

# McDonough & Rea Associates, Inc.

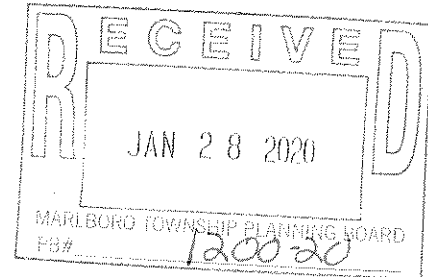
*Traffic and Transportation Consulting*

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

December 23, 2019

Marlboro Township Planning Board  
Town Hall  
1979 Township Drive  
Marlboro, NJ 07746

Re: 45-49 Route 520  
Lots 67-69 in Block 268  
Marlboro Township, Monmouth County  
MRA File No. 19-180



Dear Board Members:

McDonough & Rea Associates (MRA) has been asked to provide the Planning Board with a *Traffic Impact Analysis* for plans to construct a 24,116 SF office building that will share access and parking with an existing 9,360 SF office building on the noted property. The property is located on the south side of County Route 520, just east of its intersection with Kenduck Drive, as shown on *Figure 1, a Site Location Map in the Appendix.*

Access is proposed from 2 driveways to Route 520. All exiting movements will be right turn exit movements only at both driveways. Left turn movements into the property will only be permitted at the easterly driveway where a 2-way left turn lane is provided in the median of CR 520.

## SCOPE OF STUDY

In order to prepare a thorough *Traffic Impact Analysis* for this project, MRA conducted the following tasks:

1. Made field visits to the area to establish existing roadway and traffic conditions.
2. Conducted AM and PM peak street hour traffic counts at the intersection of CR 520/Kenduck Drive which is immediately west of the subject property.
3. Prepared estimates of traffic to be generated by the 2 office buildings based upon data published by the Institute of Transportation Engineers (ITE).

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



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Marlboro Township Planning Board

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December 23, 2019

4. Distributed site generated traffic east and west along CR 520 in accordance with anticipated origins and destinations of site generated traffic.
5. Prepared estimates of future traffic volume demand for a design year of 2022 at the 2 site driveways.
6. Conducted a level of service capacity analysis for both site driveways in accordance with *Highway Capacity Manual* procedures.
7. Reviewed the *Site Plan* with respect to availability and accessibility of the parking supply and conformance to proper traffic engineering principles.

The following report sets forth the database accumulated and the conclusions reached with respect to *45-49 Route 520*.

**EXISTING CONDITIONS**

The subject properties are located on the south side of CR 520 just east of its signalized intersection with Kenduck Drive. CR 520 is a Monmouth County minor arterial roadway in the area. In the vicinity of the site access points, 1 lane is provided in each direction along CR 520 along with a 2-way left turn lane.

**EXISTING TRAFFIC VOLUMES**

Traffic volume data was collected by conducting manual turning movement counts at the signalized intersection of CR 520 at Kenduck Drive. *Figure 2* in the *Appendix* illustrates existing AM and PM peak street hour traffic volumes.

**TRIP GENERATION/DISTRIBUTION**

Estimates of traffic to be generated by the office space were made after consulting the *10<sup>th</sup> Edition* of the *ITE Trip Generation Manual*. The smaller 9,360 SF office building is already tenanted with general office type users. Therefore, the general office trip rates were utilized for this building.

The larger 24,116 SF office building was assumed to be all medical office space in order to maximize traffic generation and prepare a worst case traffic analysis. *Table 1* illustrates the anticipated peak hour traffic generation from the 2 office buildings.



**TABLE I**  
**TRIP GENERATION**  
**45-49 ROUTE 520-MARLBORO**

<u>USE</u>	<u>AM PSH</u>			<u>PM PSH</u>		
	<u>IN</u>	<u>OUT</u>	<u>TOTAL</u>	<u>IN</u>	<u>OUT</u>	<u>TOTAL</u>
9,360 SF General Office	15	3	18	7	16	23
24,116 SF Medical Office	<u>52</u>	<u>15</u>	<u>67</u>	<u>24</u>	<u>60</u>	<u>84</u>
<b>Totals</b>	<b>67</b>	<b>18</b>	<b>85</b>	<b>31</b>	<b>76</b>	<b>107</b>

With respect to the distribution of site generated traffic, based upon location of other higher order roadways such as New Jersey State Route 9, traffic was distributed as follows:

- 2/3 to and from the west on CR 520
- 1/3 to and from the east on CR 520

Since only right turn movements exiting the site will be provided at both driveways, all exiting movements will turn right onto eastbound CR 520. *Figure 3* in the *Appendix* illustrates site generated and distributed traffic volumes.

### ANALYSIS OF FUTURE TRAFFIC

A design year of 2022 was selected for analysis. The New Jersey Department of Transportation's (NJDOT) *Historical Background Traffic Growth Rate* data for the area was consulted with a finding that minor arterial roadways in Monmouth County are anticipated to experience an increase of 1.0 percent per year in background traffic growth. *Figure 4* in the *Appendix* illustrates design year 2022 *no-build* traffic volumes. *Figure 5* in the *Appendix*, illustrates design year 2022 *build* traffic volumes.

Traffic engineers calculate levels of service of unsignalized 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.



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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 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 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 (HCS7 version 7.5)*.

Findings were that, for both the AM and PM peak street hours, exiting movements onto eastbound Route 520 will do so at level of service "B" from both driveways. Left turn movements from westbound CR 520 into the easterly driveway, will do so at level of service "A" during both time frames. Therefore, the site driveways will operate within acceptable traffic engineering parameters.

### **SITE PLAN AND PARKING**

A *Site Plan*, prepared by Challoner & Associates, LLC, shows the new 24,116 SF office building being constructed along the southwest boundary of the property. Marlboro Township ordinance requirements for the total square footage of the buildings (33,476 SF) at 1 parking space per 250 SF of gross floor area are 134 parking spaces. There are 137 parking spaces provided.

Access throughout the site is sound and logical and parking stall sizes, aisle widths, etc. meet accepted traffic engineering standards.

### **CONCLUSIONS**

It is concluded, based on the analysis set forth in this report, that plans to construct a 24,116 SF office building on the noted property, which will share access with an existing 9,360 SF general office building, can be approved and operate compatibly with existing and future traffic flows along Route 520. Exiting movements from both of the site driveways will be restricted to right turn movements only. Levels of service at the site driveways will be well within accepted traffic engineering parameters.

The *Site Plan* itself has been properly designed with respect to multiple points of access, parking stall sizes, aisle widths and general circulation patterns.



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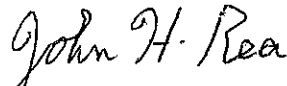
Marlboro Township Planning Board

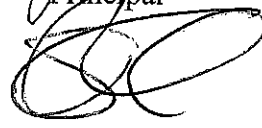
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December 23, 2019

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

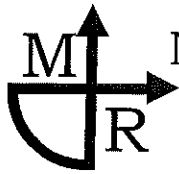
Very truly yours,

  
John H. Rea, PE  
Principal

  
Scott T. Kennel  
Sr. Associate

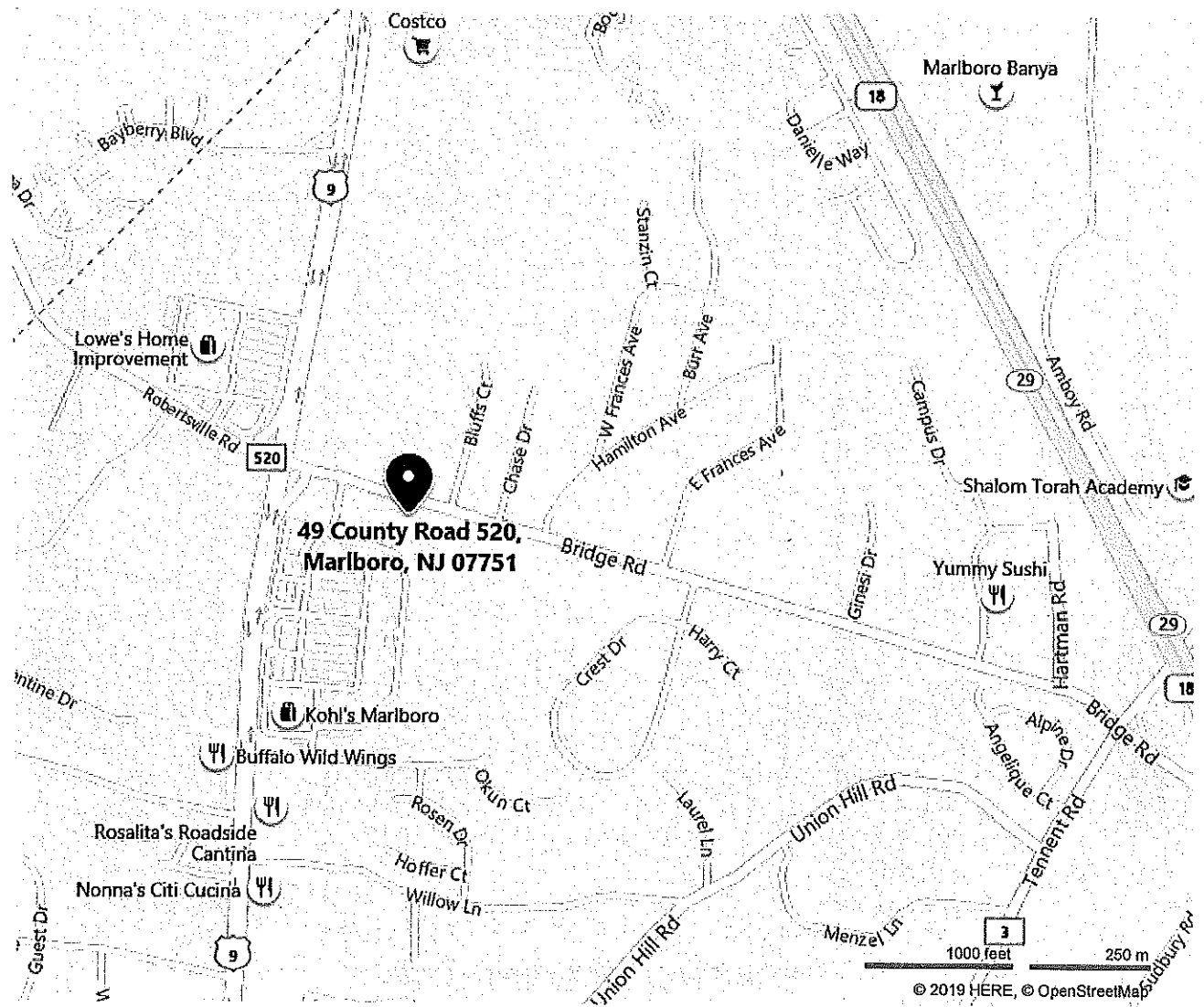
cc: Stuart Challoner, PE  
Chiara Mancini, Esq.  
Ken Pape, Esq.  
Felix Bruselovsky

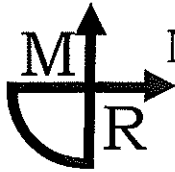
# APPENDIX



SUBJECT:

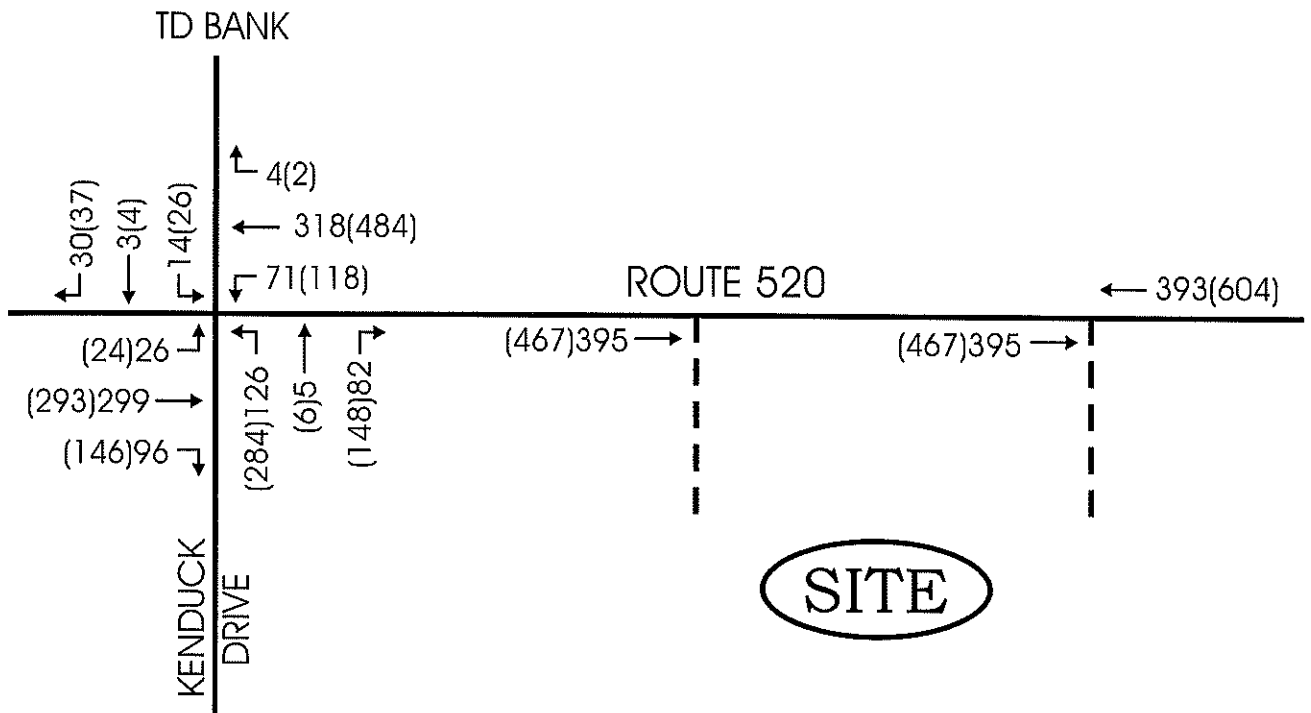
45 - 49 ROUTE 520: MARLBORO  
SITE LOCATION MAP





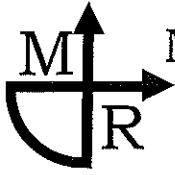
SUBJECT:

45 - 49 ROUTE 520; MARLBORO  
EXISTING AM PSH (PM PSH) TRAFFIC VOLUMES



LEGEND: ← AM PSH (PM PSH)





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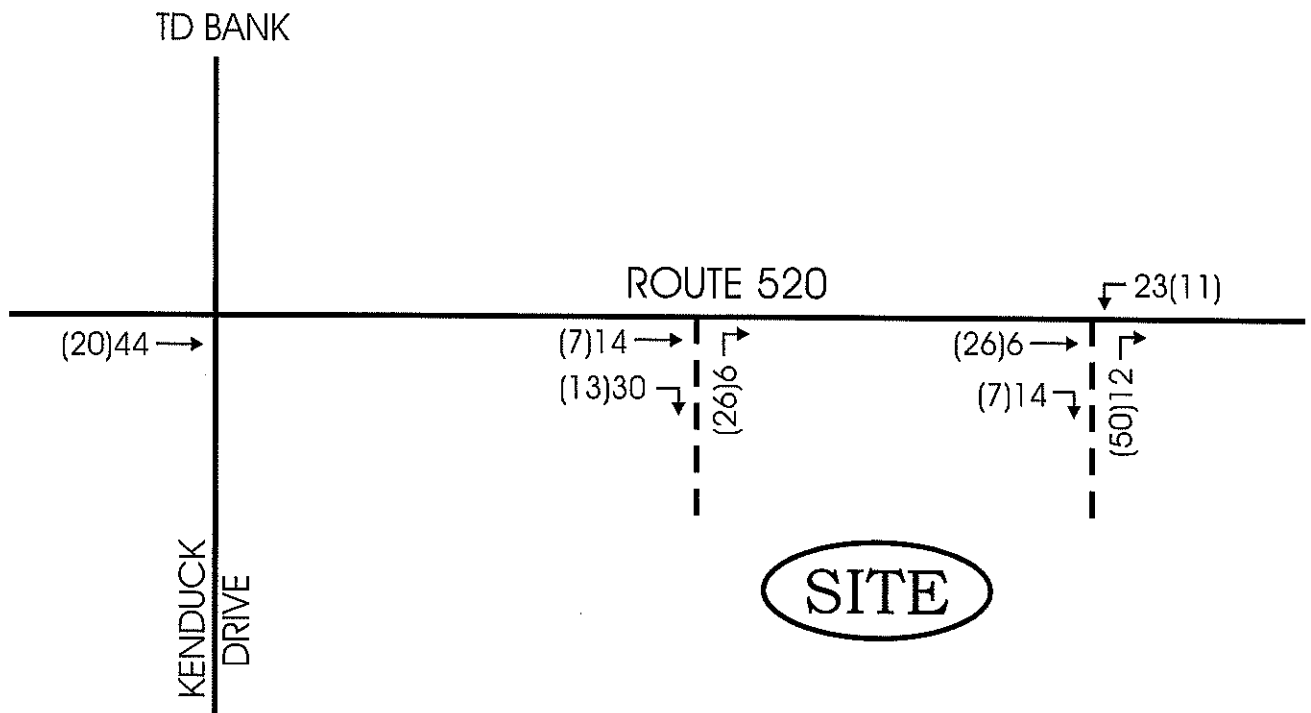
FIGURE 3

JOB NO.  
19-180

DATE:  
DEC 2019

SUBJECT:

45 - 49 ROUTE 520: MARLBORO  
SITE GENERATED TRAFFIC VOLUMES



LEGEND: ← AM PSH(PM PSH)



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TRAFFIC AND TRANSPORTATION CONSULTING

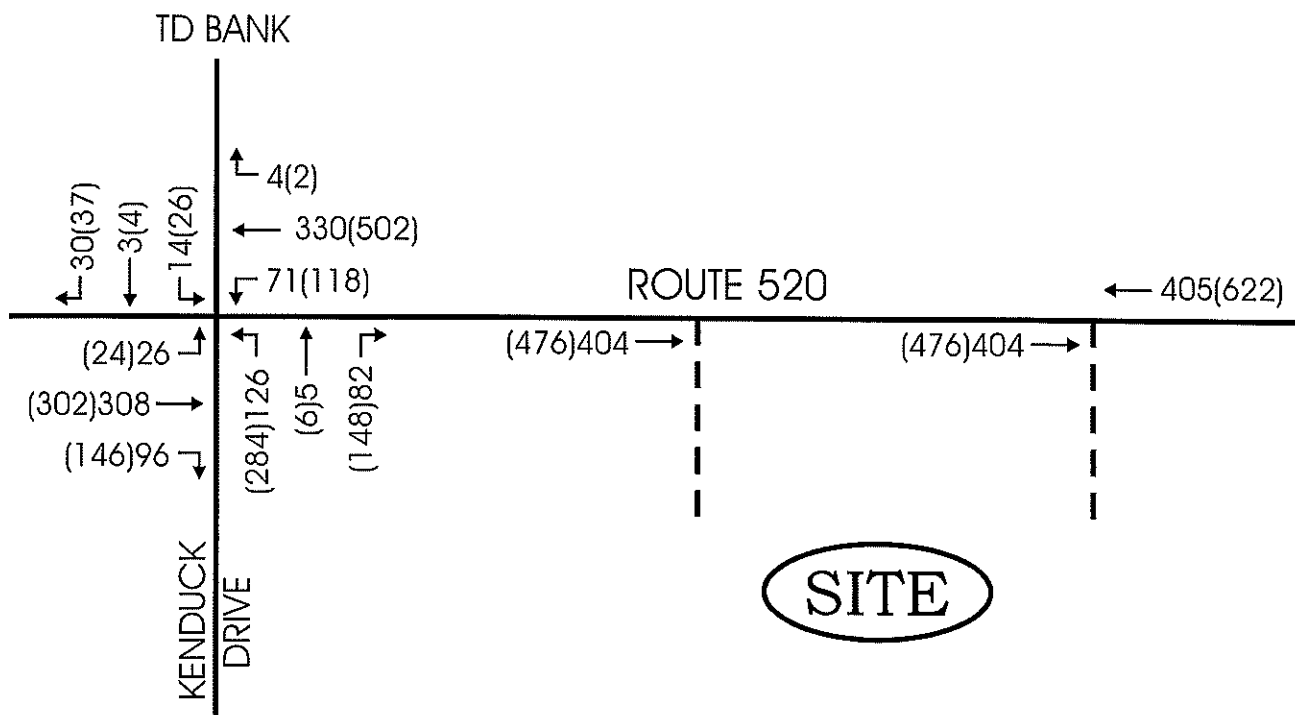
FIGURE 4

JOB NO.  
19-180

DATE:  
DEC 2019

SUBJECT:

45 - 49 ROUTE 520: MARLBORO  
2022 NO - BUILD TRAFFIC VOLUMES



LEGEND: ← AM PSH(PM PSH)



McDONOUGH & REA ASSOCIATES

TRAFFIC AND TRANSPORTATION CONSULTING

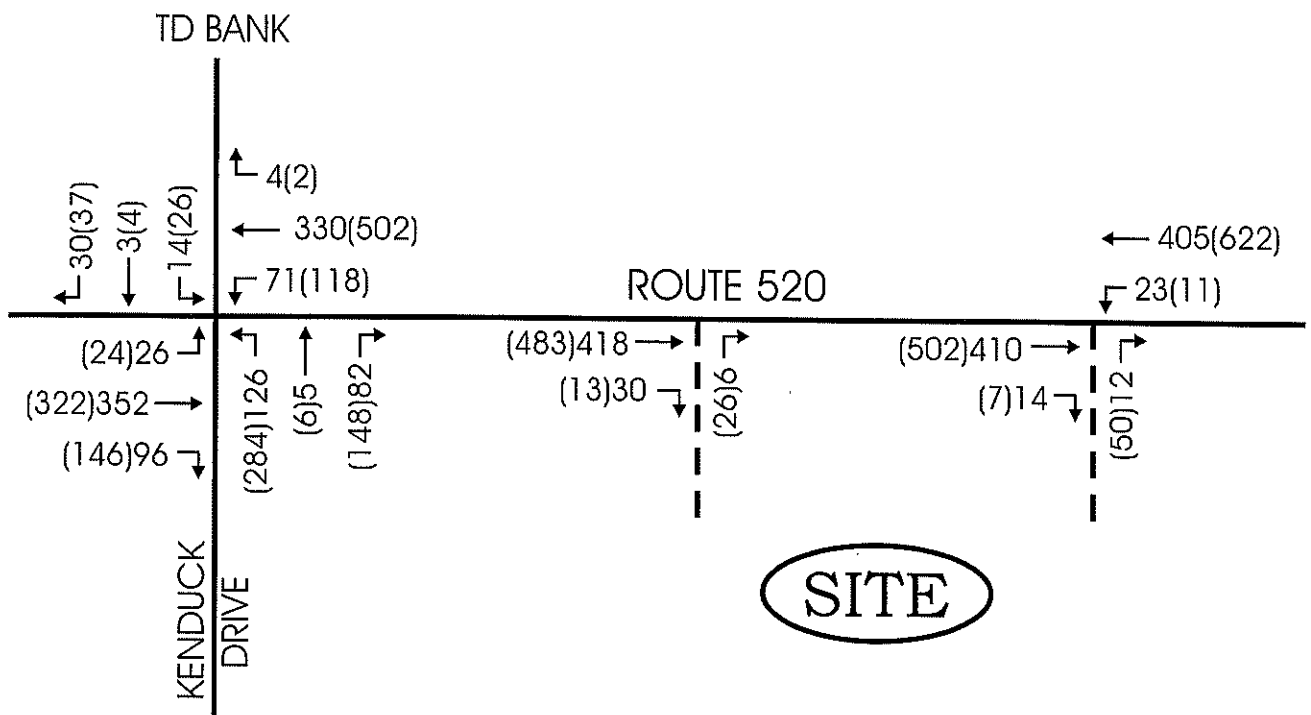
FIGURE 5

JOB NO.  
19-180

DATE:  
DEC 2019

SUBJECT:

45 - 49 ROUTE 520: MARLBORO  
2022 BUILD TRAFFIC VOLUMES



LEGEND: ← AM PSH(PM PSH)



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

File Name : 19180 kenduck & newman springs pm1  
 Site Code : 00019180  
 Start Date : 10/10/2019  
 Page No : 1

49 NEWMAN SPRINGS RD (CR 520)  
 NEWMAN SPRINGS RD & KENDUCK/BANK  
 MARLBORO TOWNSHIP, MONMOUTH COUNTY  
 MRA JOB 19-180 THURSDAY PM COUNT

Groups Printed- CARS - TRUCKS - SCHOOL BUS

Start Time	TD Bank Exit Southbound			Newman Springs Road (CR 520) Westbound			Kenduck Drive Northbound			Newman Springs Road (CR 520) Eastbound			Int. Total		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right			
03:00 PM	5	3	11	16	88	3	107	86	3	21	11	121	48	125	372
03:15 PM	0	1	8	22	73	0	95	60	4	17	7	85	29	97	286
03:30 PM	2	4	8	24	70	0	94	65	1	17	9	95	37	113	316
03:45 PM	4	0	8	26	81	0	107	86	2	23	15	126	45	110	355
Total	11	8	35	88	312	3	403	297	10	78	42	427	159	445	1329
04:00 PM	2	1	5	24	93	0	117	79	1	20	16	116	34	112	353
04:15 PM	2	3	11	38	101	0	139	68	1	23	12	104	38	132	391
04:30 PM	7	3	9	32	87	0	119	67	0	11	7	85	49	136	359
04:45 PM	7	1	10	31	101	0	132	66	4	43	11	124	34	122	396
Total	18	8	35	125	382	0	507	280	6	97	46	429	155	502	1499
05:00 PM	6	2	10	21	113	1	135	83	0	18	16	117	33	110	380
05:15 PM	10	1	12	28	114	0	142	62	2	25	13	102	36	109	376
05:30 PM	6	1	4	11	138	1	179	63	3	16	16	98	37	114	402
05:45 PM	4	0	11	29	119	0	148	76	1	28	16	121	40	130	414
Total	26	4	37	118	484	2	604	284	6	87	61	438	146	463	1572
Grand Total	55	20	107	331	1178	5	1514	861	22	262	149	1294	460	1410	4400
Approch %	30.2	11.0	58.8	21.9	77.8	0.3	34.4	66.5	1.7	20.2	11.5	29.4	32.6	32.0	
Total %	1.3	0.5	2.4	7.5	26.8	0.1		19.6	0.5	6.0	3.4		10.5		

Start Time	TD Bank Exit Southbound			Newman Springs Road (CR 520) Westbound			Kenduck Drive Northbound			Newman Springs Road (CR 520) Eastbound			Int. Total		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right			
05:00 PM	26	4	37	118	484	2	604	284	6	87	61	438	146	463	1572
05:15 PM	10	1	12	40	138	1	179	76	1	28	16	121	40	130	414
05:30 PM	4	0	11	29	119	0	148	76	1	28	16	121	40	130	414
05:45 PM	4	0	11	29	119	0	148	76	1	28	16	121	40	130	414
High Int. Volume	10	1	12	40	138	1	179	76	1	28	16	121	40	130	414
Peak Factor							0.844					0.905			0.949
Peak Hour From 03:00 PM to 05:45 PM - Peak 1 of 1															
Intersection Volume	26	4	37	118	484	2	604	284	6	87	61	438	146	463	1572
Percent	38.8	6.0	55.2	19.5	80.1	0.3	34.4	64.8	1.4	19.9	13.9	29.4	31.5	32.0	
05:45 Volume	4	0	11	29	119	0	148	76	1	28	16	121	40	130	414
Peak Factor															
High Int. Volume	10	1	12	40	138	1	179	76	1	28	16	121	40	130	414
Peak Factor							0.844					0.905			0.949

ITE Land Use: 720, Medical-Dental Office Building									
Size of Development: 24,116 SF									
10th									
Time Period	Average Rate	Studies	Avg. Size	R <sup>2</sup>	Trips	Equation	Trips	Split	
Weekday Daily	34.80	28	24	0.95	839.2	T= 38.420 (x)- 87.620	838.9	50 50	
AM Peak Street Hour	2.78	44	32	0.80	67.0	Ln(T)= 0.890 Ln(x)+ 1.310	63.0	78 22	
PM Peak Street Hour	3.46	65	28	0.73	83.4	T= 3.390 (x)+ 2.020	83.8	28 72	
AM Peak Hour of Generator	3.53	36	27	0.90	85.1	T= 3.430 (x)+ 2.570	85.3	62 38	
PM Peak Hour of Generator	4.10	42	26	0.91	98.9	T= 4.270 (x)- 4.630	98.3	39 61	
Saturday Daily	8.57	6	41	NG	206.7	Not Given	N/A	50 50	
Saturday Peak Hour of Generator	3.10	4	28	0.78	74.8	T= 4.940 (x)- 50.780	68.4	57 43	
Sunday Daily	1.42	5	44	NG	34.2	Not Given	N/A	50 50	
Sunday Peak Hour of Generator	0.32	3	31	NG	7.7	Not Given	N/A	52 48	

ITE Land Use: 710, General Office Building									
Size of Development: 9,360 SF									
10th									
Time Period	Average Rate	Studies	Avg. Size	R <sup>2</sup>	Trips	Equation	Trips	Split	
Weekday Daily	9.74	66	171	0.83	91.2	Ln(T)= 0.970 Ln(X)+ 2.500	106.6	50 50	
AM Peak Street Hour	1.16	35	117	0.85	10.9	T= 0.940 (X)+ 26.490	35.3	86 14	
PM Peak Street Hour	1.15	32	114	0.88	10.8	Ln(T)= 0.950 Ln(X)+ 0.360	12.0	16 84	
AM Peak Hour of Generator	1.47	228	209	0.84	13.8	Ln(T)= 0.880 Ln(X)+ 1.060	20.7	88 12	
PM Peak Hour of Generator	1.42	243	205	0.82	13.3	T= 1.100 (X)+ 65.390	75.7	18 82	
Saturday Daily	2.21	5	94	NG	20.7	Not Given	N/A	50 50	
Saturday Peak Hour of Generator	0.53	3	82	NG	5.0	Not Given	N/A	54 46	
Sunday Daily	0.70	5	94	NG	6.6	Not Given	N/A	50 50	
Sunday Peak Hour of Generator	0.21	3	82	NG	2.0	Not Given	N/A	58 42	

**LEVEL OF SERVICE CRITERIA  
FOR  
TWO-WAY STOP-CONTROLLED INTERSECTIONS<sup>1</sup>**

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

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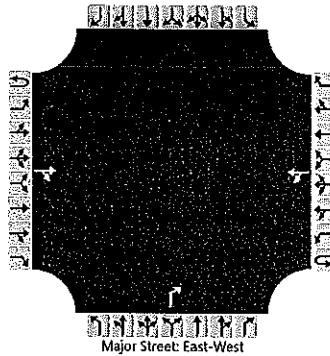
<sup>1</sup> Transportation Research Board, Highway Capacity Manual 2010, National Research Council, Washington, DC, 2010.



# HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	Jay Troutman	Intersection	Rt.520 & Site Dr. East
Agency/Co.	McDonough & Rea Assoc.	Jurisdiction	Marlboro Twp Monmouth Cty
Date Performed	12/10/2019	East/West Street	CR 520
Analysis Year	2022	North/South Street	Site Driveway East
Time Analyzed	Build AM Peak Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	45-49 Route 520		

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	0	1	0	0	0	1	0		0	0	1		0	0	0
Configuration				TR		LT						R				
Volume (veh/h)			410	14		23	405					12				
Percent Heavy Vehicles (%)						3						3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized										No						
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)						4.1						6.2				
Critical Headway (sec)						4.13						6.23				
Base Follow-Up Headway (sec)						2.2						3.3				
Follow-Up Headway (sec)						2.23						3.33				

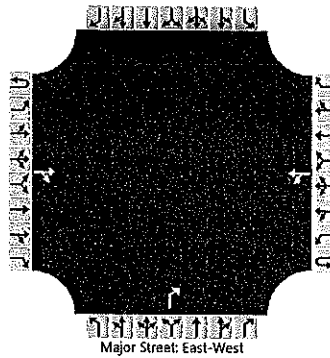
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						25						13				
Capacity, c (veh/h)						1095						604				
v/c Ratio						0.02						0.02				
95% Queue Length, Q <sub>95</sub> (veh)						0.1						0.1				
Control Delay (s/veh)						8.4						11.1				
Level of Service (LOS)						A						B				
Approach Delay (s/veh)					0.7				11.1							
Approach LOS									B							

# HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	Jay Troutman	Intersection	Rt.520 & Site Dr. East
Agency/Co.	McDonough & Rea Assoc.	Jurisdiction	Marlboro Twp Monmouth Cty
Date Performed	12/10/2019	East/West Street	CR 520
Analysis Year	2022	North/South Street	Site Driveway East
Time Analyzed	Build PM Peak Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	45-49 Route 520		

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	0	1	0	0	0	1	0		0	0	1		0	0	0
Configuration				TR		LT						R				
Volume (veh/h)			502	7		11	622					50				
Percent Heavy Vehicles (%)						3						3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized										No						
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)						4.1							6.2			
Critical Headway (sec)						4.13							6.23			
Base Follow-Up Headway (sec)						2.2							3.3			
Follow-Up Headway (sec)						2.23							3.33			

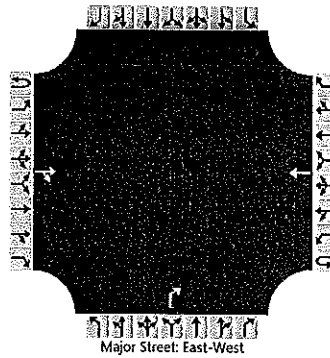
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						12							54			
Capacity, c (veh/h)						1012							533			
v/c Ratio						0.01							0.10			
95% Queue Length, Q <sub>95</sub> (veh)						0.0							0.3			
Control Delay (s/veh)						8.6							12.5			
Level of Service (LOS)						A							B			
Approach Delay (s/veh)					0.3				12.5							
Approach LOS									B							

# HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	Jay Troutman	Intersection	Rt.520 & Site Dr. West
Agency/Co.	McDonough & Rea Assoc.	Jurisdiction	Marlboro Twp Monmouth Cty
Date Performed	12/10/2019	East/West Street	CR 520
Analysis Year	2022	North/South Street	Site Driveway West
Time Analyzed	Build AM Peak Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	45-49 Route 520		

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	0	1	0	0	0	1	0		0	0	1		0	0	0
Configuration				TR			T					R				
Volume (veh/h)			418	30			405					6				
Percent Heavy Vehicles (%)												3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized										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			

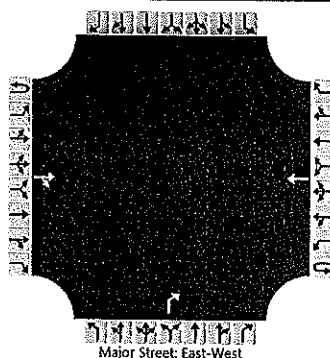
## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)													7				
Capacity, c (veh/h)													591				
v/c Ratio													0.01				
95% Queue Length, Q <sub>95</sub> (veh)													0.0				
Control Delay (s/veh)													11.2				
Level of Service (LOS)													B				
Approach Delay (s/veh)													11.2				
Approach LOS													B				

# HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	Jay Troutman			Intersection	Rt.520 & Site Dr. West		
Agency/Co.	McDonough & Rea Assoc.			Jurisdiction	Marlboro Twp Monmouth Cty		
Date Performed	12/10/2019			East/West Street	CR 520		
Analysis Year	2022			North/South Street	Site Driveway West		
Time Analyzed	Build PM Peak Hour			Peak Hour Factor	0.92		
Intersection Orientation	East-West			Analysis Time Period (hrs)	0.25		
Project Description	45-49 Route 520						

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	1		0	0	0
Configuration				TR			T					R				
Volume (veh/h)			483	13			622					26				
Percent Heavy Vehicles (%)												3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized									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)																	28
Capacity, c (veh/h)																	545
v/c Ratio																	0.05
95% Queue Length, Q <sub>95</sub> (veh)																	0.2
Control Delay (s/veh)																	12.0
Level of Service (LOS)																	B
Approach Delay (s/veh)									12.0								
Approach LOS									B								