

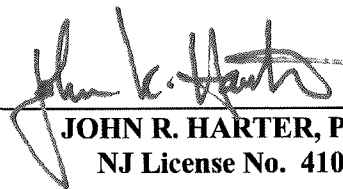


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TRAFFIC IMPACT ANALYSIS
FOR
MM/PG MONTGOMERY PROPERTIES, LLC

PROPOSED RETAIL & RESIDENTIAL
DEVELOPMENT

BLOCK 34001, LOTS 46.01, 56, 57, 77, 78 & 79
NJSH ROUTE 206 & GEORGETOWN-FRANKLIN TURNPIKE
(CR 518)
TOWNSHIP OF MONTGOMERY
SOMERSET COUNTY, NEW JERSEY



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INTRODUCTION

Atlantic Traffic & Design Engineers, Inc. (ATDE) has prepared this Traffic Impact Analysis to support the application to the Township of Montgomery for the development of a retail and residential development. The subject site is located with frontage along NJSH Route 206 southbound and in the Township of Montgomery, Somerset County, New Jersey, as shown on **Figure 1 in Appendix A.**

The site was previously approved by the New Jersey Department of Transportation (NJDOT) for 362,000 square feet of retail space and 32 age-restricted residential units. Access to the retail and residential development was approved via two (2) Township Master Plan roadways which would form the inner and outer loop roads. The outer loop road will intersect Route 206 opposite Benjamin Boulevard and CR 518 opposite Research Drive at 4-leg signalized intersections. The inner loop road will provide right-in access from southbound NJSH Route 206 and right-in/right-out access from CR 518 eastbound. The proposed loop roads will allow for the elimination of the northbound and southbound Route 206 left-turns at the signalized CR 518 intersection.

The current development proposal includes approximately 320,000 square feet of retail space inclusive of a 66,500 square foot movie theater and a 9,000 square foot daycare center and 34 single family homes. Access to the development will continue to be provided via the inner and outer loop roads.

This study has been performed to provide an updated evaluation of the traffic impacts associated with the construction of the proposed retail and residential development. Accordingly, this analysis includes the following:

- A review of existing roadway and traffic conditions in the vicinity of the site, including roadway geometrics and traffic volumes;
- An analysis of future roadway and site driveway operations;
- An analysis of future roadway improvements; and
- Recommendations and conclusions.

EXISTING TRAFFIC CONDITIONS

EXISTING SUBJECT PROPERTY

The site is located with frontage along NJSH Route 206 southbound and CR 518 eastbound in the Township of Montgomery, Somerset County, New Jersey. The subject property has the following characteristics:

- Designated as Lots 46.01, 56, 57, 77, 78 and 79 in Block 34001.
- Land uses in the site vicinity are mainly commercial in nature.

EXISTING ROADWAY NETWORK

The subject property has frontage along NJSH Route 206 southbound and CR 518 eastbound. The following is a description of the adjacent roadway network:

NJSH Route 206

- Under New Jersey Department of Transportation (NJDOT) jurisdiction.
- Classified as an urban principal arterial.
- Designated as a north/south roadway.
- Provides 1 lane to accommodate each direction of travel.
- The posted speed limit is 35 miles per hour in the vicinity of the subject property.

CR 518

- Under Somerset County jurisdiction.
- Classified as an urban minor arterial.
- Designated as an east/west roadway.
- Provides one (1) lane to accommodate each direction of travel.
- Posted speed limit is 45 miles per hour along the site frontage.

EXISTING TRAFFIC VOLUMES

To examine the current traffic conditions in the vicinity of the subject property, updated traffic counts were conducted during the weekday evening and Saturday midday peak hours at the following intersections:

- NJSH Route 206 and CR 518
- NJSH Route 206 and Montgomery Center signalized driveway
- NJSH Route 206 and Benjamin Boulevard
- NJSH Route 206 and Airpark Road/ Wall Street

Specifically, manual turning movement counts were conducted on the following dates and times:

- Wednesday, May 4, 2016 – 4:00 p.m. to 6:30 p.m.
- Saturday, May 7, 2016 – 11:00 a.m. to 2:00 p.m.

The results of the traffic counts indicate there are distinct hours during the periods of study when traffic experienced its highest levels. The weekday evening peak hour was found to occur between 5:15 p.m. and 6:15 p.m. and the Saturday midday peak hour as found to occur between 12:30 p.m. and 1:30 p.m. The manual turning movement count summaries are contained in **Appendix B**. The peak hour traffic volumes are summarized on **Figure 2** in **Appendix A**.

Traffic volumes at other times of the day are generally lower than during the study peak hours. This is primarily influenced by commuting trips made during the weekday evening period and shopping trips made during the Saturday midday peak. The higher traffic volumes on the roadway system during peak traffic hours result in minimum excess capacity.

PROPOSED DEVELOPMENT TRAFFIC CHARACTERISTICS

TRIP GENERATION

The next step in the analysis procedure is to project the volume of future traffic generated as a result of the proposed retail and residential development. For the purpose of this analysis, complete project approval, development, and occupancy are assumed to occur within 2 years.

As noted, the Township and NJDOT previously approved the development of a 362,000 square foot shopping center and 32 age-restricted residential units on the subject property. Trip generation projections for the previously approved development have been prepared utilizing data published by the Institute of Transportation Engineers (ITE) in the 10th Edition of *Trip Generation*. Specifically, trip generation projections for the approved 362,000 square foot shopping center were prepared utilizing ITE Land Use Code 820: "Shopping Center." Trip generation projections for the 32 age-restricted residential units were prepared utilizing ITE Land Use Code 252: "Senior/Adult Housing-Attached."

Table I summarizes the ITE trip generation for the previously approved retail and residential development. The ITE trip generation summary printouts are contained in **Appendix C**.

TABLE I
ITE TRIP GENERATION
PREVIOUSLY APPROVED RETAIL & RESIDENTIAL DEVELOPMENT

Peak Hour	362,000 SF Shopping Center	32 Age-Restricted Residential Units	Total
Weekday Evening	1,506	5	1,511
Saturday Midday	1,977	10	1,987

The current development proposal includes approximately 320,000 square feet of retail space inclusive of a 66,500 square foot movie theater and a 9,000 square foot day care center. Based on our discussions with the Township Traffic Engineer, trip generation projections for the movie theater and day care center will be prepared independent of the proposed retail space. **Tables II, III, IV and V** summarize the ITE trip generation projections for the proposed retail space, movie theater, day care center and single family homes, respectively. Trip generation projections for the proposed retail and residential development were prepared using the following ITE Land Use Codes (LUC):

- 244,500 square foot shopping center – ITE LUC 820: “Shopping Center”
- 66,500 square foot movie theater – ITE LUC 445: “Multiplex Movie Theater”
- 9,000 square foot day care center – ITE LUC 565: “Day Care Center”
- 34 single family homes – ITE LUC 210: “Single-Family Detached Housing”

TABLE II
ITE TRIP GENERATION
PROPOSED 244,500 SF SHOPPING CENTER

Peak Hour	Enter	Exit	Total
Weekday Morning	170	104	274
Weekday Evening	505	548	1,053
Saturday Midday	652	602	1,254

TABLE III
ITE TRIP GENERATION
PROPOSED 66,500 SF MOVIE THEATER

Peak Hour	Enter	Exit	Total
Weekday Evening	203	124	327
Saturday Midday	234	79	313

TABLE IV
ITE TRIP GENERATION
PROPOSED 9,000 SF DAY CARE CENTER

Peak Hour	Enter	Exit	Total
Weekday Morning	52	47	99
Weekday Evening	47	53	100
Saturday Midday	10	5	15

TABLE V
ITE TRIP GENERATION
PROPOSED 34 SINGLE FAMILY HOMES

Peak Hour	Enter	Exit	Total
Weekday Evening	23	13	36
Saturday Midday	25	22	47

Table VI summarizes the total trip generation associated with the proposed retail and residential development.

TABLE VI
ITE TRIP GENERATION
PROPOSED RETAIL & RESIDENTIAL DEVELOPMENT

Peak Hour	Enter	Exit	Total
Weekday Evening	778	738	1,516
Saturday Midday	921	708	1,629

It should be noted, the volumes in **Table VI** are considered conservative as no internal capture was applied to potential shared trips between the retail, residential, movie theater and day care components of the development.

Table VII provides an ITE trip generation comparison between the previously approved and proposed retail and residential developments.

TABLE VII
ITE TRIP GENERATION COMPARISON
APPROVED VS. PROPOSED
PROPOSED RETAIL & RESIDENTIAL DEVELOPMENT

Peak Hour	Approved Development	Proposed Development	Difference
Weekday Evening	1,511	1,516	+5
Saturday Midday	1,987	1,629	-358

A significant portion of the site generated traffic associated with the proposed retail portion of the development is projected to be “pass-by” in nature, as diverted movements into the site from the adjacent flows of traffic. The average peak hour “pass-by” percentage for a shopping center is 34% during the weekday evening peak hour and 26% during the Saturday midday peak hour as found in ITE’s *Trip Generation Handbook*, 3rd Edition, August 2014. Based on the ITE Trip Generation of Day Care Centers article, a 44% “pass-by” percentage was applied to the weekday evening peak hour for the trips associated with the day care center. **Table VIII** shows the site generated traffic for the proposed retail and residential development in terms of newly generated (primary) traffic and “pass-by” traffic.

**TABLE VIII
ITE TRIP GENERATION
WITH CONSIDERATION OF PASS-BY TRIPS**

Trip Type	Weekday Evening			Saturday Midday		
	Enter	Exit	Total	Enter	Exit	Total
Primary	585	545	1,130	764	551	1,315
Pass-By	193	193	386	157	157	314
Total	778	738	1,516	921	708	1,629

TRIP DISTRIBUTION

The site generated traffic attributed to the proposed retail and residential development has been assigned to the adjacent roadways based on the gravity model and Scope of Study report previously approved by NJDOT. Site traffic distributions used in the analysis are illustrated on **Figures 3 and 4 in Appendix A** for the primary and “pass-by” trip distributions, respectively. The primary and “pass-by” traffic volumes are illustrated on **Figures 5 and 6 in Appendix A**, respectfully. The total additional site traffic volumes are summarized on **Figure 7 in Appendix A**. Please note the negative values indicate “pass-by” traffic.

FUTURE TRAFFIC CONDITIONS

FUTURE TRAFFIC VOLUMES

It is recognized traffic routinely fluctuates along various State and County roadways, as well as local streets, and varies not only day-to-day, but also on a monthly and yearly basis. It is expected as development continues in the vicinity of the site, traffic may be expected to increase on a regular basis.

It is anticipated the construction of the proposed retail and residential development will be completed within 3 years. As a result, minimal (if any) additional “background” traffic growth can be anticipated with such a short build-out. However, in order to perform a conservative analysis, the existing traffic volumes on the study roadway system were increased by a 1.50% growth rate per year in accordance with the NJDOT growth factor for urban principal arterials in Somerset County to develop the Base future traffic volumes, which are depicted on appended **Figure 8 in Appendix A.**

OTHER AREA DEVELOPMENTS

The Township Engineer was contacted to determine if there were any recent development approvals which would contribute to additional traffic volume growth along the subject roadway system. According to the Township Engineer, a 1,880 square foot Dunkin Donuts with drive-through was approved at the northwest corner of NJSH Route 206 and County Route 518. The traffic volumes anticipated for the development are summarized on **Figure 9 in Appendix A** and were obtained from the Traffic Impact Study prepared by Harlyn Associates, last revised December 18, 2014.

FUTURE NO-BUILD TRAFFIC VOLUMES

The No-Build traffic volumes were established by surcharging the adjacent area development volumes onto the future Base traffic volumes. The future No-Build traffic volumes are summarized on **Figure 10 in Appendix A.**

ANALYSIS OF FUTURE TRAFFIC VOLUMES

A Volume/Capacity and Level of Service Analysis¹ was conducted for the future No-Build weekday evening and Saturday midday peak hour traffic volumes at the study intersections using the Synchro Software. This type of analysis is performed to gauge the operational state of traffic activity, and to identify any areas of excessive delay or congestion. The Synchro summary printouts are contained in **Appendix E**. Level of Service summary tables are contained in **Appendix F**.

FUTURE ROADWAY IMPROVEMENTS

In conjunction with the proposed retail and residential development, improvements are proposed along the NJSH Route 206 corridor to improve capacity. Consistent with the Township Master Plan and prior NJDOT approval, two (2) new loop roads will be constructed to facilitate the elimination of the northbound and southbound NJSH Route 206 left-turn movements at the CR 518 signalized intersection. The NJSH Route 206 intersections with CR 518 and Benjamin Boulevard will be reconstructed to accommodate the roadway improvements which are consistent with the previous NJDOT approval. The redistribution of the left-turning traffic at the CR 518 intersection is summarized on **Figure 11** in **Appendix A**.

FUTURE BUILD TRAFFIC VOLUMES

The future Build traffic volumes were established by surcharging the site-generated traffic volumes and the redistributed CR 518 left-turn volumes onto the future No-Build traffic volumes. The resulting 2018 future Build traffic volumes are shown on **Figure 12** in **Appendix A**.

ANALYSIS OF FUTURE ROADWAY IMPROVEMENTS

A Volume/Capacity and Level of Service analysis was conducted for the future Build peak hour traffic volumes at the study intersections with consideration of the proposed roadway improvements. Level of Service comparison tables are contained in **Appendix F** for each of the study intersections during the respective peak hours.

¹ See Appendix D for Volume/Capacity and Level of Service description.

ROUNDBABOUT ANALYSIS

A Capacity/Level of Service analysis has been prepared for the proposed roundabout in efforts to determine if acceptable Levels of Service could be achieved with the proposed roundabout configuration. A roundabout is proposed at the first main internal intersection located to the west of NJSH Route 206.

Traffic volume projections were prepared to evaluate the future operational conditions at the proposed roundabout. Attached **Figure 13** in **Appendix G** summarizes the projected site traffic distribution at the roundabout intersection. Note, the distribution was prepared based on the layout of the proposed retail buildings within the Montgomery Promenade as well as previously approved NJDOT gravity model. Site traffic volumes are summarized on **Figure 14** in **Appendix G** and utilized the updated trip generation projections contained in this report.

Attached **Figure 15** in **Appendix G** summarizes the reoriented NJSH Route 206 volumes as a result of the elimination of northbound left-turn movements at the NJSH Route 206 intersection with Georgetown-Franklin Turnpike (CR 518). The future Build traffic volumes were established by surcharging the reoriented NJSH Route 206 traffic volumes onto the projected site generated traffic volumes. The resulting future Build traffic volumes are summarized on attached **Figure 16** in **Appendix G**.

A volume/capacity and Level of Service analysis was conducted for the proposed roundabout using the Synchro 10 Software. The Synchro 10 summary printouts are contained in **Appendix G**. The roundabout is calculated to operate at Level of Service B or better during the critical peak hours under future Build conditions. Level of Service B translates to a maximum 95th percentile queue length of approximately four (4) vehicles (100-feet) which would not have any negative impacts on the operations of the adjacent roadway network as 500-feet of separation is provided between the signalized intersection and the proposed roundabout. In efforts to maintain a conservative analysis, 50 crossing pedestrians were assumed on the eastbound loop road approach and 50 crossing pedestrians were assumed on the northbound and southbound driveway approaches during each of the critical peak hours. Note, pedestrian crossing on the westbound loop road approach would be restricted under the current design.

DAYCARE DRIVEWAY ANALYSIS

A Capacity/Level of Service analysis has been prepared for the proposed daycare driveway intersection in efforts to determine if acceptable Levels of Service could be achieved with the proposed roadway configuration. A reverse jughandle, named Bolmer Corner, is proposed along NJSH Route 206 approximately 500 feet south of the intersection with CR 518. This jughandle will accommodate vehicles that wish to make a southbound left turn at the intersection of NJSH Route 206 and CR 518, which will be a restricted movement as part of the development proposal. The jughandle will also provide access to the proposed development via several internal drive aisles along Bolmer Corner. Along the northern portion of Bolmer Corner, two-way traffic will be allowed and its intersection with CR 518 will serve as a right-in/right-out driveway for the proposed development. The daycare center is proposed within the jughandle and will be accessed via a full-movement driveway along the jughandle.

Traffic volume projections were prepared to evaluate the future operational conditions at the daycare driveway. The resulting future Build traffic volumes are summarized on attached **Figure 17 in Appendix H**. Note, additional weekday morning peak period turning movement counts were conducted at the Route 206 intersection with CR 518 on Tuesday, December 19, 2017 from 7:00 a.m. to 9:00 a.m. to establish the existing traffic volumes during the weekday morning peak (See **Appendix B**).

A Volume/Capacity and Level of Service analysis was conducted for the proposed daycare driveway using the Synchro 10 Software. The Synchro 10 printouts are contained in **Appendix H**. The daycare driveway and Bolmer Corner intersection is calculated to operate at Level of Service B or better during the critical peak hours under future build conditions. Level of Service B translates to a maximum 95th percentile queue length of less than one (1) vehicle which would not have any negative impacts on the operations of the adjacent roadway network.

RESTAURANT VALET OPERATIONS EVALUATION

Valet parking is proposed adjacent to Building 'K' to serve the anticipated restaurant uses. A valet pick-up/drop-off area that can accommodate four (4) stacked vehicles is proposed on the southbound side of the circulation aisle to the south of the roundabout. Conservatively, if the

entire Building 'K' was assumed to be occupied by restaurant uses with valet service, the building could be expected to generate a maximum of 85 entering vehicles in a peak hour without consideration of any internal interaction with the balance of the development. Based on past experience with similar operations, a valet can be expected to turn a car every 4-5 minutes during peak times. This translates to 12-15 vehicles per hour, per valet attendant. It could conservatively be assumed that 50% of the restaurant patrons would utilize the valet services with the balance self parking or being a shared trip within the shopping center. Based on this, four (4) valet attendants would be required during peak times to serve the anticipated demands accommodated by the proposed stacking area.

CONCLUSIONS

In summary, it has been determined from the conduct of a detailed traffic count program and analysis that the previously approved improvements to the NJSH Route 206 corridor will adequately accommodate the anticipated traffic increases generated as a result of the proposed retail and residential development. The current development proposal is conservatively projected to generate comparable traffic during the weekday evening peak hour and less traffic than the previously approved development during the Saturday peak hour. Further, the construction of the Township Master Plan loop roads will allow for a significant improvement to the operational conditions at the NJSH Route 206 intersection with CR 518 by eliminating the northbound and southbound NJSH Route 206 left-turn movements.

TECHNICAL APPENDIX

APPENDIX A – TRAFFIC VOLUME FIGURES

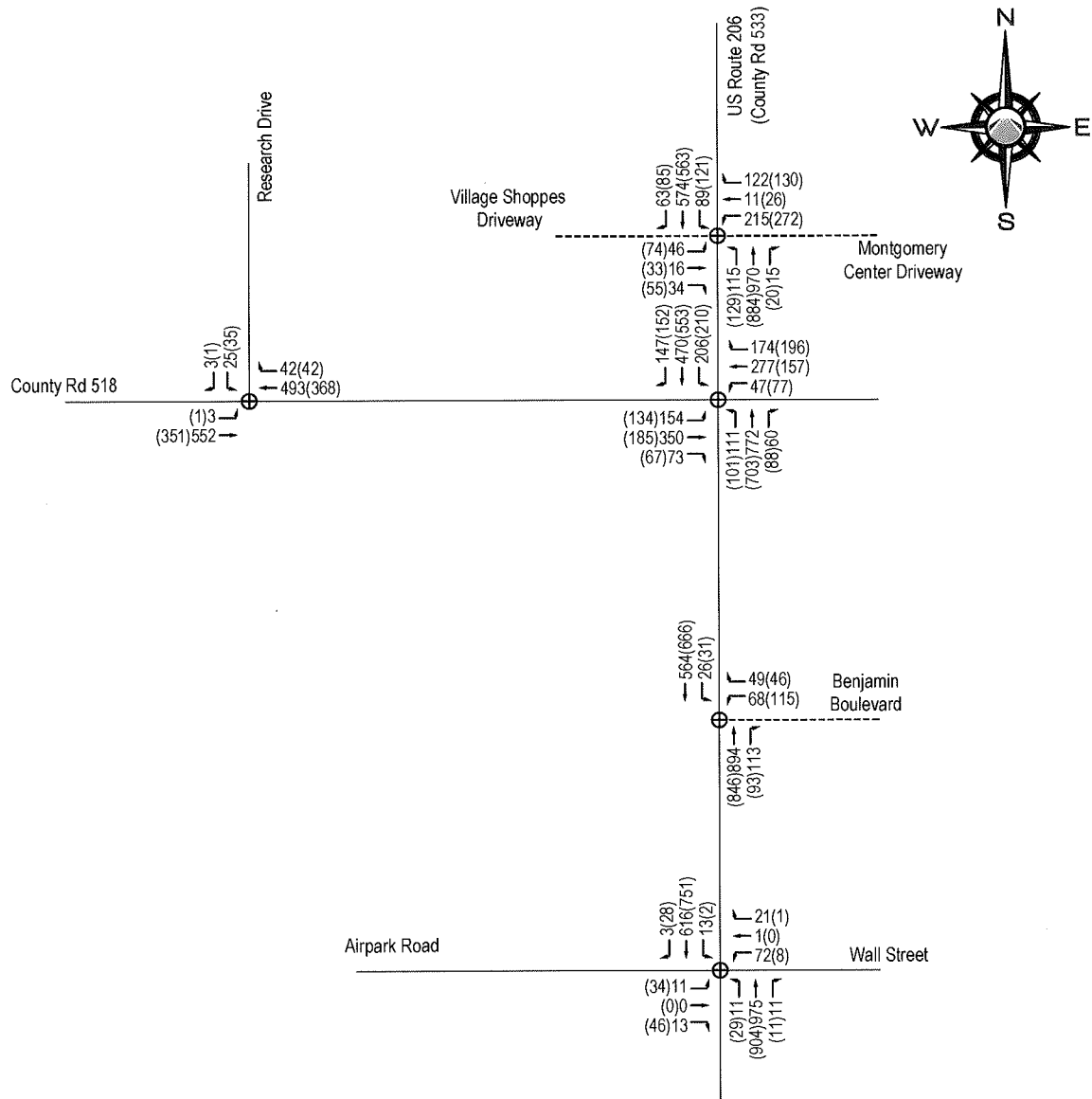
Proposed Mixed Use Development
Montgomery Township
Somerset County, New Jersey

SITE LOCATION MAP



Proposed Mixed Use Development
Montgomery Township
Somerset County, New Jersey

EXISTING TRAFFIC VOLUMES

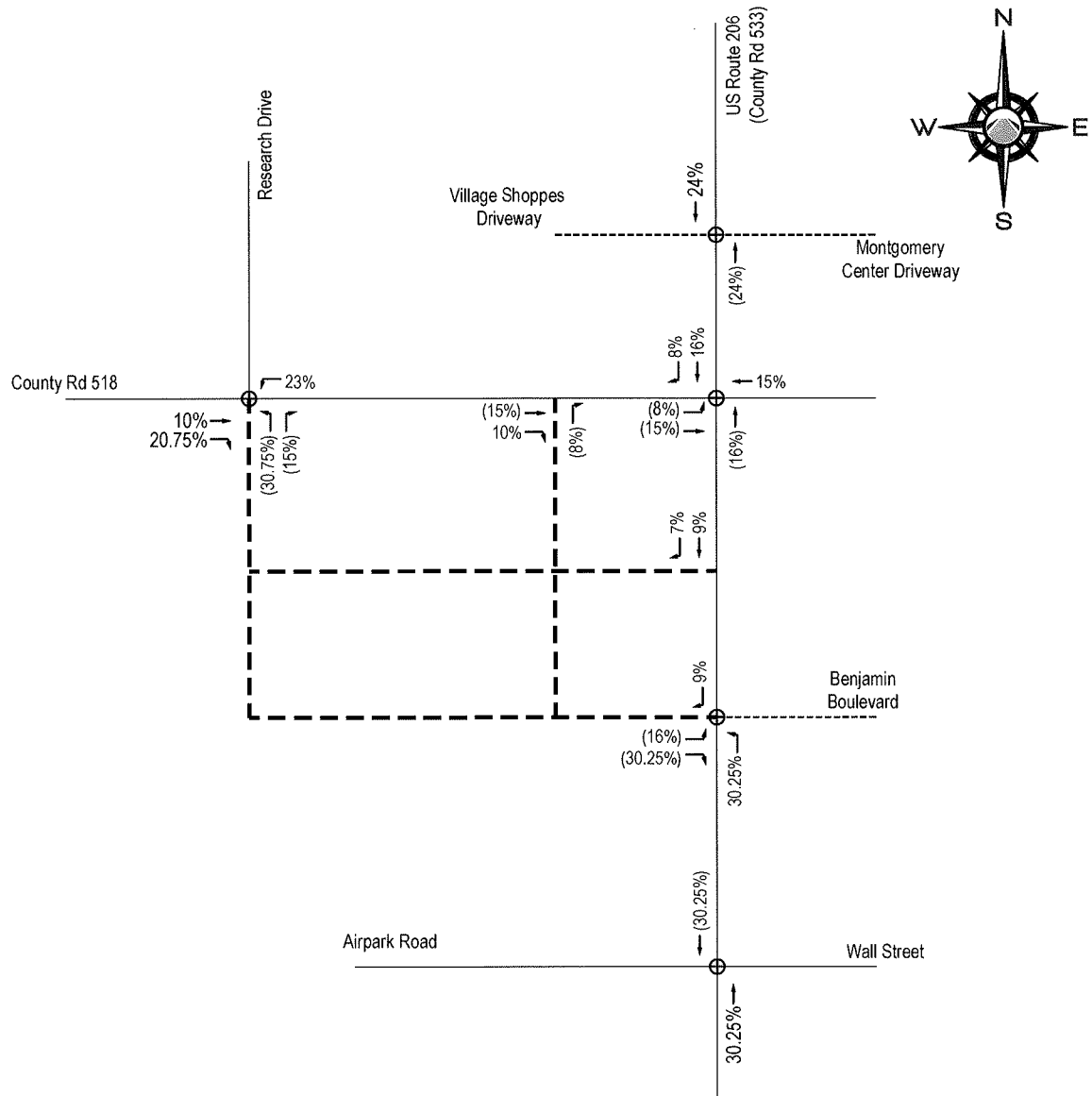


LEGEND

- AA(BB) PM(SAT) PEAK HOUR VOLUMES
- EXISTING ROADWAY
- EXISTING DRIVEWAY
- ⊕ EXISTING TRAFFIC SIGNAL

Proposed Mixed Use Development
Montgomery Township
Somerset County, New Jersey

NEW TRIP DISTRIBUTION

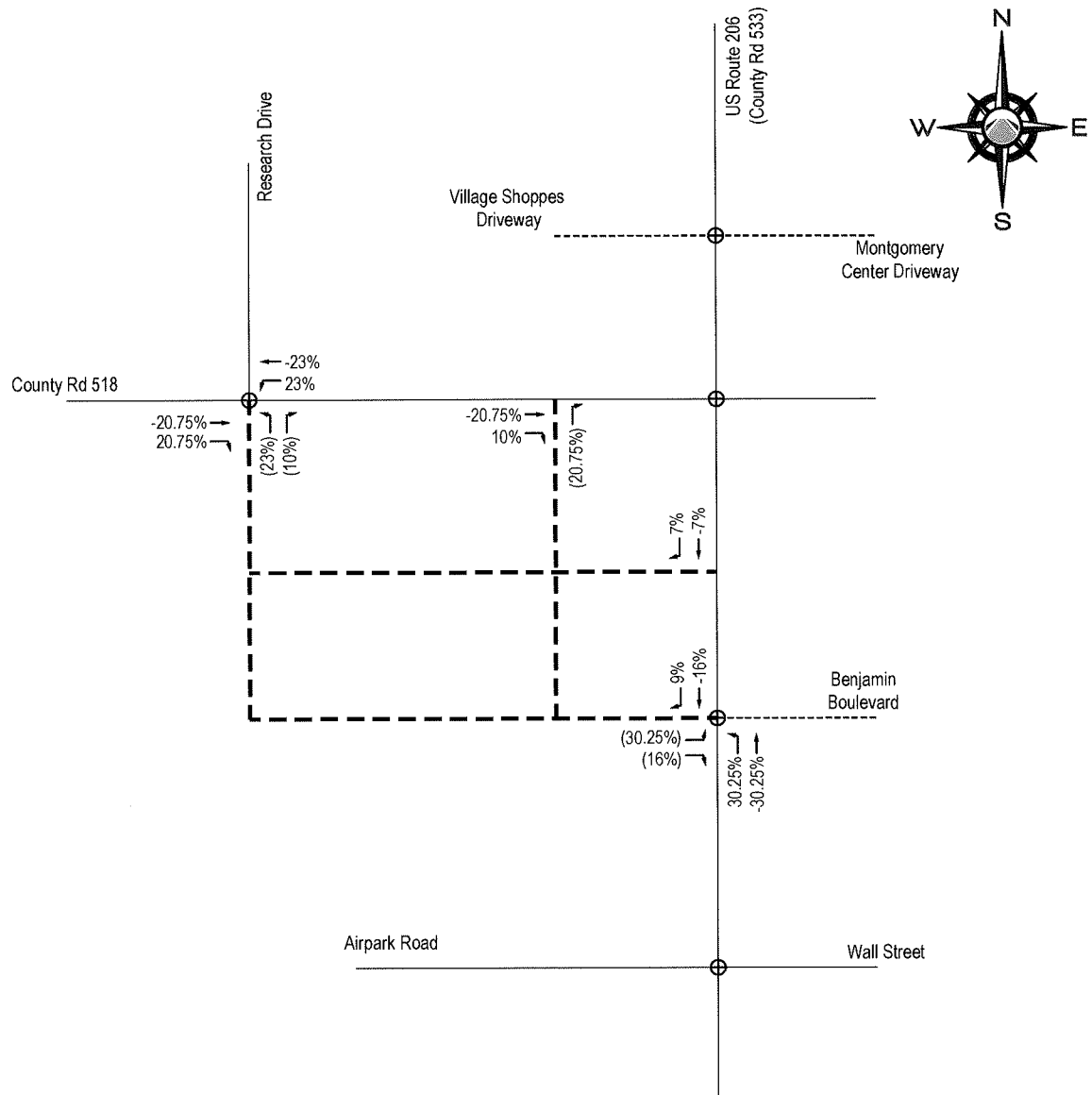


LEGEND

- AA(BB) ENTER(EXIT) TRIP DISTRIBUTION
- EXISTING ROADWAY
- EXISTING DRIVEWAY
- ⊕ EXISTING TRAFFIC SIGNAL
- - - - - PROPOSED DRIVEWAY

Proposed Mixed Use Development
Montgomery Township
Somerset County, New Jersey

PASS BY DISTRIBUTION

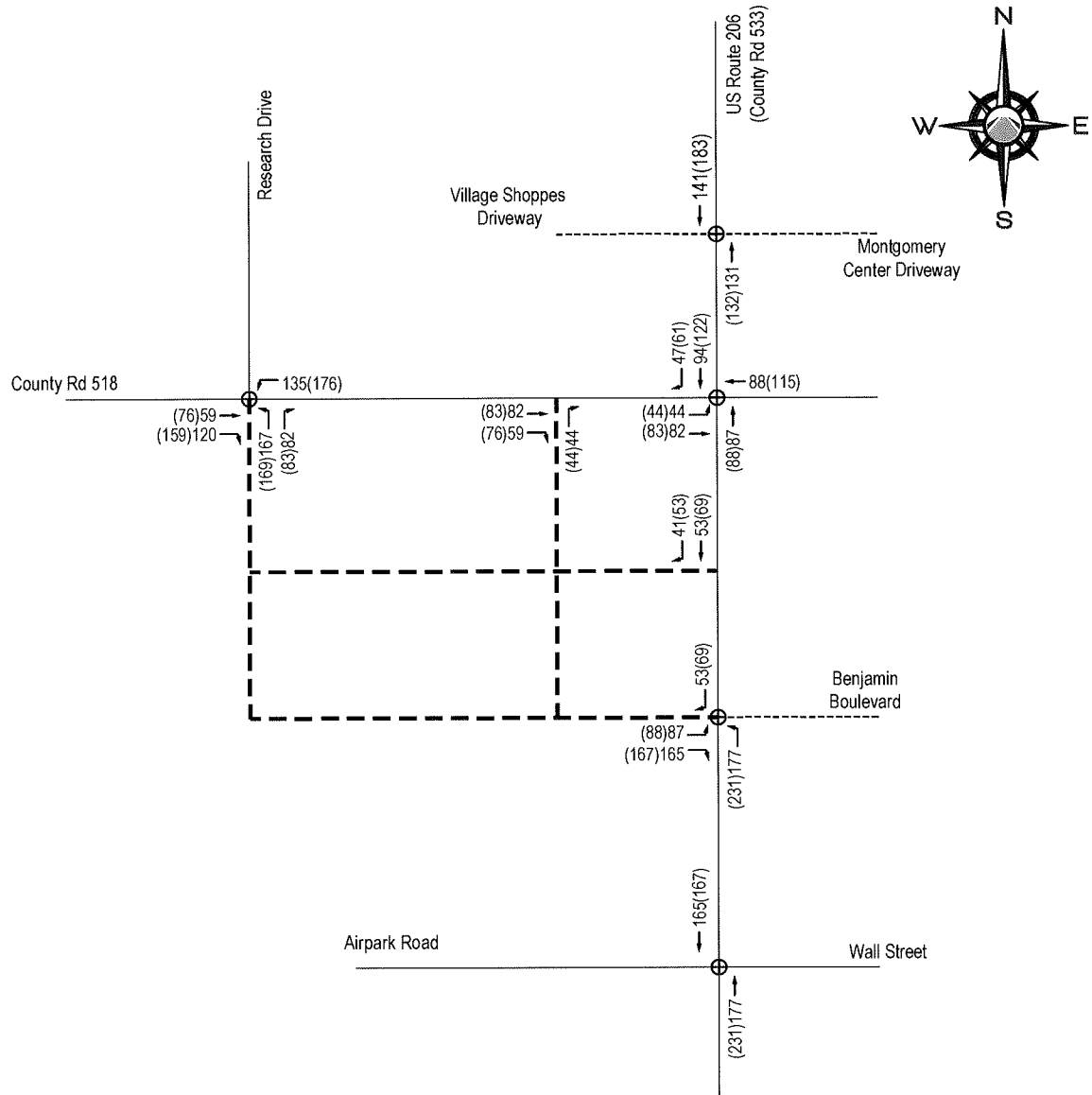


LEGEND

- AA(BB) ENTER(EXIT) TRIP DISTRIBUTION
- EXISTING ROADWAY
- EXISTING DRIVEWAY
- ⊕ EXISTING TRAFFIC SIGNAL
- - - - - PROPOSED DRIVEWAY

Proposed Mixed Use Development
Montgomery Township
Somerset County, New Jersey

SITE-GENERATED NEW TRIPS



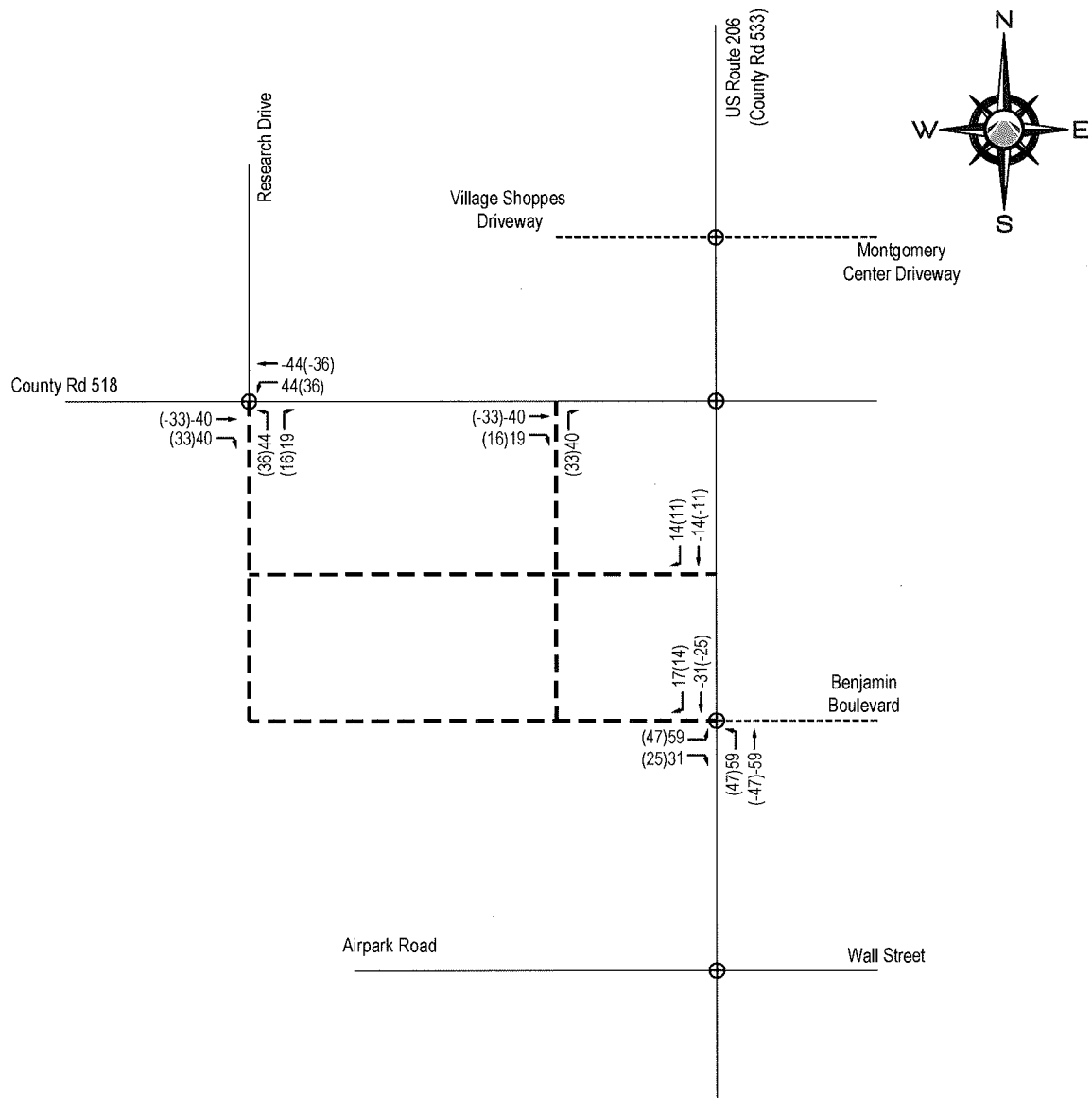
LEGEND

- AA(BB) PM(SAT) PEAK HOUR VOLUMES
- EXISTING ROADWAY
- EXISTING DRIVEWAY
- ⊕ EXISTING TRAFFIC SIGNAL
- - - - - PROPOSED DRIVEWAY

PEAK HOUR	ENTER	EXIT	TOTAL
PM	585	545	1130
SAT	764	551	1315

Proposed Mixed Use Development
Montgomery Township
Somerset County, New Jersey

SITE-GENERATED PASS-BY TRIPS



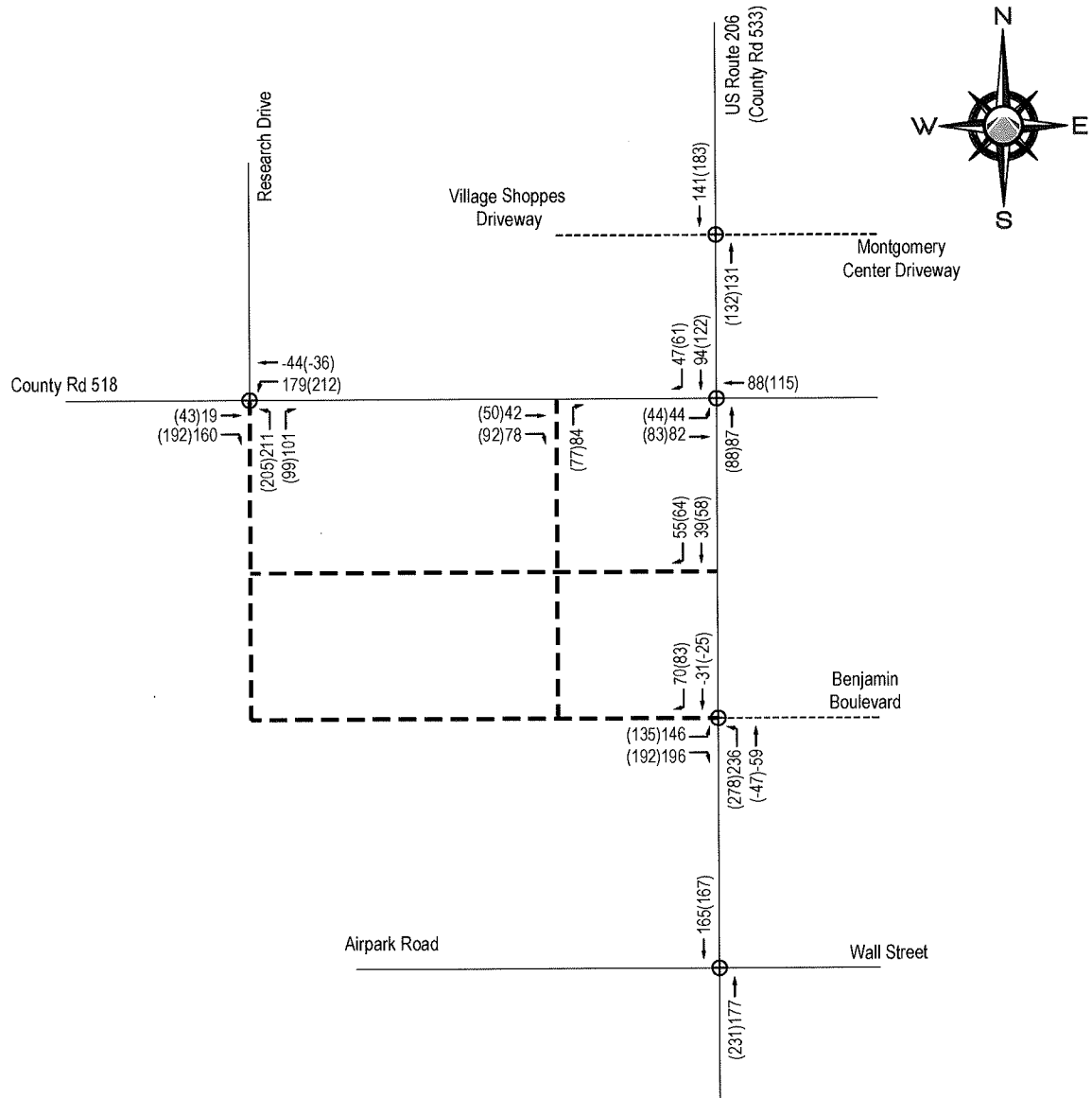
LEGEND

- AA(BB) PM(SAT) PEAK HOUR VOLUMES
- EXISTING ROADWAY
- EXISTING DRIVEWAY
- ⊕ EXISTING TRAFFIC SIGNAL
- - - - - PROPOSED DRIVEWAY

PEAK HOUR	ENTER	EXIT	TOTAL
PM	193	193	386
SAT	157	157	314

Proposed Mixed Use Development
Montgomery Township
Somerset County, New Jersey

SITE-GENERATED TOTAL TRIPS



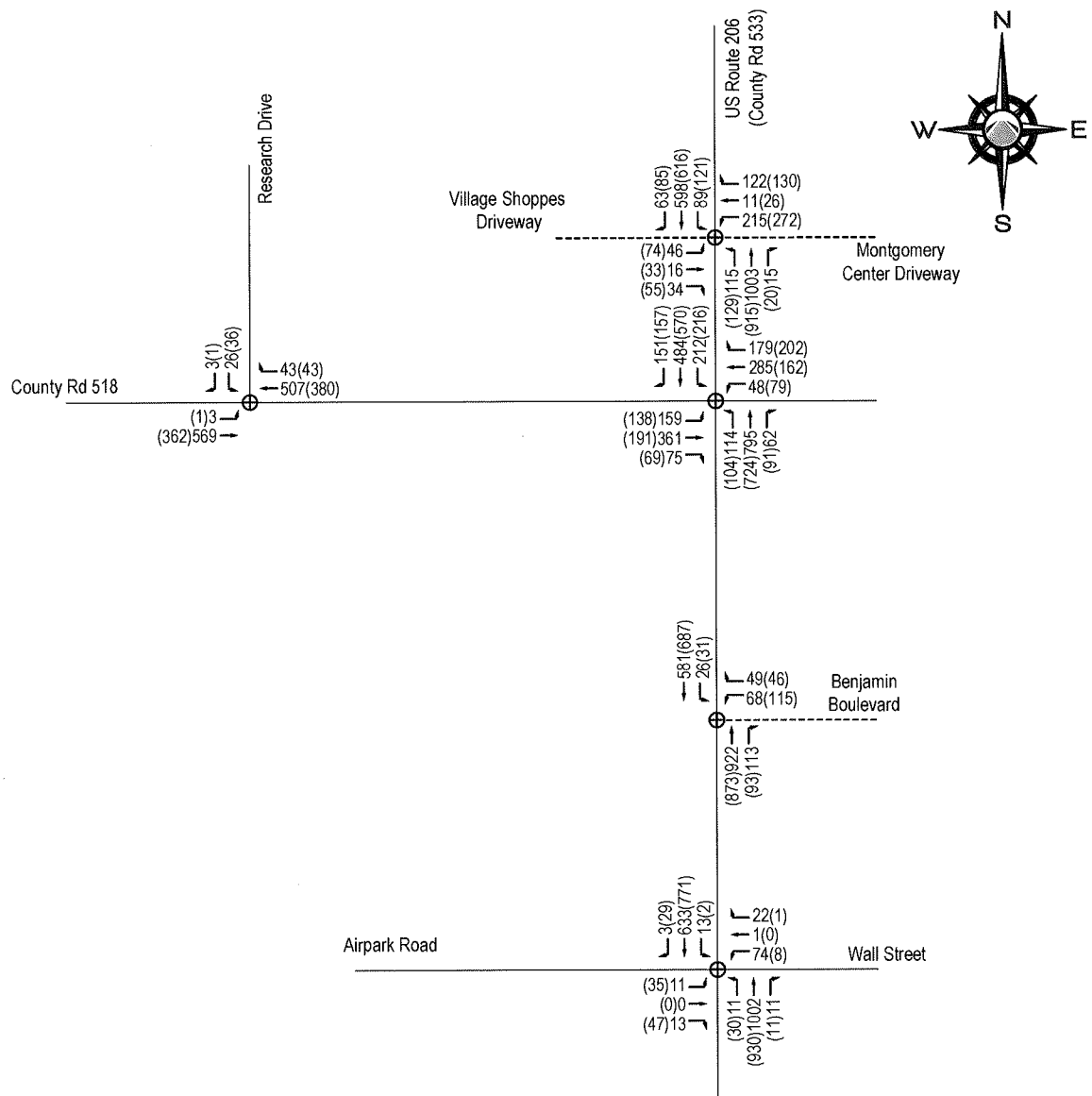
LEGEND

- AA(BB) PM(SAT) PEAK HOUR VOLUMES
- EXISTING ROADWAY
- EXISTING DRIVEWAY
- ⊕ EXISTING TRAFFIC SIGNAL
- - - - - PROPOSED DRIVEWAY

PEAK HOUR	ENTER	EXIT	TOTAL
PM	778	738	1516
SAT	921	708	1629

Proposed Mixed Use Development
Montgomery Township
Somerset County, New Jersey

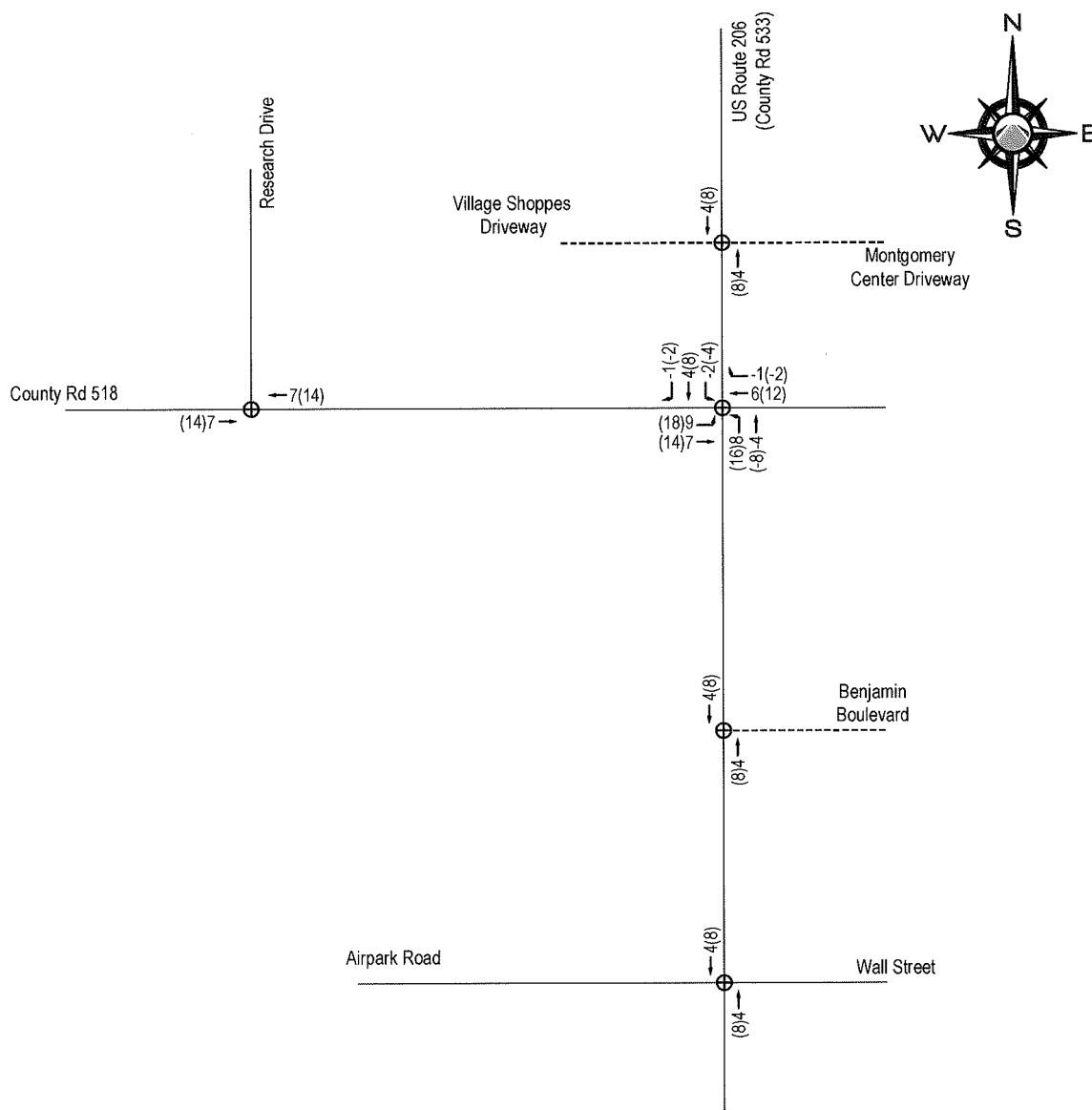
FUTURE BASE TRAFFIC VOLUME



LEGEND

- AA(BB) PM(SAT) PEAK HOUR VOLUMES
- EXISTING ROADWAY
- EXISTING DRIVEWAY
- ⊕ EXISTING TRAFFIC SIGNAL

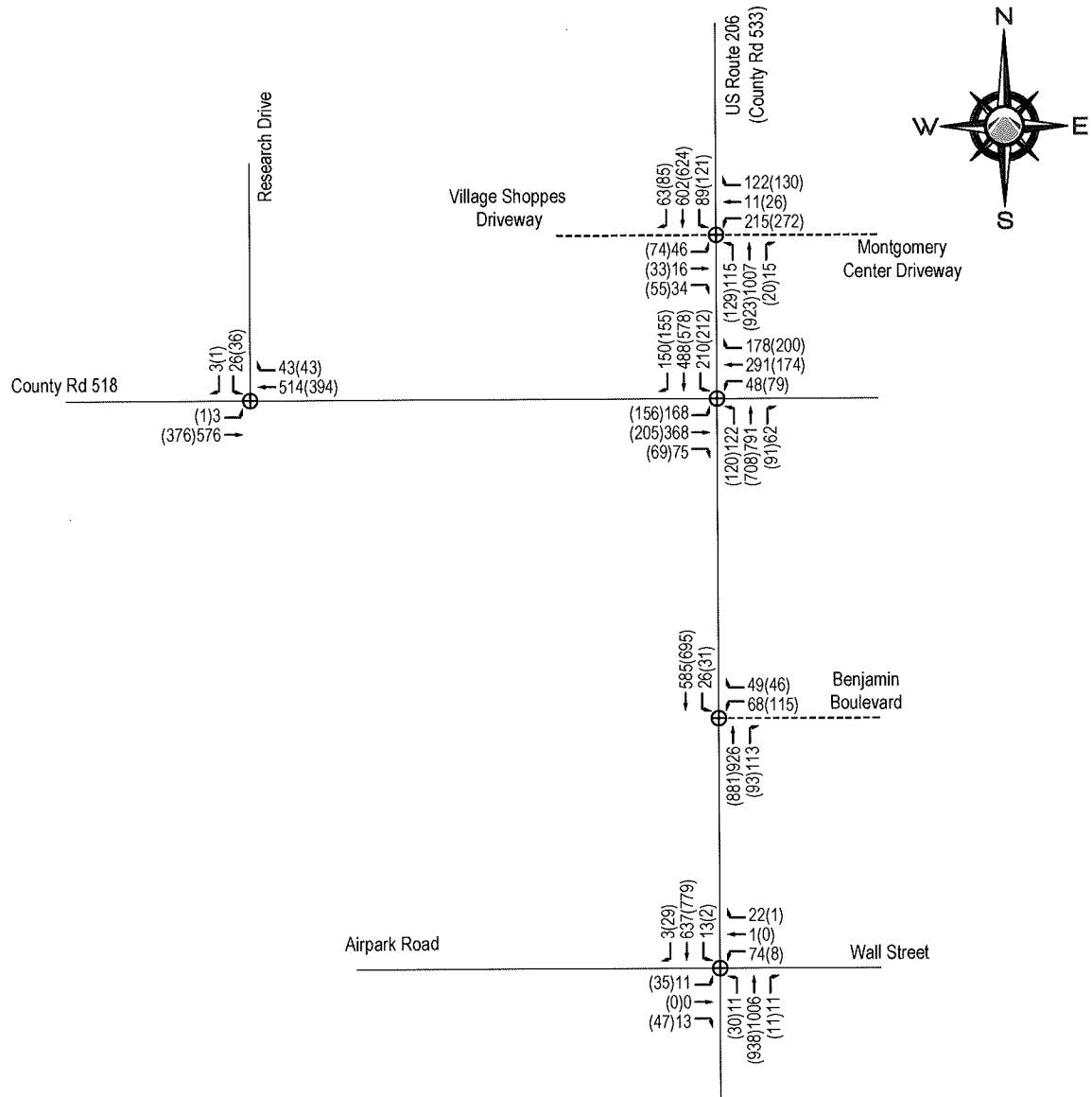
OTHER AREA DEVELOPMENT TRAFFIC VOLUMES



AA(BB) PM(SAT) PEAK HOUR VOLUMES
 _____ EXISTING ROADWAY
 - - - - - EXISTING DRIVEWAY
 ⊕ EXISTING TRAFFIC SIGNAL

Proposed Mixed Use Development
Montgomery Township
Somerset County, New Jersey

FUTURE NO-BUILD TRAFFIC VOLUMES

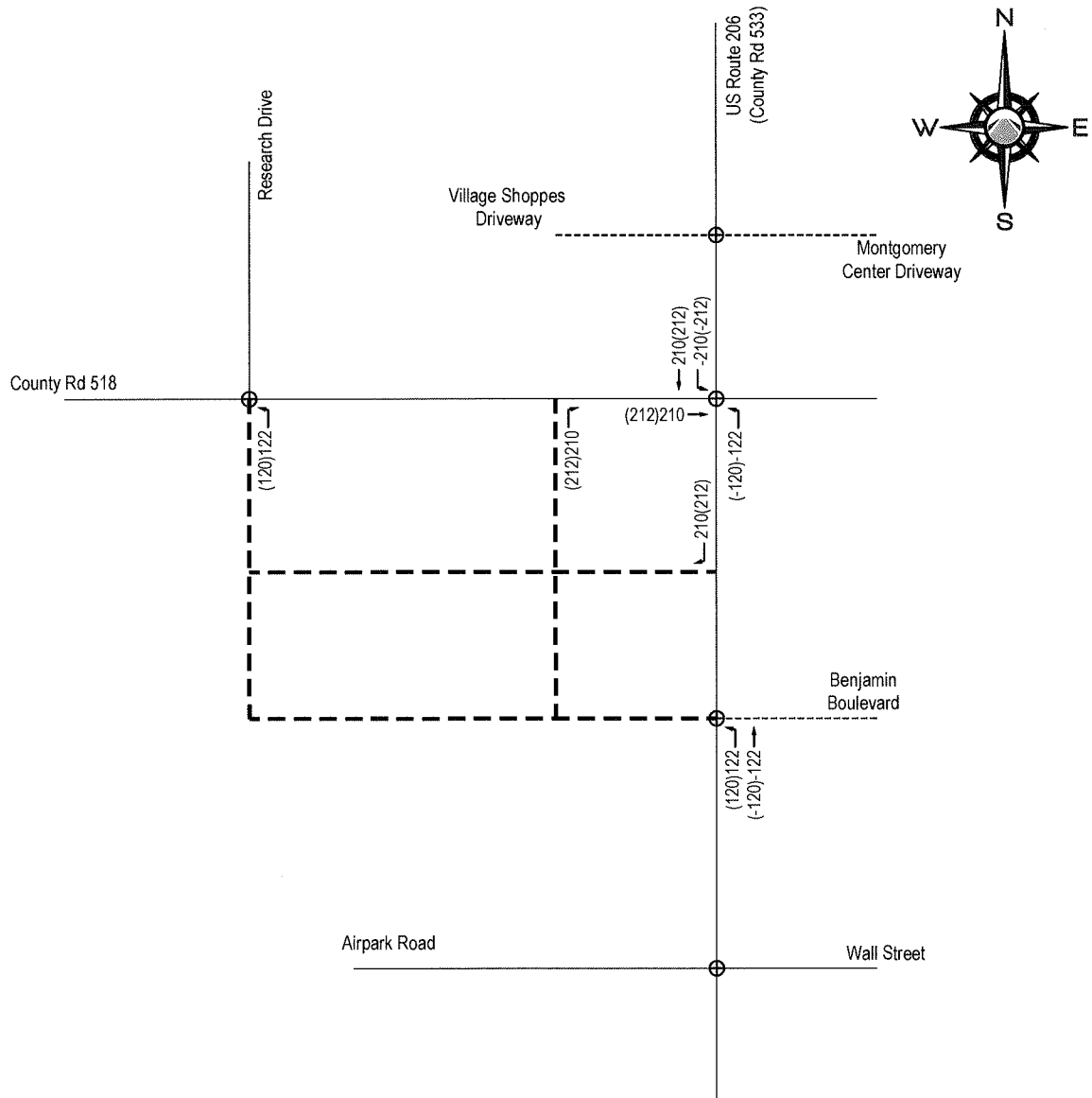


LEGEND

- AA(BB) PM(SAT) PEAK HOUR VOLUMES
- EXISTING ROADWAY
- - - - - EXISTING DRIVEWAY
- ⊕ EXISTING TRAFFIC SIGNAL

Proposed Mixed Use Development
Montgomery Township
Somerset County, New Jersey

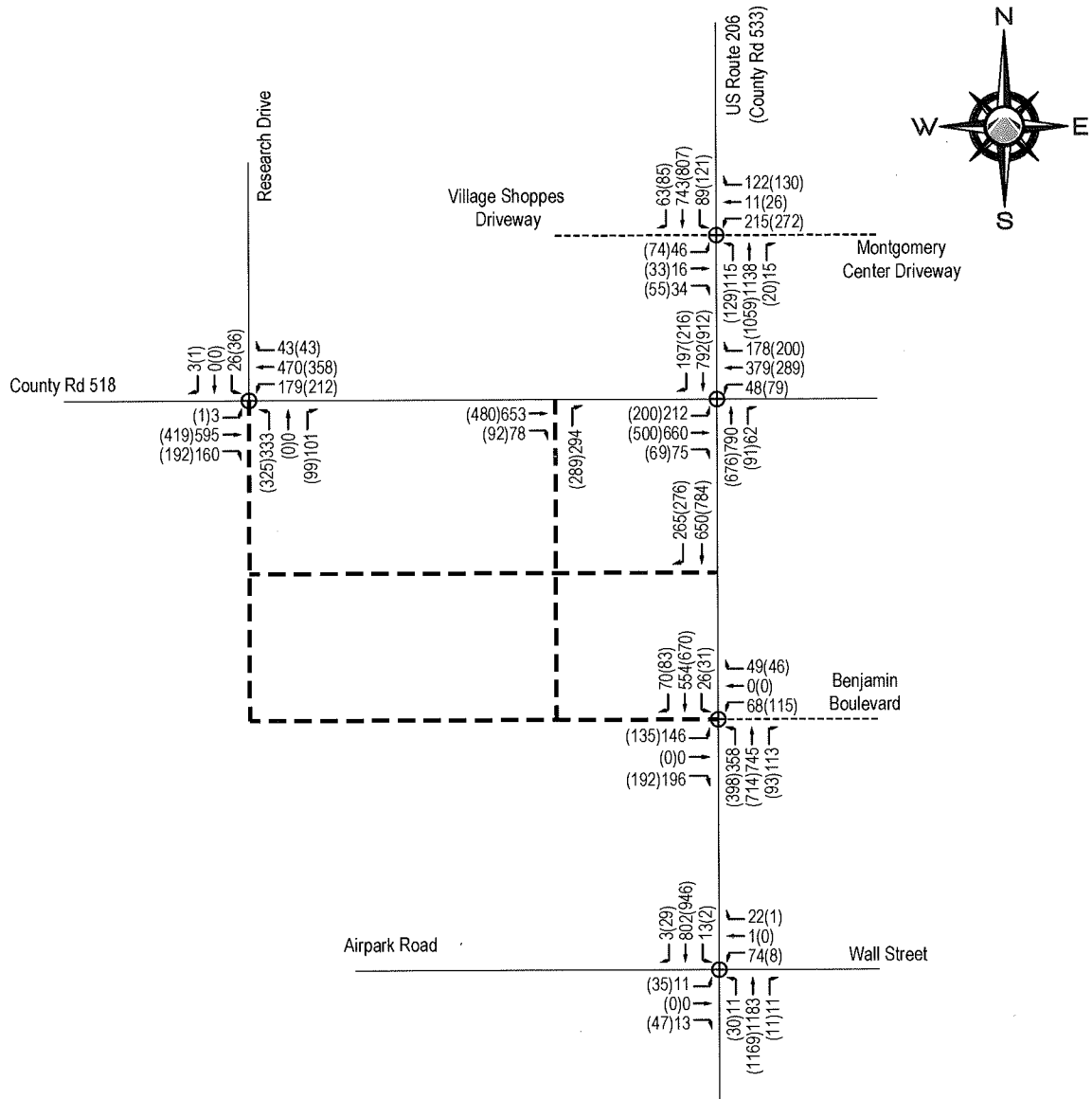
REDISTRIBUTED ROUTE 206 TRAFFIC



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Proposed Mixed Use Development
Montgomery Township
Somerset County, New Jersey

FUTURE BUILD TRAFFIC VOLUMES



LEGEND

- AA(BB) PM(SAT) PEAK HOUR VOLUMES
- EXISTING ROADWAY
- EXISTING DRIVEWAY
- ⊕ EXISTING TRAFFIC SIGNAL
- - - - - PROPOSED DRIVEWAY

PEAK HOUR	ENTER	EXIT	TOTAL
PM	778	738	1516
SAT	921	708	1629

APPENDIX B – MANUAL TURNING MOVEMENT COUNT SUMMARIES



ATLANTIC
TRAFFIC+DESIGN

Weekday Evening Peak Hour (4:00 PM - 6:30 PM)
Wednesday, May 4, 2016

Weekend Midday Peak Hour (11:00 AM - 2:00 PM)

County Road 121 & Eastern Road										US Route 206 & Eastern Road										US Route 206 & Airport Road / Wall Street									
Relocation for CS 121					Relocation for CS 121					Relocation for CS 121					Relocation for CS 121					Relocation for CS 121					Relocation for CS 121				
Westbound					Eastbound					Westbound					Eastbound					Westbound					Eastbound				
Station	Station	Station	Station	Station	Station	Station	Station	Station	Station	Station	Station	Station	Station	Station	Station	Station	Station	Station	Station	Station	Station	Station	Station	Station	Station	Station	Station	Station	Station
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908-769-5588
atde@atlantictraffic.com

Proposed Mixed Use Development
Montgomery Township, New Jersey
Somerset County, New Jersey
ATDE Project No. 08127

Weekday Morning Peak Hour (7:00 AM - 9:00 AM)
Tuesday, December 19, 2017

		US Route 206 & County Road 518												15-Min Hour	
		Route 206 Southbound			CR 518 Westbound			Route 206 Northbound			CR 518 Eastbound				
Interval	Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Sum	Sum
1	7:00 AM	26	122	12	20	47	12	29	102	9	15	60	14	468	2169
2	7:15 AM	27	133	20	16	66	12	19	122	0	32	78	17	542	2278
3	7:30 AM	41	148	20	16	58	18	33	132	8	14	49	19	556	2342
4	7:45 AM	21	147	17	17	86	15	42	143	4	22	71	18	603	2373
5	8:00 AM	41	134	15	18	79	13	35	114	3	28	75	22	577	2363
6	8:15 AM	42	152	15	30	75	13	33	139	8	19	61	19	606	
7	8:30 AM	35	148	17	27	75	21	23	112	5	16	76	32	587	
8	8:45 AM	43	144	14	23	59	26	41	123	5	22	68	25	593	
Pk. Hr. Vol.		139	581	64	92	315	62	133	508	20	85	283	91		
% HV		8.6%	2.4%	6.3%	1.1%	5.1%	17.7%	2.3%	7.7%	5.0%	9.4%	7.4%	4.4%		
PHF		0.94			0.95			0.87			0.92				

APPENDIX C – ITE TRIP GENERATION SUMMARY PRINTOUTS

Shopping Center (820)

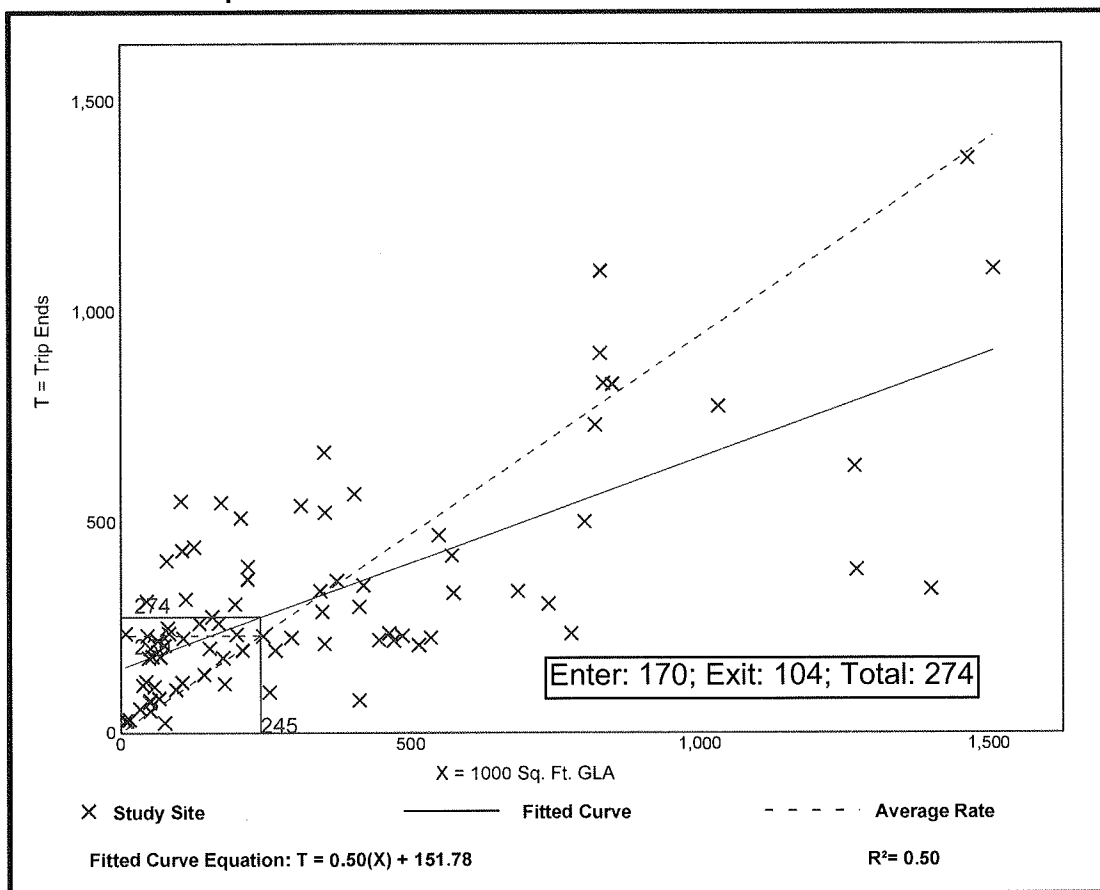
Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban
Number of Studies: 84
Avg. 1000 Sq. Ft. GLA: 351
Directional Distribution: 62% entering, 38% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
0.94	0.18 - 23.74	0.87

Data Plot and Equation



Trip Generation Manual, 10th Edition • Institute of Transportation Engineers

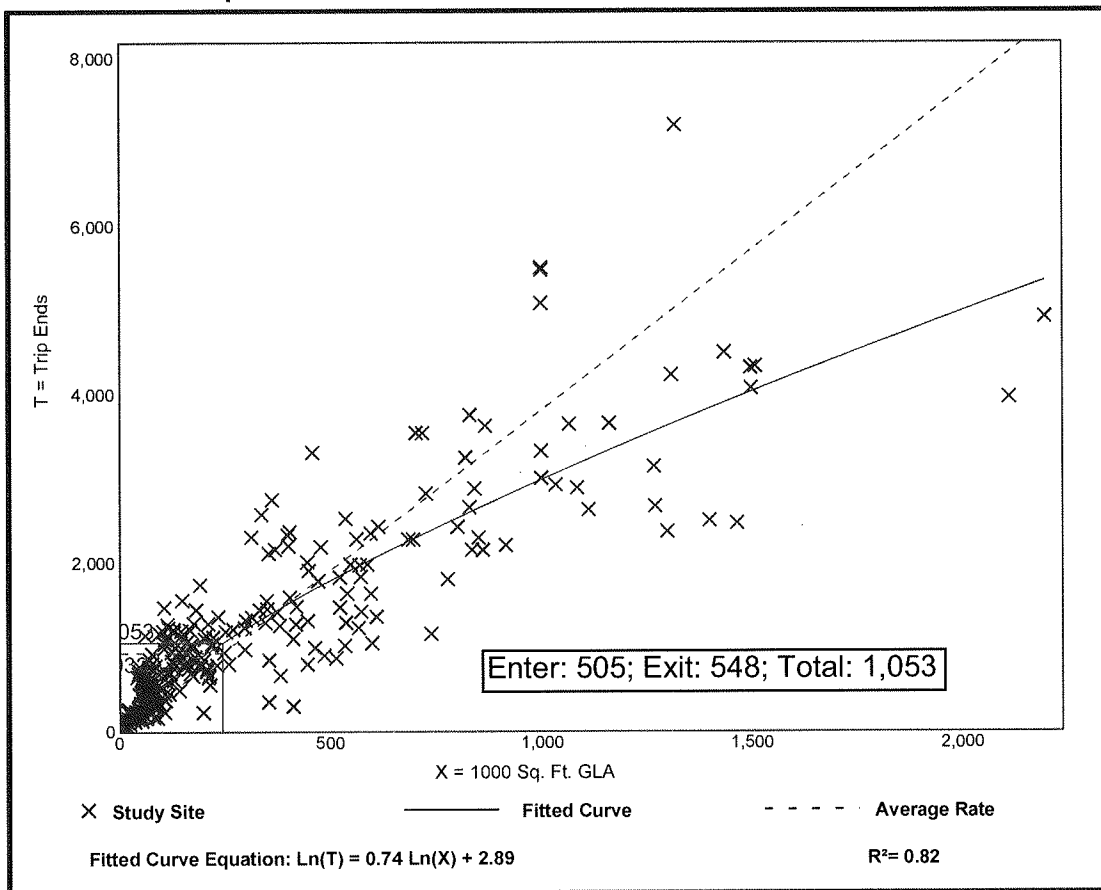
Shopping Center (820)

Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
 On a: Weekday,
 Peak Hour of Adjacent Street Traffic,
 One Hour Between 4 and 6 p.m.
 Setting/Location: General Urban/Suburban
 Number of Studies: 261
 1000 Sq. Ft. GLA: 327
 Directional Distribution: 48% entering, 52% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
3.81	0.74 - 18.69	2.04

Data Plot and Equation



Trip Generation Manual, 10th Edition • Institute of Transportation Engineers

Shopping Center (820)

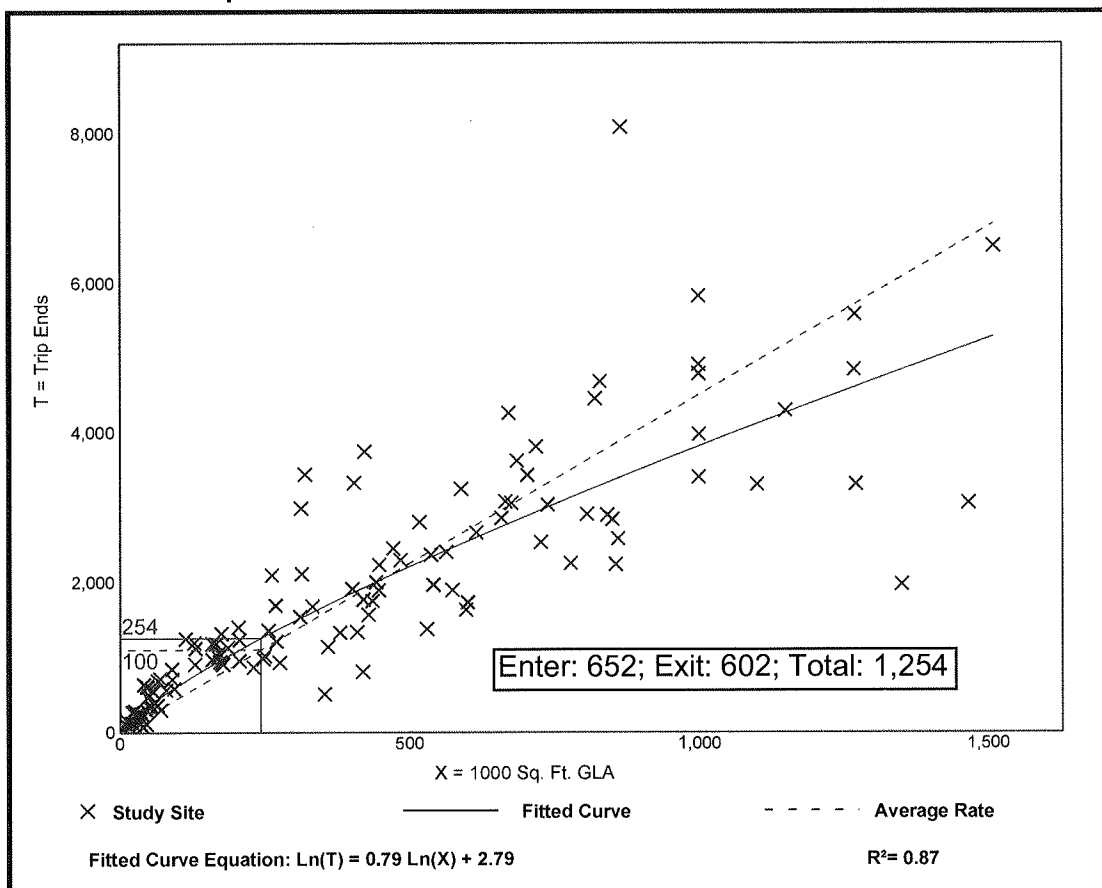
Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
On a: Saturday, Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 119
1000 Sq. Ft. GLA: 416
Directional Distribution: 52% entering, 48% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
4.50	1.42 - 15.10	1.88

Data Plot and Equation



Trip Generation Manual, 10th Edition • Institute of Transportation Engineers

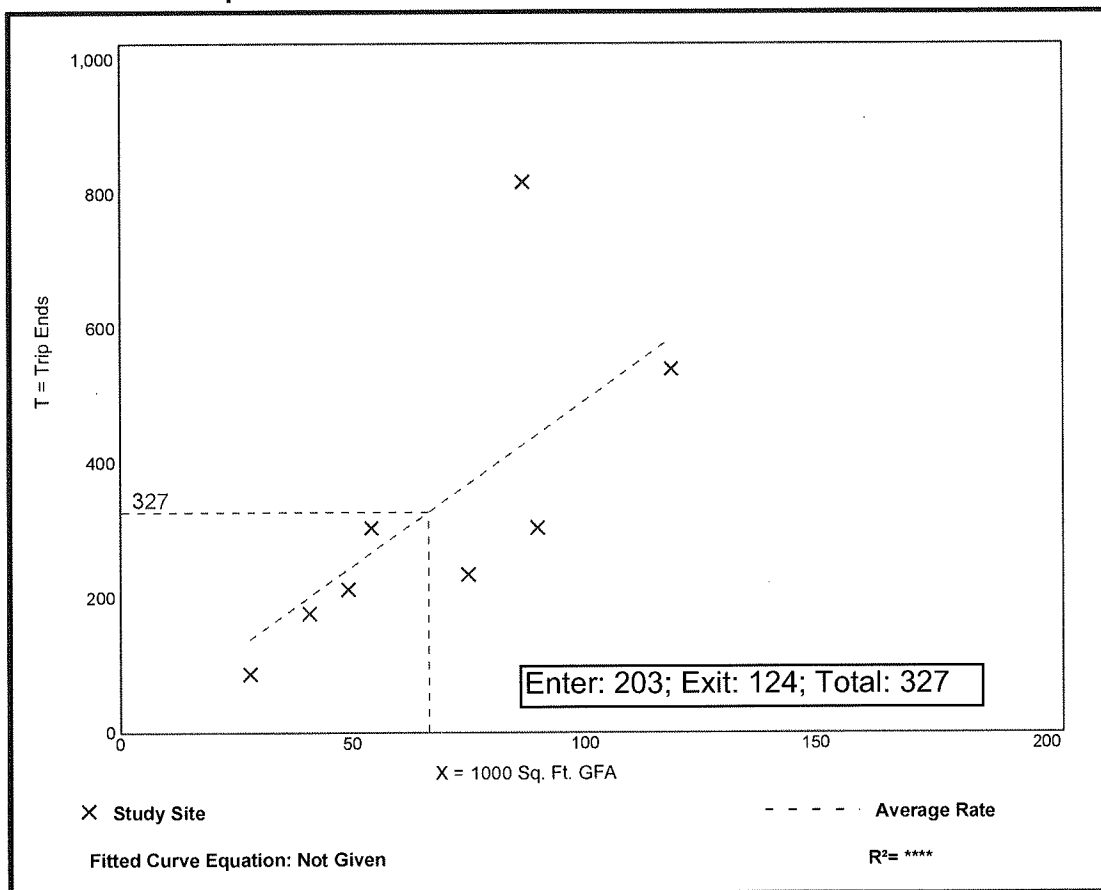
Multiplex Movie Theater (445)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
 On a: Friday,
 Peak Hour of Adjacent Street Traffic,
 One Hour Between 4 and 6 p.m.
 Setting/Location: General Urban/Suburban
 Number of Studies: 8
 1000 Sq. Ft. GFA: 68
 Directional Distribution: 62% entering, 38% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
4.91	3.07 - 9.40	2.24

Data Plot and Equation



Trip Generation Manual, 10th Edition • Institute of Transportation Engineers

Multiplex Movie Theater (445)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Saturday,
Midday Peak Hour of Generator

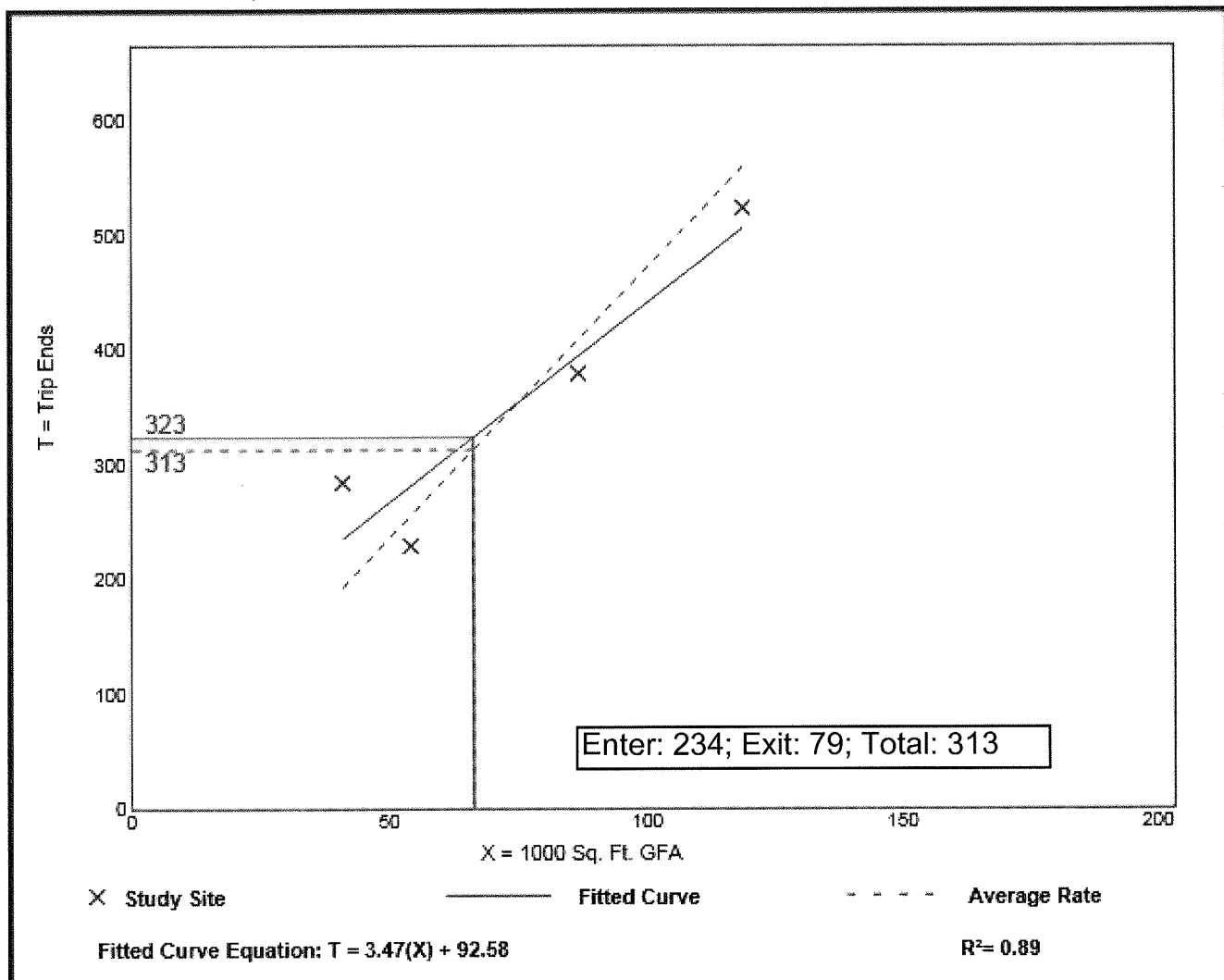
Setting/Location: General Urban/Suburban
Number of Studies: 4
1000 Sq. Ft. GFA: 75
Directional Distribution: 75% entering, 25% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
4.70	4.22 - 6.93	1.02

Data Plot and Equation

Caution – Small Sample Size



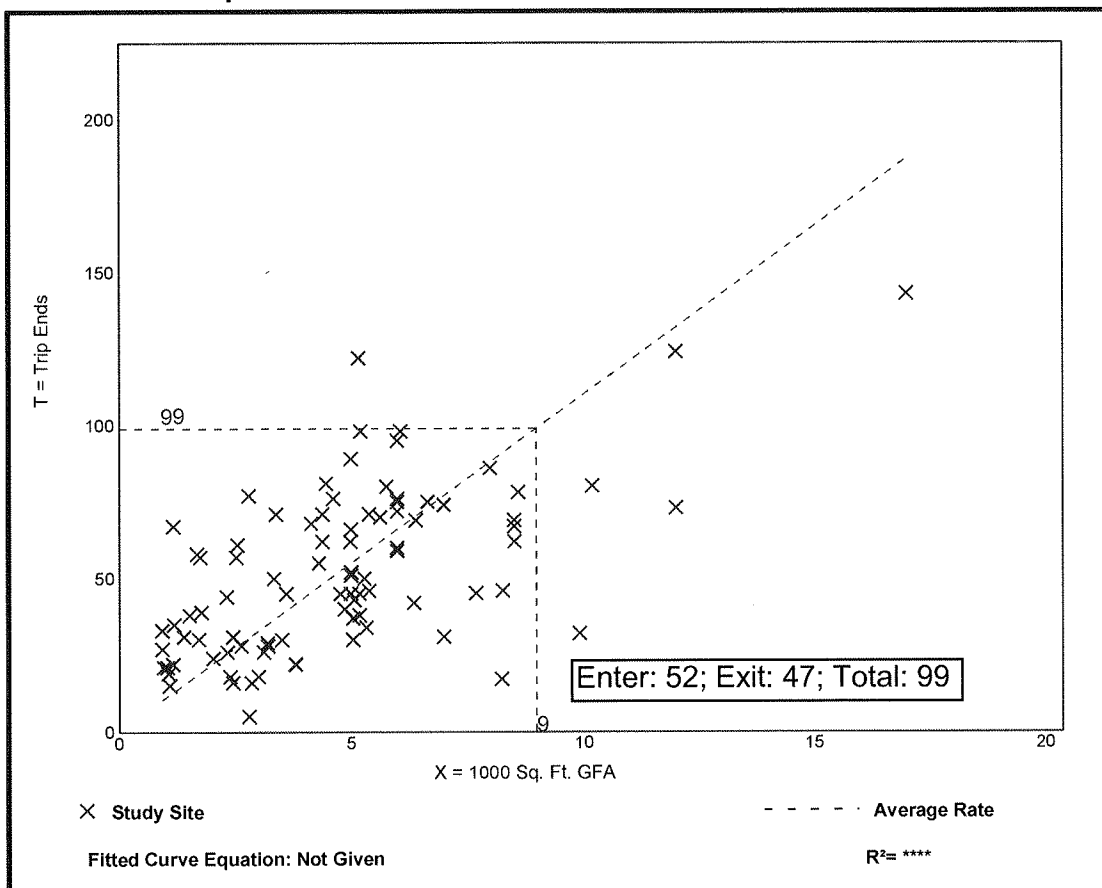
Day Care Center (565)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
 Number of Studies: 89
 Avg. 1000 Sq. Ft. GFA: 5
 Directional Distribution: 53% entering, 47% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
11.00	1.79 - 57.02	6.08

Data Plot and Equation



Trip Generation Manual, 10th Edition • Institute of Transportation Engineers

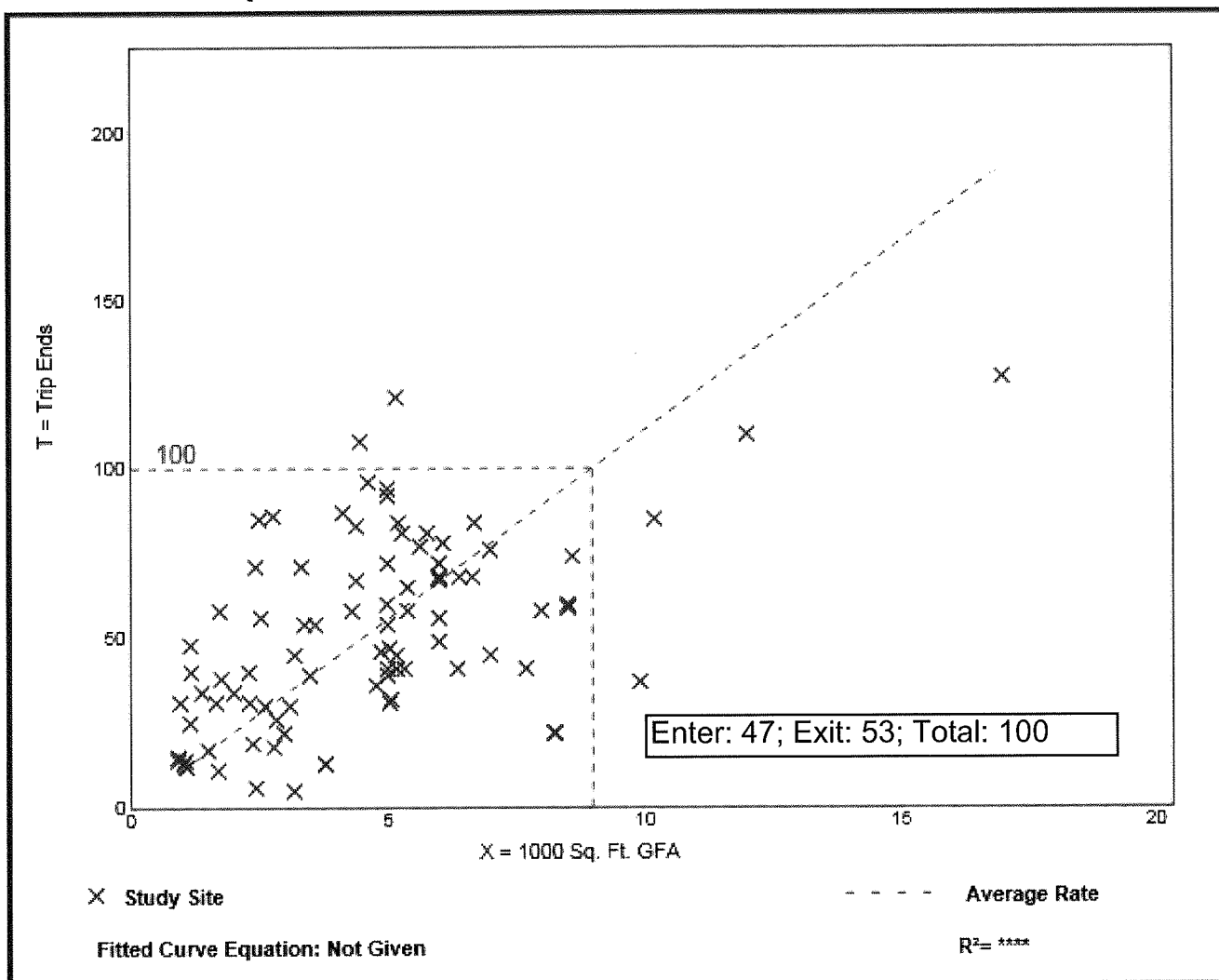
Day Care Center (565)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
 Peak Hour of Adjacent Street Traffic,
 One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
 Number of Studies: 90
 1000 Sq. Ft. GFA: 5
 Directional Distribution: 47% entering, 53% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
11.12	1.56 - 40.85	6.28

Data Plot and Equation



Day Care Center (565)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Saturday, Peak Hour of Generator

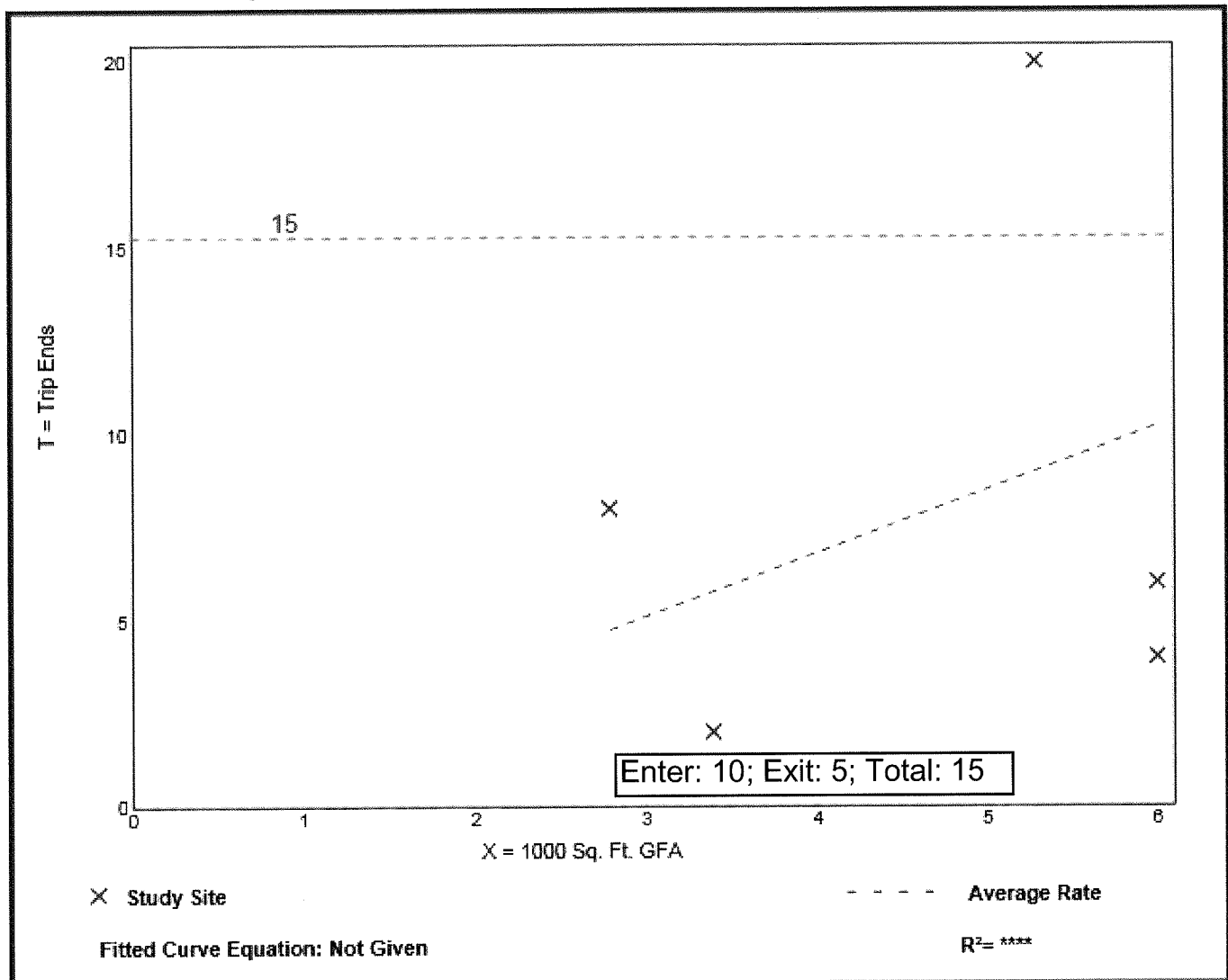
Setting/Location: General Urban/Suburban
Number of Studies: 5
1000 Sq. Ft. GFA: 5
Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.70	0.59 - 3.78	1.46

Data Plot and Equation

Caution – Small Sample Size



Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

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

Setting/Location: General Urban/Suburban

Number of Studies: 190

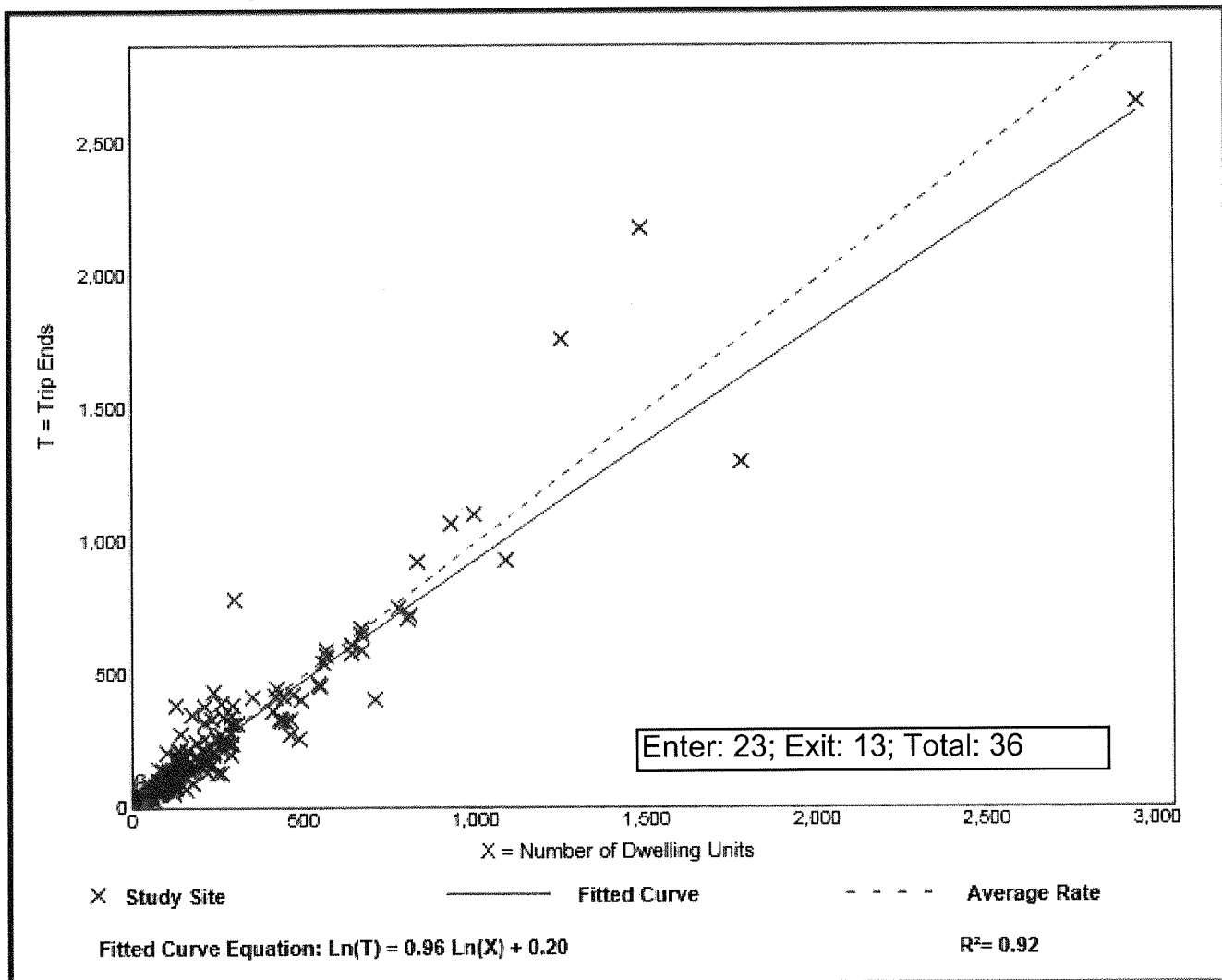
Avg. Num. of Dwelling Units: 242

Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.99	0.44 - 2.98	0.31

Data Plot and Equation



Single-Family Detached Housing (210)

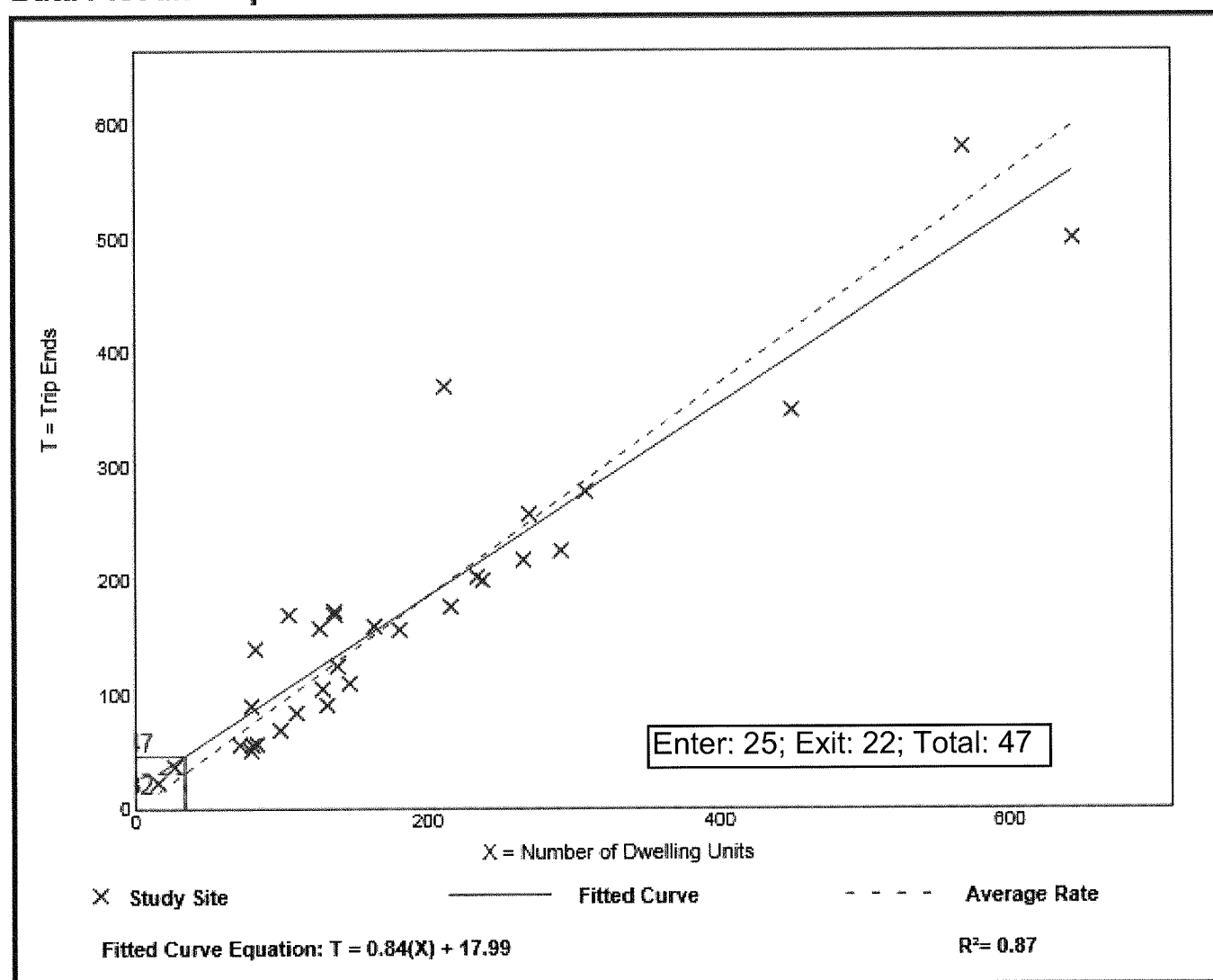
Vehicle Trip Ends vs: Dwelling Units
On a: Saturday, Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 31
Avg. Num. of Dwelling Units: 188
Directional Distribution: 54% entering, 46% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.93	0.64 - 1.75	0.26

Data Plot and Equation



APPENDIX D – LEVEL OF SERVICE DESCRIPTIONS

TABLE D-I
LEVEL OF SERVICE AND EXPECTED DELAY
FOR UNSIGNALIZED INTERSECTIONS

LEVEL OF SERVICE	AVERAGE TOTAL DELAY (SEC./VEH.)
A	≤ 10
B	> 10 and ≤ 15
C	> 15 and ≤ 25
D	> 25 and ≤ 35
E	> 35 and ≤ 50
F	> 50

* Transportation Research Board, Highway Capacity Manual, HCM2010, 2010, by the Transportation Research Board, Washington, D.C.

**TABLE D-II
LEVEL OF SERVICE
FOR SIGNALIZED INTERSECTIONS**

LEVEL OF SERVICE	DESCRIPTION	AVERAGE TOTAL DELAY (SEC./VEH.)
A	Very short delay, good progression; most vehicles do not stop at intersection.	≤ 10
B	Generally good signal progression and/or short cycle length; more vehicles stop at intersection than Level of Service A.	>10 and ≤ 20
C	Fair progression and/or longer cycle length; significant number of vehicles stop at intersection.	>20 and ≤ 35
D	Congestion becomes noticeable; individual cycle failures; longer delays from unfavorable progression, long cycle length; or high volume/capacity ratios; most vehicles stop at intersection.	>35 and ≤ 55
E	Usually considered <u>limit of acceptable delay</u> indicative of poor progression long cycle length, or high volume/capacity ratio; frequent individual cycle failures.	>55 and ≤ 80
F	Could be considered excessive delay in some areas, frequently an indication of over-saturation (i.e., arrival flows exceeds capacity), or very long cycle lengths with minimal side street green time. Capacity is not necessarily exceeded under this Level of Service.	> 80.0

* Transportation Research Board, Highway Capacity Manual, HCM2010, 2010, published by the Transportation Research Board, Washington, D.C.

APPENDIX E – SYNCHRO SUMMARY REPORT PRINTOUTS

AJ08127 Madison-Marquette
1: US Route 206 & Airpark Road/Wall Street

2019 No-Build
PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	0	13	74	1	22	11	1006	11	13	637	0
Future Volume (vph)	11	0	13	74	1	22	11	1006	11	13	637	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	13	12	12	13	13	12	13	12	12	16	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00
Frt		0.850				0.850		0.998				
Flt Protected	0.950				0.953			0.999			0.999	
Satd. Flow (prot)	1805	1669	0	0	1871	1669	0	3683	0	0	2130	0
Flt Permitted	0.663				0.708			0.946			0.970	
Satd. Flow (perm)	1260	1669	0	0	1390	1669	0	3488	0	0	2068	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		252				40		2				
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		372			351			123			174	
Travel Time (s)		10.1			9.6			2.1			3.0	
Peak Hour Factor	0.46	0.46	0.46	0.76	0.76	0.76	0.97	0.97	0.97	0.89	0.89	0.89
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	24	0	28	97	1	29	11	1037	11	15	716	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	24	28	0	0	98	29	0	1059	0	0	731	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	50.0	50.0		50.0	50.0	
Minimum Split (s)	13.0	13.0		13.0	13.0	13.0	57.0	57.0		57.0	57.0	
Total Split (s)	33.0	33.0		33.0	33.0	33.0	77.0	77.0		77.0	77.0	
Total Split (%)	30.0%	30.0%		30.0%	30.0%	30.0%	70.0%	70.0%		70.0%	70.0%	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0			0.0	0.0		0.0			0.0	
Total Lost Time (s)	5.0	5.0			5.0	5.0		7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)	13.1	13.1			13.1	13.1		84.9			84.9	
Actuated g/C Ratio	0.12	0.12			0.12	0.12		0.77			0.77	
v/c Ratio	0.16	0.07			0.59	0.12		0.39			0.46	
Control Delay	43.7	0.3			59.7	9.4		5.0			6.0	
Queue Delay	0.0	0.0			0.0	0.0		0.0			0.0	
Total Delay	43.7	0.3			59.7	9.4		5.0			6.0	
LOS	D	A			E	A		A			A	
Approach Delay		20.3			48.2			5.0			6.0	
Approach LOS		C			D			A			A	
Queue Length 50th (ft)	15	0			67	0		106			151	
Queue Length 95th (ft)	19	0			96	13		172			263	
Internal Link Dist (ft)		292			271			43			94	

AJ08127 Madison-Marquette
1: US Route 206 & Airpark Road/Wall Street

2019 No-Build
PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)												
Base Capacity (vph)	320	612			353	454		2693			1596	
Starvation Cap Reductn	0	0			0	0		0			0	
Spillback Cap Reductn	0	0			0	0		0			0	
Storage Cap Reductn	0	0			0	0		0			0	
Reduced v/c Ratio	0.07	0.05			0.28	0.06		0.39			0.46	

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 70 (64%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 8.6

Intersection LOS: A

Intersection Capacity Utilization 67.5%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 1: US Route 206 & Airpark Road/Wall Street

 Ø2 (R)	 Ø4
77 s	33 s
 Ø6 (R)	 Ø8
77 s	33 s

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	68	49	926	113	26	585
Future Volume (vph)	68	49	926	113	26	585
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	14	12	13	12	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850		0.850		
Flt Protected	0.950					0.998
Satd. Flow (prot)	1865	1723	1881	1669	0	1896
Flt Permitted	0.950					0.937
Satd. Flow (perm)	1865	1723	1881	1669	0	1780
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		75		120		
Link Speed (mph)	25		40			40
Link Distance (ft)	489		1181			996
Travel Time (s)	13.3		20.1			17.0
Peak Hour Factor	0.65	0.65	0.94	0.94	0.97	0.97
Heavy Vehicles (%)	0%	0%	1%	0%	0%	0%
Adj. Flow (vph)	105	75	985	120	27	603
Shared Lane Traffic (%)						
Lane Group Flow (vph)	105	75	985	120	0	630
Turn Type	Prot	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	6	6
Switch Phase						
Minimum Initial (s)	7.0	7.0	60.0	60.0	60.0	60.0
Minimum Split (s)	13.0	13.0	67.0	67.0	67.0	67.0
Total Split (s)	22.0	22.0	88.0	88.0	88.0	88.0
Total Split (%)	20.0%	20.0%	80.0%	80.0%	80.0%	80.0%
Yellow Time (s)	4.0	4.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0	7.0	7.0		7.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	11.5	11.5	85.5	85.5		85.5
Actuated g/C Ratio	0.10	0.10	0.78	0.78		0.78
v/c Ratio	0.54	0.30	0.67	0.09		0.46
Control Delay	56.4	13.3	9.2	0.8		2.6
Queue Delay	0.0	0.0	0.0	0.0		0.0
Total Delay	56.4	13.3	9.2	0.8		2.6
LOS	E	B	A	A		A
Approach Delay	38.4		8.3			2.6
Approach LOS	D		A			A
Queue Length 50th (ft)	72	0	266	0		52
Queue Length 95th (ft)	86	16	472	13		m81
Internal Link Dist (ft)	409		1101			916

AJ08127 Madison-Marquette
2: US Route 206 & Benjamin Boulevard

2019 No-Build
PM



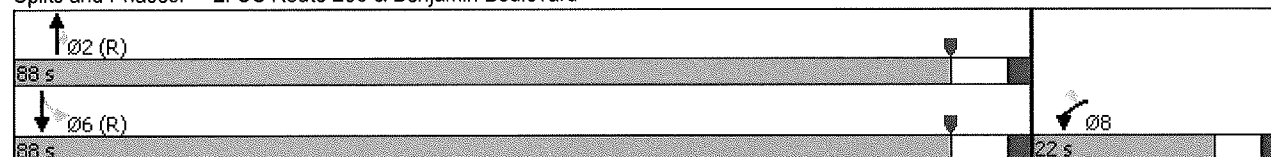
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Turn Bay Length (ft)						
Base Capacity (vph)	271	314	1462	1323		1383
Starvation Cap Reductn	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0		0
Storage Cap Reductn	0	0	0	0		0
Reduced v/c Ratio	0.39	0.24	0.67	0.09		0.46

Intersection Summary

Area Type: Other
 Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 20 (18%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.67
 Intersection Signal Delay: 9.2
 Intersection Capacity Utilization 111.7%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Intersection LOS: A
 ICU Level of Service H

Splits and Phases: 2: US Route 206 & Benjamin Boulevard



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	168	368	75	48	291	178	122	791	62	210	488	150
Future Volume (vph)	168	368	75	48	291	178	122	791	62	210	488	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	14	14	14
Storage Length (ft)	185		0	120		0	85		0	215		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	300			25			40			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00
Frt		0.975			0.943			0.989			0.965	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1852	0	1805	1792	0	1787	3563	0	1906	1941	0
Flt Permitted	0.147			0.165			0.150			0.206		
Satd. Flow (perm)	279	1852	0	314	1792	0	282	3563	0	413	1941	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			25			9			17	
Link Speed (mph)		45			35			40			40	
Link Distance (ft)		2196			2636			996			1117	
Travel Time (s)		33.3			51.4			17.0			19.0	
Peak Hour Factor	0.91	0.91	0.91	0.94	0.94	0.94	0.97	0.97	0.97	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	0%	3%	1%	1%	0%
Adj. Flow (vph)	185	404	82	51	310	189	126	815	64	214	498	153
Shared Lane Traffic (%)												
Lane Group Flow (vph)	185	486	0	51	499	0	126	879	0	214	651	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Minimum Split (s)	4.0	8.0		4.0	8.0		4.0	8.0		4.0	8.0	
Total Split (s)	15.0	30.0		15.0	30.0		13.0	52.0		13.0	52.0	
Total Split (%)	13.6%	27.3%		13.6%	27.3%		11.8%	47.3%		11.8%	47.3%	
Yellow Time (s)	3.0	5.0		3.0	5.0		3.0	5.0		3.0	5.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	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)	3.0	7.0		3.0	7.0		3.0	7.0		3.0	7.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	41.9	29.2		35.2	23.7		58.1	45.3		59.9	46.2	
Actuated g/C Ratio	0.38	0.27		0.32	0.22		0.53	0.41		0.54	0.42	
v/c Ratio	0.71	0.98		0.25	1.23		0.47	0.60		0.60	0.79	
Control Delay	39.1	76.3		25.2	159.7		16.4	21.9		16.5	29.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	39.1	76.3		25.2	159.7		16.4	21.9		16.5	29.2	
LOS	D	E		C	F		B	C		B	C	
Approach Delay		66.1			147.2			21.2			26.1	
Approach LOS		E			F			C			C	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	89	~365		23	~432		30	197		45	288	
Queue Length 95th (ft)	#159	#600		48	#641		m50	229		m95	m267	
Internal Link Dist (ft)		2116			2556			916			1037	
Turn Bay Length (ft)	185			120			85			215		
Base Capacity (vph)	273	497		275	406		289	1473		361	825	
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	0.68	0.98		0.19	1.23		0.44	0.60		0.59	0.79	

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.23

Intersection Signal Delay: 54.7

Intersection LOS: D

Intersection Capacity Utilization 95.4%

ICU Level of Service F

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: US Route 206 & CR 518

 Ø1	 Ø2 (R)	 Ø3	 Ø4
13 s	52 s	15 s	30 s
 Ø5	 Ø6 (R)	 Ø7	 Ø8
13 s	52 s	15 s	30 s

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	16	34	215	11	122	115	1007	15	89	602	63
Future Volume (vph)	46	16	34	215	11	122	115	1007	15	89	602	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	14	12	12	12	13	12	16	12	12	13	12
Storage Length (ft)	0		0	0		0	85		0	125		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	25			25			40			40		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.952				0.850		0.998			0.986	
Flt Protected		0.977			0.955		0.950			0.950		
Satd. Flow (prot)	0	1885	0	0	1814	1669	1805	2128	0	1805	1901	0
Flt Permitted		0.528			0.626		0.253			0.063		
Satd. Flow (perm)	0	1019	0	0	1189	1669	481	2128	0	120	1901	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23				137		1			8	
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		139			168			1117			586	
Travel Time (s)		3.8			4.6			19.0			10.0	
Peak Hour Factor	0.73	0.73	0.73	0.89	0.89	0.89	0.93	0.93	0.93	0.94	0.94	0.94
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	2%	0%
Adj. Flow (vph)	63	22	47	242	12	137	124	1083	16	95	640	67
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	132	0	0	254	137	124	1099	0	95	707	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	5.0	63.0		5.0	63.0	
Minimum Split (s)	12.0	12.0		12.0	12.0	12.0	8.0	70.0		8.0	70.0	
Total Split (s)	30.0	30.0		30.0	30.0	30.0	10.0	70.0		10.0	70.0	
Total Split (%)	27.3%	27.3%		27.3%	27.3%	27.3%	9.1%	63.6%		9.1%	63.6%	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	0.0	2.0		0.0	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.0			5.0	5.0	3.0	7.0		3.0	7.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None	None	None	C-Max		None	C-Max	
Act Effct Green (s)		24.6			24.6	24.6	74.5	63.6		74.2	63.5	
Actuated g/C Ratio		0.22			0.22	0.22	0.68	0.58		0.67	0.58	
v/c Ratio		0.54			0.95	0.29	0.30	0.89		0.52	0.64	
Control Delay		39.8			88.0	7.6	5.9	21.9		21.7	18.9	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		39.8			88.0	7.6	5.9	21.9		21.7	18.9	
LOS		D			F	A	A	C		C	B	
Approach Delay		39.8			59.8			20.3			19.3	
Approach LOS		D			E			C			B	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		68			177	0	20	745		19	317	
Queue Length 95th (ft)		100			#331	48	m32	m816		63	444	
Internal Link Dist (ft)		59			88			1037			506	
Turn Bay Length (ft)							85			125		
Base Capacity (vph)		249			270	485	410	1231		188	1101	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.53			0.94	0.28	0.30	0.89		0.51	0.64	

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 20 (18%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.95

Intersection Signal Delay: 27.1

Intersection LOS: C

Intersection Capacity Utilization 91.4%

ICU Level of Service F

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

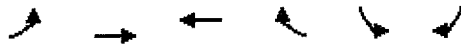
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: US Route 206 & Village Shoppes Driveway/Montgomery Center Driveway

 Ø1	 Ø2 (R)	 Ø4
10 s	70 s	30 s
 Ø5	 Ø6 (R)	 Ø8
10 s	70 s	30 s

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	3	576	514	43	26	3
Future Volume (vph)	3	576	514	43	26	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	12	15	15
Storage Length (ft)	200			0	110	0
Storage Lanes	1			0	1	1
Taper Length (ft)	40				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.990			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1745	1837	1864	0	1986	1777
Flt Permitted	0.261				0.950	
Satd. Flow (perm)	479	1837	1864	0	1986	1777
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			11			4
Link Speed (mph)		30	30		30	
Link Distance (ft)		1257	2196		434	
Travel Time (s)		28.6	49.9		9.9	
Peak Hour Factor	0.87	0.87	0.89	0.89	0.70	0.70
Heavy Vehicles (%)	0%	0%	1%	0%	0%	0%
Adj. Flow (vph)	3	662	578	48	37	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	3	662	626	0	37	4
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		4	8		6	
Permitted Phases	4				6	6
Detector Phase	4	4	8		6	6
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	21.0	21.0	21.0		21.0	21.0
Total Split (s)	39.0	39.0	39.0		21.0	21.0
Total Split (%)	65.0%	65.0%	65.0%		35.0%	35.0%
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0		5.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	None		Max	Max
Act Effct Green (s)	23.2	23.2	23.2		16.4	16.4
Actuated g/C Ratio	0.47	0.47	0.47		0.33	0.33
v/c Ratio	0.01	0.77	0.72		0.06	0.01
Control Delay	6.3	17.5	15.1		15.0	11.0
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	6.3	17.5	15.1		15.0	11.0
LOS	A	B	B		B	B
Approach Delay		17.5	15.1		14.6	
Approach LOS		B	B		B	



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)	0	144	128		7	0
Queue Length 95th (ft)	3	226	210		22	4
Internal Link Dist (ft)		1177	2116		354	
Turn Bay Length (ft)	200				110	
Base Capacity (vph)	334	1282	1304		652	586
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.01	0.52	0.48		0.06	0.01

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 49.8

Natural Cycle: 55

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 16.3

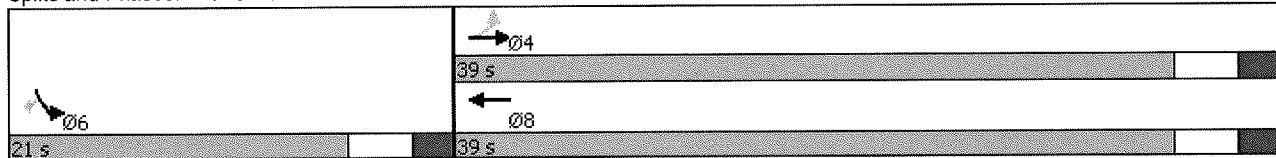
Intersection LOS: B

Intersection Capacity Utilization 42.0%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 5: CR 518 & Research Drive



AJ08127 Madison-Marquette
1: US Route 206 & Airpark Road/Wall Street

2019 No-Build
SAT

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	0	47	8	0	1	30	938	11	2	779	0
Future Volume (vph)	35	0	47	8	0	1	30	938	11	2	779	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	13	12	12	13	13	12	13	12	12	16	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00
Frt		0.850				0.850		0.998				
Flt Protected	0.950				0.950			0.998				
Satd. Flow (prot)	1805	1669	0	0	1865	1669	0	3680	0	0	2111	0
Flt Permitted	0.750				0.717			0.912			0.998	
Satd. Flow (perm)	1425	1669	0	0	1408	1669	0	3363	0	0	2107	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		220				46		2				
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		372			351			123			174	
Travel Time (s)		10.1			9.6			2.1			3.0	
Peak Hour Factor	0.77	0.77	0.77	0.75	0.75	0.75	0.96	0.96	0.96	0.99	0.99	0.99
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	2%	0%
Adj. Flow (vph)	45	0	61	11	0	1	31	977	11	2	787	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	45	61	0	0	11	1	0	1019	0	0	789	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	50.0	50.0		50.0	50.0	
Minimum Split (s)	13.0	13.0		13.0	13.0	13.0	57.0	57.0		57.0	57.0	
Total Split (s)	27.0	27.0		27.0	27.0	27.0	68.0	68.0		68.0	68.0	
Total Split (%)	28.4%	28.4%		28.4%	28.4%	28.4%	71.6%	71.6%		71.6%	71.6%	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0			0.0	0.0		0.0			0.0	
Total Lost Time (s)	5.0	5.0			5.0	5.0		7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)	8.8	8.8			8.8	8.8		78.0			78.0	
Actuated g/C Ratio	0.09	0.09			0.09	0.09		0.82			0.82	
v/c Ratio	0.34	0.17			0.08	0.01		0.37			0.46	
Control Delay	46.8	1.1			39.5	0.0		3.5			4.5	
Queue Delay	0.0	0.0			0.0	0.0		0.0			0.0	
Total Delay	46.8	1.1			39.5	0.0		3.5			4.5	
LOS	D	A			D	A		A			A	
Approach Delay		20.5			36.2			3.5			4.5	
Approach LOS		C			D			A			A	
Queue Length 50th (ft)	26	0			6	0		76			126	
Queue Length 95th (ft)	50	0			19	0		122			221	
Internal Link Dist (ft)		292			271			43			94	

AJ08127 Madison-Marquette
1: US Route 206 & Airpark Road/Wall Street

2019 No-Build
SAT

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)												
Base Capacity (vph)	330	555			326	421		2761			1730	
Starvation Cap Reductn	0	0			0	0		0			0	
Spillback Cap Reductn	0	0			0	0		0			0	
Storage Cap Reductn	0	0			0	0		0			0	
Reduced v/c Ratio	0.14	0.11			0.03	0.00		0.37			0.46	

Intersection Summary

Area Type: Other
 Cycle Length: 95
 Actuated Cycle Length: 95
 Offset: 74 (78%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.46
 Intersection Signal Delay: 5.0
 Intersection Capacity Utilization 67.5%
 Analysis Period (min) 15

Intersection LOS: A
 ICU Level of Service C

Splits and Phases: 1: US Route 206 & Airpark Road/Wall Street

 Ø2 (R)	 Ø4
68 s	27 s
 Ø6 (R)	 Ø8
68 s	27 s

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	115	46	881	93	31	695
Future Volume (vph)	115	46	881	93	31	695
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	14	12	13	12	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850		0.850		
Flt Protected	0.950					0.998
Satd. Flow (prot)	1865	1723	1881	1669	0	1878
Flt Permitted	0.950					0.938
Satd. Flow (perm)	1865	1723	1881	1669	0	1765
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		60		97		
Link Speed (mph)	25		40			40
Link Distance (ft)	489		1181			996
Travel Time (s)	13.3		20.1			17.0
Peak Hour Factor	0.77	0.77	0.96	0.96	0.88	0.88
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%
Adj. Flow (vph)	149	60	918	97	35	790
Shared Lane Traffic (%)						
Lane Group Flow (vph)	149	60	918	97	0	825
Turn Type	Prot	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	6	6
Switch Phase						
Minimum Initial (s)	7.0	7.0	60.0	60.0	60.0	60.0
Minimum Split (s)	13.0	13.0	67.0	67.0	67.0	67.0
Total Split (s)	19.0	19.0	76.0	76.0	76.0	76.0
Total Split (%)	20.0%	20.0%	80.0%	80.0%	80.0%	80.0%
Yellow Time (s)	4.0	4.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	6.0	6.0	7.0	7.0		7.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	11.6	11.6	70.4	70.4		70.4
Actuated g/C Ratio	0.12	0.12	0.74	0.74		0.74
v/c Ratio	0.66	0.23	0.66	0.08		0.63
Control Delay	53.8	12.5	9.3	1.0		11.6
Queue Delay	0.0	0.0	0.0	0.0		0.0
Total Delay	53.8	12.5	9.3	1.0		11.6
LOS	D	B	A	A		B
Approach Delay	41.9		8.5			11.6
Approach LOS	D		A			B
Queue Length 50th (ft)	86	0	246	0		244
Queue Length 95th (ft)	125	25	371	12		m297
Internal Link Dist (ft)	409		1101			916

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Turn Bay Length (ft)						
Base Capacity (vph)	255	287	1394	1262		1308
Starvation Cap Reductn	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0		0
Storage Cap Reductn	0	0	0	0		0
Reduced v/c Ratio	0.58	0.21	0.66	0.08		0.63

Intersection Summary

Area Type: Other
 Cycle Length: 95
 Actuated Cycle Length: 95
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.66
 Intersection Signal Delay: 13.2
 Intersection Capacity Utilization 111.7%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service H
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: US Route 206 & Benjamin Boulevard

	Ø2 (R)		
76 s			
	Ø6 (R)		
76 s			
			Ø8
		19 s	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	156	205	69	79	174	200	120	708	91	212	578	155
Future Volume (vph)	156	205	69	79	174	200	120	708	91	212	578	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	14	14	14
Storage Length (ft)	185		0	120		0	85		0	215		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	300			25			40			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00
Frt		0.962			0.920			0.983			0.968	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1819	0	1805	1748	0	1805	3517	0	1925	1946	0
Flt Permitted	0.172			0.402			0.103			0.206		
Satd. Flow (perm)	327	1819	0	764	1748	0	196	3517	0	417	1946	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			57			18			17	
Link Speed (mph)		45			35			40			40	
Link Distance (ft)		2196			2636			996			1117	
Travel Time (s)		33.3			51.4			17.0			19.0	
Peak Hour Factor	0.89	0.89	0.89	0.91	0.91	0.91	0.88	0.88	0.88	0.96	0.96	0.96
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	175	230	78	87	191	220	136	805	103	221	602	161
Shared Lane Traffic (%)												
Lane Group Flow (vph)	175	308	0	87	411	0	136	908	0	221	763	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Minimum Split (s)	5.0	8.0		5.0	8.0		4.0	8.0		4.0	8.0	
Total Split (s)	9.0	29.0		9.0	29.0		11.0	46.0		11.0	46.0	
Total Split (%)	9.5%	30.5%		9.5%	30.5%		11.6%	48.4%		11.6%	48.4%	
Yellow Time (s)	3.0	5.0		3.0	5.0		3.0	5.0		3.0	5.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	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)	3.0	7.0		3.0	7.0		3.0	7.0		3.0	7.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Act Effct Green (s)	32.1	23.3		31.4	21.5		51.3	39.6		51.8	39.9	
Actuated g/C Ratio	0.34	0.25		0.33	0.23		0.54	0.42		0.55	0.42	
v/c Ratio	0.86	0.67		0.27	0.94		0.58	0.61		0.63	0.92	
Control Delay	61.6	39.6		22.5	62.2		24.2	17.4		15.3	36.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	61.6	39.6		22.5	62.2		24.2	17.4		15.3	36.5	
LOS	E	D		C	E		C	B		B	D	
Approach Delay		47.6			55.3			18.3			31.7	
Approach LOS		D			E			B			C	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	73	162		34	212		15	216		53	320	
Queue Length 95th (ft)	#159	253		67	#391		m59	227		m82	m#377	
Internal Link Dist (ft)		2116			2556			916			1037	
Turn Bay Length (ft)	185			120			85			215		
Base Capacity (vph)	203	458		319	448		241	1477		354	826	
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	0.86	0.67		0.27	0.92		0.56	0.61		0.62	0.92	

Intersection Summary

Area Type: Other

Cycle Length: 95

Actuated Cycle Length: 95

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 33.5

Intersection LOS: C

Intersection Capacity Utilization 94.9%

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.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: US Route 206 & CR 518

 Ø1	 Ø2 (R)	 Ø3	 Ø4
11 s	46 s	9 s	29 s
 Ø5	 Ø6 (R)	 Ø7	 Ø8
11 s	46 s	9 s	29 s

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	74	33	55	272	26	120	129	923	20	121	624	85
Future Volume (vph)	74	33	55	272	26	120	129	923	20	121	624	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	14	12	12	12	13	12	16	12	12	13	12
Storage Length (ft)	0		0	0		0	85		0	125		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	25			25			40			40		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.954				0.850		0.997			0.982	
Flt Protected		0.978			0.956		0.950			0.950		
Satd. Flow (prot)	0	1891	0	0	1816	1669	1805	2126	0	1805	1895	0
Flt Permitted		0.496			0.600		0.166			0.087		
Satd. Flow (perm)	0	959	0	0	1140	1669	315	2126	0	165	1895	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27				130		2			10	
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		139			168			1117			586	
Travel Time (s)		3.8			4.6			19.0			10.0	
Peak Hour Factor	0.86	0.86	0.86	0.92	0.92	0.92	0.99	0.99	0.99	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	2%	0%
Adj. Flow (vph)	86	38	64	296	28	130	130	932	20	125	643	88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	188	0	0	324	130	130	952	0	125	731	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	5.0	46.0		5.0	46.0	
Minimum Split (s)	12.0	12.0		12.0	12.0	12.0	8.0	53.0		8.0	53.0	
Total Split (s)	32.0	32.0		32.0	32.0	32.0	10.0	53.0		10.0	53.0	
Total Split (%)	33.7%	33.7%		33.7%	33.7%	33.7%	10.5%	55.8%		10.5%	55.8%	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	0.0	2.0		0.0	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.0			5.0	5.0	3.0	7.0		3.0	7.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None	None	None	C-Max		None	C-Max	
Act Effct Green (s)		27.0			27.0	27.0	57.0	46.2		57.0	46.2	
Actuated g/C Ratio		0.28			0.28	0.28	0.60	0.49		0.60	0.49	
v/c Ratio		0.65			1.00	0.23	0.44	0.92		0.58	0.79	
Control Delay		37.2			86.3	5.9	11.4	25.7		22.0	27.8	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		37.2			86.3	5.9	11.4	25.7		22.0	27.8	
LOS		D			F	A	B	C		C	C	
Approach Delay		37.2			63.3			24.0			27.0	
Approach LOS		D			E			C			C	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		85			195	0	20	259		27	350	
Queue Length 95th (ft)		153			#371	41	m38	m#737		73	511	
Internal Link Dist (ft)		59			88			1037			506	
Turn Bay Length (ft)							85			125		
Base Capacity (vph)		291			324	567	299	1034		219	925	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.65			1.00	0.23	0.43	0.92		0.57	0.79	

Intersection Summary

Area Type: Other

Cycle Length: 95

Actuated Cycle Length: 95

Offset: 7 (7%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.00

Intersection Signal Delay: 32.9

Intersection LOS: C

Intersection Capacity Utilization 92.9%

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.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: US Route 206 & Village Shoppes Driveway/Montgomery Center Driveway

 Ø1	 Ø2 (R)	 Ø4
10 s	53 s	32 s
 Ø5	 Ø6 (R)	 Ø8
10 s	53 s	32 s

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	1	376	394	43	36	1
Future Volume (vph)	1	376	394	43	36	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	12	15	15
Storage Length (ft)	200			0	110	0
Storage Lanes	1			0	1	1
Taper Length (ft)	40				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.987			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1745	1837	1875	0	1986	1777
Flt Permitted	0.381				0.950	
Satd. Flow (perm)	700	1837	1875	0	1986	1777
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			15			1
Link Speed (mph)		30	30		30	
Link Distance (ft)		1257	2196		434	
Travel Time (s)		28.6	49.9		9.9	
Peak Hour Factor	0.90	0.90	0.92	0.92	0.80	0.80
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	1	418	428	47	45	1
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1	418	475	0	45	1
Turn Type	Perm	NA	NA		Perm	Perm
Protected Phases		4	8			
Permitted Phases	4				6	6
Detector Phase	4	4	8		6	6
Switch Phase						
Minimum Initial (s)	18.0	18.0	18.0		4.0	4.0
Minimum Split (s)	23.0	23.0	23.0		21.0	21.0
Total Split (s)	39.0	39.0	39.0		21.0	21.0
Total Split (%)	65.0%	65.0%	65.0%		35.0%	35.0%
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0		5.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	None		Max	Max
Act Effct Green (s)	19.2	19.2	19.2		16.0	16.0
Actuated g/C Ratio	0.42	0.42	0.42		0.35	0.35
v/c Ratio	0.00	0.54	0.59		0.06	0.00
Control Delay	7.0	12.7	13.2		10.8	9.0
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	7.0	12.7	13.2		10.8	9.0
LOS	A	B	B		B	A
Approach Delay		12.7	13.2		10.7	
Approach LOS		B	B		B	



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)	0	75	85		7	0
Queue Length 95th (ft)	2	135	152		23	2
Internal Link Dist (ft)		1177	2116		354	
Turn Bay Length (ft)	200				110	
Base Capacity (vph)	527	1384	1416		704	630
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.00	0.30	0.34		0.06	0.00

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 45.2
Natural Cycle: 45
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.59
Intersection Signal Delay: 12.8
Intersection Capacity Utilization 35.0%
Analysis Period (min) 15

Intersection LOS: B
ICU Level of Service A

Splits and Phases: 5: CR 518 & Research Drive

	04	39 s
	08	39 s
06	21 s	

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1: US Route 206 & Airpark Road/Wall Street

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	0	13	74	1	22	11	1183	11	13	802	0
Future Volume (vph)	11	0	13	74	1	22	11	1183	11	13	802	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	13	12	12	13	13	12	13	12	12	16	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00
Frt		0.850				0.850		0.999				
Flt Protected	0.950				0.953						0.999	
Satd. Flow (prot)	1805	1669	0	0	1871	1669	0	3690	0	0	2130	0
Flt Permitted	0.694				0.708			0.945			0.970	
Satd. Flow (perm)	1319	1669	0	0	1390	1669	0	3487	0	0	2068	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		170				40		2				
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		372			351			123			174	
Travel Time (s)		8.5			8.0			2.1			3.0	
Peak Hour Factor	0.46	0.46	0.46	0.76	0.76	0.76	0.97	0.97	0.97	0.89	0.89	0.89
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	24	0	28	97	1	29	11	1220	11	15	901	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	24	28	0	0	98	29	0	1242	0	0	916	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	53.0	53.0		53.0	53.0	
Minimum Split (s)	13.0	13.0		13.0	13.0	13.0	60.0	60.0		60.0	60.0	
Total Split (s)	33.0	33.0		33.0	33.0	33.0	77.0	77.0		77.0	77.0	
Total Split (%)	30.0%	30.0%		30.0%	30.0%	30.0%	70.0%	70.0%		70.0%	70.0%	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0			0.0	0.0		0.0			0.0	
Total Lost Time (s)	6.0	6.0			6.0	6.0		7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)	13.1	13.1			13.1	13.1		83.9			83.9	
Actuated g/C Ratio	0.12	0.12			0.12	0.12		0.76			0.76	
v/c Ratio	0.15	0.08			0.59	0.12		0.47			0.58	
Control Delay	43.4	0.5			59.7	9.4		5.9			10.3	
Queue Delay	0.0	0.0			0.0	0.0		0.0			0.0	
Total Delay	43.4	0.5			59.7	9.4		5.9			10.3	
LOS	D	A			E	A		A			B	
Approach Delay		20.3			48.2			5.9			10.3	
Approach LOS		C			D			A			B	
Queue Length 50th (ft)	15	0			67	0		141			251	
Queue Length 95th (ft)	19	0			96	13		224			688	
Internal Link Dist (ft)		292			271			43			94	

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)												
Base Capacity (vph)	323	537			341	439		2660			1577	
Starvation Cap Reductn	0	0			0	0		0			0	
Spillback Cap Reductn	0	0			0	0		0			0	
Storage Cap Reductn	0	0			0	0		0			0	
Reduced v/c Ratio	0.07	0.05			0.29	0.07		0.47			0.58	

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 70 (64%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 10.3

Intersection Capacity Utilization 74.3%

Analysis Period (min) 15

Intersection LOS: B

ICU Level of Service D

Splits and Phases: 1: US Route 206 & Airpark Road/Wall Street

 Ø2 (R)		 Ø4
77 s		33 s
 Ø6 (R)		 Ø8
77 s		33 s

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	146	0	196	68	0	49	358	745	113	26	554	70
Future Volume (vph)	146	0	196	68	0	49	358	745	113	26	554	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	13	12	14	12	12	13	12	12	12
Storage Length (ft)	90		0	60		0	180		0	130		0
Storage Lanes	1		1	1		1	2		0	1		0
Taper Length (ft)	60			45			100			130		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	0.95
Frt			0.850			0.850		0.980			0.983	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1865	1863	1723	3433	1846	0	1805	3541	0
Flt Permitted	0.000			0.950			0.950			0.294		
Satd. Flow (perm)	0	1863	1583	1865	1863	1723	3433	1846	0	559	3541	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			309			198		12			15	
Link Speed (mph)		30			25			40			40	
Link Distance (ft)		405			489			1181			454	
Travel Time (s)		9.2			13.3			20.1			7.7	
Peak Hour Factor	0.92	0.92	0.92	0.65	0.65	0.65	0.94	0.94	0.94	0.97	0.97	0.97
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	1%	0%	0%	0%	2%
Adj. Flow (vph)	159	0	213	105	0	75	381	793	120	27	571	72
Shared Lane Traffic (%)												
Lane Group Flow (vph)	159	0	213	105	0	75	381	913	0	27	643	0
Turn Type	pm+pt		pm+ov	pm+pt		Perm	Prot	NA		Perm	NA	
Protected Phases	7	4	5	3	8		5	2			6	
Permitted Phases	4		4	8		8				6		
Detector Phase	7	4	5	3	8	8	5	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	7.0	6.0	5.0	7.0	7.0	6.0	17.0		17.0	17.0	
Minimum Split (s)	8.0	12.0	11.0	8.0	12.0	12.0	11.0	23.0		23.0	23.0	
Total Split (s)	18.0	21.0	21.0	18.0	21.0	21.0	21.0	71.0		50.0	50.0	
Total Split (%)	16.4%	19.1%	19.1%	16.4%	19.1%	19.1%	19.1%	64.5%		45.5%	45.5%	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	4.0		4.0	4.0	
All-Red Time (s)	0.0	2.0	2.0	0.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	5.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lag	Lead			Lag	Lag	
Lead-Lag Optimize?		Yes	Yes	Yes			Yes			Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	C-Max		C-Max	C-Max	
Act Effct Green (s)	13.5		17.6	23.1		7.0	17.6	77.9		55.3	55.3	
Actuated g/C Ratio	0.12		0.16	0.21		0.06	0.16	0.71		0.50	0.50	
v/c Ratio	0.74		0.42	0.27		0.25	0.69	0.70		0.10	0.36	
Control Delay	66.4		2.8	36.4		2.1	44.9	20.2		21.5	18.6	
Queue Delay	0.0		0.0	0.0		0.0	0.0	0.0		0.0	0.0	
Total Delay	66.4		2.8	36.4		2.1	44.9	20.2		21.5	18.6	
LOS	E		A	D		A	D	C		C	B	
Approach Delay		30.0			22.1			27.4			18.7	
Approach LOS		C			C			C			B	

AJ08127 Madison-Marquette
2: US Route 206 & Nevius Boulevard/Benjamin Boulevard

2019 Build
PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	108		0	60		0	132	550		8	96	
Queue Length 95th (ft)	#190		3	75		0	175	774		m15	m155	
Internal Link Dist (ft)		325			409			1101			374	
Turn Bay Length (ft)	90			60			180			130		
Base Capacity (vph)	241		520	409		419	569	1310		281	1788	
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	0.66		0.41	0.26		0.18	0.67	0.70		0.10	0.36	

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 25.1

Intersection LOS: C

Intersection Capacity Utilization 89.2%

ICU Level of Service E

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: US Route 206 & Nevius Boulevard/Benjamin Boulevard

 Ø2 (R)		 Ø3	 Ø4
21 s		18 s	21 s
 Ø5	 Ø6 (R)	 Ø7	 Ø8
21 s	50 s	18 s	21 s

AJ08127 Madison-Marquette
3: US Route 206 & CR 518

2019 Build
PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	212	660	75	48	379	178	0	790	62	0	792	197
Future Volume (vph)	212	660	75	48	379	178	0	790	62	0	792	197
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	14	14	14
Storage Length (ft)	185		0	120		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	300			25			40			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.985			0.952			0.989			0.970	
Flt Protected	0.950			0.950								
Satd. Flow (prot)	1805	1872	0	1805	1809	0	0	3530	0	0	3676	0
Flt Permitted	0.166			0.093								
Satd. Flow (perm)	315	1872	0	177	1809	0	0	3530	0	0	3676	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			26			8			30	
Link Speed (mph)		45			35			40			40	
Link Distance (ft)		860			2636			541			1117	
Travel Time (s)		13.0			51.4			9.2			19.0	
Peak Hour Factor	0.91	0.91	0.91	0.94	0.94	0.94	0.97	0.97	0.97	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	3%	0%	2%	0%
Adj. Flow (vph)	233	725	82	51	403	189	0	814	64	0	808	201
Shared Lane Traffic (%)												
Lane Group Flow (vph)	233	807	0	51	592	0	0	878	0	0	1009	0
Turn Type	pm+pt	NA		pm+pt	NA			NA			NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8								
Detector Phase	7	4		3	8			2			6	
Switch Phase												
Minimum Initial (s)	4.0	24.0		4.0	24.0			33.0			33.0	
Minimum Split (s)	7.0	31.0		7.0	31.0			39.0			39.0	
Total Split (s)	15.0	61.0		7.0	53.0			42.0			42.0	
Total Split (%)	13.6%	55.5%		6.4%	48.2%			38.2%			38.2%	
Yellow Time (s)	3.0	5.0		3.0	5.0			4.0			4.0	
All-Red Time (s)	0.0	2.0		0.0	2.0			2.0			2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	3.0	7.0		3.0	7.0			6.0			6.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	None	None		None	None			C-Max			C-Max	
Act Effct Green (s)	60.9	51.3		50.6	42.6			40.1			40.1	
Actuated g/C Ratio	0.55	0.47		0.46	0.39			0.36			0.36	
v/c Ratio	0.71	0.92		0.36	0.83			0.68			0.74	
Control Delay	25.2	43.8		17.9	39.5			23.4			33.4	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	25.2	43.8		17.9	39.5			23.4			33.4	
LOS	C	D		B	D			C			C	
Approach Delay		39.6			37.8			23.4			33.4	
Approach LOS		D			D			C			C	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	73	489		14	338			252			259	
Queue Length 95th (ft)	124	#743		31	484			336			m363	
Internal Link Dist (ft)		780			2556			461			1037	
Turn Bay Length (ft)	185			120								
Base Capacity (vph)	336	922		140	771			1290			1357	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.69	0.88		0.36	0.77			0.68			0.74	

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 109 (99%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.92

Intersection Signal Delay: 33.5

Intersection LOS: C

Intersection Capacity Utilization 85.0%

ICU Level of Service E

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: US Route 206 & CR 518

 Ø2 (R)	 Ø3	 Ø4
42 s	7 s	61 s
 Ø6 (R)	 Ø7	 Ø8
42 s	15 s	53 s

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	16	34	215	11	122	115	1138	15	89	743	63
Future Volume (vph)	46	16	34	215	11	122	115	1138	15	89	743	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	14	12	12	12	13	12	16	12	12	13	12
Storage Length (ft)	0		0	0		0	85		0	125		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	25			25			40			40		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.952				0.850		0.998			0.988	
Flt Protected		0.977			0.955		0.950			0.950		
Satd. Flow (prot)	0	1885	0	0	1814	1669	1805	2128	0	1805	1905	0
Flt Permitted		0.528			0.626		0.154			0.063		
Satd. Flow (perm)	0	1019	0	0	1189	1669	293	2128	0	120	1905	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23				137		1			6	
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		139			168			1117			586	
Travel Time (s)		3.8			4.6			19.0			10.0	
Peak Hour Factor	0.73	0.73	0.73	0.89	0.89	0.89	0.93	0.93	0.93	0.94	0.94	0.94
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	2%	0%
Adj. Flow (vph)	63	22	47	242	12	137	124	1224	16	95	790	67
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	132	0	0	254	137	124	1240	0	95	857	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	5.0	56.0		5.0	56.0	
Minimum Split (s)	12.0	12.0		12.0	12.0	12.0	8.0	63.0		8.0	63.0	
Total Split (s)	30.0	30.0		30.0	30.0	30.0	10.0	70.0		10.0	70.0	
Total Split (%)	27.3%	27.3%		27.3%	27.3%	27.3%	9.1%	63.6%		9.1%	63.6%	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	0.0	2.0		0.0	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.0			5.0	5.0	3.0	7.0		3.0	7.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None	None	None	C-Max		None	C-Max	
Act Effct Green (s)		24.6			24.6	24.6	74.5	63.6		74.2	63.5	
Actuated g/C Ratio		0.22			0.22	0.22	0.68	0.58		0.67	0.58	
v/c Ratio		0.54			0.95	0.29	0.42	1.01		0.52	0.78	
Control Delay		39.8			88.0	7.6	10.9	41.8		21.7	24.1	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		39.8			88.0	7.6	10.9	41.8		21.7	24.1	
LOS		D			F	A	B	D		C	C	
Approach Delay		39.8			59.8			39.0			23.8	
Approach LOS		D			E			D			C	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		68			177	0	18	~953		19	440	
Queue Length 95th (ft)		100			#331	48	m28	#1213		63	620	
Internal Link Dist (ft)		59			88			1037			506	
Turn Bay Length (ft)							85			125		
Base Capacity (vph)		249			270	485	295	1231		188	1102	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.53			0.94	0.28	0.42	1.01		0.51	0.78	

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 20 (18%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow

Natural Cycle: 95

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.01

Intersection Signal Delay: 36.8

Intersection LOS: D

Intersection Capacity Utilization 98.2%

ICU Level of Service F

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: US Route 206 & Village Shoppes Driveway/Montgomery Center Driveway

 Ø1	 Ø2 (R)	 Ø4
10 s	70 s	30 s
 Ø5	 Ø6 (R)	 Ø8
10 s	70 s	30 s

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5: Outer Loop/Research Drive & CR 518

2019 Build
PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	595	160	179	470	43	333	0	101	26	0	3
Future Volume (vph)	3	595	160	179	470	43	333	0	101	26	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	12	12	12	12	12	12	15	12	15
Storage Length (ft)	200		0	0		0	0		0	110		0
Storage Lanes	1		1	1		0	1		0	0		1
Taper Length (ft)	40			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.987			0.850				0.850
Flt Protected	0.950			0.950			0.950				0.950	
Satd. Flow (prot)	1745	1837	1615	1805	1858	0	1770	1583	0	0	1805	1777
Flt Permitted	0.424			0.107			0.480				0.702	
Satd. Flow (perm)	779	1837	1615	203	1858	0	894	1583	0	0	1334	1777
Right Turn on Red			Yes		Yes			Yes		Yes		Yes
Satd. Flow (RTOR)			184		8			301				121
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1257			1337			486			434	
Travel Time (s)		28.6			30.4			11.0			9.9	
Peak Hour Factor	0.87	0.87	0.87	0.89	0.89	0.89	0.92	0.92	0.92	0.70	0.70	0.70
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	2%	2%	2%	0%	0%	0%
Adj. Flow (vph)	3	684	184	201	528	48	362	0	110	37	0	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	684	184	201	576	0	362	110	0	0	37	4
Turn Type	Perm	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases		4		3	8		5	2			6	
Permitted Phases	4		4	8			2			6		6
Detector Phase	4	4	4	3	8		5	2		6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	4.0	8.0		8.0	8.0		8.0	8.0	8.0
Minimum Split (s)	15.0	15.0	15.0	7.0	15.0		15.0	15.0		15.0	15.0	15.0
Total Split (s)	47.0	47.0	47.0	11.0	58.0		15.0	32.0		17.0	17.0	17.0
Total Split (%)	52.2%	52.2%	52.2%	12.2%	64.4%		16.7%	35.6%		18.9%	18.9%	18.9%
Yellow Time (s)	5.0	5.0	5.0	3.0	5.0		3.0	5.0		5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	0.0	2.0		0.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	3.0	7.0		3.0	7.0			7.0	7.0
Lead/Lag	Lag	Lag	Lag	Lead			Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes			Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	Max		None	None	None
Act Effct Green (s)	35.7	35.7	35.7	50.6	46.6		29.2	25.1			9.2	9.2
Actuated g/C Ratio	0.42	0.42	0.42	0.59	0.54		0.34	0.29			0.11	0.11
v/c Ratio	0.01	0.90	0.24	0.76	0.57		0.72	0.16			0.26	0.01
Control Delay	14.0	39.1	3.2	32.2	15.2		36.4	0.5			41.6	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	0.0
Total Delay	14.0	39.1	3.2	32.2	15.2		36.4	0.5			41.6	0.0
LOS	B	D	A	C	B		D	A			D	A
Approach Delay		31.5			19.6			28.1			37.5	
Approach LOS		C			B			C			D	

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5: Outer Loop/Research Drive & CR 518

2019 Build
PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	1	333	0	46	188		174	0			20	0
Queue Length 95th (ft)	6	#481	32	#147	275		#360	0			38	0
Internal Link Dist (ft)		1177			1257			406			354	
Turn Bay Length (ft)	200											
Base Capacity (vph)	365	860	854	269	1113		501	676			156	315
Starvation Cap Reductn	0	0	0	0	0		0	0			0	0
Spillback Cap Reductn	0	0	0	0	0		0	0			0	0
Storage Cap Reductn	0	0	0	0	0		0	0			0	0
Reduced v/c Ratio	0.01	0.80	0.22	0.75	0.52		0.72	0.16			0.24	0.01

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 85.8
 Natural Cycle: 75
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.90
 Intersection Signal Delay: 26.6
 Intersection LOS: C
 Intersection Capacity Utilization 81.3%
 ICU Level of Service D
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 5: Outer Loop/Research Drive & CR 518

 Ø2	 Ø3	 Ø4
32 s	11 s	47 s
 Ø5	 Ø6	 Ø8
15 s	17 s	58 s

Intersection						
Int Delay, s/veh	7.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↑		↖
Traffic Vol, veh/h	653	78	0	576	0	294
Future Vol, veh/h	653	78	0	576	0	294
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	710	85	0	626	0	320

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- 753
Stage 1	-	-	- -
Stage 2	-	-	- -
Critical Hdwy	-	-	- 6.22
Critical Hdwy Stg 1	-	-	- -
Critical Hdwy Stg 2	-	-	- -
Follow-up Hdwy	-	-	- 3.318
Pot Cap-1 Maneuver	-	0	0 410
Stage 1	-	0	0 -
Stage 2	-	0	0 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	- 410
Mov Cap-2 Maneuver	-	-	- -
Stage 1	-	-	- -
Stage 2	-	-	- -

Approach	EB	WB	NB
HCM Control Delay, s	0	0	38.6
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	410	-	-	-
HCM Lane V/C Ratio	0.779	-	-	-
HCM Control Delay (s)	38.6	-	-	-
HCM Lane LOS	E	-	-	-
HCM 95th %tile Q(veh)	6.7	-	-	-

AJ08127 Madison-Marquette
1: US Route 206 & Airpark Road/Wall Street

2019 Build
SAT

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	0	47	8	0	1	30	1169	11	2	946	0
Future Volume (vph)	35	0	47	8	0	1	30	1169	11	2	946	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	13	12	12	13	13	12	13	12	12	16	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00
Frt		0.850				0.850		0.999				
Flt Protected	0.950				0.950			0.999				
Satd. Flow (prot)	1805	1669	0	0	1865	1669	0	3687	0	0	2111	0
Flt Permitted	0.750				0.717			0.910			0.998	
Satd. Flow (perm)	1425	1669	0	0	1408	1669	0	3359	0	0	2107	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		154				46		2				
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		372			351			123			174	
Travel Time (s)		8.5			8.0			2.1			3.0	
Peak Hour Factor	0.77	0.77	0.77	0.75	0.75	0.75	0.96	0.96	0.96	0.99	0.99	0.99
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	2%	0%
Adj. Flow (vph)	45	0	61	11	0	1	31	1218	11	2	956	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	45	61	0	0	11	1	0	1260	0	0	958	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	53.0	53.0		53.0	53.0	
Minimum Split (s)	13.0	13.0		13.0	13.0	13.0	60.0	60.0		60.0	60.0	
Total Split (s)	27.0	27.0		27.0	27.0	27.0	68.0	68.0		68.0	68.0	
Total Split (%)	28.4%	28.4%		28.4%	28.4%	28.4%	71.6%	71.6%		71.6%	71.6%	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0			0.0	0.0		0.0			0.0	
Total Lost Time (s)	6.0	6.0			6.0	6.0		7.0			7.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)	8.8	8.8			8.8	8.8		77.2			77.2	
Actuated g/C Ratio	0.09	0.09			0.09	0.09		0.81			0.81	
v/c Ratio	0.34	0.21			0.08	0.01		0.46			0.56	
Control Delay	46.8	1.6			39.5	0.0		4.4			13.0	
Queue Delay	0.0	0.0			0.0	0.0		0.0			0.0	
Total Delay	46.8	1.6			39.5	0.0		4.4			13.0	
LOS	D	A			D	A		A			B	
Approach Delay		20.8			36.2			4.4			13.0	
Approach LOS		C			D			A			B	
Queue Length 50th (ft)	26	0			6	0		113			486	
Queue Length 95th (ft)	50	0			19	0		176			666	
Internal Link Dist (ft)		292			271			43			94	

AJ08127 Madison-Marquette
1: US Route 206 & Airpark Road/Wall Street

2019 Build
SAT

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)												
Base Capacity (vph)	315	488			311	404		2730			1712	
Starvation Cap Reductn	0	0			0	0		0			0	
Spillback Cap Reductn	0	0			0	0		0			0	
Storage Cap Reductn	0	0			0	0		0			0	
Reduced v/c Ratio	0.14	0.13			0.04	0.00		0.46			0.56	

Intersection Summary

Area Type: Other

Cycle Length: 95

Actuated Cycle Length: 95

Offset: 74 (78%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.56

Intersection Signal Delay: 8.8

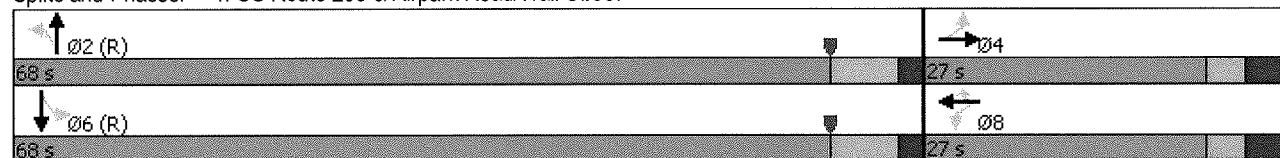
Intersection LOS: A

Intersection Capacity Utilization 72.2%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 1: US Route 206 & Airpark Road/Wall Street



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	135	0	192	115	0	46	398	714	93	31	670	83
Future Volume (vph)	135	0	192	115	0	46	398	714	93	31	670	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	13	12	14	12	12	13	12	12	12
Storage Length (ft)	90		0	60		0	180		0	130		0
Storage Lanes	1		1	1		1	2		0	1		0
Taper Length (ft)	60			45			100			130		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	0.95
Frt			0.850			0.850		0.983			0.984	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1865	1863	1723	3433	1851	0	1805	3513	0
Flt Permitted	0.000			0.950			0.950			0.350		
Satd. Flow (perm)	0	1863	1583	1865	1863	1723	3433	1851	0	665	3513	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			216			218		11			16	
Link Speed (mph)		30			25			40			40	
Link Distance (ft)		405			489			1181			454	
Travel Time (s)		9.2			13.3			20.1			7.7	
Peak Hour Factor	0.92	0.92	0.92	0.77	0.77	0.77	0.96	0.96	0.96	0.88	0.88	0.88
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	1%	0%	0%	1%	2%
Adj. Flow (vph)	147	0	209	149	0	60	415	744	97	35	761	94
Shared Lane Traffic (%)												
Lane Group Flow (vph)	147	0	209	149	0	60	415	841	0	35	855	0
Turn Type	pm+pt		pm+ov	pm+pt		Perm	Prot	NA		Perm	NA	
Protected Phases	7	4	5	3	8		5	2			6	
Permitted Phases	4		4	8		8				6		
Detector Phase	7	4	5	3	8	8	5	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	7.0	6.0	4.0	7.0	7.0	6.0	31.0		21.0	21.0	
Minimum Split (s)	8.0	12.0	11.0	8.0	12.0	12.0	11.0	37.0		37.0	37.0	
Total Split (s)	17.0	18.0	18.0	17.0	18.0	18.0	18.0	60.0		42.0	42.0	
Total Split (%)	17.9%	18.9%	18.9%	17.9%	18.9%	18.9%	18.9%	63.2%		44.2%	44.2%	
Yellow Time (s)	3.0	3.0	3.0	3.5	3.0	3.0	3.0	4.0		4.0	4.0	
All-Red Time (s)	0.0	2.0	2.0	0.5	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	5.0	5.0	4.0	5.0	5.0	5.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lag	Lead			Lag	Lag	
Lead-Lag Optimize?		Yes	Yes	Yes			Yes			Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	C-Max		C-Max	C-Max	
Act Effct Green (s)	12.3		17.0	20.9		7.0	17.0	64.1		42.1	42.1	
Actuated g/C Ratio	0.13		0.18	0.22		0.07	0.18	0.67		0.44	0.44	
v/c Ratio	0.64		0.45	0.36		0.18	0.68	0.67		0.12	0.55	
Control Delay	52.3		7.8	32.5		1.2	37.8	10.9		10.7	10.3	
Queue Delay	0.0		0.0	0.0		0.0	0.0	0.0		0.0	0.0	
Total Delay	52.3		7.8	32.5		1.2	37.8	10.9		10.7	10.3	
LOS	D		A	C		A	D	B		B	B	
Approach Delay		26.2			23.5			19.8			10.3	
Approach LOS		C			C			B			B	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	84		0	73		0	121	315		6	70	
Queue Length 95th (ft)	147		54	105		0	151	471		m10	m102	
Internal Link Dist (ft)		325			409			1101				374
Turn Bay Length (ft)	90			60			180			130		
Base Capacity (vph)	260		460	429		423	613	1252		294	1565	
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	0.57		0.45	0.35		0.14	0.68	0.67		0.12	0.55	

Intersection Summary

Area Type: Other

Cycle Length: 95

Actuated Cycle Length: 95

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.68

Intersection Signal Delay: 17.8

Intersection LOS: B

Intersection Capacity Utilization 89.0%

ICU Level of Service E

Analysis Period (min) 15

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: US Route 206 & Nevius Boulevard/Benjamin Boulevard

		
Ø2 (R)	Ø3	Ø4
60 s	17 s	18 s
		
Ø5	Ø6 (R)	Ø7
18 s	42 s	17 s
		Ø8
		18 s

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	200	500	69	79	289	200	0	676	91	0	912	216
Future Volume (vph)	200	500	69	79	289	200	0	676	91	0	912	216
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	14	14	14
Storage Length (ft)	185		0	120		0	85		0	215		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	300			25			40			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.982			0.939			0.982			0.971	
Flt Protected	0.950			0.950								
Satd. Flow (prot)	1805	1861	0	1805	1784	0	0	3514	0	0	3709	0
Flt Permitted	0.154			0.127								
Satd. Flow (perm)	293	1861	0	241	1784	0	0	3514	0	0	3709	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			40			18			35	
Link Speed (mph)		45			35			40			40	
Link Distance (ft)		860			2636			541			1117	
Travel Time (s)		13.0			51.4			9.2			19.0	
Peak Hour Factor	0.89	0.89	0.89	0.91	0.91	0.91	0.88	0.88	0.88	0.96	0.96	0.96
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	225	562	78	87	318	220	0	768	103	0	950	225
Shared Lane Traffic (%)												
Lane Group Flow (vph)	225	640	0	87	538	0	0	871	0	0	1175	0
Turn Type	pm+pt	NA		pm+pt	NA			NA			NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8								
Detector Phase	7	4		3	8			2			6	
Switch Phase												
Minimum Initial (s)	4.0	8.0		4.0	8.0			8.0			8.0	
Minimum Split (s)	7.0	15.0		7.0	15.0			15.0			15.0	
Total Split (s)	14.0	39.0		14.0	39.0			42.0			42.0	
Total Split (%)	14.7%	41.1%		14.7%	41.1%			44.2%			44.2%	
Yellow Time (s)	3.0	5.0		3.0	5.0			4.0			4.0	
All-Red Time (s)	0.0	2.0		0.0	2.0			2.0			2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	3.0	7.0		3.0	7.0			6.0			6.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	None	None		None	None			C-Max			C-Max	
Act Effct Green (s)	47.9	35.4		42.7	31.0			37.6			37.6	
Actuated g/C Ratio	0.50	0.37		0.45	0.33			0.40			0.40	
v/c Ratio	0.72	0.92		0.37	0.88			0.62			0.79	
Control Delay	28.0	48.8		16.2	46.0			21.1			34.8	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	28.0	48.8		16.2	46.0			21.1			34.8	
LOS	C	D		B	D			C			C	
Approach Delay		43.4			41.8			21.1			34.8	
Approach LOS		D			D			C			C	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	70	359		25	280			127			263	
Queue Length 95th (ft)	#145	#595		49	#468			224			m264	
Internal Link Dist (ft)		780			2556			461			1037	
Turn Bay Length (ft)	185			120								
Base Capacity (vph)	323	698		297	629			1399			1487	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.70	0.92		0.29	0.86			0.62			0.79	

Intersection Summary

Area Type: Other
 Cycle Length: 95
 Actuated Cycle Length: 95
 Offset: 83 (87%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow
 Natural Cycle: 75
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.92
 Intersection Signal Delay: 34.8
 Intersection Capacity Utilization 84.8%
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: US Route 206 & CR 518

		
Ø2 (R.)	Ø3	Ø4
42 s	14 s	39 s
		
Ø6 (R.)	Ø7	Ø8
42 s	14 s	39 s

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	74	33	55	272	26	130	129	1059	20	121	807	85
Future Volume (vph)	74	33	55	272	26	130	129	1059	20	121	807	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	14	12	12	12	13	12	16	12	12	13	12
Storage Length (ft)	0		0	0		0	85		0	125		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	25			25			40			40		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.954				0.850		0.997			0.986	
Flt Protected		0.978			0.956		0.950			0.950		
Satd. Flow (prot)	0	1891	0	0	1816	1669	1805	2126	0	1805	1901	0
Flt Permitted		0.496			0.600		0.087			0.087		
Satd. Flow (perm)	0	959	0	0	1140	1669	165	2126	0	165	1901	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27				141		1			8	
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		139			168			1117			586	
Travel Time (s)		3.8			4.6			19.0			10.0	
Peak Hour Factor	0.86	0.86	0.86	0.92	0.92	0.92	0.99	0.99	0.99	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	2%	0%
Adj. Flow (vph)	86	38	64	296	28	141	130	1070	20	125	832	88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	188	0	0	324	141	130	1090	0	125	920	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	5.0	46.0		5.0	46.0	
Minimum Split (s)	12.0	12.0		12.0	12.0	12.0	8.0	53.0		8.0	53.0	
Total Split (s)	32.0	32.0		32.0	32.0	32.0	10.0	53.0		10.0	53.0	
Total Split (%)	33.7%	33.7%		33.7%	33.7%	33.7%	10.5%	55.8%		10.5%	55.8%	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	0.0	2.0		0.0	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.0			5.0	5.0	3.0	7.0		3.0	7.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None	None	None	C-Max		None	C-Max	
Act Effct Green (s)		27.0			27.0	27.0	57.0	46.2		57.0	46.1	
Actuated g/C Ratio		0.28			0.28	0.28	0.60	0.49		0.60	0.49	
v/c Ratio		0.65			1.00	0.25	0.60	1.06		0.58	0.99	
Control Delay		37.2			86.3	5.8	28.1	59.7		22.1	53.4	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		37.2			86.3	5.8	28.1	59.7		22.1	53.4	
LOS		D			F	A	C	E		C	D	
Approach Delay		37.2			61.9			56.3			49.7	
Approach LOS		D			E			E			D	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		85			195	0	30	~739		27	527	
Queue Length 95th (ft)		153			#371	43	m68	m#978		73	#814	
Internal Link Dist (ft)		59			88			1037			506	
Turn Bay Length (ft)							85			125		
Base Capacity (vph)		291			324	575	219	1033		219	927	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.65			1.00	0.25	0.59	1.06		0.57	0.99	

Intersection Summary

Area Type: Other

Cycle Length: 95

Actuated Cycle Length: 95

Offset: 7 (7%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.06

Intersection Signal Delay: 53.6

Intersection LOS: D

Intersection Capacity Utilization 100.1%

ICU Level of Service G

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: US Route 206 & Village Shoppes Driveway/Montgomery Center Driveway

 Ø1	 Ø2 (R)		 Ø4
10 s	53 s		32 s
 Ø5	 Ø6 (R)		 Ø8
10 s	53 s		32 s

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	419	192	212	358	43	325	0	99	36	0	1
Future Volume (vph)	1	419	192	212	358	43	325	0	99	36	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	12	12	12	12	12	12	15	12	15
Storage Length (ft)	200		0	0		0	0		0	110		0
Storage Lanes	1		1	1		0	1		0	0		1
Taper Length (ft)	40			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.984			0.850				0.850
Flt Protected	0.950			0.950			0.950				0.950	
Satd. Flow (prot)	1745	1837	1583	1770	1870	0	1770	1583	0	0	1805	1777
Flt Permitted	0.509			0.222			0.527				0.687	
Satd. Flow (perm)	935	1837	1583	414	1870	0	982	1583	0	0	1305	1777
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			213		10			377				121
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1257			1337			486			434	
Travel Time (s)		28.6			30.4			11.0			9.9	
Peak Hour Factor	0.90	0.90	0.90	0.92	0.92	0.92	0.92	0.92	0.92	0.80	0.80	0.80
Heavy Vehicles (%)	0%	0%	2%	2%	0%	0%	2%	2%	2%	0%	0%	0%
Adj. Flow (vph)	1	466	213	230	389	47	353	0	108	45	0	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1	466	213	230	436	0	353	108	0	0	45	1
Turn Type	Perm	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases		4		3	8		5	2			6	
Permitted Phases	4		4	8			2			6		6
Detector Phase	4	4	4	3	8		5	2		6	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	23.0	23.0	23.0	8.0	23.0		8.0	23.0		23.0	23.0	23.0
Total Split (s)	43.0	43.0	43.0	10.0	53.0		16.0	37.0		21.0	21.0	21.0
Total Split (%)	47.8%	47.8%	47.8%	11.1%	58.9%		17.8%	41.1%		23.3%	23.3%	23.3%
Yellow Time (s)	5.0	5.0	5.0	3.0	5.0		3.0	5.0		5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	0.0	2.0		0.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	3.0	7.0		3.0	7.0			7.0	7.0
Lead/Lag	Lag	Lag	Lag	Lead			Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes			Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	Max		None	None	None
Act Effct Green (s)	26.1	26.1	26.1	40.2	36.2		34.3	30.2			10.6	10.6
Actuated g/C Ratio	0.32	0.32	0.32	0.50	0.45		0.43	0.38			0.13	0.13
v/c Ratio	0.00	0.78	0.32	0.71	0.52		0.56	0.13			0.26	0.00
Control Delay	17.0	34.3	4.2	25.0	17.5		23.0	0.3			36.1	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	0.0
Total Delay	17.0	34.3	4.2	25.0	17.5		23.0	0.3			36.1	0.0
LOS	B	C	A	C	B		C	A			D	A
Approach Delay		24.8			20.1			17.7			35.3	
Approach LOS		C			C			B			D	

AJ08127 Madison-Marquette
5: Nevius Boulevard/Research Drive & CR 518

2019 Build
SAT

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	0	208	0	62	146		125	0			20	0
Queue Length 95th (ft)	3	314	42	#112	222		#244	0			48	0
Internal Link Dist (ft)		1177			1257			406			354	
Turn Bay Length (ft)	200											
Base Capacity (vph)	421	827	830	325	1081		636	830			228	411
Starvation Cap Reductn	0	0	0	0	0		0	0			0	0
Spillback Cap Reductn	0	0	0	0	0		0	0			0	0
Storage Cap Reductn	0	0	0	0	0		0	0			0	0
Reduced v/c Ratio	0.00	0.56	0.26	0.71	0.40		0.56	0.13			0.20	0.00

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 80.5

Natural Cycle: 65

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 21.6

Intersection LOS: C

Intersection Capacity Utilization 73.5%

ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 5: Nevius Boulevard/Research Drive & CR 518

 Ø2	 Ø3	 Ø4
37 s	10 s	43 s
 Ø5	 Ø6	 Ø8
16 s	21 s	53 s

Intersection						
Int Delay, s/veh	4.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↑		↖
Traffic Vol, veh/h	480	92	0	505	0	289
Future Vol, veh/h	480	92	0	505	0	289
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	522	100	0	549	0	314

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- 572
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	- 6.22
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	- 3.318
Pot Cap-1 Maneuver	-	- 0	- 0 520
Stage 1	-	- 0	- 0 -
Stage 2	-	- 0	- 0 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	- 520
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	21.9
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	520	-	-	-
HCM Lane V/C Ratio	0.604	-	-	-
HCM Control Delay (s)	21.9	-	-	-
HCM Lane LOS	C	-	-	-
HCM 95th %tile Q(veh)	4	-	-	-

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	74	33	55	272	26	130	129	1059	20	121	807	85
Future Volume (vph)	74	33	55	272	26	130	129	1059	20	121	807	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	14	12	12	12	13	12	16	12	12	13	12
Storage Length (ft)	0		0	0		0	85		0	125		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	25			25			40			40		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.954				0.850		0.997			0.986	
Flt Protected		0.978			0.956		0.950			0.950		
Satd. Flow (prot)	0	1891	0	0	1816	1669	1805	2126	0	1805	1901	0
Flt Permitted		0.496			0.600		0.085			0.085		
Satd. Flow (perm)	0	959	0	0	1140	1669	162	2126	0	162	1901	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27				141		1			8	
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		139			168			1117			586	
Travel Time (s)		3.8			4.6			19.0			10.0	
Peak Hour Factor	0.86	0.86	0.86	0.92	0.92	0.92	0.99	0.99	0.99	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	2%	0%
Adj. Flow (vph)	86	38	64	296	28	141	130	1070	20	125	832	88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	188	0	0	324	141	130	1090	0	125	920	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	5.0	46.0		5.0	46.0	
Minimum Split (s)	12.0	12.0		12.0	12.0	12.0	8.0	53.0		8.0	53.0	
Total Split (s)	32.0	32.0		32.0	32.0	32.0	9.0	54.0		9.0	54.0	
Total Split (%)	33.7%	33.7%		33.7%	33.7%	33.7%	9.5%	56.8%		9.5%	56.8%	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	0.0	2.0		0.0	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.0			5.0	5.0	3.0	7.0		3.0	7.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None	None	None	C-Max		None	C-Max	
Act Effct Green (s)		27.0			27.0	27.0	57.0	47.0		57.0	47.0	
Actuated g/C Ratio		0.28			0.28	0.28	0.60	0.49		0.60	0.49	
v/c Ratio		0.65			1.00	0.25	0.65	1.04		0.62	0.97	
Control Delay		37.2			86.3	5.8	31.5	52.6		25.8	48.4	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		37.2			86.3	5.8	31.5	52.6		25.8	48.4	
LOS		D			F	A	C	D		C	D	
Approach Delay		37.2			61.9			50.3			45.7	
Approach LOS		D			E			D			D	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		85			195	0	31	~724		27	515	
Queue Length 95th (ft)		153			#371	43	m69	m#963		#87	#801	
Internal Link Dist (ft)		59			88			1037			506	
Turn Bay Length (ft)							85			125		
Base Capacity (vph)		291			324	575	200	1052		200	944	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.65			1.00	0.25	0.65	1.04		0.63	0.97	

Intersection Summary

Area Type: Other

Cycle Length: 95

Actuated Cycle Length: 95

Offset: 7 (7%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.04

Intersection Signal Delay: 49.7

Intersection LOS: D

Intersection Capacity Utilization 100.1%

ICU Level of Service G

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: US Route 206 & Village Shoppes Driveway/Montgomery Center Driveway

 Ø1	 Ø2 (R)		 Ø4
9 s	54 s		32 s
 Ø5	 Ø6 (R)		 Ø8
9 s	54 s		32 s

APPENDIX F – LEVEL OF SERVICE SUMMARY TABLES

TABLE F-I
SIGNALIZED LEVEL OF SERVICE SUMMARY
NJSH ROUTE 206 & AIRPARK ROAD/WALL STREET
WEEKDAY EVENING PEAK HOUR

Approach/Movement	No-Build	Build
EB Left	D(43.7)	D(43.4)
EB Thru/Right	A(0.3)	A(0.5)
WB Left/Thru	E(59.7)	E(59.7)
WB Right	A(9.4)	A(9.4)
NB Left/Thru/Right	A(5.0)	A(5.9)
SB Left/Thru	A(6.0)	B(10.3)
Overall	A(8.6)	B(10.3)

- EB (Eastbound) and WB (Westbound) are the Wall Street and Airpark Road approaches.
- NB (Northbound) and SB (Southbound) approaches are the NJSH Route 206 approaches.
- Levels of Delay are in seconds and are shown in parenthesis.

TABLE F-II
SIGNALIZED LEVEL OF SERVICE SUMMARY
NJSH ROUTE 206 & AIRPARK ROAD/WALL STREET
SATURDAY MIDDAY PEAK HOUR

Approach/Movement	No-Build	Build
EB Left	D(46.8)	D(46.8)
EB Thru/Right	A(1.1)	A(1.6)
WB Left/Thru	D(39.5)	D(39.5)
WB Right	-	-
NB Left/Thru/Right	A(3.5)	A(4.4)
SB Left/Thru	A(4.5)	B(13.0)
Overall	A(5.0)	A(8.8)

- EB (Eastbound) and WB (Westbound) are the Wall St and Airpark Rd approaches.
- NB (Northbound) and SB (Southbound) approaches are the NJSH Route 206 approaches.
- Levels of Delay are in seconds and are shown in parenthesis.

TABLE F-III
SIGNALIZED LEVEL OF SERVICE SUMMARY
NJSH ROUTE 206 & BENJAMIN BOULEVARD/NEVIUS BOULEVARD
WEEKDAY EVENING PEAK HOUR

Approach/Movement	No-Build	Build
EB Left	-	E(66.4)
EB Thru	-	-
EB Right	-	A(2.8)
WB Left	E(56.4)	D(36.4)
WB Thru	-	-
WB Right	B(13.3)	A(2.1)
NB Left	-	D(44.9)
NB Thru	A(9.2)	-
NB Right	A(0.8)	-
NB Thru/Right	-	C(20.2)
SB Left	-	C(21.5)
SB Left/Thru	A(2.6)	-
SB Thru/Right	-	B(18.5)
Overall	A(9.2)	C(25.1)

- EB (Eastbound) is the proposed site driveway approach.
- WB (Westbound) is the Benjamin Boulevard approach.
- NB (Northbound) and SB (Southbound) approaches are the Route 206 approaches.
- Levels of Delay are in seconds and are shown in parenthesis.

TABLE F-IV
SIGNALIZED LEVEL OF SERVICE SUMMARY
NJSH ROUTE 206 & BENJAMIN BOULEVARD/NEVIUS BOULEVARD
SATURDAY MIDDAY PEAK HOUR

Approach/Movement	No-Build	Build
EB Left	-	D(52.3)
EB Thru	-	-
EB Right	-	A(7.8)
WB Left	D(53.8)	C(32.5)
WB Thru	-	-
WB Right	B(12.5)	A(1.2)
NB Left	-	D(37.8)
NB Thru	A(9.3)	-
NB Right	A(1.0)	-
NB Thru/Right	-	B(10.9)
SB Left	-	B(10.7)
SB Left/Thru	B(11.8)	-
SB Thru/Right	-	B(10.3)
Overall	B(13.2)	B(17.8)

- EB (Eastbound) is the proposed site driveway approach.
- WB (Westbound) is the Benjamin Boulevard approach.
- NB (Northbound) and SB (Southbound) approaches are the Route 206 approaches.
- Levels of Delay are in seconds and are shown in parenthesis.

TABLE F-V
SIGNALIZED LEVEL OF SERVICE SUMMARY
NJSH ROUTE 206 & COUNTY ROUTE 518
WEEKDAY EVENING PEAK HOUR

Approach/Movement	No-Build	Build
EB Left	D(39.1)	C(25.2)
EB Thru/Right	E(76.3)	D(43.8)
WB Left	C(25.2)	B(17.9)
WB Thru/Right	F(159.7)	D(39.5)
NB Left	B(19.8)	-
NB Thru/Right	C(23.2)	C(23.4)
SB Left	B(16.5)	-
SB Thru/Right	C(29.2)	C(31.1)
Overall	E(55.2)	C(32.9)

- EB (Eastbound) and WB (Westbound) is the CR 518 approaches.
- NB (Northbound) and SB (Southbound) approaches are the Route 206 approaches.
- Levels of Delay are in seconds and are shown in parenthesis.

TABLE F-VI
SIGNALIZED LEVEL OF SERVICE SUMMARY
NJSH ROUTE 206 & COUNTY ROUTE 518
SATURDAY MIDDAY PEAK HOUR

Approach/Movement	No-Build	Build
EB Left	E(61.6)	C(28.0)
EB Thru/Right	D(39.6)	D(48.8)
WB Left	C(22.5)	B(16.2)
WB Thru/Right	E(62.2)	D(46.0)
NB Left	C(20.2)	-
NB Thru/Right	B(19.8)	C(21.1)
SB Left	B(15.3)	-
SB Thru/Right	D(36.5)	C(34.1)
Overall	C(34.1)	C(34.5)

- EB (Eastbound) and WB (Westbound) is the CR 518 approaches.
- NB (Northbound) and SB (Southbound) approaches are the Route 206 approaches.
- Levels of Delay are in seconds and are shown in parenthesis.

TABLE F-VII
SIGNALIZED LEVEL OF SERVICE SUMMARY
NJSH ROUTE 206 & SHOPPING CENTER DRIVEWAYS
WEEKDAY EVENING PEAK HOUR

Approach/Movement	No-Build	Build
EB Left/Thru/Right	D(39.8)	D(39.8)
WB Left/Thru	F(88.0)	F(88.0)
WB Right	A(7.6)	A(7.6)
NB Left	A(5.9)	B(10.9)
NB Thru/Right	C(22.1)	D(41.8)
SB Left	C(21.7)	C(21.7)
SB Thru/Right	B(18.9)	C(24.1)
Overall	C(27.1)	D(36.8)

- EB (Eastbound) is the Village Shoppes Driveway approach.
- WB (Westbound) is the Montgomery Shopping Center approach.
- NB (Northbound) and SB (Southbound) approaches are the Route 206 approaches.
- Levels of Delay are in seconds and are shown in parenthesis.

TABLE F-VIII
SIGNALIZED LEVEL OF SERVICE SUMMARY
NJSH ROUTE 206 & SHOPPING CENTER DRIVEWAYS
SATURDAY MIDDAY PEAK HOUR

Approach/Movement	No-Build	Build	Build with Mitigation
EB Left/Thru/Right	D(37.2)	D(37.2)	D(37.2)
WB Left/Thru	F(86.3)	F(86.3)	F(86.3)
WB Right	A(5.9)	A(5.8)	A(5.8)
NB Left	B(11.4)	C(28.1)	C(31.5)
NB Thru/Right	C(25.6)	E(59.7)	D(52.6)
SB Left	C(22.0)	C(22.1)	C(25.8)
SB Thru/Right	C(27.8)	D(53.4)	D(48.4)
Overall	C(32.8)	D(53.6)	D(49.7)

- EB (Eastbound) is the Village Shoppes Driveway approach.
- WB (Westbound) is the Montgomery Shopping Center approach.
- NB (Northbound) and SB (Southbound) approaches are the Route 206 approaches.
- Levels of Delay are in seconds and are shown in parenthesis.

TABLE F-IX
SIGNALIZED LEVEL OF SERVICE SUMMARY
COUNTY ROUTE 518 & RESEARCH DRIVE/SITE DRIVEWAY
WEEKDAY EVENING PEAK HOUR

Approach/Movement	No-Build	Build
EB Left	A(6.3)	B(14.0)
EB Thru	B(17.5)	D(39.1)
EB Right	-	A(3.2)
WB Left	-	C(32.2)
WB Thru/Right	B(15.1)	B(15.2)
NB Left	-	D(36.4)
NB Thru/Right	-	A(0.5)
SB Left/Thru	-	D(41.6)
SB Left	B(15.0)	-
SB Right	B(11.0)	-
Overall	B(16.3)	C(26.6)

- EB (Eastbound) and WB (Westbound) are the County Route 518 approaches.
- NB (Northbound) is the Site driveway approach.
- SB (Southbound) is the Research Drive approach.
- Levels of Delay are in seconds and are shown in parenthesis.

TABLE F-X
SIGNALIZED LEVEL OF SERVICE SUMMARY
COUNTY ROUTE 518 & RESEARCH DRIVE/SITE DRIVEWAY
SATURDAY MIDDAY PEAK HOUR

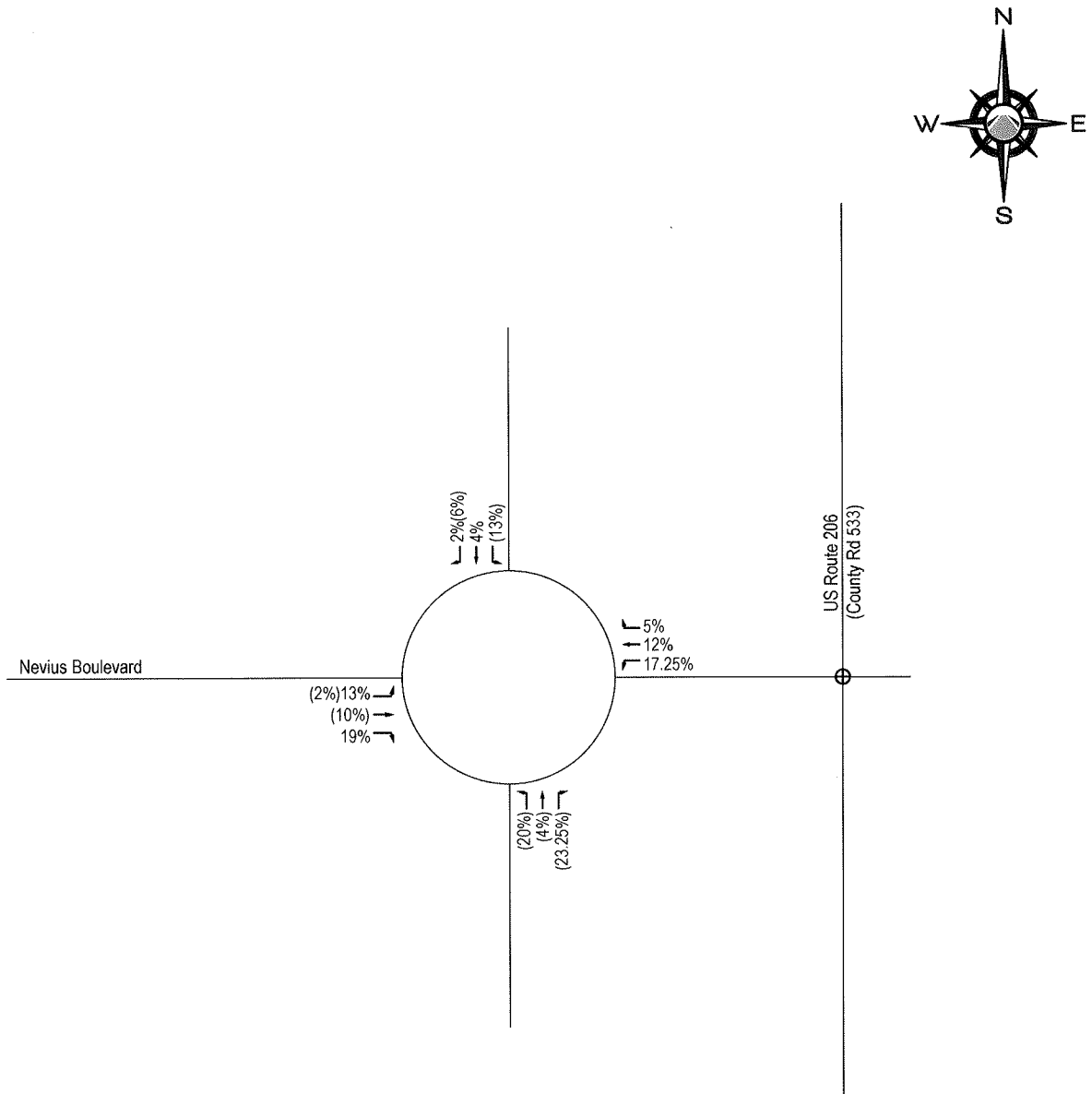
Approach/Movement	No-Build	Build
EB Left	A(7.0)	B(17.0)
EB Thru	B(12.7)	C(34.3)
EB Right	-	A(4.2)
WB Left	-	C(25.0)
WB Thru/Right	B(13.2)	B(17.5)
NB Left	-	C(23.0)
NB Thru/Right	-	A(0.3)
SB Left/Thru	-	D(36.1)
SB Left	B(10.8)	-
SB Right	A(9.0)	-
Overall	B(12.8)	C(21.6)

- EB (Eastbound) and WB (Westbound) are the County Route 518 approaches.
- NB (Northbound) is the Site driveway approach.
- SB (Southbound) is the Research Drive approach.
- Levels of Delay are in seconds and are shown in parenthesis.

APPENDIX G – ROUNDABOUT ANALYSIS

Proposed Mixed Use Development
Montgomery Township
Somerset County, New Jersey

SITE TRAFFIC DISTRIBUTIONS

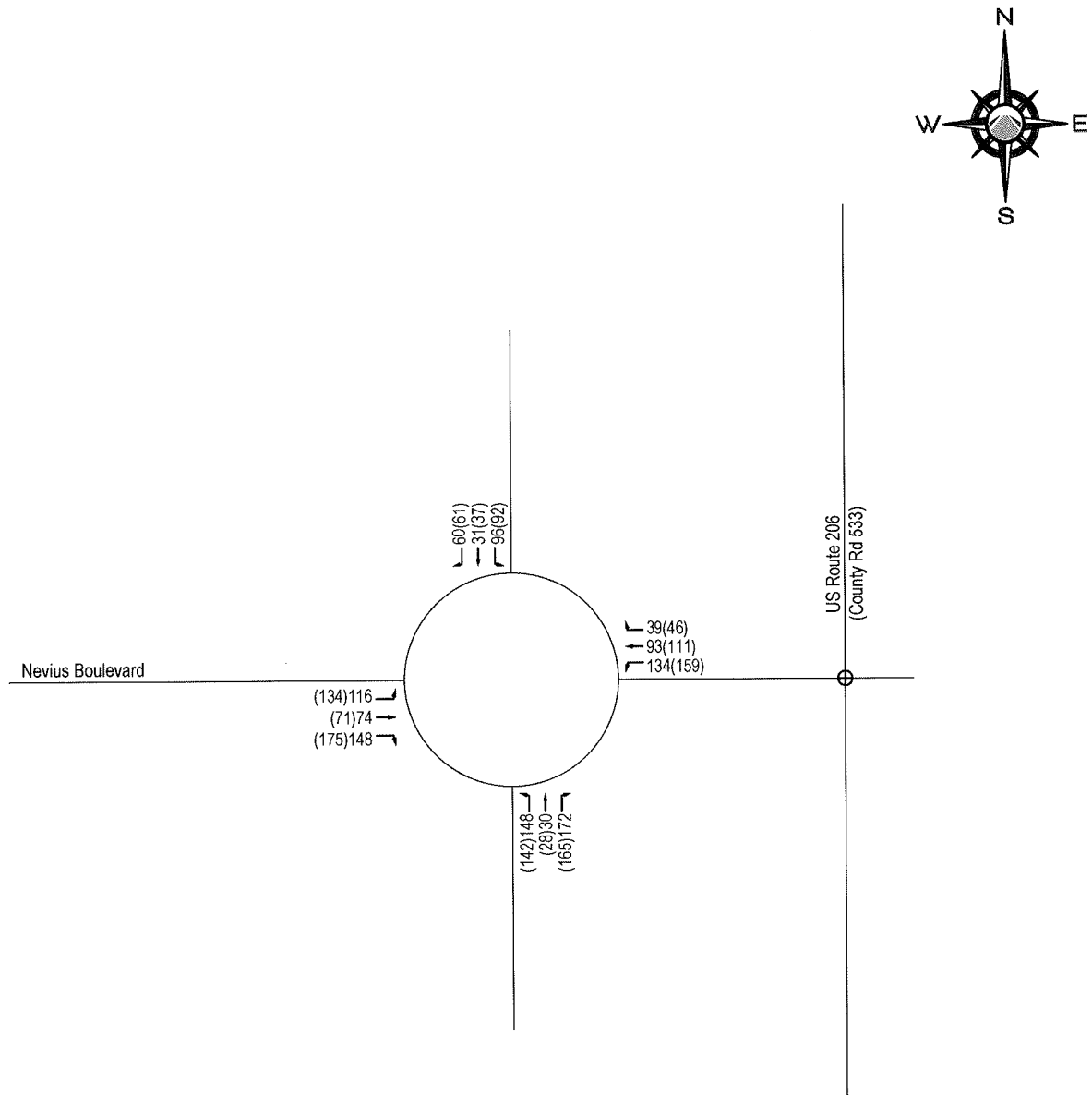


LEGEND

- AA(BB) ENTER(EXIT) TRIP DISTRIBUTION
- INTERNAL ROADWAY
- ROUNDABOUT
- ⊕ EXISTING TRAFFIC SIGNAL

Proposed Mixed Use Development
Montgomery Township
Somerset County, New Jersey

SITE TRAFFIC VOLUMES

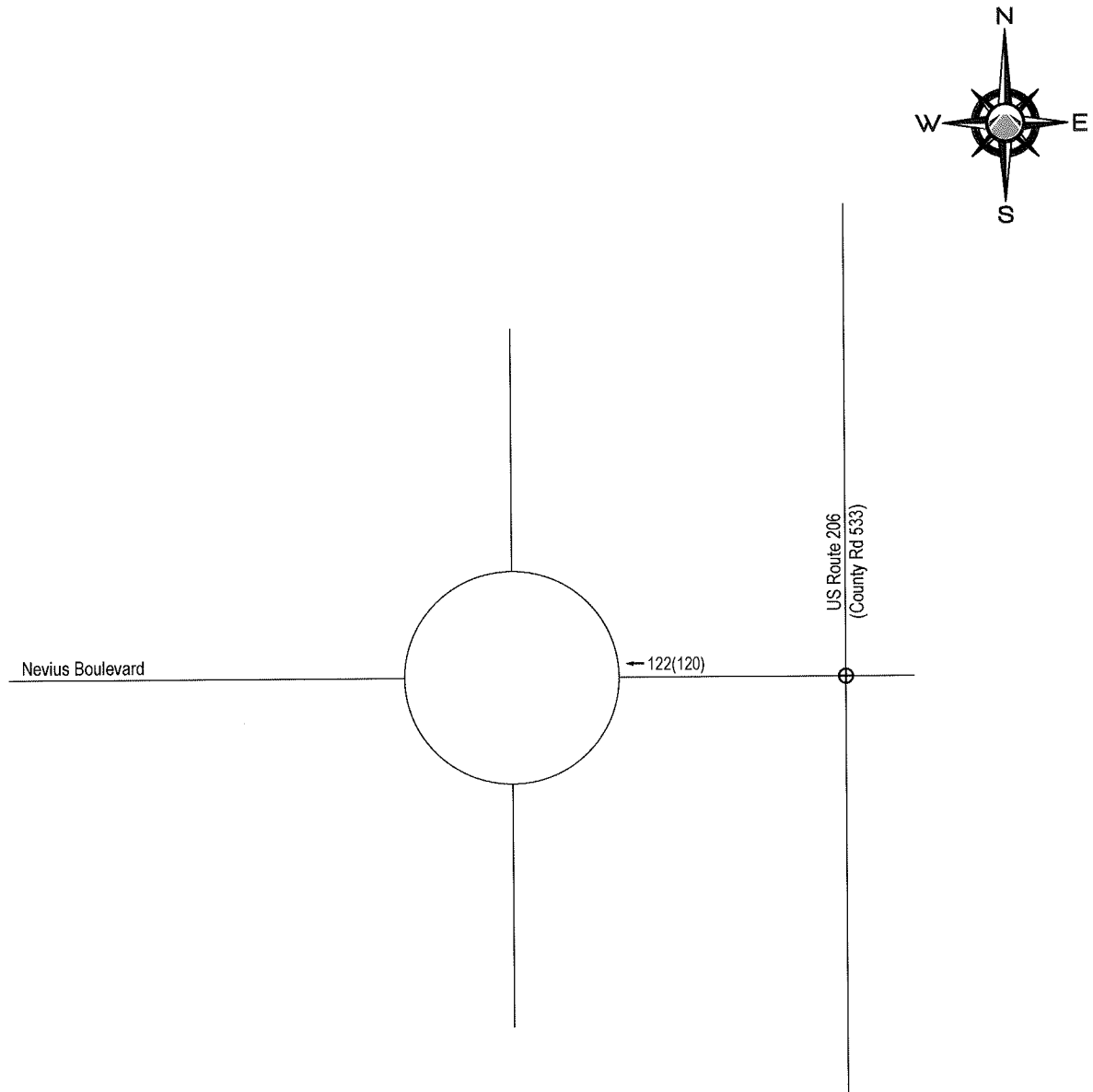


LEGEND

- AA(BB) PM(SAT) PEAK HOUR VOLUMES
- INTERNAL ROADWAY
- ROUNDABOUT
- ⊕ EXISTING TRAFFIC SIGNAL

Proposed Mixed Use Development
Montgomery Township
Somerset County, New Jersey

REDISTRIBUTED TRAFFIC VOLUMES



LEGEND

- AA(BB) PM(SAT) PEAK HOUR VOLUMES
- INTERNAL ROADWAY
- ROUNDABOUT
- ⊕ EXISTING TRAFFIC SIGNAL

K:\2008\AJ08127\TRAFFIC DATA\FIGURES\AJ08127 ROUNDABOUT FIGURES--->LAYOUT: 15 REDIST

Intersection					
Intersection Delay, s/veh	10.3				
Intersection LOS	B				
Approach	EB	WB	NB	SB	
Entry Lanes	1	2	1	1	
Conflicting Circle Lanes	1	1	1	1	
Adj Approach Flow, veh/h	367	413	381	203	
Demand Flow Rate, veh/h	375	422	389	207	
Vehicles Circulating, veh/h	287	327	317	544	
Vehicles Exiting, veh/h	464	379	345	205	
Follow-Up Headway, s	3.186	3.186	3.186	3.186	
Ped Vol Crossing Leg, #/h	50	0	50	50	
Ped Cap Adj	0.993	1.000	0.993	0.993	
Approach Delay, s/veh	10.0	10.2	10.9	9.8	
Approach LOS	B	B	B	A	
Lane	Left	Left	Right	Left	Left
Designated Moves	LTR	LT	R	LTR	LTR
Assumed Moves	LTR	LT	R	LTR	LTR
RT Channelized					
Lane Util	1.000	0.900	0.100	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193	5.193
Entry Flow, veh/h	375	380	42	389	207
Cap Entry Lane, veh/h	848	815	815	823	656
Entry HV Adj Factor	0.980	0.980	0.976	0.980	0.982
Flow Entry, veh/h	367	372	41	381	203
Cap Entry, veh/h	825	799	795	801	640
V/C Ratio	0.445	0.466	0.052	0.476	0.318
Control Delay, s/veh	10.0	10.7	5.0	10.9	9.8
LOS	B	B	A	B	A
95th %tile Queue, veh	2	3	0	3	1

Intersection					
Intersection Delay, s/veh	11.6				
Intersection LOS	B				
Approach	EB	WB		NB	SB
Entry Lanes	1	2		1	1
Conflicting Circle Lanes	1	1		1	1
Adj Approach Flow, veh/h	413	496		363	206
Demand Flow Rate, veh/h	422	506		371	210
Vehicles Circulating, veh/h	328	337		330	610
Vehicles Exiting, veh/h	492	364		420	233
Follow-Up Headway, s	3.186	3.186		3.186	3.186
Ped Vol Crossing Leg, #/h	50	0		50	50
Ped Cap Adj	0.993	1.000		0.993	0.993
Approach Delay, s/veh	12.0	12.2		10.7	10.9
Approach LOS	B	B		B	B
Lane	Left	Left	Right	Left	Left
Designated Moves	LTR	LT	R	LTR	LTR
Assumed Moves	LTR	LT	R	LTR	LTR
RT Channelized					
Lane Util	1.000	0.895	0.105	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193	5.193
Entry Flow, veh/h	422	453	53	371	210
Cap Entry Lane, veh/h	814	807	807	812	614
Entry HV Adj Factor	0.980	0.980	0.981	0.979	0.982
Flow Entry, veh/h	413	444	52	363	206
Cap Entry, veh/h	792	790	791	790	599
V/C Ratio	0.522	0.562	0.066	0.460	0.344
Control Delay, s/veh	12.0	13.0	5.2	10.7	10.9
LOS	B	B	A	B	B
95th %tile Queue, veh	3	4	0	2	2

TABLE G-I
UNSIGNALIZED LEVEL OF SERVICE SUMMARY
NEVIUS BOULEVARD ROUNDABOUT
WEEKDAY EVENING PEAK HOUR

Approach/Movement	No-Build	Build
EB Left/Thru/Right	-	B(10.0)
WB Left/Thru	-	B(10.7)
WB Right	-	A(5.0)
NB Left/Thru/Right	-	B(10.9)
SB Left/Thru/Right	-	A(9.8)
Overall	-	B(10.3)

- EB (Eastbound) and WB (Westbound) are the Nevius Boulevard approaches.
- NB (Northbound) and SB (Southbound) approaches are the Driveway approaches.
- Levels of Delay are in seconds and are shown in parenthesis.

TABLE G-II
UNSIGNALIZED LEVEL OF SERVICE SUMMARY
NEVIUS BOULEVARD ROUNDABOUT
SATURDAY MIDDAY PEAK HOUR

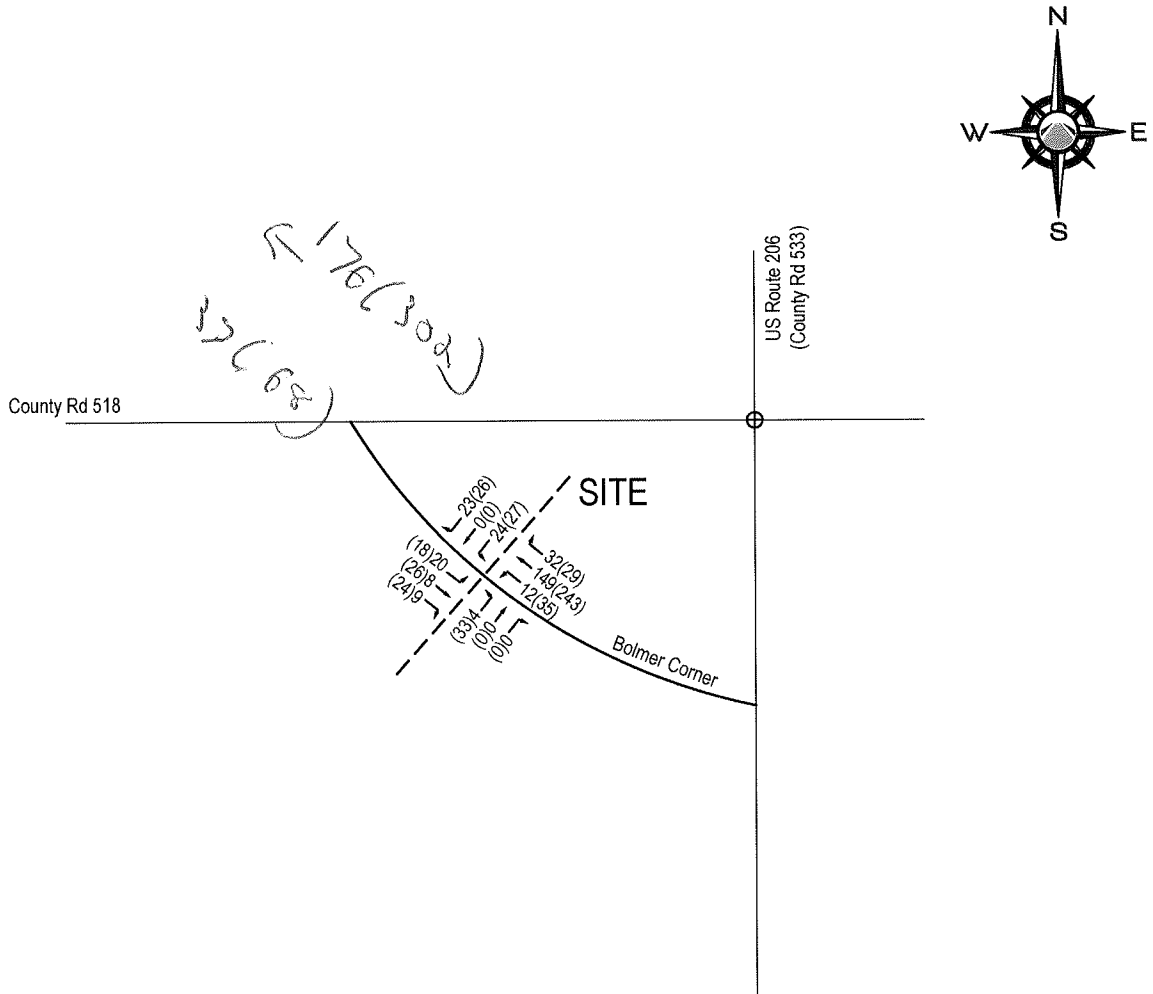
Approach/Movement	No-Build	Build
EB Left/Thru/Right	-	B(12.0)
WB Left/Thru	-	B(13.0)
WB Right	-	A(5.2)
NB Left/Thru/Right	-	B(10.7)
SB Left/Thru/Right	-	B(10.9)
Overall	-	B(11.6)

- EB (Eastbound) and WB (Westbound) are the Nevius Boulevard approaches.
- NB (Northbound) and SB (Southbound) approaches are the Driveway approaches.
- Levels of Delay are in seconds and are shown in parenthesis.

APPENDIX H – DAYCARE DRIVEWAY ANALYSIS

Proposed Mixed Use Development
Montgomery Township
Somerset County, New Jersey

FUTURE BUILD TRAFFIC VOLUMES - DAYCARE DRIVEWAY



LEGEND

- AA(BB) AM(PM) PEAK HOUR VOLUMES
- EXISTING ROADWAY
- EXISTING DRIVEWAY
- ⊕ EXISTING TRAFFIC SIGNAL
- PROPOSED ROADWAY
- PROPOSED DRIVEWAY

PEAK HOUR	ENTER	EXIT	TOTAL
PM	52	47	99
SAT	47	53	100

Intersection

Int Delay, s/veh 2.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Traffic Vol, veh/h	4	0	0	24	0	23	12	149	32	20	8	9
Future Vol, veh/h	4	0	0	24	0	23	12	149	32	20	8	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	4	0	0	26	0	25	13	162	35	22	9	10

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	276	281	14	264	269	180	19	0	0	197	0	0
Stage 1	58	58	-	206	206	-	-	-	-	-	-	-
Stage 2	218	223	-	58	63	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	680	631	1072	693	641	868	1611	-	-	1388	-	-
Stage 1	959	851	-	801	735	-	-	-	-	-	-	-
Stage 2	789	723	-	959	846	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	648	615	1072	680	625	868	1611	-	-	1388	-	-
Mov Cap-2 Maneuver	648	615	-	680	625	-	-	-	-	-	-	-
Stage 1	950	837	-	794	728	-	-	-	-	-	-	-
Stage 2	759	716	-	944	832	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	10.6		10.1		0.5		4.1	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1611	-	-	648	761	1388	-	-
HCM Lane V/C Ratio	0.008	-	-	0.007	0.067	0.016	-	-
HCM Control Delay (s)	7.3	0	-	10.6	10.1	7.6	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.2	0	-	-

Intersection												
Int Delay, s/veh	3.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Traffic Vol, veh/h	33	0	0	27	0	26	35	243	29	18	26	24
Future Vol, veh/h	33	0	0	27	0	26	35	243	29	18	26	24
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	36	0	0	29	0	28	38	264	32	20	28	26

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	451	453	41	437	450	280	54	0	0	296	0	0
Stage 1	81	81	-	356	356	-	-	-	-	-	-	-
Stage 2	370	372	-	81	94	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	522	506	1036	533	508	764	1564	-	-	1277	-	-
Stage 1	932	832	-	666	633	-	-	-	-	-	-	-
Stage 2	654	622	-	932	821	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	485	483	1036	515	485	764	1564	-	-	1277	-	-
Mov Cap-2 Maneuver	485	483	-	515	485	-	-	-	-	-	-	-
Stage 1	905	819	-	647	615	-	-	-	-	-	-	-
Stage 2	612	604	-	917	808	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	13		11.5		0.8		2.1	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1564	-	-	485	613	1277	-	-
HCM Lane V/C Ratio	0.024	-	-	0.074	0.094	0.015	-	-
HCM Control Delay (s)	7.4	0	-	13	11.5	7.9	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.2	0.3	0	-	-

TABLE H-I
UNSIGNALIZED LEVEL OF SERVICE SUMMARY
BOLMER CORNER & INTERNAL DRIVEWAYS
WEEKDAY MORNING PEAK HOUR

Approach/Movement	No-Build	Build
EB Left/Thru/Right	-	B(10.6)
WB Left/Thru/Right	-	B(10.1)
NB Left/Thru/Right	-	A(7.3)
SB Left/Thru/Right	-	A(7.6)
Overall	-	A(2.7)

- EB (Eastbound) and WB (Westbound) are the Shopping Center and Daycare Driveway approaches, respectively.
- NB (Northbound) and SB (Southbound) approaches are the Bolmer Corner approaches.
- Levels of Delay are in seconds and are shown in parenthesis.

TABLE H-II
UNSIGNALIZED LEVEL OF SERVICE SUMMARY
BOLMER CORNER & INTERNAL DRIVEWAYS
WEEKDAY EVENING PEAK HOUR

Approach/Movement	No-Build	Build
EB Left/Thru/Right	-	B(13.0)
WB Left/Thru/Right	-	B(11.5)
NB Left/Thru/Right	-	A(7.4)
SB Left/Thru/Right	-	A(7.9)
Overall	-	A(3.1)

- EB (Eastbound) and WB (Westbound) are the Shopping Center and Daycare Driveway approaches, respectively.
- NB (Northbound) and SB (Southbound) approaches are the Bolmer Corner approaches.
- Levels of Delay are in seconds and are shown in parenthesis.