the Sunrise driveway intersect River Road to form a four-leg intersection controlled by a four-phase traffic signal with a 90-second cycle length. The eastbound approach of the Sunrise Driveway provides a shared left turn/through/right turn lane. The westbound approach of Morris Avenue provides a dedicated left turn lane, a shared left turn/through lane and a channelized right turn lane under yield control. The northbound approach of River Road provides a shared left turn/through lane, a dedicated through and a channelized right turn lane under yield control. The southbound approach of River Road provides a dedicated left turn lane and a shared through/right turn lane.

A review of the existing analysis reveals that the intersection operates at overall Level of Service “C” during the analyzed peak periods. See Table III for the individual movement Levels of Service and delays.

FUTURE CONDITIONS

Traffic volumes and operational analyses were developed for both the Future No Build and Build conditions. The No Build conditions provide a baseline for assessing the impact of site development traffic on the roadway system. The process of developing the No Build and Build traffic volumes and the subsequent analyses is outlined below.

Regardless of whether the subject site is developed or not, traffic volumes on the surrounding roadways are expected to increase as a result of developments throughout the region. A growth rate for roadways within the study area was obtained from the NJDOT Annual Background Growth Rate Table, which indicates a growth rate of 1% per year.

Future No Build traffic volumes were developed by applying the background growth rate of 1% for two (2) years to the study area roadways existing traffic volumes. Figure 3, in Appendix A, shows the Future No Build traffic volumes.

It is noted that a traffic signal is being installed by Union County at the intersection of River Road and Chatham Road. It is not anticipated that this signalization will have a material impact on the intersections examined herein or the analysis results.

Traffic Generation

Projections of future traffic volumes were developed utilizing data as published in the Institute of Transportation Engineers (ITE) publication *Trip Generation, 10th Edition* for Land Use Code (LUC) 221 – Multifamily Housing (Mid-Rise). Table IV summarizes the projected trips generated by the proposed development utilizing the ITE data.

**Table IV
Trip Generation**

Land Use	AM PSH			PM PSH		
	In	Out	Total	In	Out	Total
52 Residential Units	5	13	18	15	9	24

As previously noted, the site is currently developed with numerous residential dwellings, a commercial building and an overflow parking lot associated with the Volvo car dealership. However, no credit was taken for the existing use of the property and all trip generation was considered an increase over vacant land. This accounts for a “worst case scenario” from a traffic impact perspective.

Once the magnitude of traffic to be generated by the site is known, it is necessary to assign that traffic to the adjacent street system. The distribution of new traffic to the surrounding roadways is based on the location of primary arterial roadways, major signalized intersections and existing traffic patterns. Figure 4, located in Appendix A, illustrates the percent distribution of site generated trips and Figure 5 illustrates the site generated traffic volumes for the proposed residential development. The site generated volumes were added to the Future No Build traffic volumes to generate the Future Build traffic volumes, which are shown in Figure 6.

Future Capacity Analysis

Operational conditions at the study intersections were analyzed under the No Build and Build conditions and are summarized in Table V below.

Table V
Future Levels of Service

Intersection	Direction/ Movement		AM PSH		PM PSH	
			No Build	Build	No Build	Build
River Road and Morris Avenue/Sunrise Driveway	EB	LTR	A (0)	A (0)	A (0)	A (0)
		L	C (22)	C (22)	C (22)	C (22)
	WB	LT	C (22)	C (22)	C (22)	C (22)
		R	C (23)	C (23)	C (22)	C (22)
	NB	LT	C (27)	C (27)	D (35)	D (35)
		R	B (15)	B (15)	B (13)	B (14)
	SB	L	D (36)	D (37)	C (21)	C (22)
		TR	C (26)	C (26)	C (22)	C (23)
	Overall		C (25)	C (26)	C (25)	C (26)
Morris Avenue and Site Driveway	EB	LT	-	a (10)	-	a (10)
	SB	LR	-	c (24)	-	c (21)

A (#) - Signalized Intersection Level of Service (seconds of delay per vehicle)
a (#) - Unsignalized Intersection Level of Service (seconds of delay per vehicle)

River Road and Morris Avenue/Sunrise Driveway

With the addition of the site traffic, the intersection is anticipated to continue to operate at overall Level of Service “C” during the analyzed peak periods, maintaining No Build Levels of Service. See Table V for the individual movement Levels of Service and delays.

Morris Avenue and the Site Driveway

The site driveway is proposed to intersect Morris Avenue to form an unsignalized T-intersection with the site driveway under stop control. The eastbound and westbound approaches of Morris Avenue are proposed to provide a shared left turn/through lane and a shared through/right turn lane, respectively. The southbound approach of the site driveway is proposed to provide a shared lane for left and right turns.

As designed, the individual intersection movements are anticipated to operate at Level of Service “C” or better during the analyzed peak periods. See Table V for the individual movement Levels of Service and delays.

It should be noted that the maximum 95th percentile queue length along Morris Avenue from the signalized intersection with River Road is calculated to be 212 feet which will not extend beyond the location of the site driveway. Furthermore, it is noted that east of the site driveway, Morris Avenue provides only one westbound lane conflicting with driveway egress. Therefore, a motorist will exit the driveway in a gap in this single lane and have ample opportunity to choose any of the three approach lanes at the signalized intersection.

SITE PLAN

Site Access and Circulation

The site plan was reviewed with respect to the site access and on-site circulation design. As noted previously, access to The Project will be provided via one (1) full movement driveway along Morris Avenue. This driveway layout offers sufficient geometry to allow safe and efficient access of the site. Adequate sight distance is available along Morris Avenue and vehicles exiting the site driveway and the adjacent property's driveway will have unobstructed visibility of one another for the rare occurrence of vehicles exiting simultaneously.

The newly constructed parking areas will be serviced by parking aisles with a minimum width of 24', which meets the Residential Site Improvement Standards (RSIS) requirement. This access configuration will allow for two-way circulation and 90-degree parking. As mentioned previously, the garage spaces will be accessible via a mechanical vehicle lift system. These dimensions are consistent with accepted engineering design standards and will adequately accommodate the anticipated site traffic.

Parking

The City of Summit Ordinance defers to RSIS for residential land uses which sets forth a minimum parking requirement of 1.8 parking spaces per one-bedroom unit, 2 parking spaces per two-bedroom unit and 2.1 parking spaces per three-bedroom unit for mid-rise developments. With 34 one-bedroom units, 17 two-bedroom units and 1 three-bedroom unit proposed, this equates to a parking requirement of 97 spaces. The site as proposed provides 138 parking spaces, and as such the Ordinance requirements are exceeded.

It is proposed to provide parking stalls with dimensions of 9'x18' which meets the RSIS requirement and is consistent with accepted engineering design standards. Given the low-turnover expected for the parking spaces which will be utilized by residents who are very familiar with the site circulation patterns, these dimensions will adequately accommodate the site.

FINDINGS & CONCLUSIONS

Findings

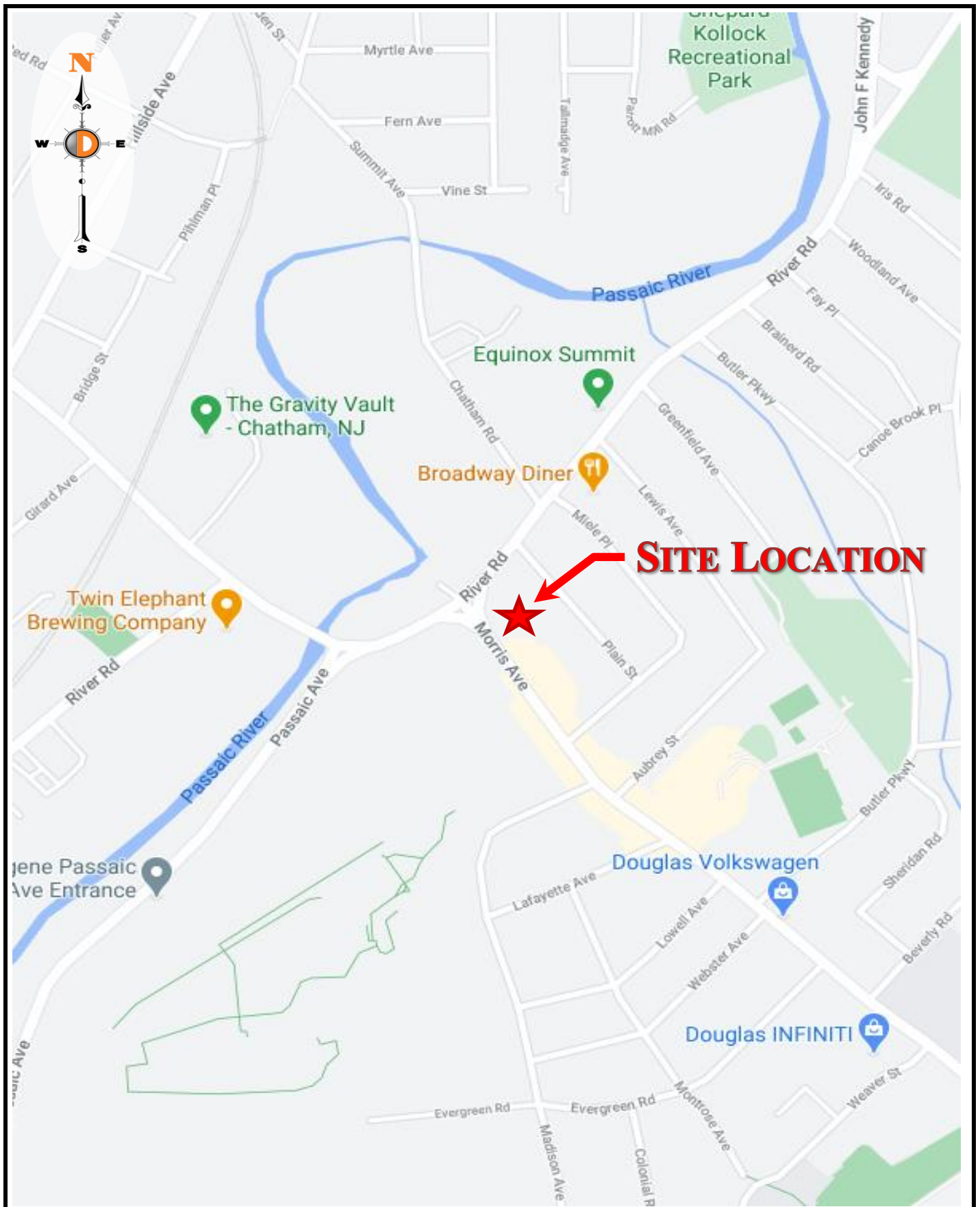
Based upon the detailed analyses as documented herein, the following findings are noted:

- The proposed 52 residential units are projected to generate 5 entering trips and 13 exiting trips during the morning peak hour and 15 entering trips and 9 exiting trips during the evening peak hour.
- Access to the site will be provided via one (1) full movement driveway along Morris Avenue which will provide adequate sight visibility along Morris Avenue and to the adjacent driveway. The proposed driveway is appropriately located as far as possible from the adjacent signalized intersection.
- With the addition of the site generated traffic, the intersection of River Road and Morris Avenue/the Sunrise Driveway is anticipated to continue to operate at overall Level of Service “C” during the analyzed peak periods, maintaining No Build Levels of Service.
- As designed, the individual intersection movements of Morris Avenue and the site driveway are anticipated to operate at Level of Service “C” or better during the studied peak hours.
- As proposed, The Project’s site driveway and internal circulation has been designed to provide for safe and efficient movement of automobiles.
- The proposed parking supply and design is sufficient to support the projected demand and exceeds the RSIS requirements.

Conclusions

Based upon our Traffic Impact Study as detailed in the body of this report, it is the professional opinion of Dynamic Traffic, LLC that the adjacent street system of the City of Summit and Union County will not experience any significant degradation in operating conditions with the construction of The Project. The site driveway is located to provide safe and efficient access to the adjacent roadway system. The site plan as proposed provides for good circulation throughout the site and provides adequate parking to accommodate The Project’s needs.

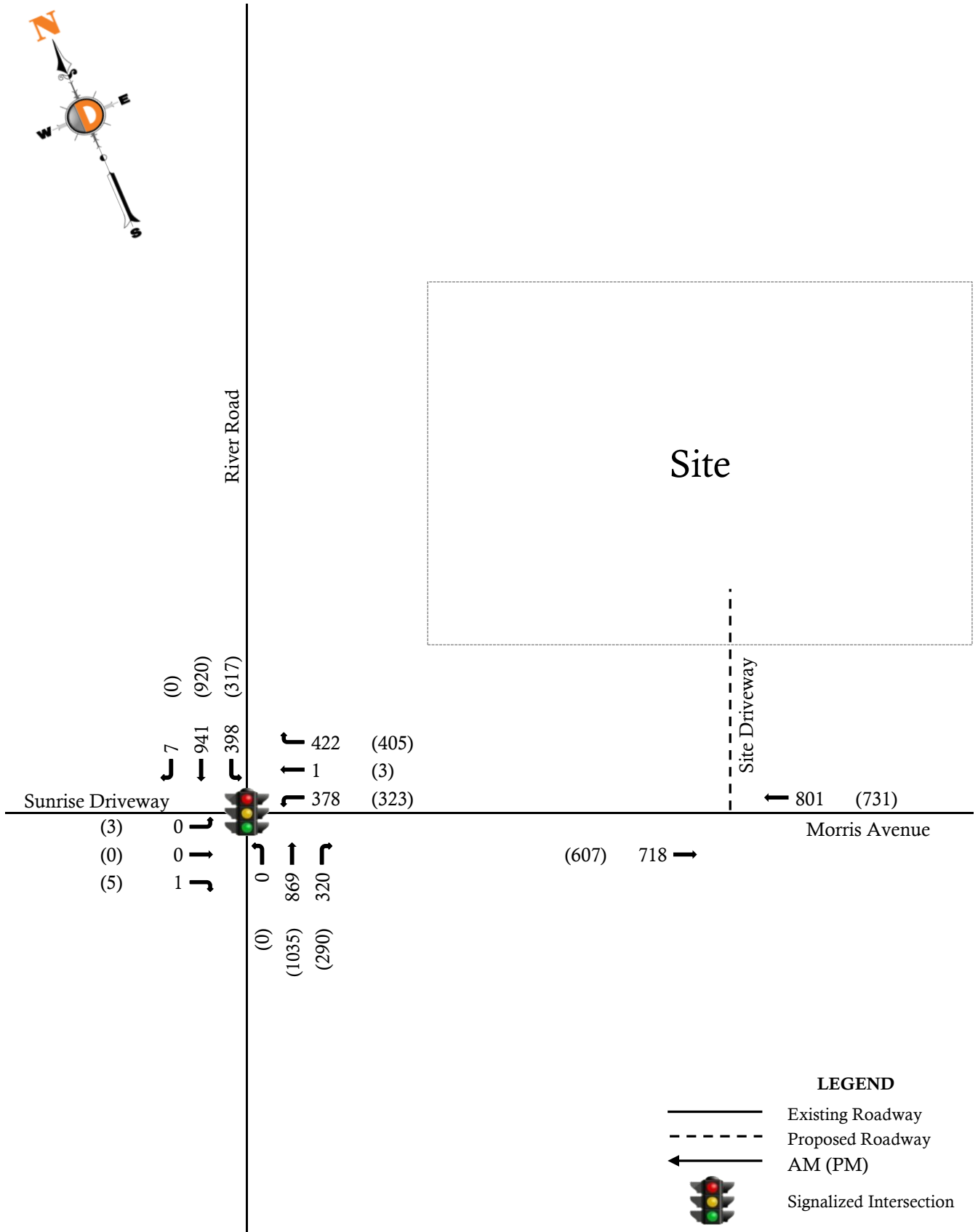
Appendix A
Traffic Volume Figures



Proposed Multi-Family Residential Development
Traffic Impact Study
3692-99-001T
5/24/2021

Figure 1

Site Location Map



LEGEND





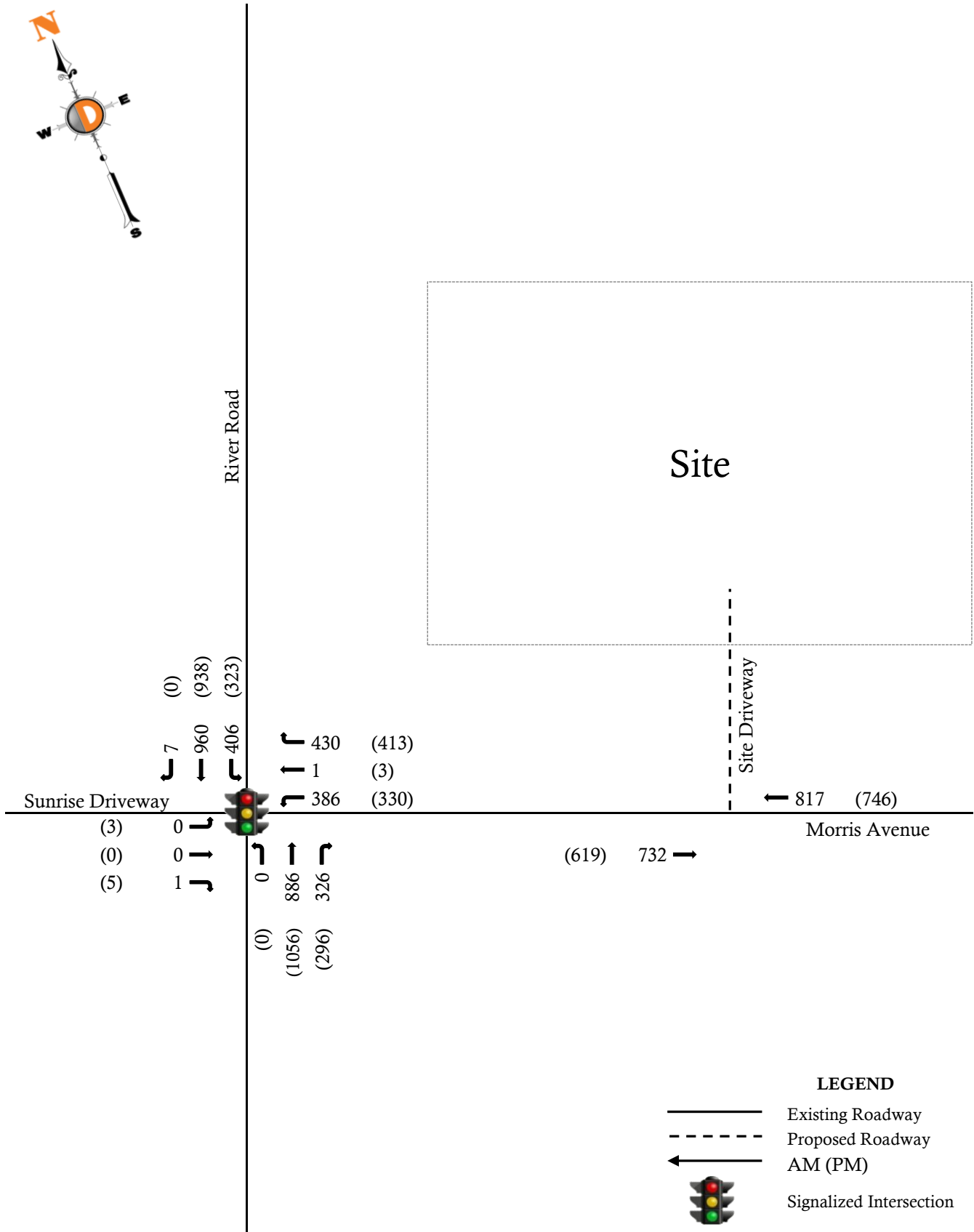
-  Existing Roadway
-  Proposed Roadway
-  AM (PM)
-  Signalized Intersection



Figure 2

Existing Traffic Volumes



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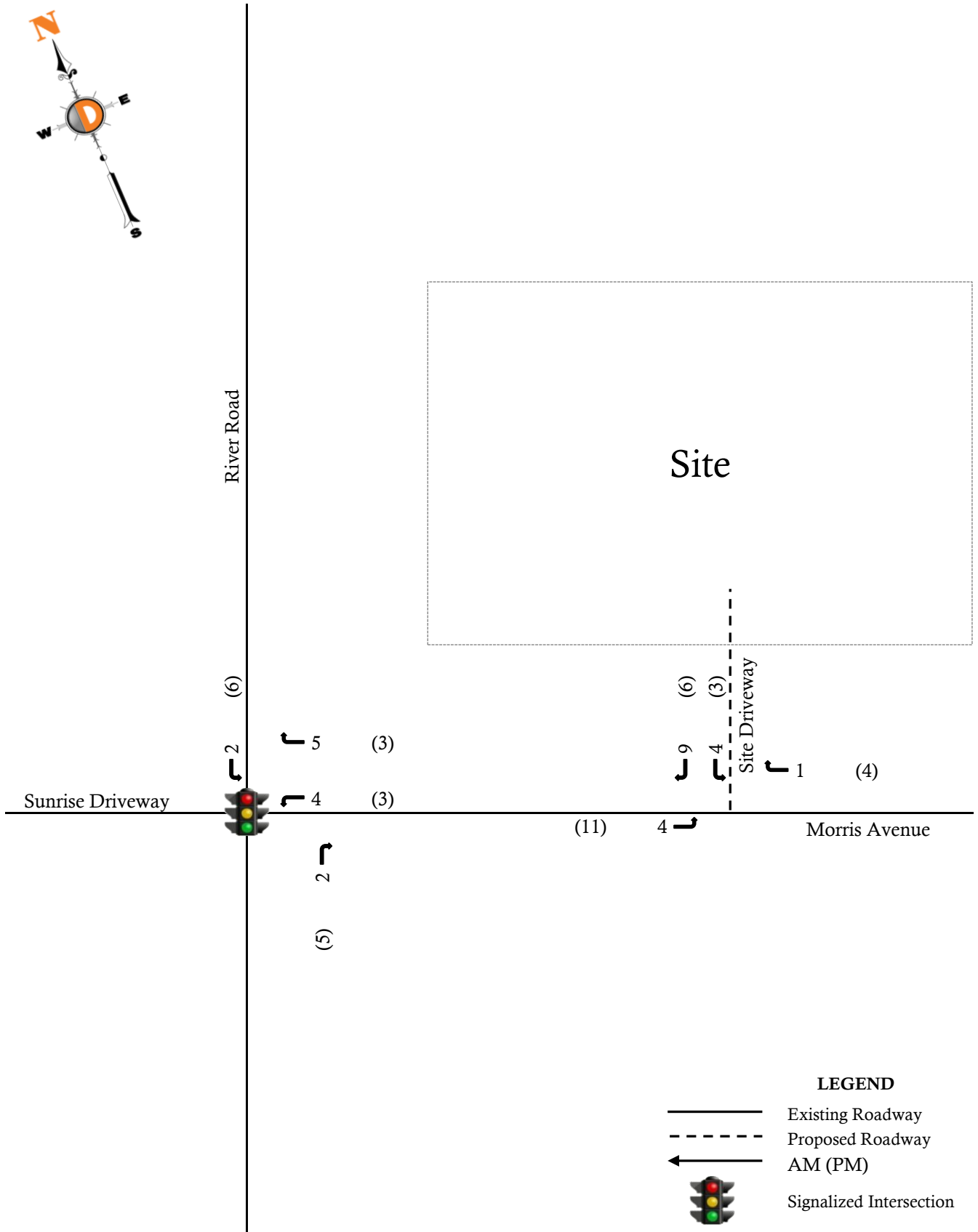
-  Existing Roadway
-  Proposed Roadway
-  AM (PM)
-  Signalized Intersection



Figure 3

No Build Traffic Volumes



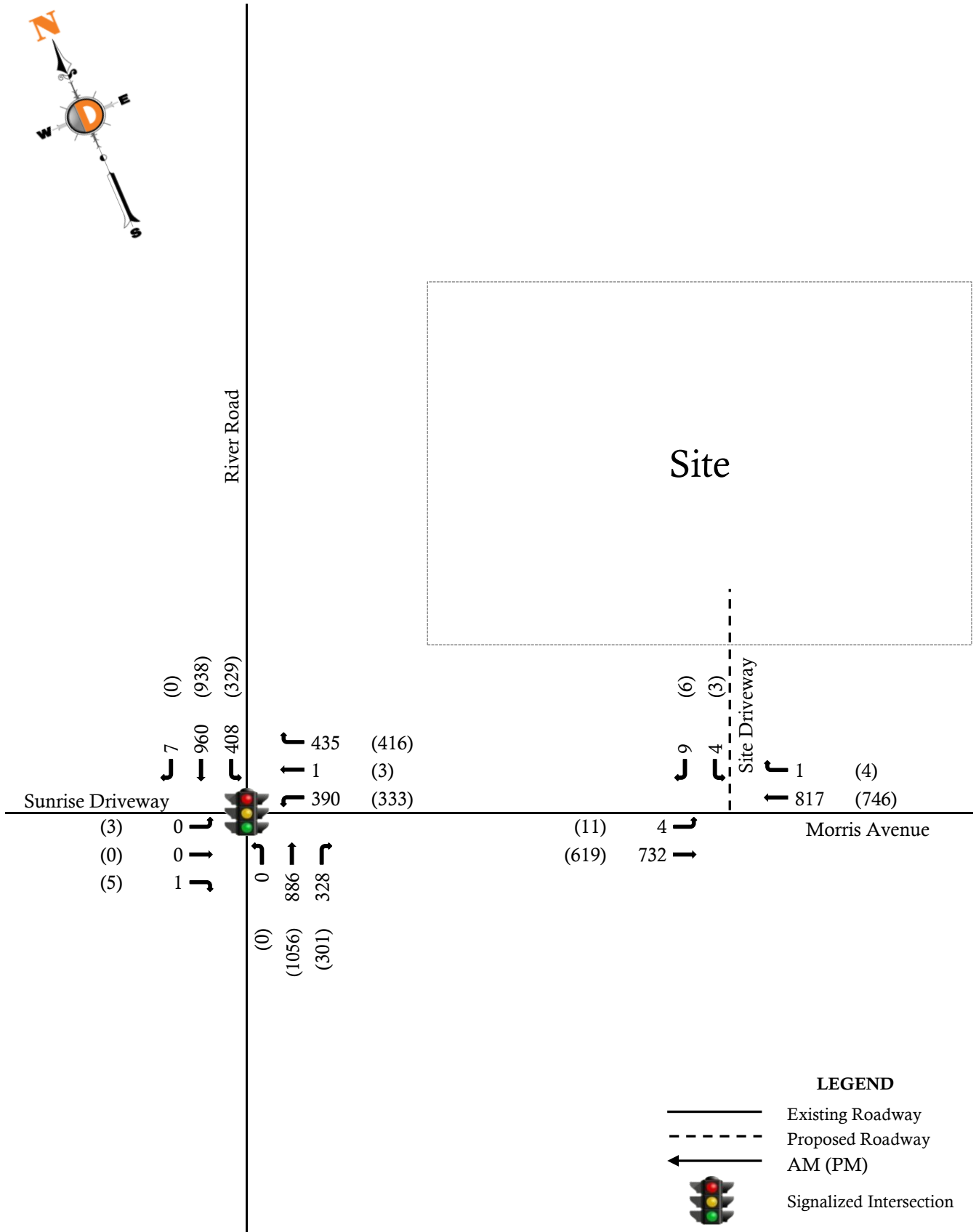


LEGEND

- Existing Roadway
- Proposed Roadway
- AM (PM)
- Signalized Intersection



Figure 5
Site Generated Trips



LEGEND


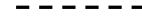


-  Existing Roadway
-  Proposed Roadway
-  AM (PM)
-  Signalized Intersection



Figure 6

Build Traffic Volumes

Appendix B
Traffic Counts

Dynamic Traffic, LLC

1904 Main Street, Lake Como, NJ 07719
 245 Main Street - Suite 110, Chester, NJ 07930
 732-681-0760

E/W: Dway/Morris Ave
 N/S: River Rd
 Town/County: Summit/Union
 Job #: 3692-99-001T

File Name : River Rd & Morris Ave-Dway - AMPM
 Site Code : 00000000
 Start Date : 2/17/2021
 Page No : 1

Groups Printed- Cars - Trucks (SU) - Trucks (TT)

Start Time	Sunrise Driveway Eastbound					Morris Avenue (CR 651) Westbound					River Road (CR 649) Northbound					River Road (CR 649) Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
07:00 AM	0	0	0	2	2	25	0	33	0	58	0	78	18	0	96	66	119	0	1	186	342
07:15 AM	0	0	0	1	1	40	0	27	0	67	0	117	34	0	151	50	140	0	0	190	409
07:30 AM	0	1	0	0	1	34	0	34	0	68	0	135	44	0	179	71	160	2	1	234	482
07:45 AM	0	0	0	0	0	53	1	47	0	101	0	152	71	0	223	78	163	0	1	242	566
Total	0	1	0	3	4	152	1	141	0	294	0	482	167	0	649	265	582	2	3	852	1799
08:00 AM	0	0	1	0	1	72	0	57	0	129	0	121	59	2	182	89	162	3	1	255	567
08:15 AM	0	0	0	0	0	77	0	98	0	175	0	150	46	1	197	53	151	0	0	204	576
08:30 AM	0	0	0	0	0	53	0	83	0	136	0	164	40	0	204	49	160	2	1	212	552
08:45 AM	0	0	0	0	0	39	0	54	0	93	0	159	47	0	206	58	130	1	1	190	489
Total	0	0	1	0	1	241	0	292	0	533	0	594	192	3	789	249	603	6	3	861	2184
*** BREAK ***																					
04:30 PM	0	0	2	0	2	58	2	56	0	116	0	195	51	1	247	46	143	0	1	190	555
04:45 PM	1	0	0	0	1	38	0	68	0	106	0	170	52	0	222	38	154	0	1	193	522
Total	1	0	2	0	3	96	2	124	0	222	0	365	103	1	469	84	297	0	2	383	1077
05:00 PM	1	0	1	3	5	58	0	74	0	132	0	151	45	0	196	66	148	0	4	218	551
05:15 PM	0	0	0	0	0	61	0	72	0	133	0	174	45	0	219	61	168	0	0	229	581
05:30 PM	1	0	0	0	1	54	1	66	0	121	0	143	66	0	209	63	142	0	0	205	536
05:45 PM	0	1	1	1	3	54	0	59	0	113	0	150	47	0	197	42	153	0	1	196	509
Total	2	1	2	4	9	227	1	271	0	499	0	618	203	0	821	232	611	0	5	848	2177
06:00 PM	0	0	0	1	1	49	0	52	0	101	0	138	47	0	185	52	140	0	0	192	479
06:15 PM	0	0	0	0	0	50	0	44	0	94	0	127	25	0	152	54	141	0	0	195	441
Grand Total	3	2	5	8	18	815	4	924	0	1743	0	2324	737	4	3065	936	2374	8	13	3331	8157
Apprch %	16.7	11.1	27.8	44.4		46.8	0.2	53	0		0	75.8	24	0.1		28.1	71.3	0.2	0.4		
Total %	0	0	0.1	0.1	0.2	10	0	11.3	0	21.4	0	28.5	9	0	37.6	11.5	29.1	0.1	0.2	40.8	
Cars	3	2	4	8	17	805	4	900	0	1709	0	2292	726	4	3022	910	2317	8	13	3248	7996
% Cars	100	100	80	100	94.4	98.8	100	97.4	0	98	0	98.6	98.5	100	98.6	97.2	97.6	100	100	97.5	98
Trucks (SU)	0	0	0	0	0	10	0	24	0	34	0	28	11	0	39	26	52	0	0	78	151
% Trucks (SU)	0	0	0	0	0	1.2	0	2.6	0	2	0	1.2	1.5	0	1.3	2.8	2.2	0	0	2.3	1.9
Trucks (TT)	0	0	1	0	1	0	0	0	0	0	0	4	0	0	4	0	5	0	0	5	10
% Trucks (TT)	0	0	20	0	5.6	0	0	0	0	0	0	0.2	0	0	0.1	0	0.2	0	0	0.2	0.1

New Jersey Department of Transportation

Daily Volume from 04/24/2017 through 04/26/2017

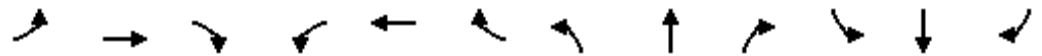
Site Names: 112067, , River Road-1.68, 20000649 __, Summit City
 County: UNION
 Funct: Urban Minor Arterial
 Location: BET BUTLER PARKWAY AND GREENFIELD AVE

Seasonal Factor Group: RG1_FC16
 Daily Factor Group: RG1_FC16
 Axle Factor Group: RG1_FC16
 Growth Factor Group: RG1_FC16

	Sun 04/23/2017		Mon 04/24/2017		Tue 04/25/2017		Wed 04/26/2017		Thu 04/27/2017		Fri 04/28/2017		Sat 04/29/2017		
	ROAD	S	N	ROAD	S	N	ROAD	S	N	ROAD	S	N	ROAD	S	N
00:00					96	49	47	101	54	47					
01:00					33	17	16	35	19	16					
02:00					19	11	8	22	14	8					
03:00					27	10	17	33	16	17					
04:00					114	57	57	111	54	57					
05:00					442	209	233	442	209	233					
06:00					1,202	595	607	1,196	589	607					
07:00					2,265	1,068	1,197	2,256	1,059	1,197					
08:00					2,345	1,110	1,235	2,283	1,048	1,235					
09:00					1,813	919	894	1,747	853	894					
10:00					1,449	696	753	1,448	695	753					
11:00					1,404	685	719	1,393	674	719					
12:00					1,580	785	795	1,474	729	745					
13:00					1,500	725	775	1,491	714	777					
14:00					1,663	873	790	1,669	879	790					
15:00					2,109	950	1,159	2,104	945	1,159					
16:00					2,161	1,073	1,088	2,161	1,073	1,088					
17:00					2,440	1,313	1,127	2,506	1,379	1,127					
18:00					1,889	1,061	828	1,922	1,094	828					
19:00					1,346	755	591	1,394	803	591					
20:00					926	522	404	925	521	404					
21:00					637	347	290	648	358	290					
22:00					323	195	128	324	196	128					
23:00					164	94	70	179	109	70					
Volume					16,738	8,693	8,045	28,006	14,226	13,780	11,067	5,284	5,783		
AM Peak Vol								2,345	1,110	1,235	2,283	1,059	1,235		
AM Peak Fct								1.00	1.00	1.00	1.00	1.00	1.00		
AM Peak Hr								8:00	8:00	8:00	8:00	7:00	8:00		
PM Peak Vol					2,440	1,313	1,159	2,506	1,379	1,159					
PM Peak Fct					1.00	1.00	1.00	1.00	1.00	1.00					
PM Peak Hr					17:00	17:00	15:00	17:00	17:00	15:00					
Seasonal Fct					0.961	0.961	0.961	0.961	0.961	0.961	0.961	0.961	0.961		
Daily Fct					0.928	0.928	0.928	0.896	0.896	0.896	0.896	0.890	0.890		
Axle Fct					0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500		
Pulse Fct					2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000		

Appendix C
Capacity Analysis

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	1	378	1	422	0	869	320	398	941	7
Future Volume (vph)	0	0	1	378	1	422	0	869	320	398	941	7
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
Lane Width (ft)	12	12	12	12	12	13	10	10	16	11	12	12
Grade (%)		11%			-3%			3%				-1%
Storage Length (ft)	0		0	260		5	0		5	415		0
Storage Lanes	0		0	1		1	0		1	1		0
Taper Length (ft)	25			25			25			30		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Frt		0.865				0.850			0.850		0.999	
Flt Protected				0.950	0.953					0.950		
Satd. Flow (prot)	0	1717	0	1886	1892	1818	0	3596	1954	1864	2009	0
Flt Permitted				0.950	0.953					0.170		
Satd. Flow (perm)	0	1717	0	1886	1892	1818	0	3596	1954	333	2009	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		144				163			121			
Link Speed (mph)		35			35			40				40
Link Distance (ft)		248			436			569				577
Travel Time (s)		4.8			8.5			9.7				9.8
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
Heavy Vehicles (%)	0%	0%	0%	2%	0%	3%	0%	2%	2%	4%	5%	0%
Shared Lane Traffic (%)				50%								
Lane Group Flow (vph)	0	1	0	193	194	431	0	887	327	406	967	0
Turn Type		NA		Split	NA	Perm		NA	Perm	pm+pt	NA	
Protected Phases	8	8		4	4			2		1	6	
Permitted Phases						4	2		2	6		
Detector Phase	8	8		4	4	4	2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		8.0	8.0	8.0	20.0	20.0	20.0	5.0	28.0	
Minimum Split (s)	10.0	10.0		13.0	13.0	13.0	25.0	25.0	25.0	8.0	33.0	
Total Split (s)	15.0	15.0		36.0	36.0	36.0	25.0	25.0	25.0	14.0	39.0	
Total Split (%)	16.7%	16.7%		40.0%	40.0%	40.0%	27.8%	27.8%	27.8%	15.6%	43.3%	
Yellow Time (s)	3.0	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	2.0	2.0	2.0	2.0	0.0	2.0	
Lost Time Adjust (s)		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		5.0	5.0	3.0	5.0	
Lead/Lag							Lag	Lag	Lag	Lead		
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Recall Mode	None	None		Min	Min	Min	Max	Max	Max	None	Max	
Act Effct Green (s)		5.1		14.8	14.8	14.8		20.5	20.5	36.9	34.8	
Actuated g/C Ratio		0.08		0.24	0.24	0.24		0.33	0.33	0.60	0.57	
v/c Ratio		0.00		0.42	0.43	0.77		0.74	0.45	0.85	0.85	
Control Delay		0.0		22.4	22.4	22.9		25.6	14.2	32.4	23.8	
Queue Delay		0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay		0.0		22.4	22.4	22.9		25.6	14.2	32.4	23.8	
LOS		A		C	C	C		C	B	C	C	
Approach Delay					22.7			22.5			26.4	
Approach LOS					C			C			C	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		0		60	60	84		136	51	72	229	
Queue Length 95th (ft)		0		130	130	203		#364	170	#360	#807	
Internal Link Dist (ft)		168			356			489			497	
Turn Bay Length (ft)				260		5			5	415		
Base Capacity (vph)		406		975	978	1018		1199	732	480	1139	
Starvation Cap Reductn		0		0	0	0		0	0	0	0	
Spillback Cap Reductn		0		0	0	0		0	0	0	0	
Storage Cap Reductn		0		0	0	0		0	0	0	0	
Reduced v/c Ratio		0.00		0.20	0.20	0.42		0.74	0.45	0.85	0.85	

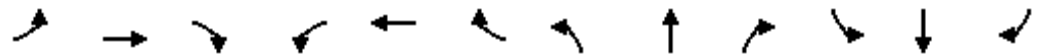
Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	61.4
Natural Cycle:	75
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.85
Intersection Signal Delay:	24.1
Intersection LOS:	C
Intersection Capacity Utilization:	95.6%
ICU Level of Service:	F
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Splits and Phases: 10: River Road & Sunrise Driveway/Morris Avenue

Ø1	Ø2	Ø4	Ø8
14 s	25 s	36 s	15 s
Ø6			
39 s			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	0	5	333	3	416	0	1056	301	329	938	0
Future Volume (vph)	3	0	5	333	3	416	0	1056	301	329	938	0
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
Lane Width (ft)	12	12	12	12	12	13	10	10	16	11	12	12
Grade (%)		11%			-3%			3%			-1%	
Storage Length (ft)	0		0	260		5	0		5	415		0
Storage Lanes	0		0	1		1	0		1	1		0
Taper Length (ft)	25			25			25			30		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Frt		0.916				0.850			0.850			
Flt Protected		0.982		0.950	0.953					0.950		
Satd. Flow (prot)	0	1785	0	1905	1911	1835	0	3632	1973	1882	2069	0
Flt Permitted		0.982		0.950	0.953					0.170		
Satd. Flow (perm)	0	1785	0	1905	1911	1835	0	3632	1973	337	2069	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		121				179			121			
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		248			436			569			577	
Travel Time (s)		4.8			8.5			9.7			9.8	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	1%	0%	2%	0%	1%	1%	3%	2%	0%
Shared Lane Traffic (%)				50%								
Lane Group Flow (vph)	0	8	0	175	179	438	0	1112	317	346	987	0
Turn Type	Split	NA		Split	NA	Perm		NA	Perm	pm+pt	NA	
Protected Phases	8	8		4	4			2		1	6	
Permitted Phases						4	2		2	6		
Detector Phase	8	8		4	4	4	2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		8.0	8.0	8.0	20.0	20.0	20.0	5.0	28.0	
Minimum Split (s)	10.0	10.0		13.0	13.0	13.0	25.0	25.0	25.0	8.0	33.0	
Total Split (s)	15.0	15.0		36.0	36.0	36.0	25.0	25.0	25.0	14.0	39.0	
Total Split (%)	16.7%	16.7%		40.0%	40.0%	40.0%	27.8%	27.8%	27.8%	15.6%	43.3%	
Yellow Time (s)	3.0	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	2.0	2.0	2.0	2.0	0.0	2.0	
Lost Time Adjust (s)		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		5.0	5.0	3.0	5.0	
Lead/Lag							Lag	Lag	Lag	Lead		
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Recall Mode	None	None		Min	Min	Min	Max	Max	Max	None	Max	
Act Effct Green (s)		5.1		14.5	14.5	14.5		20.5	20.5	36.9	34.8	
Actuated g/C Ratio		0.08		0.24	0.24	0.24		0.34	0.34	0.60	0.57	
v/c Ratio		0.03		0.39	0.39	0.77		0.91	0.43	0.71	0.84	
Control Delay		0.2		21.9	22.0	22.0		35.4	13.6	21.6	22.7	
Queue Delay		0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay		0.2		21.9	22.0	22.0		35.4	13.6	21.6	22.7	
LOS		A		C	C	C		D	B	C	C	
Approach Delay		0.3			22.0			30.6			22.4	
Approach LOS		A			C			C			C	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		0		53	54	80		183	47	47	227	
Queue Length 95th (ft)		0		120	121	198		#491	162	#280	#810	
Internal Link Dist (ft)		168			356			489			497	
Turn Bay Length (ft)				260		5			5	415		
Base Capacity (vph)		399		989	992	1039		1216	741	488	1178	
Starvation Cap Reductn		0		0	0	0		0	0	0	0	
Spillback Cap Reductn		0		0	0	0		0	0	0	0	
Storage Cap Reductn		0		0	0	0		0	0	0	0	
Reduced v/c Ratio		0.02		0.18	0.18	0.42		0.91	0.43	0.71	0.84	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	61.1
Natural Cycle:	80
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.91
Intersection Signal Delay:	25.5
Intersection LOS:	C
Intersection Capacity Utilization:	98.7%
ICU Level of Service:	F
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 10: River Road & Sunrise Driveway/Morris Avenue

Ø1	Ø2	Ø4	Ø8
14 s	25 s	36 s	15 s
Ø6			
39 s			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	1	386	1	430	0	886	326	406	960	7
Future Volume (vph)	0	0	1	386	1	430	0	886	326	406	960	7
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
Lane Width (ft)	12	12	12	12	12	13	10	10	16	11	12	12
Grade (%)		11%			-3%			3%			-1%	
Storage Length (ft)	0		0	260		5	0		5	415		0
Storage Lanes	0		0	1		1	0		1	1		0
Taper Length (ft)	25			25			25			30		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Frt		0.865				0.850			0.850		0.999	
Flt Protected				0.950	0.953					0.950		
Satd. Flow (prot)	0	1717	0	1886	1892	1818	0	3596	1954	1864	2009	0
Flt Permitted				0.950	0.953					0.170		
Satd. Flow (perm)	0	1717	0	1886	1892	1818	0	3596	1954	333	2009	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		139				162			121			
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		248			436			569			577	
Travel Time (s)		4.8			8.5			9.7			9.8	
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
Heavy Vehicles (%)	0%	0%	0%	2%	0%	3%	0%	2%	2%	4%	5%	0%
Shared Lane Traffic (%)				50%								
Lane Group Flow (vph)	0	1	0	197	198	439	0	904	333	414	987	0
Turn Type		NA		Split	NA	Perm		NA	Perm	pm+pt	NA	
Protected Phases	8	8		4	4			2		1	6	
Permitted Phases						4	2		2	6		
Detector Phase	8	8		4	4	4	2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		8.0	8.0	8.0	20.0	20.0	20.0	5.0	28.0	
Minimum Split (s)	10.0	10.0		13.0	13.0	13.0	25.0	25.0	25.0	8.0	33.0	
Total Split (s)	15.0	15.0		36.0	36.0	36.0	25.0	25.0	25.0	14.0	39.0	
Total Split (%)	16.7%	16.7%		40.0%	40.0%	40.0%	27.8%	27.8%	27.8%	15.6%	43.3%	
Yellow Time (s)	3.0	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	2.0	2.0	2.0	2.0	0.0	2.0	
Lost Time Adjust (s)		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		5.0	5.0	3.0	5.0	
Lead/Lag							Lag	Lag	Lag	Lead		
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Recall Mode	None	None		Min	Min	Min	Max	Max	Max	None	Max	
Act Effct Green (s)		5.1		15.4	15.4	15.4		20.5	20.5	36.9	34.9	
Actuated g/C Ratio		0.08		0.25	0.25	0.25		0.33	0.33	0.60	0.56	
v/c Ratio		0.00		0.42	0.42	0.77		0.76	0.46	0.87	0.87	
Control Delay		0.0		22.2	22.2	22.9		26.6	14.6	35.6	26.0	
Queue Delay		0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay		0.0		22.2	22.2	22.9		26.6	14.6	35.6	26.0	
LOS		A		C	C	C		C	B	D	C	
Approach Delay				22.5				23.4			28.9	
Approach LOS				C				C			C	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		0		61	61	88		145	55	81	257	
Queue Length 95th (ft)		0		132	133	209		#378	177	#374	#838	
Internal Link Dist (ft)		168			356			489			497	
Turn Bay Length (ft)				260		5			5	415		
Base Capacity (vph)		399		966	969	1010		1189	727	476	1129	
Starvation Cap Reductn		0		0	0	0		0	0	0	0	
Spillback Cap Reductn		0		0	0	0		0	0	0	0	
Storage Cap Reductn		0		0	0	0		0	0	0	0	
Reduced v/c Ratio		0.00		0.20	0.20	0.43		0.76	0.46	0.87	0.87	

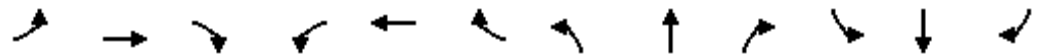
Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	62
Natural Cycle:	80
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.87
Intersection Signal Delay:	25.4
Intersection LOS:	C
Intersection Capacity Utilization:	97.1%
ICU Level of Service:	F
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Splits and Phases: 10: River Road & Sunrise Driveway/Morris Avenue

Ø1	Ø2	Ø4	Ø8
14 s	25 s	36 s	15 s
Ø6			
39 s			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	0	5	330	3	413	0	1056	296	323	938	0
Future Volume (vph)	3	0	5	330	3	413	0	1056	296	323	938	0
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
Lane Width (ft)	12	12	12	12	12	13	10	10	16	11	12	12
Grade (%)		11%			-3%			3%				-1%
Storage Length (ft)	0		0	260		5	0		5	415		0
Storage Lanes	0		0	1		1	0		1	1		0
Taper Length (ft)	25			25			25			30		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Frt		0.916				0.850			0.850			
Flt Protected		0.982		0.950	0.953					0.950		
Satd. Flow (prot)	0	1785	0	1905	1911	1835	0	3632	1973	1882	2069	0
Flt Permitted		0.982		0.950	0.953					0.170		
Satd. Flow (perm)	0	1785	0	1905	1911	1835	0	3632	1973	337	2069	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		121				180			121			
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		248			436			569			577	
Travel Time (s)		4.8			8.5			9.7			9.8	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	1%	0%	2%	0%	1%	1%	3%	2%	0%
Shared Lane Traffic (%)				50%								
Lane Group Flow (vph)	0	8	0	173	177	435	0	1112	312	340	987	0
Turn Type	Split	NA		Split	NA	Perm		NA	Perm	pm+pt	NA	
Protected Phases	8	8		4	4			2		1	6	
Permitted Phases						4	2		2	6		
Detector Phase	8	8		4	4	4	2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		8.0	8.0	8.0	20.0	20.0	20.0	5.0	28.0	
Minimum Split (s)	10.0	10.0		13.0	13.0	13.0	25.0	25.0	25.0	8.0	33.0	
Total Split (s)	15.0	15.0		36.0	36.0	36.0	25.0	25.0	25.0	14.0	39.0	
Total Split (%)	16.7%	16.7%		40.0%	40.0%	40.0%	27.8%	27.8%	27.8%	15.6%	43.3%	
Yellow Time (s)	3.0	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	2.0	2.0	2.0	2.0	0.0	2.0	
Lost Time Adjust (s)		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		5.0	5.0	3.0	5.0	
Lead/Lag							Lag	Lag	Lag	Lead		
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Recall Mode	None	None		Min	Min	Min	Max	Max	Max	None	Max	
Act Effct Green (s)		5.1		14.4	14.4	14.4		20.5	20.5	36.8	34.8	
Actuated g/C Ratio		0.08		0.24	0.24	0.24		0.34	0.34	0.60	0.57	
v/c Ratio		0.03		0.39	0.39	0.76		0.91	0.42	0.70	0.84	
Control Delay		0.2		21.9	22.1	21.8		35.1	13.3	20.8	22.4	
Queue Delay		0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay		0.2		21.9	22.1	21.8		35.1	13.3	20.8	22.4	
LOS		A		C	C	C		D	B	C	C	
Approach Delay		0.3			21.9			30.3			22.0	
Approach LOS		A			C			C			C	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		0		52	54	78		182	46	44	224	
Queue Length 95th (ft)		0		117	121	196		#488	157	#270	#805	
Internal Link Dist (ft)		168			356			489			497	
Turn Bay Length (ft)				260		5			5	415		
Base Capacity (vph)		400		991	994	1041		1219	743	489	1181	
Starvation Cap Reductn		0		0	0	0		0	0	0	0	
Spillback Cap Reductn		0		0	0	0		0	0	0	0	
Storage Cap Reductn		0		0	0	0		0	0	0	0	
Reduced v/c Ratio		0.02		0.17	0.18	0.42		0.91	0.42	0.70	0.84	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	60.9
Natural Cycle:	75
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.91
Intersection Signal Delay:	25.3
Intersection LOS:	C
Intersection Capacity Utilization:	98.6%
ICU Level of Service:	F
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 10: River Road & Sunrise Driveway/Morris Avenue

Ø1	Ø2	Ø4	Ø8
14 s	25 s	36 s	15 s
Ø6			
39 s			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	1	390	1	435	0	886	328	408	960	7
Future Volume (vph)	0	0	1	390	1	435	0	886	328	408	960	7
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
Lane Width (ft)	12	12	12	12	12	13	10	10	16	11	12	12
Grade (%)		11%			-3%			3%				-1%
Storage Length (ft)	0		0	260		5	0		5	415		0
Storage Lanes	0		0	1		1	0		1	1		0
Taper Length (ft)	25			25			25			30		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Frt		0.865				0.850			0.850		0.999	
Flt Protected				0.950	0.953					0.950		
Satd. Flow (prot)	0	1717	0	1886	1892	1818	0	3596	1954	1864	2009	0
Flt Permitted				0.950	0.953					0.170		
Satd. Flow (perm)	0	1717	0	1886	1892	1818	0	3596	1954	333	2009	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		137				163			121			
Link Speed (mph)		35			35			40				40
Link Distance (ft)		248			342			569				577
Travel Time (s)		4.8			6.7			9.7				9.8
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
Heavy Vehicles (%)	0%	0%	0%	2%	0%	3%	0%	2%	2%	4%	5%	0%
Shared Lane Traffic (%)				50%								
Lane Group Flow (vph)	0	1	0	199	200	444	0	904	335	416	987	0
Turn Type		NA		Split	NA	Perm		NA	Perm	pm+pt	NA	
Protected Phases	8	8		4	4			2		1	6	
Permitted Phases						4	2		2	6		
Detector Phase	8	8		4	4	4	2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		8.0	8.0	8.0	20.0	20.0	20.0	5.0	28.0	
Minimum Split (s)	10.0	10.0		13.0	13.0	13.0	25.0	25.0	25.0	8.0	33.0	
Total Split (s)	15.0	15.0		36.0	36.0	36.0	25.0	25.0	25.0	14.0	39.0	
Total Split (%)	16.7%	16.7%		40.0%	40.0%	40.0%	27.8%	27.8%	27.8%	15.6%	43.3%	
Yellow Time (s)	3.0	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	2.0	2.0	2.0	2.0	0.0	2.0	
Lost Time Adjust (s)		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		5.0	5.0	3.0	5.0	
Lead/Lag							Lag	Lag	Lag	Lead		
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Recall Mode	None	None		Min	Min	Min	Max	Max	Max	None	Max	
Act Effct Green (s)		5.1		15.5	15.5	15.5		20.5	20.5	36.9	34.8	
Actuated g/C Ratio		0.08		0.25	0.25	0.25		0.33	0.33	0.59	0.56	
v/c Ratio		0.00		0.42	0.42	0.77		0.76	0.46	0.88	0.88	
Control Delay		0.0		22.1	22.1	23.0		26.8	14.8	36.5	26.3	
Queue Delay		0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay		0.0		22.1	22.1	23.0		26.8	14.8	36.5	26.3	
LOS		A		C	C	C		C	B	D	C	
Approach Delay				22.6				23.5			29.3	
Approach LOS				C				C			C	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		0		62	62	89		146	55	82	259	
Queue Length 95th (ft)		0		134	134	212		#381	179	#379	#844	
Internal Link Dist (ft)		168			262			489			497	
Turn Bay Length (ft)				260		5			5	415		
Base Capacity (vph)		397		964	967	1009		1186	725	475	1126	
Starvation Cap Reductn		0		0	0	0		0	0	0	0	
Spillback Cap Reductn		0		0	0	0		0	0	0	0	
Storage Cap Reductn		0		0	0	0		0	0	0	0	
Reduced v/c Ratio		0.00		0.21	0.21	0.44		0.76	0.46	0.88	0.88	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	62.1
Natural Cycle:	80
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.88
Intersection Signal Delay:	25.6
Intersection LOS:	C
Intersection Capacity Utilization:	97.2%
ICU Level of Service:	F
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 10: River Road & Sunrise Driveway/Morris Avenue

14 s	25 s	36 s	15 s
39 s			

Intersection

Int Delay, s/veh 0.2

Movement EBL EBT WBT WBR SBL SBR

Lane Configurations

Traffic Vol, veh/h 4 732 817 1 4 9

Future Vol, veh/h 4 732 817 1 4 9

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, % - 1 -1 - 0 -

Peak Hour Factor 93 93 93 93 93 93

Heavy Vehicles, % 2 3 2 2 2 2

Mvmt Flow 4 787 878 1 4 10

Major/Minor Major1 Major2 Minor2

Conflicting Flow All 879 0 - 0 1674 879

Stage 1 - - - - 879 -

Stage 2 - - - - 795 -

Critical Hdwy 4.12 - - - 6.42 6.22

Critical Hdwy Stg 1 - - - - 5.42 -

Critical Hdwy Stg 2 - - - - 5.42 -

Follow-up Hdwy 2.218 - - - 3.518 3.318

Pot Cap-1 Maneuver 769 - - - 105 347

Stage 1 - - - - 406 -

Stage 2 - - - - 445 -

Platoon blocked, % - - - -

Mov Cap-1 Maneuver 769 - - - 104 347

Mov Cap-2 Maneuver - - - - 104 -

Stage 1 - - - - 402 -

Stage 2 - - - - 445 -

Approach EB WB SB

HCM Control Delay, s 0.1 0 24.1

HCM LOS C

Minor Lane/Major Mvmt EBL EBT WBT WBR SBLn1

Capacity (veh/h) 769 - - - 202

HCM Lane V/C Ratio 0.006 - - - 0.069

HCM Control Delay (s) 9.7 0 - - 24.1

HCM Lane LOS A A - - C

HCM 95th %tile Q(veh) 0 - - - 0.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	0	5	333	3	416	0	1056	301	329	938	0
Future Volume (vph)	3	0	5	333	3	416	0	1056	301	329	938	0
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
Lane Width (ft)	12	12	12	12	12	13	10	10	16	11	12	12
Grade (%)		11%			-3%			3%			-1%	
Storage Length (ft)	0		0	260		5	0		5	415		0
Storage Lanes	0		0	1		1	0		1	1		0
Taper Length (ft)	25			25			25			30		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Frt		0.916				0.850			0.850			
Flt Protected		0.982		0.950	0.953					0.950		
Satd. Flow (prot)	0	1785	0	1905	1911	1835	0	3632	1973	1882	2069	0
Flt Permitted		0.982		0.950	0.953					0.170		
Satd. Flow (perm)	0	1785	0	1905	1911	1835	0	3632	1973	337	2069	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		121				179			121			
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		248			342			569			577	
Travel Time (s)		4.8			6.7			9.7			9.8	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	1%	0%	2%	0%	1%	1%	3%	2%	0%
Shared Lane Traffic (%)				50%								
Lane Group Flow (vph)	0	8	0	175	179	438	0	1112	317	346	987	0
Turn Type	Split	NA		Split	NA	Perm		NA	Perm	pm+pt	NA	
Protected Phases	8	8		4	4			2		1	6	
Permitted Phases						4	2		2	6		
Detector Phase	8	8		4	4	4	2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		8.0	8.0	8.0	20.0	20.0	20.0	5.0	28.0	
Minimum Split (s)	10.0	10.0		13.0	13.0	13.0	25.0	25.0	25.0	8.0	33.0	
Total Split (s)	15.0	15.0		36.0	36.0	36.0	25.0	25.0	25.0	14.0	39.0	
Total Split (%)	16.7%	16.7%		40.0%	40.0%	40.0%	27.8%	27.8%	27.8%	15.6%	43.3%	
Yellow Time (s)	3.0	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	2.0	2.0	2.0	2.0	0.0	2.0	
Lost Time Adjust (s)		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		5.0	5.0	3.0	5.0	
Lead/Lag							Lag	Lag	Lag	Lead		
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Recall Mode	None	None		Min	Min	Min	Max	Max	Max	None	Max	
Act Effct Green (s)		5.1		14.5	14.5	14.5		20.5	20.5	36.9	34.8	
Actuated g/C Ratio		0.08		0.24	0.24	0.24		0.34	0.34	0.60	0.57	
v/c Ratio		0.03		0.39	0.39	0.77		0.91	0.43	0.71	0.84	
Control Delay		0.2		21.9	22.0	22.0		35.4	13.6	21.6	22.7	
Queue Delay		0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay		0.2		21.9	22.0	22.0		35.4	13.6	21.6	22.7	
LOS		A		C	C	C		D	B	C	C	
Approach Delay		0.3			22.0			30.6			22.4	
Approach LOS		A			C			C			C	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		0		53	54	80		183	47	47	227	
Queue Length 95th (ft)		0		120	121	198		#491	162	#280	#810	
Internal Link Dist (ft)		168			262			489			497	
Turn Bay Length (ft)				260		5			5	415		
Base Capacity (vph)		399		989	992	1039		1216	741	488	1178	
Starvation Cap Reductn		0		0	0	0		0	0	0	0	
Spillback Cap Reductn		0		0	0	0		0	0	0	0	
Storage Cap Reductn		0		0	0	0		0	0	0	0	
Reduced v/c Ratio		0.02		0.18	0.18	0.42		0.91	0.43	0.71	0.84	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	61.1
Natural Cycle:	80
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.91
Intersection Signal Delay:	25.5
Intersection LOS:	C
Intersection Capacity Utilization:	98.7%
ICU Level of Service:	F
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 10: River Road & Sunrise Driveway/Morris Avenue

Ø1	Ø2	Ø4	Ø8
14 s	25 s	36 s	15 s
Ø6			
39 s			

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	11	619	746	4	3	6
Future Vol, veh/h	11	619	746	4	3	6
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, %	-	1	-1	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	1	2	2	2
Mvmt Flow	12	673	811	4	3	7

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	815	0	0	1510	813
Stage 1	-	-	-	813	-
Stage 2	-	-	-	697	-
Critical Hdwy	4.12	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	3.518	3.318
Pot Cap-1 Maneuver	812	-	-	133	378
Stage 1	-	-	-	436	-
Stage 2	-	-	-	494	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	812	-	-	130	378
Mov Cap-2 Maneuver	-	-	-	130	-
Stage 1	-	-	-	426	-
Stage 2	-	-	-	494	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	21.3
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	812	-	-	-	231
HCM Lane V/C Ratio	0.015	-	-	-	0.042
HCM Control Delay (s)	9.5	0	-	-	21.3
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.1