

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.

<u>Scope of Study</u>

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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- 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^{th} 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 I* illustrates the anticipated peak hour traffic generation from the 2 office buildings.



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TABLE I TRIP GENERATION 45-49 ROUTE 520-MARLBORO

		<u>AM F</u>	<u>PSH</u>		<u>PM P</u>	SH
<u>USE</u>	<u>In</u>	O UT	TOTAL	<u>IN</u>	OUT	TOTAL
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>	24	60	84
Totals	67	18	85	31	76	$\overline{107}$

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:

- \triangleright 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.

<u>Site Plan and Parking</u>

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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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,

øhn H. Rea, PE

Principal

Scott T. Kennel Sr. Associate

cc:

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





TRAFFIC AND TRANSPORTATION CONSULTING

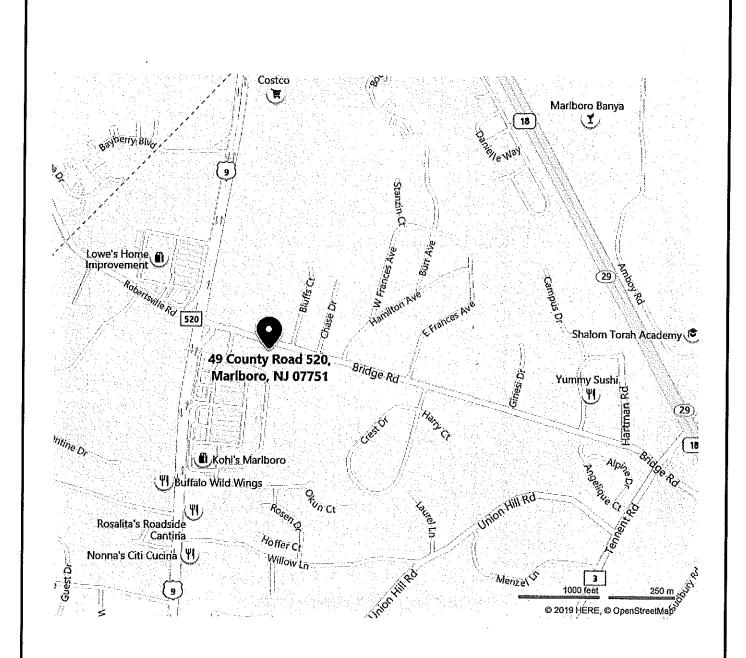
FIGURE

JOB NO. 19-180

DEC 2019

SUBJECT:

45 - 49 ROUTE 520: MARLBORO SITE LOCATION MAP





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FIGURE

2

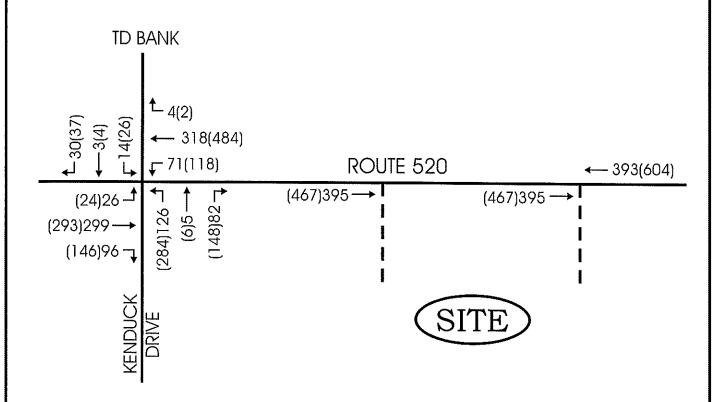
JOB NO. 19-180

DEC 2019

SUBJECT:

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

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McDONOUGH & REA ASSOCIATES

FIGURE

3

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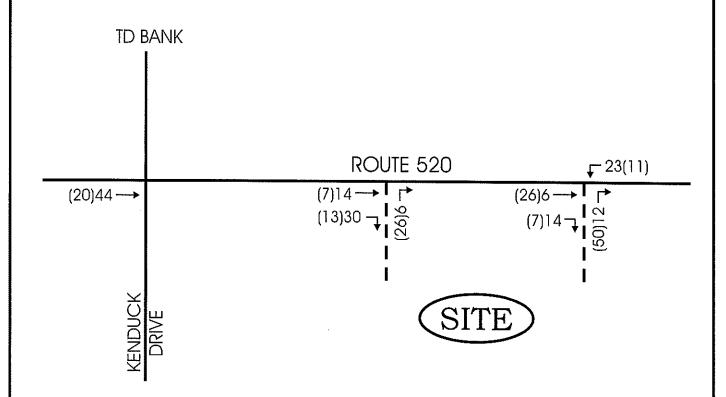
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DEC 2019

SUBJECT:

45 - 49 ROUTE 520: MARLBORO SITE GENERATED TRAFFIC VOLUMES







FIGURE

4

TRAFFIC AND TRANSPORTATION CONSULTING

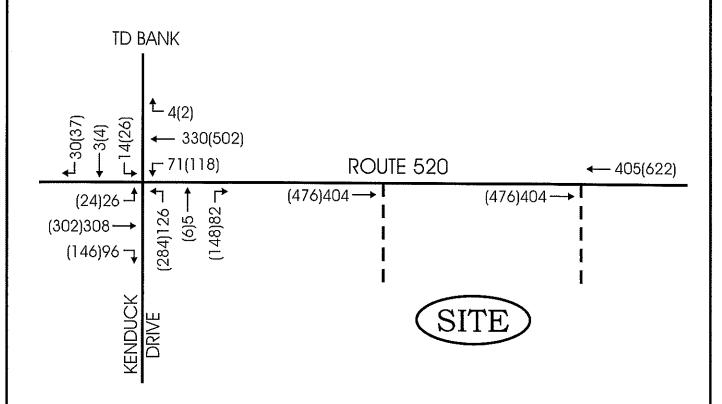
JOB NO. 19-180

DEC 2019

SUBJECT:

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

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FIGURE

5

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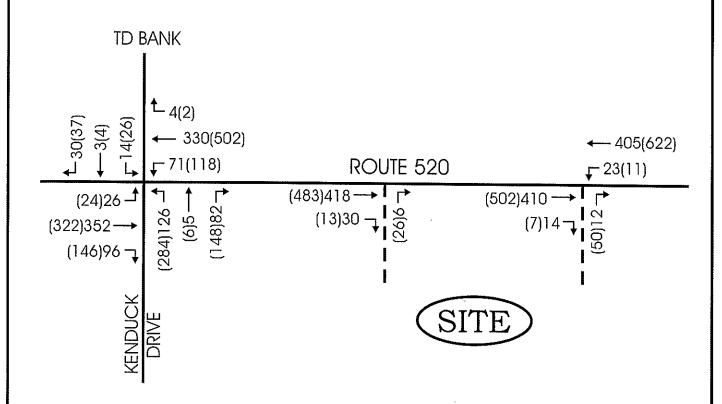
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19-180

DEC 2019

SUBJECT:

45 - 49 ROUTE 520: MARLBORO 2022 BUILD TRAFFIC VOLUMES



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

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

File Name: 19180 kenduck & newman springs am1 Site Code: 00019180

Site Code : 00019180 Start Date : 10/11/2019 Page No : 1

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Manasquan NJ 08736 (732) 528-7076 NEWMAN SPRINGS RD & KENDUCK/BANK MARLBORO TOWNSHIP, MONMOUTH COUNTY MRA JOB 19-180 THURSDAY PM COUNT

49 NEWMAN SPRINGS RD (CR 520)

McDonough & Rea Associates 1431 Lakewood Road Suite C

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

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		**	Start Time	Peak Hour From 03:00 PM to 05:45 PM - Peak 1 of	Intersection 05:00 PM	Volume	Percent	05-45 Volume	Peak Factor	High Int. 05:15 PM	Volume	Peak Factor

ITE Land Use: 720, Medical-Dental Offi	720, Medical-Der	ntal Office E	ce Building										
Size of Development:	24,116 SF	SF		10th									
Time Period	Average Rate	Studies	Avg. Size	낊	Trips		Equ	Equation		Trips	Split	#=	
Weekday Daily	34.80	28	24	0.95	839.2	<u>"</u>	38.420	(x)- 87.620	7.620	838.9	50 50	50	
AM Peak Street Hour	2.78	44	32	08.0	67.0	Ln(T)=		0.890 Ln(x)+ 1.310	310	63.0	78 22	22	
PM Peak Street Hour	3,46	65	28	0.73	83.4	<u></u>	3.390	(x)+ 2.020	020	83.8	28 72	72	
AM Peak Hour of Generator	3.53	36	27	0.90	85.1	<u> </u>	3.430	(x)+ 2.570	570	85.3	62 38	38	
PM Peak Hour of Generator	4.10	42	26	0.91	98.9	H	4.270	(x)- 4.630	630	98.3	39 61	51	
Saturday Daily	8.57	9	41	NG	206.7		Not (Not Given		ΑN	50 50	20	
Saturday Peak Hour of Generator	3.10	4	28	0.78	74.8	Ľ	4.940	4.940 (x)-50.780	08.7.0	68.4	22 '	43	
Sunday Daily	1.42	5	44	NG	34.2		Not (Not Given		A/A	20	20	
Sunday Peak Hour of Generator	0.32	3	31	NG	7.7		Not (Not Given		N/A	52 7	48	
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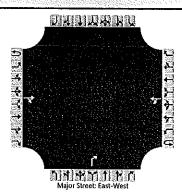
ITE Land Use: 710, General Office Building	710, General Off	fice Building	Į.		}							
Size of Development:	9,360 SF	SF		10th								
Time Period	Average Rate	Studies	Avg. Size	<u>2</u> 2	Trips		Equ	Equation	Trips	Split	;	
Weekday Daily	9.74	99	171	0.83	91.2	(T)n1	0.970	0.970 Ln(x)+ 2.500	106.6	50 50	50	
AM Peak Street Hour	1.16	35	117	0.85	10.9	#	0.940	0.940 (x)+ 26.490	35.3	86 1	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	34	
AM Peak Hour of Generator	1.47	228	209	0.84	13.8	Ln(T)=	0.880	0.880 Ln(x)+ 1.060	20.7	88 12	12	
PM Peak Hour of Generator	1.42	243	205	0.82	13.3	<u>"</u>	1.100	(x)+ 65.390	75.7	18 82	32	
Saturday Daily	2.21	5	94	SG	20.7		Not	Not Given	N/A	20	50	
Saturday Peak Hour of Generator	0.53	3	82	NG	5.0		Not	Not Given	N/A	54 4	46	
Sunday Daily	0.70	5	94	NG	9.9		Not	Not Given	N/A	50 5	20	
Sunday Peak Hour of Generator	0.21	က	82	NG	2.0		Not	Not Given	A/N	58 4	42	

LEVEL OF SERVICE CRITERIA FOR ${\bf TWo\text{-}Way\ Stop\text{-}Controlled\ Intersections}^1}$

Level of Service	Average Control Delay
A	≤ 10.0 Seconds Per Vehicle
В	> 10.0 and ≤ 15.0 Seconds Per Vehicle
С	> 15.0 and ≤ 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

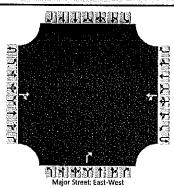
¹ Transportation Research Board, <u>Highway Capacity Manual 2010</u>, National Research Council, Washington, DC, 2010.

And the second s	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		



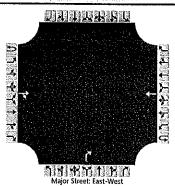
Approach		Eastl	bound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Ţ	R
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	1	· · · · · · ·	0	0	0
Configuration				TR		LT						R				
Volume (veh/h)			410	14		23	405	Ì				12				
Percent Heavy Vehicles (%)						3						3				
Proportion Time Blocked																
Percent Grade (%)							1	·		<u> </u>	0				1	
Right Turn Channelized								····		١	/o				······	
Median Type Storage				Undi	vided								.			
Critical and Follow-up H	eadwa	ys .														
Base Critical Headway (sec)						4.1				<u> </u>	I	6.2				
Critical Headway (sec)						4.13				· ·	1	6.23				
Base Follow-Up Headway (sec)				-		2,2					<u> </u>	3.3				┪
Follow-Up Headway (sec)						2,23			:			3.33			1.3	
Delay, Queue Length, an	d Leve	of S	ervice													
Flow Rate, v (veh/h)						25						13				
Capacity, c (veh/h)						1095						604		1	<u> </u>	
v/c Ratio						0.02						0.02				
						0.1						0.1				1
95% Queue Length, Q ₉₅ (veh)						8.4					†	11,1		†	 	
95% Queue Length, Q ₉₅ (veh) Control Delay (s/veh)						0,4	1	L						1		1
· · · · · · · · · · · · · · · · · · ·						A						В				
Control Delay (s/veh)						Α	.7			1	1.1	В				

	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		



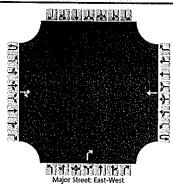
					IVIB	OL 2(lest) 55	ist-west									
Vehicle Volumes and Ad	justme	nts														
Approach		East	bound			West	bound			North	bound	· ·		South	bound	ian di kabasa ar
Movement	U	L.	Т	·R	U	L	· T	R	U	L	Т	R	U	L	Т	R
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	1		0	0	0
Configuration				TR		LT						R				
Volume (veh/h)			502	7		11	622					50		1		
Percent Heavy Vehicles (%)						3						3				
Proportion Time Blocked																-
Percent Grade (%)							· · · · · · · · · · · · · · · · · · ·				0				.1	<u> </u>
Right Turn Channelized			-							ľ	Vo.					
Median Type Storage			t	Undi	ivided								4			
Critical and Follow-up H	leadwa	ys														
Base Critical Headway (sec)			T			4.1		<u> </u>				6.2				
Critical Headway (sec)						4.13						6.23			1.5	
Base Follow-Up Headway (sec)						2.2					1	3.3		1		
Follow-Up Headway (sec)						2.23						3,33				
Delay, Queue Length, an	nd Leve	of S	ervice													
Flow Rate, v (veh/h)			1			12						54		l	e) a Ljavin er care	and deliners.
Capacity, c (veh/h)						1012						533				
v/c Ratio						0.01					-	0.10		1		
95% Queue Length, Q ₉₅ (veh)						0.0						0.3				
Control Delay (s/veh)						8.6						12,5				
Level of Service (LOS)						Α					T	В	†			<u> </u>
Approach Delay (s/veh)			•			0	.3	L		1	2.5	<u></u>		1		1
Approach LOS											В					
									1							

	HCS7 Two-Way	y 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		



					Widje	or sueer. Ea	sst-west									
Vehicle Volumes and Ad	justme	nts														
Approach	Eastbound			Westbound					North	bound		Southbound				
Movement	U	L	Т	R	U	L	Т	R	U	L	T	R	U	L	Т	R
Priority	10	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)			418	30			405					6				
Percent Heavy Vehicles (%)												3				
Proportion Time Blocked												<u> </u>			-	
Percent Grade (%)				<u> </u>							0			1	1	!
Right Turn Channelized										N	No					
Median Type Storage				Undi	ivided								L.,			
Critical and Follow-up H	eadway	ys														
Base Critical Headway (sec)		į.								l		6.2				
Critical Headway (sec)								****				6.23				
Base Follow-Up Headway (sec)												3.3			 	
Follow-Up Headway (sec)		,								-		3.33				
Delay, Queue Length, an	d Leve	l of S	ervice													
Flow Rate, v (veh/h)									A, 1764 A, 24 C C C	i seri elemen	1	7	entige two trave			Section 1
Capacity, c (veh/h)												-591				
v/c Ratio												0.01				<u> </u>
95% Queue Length, Q ₉₅ (veh)												0.0	<u> </u>		1.	
Control Delay (s/veh)										1		11.2				
Level of Service (LOS)			1									В				
Approach Delay (s/veh)			-					·	1	1	1.2	. 		<u> </u>		<u> </u>
Approach LOS						1		В	· · · · ·							
					<u> </u>				<u> </u>				L			

Anne Sue de l'Anne de l'An	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		



Vehicle Volumes and Ad	justme	nts															
Approach	Eastbound				Westbound				ilia se ibisiliggi	North	hound	d Usak pak	Southbound				
Movement	U	L	Т	R	U	L	T	R	U	Northbound L T		R	U	T	T		
Priority	1U	1	2	3	4U	4	5	6		7	8	9	U	10	11	R	
Number of Lanes	0	0	1	0	0	0	1	0		0	0	1 1		0	-0	12 0	
Configuration				TR			<u> </u>					H R		-			
Volume (veh/h)		-	483	13			622					26					
Percent Heavy Vehicles (%)			<u> </u>									3					
Proportion Time Blocked									<u> </u>	,							
Percent Grade (%)			<u></u>					<u> </u>			0	<u> </u>		<u> </u>		<u> </u>	
Right Turn Channelized										١	10						
Median Type Storage				Undi	vided												
Critical and Follow-up H	eadway	/ S												erenevane Eren esek			
Base Critical Headway (sec)		·								***************************************		6.2					
Critical Headway (sec)											<u> </u>	6.23				 	
Base Follow-Up Headway (sec)												3.3			<u> </u>		
Follow-Up Headway (sec)										٠.	<u> </u>	3.33					
Delay, Queue Length, an	d Level	of S	ervice							201503							
Flow Rate, v (veh/h)	1000	grander on t	M-100-10-10-10-10-10-10-10-10-10-10-10-10	1946) 1941 - 114 -				The State of States		1419/14/14/14	3249.03500	28			l		
Capacity, c (veh/h)												545					
v/c Ratio												0.05		<u> </u>			
95% Queue Length, Q ₉₅ (veh)												0.2	······································				
Control Delay (s/veh)												12.0		<u> </u>	·		
Level of Service (LOS)												В					
Approach Delay (s/veh)					I		L			12	<u>. </u>	1		1	L	L	
Approach LOS		·····								······································	В	-					