

McDonough & Rea Associates, Inc.

Traffic and Transportation Consulting

Kevin P. McDonough (1953-1994)
John H. Rea, P.E.
Jay S. Troutman, Jr., P.E.
Scott T. Kennel

March 22, 2018

Montgomery Township Planning Board
2761 Route 206
Bellemead, NJ 08502

Re: Village Walk at Montgomery
Lots 60, 65, 68 and 69, Block 28005
Montgomery Township, Somerset County
MRA File No. 16-243

Dear Board Members:

McDonough & Rea Associates (MRA) has been asked to prepare a *Traffic Impact Analysis* for plans to raze the *Village Shopper II* mixed-use office/retail development and construct the *Village Walk at Montgomery* mixed-use residential/retail development on Route 206 in Montgomery Township as shown on *Figure 1*, a *Site Location Map* in the *Appendix*. *Village Shopper II* contains 2 buildings with 31,000 SF with access to Route 206 via a signalized access opposite *Montgomery Center* and a right-in/right-out access.

The *Village Walk at Montgomery* redevelopment proposal contains a mixed-use residential/commercial building and 4 commercial buildings. The roadway improvement program in conjunction with the redevelopment proposal is as follows:

- Construct Intermediate Loop Road (Township Master Plan Roadway)
- Upgrade Route 206 and the Intermediate Loop Road traffic signal with a southbound dedicated right turn lane
- Construct Inner Loop Road (Township Master Plan Roadway) right-in/right-out at Route 206
- Construct right-in/right-out access to *Village Walk at Montgomery*
- Construct alternate access via *Sharbell* residential development to Route 518 at Research Road

The following report sets forth the database accumulated and the conclusions reached with respect to *Village Walk at Montgomery*.

Please reply to:

- ☒ 1431 Lakewood Road, Suite C, Manasquan, NJ 08736 • (732) 528-7076 • Fax (732) 528-6673
- ☐ 105 Elm Street, Lower Level, Westfield, NJ 07090 • (908) 789-7180 • Fax (908) 789-7181



McDonough & Rea Associates, Inc.

Traffic and Transportation Consulting

1431 Lakewood Road, Suite C, Manasquan, NJ 08736 • (732) 528-7076 • Fax (732) 528-6673
105 Elm Street, Lower Level, Westfield, NJ 07090 • (908) 789-7180 • Fax (908) 789-7181

Montgomery Township Planning Board

-2-

March 22, 2018

SCOPE OF STUDY

In order to prepare a thorough *Traffic Impact Analysis* for the *Village Walk at Montgomery* development, MRA has conducted the following tasks:

1. Made field visits to the site to establish existing roadway and traffic conditions in the area.
2. Conducted existing peak hour traffic counts at the access points to *Village Shopper II* along Route 206.
3. Prepared trip generation estimates for the *Village Walk at Montgomery* development based upon Institute of Transportation Engineers (ITE) data.
4. Distributed site generated traffic to the adjacent roadway network in accordance with existing directional distribution and the proposed access system.
5. Prepared estimates of future traffic volume demand for the design year of the development, including background traffic growth in accordance with New Jersey Department of Transportation (NJDOT) data as well as other approved/planned developments in the area.
6. Conducted level of service capacity analyses for the following intersections in accordance with *Highway Capacity Manual* procedures:
 - Route 206 and Intermediate Loop Road/*Montgomery Center* access
 - Route 206 and Inner Loop Road
 - Route 206 and site access
7. Reviewed the *Site Plan* prepared by Menlo Engineering with respect to availability and accessibility of the parking supply, and conformance to proper traffic engineering principles.



McDonough & Rea Associates, Inc.

Traffic and Transportation Consulting

1431 Lakewood Road, Suite C, Manasquan, NJ 08736 • (732) 528-7076 • Fax (732) 528-6673
105 Elm Street, Lower Level, Westfield, NJ 07090 • (908) 789-7180 • Fax (908) 789-7181

Montgomery Township Planning Board

-3-

March 22, 2018

EXISTING CONDITIONS

The subject property contains a 1-story retail building and a 2-story retail/office building, totaling 31,000 SF located west of Route 206 opposite the *Montgomery Center*. The site is served by a full movement signalized access and a right-in/right-out access to southbound Route 206. The site access also serves *Village Shopper III*, a 37,600 office/retail development located north of the subject property.

The Route 206 and site access/*Montgomery Center* intersection is a signalized intersection that is controlled by a multi-phase traffic signal with the following lane assignments:

- Southbound Route 206 – A left turn lane and a shared thru/right turn lane.
- Northbound Route 206 – A left turn lane and a shared thru/right turn lane.
- Westbound *Montgomery Center* – A dedicated right turn lane and a shared left/thru lane.
- Eastbound site access – One shared left/thru/right turn lane.

EXISTING TRAFFIC VOLUMES

Traffic volume data was collected by conducting manual turning movement counts at the Route 206 and *Village Shopper II* driveways during the critical weekday PM peak street hour and mid-day Saturday peak hour when traffic volumes on the adjacent roadway network are at a maximum and when retail facilities along Route 206 generate their maximum traffic volume. The counts were conducted in June 2017 from 4:00 PM to 7:00 PM on a weekday and from 11:00 AM to 2:00 PM on a Saturday. *Figure 2* in the *Appendix* illustrates existing peak hour traffic volumes on Route 206 along the site frontage.

PROPOSED ROADWAY IMPROVEMENTS

The Montgomery Township Master Plan identifies several new roadways along the Route 206 corridor to accommodate future developments and to increase efficiency/capacity of the Route 206/Route 518 intersection (see attached *Montgomery Township Master Plan Circulation Element*).



McDonough & Rea Associates, Inc.

Traffic and Transportation Consulting

1431 Lakewood Road, Suite C, Manasquan, NJ 08736 • (732) 528-7076 • Fax (732) 528-6673
105 Elm Street, Lower Level, Westfield, NJ 07090 • (908) 789-7180 • Fax (908) 789-7181

Montgomery Township Planning Board

-4-

March 22, 2018

The *Village Walk at Montgomery Land Use Plan* includes the following improvements:

- Construction of the Intermediate Loop Road, a Township roadway, from Route 206 to the *Sharbell* property to the west connecting with Research Road.
- Construction of the Inner Loop Road, a Township roadway, from Route 206 to the *Sharbell* property connecting with Route 518.
- Construction of a dedicated right turn lane on Route 206 southbound approach at the Intermediate Loop Road intersection
- Install new traffic signal system at Route 206 and Intermediate Loop Road/*Montgomery Center* access intersection.

TRIP GENERATION/DISTRIBUTION

Estimates of traffic to be generated by *Village Walk at Montgomery* were calculated using the 10th Edition of the ITE *Trip Generation* manual.

The following *Table* illustrates the anticipated AM and PM peak street hour and mid-day Saturday peak hour traffic that will be generated from each uses within *Village Walk at Montgomery*.

TABLE I
TRIP GENERATION
VILLAGE WALK AT MONTGOMERY

<u>USE</u>	<u>WEEKDAY AM PSH</u>			<u>WEEKDAY PM PSH</u>			<u>SAT. PH</u>		
	<u>IN</u>	<u>OUT</u>	<u>TOTAL</u>	<u>IN</u>	<u>OUT</u>	<u>TOTAL</u>	<u>IN</u>	<u>OUT</u>	<u>TOTAL</u>
Low Rise Apt. – 52 DU									
ITE LUC 223	5	19	24	19	9	28	18	17	35
Shopping Center – 56,000 SF									
ITE LUC 820	<u>112</u>	<u>68</u>	<u>180</u>	<u>170</u>	<u>184</u>	<u>354</u>	<u>204</u>	<u>188</u>	<u>392</u>
Sub Total	<u>117</u>	<u>87</u>	<u>204</u>	<u>189</u>	<u>193</u>	<u>382</u>	<u>222</u>	<u>205</u>	<u>427</u>
Internal Credit	<u>-6</u>	<u>-4</u>	<u>-10</u>	<u>-10</u>	<u>-9</u>	<u>-19</u>	<u>-11</u>	<u>-10</u>	<u>-21</u>
Total	111	83	194	179	184	363	211	195	406
Retail Pass-By	<u>0</u>	<u>0</u>	<u>0</u>	<u>-68</u>	<u>-72</u>	<u>-140</u>	<u>-61</u>	<u>-56</u>	<u>-117</u>
New Trips	111	83	194	111	112	223	150	139	289



McDonough & Rea Associates, Inc.

Traffic and Transportation Consulting

1431 Lakewood Road, Suite C, Manasquan, NJ 08736 • (732) 528-7076 • Fax (732) 528-6673
105 Elm Street, Lower Level, Westfield, NJ 07090 • (908) 789-7180 • Fax (908) 789-7181

Montgomery Township Planning Board

-5-

March 22, 2018

Please note that pass-by percentages for the traffic generated by the retail use was also established using ITE data (40 percent PM and 30 percent Saturday). In addition, an internal capture rate of 5 percent was assumed after conducting an internal capture analysis utilizing guidelines set forth by the ITE. The 5 percent internal capture rate is overly conservative as the calculated internal capture rate was 11.0 percent.

Once the amount of peak hour traffic to be generated by the various uses within *Village Walk at Montgomery* has been established, traffic needs to be distributed to the adjacent roadway network in accordance with anticipated origins and destinations of site generated traffic. MRA is familiar with commuting patterns in Somerset County and has over 30 years' experience working in the area. Based upon our experience, location of other commercial (existing/proposed) developments, proposed *Montgomery Township Master Plan* roadways and the existing roadway network, the following *Table* illustrates the anticipated distribution of traffic for each use within *Village Walk at Montgomery*.

TABLE II
TRAFFIC DISTRIBUTION

<u>TO/FROM</u>	<u>RETAIL</u>	<u>RESIDENTIAL</u>
Route 206-North	30%	45%
Route 206-South	30%	30%
Route 518-East	20%	0%
Route 518-West	10%	10%
Montgomery Center-East	5%	10%
Internal	5%	5%
Total	100%	100%

Figure 3 illustrates site generated and distributed traffic volumes at the site access points and through the adjacent roadway network.

Table III details the ITE traffic projections for the existing uses on the subject property.



McDonough & Rea Associates, Inc.

Traffic and Transportation Consulting

1431 Lakewood Road, Suite C, Manasquan, NJ 08736 • (732) 528-7076 • Fax (732) 528-6673
105 Elm Street, Lower Level, Westfield, NJ 07090 • (908) 789-7180 • Fax (908) 789-7181

Montgomery Township Planning Board

-6-

March 22, 2018

TABLE III
EXISTING TRIP GENERATION
VILLAGE SHOPPER II

<u>USE</u>	<u>WEEKDAY AM PSH</u>			<u>WEEKDAY PM PSH</u>			<u>SAT. PH</u>		
	<u>IN</u>	<u>OUT</u>	<u>TOTAL</u>	<u>IN</u>	<u>OUT</u>	<u>TOTAL</u>	<u>IN</u>	<u>OUT</u>	<u>TOTAL</u>
Office – 8,000 SF									
ITE LUC 710	11	1	12	2	10	12	2	2	4
Retail – 23,000 SF									
ITE LUC 820	<u>100</u>	<u>62</u>	<u>162</u>	<u>88</u>	<u>96</u>	<u>184</u>	<u>101</u>	<u>93</u>	<u>194</u>
Sub Total	111	63	174	90	106	196	103	95	198

Table IV was prepared to compare the traffic generation of the existing *Village Shopper II* development to the proposed Village Walk at Montgomery proposal to determine the type of access permit required by NJDOT.

TABLE IV
TRIP GENERATION COMPARISON
VILLAGE WALK AT MONTGOMERY VS. VILLAGE SHOPPER II

	<u>AM PSH 2-WAY</u>	<u>PM PSH 2-WAY</u>	<u>SAT. PH 2-WAY</u>
Village Shopper-existing	174	196	198
Village Walk at Montgomery-Proposed	<u>204</u>	<u>382</u>	<u>427</u>
Net Difference	+30	+186	+229
5% Internal Credit (VW)	-10	-19	-21
Alternate Access Credit (VW)	<u>-19</u>	<u>-58</u>	<u>-68</u>
Route 206 Net Difference	+1	+109	+140

Based on the results of Table IV, the redevelopment project as proposed will qualify for an NJDOT Major Access Application since the net increase in peak hour traffic to the Route 206 access system is greater than 100 trips and less than 200 trips. Therefore, the study locations enumerated and analyzed herein comply with the NJDOT *Access Code* requirements.



McDonough & Rea Associates, Inc.

Traffic and Transportation Consulting

1431 Lakewood Road, Suite C, Manasquan, NJ 08736 • (732) 528-7076 • Fax (732) 528-6673
105 Elm Street, Lower Level, Westfield, NJ 07090 • (908) 789-7180 • Fax (908) 789-7181

Montgomery Township Planning Board

-7-

March 22, 2018

ANALYSIS OF FUTURE TRAFFIC CONDITIONS

A design year of 2022, 5 years in the future was selected for analysis. The NJDOT's *Background Traffic Growth Rate* data for the area was consulted and existing 2017 traffic volumes were expanded by a growth rate of 1.0 percent per year for 3 years and 0.50 percent for 2 years in order to arrive at year 2022 pre-development traffic volumes. In addition, an induced traffic volume adjustment has been factored into the future traffic volume projections to account for non-site related traffic with origins/destinations to the existing *Sharbell* neighborhoods west of the site.

Site generated traffic from 3 other developments in the area were surcharged onto the Route 206 study locations (*Figure A* in the *Appendix*) and they are as follows:

- *Madison Marquette* - Southwest quadrant Route 206 and Route 518
 - 281,000 SF shopping center
 - 61,000 SF movie theater
 - 10,000 SF day care center
 - 34 single family homes
- *Sharbell* - West of *Village Walk at Montgomery* and north of Route 518
 - 107 townhomes
 - 40 condominiums
 - 80 apartments single family homes
- *Kings Interest LLC Redevelopment* – Northeast quadrant Route 206 and Route 518
 - 48,240 SF retail space

The 2022 pre-development volumes include 2017 traffic volumes with growth, existing *Sharbell* induced traffic and site traffic from the 3 off-site developments referenced above and are depicted on *Figure 4* in the *Appendix*.

The existing Village Shopper II site traffic volumes were deducted from the base volumes in the analysis herein (traffic volume worksheet, *Figure 2A*, is attached to the *Appendix*) prior to surcharging the *Village Walk at Montgomery* site generated traffic volumes detailed in *Table I*.

Figure 5 in the *Appendix* illustrates year 2022 post-development traffic volumes with the *Village Walk at Montgomery* traffic included.



McDonough & Rea Associates, Inc.

Traffic and Transportation Consulting

1431 Lakewood Road, Suite C, Manasquan, NJ 08736 • (732) 528-7076 • Fax (732) 528-6673
105 Elm Street, Lower Level, Westfield, NJ 07090 • (908) 789-7180 • Fax (908) 789-7181

Montgomery Township Planning Board

-8-

March 22, 2018

Traffic engineers calculate levels of service of unsignalized and signalized intersections which relate to the quality of traffic flow. Level of service is a measure of average control delay. Average control delay is the time lost due to deceleration and the amount of time from when a vehicle is stopped for a traffic control device (or at the end of the queue) to when the vehicle departs the intersection. Delay is a relative quantity of driver discomfort, frustration, fuel consumption, and loss in travel time.

Levels of service range from “A” to “F,” with “A” being the highest, or best attainable level of service. Level of service “E” with average control delays of not more than 50 seconds per vehicle at an unsignalized intersection or 80 seconds per vehicle at a signalized intersection indicates near to or at capacity conditions and is generally considered the limit of acceptable level of service and delay.

Full definitions of levels of service for unsignalized and signalized intersections and level of service summaries are included in the *Appendix*. The intersections studied by this report were analyzed according to the procedures set forth in the *Highway Capacity Manual 2010*, using the *Highway Capacity Software (HCS)*, release 7.4.

ROUTE 206 AND INTERMEDIATE LOOP ROAD/MONTGOMERY CENTER ACCESS

The intersection is projected to operate at an overall level of service “D” and “F” for the PM peak street hour and Saturday peak hour, respectively, for the 2022 pre-development conditions. It is proposed to enhance the capacity and efficiency of the intersection with the construction of a southbound dedicated right turn lane and the restriping of the Montgomery Center westbound approach as a dedicated left turn lane and a shared thru/right turn lane. With the proposed improvements, the intersection is projected to operate at an overall level of service “D” and “E” for the PM and Saturday peak hours, respectively and the resulting levels of service are compliant with the NJDOT level of service guidelines as stipulated in the *Access Code*.

ROUTE 206 AT SITE ACCESS

The site access right-in/right-out intersection will operate at level of service “C” and “D” for the PM peak street hour and Saturday peak hour, respectively.

ROUTE 206 AND INNER LOOP ROAD

At this unsignalized intersection, an analysis was performed under the stop control scenario. Findings were that the intersection would operate at an overall level of service “C” and “E” for the PM peak street hour and Saturday peak hour, respectively.



McDonough & Rea Associates, Inc.

Traffic and Transportation Consulting

1431 Lakewood Road, Suite C, Manasquan, NJ 08736 • (732) 528-7076 • Fax (732) 528-6673
105 Elm Street, Lower Level, Westfield, NJ 07090 • (908) 789-7180 • Fax (908) 789-7181

Montgomery Township Planning Board

-9-

March 22, 2018

SITE PLAN AND PARKING

A total of 285 parking spaces are required under Montgomery Township zoning requirements for Lots A-D, as referenced on the plans prepared by Menlo Engineering, and 302 are provided, meeting this requirement. The peak parking periods for the proposed uses are not coincidental and, therefore, shared parking will occur on site. The parking spaces are well distributed to efficiently serve the proposed uses. The overall circulation plan is sound and logical and is anticipated to operate safely and efficiently.


CONCLUSIONS


It is concluded based on the analysis set forth in this report, that plans to redevelop the subject property and construct 2 Township Master Plan Roadways can be approved and operate compatibly with future traffic conditions in the area. The site driveway will operate at level of service "D" or better during the PM peak street hour and Saturday peak hour under the 2022 post-development condition. The signalized intersection at Route 206 and Intermediate Loop Road will be improved in connection with the redevelopment proposal and will operate at level of service "D" and "E" for the PM peak street hour and Saturday peak hour under the 2022 post-development condition, respectively in accordance with the NJDOT level of service guidelines.

The *Site Plan* has been prepared in accordance with proper traffic engineering principles and provides for adequate parking and adequate circulation for customer and delivery vehicles.

A representative from MRA will be in attendance at an upcoming Montgomery Township Planning Board meeting to provide expert testimony and answer questions Board members, Board experts or the public may have.

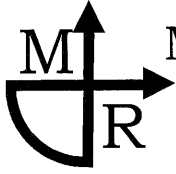
Very truly yours,


John H. Rea, PE
Principal


Scott T. Kennel
Sr. Associate

cc: Chris Szalay, PE
Vince Pugliese

APPENDIX



McDONOUGH & REA ASSOCIATES

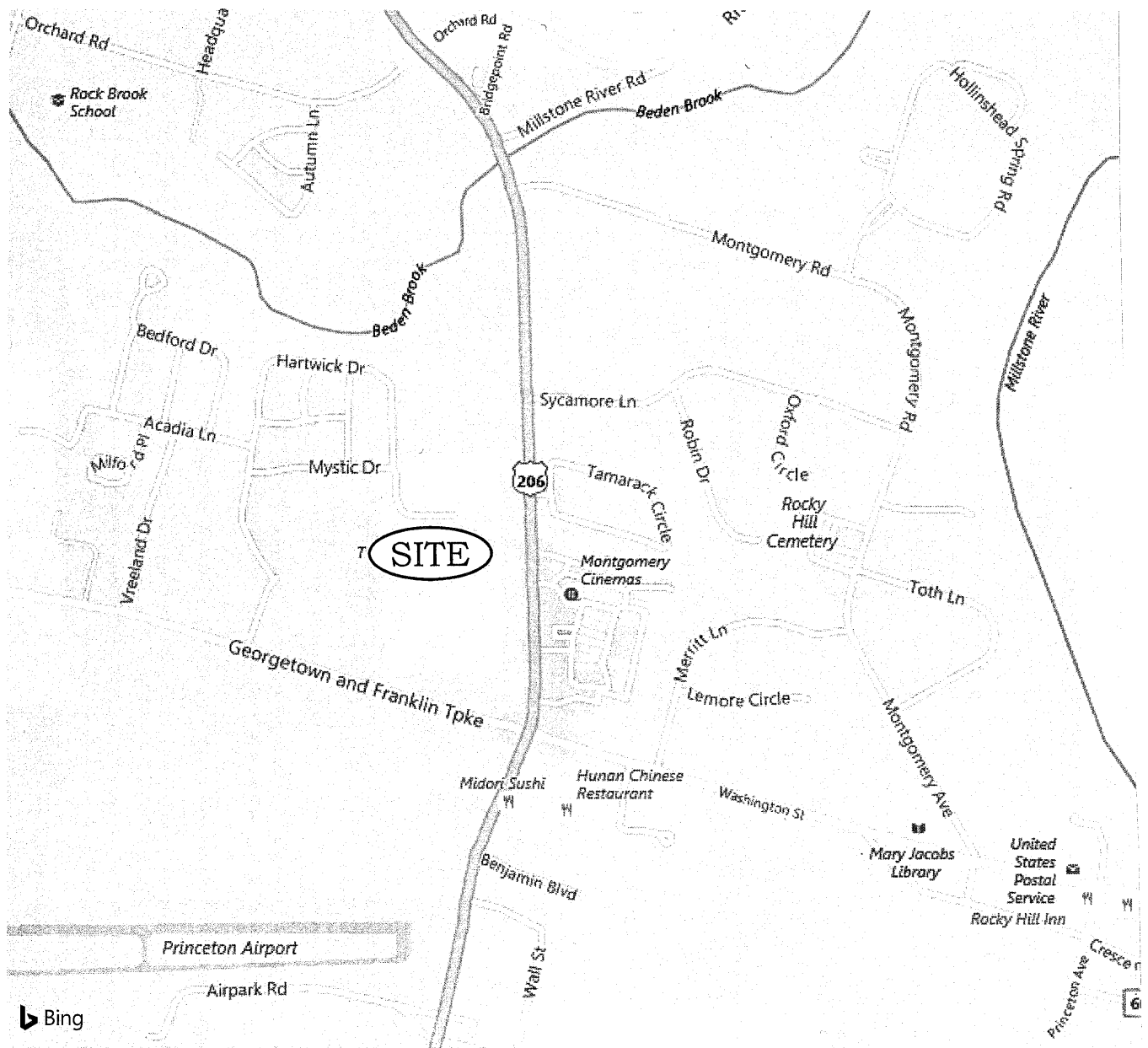
TRAFFIC AND TRANSPORTATION CONSULTING

FIGURE 1

JOB NO.
16-243

DATE:
DEC 2017

SUBJECT: VILLAGE WALK @ MONTGOMERY : MONTGOMERY TWP., SOMERSET CO.
SITE LOCATION MAP





RESEARCH ROAD

SHARBELL

SITE

MADISON
MARQUETTE

VILLAGE
SHOPPER III

(79) 33 → ← 12(6)
 ← 785(965)
 (106) 53 → ← 140(122)
 (87) 44 → ← 9(25)
 (26) 15 → ← 174(223)
 (50) 28 → ← 90(51)

ROUTE 206

MONTGOMERY
CENTER

ROUTE 518

LEGEND: ← PM PSH(SAT PSH)



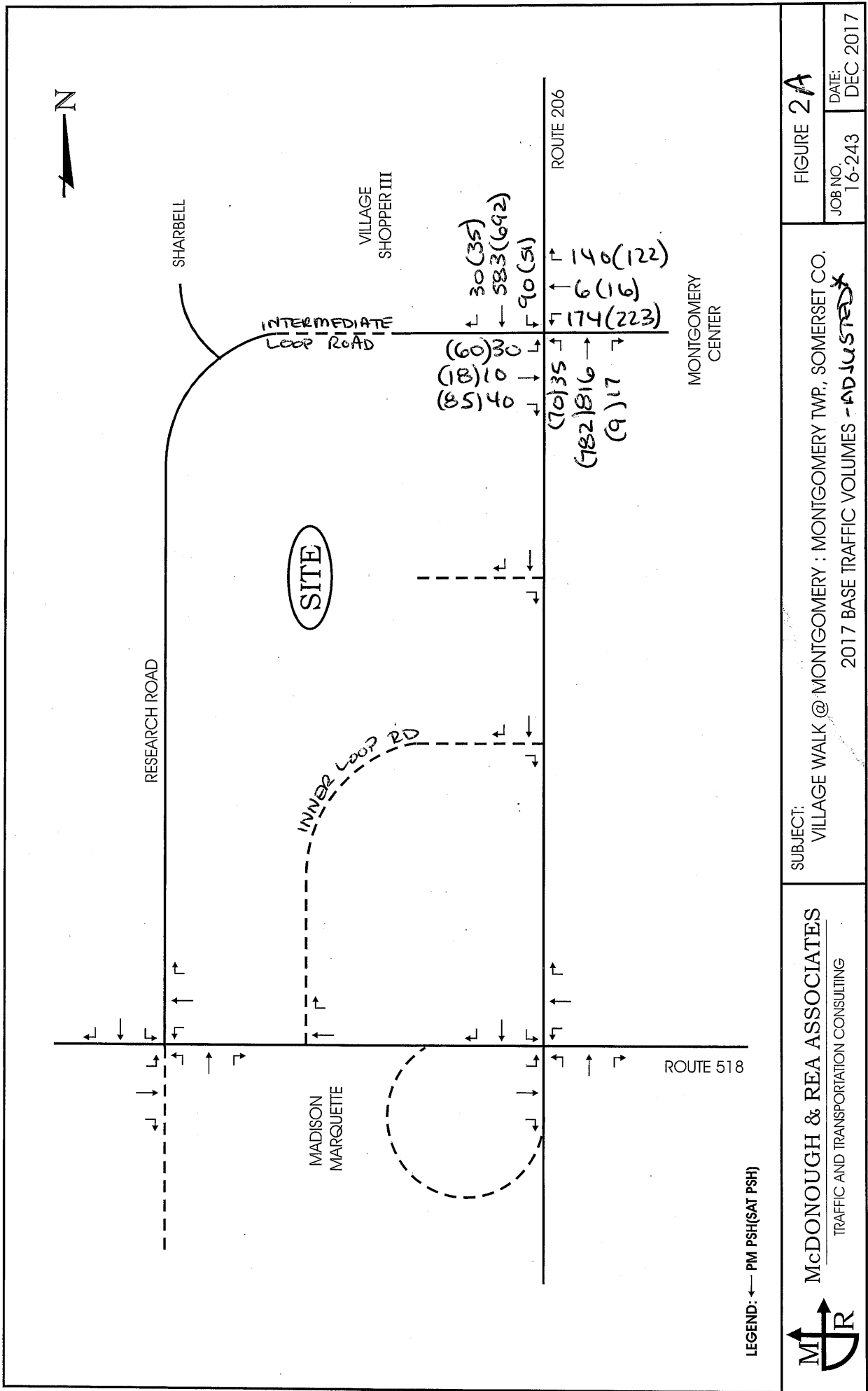
McDONOUGH & REA ASSOCIATES
TRAFFIC AND TRANSPORTATION CONSULTING

SUBJECT:
VILLAGE WALK @ MONTGOMERY : MONTGOMERY TWP., SOMERSET CO.
2017 BASE TRAFFIC VOLUMES

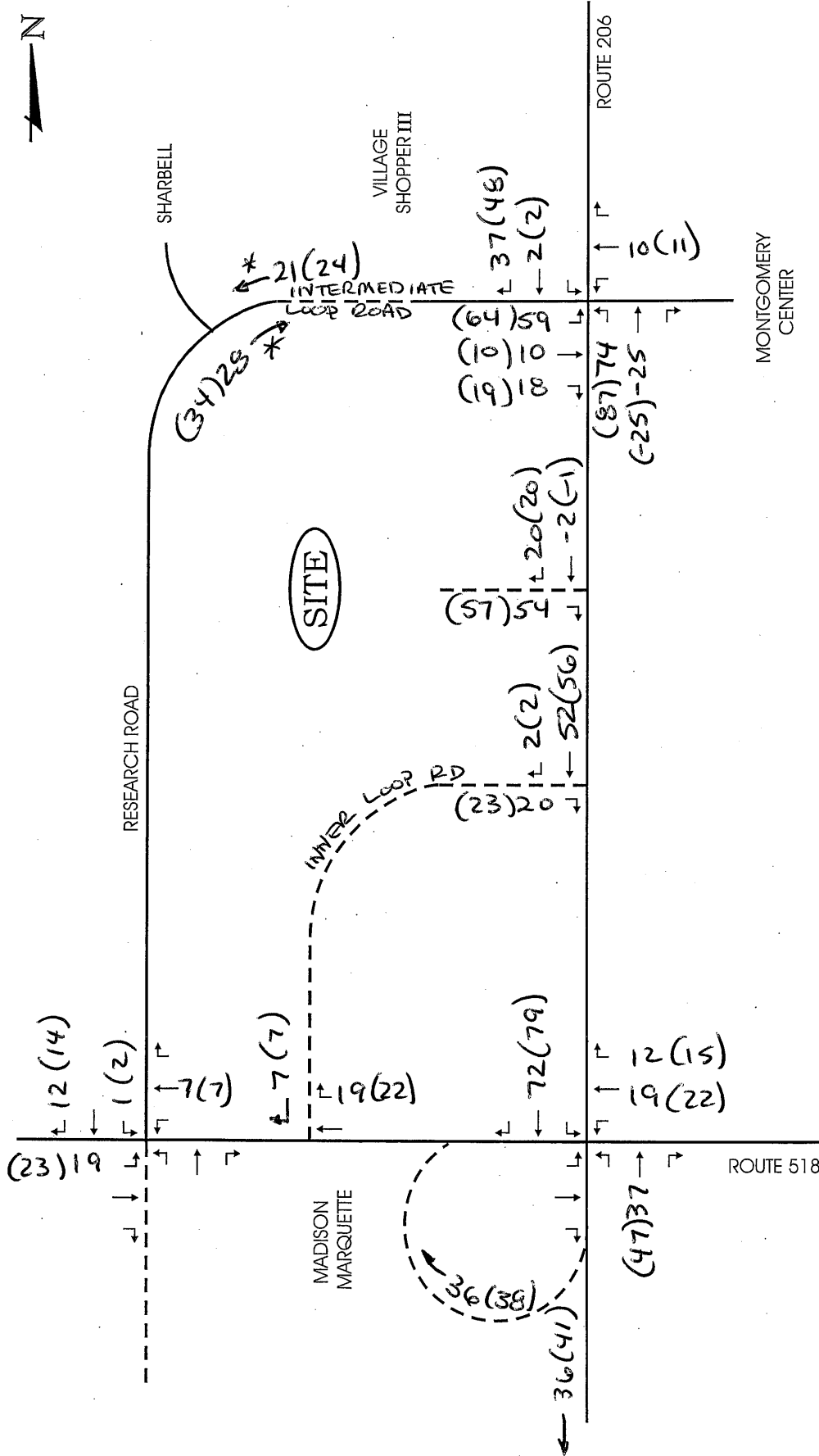
FIGURE 2

JOB NO.
16-243

DATE:
DEC 2017



<div><div>MCDONOUGH & REA ASSOCIATES</div><div>TRAFFIC AND TRANSPORTATION CONSULTING</div></div>	SUBJECT: VILLAGE WALK @ MONTGOMERY : MONTGOMERY TWP., SOMERSET CO.	FIGURE 2A
	2017 BASE TRAFFIC VOLUMES - ADJUSTED*	JOB NO. 16-243



LEGEND: ← PM PSH (SAT PSH)
← PASS-BY

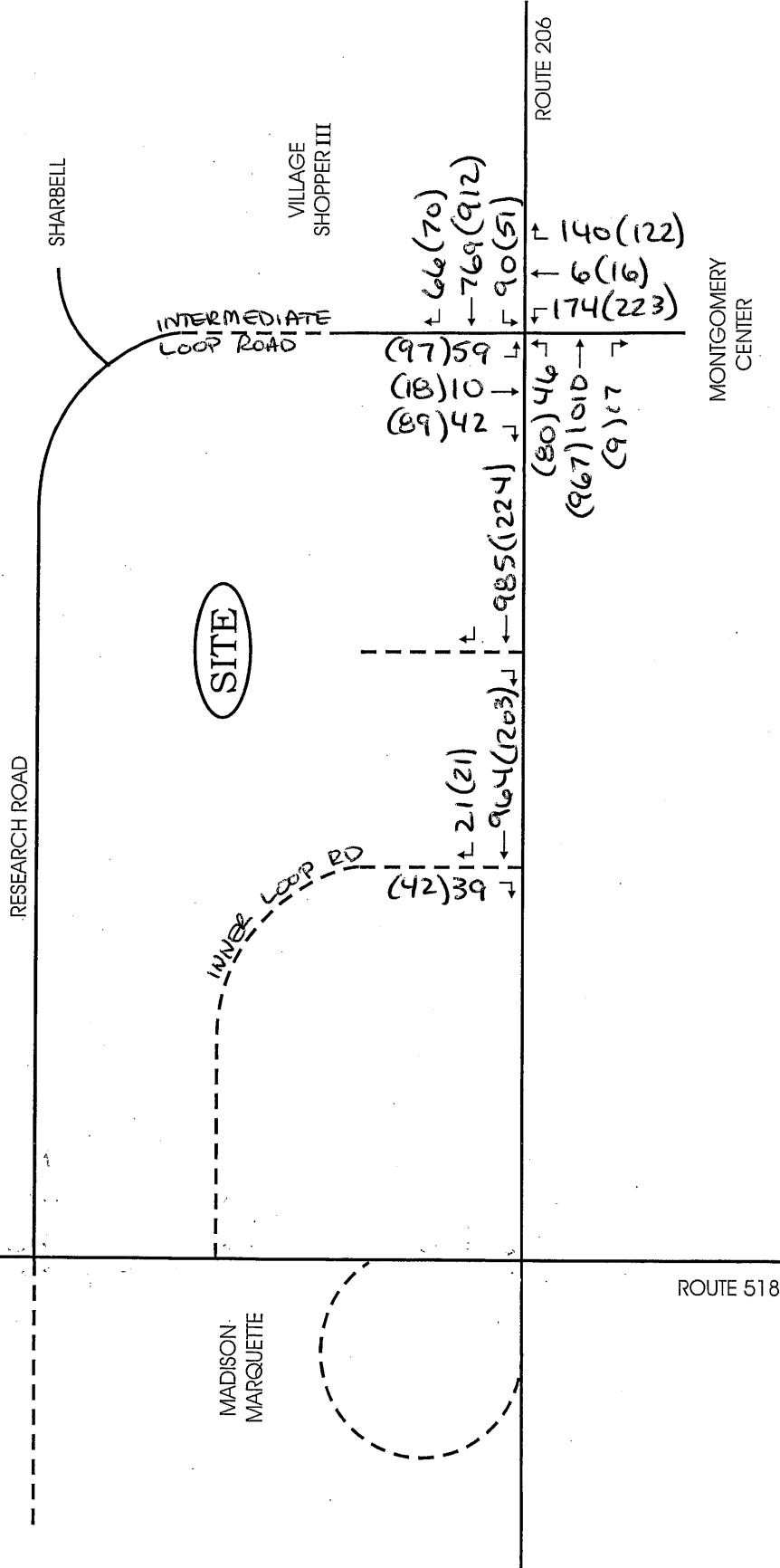
* INCLUDES THE 5% INTERNAL TRIPS



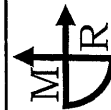
McDONOUGH & REA ASSOCIATES
TRAFFIC AND TRANSPORTATION CONSULTING

SUBJECT: VILLAGE WALK @ MONTGOMERY : MONTGOMERY TWP, SOMERSET CO.
SITE GENERATED TRAFFIC VOLUMES

FIGURE 3
JOB NO. 16-243
DATE: DEC 2017



LEGEND: ← PM PSH(SAT PSH)



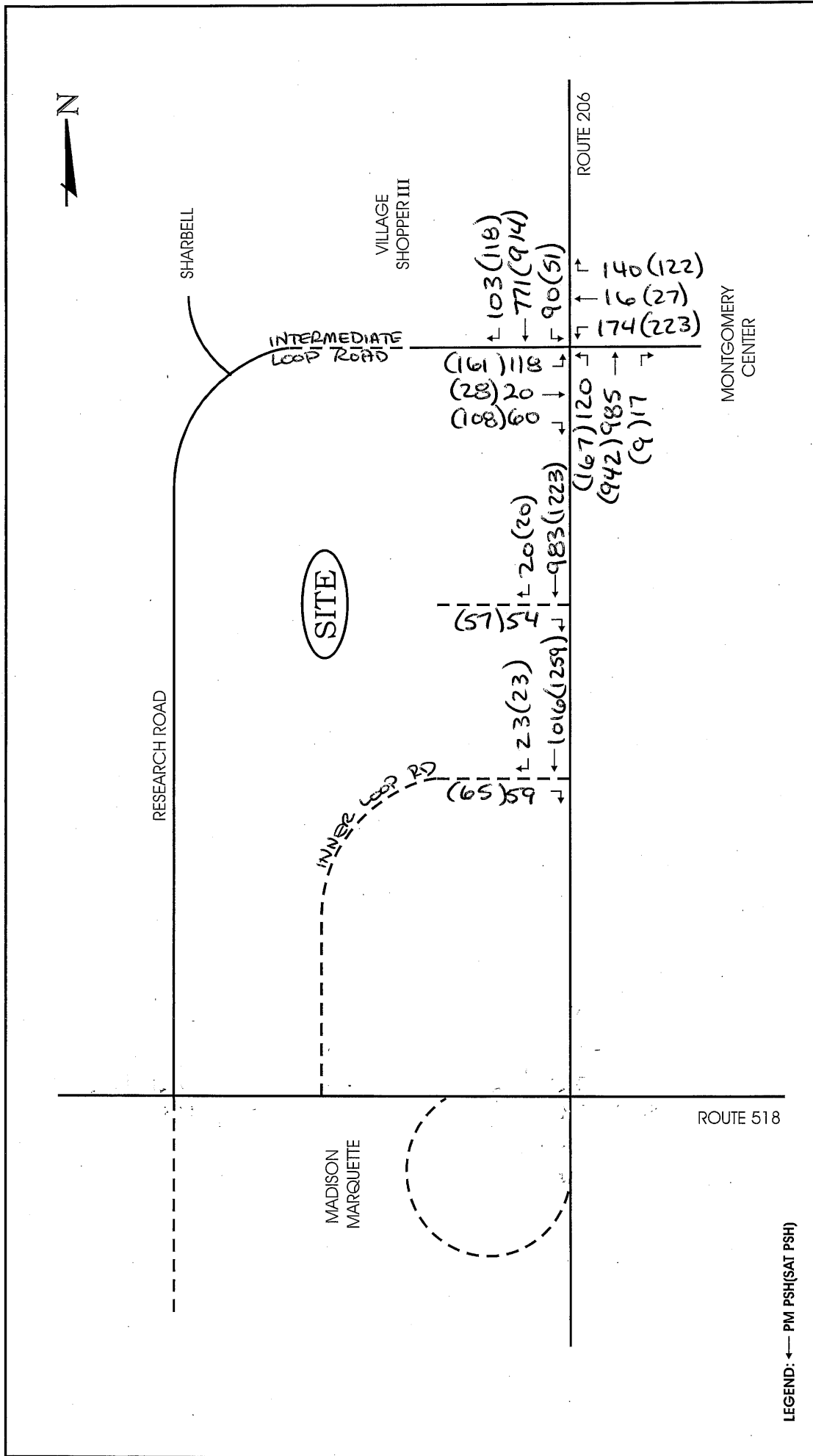
McDONOUGH & REA ASSOCIATES
TRAFFIC AND TRANSPORTATION CONSULTING

SUBJECT:
VILLAGE WALK @ MONTGOMERY : MONTGOMERY TWP., SOMERSET CO.
2022 FUTURE PRE - DEVELOPMENT TRAFFIC VOLUMES

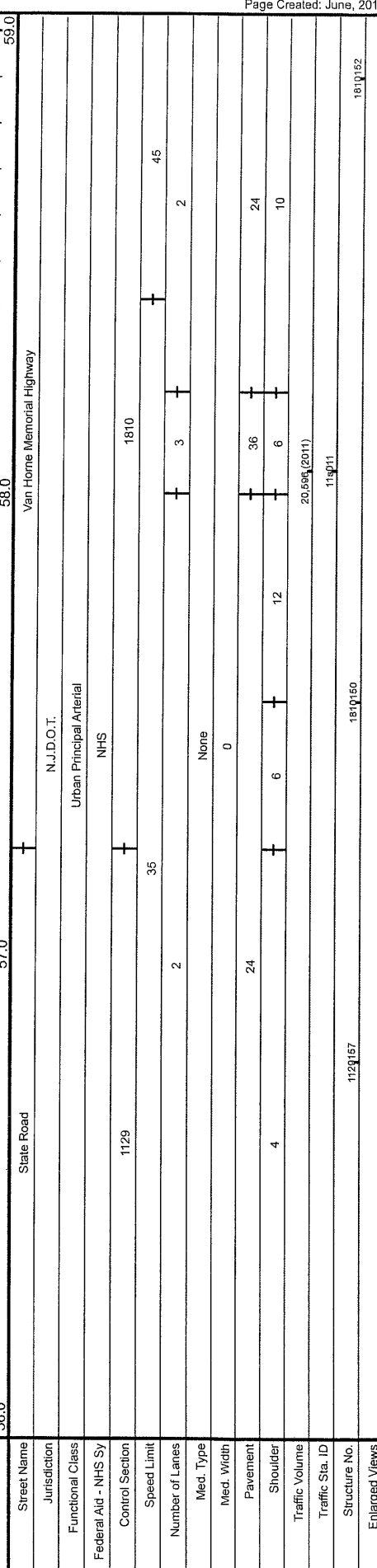
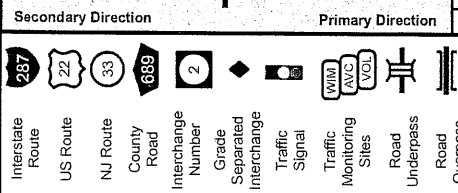
FIGURE 4

JOB NO.
16-243

DATE:
DEC 2017



 McDONOUGH & REA ASSOCIATES TRAFFIC AND TRANSPORTATION CONSULTING	SUBJECT: VILLAGE WALK @ MONTGOMERY : MONTGOMERY TWP., SOMERSET CO. 2022 FUTURE POST - DEVELOPMENT TRAFFIC VOLUMES	FIGURE 5
	JOB NO. 16-243	DATE: DEC 2017



McDonough & Rea Associates
1431 Lakewood Road Suite C
Manasquan NJ 08736
(732) 528-7076

File Name : 16243 rt 206 & center pm1
Site Code : 00016243
Start Date : 6/8/2017
Page No : 1

VILLAGE SHOPPER
ROUTE 206 & CENTER DR/VILLAGE
MONTGOMERY TOWNSHIP, SOMERSET COUNTY
MRA JOB 16-243 THURSDAY PM COUNT

Groups Printed- CARS - TRUCKS

Start Time	Route 206 Southbound					Shop-Rite Exit Westbound					Route 206 Northbound					Village Shopper Exit Eastbound				
	Left	Thru	Right	App. Total		Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	App. Total		Left	Thru	Right	RTOR	App. Total
04:00 PM	29	128	8	165		43	2	11	16	72	13	195	3	211		7	1	2	2	12
04:15 PM	28	133	7	168		47	2	12	18	79	10	204	2	216		9	1	3	1	14
04:30 PM	26	130	10	166		53	2	19	9	83	22	194	6	222		2	0	4	2	8
04:45 PM	30	154	7	191		55	2	18	14	89	13	190	1	204		12	4	5	1	22
Total	113	545	32	690		198	8	60	57	323	58	783	12	853		30	6	14	6	56
05:00 PM	15	144	13	172		51	2	16	12	81	14	192	2	208		13	0	2	2	17
05:15 PM	22	126	12	160		51	3	13	20	87	13	206	7	226		8	3	3	3	17
05:30 PM	31	155	8	194		39	2	27	15	83	13	207	6	226		13	9	6	3	31
05:45 PM	22	158	10	190		33	2	28	9	72	13	211	2	226		10	3	6	3	22
Total	90	583	43	716		174	9	84	56	323	53	816	17	886		44	15	17	11	87
Grand Total	203	1128	75	1406		372	17	144	113	646	111	1599	29	1739		74	21	31	17	143
Approch %	14.4	80.2	5.3			57.6	2.6	22.3	17.5	16.4	6.4	91.9	1.7	44.2		51.7	14.7	21.7	11.9	3.6
Total %	5.2	28.7	1.9	35.7		9.5	0.4	3.7	2.9		2.8	40.6	0.7			1.9	0.5	0.8	0.4	

Start Time	Route 206 Southbound					Shop-Rite Exit Westbound					Route 206 Northbound					Village Shopper Exit Eastbound				
	Left	Thru	Right	App. Total		Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	App. Total		Left	Thru	Right	RTOR	App. Total
Intersection 05:00 PM	90	583	43	716		174	9	84	56	323	53	816	17	886		44	15	17	11	87
Volume	12.6	81.4	6.0			53.9	2.8	26.0	17.3	16.4	6.0	92.1	1.9	44.2		50.6	17.2	19.5	12.6	3.6
05:30 Volume	31	155	8	194		39	2	27	15	83	13	207	6	226		13	9	6	3	31
Peak Factor																				
High Int. Volume	31	155	8	194		51	3	13	20	87	13	206	7	226		13	9	6	3	31
Peak Factor				0.923						0.928				0.980						0.702

VILLAGE SHOPPER
ROUTE 206 & CENTER DR/VILLAGE
MONTGOMERY TOWNSHIP, SOMERSET COUNTY
MRA JOB 16-243 THURSDAY PM COUNT

McDonough & Rea Associates
1431 Lakewood Road Suite C
Manasquan NJ 08736
(732) 528-7076

File Name : 16243 rt 206 & center pm1
Site Code : 00016243
Start Date : 6/8/2017
Page No : 1

Groups Printed- CARS

	Route 206 Southbound				Shop-Rite Exit Westbound				Route 206 Northbound				Village Shopper Exit Eastbound				Int. Total
	Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total		
04:00 PM		29	127	8	164	42	2	11	16	71	13	192	3	2	2	12	455
04:15 PM		27	131	7	165	47	2	12	18	79	10	200	2	1	3	14	470
04:30 PM		26	125	10	161	52	2	19	9	82	22	191	5	0	4	2	469
04:45 PM		30	152	7	189	55	2	18	14	89	13	189	1	4	5	1	503
Total		112	535	32	679	196	8	60	57	321	58	772	11	6	14	6	1897
05:00 PM		15	143	13	171	51	2	16	12	81	14	191	2	0	2	2	476
05:15 PM		22	123	12	157	51	3	12	20	86	13	205	5	3	3	3	483
05:30 PM		31	154	8	193	39	2	27	15	83	13	203	4	9	6	3	527
05:45 PM		22	155	10	187	33	2	28	9	72	13	211	1	3	6	3	506
Total		90	575	43	708	174	9	83	56	322	53	810	12	15	17	11	1992
Grand Total		202	1110	75	1387	370	17	143	113	643	111	1582	23	21	31	17	3889
Approch %		14.6	80.0	5.4		57.5	2.6	22.2	17.6	16.5	6.5	92.2	1.3	14.7	21.7	11.9	
Total %		5.2	28.5	1.9	35.7	9.5	0.4	3.7	2.9	16.5	2.9	40.7	0.6	0.5	0.8	0.4	3.7

		Route 206 Southbound				Shop-Rite Exit Westbound				Route 206 Northbound				Village Shopper Exit Eastbound							
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total		
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Intersection	05:00 PM																				1992
Volume	90	575	43	708	174	9	83	56	322	53	810	12	875	44	15	17	11	87			
Percent	12.7	81.2	6.1		54.0	2.8	25.8	17.4		6.1	92.6	1.4		50.6	17.2	19.5	12.6				
05:30 Volume	31	154	8	193	39	2	27	15	83	13	203	4	220	13	9	6	3	31	527		
Peak Factor																					0.945
High Int. Volume	05:30 PM	31	154	193	05:15 PM	51	3	12	20	05:45 PM	13	211	1	225	05:30 PM	13	9	6	3	31	
Peak Factor					0.917					0.936					0.972					0.702	

McDonough & Rea Associates
1431 Lakewood Road Suite C
Manasquan NJ 08736
(732) 528-7076

File Name : 16243 rt 206 & center pm1
Site Code : 00016243
Start Date : 6/8/2017
Page No : 1

VILLAGE SHOPPER
ROUTE 206 & CENTER DR/VILLAGE
MONTGOMERY TOWNSHIP, SOMERSET COUNTY
MRA JOB 16-243 THURSDAY PM COUNT

Groups Printed- TRUCKS

Start Time	Route 206 Southbound					Shop-Rite Exit Westbound					Route 206 Northbound					Village Shopper Exit Eastbound				
	Left	Thru	Right	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total	
04:00 PM	0	1	0	1	1	0	0	0	1	0	3	0	3	0	0	0	0	0	5	
04:15 PM	1	2	0	3	0	0	0	0	0	0	4	0	4	0	0	0	0	0	7	
04:30 PM	0	5	0	5	1	0	0	0	1	0	3	1	4	0	0	0	0	0	10	
04:45 PM	0	2	0	2	0	0	0	0	0	0	1	0	1	0	0	0	0	0	3	
Total	1	10	0	11	2	0	0	0	2	0	11	1	12	0	0	0	0	0	25	
05:00 PM	0	1	0	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	2	
05:15 PM	0	3	0	3	0	0	1	0	1	0	1	2	3	0	0	0	0	0	7	
05:30 PM	0	1	0	1	0	0	0	0	0	0	4	2	6	0	0	0	0	0	7	
05:45 PM	0	3	0	3	0	0	0	0	0	0	0	1	1	0	0	0	0	0	4	
Total	0	8	0	8	0	0	1	0	1	0	6	5	11	0	0	0	0	0	20	
Grand Total	1	18	0	19	2	0	1	0	3	0	17	6	23	0	0	0	0	0	45	
Approach %	5.3	94.7	0.0		66.7	0.0	33.3	0.0		0.0	73.9	26.1		0.0	0.0	0.0	0.0			
Total %	2.2	40.0	0.0	42.2	4.4	0.0	2.2	0.0	6.7	0.0	37.8	13.3	51.1	0.0	0.0	0.0	0.0	0.0		

	Route 206 Southbound					Shop-Rite Exit Westbound					Route 206 Northbound					Village Shopper Exit Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total	
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																				
Intersection 04:00 PM																				
Volume	1	10	0	11	2	0	0	0	2	0	11	1	12	0	0	0	0	0	25	
Percent	9.1	90.9	0.0		100.0	0.0	0.0	0.0		0.0	91.7	8.3		0.0	0.0	0.0	0.0			
04:30 Volume	0	5	0	5	1	0	0	0	1	0	3	1	4	0	0	0	0	0	10	
Peak Factor																			0.625	
High Int.	04:30 PM				04:00 PM					04:15 PM				3:45:00 PM						
Volume	0	5	0	5	1	0	0	0	1	0	4	0	4							
Peak Factor				0.550					0.500				0.750							

McDonough & Rea Associates
1431 Lakewood Road Suite C
Manasquan NJ 08736
(732) 528-7076

File Name : 16243 rt 206 & center sat1
Site Code : 00016243
Start Date : 6/10/2017
Page No : 1

-
.
0
-
0
0
5
-

Start Time	Route 206 Southbound					Shop-Rite Exit Westbound					Route 206 Northbound					Village Shopper Exit Eastbound									
	Left	Thru	Right	App. Total		Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total					
Peak Hour From 11:00 AM to 01:45 PM - Peak 1 of 1																									
Intersection	12:30 PM																								
Volume	125	692	51	868		223	25	90	32	370	106	782	9	897	87	26	45	5	163	2298					
Percent	14.4	79.7	5.9			60.3	6.8	24.3	8.6		11.8	87.2	1.0		53.4	16.0	27.6	3.1							
12:30 Volume	40	181	15	236		43	6	19	8	76	31	220	2	253	14	8	7	0	29	594					
Peak Factor																					0.967				
High Int. Volume	12:30 PM	40	181	15	236	12:45 PM	8	29	9	115	12:30 PM	31	220	2	253	01:00 PM	27	6	16	1	50				
Peak Factor											0.804					0.886					0.815				

McDonough & Rea Associates
1431 Lakewood Road Suite C
Manasquan NJ 08736
(732) 528-7076

File Name : 16243 rt 206 & center sat1
Site Code : 00016243
Start Date : 6/10/2017
Page No : 1

— 225 —

	Route 206 Southbound				Shop-Rite Exit Westbound				Route 206 Northbound				Village Shopper Exit Eastbound			
	Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total
Peak Hour From 11:00 AM to 01:45 PM - Peak 1 of 1																
Intersection																
12:30 PM																
Volume	125	685	51		861	223	25	90	32	370	106	775	9		890	
Percent	14.5	79.6	5.9			60.3	6.8	24.3	8.6		11.9	87.1	1.0		53.4	2284
12:30 Volume	40	179	15		234	43	6	19	8	76	31	218	2		251	
Peak Factor															14	590
High Int.	12:30 PM					12:45 PM					12:30 PM				01:00 PM	0.968
Volume	40	179	15		234	69	8	29	9	115	31	218	2		27	
Peak Factor					0.920					0.804					0.886	0.815

McDonough & Rea Associates
1431 Lakewood Road Suite C
Manasquan NJ 08736
(732) 528-7076

File Name : 16243 rt 206 & center sat1
Site Code : 00016243
Start Date : 6/10/2017
Page No : 1

Groups Printed- TRUCKS																					
Route 206 Southbound					Shop-Rite Exit Westbound					Route 206 Northbound					Village Shopper Exit Eastbound						
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total		
11:00 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1		
11:15 AM	0	1	0	1	0	0	0	0	0	0	2	0	0	2	0	0	0	0	3		
11:30 AM	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2		
11:45 AM	0	0	0	0	0	0	0	0	0	0	1	1	1	2	0	0	0	0	2		
Total	0	3	0	3	0	0	0	0	0	0	4	1	1	5	0	0	0	0	8		
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
12:30 PM	0	2	0	2	0	0	0	0	0	0	2	0	0	2	0	0	0	0	4		
12:45 PM	0	2	0	2	0	0	0	0	0	0	2	0	0	2	0	0	0	0	4		
Total	0	4	0	4	0	0	0	0	0	0	4	0	0	4	0	0	0	0	8		
01:00 PM	0	1	0	1	0	0	0	0	0	0	3	0	0	3	0	0	0	0	4		
01:15 PM	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2		
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
01:45 PM	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	3		
Total	0	3	0	3	0	0	0	0	0	0	6	0	0	6	0	0	0	0	9		
Grand Total	0	10	0	10	0	0	0	0	0	0	14	1	15	0	0	0	0	0	25		
Approch %	0.0	100.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	93.3	6.7		0.0	0.0	0.0	0.0				
Total %	0.0	40.0	0.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	56.0	4.0	60.0	0.0	0.0	0.0	0.0	0.0			
Route 206 Southbound					Shop-Rite Exit Westbound					Route 206 Northbound					Village Shopper Exit Eastbound						
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total		
Peak Hour From 11:00 AM to 01:45 PM - Peak 1 of 1																					
Intersection 12:30 PM																					
Volume	0	7	0	7	0	0	0	0	0	0	7	0	7	0	0	0	0	0	14		
Percent	0.0	100.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0		0.0	0.0	0.0	0.0				
01:00 Volume	0	1	0	1	0	0	0	0	0	0	3	0	3	0	0	0	0	0	4		
Peak Factor																					
High Int.	12:30 PM	10:45:00 AM				01:00 PM				10:45:00 AM								0.875			
Volume	0	2	0	2	0	0	0	0	0	0	3	0	3	0	0	0	0	0			
Peak Factor																					

New Jersey Department of Transportation

Daily Volume from 05/12/2015 through 05/14/2015

Site Names: 11s011, Van Horne Memorial Highway-57.93, 00000206__, Montgo
 County: SOMERSET
 Funct. Class: Urban Principal Arterial - Other
 Location: Between Wall Street and RT 518 County Road

Seasonal Factor Group: RG3_FC14
 Daily Factor Group: RG3_FC14
 Axle Factor Group: RG3_FC14
 Growth Factor Group: RG3_FC14

	Sun 05/10/2015			Mon 05/11/2015			Tue 05/12/2015			Wed 05/13/2015			Thu 05/14/2015			Fri 05/15/2015			Sat 05/16/2015		
	ROAD	S	N	ROAD	S	N	ROAD	S	N	ROAD	S	N	ROAD	S	N	ROAD	S	N	ROAD	S	N
00:00																					
01:00																					
02:00																					
03:00																					
04:00																					
05:00																					
06:00																					
07:00																					
08:00																					
09:00																					
10:00																					
11:00																					
12:00																					
13:00																					
14:00																					
15:00																					
16:00																					
17:00																					
18:00																					
19:00																					
20:00																					
21:00																					
22:00																					
23:00																					
Volume																					
AM Peak Vol																					
AM Peak Fct																					
AM Peak Hr																					
PM Peak Vol																					
PM Peak Fct																					
PM Peak Hr																					
Seasonal Fct																					
Daily Fct																					
Axle Fct																					
Pulse Fct																					

1810128d

Directive No. 163 – 09

Effective: 7/16/09

Route US 206 and Montgomery Shopping
Center Driveway
Montgomery Twp., Somerset Co.

70, 95, 110 & 135 – SECOND BACKGROUND CYCLES

<u>Phase</u>	<u>Signal Indications</u>			<u>Time (Seconds)</u>			
	<u>1 – 3</u>	<u>4 – 6</u>	<u>7 – 10</u>	<u>Plan I</u> (135 Sec.)	<u>Plan II</u> (110 Sec.)	<u>Plan III</u> (70 Sec.)	<u>Plan IV</u> (95 Sec.)
A) Route US 206 ROW	G	G	R	108 – 87	83 – 63	43 – 31	68 – 46
Change	Y	Y	R	5*	5*	5*	5*
Clearance	R	R	R	2	2	2	2
B) Shopping Center Driveway ROW	R	R	G	7 – 24**	7 – 25**	7 – 17**	7 – 27**
Change	R	R	Y	3	3	3	3
Clearance	R	R	R	2	2	2	2
C) Route US 206 Lead Lefts	R/<G-	R/<G-	R	5 – 9	5 – 7	5 – 7	5 – 7
Change	R/<Y-	R/<Y-	R	3	3	3	3
Emergency Flash	Y	Y	R	-	-	-	-

NOTES:

- *Offsets are measured from the beginning of yellow to Route US 206 traffic at Rocky Hill Road (CR 518) to the beginning of yellow to Route US 206 traffic at this intersection.
- **Actuation of a pedestrian push button shall guarantee 12 seconds of green time to Phase B.
- The Route US 206 left-turn slots are to be wired separately but concurrently timed if actuation occurs in both slots. Each slot shall have the capability of terminating or extending independently of the other, thereby reverting the timing to an actuated, non-conflicting Phase A movement.
- The manual control cord is to be removed.
- The vehicle interval is to be 2 seconds.
- The memory circuit is to be off.

<u>HOURS OF OPERATION</u>	<u>CYCLE LENGTH</u>	<u>*OFFSETS</u>
Plan I - Monday thru Friday / 6:30 A.M. – 9:30 A.M.	135-Second Background Cycle	19 Seconds
Plan II - Monday thru Friday / 3:30 P.M. – 6:30 P.M.	110-Second Background Cycle	20 Seconds
Plan III - Monday thru Sunday / 10:00 P.M. – 6:30 A.M.	70-Second Background Cycle	15 Seconds
Plan IV - All Other Times	95-Second Background Cycle	7 Seconds



TOWNSHIP OF MONTGOMERY

**SOMERSET COUNTY
NEW JERSEY**

MASTER PLAN

TRAFFIC CIRCULATION PLAN ELEMENT 2005 Amendment No. 1

March 15, 2005

**A PROPOSED REALIGNMENT OF THE SOUTHERN PORTION
OF THE PROPOSED ROUTE 206/HILLSBOROUGH BYPASS
TO PROVIDE AN ACHIEVABLE AND VIABLE
DIRECT CONNECTION TO COUNTY ROUTE 601,
AND RELATED ROUTE 206 CORRIDOR IMPROVEMENTS**

**PREPARED BY: COPPOLA & COPPOLA ASSOCIATES
PRINCETON JUNCTION ~ NEW JERSEY**

**PROPOSED NEW ROADWAYS
TO HELP ALLEVIATE TRAFFIC CONGESTION
AT THE ROUTE 206/ROUTE 518 INTERSECTION
AND RELATED ROUTE 206 CORRIDOR IMPROVEMENTS**

At this time, the Transportation Advisory Committee has recommended a number of new roadways to help alleviate traffic congestion at the Route 206/Route 518 intersection and related Route 206 corridor improvements. The specifics of the recommendations, the need for the improvements and the benefits to the public which will result are discussed in an April 29, 2003 report prepared by McDonough & Rea Associates, the Township's Traffic Engineer.

The proposed roadway improvements are shown on the two (2) attached aerial photograph maps. Each roadway is proposed to provide for 2-way traffic within a fifty foot (50') right-of-way.

The following summarizes the proposed new roadways, and the descriptions are organized by the quadrant of the Route 206/Route 518 intersection within which they are located

Northwest Quadrant

In the northwest quadrant of the Route 206/518 intersection, three (3) new loop roadways are proposed, as follows:

1. An "inner loop" roadway linking Route 518 to Route 206 is proposed behind the properties in the vicinity of the "Tigers Tale" restaurant.
2. An "intermediate loop" roadway is proposed which will connect with Route 518 at the existing Research Road intersection, extend northerly via Research Road, and then turn in an easterly direction through the "Village Shopper" shopping center to an intersection with Route 206 at the traffic signal currently located at the intersection with the driveway accessing the "Montgomery Shopping Center".
3. Finally, an "outer loop" roadway is proposed from a signalized intersection at Route 518, extending northerly along the western boundary of the "Sharbell" adult community tract between Route 518 and Bedens Brook, crossing Bedens Brook at a flood free bridge crossing, and intersecting with Orchard Road west of the Orchard Road/Route 206 intersection.

Southwest Quadrant

In the southwest quadrant of the Route 206/518 intersection, three (3) new loop roadways are proposed to connect Route 518 with Route 206, as follows:

1. An "inner loop" roadway is proposed from Route 518 along the westerly and southerly sides of the "Amboy Bank" property to a new intersection with Route 206. Additionally, an extension of the "inner loop" along the westerly side of the "Amboy Bank" property will continue southwardly along the westerly side of the former "Z&W Mazda" car dealership to a "T" intersection with another new roadway (i.e., the "intermediate loop" discussed in the next paragraph) extending westerly from a new lighted intersection with Route 206 opposite the boulevard entrance to the "Princeton North Shopping Center".
2. An "intermediate loop" roadway is proposed to extend westerly from a new lighted intersection with Route 206 through undeveloped lands which are being considered for the development of a "shopping village", which primarily is to include an assortment of retail uses. The "intermediate loop" will turn north and intersect with Route 518 opposite Research Road.
3. An "outer loop" roadway it proposed to extend to the west from a "T" intersection with the "intermediate loop", proceed parallel and close to the northern boundary of the "Princeton Airport" in order to safeguard the continued agricultural use of the subject property, if desired by the property owner, and then turn north to a signalized intersection with Route 518 opposite the "outer loop" roadway in the northwest quadrant of the study area.

Southeast Quadrant

In the southeast quadrant of the Route 206/518 intersection, new interconnected roadway segments are shown on the proposed "Traffic Circulation Plan". Most of these new roadway segments are located in neighboring Rocky Hill Borough, and whether or not they eventually are constructed will depend upon the results of ongoing discussions between the two (2) municipalities. The municipalities do share proprietary interest in the currently named "Schaeffer Tract" park, and the proposed roadway segments are proposed to provide alternative vehicular access into the park. Additionally, the proposed roadway segments will further help to enhance traffic circulation along Route 518 and at the Route 518/206 intersection. The new roadway segments include the following:

1. A north/south connector is shown to extend from Route 518 via Young Drive southwardly into the park, where it intersects with a new public roadway, which will be in place of, and an extension of, the existing boulevard driveway entrance into the "Princeton North Shopping Center" from the newly planned lighted intersection with Route 206.
2. The north/south connector is shown to extend further to the south through the park, and then turn west to an intersection with the existing loop driveway within the "Research Park" office complex.

Northeast Quadrant

In the northeast quadrant of the Route 206/518 intersection, vehicular and pedestrian access to the "Montgomery Shopping Center" is intended to be provided from Route 518 through a portion of the "Princeton Gamma Tech" property.

PROPOSED NEW ROADWAYS TO HELP ALLEVIATE TRAFFIC CONGESTION AT THE ROUTE 206 INTERSECTION WITH CHERRY VALLEY ROAD AND PRINCETON AVENUE AND RELATED ROUTE 206 CORRIDOR IMPROVEMENTS

The Transportation Advisory Committee (TAC) previously recommended to the Planning Board that certain improvements be made to the Route 206 intersection with Cherry Valley Road and Princeton Avenue. The specifics of the recommendation and a documentation of the need for the improvements and the benefits to the public which will result are detailed in a March 8, 2002 report prepared by McDonough & Rea Associates, the Township's Traffic Engineer.

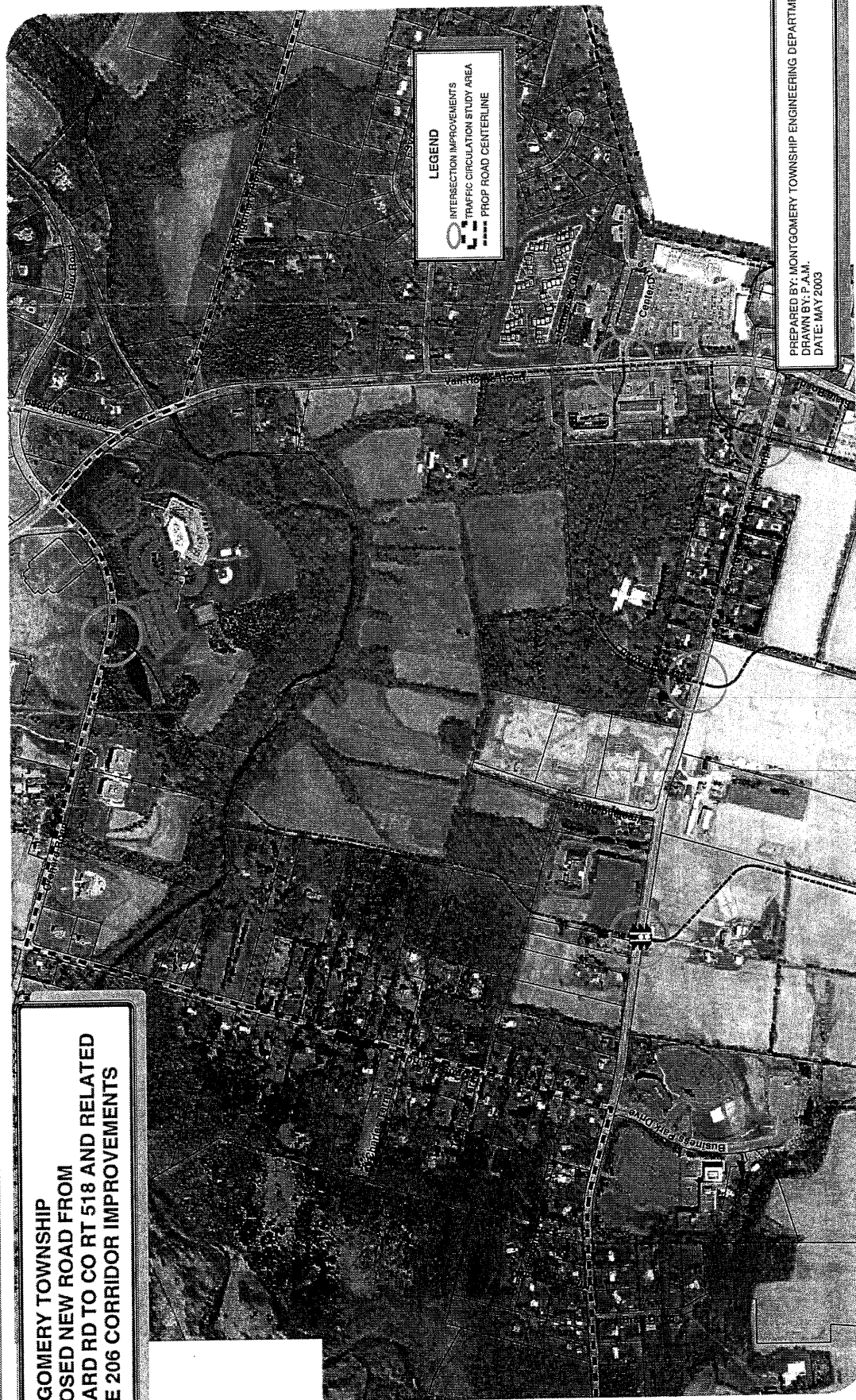
The recommendation from the Transportation Advisory Committee (TAC) for the improvements at the subject intersection was timely, since applications had been filed by "SDI, LLC" for the development of a "Commerce Bank" building and a "CVS Pharmacy" building on a tract of land at the southeast corner of the intersection. The subject tract of land straddles the Montgomery Township/Princeton Township boundary, and both Township's reviewed the proposed development.

The submission of the applications to develop the subject tract of land precipitated a dialogue between the municipal officials and staff members of Montgomery and Princeton, since both Townships recognize the safety problems associated with the relatively large volumes of traffic attempting to pass through the intersection, which has an irregular geometry and no left-turn lanes.



NOT TO SCALE

**MONTGOMERY TOWNSHIP
PROPOSED NEW ROAD FROM
ORCHARD RD TO CO RT 518 AND RELATED
ROUTE 206 CORRIDOR IMPROVEMENTS**



LEGEND

- INTERSECTION IMPROVEMENTS
- TRAFFIC CIRCULATION STUDY AREA
- PROP ROAD CENTERLINE

PREPARED BY: MONTGOMERY TOWNSHIP ENGINEERING DEPARTMENT
DRAWN BY: P.A.M.
DATE: MAY 2003

ITE Land Use: 820, Shopping Center		Proposed																
Size of Development:		56,000 SF		10th														
Time Period	Average Rate	Studies	Avg. Size	R ²	Trips	Equation		Trips		Split								
Weekday Daily	37.75	147	453	0.76	2114.0	Ln(T)=	0.680	Ln(x)+	5.570	4053.1	50	50						
AM Peak Street Hour	0.94	84	351	0.50	52.6	T=	0.500	(x)+	151.780	179.8	62	38						
PM Peak Street Hour	3.81	261	327	0.82	213.4	Ln(T)=	0.740	Ln(x)+	2.890	353.8	48	52						
AM Peak Hour of Generator	3.00	47	323	0.71	168.0	T=	2.760	(x)+	77.280	231.8	54	46						
PM Peak Hour of Generator	4.21	53	298	0.76	235.8	Ln(T)=	0.720	Ln(x)+	3.020	371.8	50	50						
Saturday Daily	46.12	58	602	0.71	2582.7	Ln(T)=	0.620	Ln(x)+	6.240	6221.2	50	50						
Saturday Peak Hour of Generator	4.50	119	416	0.87	252.0	Ln(T)=	0.790	Ln(x)+	2.790	391.5	52	48						
Sunday Daily	21.10	30	509	NG	1181.6	Not Given				N/A	50	50						
Sunday Peak Hour of Generator	2.79	24	382	NG	156.2	Not Given				N/A	49	51						
PM Pass-By Percentage						Ln(T)=	-0.291	Ln(x)+	5.001	46.0								
Saturday Pass-By Percentage						T=	-0.024	(x)+	38.591	37.2								

AM
 IN 112
 OUT 68
 TOTAL 180
 40% PB - 68
 102

PM
 IN 170
 OUT 184
 TOTAL 354
 40% PB - 68
 102

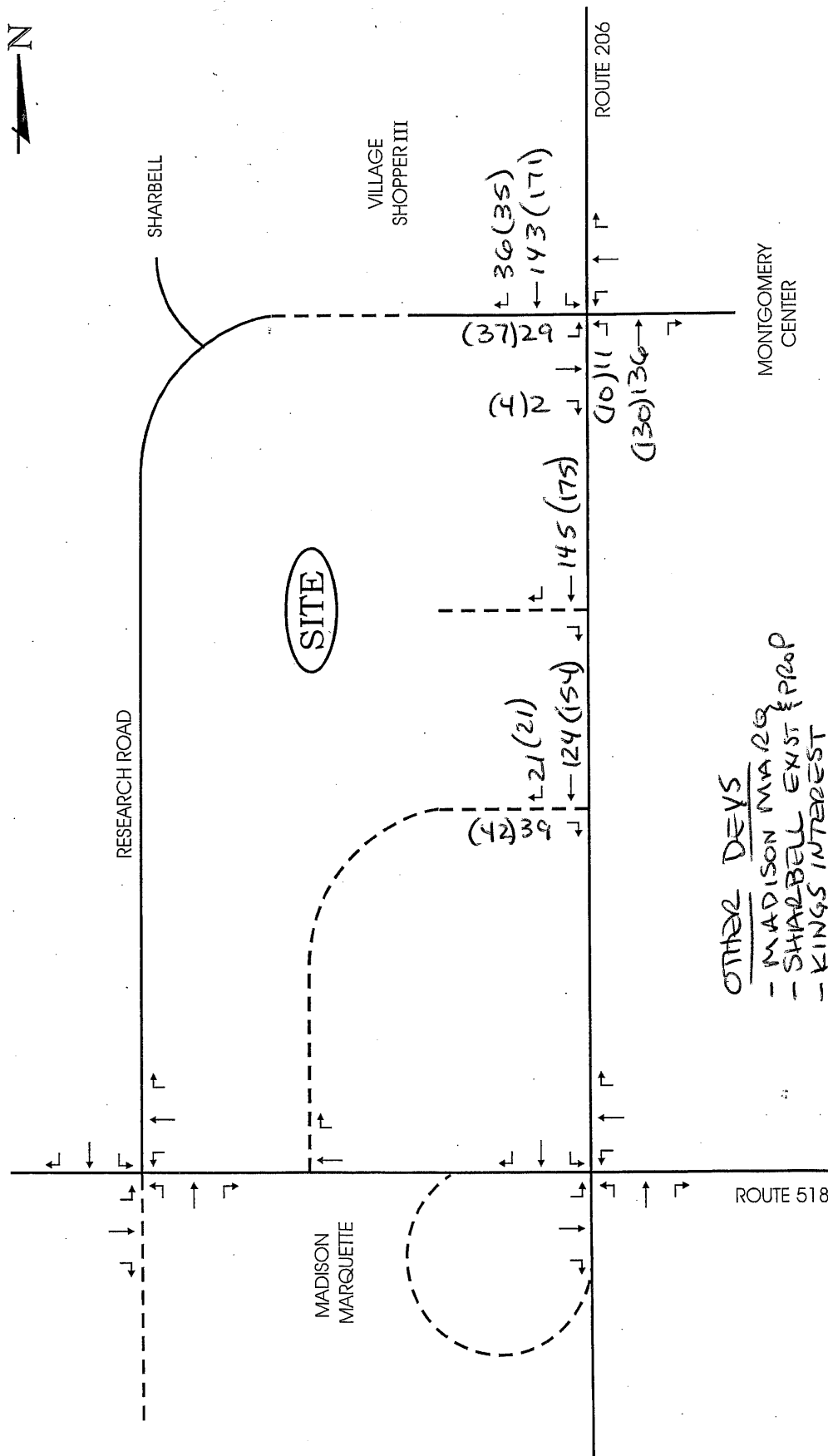
SH
 IN 204
 OUT 189
 TOTAL 392
 30% PB - 61
 143

SH
 IN 204
 OUT 189
 TOTAL 392
 30% PB - 61
 143

ITE Land Use: Size of Development:	220, Multifamily Housing (Low-Rise) 52 Dwelling Units	Average Rate	Studies	Avg. Size	R ²	Trips	Equation		Trips	Split
							T=	(x)-		
							Ln(T)=	Ln(x)-		
Weekday Daily	7.32	29	168	0.96	380.6	T=	7.560	(x)- 40.860	352.3	50 50
AM Peak Street Hour	0.46	42	199	0.90	23.9	Ln(T)=	0.950	Ln(x)- 0.510	25.6	23 77
PM Peak Street Hour	0.56	50	187	0.86	29.1	Ln(T)=	0.890	Ln(x)- 0.020	33.0	63 37
AM Peak Hour of Generator	0.56	36	161	0.91	29.1	Ln(T)=	0.940	Ln(x)- 0.290	30.7	28 72
PM Peak Hour of Generator	0.67	35	146	0.94	34.8	T=	0.660	(x)+ 1.410	35.7	59 41
Saturday Daily	8.14	5	89	0.93	423.3	T=	14.010	(x)- 521.690	206.8	50 50
Saturday Peak Hour of Generator	0.70	5	89	0.92	36.4	T=	1.080	(x)- 33.240	22.9	N/A
Sunday Daily	6.28	5	89	0.96	326.6	T=	10.130	(x)- 341.890	184.9	50 50
Sunday Peak Hour of Generator	0.67	5	89	0.93	34.8	T=	1.120	(x)- 40.410	17.8	N/A

ITE Land Use: Size of Development:		820, Shopping Center 23,000 SF	EXISTING		10th						
Time Period	Average Rate	Studies	Avg. Size	R ²	Trips	Equation		Trips	Split		
Weekday Daily	37.75	147	453	0.76	868.3	$\ln(T) =$	$\ln(x) + 5.570$	2213.1	50 50		
AM Peak Street Hour	0.94	84	351	0.50	21.6	$T =$	$0.500 (x) + 151.780$	163.3	62 38		
PM Peak Street Hour	3.81	261	327	0.82	87.6	$\ln(T) =$	$\ln(x) + 2.890$	183.1	48 52		
AM Peak Hour of Generator	3.00	47	323	0.71	69.0	$T =$	$2.760 (x) + 77.280$	140.8	54 46		
PM Peak Hour of Generator	4.21	53	298	0.76	96.8	$\ln(T) =$	$\ln(x) + 3.020$	195.9	50 50		
Saturday Daily	46.12	58	602	0.71	1060.8	$\ln(T) =$	$\ln(x) + 6.240$	3583.2	50 50		
Saturday Peak Hour of Generator	4.50	119	416	0.87	103.5	$\ln(T) =$	$\ln(x) + 2.790$	193.8	52 48		
Sunday Daily	21.10	30	509	NG	485.3	Not Given		N/A	50 50		
Sunday Peak Hour of Generator	2.79	24	382	NG	64.2	Not Given		N/A	49 51		
PM Pass-By Percentage						$\ln(T) =$	$\ln(x) + 5.001$	59.7			
Saturday Pass-By Percentage						$T =$	$-0.024 (x) + 38.591$	38.0			

ITE Land Use: Size of Development:		710, General Office Building 8,000 SF		EX-577NG		10th													
Time Period	Average Rate	Studies	Avg. Size	R ²	Trips	Equation		Trips	Split										
Weekday Daily	9.74	66	171	0.83	77.9	Ln(T)=	Ln(x)+ 2.500	91.6	50										
AM Peak Street Hour	1.16	35	117	0.85	9.3	T=	0.940 (x)+ 26.490	34.0	86										
PM Peak Street Hour	1.15	32	114	0.88	9.2	Ln(T)=	Ln(x)+ 0.360	10.3	16										
AM Peak Hour of Generator	1.47	228	209	0.84	11.8	Ln(T)=	Ln(x)+ 1.060	18.0	88										
PM Peak Hour of Generator	1.42	243	205	0.82	11.4	T=	1.100 (x)+ 65.390	74.2	18										
Saturday Daily	2.21	5	94	NG	17.7	Not Given		N/A	50										
Saturday Peak Hour of Generator	0.53	3	82	NG	4.2	Not Given		N/A	54										
Sunday Daily	0.70	5	94	NG	5.6	Not Given		N/A	50										
Sunday Peak Hour of Generator	0.21	3	82	NG	1.7	Not Given		N/A	58										

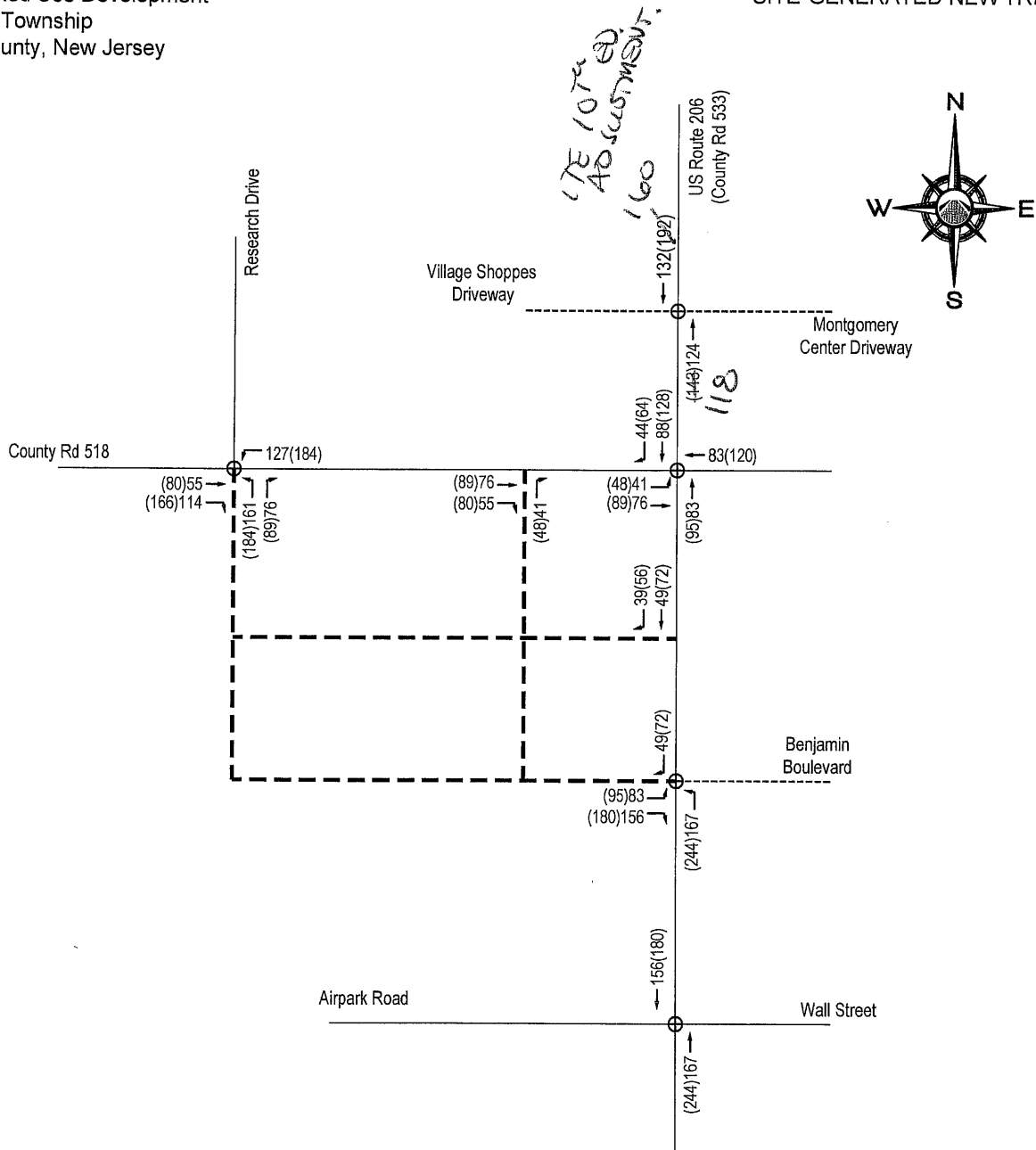


LEGEND: ← PM PSH(SAT PSH)

 McDONOUGH & REA ASSOCIATES TRAFFIC AND TRANSPORTATION CONSULTING	SUBJECT: VILLAGE WALK @ MONTGOMERY ; MONTGOMERY TWP., SOMERSET CO.		FIGURE A
	SITE GENERATED TRAFFIC VOLUMES - OTHER DEVS		JOB NO. 16-243
			DATE: DEC 2017

Proposed Mixed Use Development
Montgomery Township
Somerset County, New Jersey

SITE-GENERATED NEW TRIPS



PEAK HOUR	ENTER	EXIT	TOTAL
PM	551	517	1068
SAT	802	596	1398

10th Edition TG

TABLE 1 - Trip Generation Estimates

Use	Weekday AM Peak Hour			Weekday PM Peak Hour			Saturday Midday Peak Hour		
	In	Out	Total	In	Out	Total	In	Out	Total
48,240sf Retail Space	62	38	100	177	191	368	283	261	544
Total	62	38	100	177	191	368	283	261	544
Retail Pass-By	0	0	0	60	65	125	73	68	141
Total Pass-By*	0	0	0	- 60	- 65	- 125	- 73	- 68	- 141
Total New	62	38	100	117	126	243	210	193	403

We determined study locations based on the new trips shown in Table 1.

Existing Use Site Traffic

A portion of the project site is currently developed with a 3,300 sf high-turnover sit-down restaurant. To provide an accurate evaluation of the proposed redevelopment's impact on the surrounding roadways we took into account the existing property use on the site and the traffic the use creates. We generated trip generation estimates associated with the full occupancy of the 3,300 sf high-turnover sit-down restaurant. The existing property use trips were then subtracted from the proposed new site generated trips, since that traffic exists on the adjacent roadways in the surrounding area. We removed the existing use trips from the proposed new trips in order to develop a more accurate representation of the new traffic the redevelopment will add to the road system. Table 2 summarizes the peak hour trips that would be generated by the proposed new redevelopment with a reduction of the existing property uses at full occupancy. We prepared trip generation estimates for the existing property uses at full occupancy using data compiled for Land Use 932 (High-Turnover Sit-Down Restaurant) by ITE as contained in the publication Trip Generation, 9th edition.

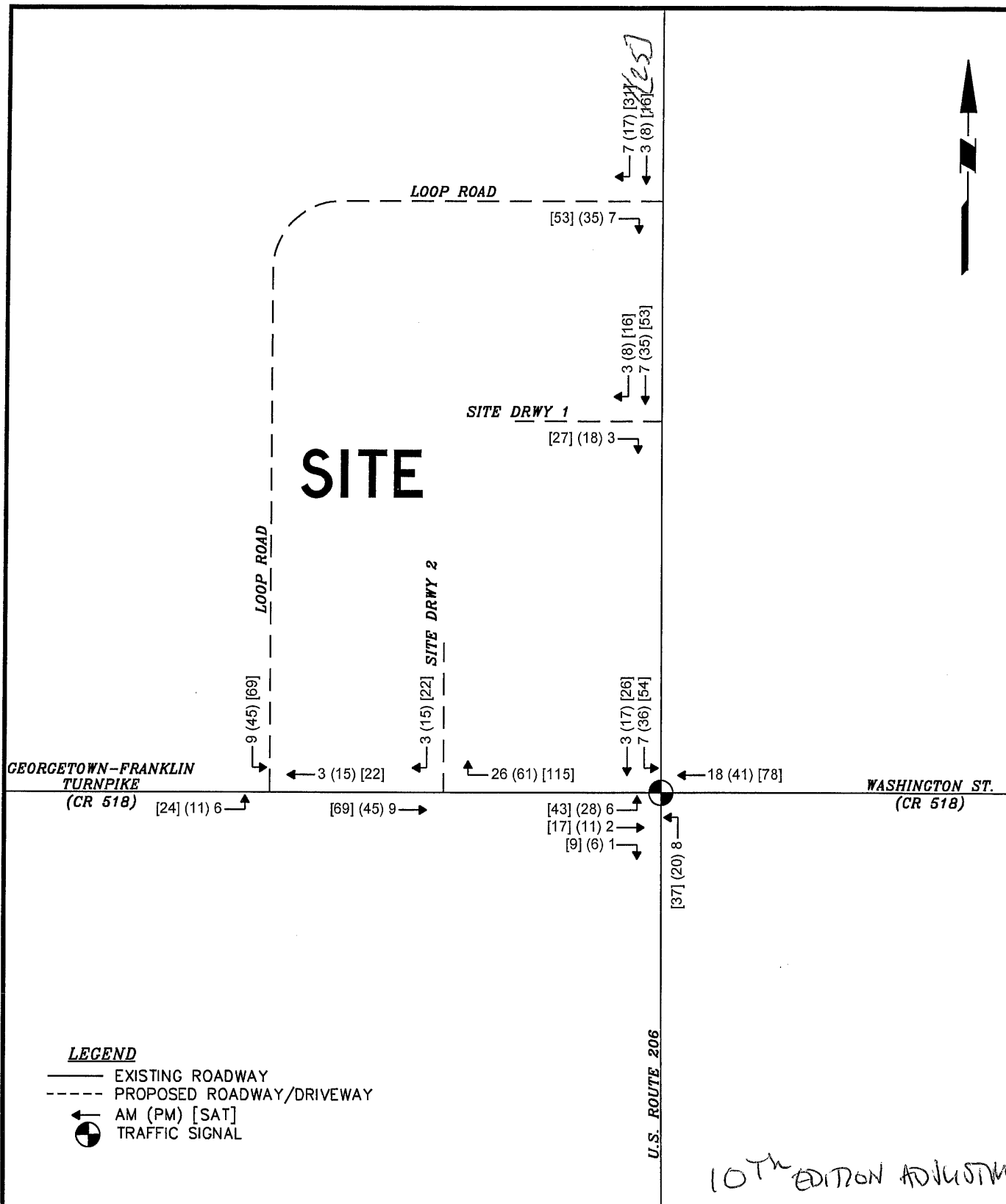
TABLE 2 - Trip Generation Reduction

Use	Weekday AM Peak Hour			Weekday PM Peak Hour			Saturday Midday Peak Hour		
	In	Out	Total	In	Out	Total	In	Out	Total
3,300 sf High-Turnover Restaurant	20	16	36	20	13	33	24	22	46
Total Existing Use New Trips	- 20	- 16	- 36	- 20	- 13	- 33	- 24	- 22	- 46
Total Proposed New Trips	62	38	100	117	126	243	210	193	403
Total New Trips With Reduction	42	22	64	97	113	210	186	171	357

TRAFFIC IMPACT STUDY AREA

We determined the direction distribution of site-generated trips based on existing travel patterns in the study area, demographic data and a gravity model.

We defined the primary market area for the site using a 5-mile radius from the site. We identified the population for each census tract within the area through available census data. We then developed a gravity model based on the population and distance to the site



LANGAN 989 Lenox Drive, Suite 124 Lawrenceville, NJ 08648 T: 609.282.8000 F: 609.282.8001 www.langan.com Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C. Langan Engineering and Environmental Services, Inc. Langan CT, Inc. Langan International LLC Collectively known as Langan NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400	Project MONTGOMERY REDEVELOPMENT BLOCK No. 28005, LOT Nos. 57, 58, 59, 61, & 62 TOWNSHIP OF MONTGOMERY SOMERSET COUNTY NEW JERSEY	Drawing Title TOTAL NEW SITE-GENERATED TRIPS	Project No. 130108201 Date 05/16/2017 Scale N.T.S. Drawn By EJV Submission Date MAY 2017	Drawing No. FIGURE 7 Sheet 7 of 9
--	---	--	---	--

MEMORANDUM

To: Scott Kennel

From: Nick Verderese

c: Mark Cannuli

Date: June 27, 2017
Revised October 19, 2017

Re: Trip Generation/Distribution
Sharbell Kepner – Tregoe Tract
CR 518 at Research Road
Block 28001 – Lot 66
Montgomery Township, Somerset County, NJ
DT# 0043-14-015TE

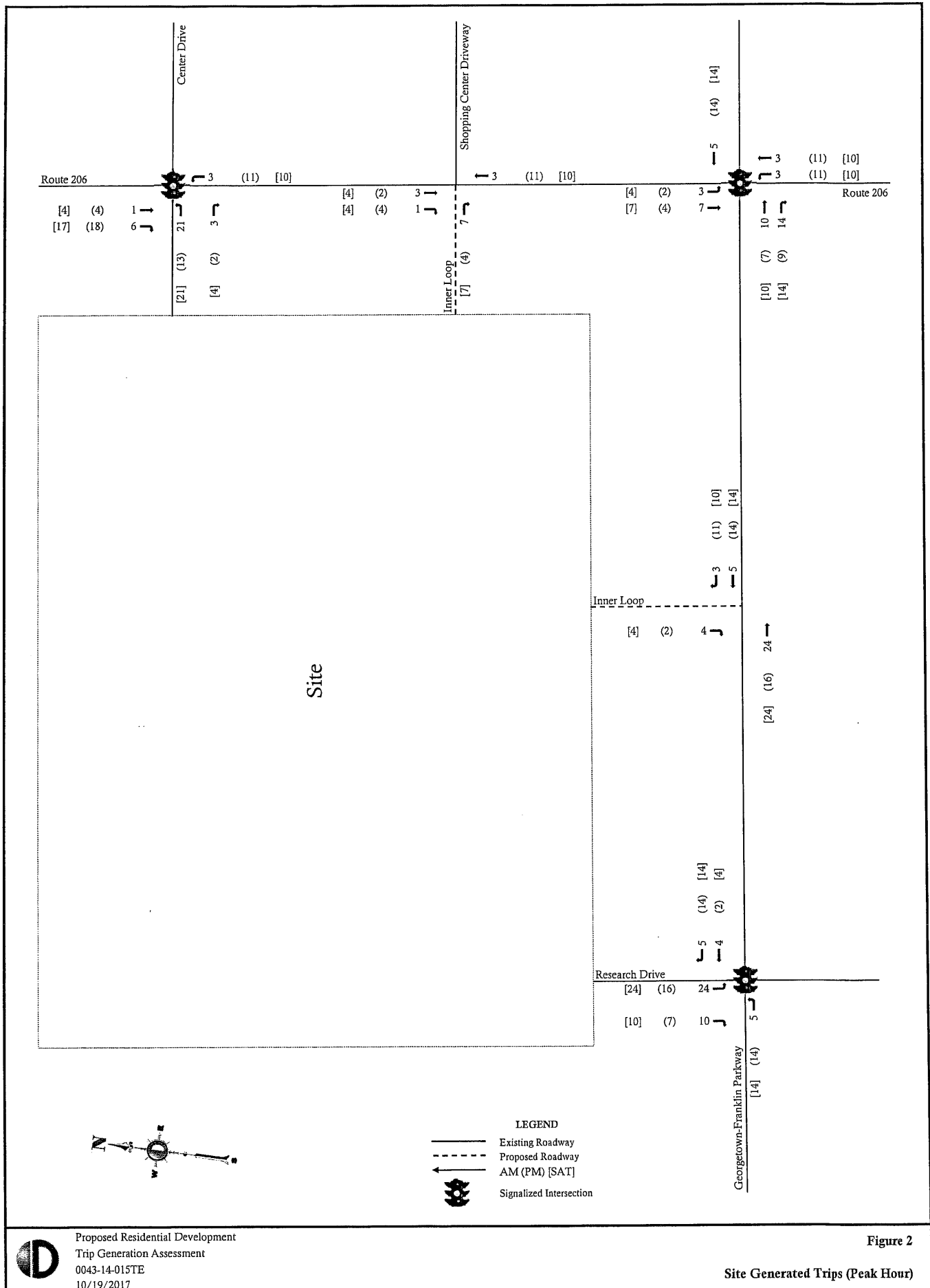
Dynamic Traffic has prepared the following assessment to determine the site generated traffic associated with the development of Block 28001 – Lot 66 with an approximate size of 25.72 acres. It is proposed to raze the site and construct 107 townhomes, 40 condominiums, and 80 apartments. Access to the site will be provided via a new connection to the traffic signal at Route 206 and Village Shopper, a new right turn in/right turn out roadway along Route 206 between Village Shopper and CR 518, a new right turn in/right turn out roadway along CR 518 between Route 206 and Research Road, and the existing Research Road intersection with CR 518.

Trip Generation

Trip generation projections for The Project were made utilizing trip generation research data as published under Land Use Code (LUC) 220 – Multifamily Housing (Low-Rise) and LUC 221 – Multifamily Housing (Mid-Rise) in the Institute of Transportation Engineers' (ITE) publication, *Trip Generation, 10th Edition*. This publication sets forth trip generation rates based on traffic counts conducted at research sites throughout the country.

Table I
Trip Generation

Trip Type	AM PSH			PM PSH			SAT PSH		
	In	Out	Total	In	Out	Total	In	Out	Total
107 Low-Rise Multifamily Housing Units	12	39	51	40	23	63	41	41	82
120 Mid-Rise Multifamily Housing Units	11	30	41	32	21	53	28	29	57
Total	23	69	92	72	44	116	69	70	139



Analyst

Date

1060 2017

Name of Div/pt

Time Period

PM

MULTI-USE DEVELOPMENT TRIP GENERATION AND INTERNAL CAPTURE SUMMARY

LAND USE A

ITE LU Code	Size	Total	Internal	External
210,220,221	*	169	20	149
Enter		99	15	84
Exit				
Total				
%				

Exit to External

Enter from External

Exit to External

Enter from External

* - VW - 52 APTS
 - SHARBAU PEOP 227 MF
 - SHARBAU EXIST 40 APTS
 905F

55% Demand

15

Balanced

8% 15 Demand

21% Demand

20

Balanced

12% 20 Demand

% Demand

Balanced

% Demand

% Demand

Balanced

% Demand

LAND USE B

ITE LU Code	Size	Total	Internal	External
620	56,000 (V/L)	170	15	155
Enter		184	20	164
Exit				
Total				
%				

Exit to External

Enter from External

Exit to External

Enter from External

LAND USE C

ITE LU Code	Size	Total	Internal	External
Enter				
Exit				
Total				
%				

Enter from External

Exit to External

Exit to External

Enter from External

Net External Trips for Multi-Use Development

	LAND USE A	LAND USE B	LAND USE C	TOTAL
Enter	149	155		
Exit	84	164		
Total	233	319		
Single-Use Trip Gen. Est.	267	354		
			552	
			621	
				119%

Source: Kaku Associates, Inc.

INTERNAL CAPTURE

**LEVEL OF SERVICE
FOR
SIGNALIZED INTERSECTIONS¹**

<u>Level of Service</u>	<u>Description</u>	<u>Control (Signal) Delay Per Vehicle (Seconds)</u>
A	Very short delay, good progression; most vehicles do not stop at intersection.	≤ 10.0
B	Generally good progression and/or short cycle length; more vehicles stop at intersection than at Level of Service "A."	> 10.0 and ≤ 20.0
C	Fair progression and/or longer cycle length; significant number of vehicles stop at intersection, though many still pass through without stopping.	> 20.0 and ≤ 35.0
D	Congestion becomes noticeable; longer delays from unfavorable progression, long cycle lengths, or high volume/capacity ratios; many vehicles stop at intersection.	> 35.0 and ≤ 55.0
E	Considered to be the <u>limit of acceptable delay</u> ; indicative of poor progression, long cycle lengths, or high volume/capacity ratios; frequent individual cycles failures.	> 55.0 and ≤ 80.0
F	Often an indication of over-saturation (i.e., arrival flow exceeds capacity); also caused by poor progression and long cycles lengths; capacity is not necessarily exceeded under this level of service.	> 80.0

¹ Transportation Research Board, Highway Capacity Manual 2010, National Research Council, Washington, DC, 2010.

Table

Future 2022 Levels of Service Route 206 and Montgomery Walk

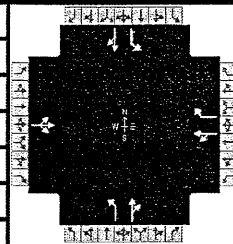
Lane Group	PM Peak Hour No-Build			PM Peak Hour Build			Allowable	Violation	PM Peak Hour w/Mitigation		
	V/C	Delay	LOS	V/C	Delay	LOS	Delay	?	V/C	Delay	LOS
NB Left	0.17	18.4	B	0.54	31.9	C	33.8	N	0.41	20.5	C
NB Thru/Right	1.04	61.0	E	1.01	53.9	D	65.8	N	1.01	53.9	D
SB Left	0.54	37.1	D	0.54	37.1	D	47.8	N	0.54	37.1	D
SB Thru/Right	0.83	26.3	C	0.90	32.6	C	39.7	N	0.78	23.6	C
EB Left/Thru/Right	0.29	37.2	D	0.53	42.8	D	47.8	N			
EB Left									0.45	47.4	D
EB Thru/Right									0.23	36.1	D
WB Left/Thru	0.52	43.6	D	0.59	46.6	D	52.7	N			
WB Right	0.27	36.8	D	0.27	36.8	D	47.6	N			
WB Left									0.61	51.4	D
WB Thru/Right									0.31	37.5	D
Overall		43.9	D		43.0	D				39.2	D

Lane Group	Saturday Peak Hour No-Build			Saturday Peak Hour Build			Allowable	Violation	Saturday Peak Hour w/Mitigation		
	V/C	Delay	LOS	V/C	Delay	LOS	Delay	?	V/C	Delay	LOS
NB Left	0.42	27.0	C	0.87	60.9	E	40.2	Y	0.87	60.9	E
NB Thru/Right	1.16	110.4	F	1.13	98.6	F	110.4	N	1.13	98.6	F
SB Left	0.27	23.8	C	0.27	23.8	C	37.8	N	0.27	23.8	C
SB Thru/Right	1.18	108.0	F	1.25	148.1	F	148.1	Y	1.09	81.3	F
EB Left/Thru/Right	0.43	30.7	C	0.64	36.6	D					
EB Left									0.46	36.1	D
EB Thru/Right									0.32	28.5	C
WB Left/Thru	0.62	38.2	D	0.67	40.9	D	48.6	N			
WB Right	0.17	26.4	C	0.17	26.4	C	39.8	N			
WB Left									0.71	48.1	D
WB Thru/Right									0.23	27.1	C
Overall		89.9	F		9.6	F				72.4	E

HCS7 Signalized Intersection Results Summary

General Information

Agency	MRA	Duration, h	0.25
Analyst	STK	Analysis Date	
Jurisdiction		Area Type	Other
Urban Street	ROUTE 206-VILLAGE	Time Period	PM
Intersection		PHF	0.92
Project Description	HCS Export	Analysis Year	2022 NOBUILD
		Analysis Period	1> 7:00
		File Name	



Demand Information

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	59	10	42	174	6	140	46	1010	17	90	769	43

Signal Information

Cycle, s	110.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On
		Green	7.0
		Yellow	3.0
		Red	0.0

Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		8.0		7.0	1.1	4.0	1.1	4.0
Phase Duration, s		30.0		30.0	10.0	70.0	10.0	70.0
Change Period, (Y+R _c), s		5.0		5.0	3.0	7.0	3.0	7.0
Max Allow Headway (MAH), s		3.2		3.2	2.8	0.0	2.8	0.0
Queue Clearance Time (g _s), s		8.7		16.4	3.1		4.3	
Green Extension Time (g _e), s		0.7		0.6	0.0	0.0	0.0	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		0.00		0.03	0.14		1.00	

Movement Group Results

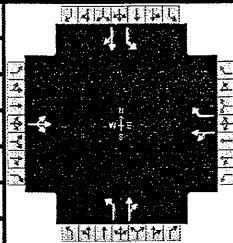
	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h		121			196	98	50	1116		98	883	
Adjusted Saturation Flow Rate (s), veh/h/ln		1580			1361	1598	1795	1880		1795	1867	
Queue Service Time (g _s), s		0.0			7.6	5.5	1.1	63.0		2.3	42.1	
Cycle Queue Clearance Time (g _c), s		6.7			14.4	5.5	1.1	63.0		2.3	42.1	
Green Ratio (g/C)		0.23			0.23	0.23	0.64	0.57		0.64	0.57	
Capacity (c), veh/h		409			374	363	289	1076		180	1070	
Volume-to-Capacity Ratio (X)		0.295			0.523	0.269	0.173	1.037		0.544	0.825	
Back of Queue (Q), ft/ln (50 th percentile)		73.1			132.8	59	15.4	927.4		50.3	483.2	
Back of Queue (Q), veh/ln (50 th percentile)		2.9			5.3	2.3	0.6	36.8		2.0	19.2	
Queue Storage Ratio (RQ) (50 th percentile)		0.00			0.00	0.00	0.00	0.00		0.00	0.00	
Uniform Delay (d ₁), s/veh		35.4			38.4	35.0	17.1	23.5		25.7	19.0	
Incremental Delay (d ₂), s/veh		1.8			5.2	1.8	1.3	37.5		11.3	7.3	
Initial Queue Delay (d ₃), s/veh		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (d), s/veh		37.2			43.6	36.8	18.4	61.0		37.1	26.3	
Level of Service (LOS)		D			D	D	B	F		D	C	
Approach Delay, s/veh / LOS	37.2	D		41.3	D		59.1	E		27.4	C	
Intersection Delay, s/veh / LOS	43.9						D					

Multimodal Results















	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	MRA			Duration, h	0.25
Analyst	STK	Analysis Date		Area Type	Other
Jurisdiction		Time Period	PM	PHF	0.92
Urban Street	ROUTE 206-VILLAGE	Analysis Year	2022 BUILD	Analysis Period	1> 7:00
Intersection		File Name			
Project Description	HCS Export				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	118	20	60	174	16	140	120	985	17	90	771	103

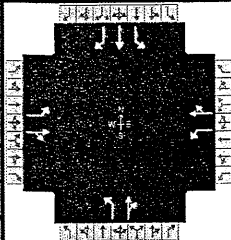
Signal Information														
Cycle, s	110.0	Reference Phase	2											
Offset, s	0	Reference Point	End	Green	7.0	63.0	25.0	0.0	0.0	0.0				
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.0	5.0	3.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Red	0.0	2.0	2.0	0.0	0.0	0.0				

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		8.0		7.0	1.1	4.0	1.1	4.0
Phase Duration, s		30.0		30.0	10.0	70.0	10.0	70.0
Change Period (Y+R _c), s		5.0		5.0	3.0	7.0	3.0	7.0
Max Allow Headway (MAH), s		3.2		3.2	2.8	0.0	2.8	0.0
Queue Clearance Time (g _s), s		15.3		19.1	5.1		4.3	
Green Extension Time (g _e), s		0.8		0.6	0.0	0.0	0.0	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		0.03		0.21	1.00		1.00	

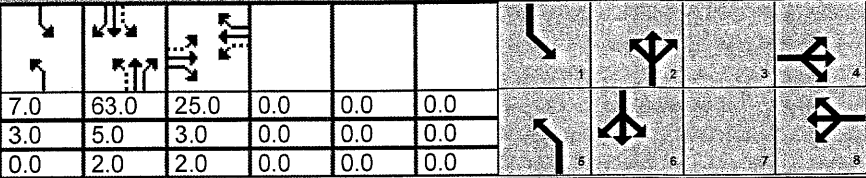
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h		215			207	98	130	1089		98	950	
Adjusted Saturation Flow Rate (s), veh/h/ln		1557			1274	1598	1795	1879		1795	1846	
Queue Service Time (g_s), s		0.0			3.7	5.5	3.1	63.0		2.3	49.8	
Cycle Queue Clearance Time (g_c), s		13.3			17.1	5.5	3.1	63.0		2.3	49.8	
Green Ratio (g/C)		0.23			0.23	0.23	0.64	0.57		0.64	0.57	
Capacity (c), veh/h		406			352	363	240	1076		180	1057	
Volume-to-Capacity Ratio (X)		0.530			0.586	0.269	0.543	1.012		0.544	0.899	
Back of Queue (Q), ft/ln (50 th percentile)		143.7			146.9	59	62.4	873.9		50.3	589.8	
Back of Queue (Q), veh/ln (50 th percentile)		5.7			5.8	2.3	2.5	34.7		2.0	23.4	
Queue Storage Ratio (RQ) (50 th percentile)		0.00			0.00	0.00	0.00	0.00		0.00	0.00	
Uniform Delay (d_1), s/veh		37.9			39.6	35.0	23.3	23.5		25.7	20.7	
Incremental Delay (d_2), s/veh		4.9			7.0	1.8	8.6	30.4		11.3	11.9	
Initial Queue Delay (d_3), s/veh		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (d), s/veh		42.8			46.6	36.8	31.9	53.9		37.1	32.6	
Level of Service (LOS)		D			D	D	C	F		D	C	
Approach Delay, s/veh / LOS	42.8	D		43.4	D		51.5	D		33.1	C	
Intersection Delay, s/veh / LOS	43.0						D					

Multimodal Results	EB			WB			NB			SB		
Pedestrian LOS Score / LOS												
Bicycle LOS Score / LOS												

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information		
Agency	MRA			Duration, h	0.25	
Analyst	STK	Analysis Date		Area Type	Other	
Jurisdiction		Time Period	PM	PHF	0.92	
Urban Street	ROUTE 206-VILLAGE	Analysis Year	2022 BUILD MIT	Analysis Period	1> 7:00	
Intersection		File Name				
Project Description	HCS Export					

Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	118	20	60	174	16	140	120	985	17	90	771	103

Signal Information											
Cycle, s	110.0	Reference Phase	2								
Offset, s	0	Reference Point	End								
Uncoordinated	No	Simult. Gap E/W	On								
Force Mode	Fixed	Simult. Gap N/S	On	Green	7.0	63.0	25.0	0.0	0.0	0.0	
				Yellow	3.0	5.0	3.0	0.0	0.0	0.0	
				Red	0.0	2.0	2.0	0.0	0.0	0.0	

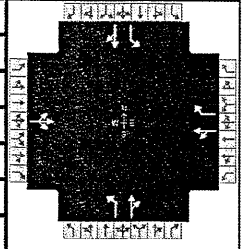
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		6.0		6.0	1.1	4.0	1.1	3.0
Phase Duration, s		30.0		30.0	10.0	70.0	10.0	70.0
Change Period, (Y+R c), s		5.0		5.0	3.0	7.0	3.0	7.0
Max Allow Headway (MAH), s		3.1		3.1	2.8	0.0	2.8	0.0
Queue Clearance Time (g s), s		18.6		21.7	5.1		4.3	
Green Extension Time (g e), s		0.6		0.4	0.0	0.0	0.0	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		0.13		0.86	1.00		1.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h	128	87		189	115		130	1089		98	838	112
Adjusted Saturation Flow Rate (s), veh/h/ln	1287	1661		1321	1635		1795	1879		1795	1885	1598
Queue Service Time (g s), s	10.1	4.7		15.0	6.4		3.1	63.0		2.3	37.6	3.5
Cycle Queue Clearance Time (g c), s	16.6	4.7		19.7	6.4		3.1	63.0		2.3	37.6	3.5
Green Ratio (g/C)	0.23	0.23		0.23	0.23		0.64	0.57		0.64	0.57	0.57
Capacity (c), veh/h	283	377		309	372		320	1076		180	1080	915
Volume-to-Capacity Ratio (X)	0.454	0.230		0.612	0.310		0.407	1.012		0.544	0.776	0.122
Back of Queue (Q), ft/ln (50 th percentile)	90.2	51.1		140.2	69.6		40.9	859.6		49.7	419.2	31.8
Back of Queue (Q), veh/ln (50 th percentile)	3.6	2.0		5.6	2.8		1.6	34.1		2.0	16.6	1.3
Queue Storage Ratio (RQ) (50 th percentile)	0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	0.00
Uniform Delay (d 1), s/veh	42.2	34.7		42.7	35.3		16.7	23.5		25.7	18.1	10.8
Incremental Delay (d 2), s/veh	5.2	1.4		8.7	2.2		3.8	30.4		11.3	5.5	0.3
Initial Queue Delay (d 3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh	47.4	36.1		51.4	37.5		20.5	53.9		37.1	23.6	11.1
Level of Service (LOS)	D	D		D	D		C	F		D	C	B
Approach Delay, s/veh / LOS	42.8	D		46.1	D		50.3	D		23.5	C	
Intersection Delay, s/veh / LOS	39.2						D					

Multimodal Results	EB			WB			NB			SB		
Pedestrian LOS Score / LOS												
Bicycle LOS Score / LOS												

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	MRA			Duration, h	0.25
Analyst	STK	Analysis Date		Area Type	Other
Jurisdiction		Time Period	SAT	PHF	0.92
Urban Street	ROUTE 206-VILLAGE	Analysis Year	2022 NOBUILD	Analysis Period	1> 7:00
Intersection		File Name			
Project Description	HCS Export				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	97	18	89	223	16	122	80	967	9	51	912	51


Signal Information											
Cycle, s	95.0	Reference Phase	2								
Offset, s	0	Reference Point	End								
Uncoordinated	No	Simult. Gap E/W	On								
Force Mode	Fixed	Simult. Gap N/S	On								

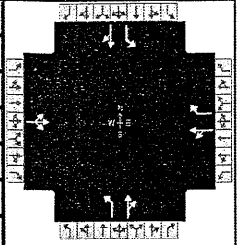
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		8.0		7.0	1.1	4.0	1.1	4.0
Phase Duration, s		32.0		32.0	10.0	53.0	10.0	53.0
Change Period, (Y+R c), s		5.0		5.0	3.0	7.0	3.0	7.0
Max Allow Headway (MAH), s		3.3		3.3	2.8	0.0	2.8	0.0
Queue Clearance Time (g s), s		12.6		21.0	4.1		3.3	
Green Extension Time (g e), s		1.1		0.7	0.0	0.0	0.0	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		0.00		0.24	0.91		0.21	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h		222			260	78	87	1061		55	1047	
Adjusted Saturation Flow Rate (s), veh/h/ln		1603			1225	1598	1795	1882		1795	1867	
Queue Service Time (g_s), s		0.0			8.5	3.5	2.1	46.0		1.3	46.0	
Cycle Queue Clearance Time (g_c), s		10.6			19.0	3.5	2.1	46.0		1.3	46.0	
Green Ratio (g/C)		0.28			0.28	0.28	0.56	0.48		0.56	0.48	
Capacity (c), veh/h		511			421	454	208	911		208	904	
Volume-to-Capacity Ratio (X)		0.434			0.616	0.172	0.418	1.164		0.266	1.158	
Back of Queue (Q), ft/ln (50 th percentile)		112.9			154.1	35.8	30.5	1025.1		18.3	1001.1	
Back of Queue (Q), veh/ln (50 th percentile)		4.5			6.1	1.4	1.2	40.7		0.7	39.7	
Queue Storage Ratio (RQ) (50 th percentile)		0.00			0.00	0.00	0.00	0.00		0.00	0.00	
Uniform Delay (d_1), s/veh		28.1			31.6	25.6	20.9	24.5		20.7	24.5	
Incremental Delay (d_2), s/veh		2.7			6.6	0.8	6.1	85.9		3.1	83.4	
Initial Queue Delay (d_3), s/veh		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (d), s/veh		30.7			38.2	26.4	27.0	110.4		23.8	107.9	
Level of Service (LOS)		C			D	C	C	F		C	F	
Approach Delay, s/veh / LOS	30.7	C		35.4	D		104.1	F		103.6	F	
Intersection Delay, s/veh / LOS	89.9						F					

Multimodal Results	EB			WB			NB			SB		
Pedestrian LOS Score / LOS												
Bicycle LOS Score / LOS												

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information		
Agency	MRA			Duration, h	0.25	
Analyst	STK	Analysis Date		Area Type	Other	
Jurisdiction		Time Period	SAT	PHF	0.92	
Urban Street	ROUTE 206-VILLAGE	Analysis Year	2022 BUILD	Analysis Period	1> 7:00	
Intersection		File Name				
Project Description	HCS Export					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	161	28	108	223	27	122	167	942	9	51	914	118

Signal Information											
Cycle, s	95.0	Reference Phase	2								
Offset, s	0	Reference Point	End								
Uncoordinated	No	Simult. Gap E/W	On	Green	7.0	46.0	27.0	0.0	0.0	0.0	
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.0	5.0	3.0	0.0	0.0	0.0	
				Red	0.0	2.0	2.0	0.0	0.0	0.0	

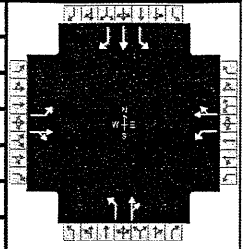
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		8.0		7.0	1.1	4.0	1.1	4.0
Phase Duration, s		32.0		32.0	10.0	53.0	10.0	53.0
Change Period, (Y+R _c), s		5.0		5.0	3.0	7.0	3.0	7.0
Max Allow Headway (MAH), s		3.3		3.3	2.8	0.0	2.8	0.0
Queue Clearance Time (g _s), s		19.3		23.4	7.4		3.3	
Green Extension Time (g _e), s		1.1		0.7	0.0	0.0	0.0	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		0.14		0.86	1.00		0.21	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h		323			272	78	182	1034		55	1122	
Adjusted Saturation Flow Rate (s), veh/h/ln		1570			1170	1598	1795	1882		1795	1847	
Queue Service Time (g_s), s		0.0			4.0	3.5	5.4	46.0		1.3	46.0	
Cycle Queue Clearance Time (g_c), s		17.3			21.4	3.5	5.4	46.0		1.3	46.0	
Green Ratio (g/C)		0.28			0.28	0.28	0.56	0.48		0.56	0.48	
Capacity (c), veh/h		505			404	454	208	911		208	894	
Volume-to-Capacity Ratio (X)		0.640			0.672	0.172	0.872	1.134		0.266	1.254	
Back of Queue (Q), ft/ln (50 th percentile)		184.7			169.4	35.8	98	949.6		18.3	1241.9	
Back of Queue (Q), veh/ln (50 th percentile)		7.3			6.7	1.4	3.9	37.7		0.7	49.3	
Queue Storage Ratio (RQ) (50 th percentile)		0.00			0.00	0.00	0.00	0.00		0.00	0.00	
Uniform Delay (d_1), s/veh		30.5			32.3	25.6	24.6	24.5		20.7	24.5	
Incremental Delay (d_2), s/veh		6.1			8.6	0.8	36.2	74.1		3.1	123.6	
Initial Queue Delay (d_3), s/veh		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (d), s/veh		36.6			40.9	26.4	60.9	98.6		23.8	148.1	
Level of Service (LOS)		D			D	C	E	F		C	F	
Approach Delay, s/veh / LOS	36.6	D		37.6	D		92.9	F		142.2	F	
Intersection Delay, s/veh / LOS	99.6						F					

Multimodal Results	EB			WB			NB			SB		
Pedestrian LOS Score / LOS												
Bicycle LOS Score / LOS												

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information		
Agency	MRA			Duration, h	0.25	
Analyst	STK	Analysis Date		Area Type	Other	
Jurisdiction		Time Period	SAT	PHF	0.92	
Urban Street	ROUTE 206-VILLAGE	Analysis Year	2022 BUILD MIT	Analysis Period	1> 7:00	
Intersection		File Name				
Project Description	HCS Export					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	161	28	108	223	27	122	167	942	9	51	914	118

Signal Information													
Cycle, s	95.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	No	Simult. Gap E/W	On	Green	7.0	46.0	27.0	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.0	5.0	3.0	0.0	0.0	0.0			
				Red	0.0	2.0	2.0	0.0	0.0	0.0			

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		6.0		6.0	1.1	4.0	1.1	3.0
Phase Duration, s		32.0		32.0	10.0	53.0	10.0	53.0
Change Period, (Y+R), s		5.0		5.0	3.0	7.0	3.0	7.0
Max Allow Headway (MAH), s		3.2		3.2	2.8	0.0	2.8	0.0
Queue Clearance Time (g _s), s		18.0		26.7	7.4		3.3	
Green Extension Time (g _e), s		1.0		0.1	0.0	0.0	0.0	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		0.06		1.00	1.00		0.21	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h	175	148		242	108		182	1034		55	993	128
Adjusted Saturation Flow Rate (s), veh/h/ln	1296	1649		1250	1667		1795	1882		1795	1885	1598
Queue Service Time (g _s), s	11.3	6.7		18.0	4.7		5.4	46.0		1.3	46.0	4.3
Cycle Queue Clearance Time (g _c), s	16.0	6.7		24.7	4.7		5.4	46.0		1.3	46.0	4.3
Green Ratio (g/C)	0.28	0.28		0.28	0.28		0.56	0.48		0.56	0.48	0.48
Capacity (c), veh/h	380	469		343	474		208	911		208	913	774
Volume-to-Capacity Ratio (X)	0.460	0.315		0.707	0.227		0.872	1.134		0.266	1.088	0.166
Back of Queue (Q), ft/ln (50 th percentile)	98.8	71.2		163.2	50		98	949.6		18.3	840.7	40.1
Back of Queue (Q), veh/ln (50 th percentile)	3.9	2.8		6.5	2.0		3.9	37.7		0.7	33.4	1.6
Queue Storage Ratio (RQ) (50 th percentile)	0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	0.00
Uniform Delay (d ₁), s/veh	32.2	26.7		36.4	26.0		24.6	24.5		20.7	24.5	13.7
Incremental Delay (d ₂), s/veh	4.0	1.8		11.6	1.1		36.2	74.1		3.1	56.8	0.5
Initial Queue Delay (d ₃), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh	36.1	28.5		48.1	27.1		60.9	98.6		23.8	81.3	14.2
Level of Service (LOS)	D	C		D	C		E	F		C	F	B
Approach Delay, s/veh / LOS	32.6	C		41.6	D		92.9	F		71.3	E	
Intersection Delay, s/veh / LOS	72.4						E					

Multimodal Results	EB	WB	NB	SB
Pedestrian LOS Score / LOS				
Bicycle LOS Score / LOS				

**LEVEL OF SERVICE CRITERIA
FOR
TWO-WAY STOP-CONTROLLED INTERSECTIONS¹**

<u>Level of Service</u>	<u>Average Control Delay</u>
A	≤ 10.0 Seconds Per Vehicle
B	> 10.0 and ≤ 15.0 Seconds Per Vehicle
C	> 15.0 and ≤ 25.0 Seconds Per Vehicle
D	> 25.0 and ≤ 35.0 Seconds Per Vehicle
E	> 35.0 and ≤ 50.0 Seconds Per Vehicle
F	> 50.0 Seconds Per Vehicle

¹ Transportation Research Board, Highway Capacity Manual 2010, National Research Council, Washington, DC, 2010.

HCS7 Two-Way Stop-Control Report

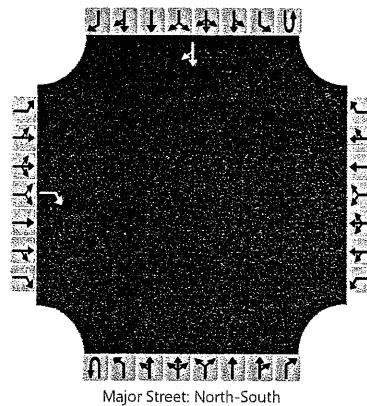
General Information

Analyst	STK
Agency/Co.	MRA
Date Performed	1/19/2018
Analysis Year	2022
Time Analyzed	PM
Intersection Orientation	North-South
Project Description	16-243PFB-2

Site Information

Intersection	RT 206 & SITE ACCESS
Jurisdiction	
East/West Street	SITE ACCESS
North/South Street	RT 206
Peak Hour Factor	0.95
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	1		0	0	0	0	0	0	0	0	0	1	0
Configuration				R												TR
Volume, V (veh/h)				054											0983	020
Percent Heavy Vehicles (%)				3												
Proportion Time Blocked																
Percent Grade (%)	0															
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)				6.2												
Critical Headway (sec)				6.23												
Base Follow-Up Headway (sec)				3.3												
Follow-Up Headway (sec)				3.33												

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)				57												
Capacity, c (veh/h)				277												
v/c Ratio				0.21												
95% Queue Length, Q ₉₅ (veh)				0.8												
Control Delay (s/veh)				21.4												
Level of Service, LOS				C												
Approach Delay (s/veh)	21.4															
Approach LOS	C															

HCS7 Two-Way Stop-Control Report

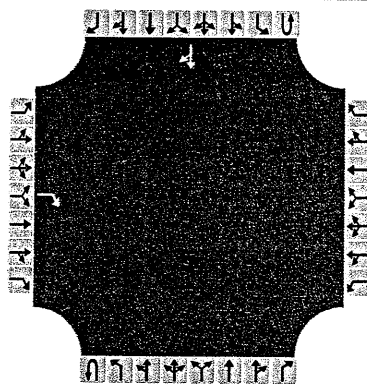
General Information

Analyst	STK
Agency/Co.	MRA
Date Performed	1/19/2018
Analysis Year	2022
Time Analyzed	SAT
Intersection Orientation	North-South
Project Description	16-243SFB-2

Site Information

Intersection	RT 206 & SITE ACCESS
Jurisdiction	
East/West Street	SITE ACCESS
North/South Street	RT 206
Peak Hour Factor	0.95
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	1		0	0	0	0	0	0	0	0	0	1	0
Configuration				R												TR
Volume, V (veh/h)				57											1223	020
Percent Heavy Vehicles (%)				3												
Proportion Time Blocked																
Percent Grade (%)	0															
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)				6.2												
Critical Headway (sec)				6.23												
Base Follow-Up Headway (sec)				3.3												
Follow-Up Headway (sec)				3.33												

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)				60												
Capacity, c (veh/h)				197												
v/c Ratio				0.31												
95% Queue Length, Q ₉₅ (veh)				1.2												
Control Delay (s/veh)				31.2												
Level of Service, LOS				D												
Approach Delay (s/veh)	31.2															
Approach LOS	D															

HCS7 Two-Way Stop-Control Report

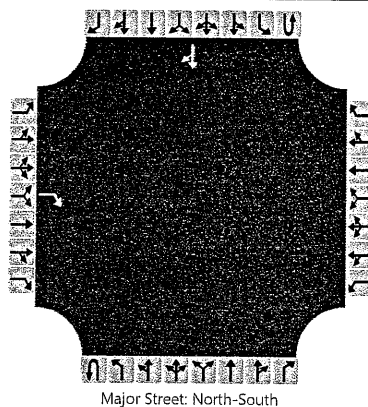
General Information

Analyst	STK
Agency/Co.	MRA
Date Performed	1/19/2018
Analysis Year	2022
Time Analyzed	PM
Intersection Orientation	North-South
Project Description	16-243PFB-3

Site Information

Intersection	RT 206 & INNER LOOP
Jurisdiction	
East/West Street	INNER LOOP
North/South Street	RT 206
Peak Hour Factor	0.95
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	1		0	0	0	0	0	0	0	0	0	1	0
Configuration				R												TR
Volume, V (veh/h)				59											1016	23
Percent Heavy Vehicles (%)				3												
Proportion Time Blocked																
Percent Grade (%)	0															
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)				6.2												
Critical Headway (sec)				6.23												
Base Follow-Up Headway (sec)				3.3												
Follow-Up Headway (sec)				3.33												

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)				62												
Capacity, c (veh/h)				263												
v/c Ratio				0.24												
95% Queue Length, Q ₉₅ (veh)				0.9												
Control Delay (s/veh)				22.9												
Level of Service, LOS				C												
Approach Delay (s/veh)	22.9															
Approach LOS	C															

HCS7 Two-Way Stop-Control Report

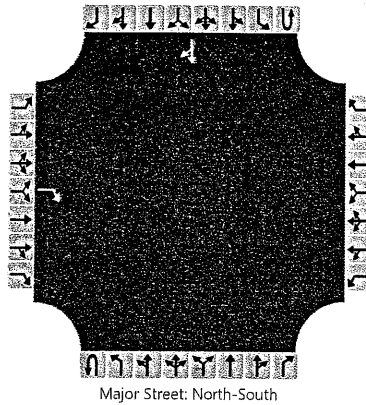
General Information

Analyst	STK
Agency/Co.	MRA
Date Performed	1/19/2018
Analysis Year	2022
Time Analyzed	SAT
Intersection Orientation	North-South
Project Description	16-243SFB-3

Site Information

Intersection	RT 206 & INNER LOOP
Jurisdiction	
East/West Street	INNER LOOP
North/South Street	RT 206
Peak Hour Factor	0.95
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	1		0	0	0	0	0	0	0	0	0	1	0
Configuration				R												TR
Volume, V (veh/h)				65											1259	23
Percent Heavy Vehicles (%)				3												
Proportion Time Blocked																
Percent Grade (%)	0															
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)				6.2												
Critical Headway (sec)				6.23												
Base Follow-Up Headway (sec)				3.3												
Follow-Up Headway (sec)				3.33												

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)				68												
Capacity, c (veh/h)				186												
v/c Ratio				0.37												
95% Queue Length, Q ₉₅ (veh)				1.6												
Control Delay (s/veh)				35.1												
Level of Service, LOS				E												
Approach Delay (s/veh)	35.1															
Approach LOS	E															