CURRENT 2018-678
1/30/2018

RAMEY KEMP & ASSOCIATES, INC.
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January 30, 2018

Marsha L. Mayhew
Lat Purser & Associates, Inc.
4530 Park Road, Suite 410
Charlotte, NC 28209

Reference: Sam Newell Road Gas Station – Matthews, North Carolina

Subject: **Traffic Technical Memorandum**

Dear Ms. Mayhew,

The contents of this letter present the findings of a technical memorandum that was completed for the proposed development located in the northwest quadrant of the Matthews Township Parkway and Sam Newell Road intersection in Matthews, North Carolina. The purpose of this technical memorandum is to evaluate the proposed full movement access on Sam Newell Road.

Site Location and Development Plan

The proposed site is located in the northwest quadrant of the Matthews Township Parkway and Sam Newell Road intersection in Matthews, North Carolina. Refer to Figure 1 in Appendix A for an illustration of the site location map. Refer to Figure 2 for the preliminary site plan. One full movement driveway is proposed on Sam Newell Road. One right-in/right-out driveway is proposed on Matthews Township Parkway. The existing lane configuration can is illustrated on Figure 3.

Traffic Volumes

A turn movement traffic count was performed at the intersection of Matthews Township Parkway and Sam Newell Road. Refer to Figure 4 for the 2018 existing peak hour traffic volumes. The traffic count data can be found in Appendix B.

The trip generation for the development was completed utilizing the 9th Edition of the *ITE Trip Generation* manual. The site is proposed to consist of a gas station with 20 fueling stations and an outparcel. No user has been identified for the outparcel so it was assumed to be a fast food restaurant with drive-thru window. Refer to Table 1 below for a summary of the proposed trip generation.

TABLE 1
PROPOSED TRIP GENERATION

Land Use	Size	Units	Daily Trips (VPD)	Peak Hour Trips (VPH)					
				AM			PM		
				Enter	Exit	Total	Enter	Exit	Total
Fast Food Restaurant (LUC 934)	3	KSF	1,490	69	67	136	51	47	98
Internal Capture				13	8	21	15	19	34
Pass-by				29	29	58	16	16	32
Gas Station (945)	20	FS	3,256	102	101	203	135	135	270
Internal Capture				8	13	21	19	14	33
Pass-by				57	57	114	67	67	134
Total Trips			4,746	171	168	339	186	182	368
Internal Capture				21	21	42	34	33	67
Pass-by				86	86	172	83	83	166
Total New External Trips				64	61	125	69	66	135

(1) Based on *ITE Trip Generation* – 9th Edition

Trip distribution percentages for the proposed site were determined based on existing traffic patterns, nearby land uses, location of employment centers, and engineering judgment. Figure 5 illustrates the primary trip distribution percentages for the site. These trip distribution percentages were applied to the total new external trips in Table 1 to determine the primary trip assignments shown on Figure 6. Pass-by trips were added at the driveways based on the existing traffic volumes. Figure 7 illustrates the pass-by trip assignment. Combining the primary trips with the pass-by trips results in the total trip assignments shown on Figure 8.

The 2018 existing traffic volumes (Figure 4) were projected to the year 2020 using a growth rate of 2% per year. Figure 9 illustrates the 2020 projected traffic volumes. The site trip assignments were added to these projected traffic volumes resulting in the 2020 Build peak hour traffic volumes shown on Figure 10.

Traffic Analysis

The intersection of Matthews Township Parkway and Sam Newell Road was modeled using Synchro and SimTraffic. This software was used to analyze the traffic operations of the intersection and the proposed site driveways; specifically the area of Sam Newell Road between Matthews Township Parkway and Site Drive 1.

The intersection of Matthews Township Parkway was first modeled with existing lane configurations. Additional lanes were added to improve queueing on Sam Newell Road between Matthews Township Parkway and Site Drive 1. A southbound through lane at Matthews Township Parkway was added to Sam Newell Road. A northbound left turn lane on Sam Newell Road was added at Site Drive 1. These additional lanes are expected to reduce the queues on Sam Newell Road. However, the southbound right turn movement on Sam Newell Road is expected to spillback from Matthews Township Parkway, past Site Drive 1. No other spillback is expected between Matthews Township Parkway and Site Drive 1. All Synchro and SimTraffic reports can be found in Appendix C.

The additional lanes mentioned above may make it more difficult for NCDOT to construct improvements at the intersection of Matthews Township Parkway and Sam Newell Road. NCDOT has developed some conceptual

improvements for this intersection; which include dual northbound through lanes on Sam Newell Road. The NCDOT conceptual design can be found in Appendix D.

One area of concern is the sight distance for vehicles turning left from Site Drive 1 onto northbound Sam Newell Road. The queueing of vehicles on Sam Newell Road between Matthews Township Parkway and Site Drive 1 could limit this sight distance. Prohibiting the left turn movement from Site Drive 1, while still allowing a left turn onto Site Drive 1, may be a safer alternative. This could be accomplished with a concrete pork chop island on Site Drive 1.

Conclusions

Additional lanes on Sam Newell Road will be needed to reduce spillback on Sam Newell Road between Matthews Township Parkway and Site Drive 1. These lanes include a southbound through lane at Matthews Township Parkway and a northbound left turn lane at Site Drive 1. Sight distance for vehicles turning left from Site Drive 1 onto northbound Sam Newell Road will be restricted during peak hours. Prohibiting this left turn movement from Site Drive 1, while still allowing a left turn onto Site Drive 1, will be a safer alternative. A concrete pork chop island on Site Drive 1 could be constructed to prohibit this left turn movement if considered necessary.

Please feel free to contact me with any questions or comments regarding this study.

Sincerely,
Ramey Kemp & Associates, Inc.

J. Andrew Eagle

J. Andrew Eagle, P.E., PTOE
Senior Transportation Engineer

Attachments

- Appendix A – Figures
- Appendix B – Traffic Count Data
- Appendix C – Synchro and SimTraffic Reports
- Appendix D – NCDOT Conceptual Design
- Appendix E – Proposed Improvements by Developer

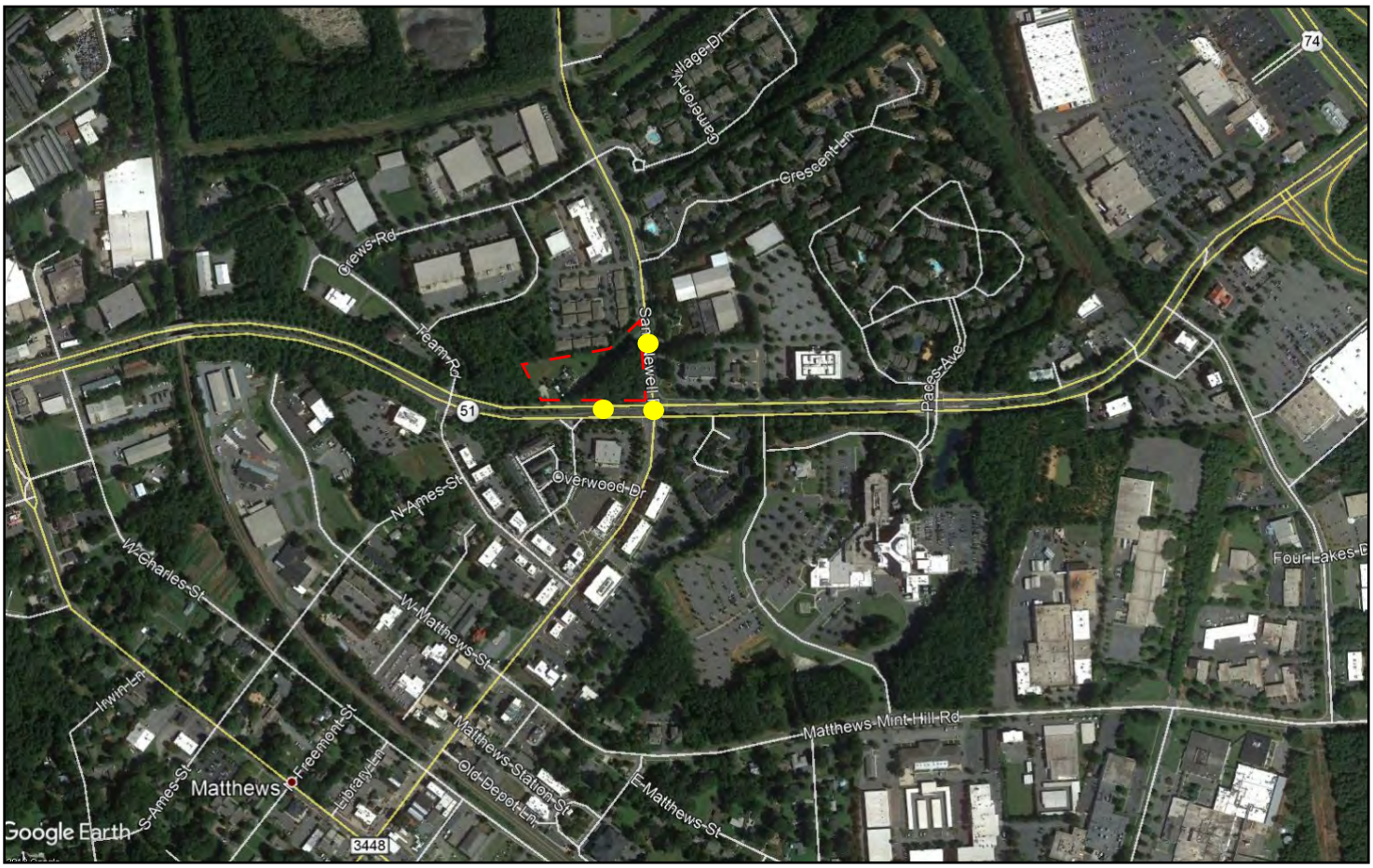
NORTH CAROLINA PROFESSIONAL SEAL 036792 ENGINEER J. ANDREW EAGLE

J. Andrew Eagle
1-30-2018

TECHNICAL APPENDIX

APPENDIX A

FIGURES

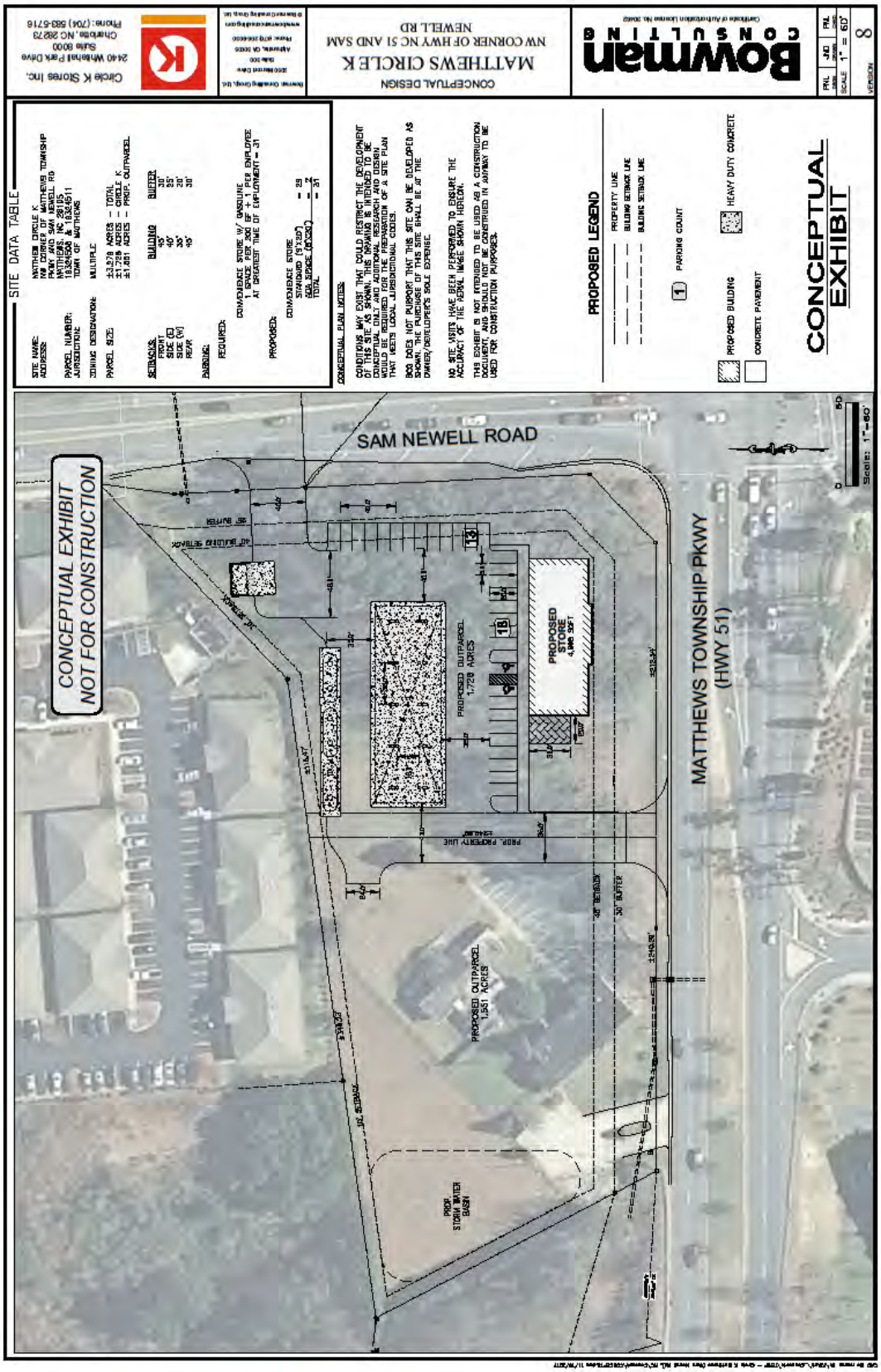


LEGEND

Proposed Site Location

Study Intersection

RAMEY KEMP & ASSOCIATES TRANSPORTATION ENGINEERS	Sam Newell Road Gas Station Matthews, NC	Site Location Map Scale: Not to Scale Figure 1



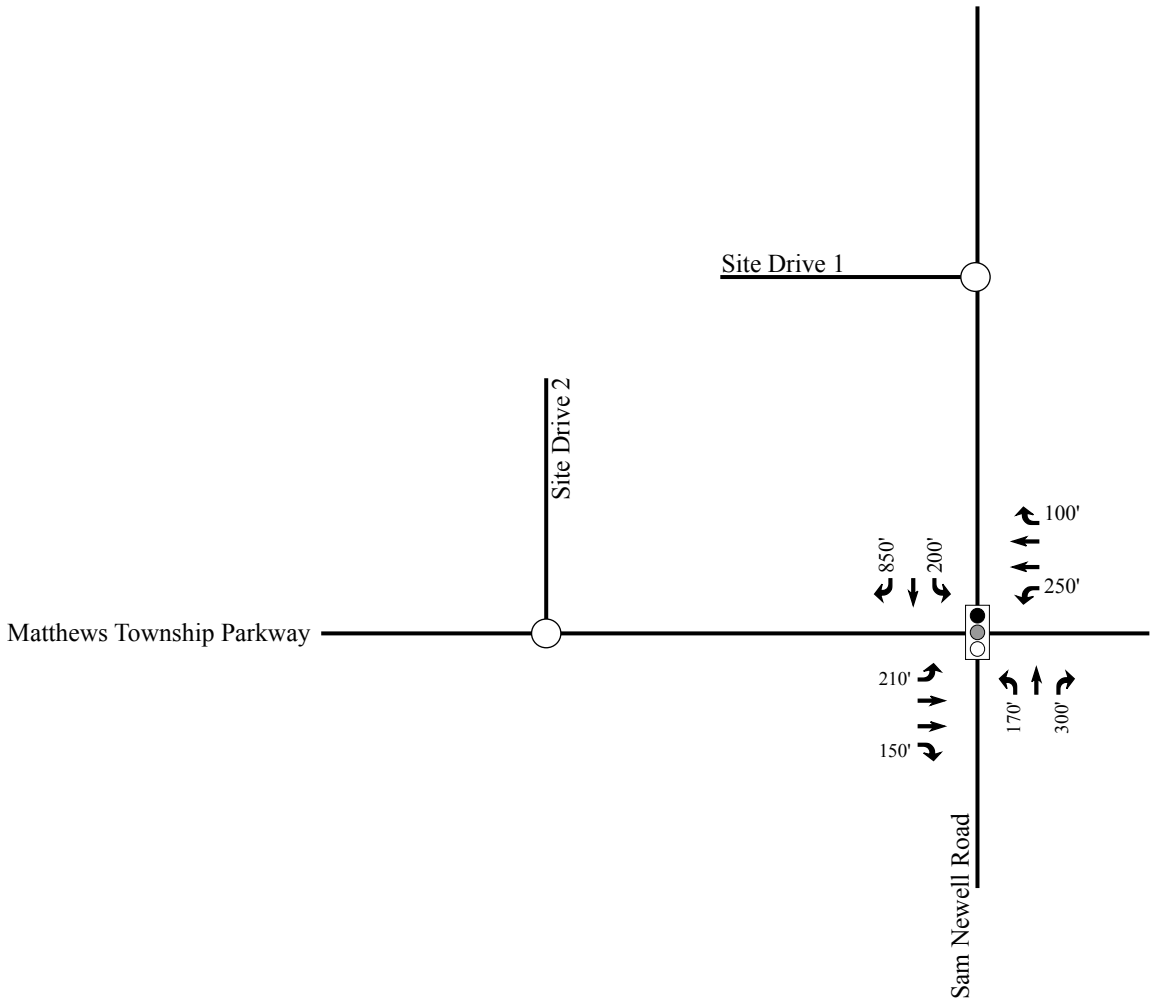
RAMEY KEMP & ASSOCIATES
TRANSPORTATION ENGINEERS

Sam Newell Road
Gas Station
Matthews, NC

2017 Existing
Lane Configurations

Scale: Not to Scale

Figure 2



LEGEND

- Unsignalized Intersection
- Signalized Intersection
- Existing Lane
- X' Storage (In Feet)

N

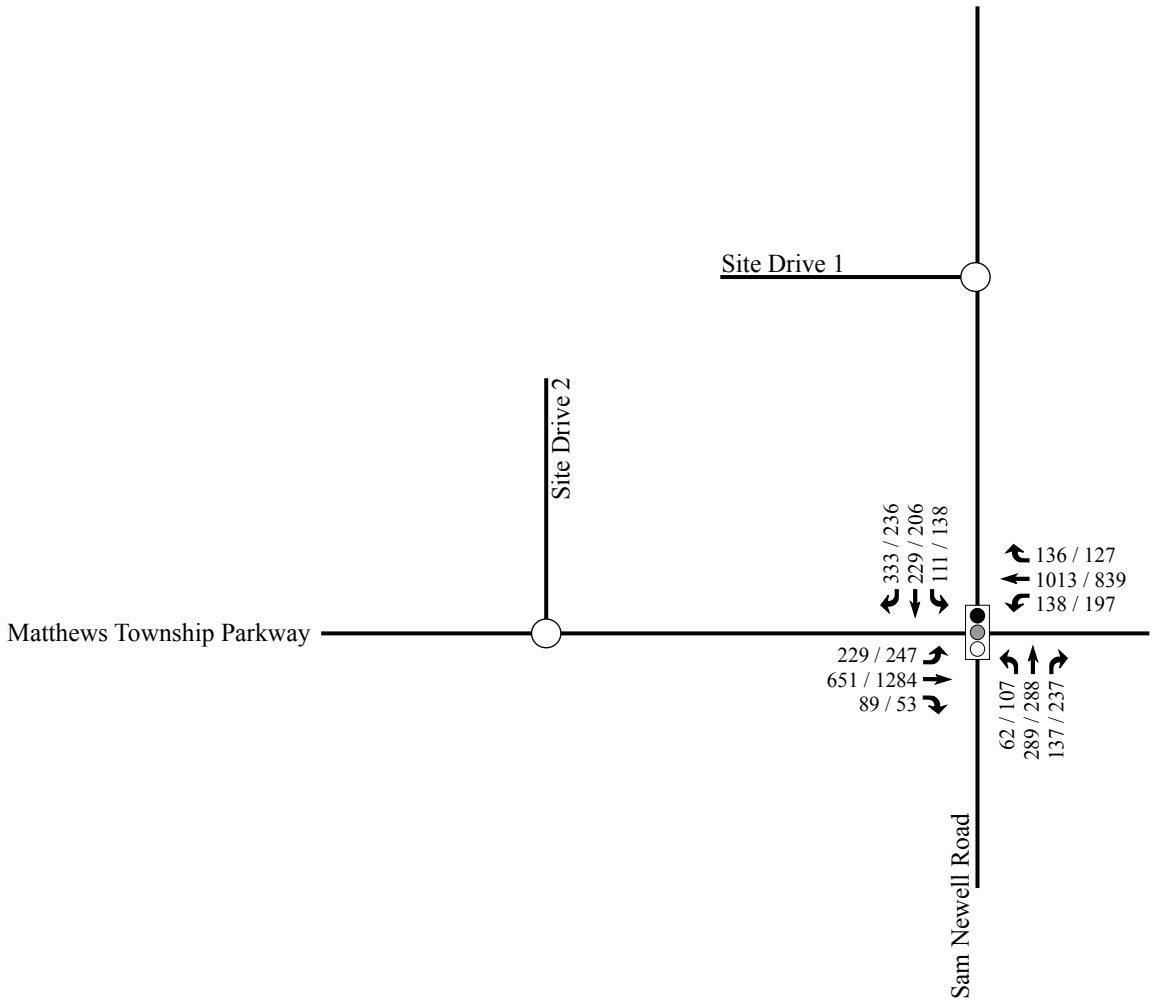
RAMEY KEMP & ASSOCIATES
TRANSPORTATION ENGINEERS

Sam Newell Road
Gas Station
Matthews, NC

2018 Existing
Lane Configurations

Scale: Not to Scale

Figure 3



LEGEND

Unsignalized Intersection

Signalized Intersection

X / Y → AM / PM Peak Hour Traffic Volumes

N

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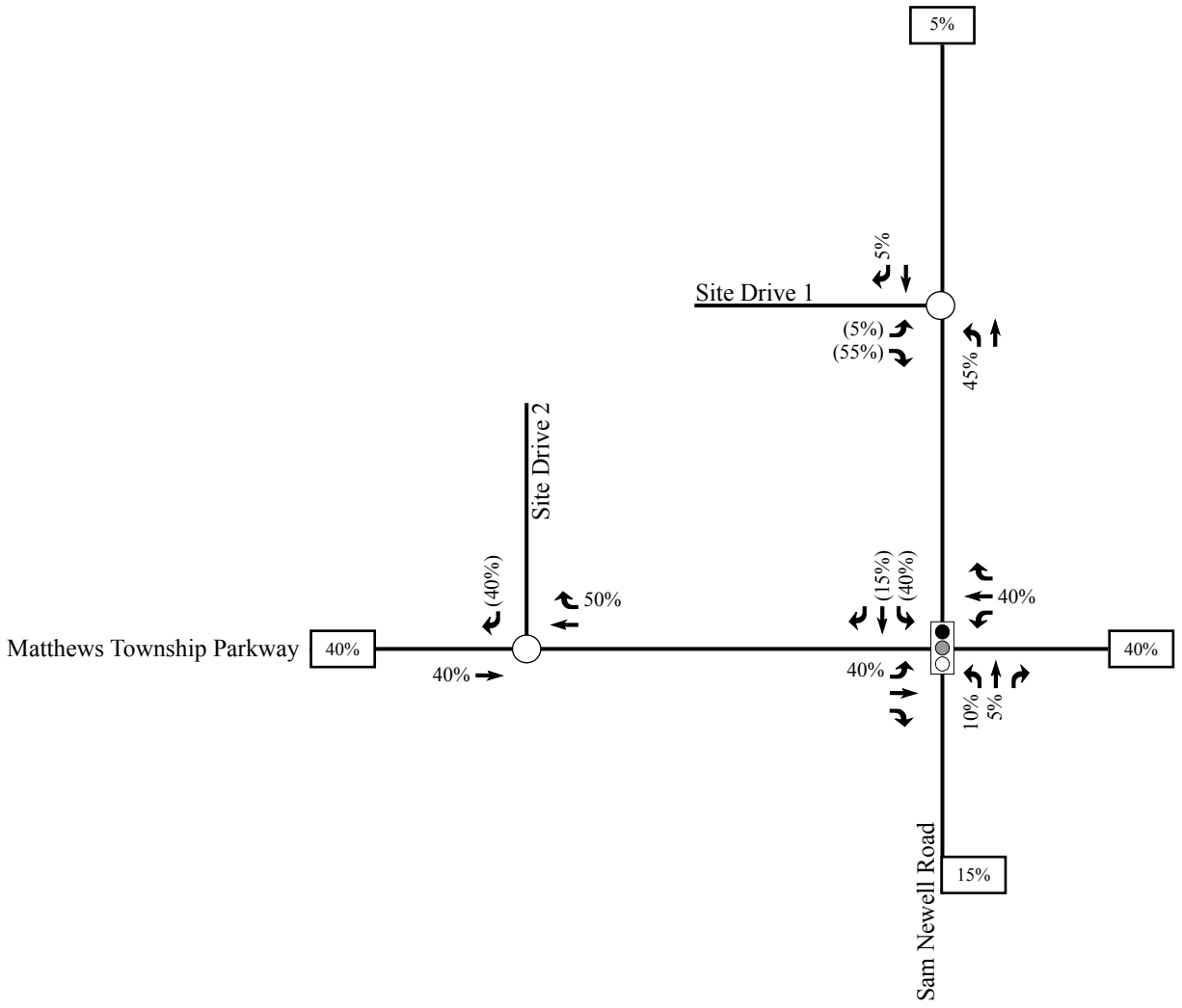
TRANSPORTATION ENGINEERS

Sam Newell Road
Gas Station
Matthews, NC

2018 Existing
Peak Hour Traffic Volumes

Scale: Not to Scale

Figure 4



LEGEND

- Unsignalized Intersection
- Signalized Intersection
- X% → Entering Trip Distribution
- (Y%) → Exiting Trip Distribution
- XX% Regional Trip Distribution

N

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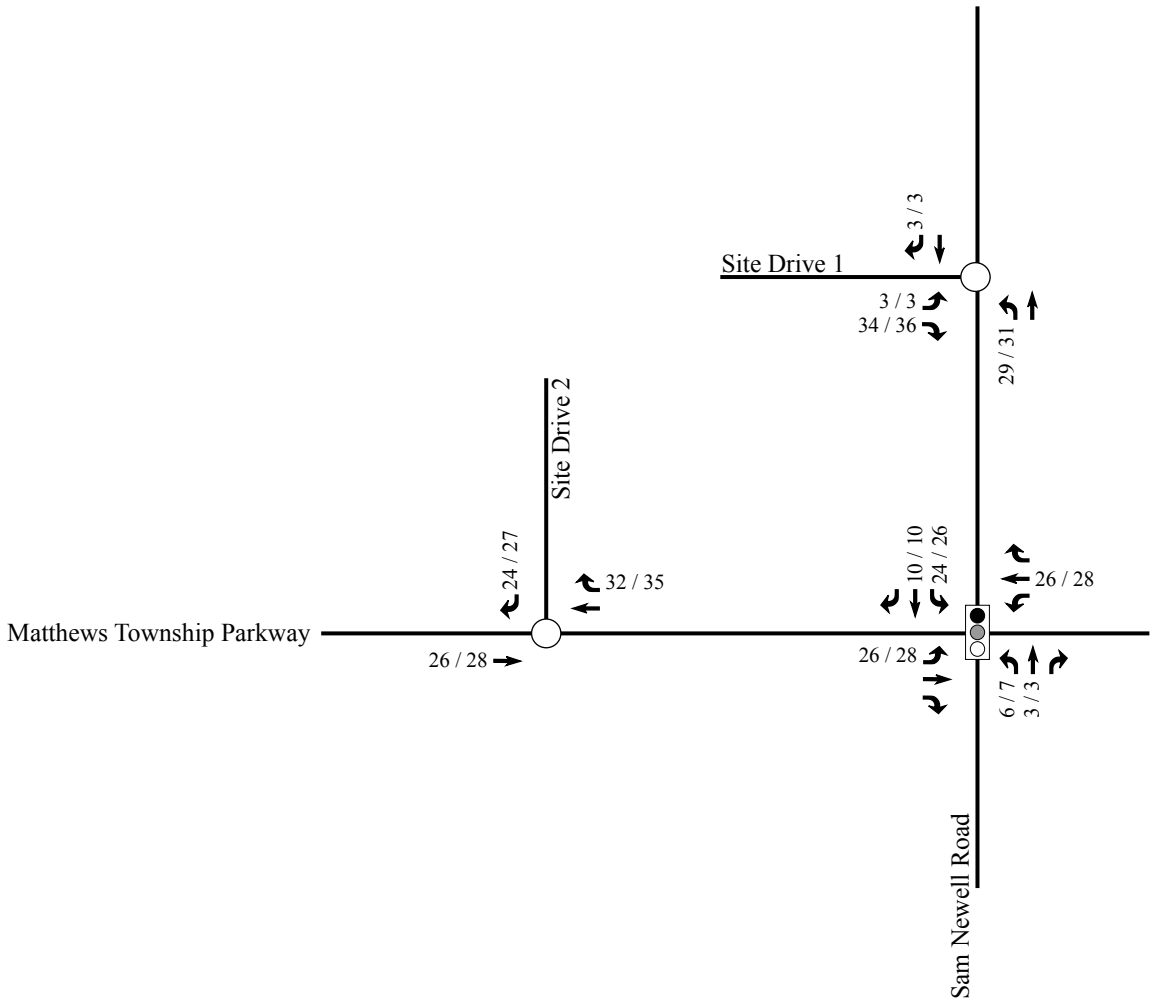
TRANSPORTATION ENGINEERS

Sam Newell Road
Gas Station
Matthews, NC

Proposed Site
Primary
Trip Distribution Percentages

Scale: Not to Scale

Figure 5



LEGEND

Unsignalized Intersection

Signalized Intersection

X / Y → AM / PM Peak Hour Traffic Volumes

N

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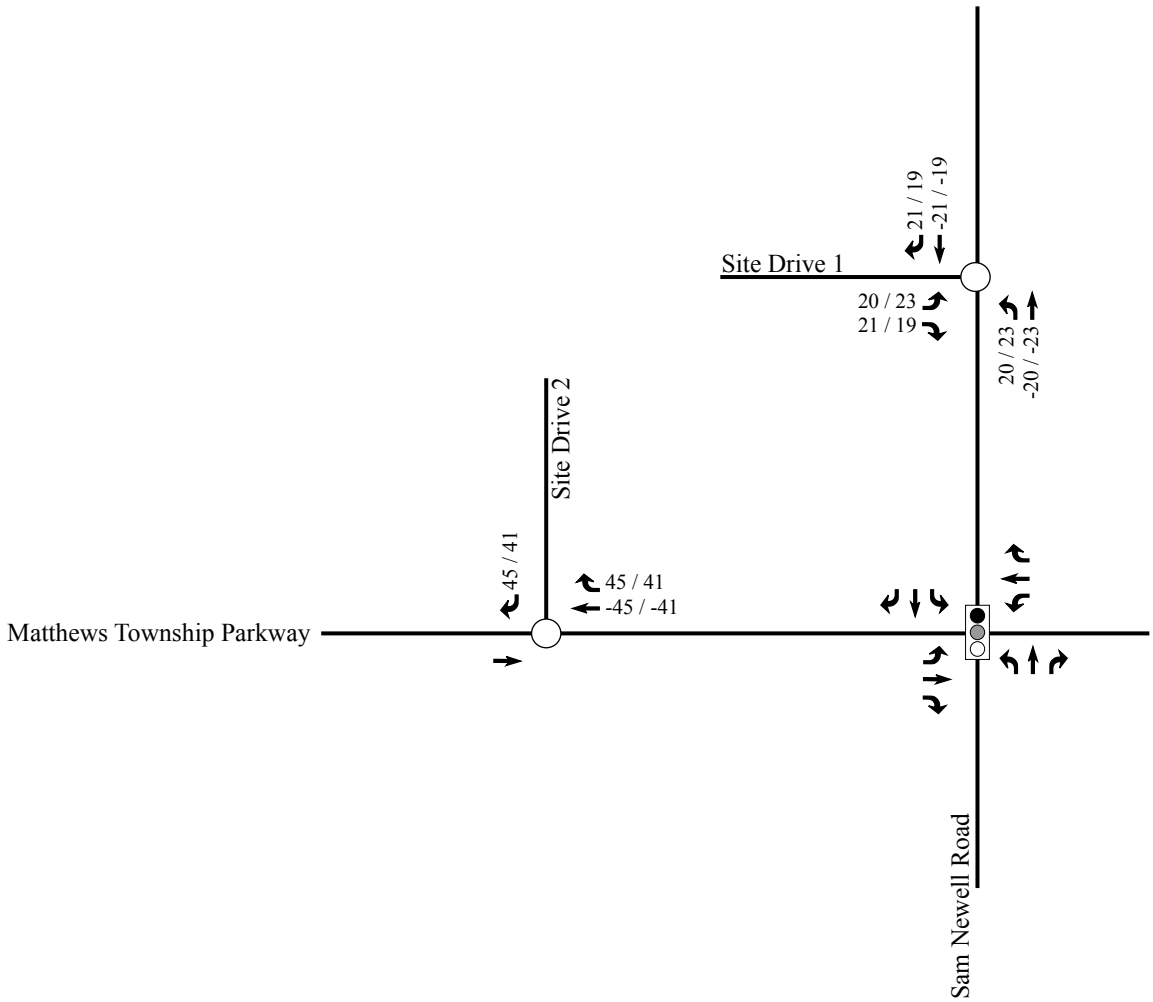
TRANSPORTATION ENGINEERS

Sam Newell Road
Gas Station
Matthews, NC

Proposed Site
Primary
Trip Assignment

Scale: Not to Scale

Figure 6



LEGEND

Unsignalized Intersection

Signalized Intersection

X / Y → AM / PM Peak Hour Traffic Volumes

N

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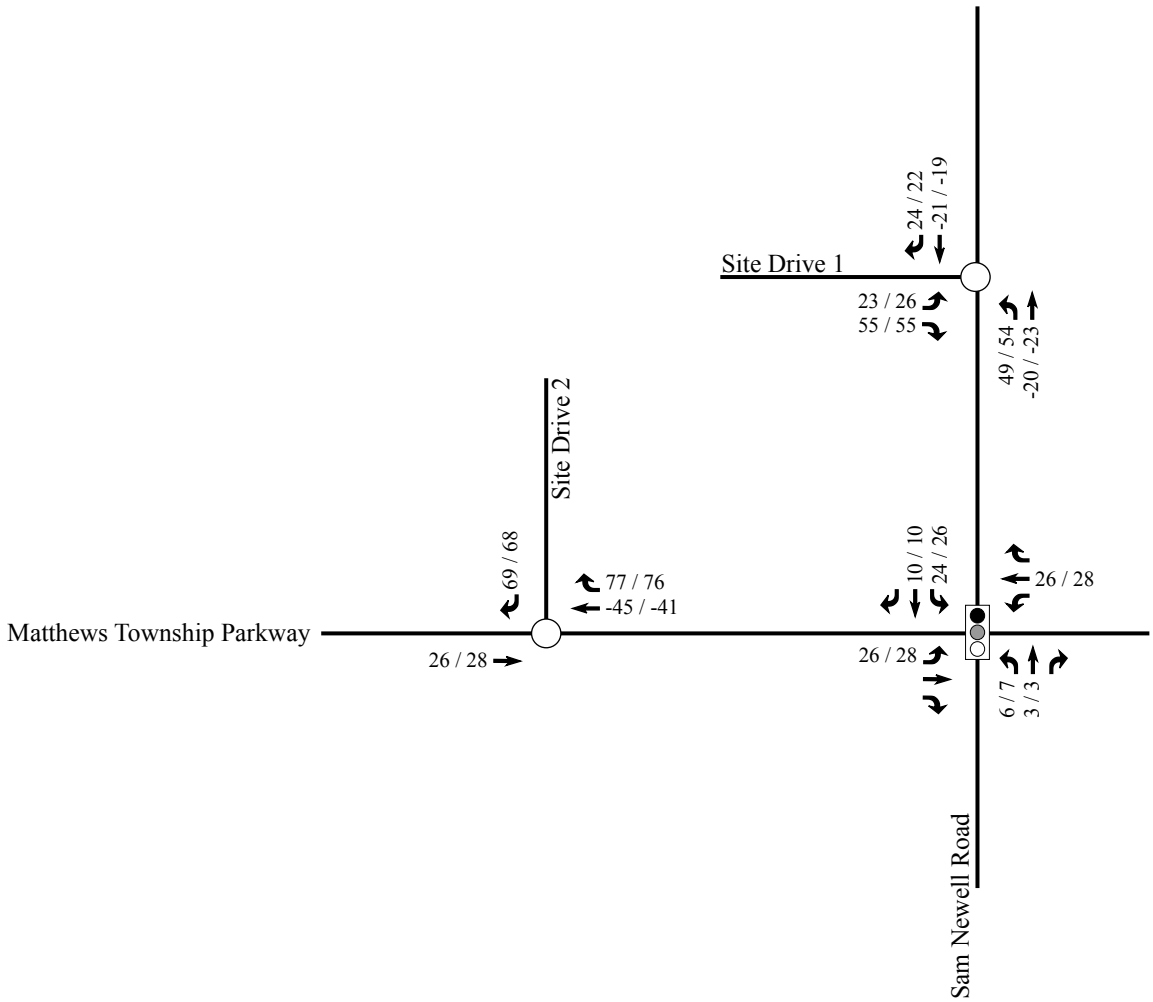
TRANSPORTATION ENGINEERS

Sam Newell Road
Gas Station
Matthews, NC

Proposed Site
Pass-by
Trip Assignment

Scale: Not to Scale

Figure 7



LEGEND

Unsignalized Intersection

Signalized Intersection

X / Y → AM / PM Peak Hour Traffic Volumes

N

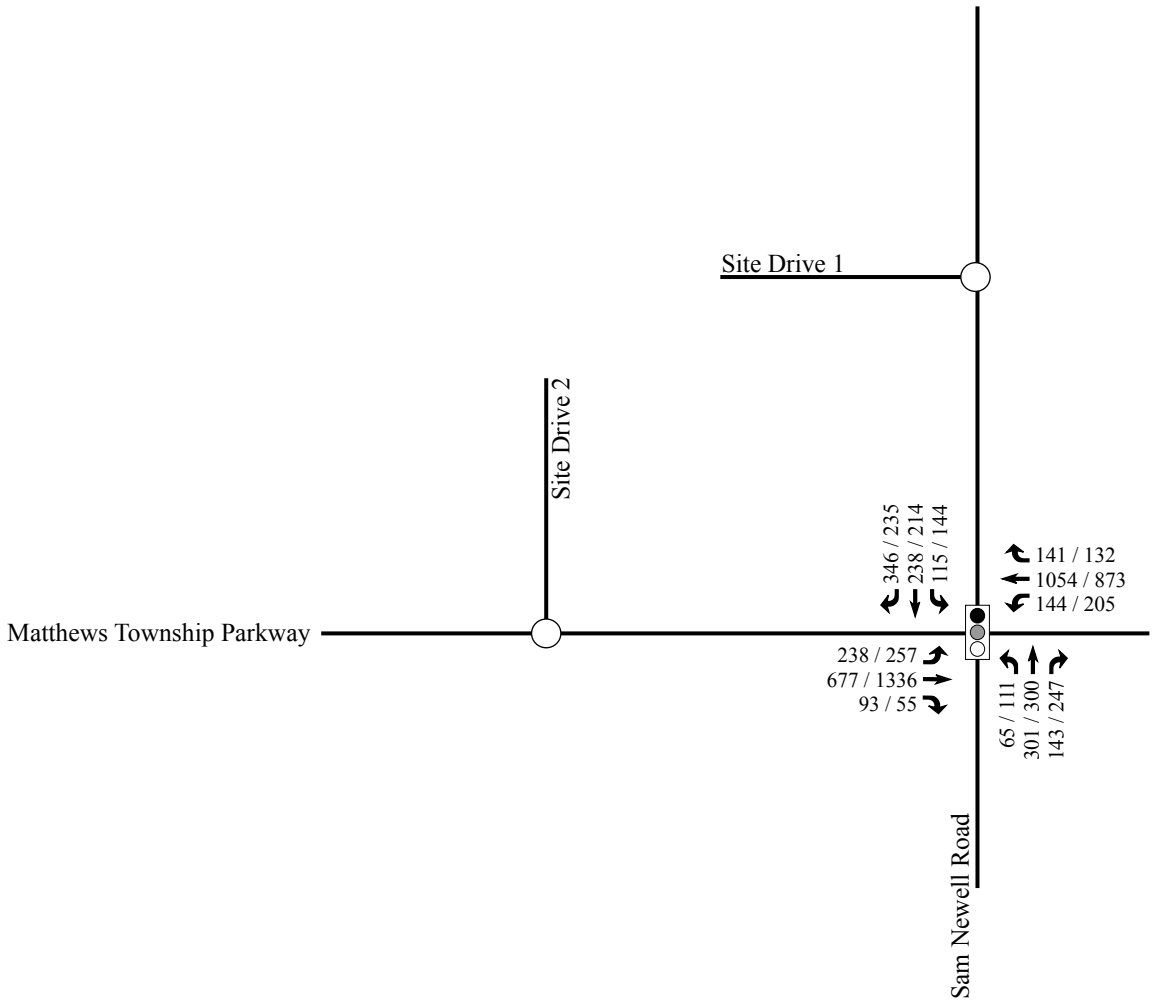
RAMEY KEMP & ASSOCIATES
TRANSPORTATION ENGINEERS

Sam Newell Road
Gas Station
Matthews, NC

Proposed Site
Total
Trip Assignment

Scale: Not to Scale

Figure 8



LEGEND

Unsignalized Intersection

Signalized Intersection

X / Y → AM / PM Peak Hour Traffic Volumes

N

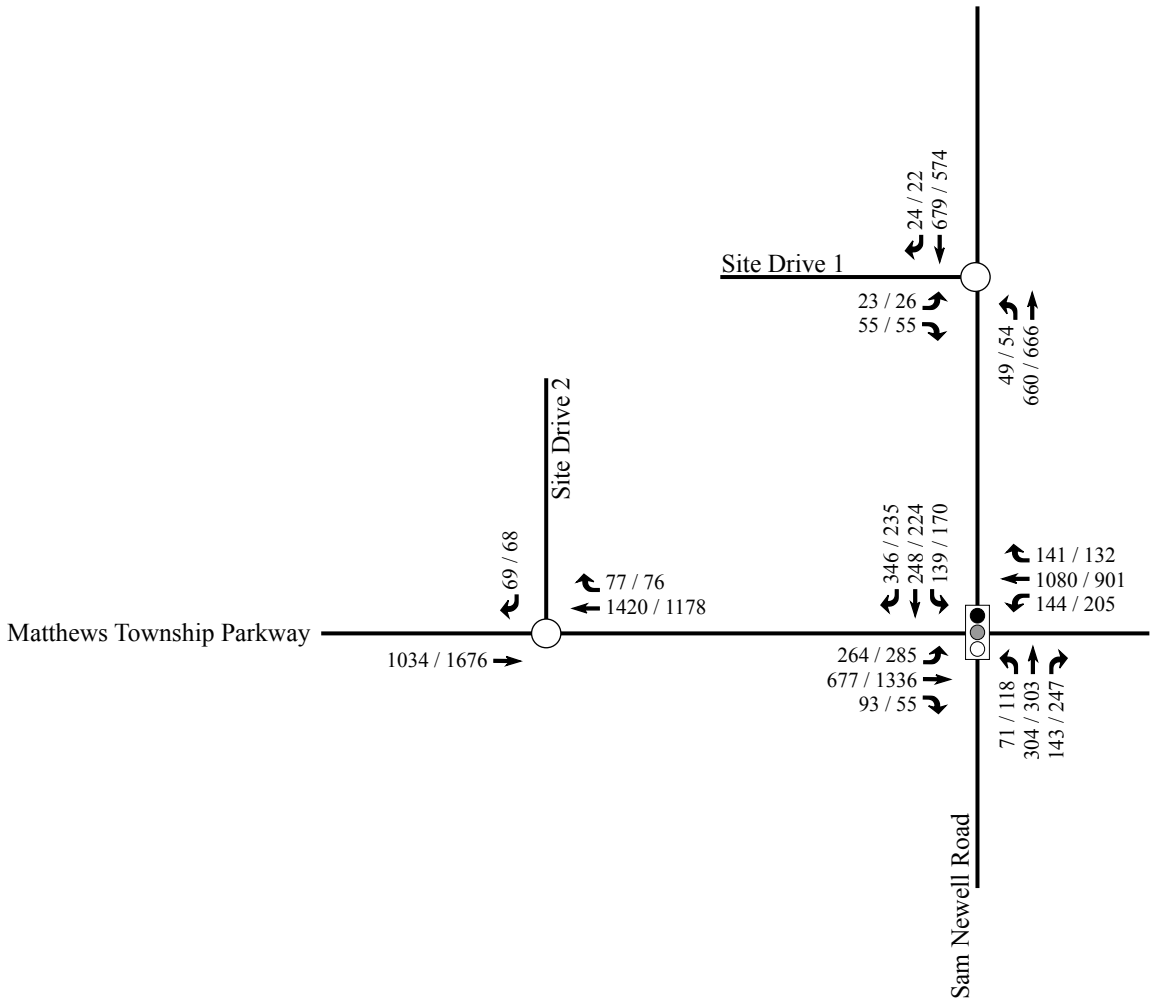
RAMEY KEMP & ASSOCIATES
TRANSPORTATION ENGINEERS

Sam Newell Road
Gas Station
Matthews, NC

2020 Projected
Peak Hour Traffic Volumes

Scale: Not to Scale

Figure 9



LEGEND

Unsignalized Intersection

Signalized Intersection

X / Y → AM / PM Peak Hour Traffic Volumes

N

RAMEY KEMP & ASSOCIATES
TRANSPORTATION ENGINEERS

Sam Newell Road
Gas Station
Matthews, NC

2020 Build
Peak Hour Traffic Volumes

Scale: Not to Scale

Figure 10

APPENDIX B

TRAFFIC COUNT DATA

Burns Service Inc.

1202 Langdon Terrace Drive
Indian Trail, NC, 28079
We Count because YOU Count

File Name : Mathews(Mathews Township and Sam Newell) AM Peak
Site Code :
Start Date : 1/24/2018
Page No : 1

Groups Printed- Cars + - Trucks

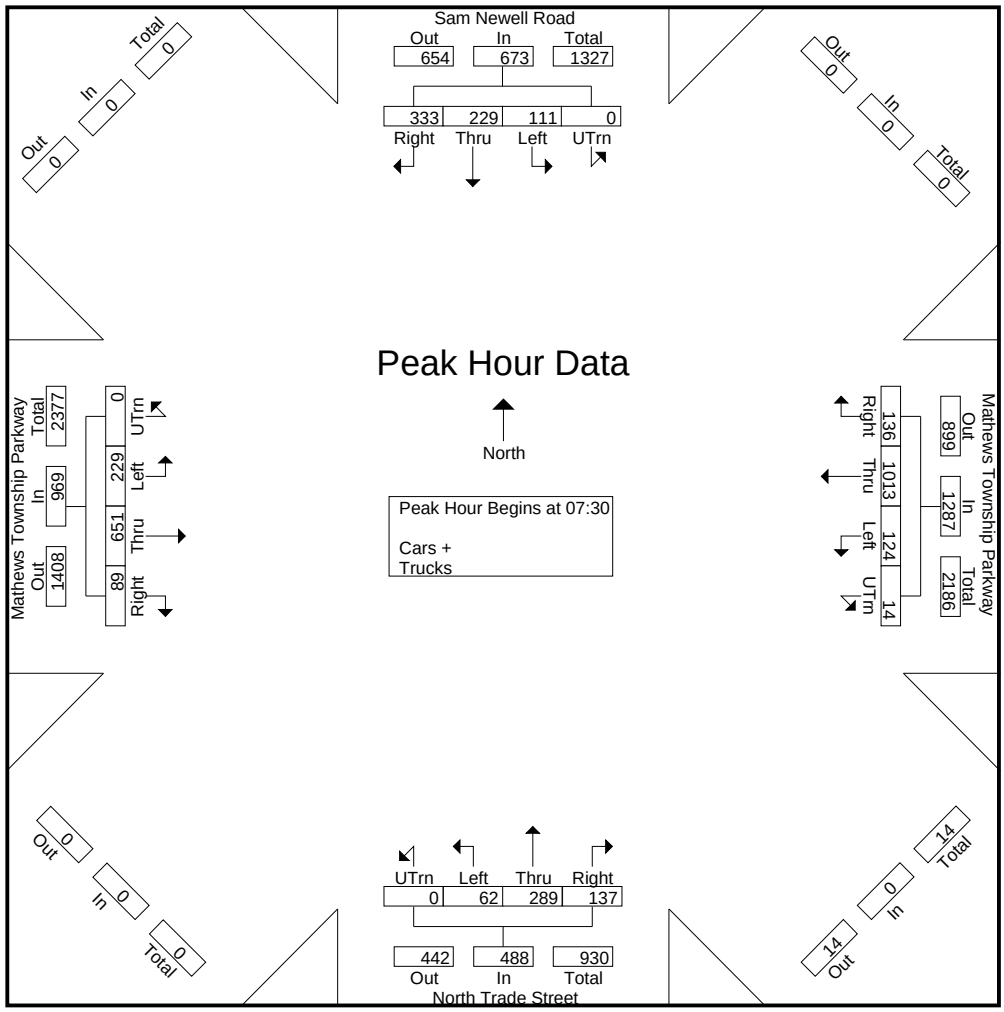
	Sam Newell Road Southbound					Mathews Township Parkway Westbound					North Trade Street Northbound					Mathews Township Parkway Eastbound					
Start Time	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Int. Total
07:00	66	38	28	0	132	12	209	21	3	245	29	57	10	0	96	4	115	24	0	143	616
07:15	93	52	24	0	169	28	301	21	2	352	16	62	12	0	90	11	132	34	3	180	791
07:30	86	73	26	0	185	26	270	25	3	324	27	71	9	0	107	14	160	60	0	234	850
07:45	69	53	27	0	149	37	238	34	2	311	38	79	13	0	130	21	172	64	0	257	847
Total	314	216	105	0	635	103	1018	101	10	1232	110	269	44	0	423	50	579	182	3	814	3104
08:00	99	56	26	0	181	41	271	35	2	349	37	63	16	0	116	18	149	61	0	228	874
08:15	79	47	32	0	158	32	234	30	7	303	35	76	24	0	135	36	170	44	0	250	846
08:30	100	62	31	0	193	29	251	23	7	310	39	77	13	0	129	9	145	48	0	202	834
08:45	117	81	30	0	228	29	169	42	8	248	37	78	10	0	125	22	147	67	0	236	837
Total	395	246	119	0	760	131	925	130	24	1210	148	294	63	0	505	85	611	220	0	916	3391
Grand Total	709	462	224	0	1395	234	1943	231	34	2442	258	563	107	0	928	135	1190	402	3	1730	6495
Apprch %	50.8	33.1	16.1	0		9.6	79.6	9.5	1.4		27.8	60.7	11.5	0		7.8	68.8	23.2	0.2		
Total %	10.9	7.1	3.4	0	21.5	3.6	29.9	3.6	0.5	37.6	4	8.7	1.6	0	14.3	2.1	18.3	6.2	0	26.6	
Cars +	709	461	224	0	1394	233	1942	230	34	2439	256	562	106	0	924	135	1183	399	3	1720	6477
% Cars +	100	99.8	100	0	99.9	99.6	99.9	99.6	100	99.9	99.2	99.8	99.1	0	99.6	100	99.4	99.3	100	99.4	99.7
Trucks	0	1	0	0	1	1	1	1	0	3	2	1	1	0	4	0	7	3	0	10	18
% Trucks	0	0.2	0	0	0.1	0.4	0.1	0.4	0	0.1	0.8	0.2	0.9	0	0.4	0	0.6	0.7	0	0.6	0.3

Burns Service Inc.

1202 Langdon Terrace Drive
Indian Trail, NC, 28079
We Count because YOU Count

File Name : Mathews(Mathews Township and Sam Newell) AM Peak
Site Code :
Start Date : 1/24/2018
Page No : 2

	Sam Newell Road Southbound					Mathews Township Parkway Westbound					North Trade Street Northbound					Mathews Township Parkway Eastbound					
Start Time	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30																					
07:30	86	**73**	26	0	**185**	26	270	25	3	324	27	71	9	0	107	14	160	60	0	234	850
07:45	69	53	27	0	149	37	238	34	2	311	**38**	**79**	13	0	130	21	**172**	**64**	0	**257**	847
08:00	**99**	56	26	0	181	**41**	**271**	**35**	2	**349**	37	63	16	0	116	18	149	61	0	228	**874**
08:15	79	47	**32**	0	158	32	234	30	**7**	303	35	76	**24**	0	**135**	**36**	170	44	0	250	846
Total Volume	333	229	111	0	673	136	1013	124	14	1287	137	289	62	0	488	89	651	229	0	969	3417
% App. Total	49.5	34	16.5	0		10.6	78.7	9.6	1.1		28.1	59.2	12.7	0		9.2	67.2	23.6	0		
PHF	.841	.784	.867	.000	.909	.829	.935	.886	.500	.922	.901	.915	.646	.000	.904	.618	.946	.895	.000	.943	.977



Burns Service Inc.

1202 Langdon Terrace Drive
Indian Trail, NC, 28079
We Count because YOU Count

File Name : Mathews(Mathews Township and Sam Newell) PM Peak
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Groups Printed- Cars + - Trucks

	Sam Newell Road Southbound					Mathews Township Parkway Westbound					North Trade Street Northbound					Mathews Township Parkway Eastbound					
Start Time	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Int. Total
16:00	71	66	38	0	175	24	187	40	13	264	54	71	29	0	154	11	329	57	1	398	991
16:15	69	69	49	0	187	24	190	44	15	273	59	65	30	0	154	11	284	38	0	333	947
16:30	56	59	45	0	160	24	150	33	14	221	48	75	26	0	149	11	316	48	2	377	907
16:45	53	67	41	0	161	34	190	49	16	289	59	65	32	0	156	15	285	45	3	348	954
Total	249	261	173	0	683	106	717	166	58	1047	220	276	117	0	613	48	1214	188	6	1456	3799
17:00	67	53	50	0	170	29	203	34	8	274	55	79	34	0	168	13	314	49	0	376	988
17:15	50	43	28	0	121	40	234	44	5	323	65	71	25	0	161	8	344	57	3	412	1017
17:30	62	56	31	0	149	30	192	47	9	278	68	72	23	0	163	18	296	51	1	366	956
17:45	47	54	29	0	130	28	210	47	3	288	49	66	25	0	140	14	330	85	1	430	988
Total	226	206	138	0	570	127	839	172	25	1163	237	288	107	0	632	53	1284	242	5	1584	3949
Grand Total	475	467	311	0	1253	233	1556	338	83	2210	457	564	224	0	1245	101	2498	430	11	3040	7748
Apprch %	37.9	37.3	24.8	0		10.5	70.4	15.3	3.8		36.7	45.3	18	0		3.3	82.2	14.1	0.4		
Total %	6.1	6	4	0	16.2	3	20.1	4.4	1.1	28.5	5.9	7.3	2.9	0	16.1	1.3	32.2	5.5	0.1	39.2	
Cars +	475	467	311	0	1253	233	1553	338	83	2207	457	564	224	0	1245	101	2494	430	11	3036	7741
% Cars +	100	100	100	0	100	100	99.8	100	100	99.9	100	100	100	0	100	100	99.8	100	100	99.9	99.9
Trucks	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	4	0	0	4	7
% Trucks	0	0	0	0	0	0	0.2	0	0	0.1	0	0	0	0	0	0	0.2	0	0	0.1	0.1

Burns Service Inc.

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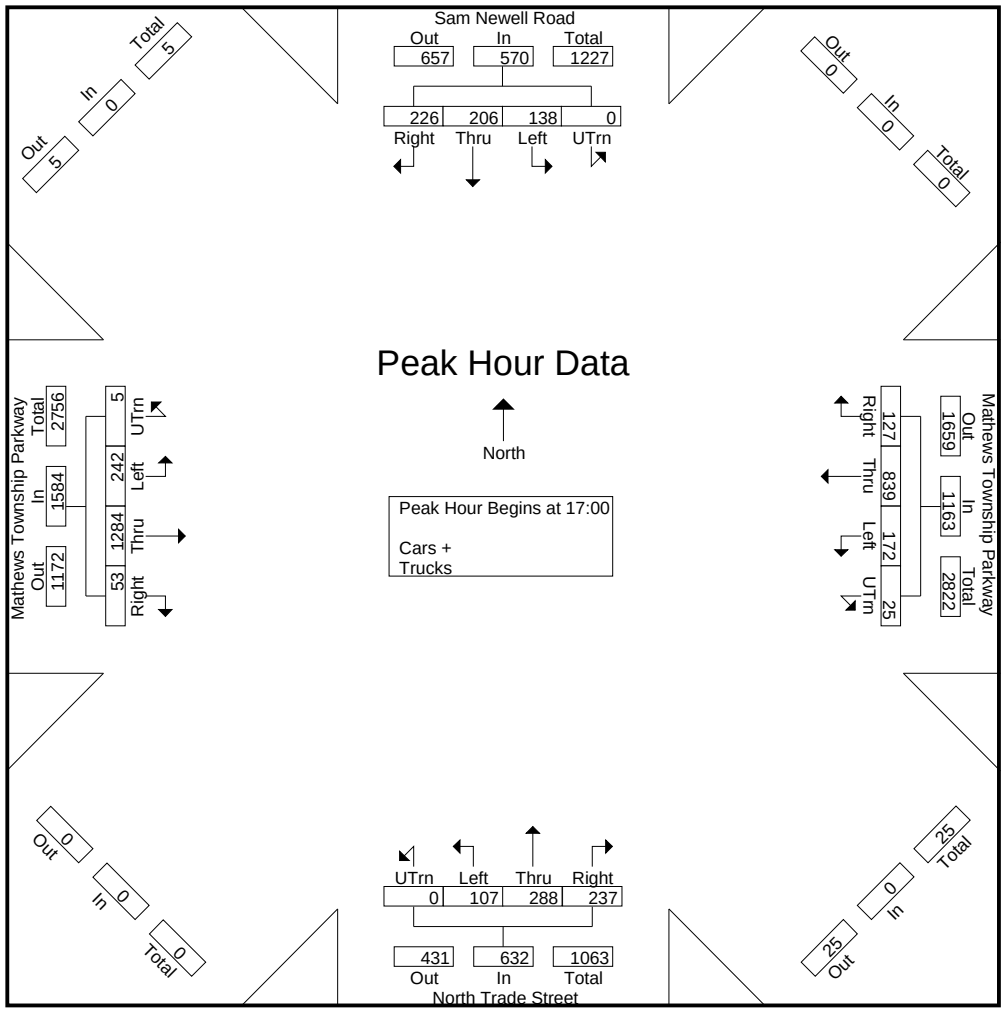
Start Time	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 17:00																					
17:00	**67**	53	**50**	0	**170**	29	203	34	8	274	55	**79**	**34**	0	**168**	13	314	49	0	376	988
17:15	50	43	28	0	121	**40**	**234**	44	5	**323**	65	71	25	0	161	8	**344**	57	**3**	412	**1017**
17:30	62	**56**	31	0	149	30	192	**47**	**9**	278	**68**	72	23	0	163	**18**	296	51	1	366	956
17:45	47	54	29	0	130	28	210	47	3	288	49	66	25	0	140	14	330	**85**	1	**430**	988
Total Volume	226	206	138	0	570	127	839	172	25	1163	237	288	107	0	632	53	1284	242	5	1584	3949
% App. Total	39.6	36.1	24.2	0		10.9	72.1	14.8	2.1		37.5	45.6	16.9	0		3.3	81.1	15.3	0.3		
PHF	.843	.920	.690	.000	.838	.794	.896	.915	.694	.900	.871	.911	.787	.000	.940	.736	.933	.712	.417	.921	.971



APPENDIX C

SYNCHRO REPORTS AND SIMTRAFFIC REPORTS

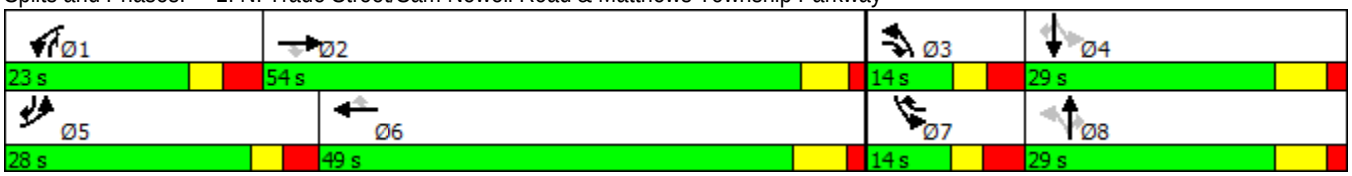
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	264	677	93	144	1080	141	71	304	143	139	248	346
Future Volume (vph)	264	677	93	144	1080	141	71	304	143	139	248	346
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			-2%			0%			-1%	
Storage Length (ft)	210		150	250		100	170		300	200		0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	100			120			70			175		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	3504	1567	1787	3575	1599	1770	1863	1583	1778	3557	1591
Flt Permitted	0.950			0.950			0.510			0.170		
Satd. Flow (perm)	1752	3504	1567	1787	3575	1599	950	1863	1583	318	3557	1591
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		317			2993			4577			336	
Travel Time (s)		4.8			45.3			69.3			5.1	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	293	752	103	160	1200	157	79	338	159	154	276	384
Shared Lane Traffic (%)												
Lane Group Flow (vph)	293	752	103	160	1200	157	79	338	159	154	276	384
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		10			10			10			10	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	0.99	0.99	0.99	1.00	1.00	1.00	0.99	0.99	0.99
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	5
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	3	1	6	7	3	8	1	7	4	5
Switch Phase												
Minimum Initial (s)	7.0	12.0	7.0	7.0	12.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.0	18.0	14.0	14.0	19.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Total Split (s)	28.0	54.0	14.0	23.0	49.0	14.0	14.0	29.0	23.0	14.0	29.0	28.0
Total Split (%)	23.3%	45.0%	11.7%	19.2%	40.8%	11.7%	11.7%	24.2%	19.2%	11.7%	24.2%	23.3%
Maximum Green (s)	21.9	48.0	7.7	16.5	42.4	7.4	7.7	22.4	16.5	7.4	22.4	21.9
Yellow Time (s)	3.0	4.3	3.0	3.0	4.7	3.0	3.0	4.6	3.0	3.0	4.6	3.0
All-Red Time (s)	3.1	1.7	3.3	3.5	1.9	3.6	3.3	2.0	3.5	3.6	2.0	3.1
Lost Time Adjust (s)	-1.1	-1.0	-1.3	-1.5	-1.6	-1.6	-1.3	-1.6	-1.5	-1.6	-1.6	-1.1
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	1.0	6.0	1.0	1.0	6.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Minimum Gap (s)	0.2	3.0	0.2	0.2	3.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time Before Reduce (s)	0.0	20.0	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	30.0	0.0	0.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Min	None	None	Min	None	None	None	None	None	None	None
Act Effct Green (s)	21.8	50.5	64.2	14.7	43.4	57.5	31.8	23.2	42.9	32.5	23.5	50.4
Actuated g/C Ratio	0.19	0.43	0.55	0.13	0.37	0.49	0.27	0.20	0.37	0.28	0.20	0.43
v/c Ratio	0.90	0.50	0.12	0.71	0.91	0.20	0.25	0.92	0.28	0.77	0.39	0.56
Control Delay	77.8	26.3	14.3	67.4	46.6	18.4	31.6	78.0	27.4	57.7	43.0	29.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	77.8	26.3	14.3	67.4	46.6	18.4	31.6	78.0	27.4	57.7	43.0	29.2
LOS	E	C	B	E	D	B	C	E	C	E	D	C
Approach Delay		38.4			45.9			57.7			39.3	
Approach LOS		D			D			E			D	
Queue Length 50th (ft)	222	219	38	120	462	68	44	258	85	89	97	217
Queue Length 95th (ft)	#377	287	70	191	#598	111	82	#432	136	#173	141	319
Internal Link Dist (ft)		237			2913			4497			256	
Turn Bay Length (ft)	210		150	250		100	170		300	200		
Base Capacity (vph)	343	1507	861	274	1341	781	322	381	622	200	734	698
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.85	0.50	0.12	0.58	0.89	0.20	0.25	0.89	0.26	0.77	0.38	0.55

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 117.5
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 44.1 — Intersection LOS: D
Intersection Capacity Utilization 84.8% — ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: N. Trade Street/Sam Newell Road & Matthews Township Parkway



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	23	55	49	660	679	24
Future Volume (vph)	23	55	49	660	679	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			0%	-1%	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Frt		0.850			0.995	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	1863	3539	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1770	1583	1770	1863	3539	0
Link Speed (mph)	30			45	45	
Link Distance (ft)	404			336	556	
Travel Time (s)	9.2			5.1	8.4	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	26	61	54	733	754	27
Shared Lane Traffic (%)						
Lane Group Flow (vph)	26	61	54	733	781	0
Enter Blocked Intersection	1 veh	1 veh	2 veh	Yes	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			24	24	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	10			10	10	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	0.99	0.99
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 44.7%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	23	55	49	660	679	24
Future Volume (Veh/h)	23	55	49	660	679	24
Sign Control	Stop			Free	Free	
Grade	0%			0%	-1%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	26	61	54	733	754	27
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				336		
pX, platoon unblocked	0.82					
vC, conflicting volume	1608	390	781			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1632	390	781			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	63	90	94			
cM capacity (veh/h)	71	608	832			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	26	61	54	733	503	278
Volume Left	26	0	54	0	0	0
Volume Right	0	61	0	0	0	27
cSH	71	608	832	1700	1700	1700
Volume to Capacity	0.37	0.10	0.06	0.43	0.30	0.16
Queue Length 95th (ft)	35	8	5	0	0	0
Control Delay (s)	82.4	11.6	9.6	0.0	0.0	0.0
Lane LOS	F	B	A			
Approach Delay (s)	32.7		0.7		0.0	
Approach LOS	D					

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	44.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	1034	1420	77	0	69
Future Volume (vph)	0	1034	1420	77	0	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		2%	0%		0%	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.992			0.865
Flt Protected						
Satd. Flow (prot)	0	3504	3511	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	3504	3511	0	0	1611
Link Speed (mph)		45	45		30	
Link Distance (ft)		2662	317		238	
Travel Time (s)		40.3	4.8		5.4	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	1149	1578	86	0	77
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1149	1664	0	0	77
Enter Blocked Intersection	No	Yes	Yes	Yes	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		0	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		10	10		10	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 52.6%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	1034	1420	77	0	69
Future Volume (Veh/h)	0	1034	1420	77	0	69
Sign Control		Free	Free		Stop	
Grade		2%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	1149	1578	86	0	77
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			317			
pX, platoon unblocked	0.68				0.68	0.68
vC, conflicting volume	1664				2196	832
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1029				1813	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	90
cM capacity (veh/h)	455				47	735

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	574	574	1052	612	77
Volume Left	0	0	0	0	0
Volume Right	0	0	0	86	77
cSH	1700	1700	1700	1700	735
Volume to Capacity	0.34	0.34	0.62	0.36	0.10
Queue Length 95th (ft)	0	0	0	0	9
Control Delay (s)	0.0	0.0	0.0	0.0	10.5
Lane LOS					B
Approach Delay (s)	0.0		0.0		10.5
Approach LOS					B

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		

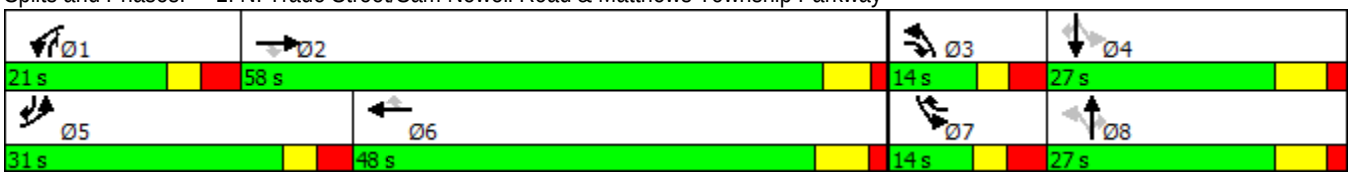
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	285	1336	55	205	901	132	118	303	247	170	224	235
Future Volume (vph)	285	1336	55	205	901	132	118	303	247	170	224	235
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			-2%			0%			-1%	
Storage Length (ft)	210		150	250		100	170		300	200		0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	100			120			70			175		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	3504	1567	1787	3575	1599	1770	1863	1583	1778	3557	1591
Flt Permitted	0.950			0.950			0.526			0.181		
Satd. Flow (perm)	1752	3504	1567	1787	3575	1599	980	1863	1583	339	3557	1591
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		317			2993			4577			336	
Travel Time (s)		4.8			45.3			69.3			5.1	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	317	1484	61	228	1001	147	131	337	274	189	249	261
Shared Lane Traffic (%)												
Lane Group Flow (vph)	317	1484	61	228	1001	147	131	337	274	189	249	261
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		10			10			10			10	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	0.99	0.99	0.99	1.00	1.00	1.00	0.99	0.99	0.99
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	5
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	3	1	6	7	3	8	1	7	4	5
Switch Phase												
Minimum Initial (s)	7.0	12.0	7.0	7.0	12.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.0	18.0	14.0	14.0	19.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Total Split (s)	31.0	58.0	14.0	21.0	48.0	14.0	14.0	27.0	21.0	14.0	27.0	31.0
Total Split (%)	25.8%	48.3%	11.7%	17.5%	40.0%	11.7%	11.7%	22.5%	17.5%	11.7%	22.5%	25.8%
Maximum Green (s)	24.9	52.0	7.7	14.5	41.4	7.4	7.7	20.4	14.5	7.4	20.4	24.9
Yellow Time (s)	3.0	4.3	3.0	3.0	4.7	3.0	3.0	4.6	3.0	3.0	4.6	3.0
All-Red Time (s)	3.1	1.7	3.3	3.5	1.9	3.6	3.3	2.0	3.5	3.6	2.0	3.1
Lost Time Adjust (s)	-1.1	-1.0	-1.3	-1.5	-1.6	-1.6	-1.3	-1.6	-1.5	-1.6	-1.6	-1.1
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	1.0	6.0	1.0	1.0	6.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Minimum Gap (s)	0.2	3.0	0.2	0.2	3.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time Before Reduce (s)	0.0	20.0	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	30.0	0.0	0.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Min	None	None	Min	None	None	None	None	None	None	None
Act Effct Green (s)	24.2	53.0	66.9	16.0	44.8	58.8	30.9	22.0	43.0	31.1	22.1	51.3
Actuated g/C Ratio	0.20	0.44	0.56	0.13	0.37	0.49	0.26	0.18	0.36	0.26	0.18	0.43
v/c Ratio	0.90	0.96	0.07	0.96	0.75	0.19	0.42	0.99	0.48	0.97	0.38	0.38
Control Delay	75.2	47.9	12.5	100.6	37.4	18.6	36.9	95.2	33.4	93.7	44.9	25.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.2	47.9	12.5	100.6	37.4	18.6	36.9	95.2	33.4	93.7	44.9	25.2
LOS	E	D	B	F	D	B	D	F	C	F	D	C
Approach Delay		51.4			45.9			62.1			50.7	
Approach LOS		D			D			E			D	
Queue Length 50th (ft)	237	574	21	178	361	64	77	263	164	115	90	132
Queue Length 95th (ft)	#386	#741	42	#337	443	106	130	#453	248	#244	131	201
Internal Link Dist (ft)		237			2913			4497			256	
Turn Bay Length (ft)	210		150	250		100	170		300	200		
Base Capacity (vph)	379	1547	874	238	1336	784	312	341	567	195	656	704
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.84	0.96	0.07	0.96	0.75	0.19	0.42	0.99	0.48	0.97	0.38	0.37

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Natural Cycle: 100
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 51.4 Intersection LOS: D
Intersection Capacity Utilization 90.3% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: N. Trade Street/Sam Newell Road & Matthews Township Parkway



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	26	55	54	666	574	22
Future Volume (vph)	26	55	54	666	574	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			0%	-1%	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Frt		0.850			0.995	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	1863	3539	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1770	1583	1770	1863	3539	0
Link Speed (mph)	30			45	45	
Link Distance (ft)	404			336	556	
Travel Time (s)	9.2			5.1	8.4	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	29	61	60	740	638	24
Shared Lane Traffic (%)						
Lane Group Flow (vph)	29	61	60	740	662	0
Enter Blocked Intersection	1 veh	1 veh	2 veh	Yes	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			24	24	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	10			10	10	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	0.99	0.99
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 45.1%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	26	55	54	666	574	22
Future Volume (Veh/h)	26	55	54	666	574	22
Sign Control	Stop			Free	Free	
Grade	0%			0%	-1%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	29	61	60	740	638	24
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				336		
pX, platoon unblocked	0.82					
vC, conflicting volume	1510	331	662			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1512	331	662			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	66	91	93			
cM capacity (veh/h)	85	665	922			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	29	61	60	740	425	237
Volume Left	29	0	60	0	0	0
Volume Right	0	61	0	0	0	24
cSH	85	665	922	1700	1700	1700
Volume to Capacity	0.34	0.09	0.07	0.44	0.25	0.14
Queue Length 95th (ft)	33	8	5	0	0	0
Control Delay (s)	67.6	11.0	9.2	0.0	0.0	0.0
Lane LOS	F	B	A			
Approach Delay (s)	29.2		0.7		0.0	
Approach LOS	D					

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	45.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	1676	1178	76	0	68
Future Volume (vph)	0	1676	1178	76	0	68
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		2%	0%		0%	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.991			0.865
Flt Protected						
Satd. Flow (prot)	0	3504	3507	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	3504	3507	0	0	1611
Link Speed (mph)		45	45		30	
Link Distance (ft)		2662	317		238	
Travel Time (s)		40.3	4.8		5.4	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	1862	1309	84	0	76
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1862	1393	0	0	76
Enter Blocked Intersection	No	Yes	Yes	Yes	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		0	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		10	10		10	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 49.7%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	1676	1178	76	0	68
Future Volume (Veh/h)	0	1676	1178	76	0	68
Sign Control		Free	Free		Stop	
Grade		2%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	1862	1309	84	0	76
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			317			
pX, platoon unblocked	0.75				0.75	0.75
vC, conflicting volume	1393				2282	696
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	870				2048	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	91
cM capacity (veh/h)	581				36	818

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	931	931	873	520	76
Volume Left	0	0	0	0	0
Volume Right	0	0	0	84	76
cSH	1700	1700	1700	1700	818
Volume to Capacity	0.55	0.55	0.51	0.31	0.09
Queue Length 95th (ft)	0	0	0	0	8
Control Delay (s)	0.0	0.0	0.0	0.0	9.9
Lane LOS					A
Approach Delay (s)	0.0		0.0		9.9
Approach LOS					A

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: N. Trade Street/Sam Newell Road & Matthews Township Parkway

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	R	L	T	T	R	L	T	R	L
Maximum Queue (ft)	239	308	274	118	332	532	542	300	240	619	350	170
Average Queue (ft)	184	181	146	29	137	294	306	118	91	299	113	82
95th Queue (ft)	256	311	238	80	288	474	479	297	240	578	319	140
Link Distance (ft)		241	241			2953	2953			4524		
Upstream Blk Time (%)	5	6	1	0								
Queuing Penalty (veh)	0	33	3	0								
Storage Bay Dist (ft)	210			150	250			100	170		300	200
Storage Blk Time (%)	14	2	6			14	45	3		41		0
Queuing Penalty (veh)	47	6	6			21	64	16		89		0

Intersection: 1: N. Trade Street/Sam Newell Road & Matthews Township Parkway

Movement	SB	SB	SB
Directions Served	T	T	R
Maximum Queue (ft)	152	160	280
Average Queue (ft)	87	71	156
95th Queue (ft)	135	126	251
Link Distance (ft)	261	261	261
Upstream Blk Time (%)		0	1
Queuing Penalty (veh)		0	2
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: Sam Newell Road & Site Drive 1

Movement	EB	EB	NB	SB
Directions Served	L	R	L	TR
Maximum Queue (ft)	54	57	57	60
Average Queue (ft)	17	27	22	4
95th Queue (ft)	43	51	51	27
Link Distance (ft)	347	347	261	502
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Matthews Township Parkway & Site Drive 2

Movement	EB	EB	SB
Directions Served	T	T	R
Maximum Queue (ft)	112	61	77
Average Queue (ft)	15	7	37
95th Queue (ft)	102	73	68
Link Distance (ft)	2634	2634	194
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 286

Intersection: 1: N. Trade Street/Sam Newell Road & Matthews Township Parkway

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	R	L	T	T	R	L	T	R	L
Maximum Queue (ft)	241	331	330	241	370	602	568	300	240	1049	400	244
Average Queue (ft)	222	286	281	61	267	338	325	80	161	475	244	149
95th Queue (ft)	277	351	350	220	422	655	621	215	302	956	490	255
Link Distance (ft)		241	241			2953	2953			4524		
Upstream Blk Time (%)	7	25	21	0								7
Queuing Penalty (veh)	0	214	182	0								0
Storage Bay Dist (ft)	210			150	250			100	170		300	200
Storage Blk Time (%)	19	25	34		42	3	40	2	4	60	0	16
Queuing Penalty (veh)	132	73	19		192	7	53	11	25	220	0	19

Intersection: 1: N. Trade Street/Sam Newell Road & Matthews Township Parkway

Movement	SB	SB	SB
Directions Served	T	T	R
Maximum Queue (ft)	271	208	220
Average Queue (ft)	126	86	105
95th Queue (ft)	262	175	180
Link Distance (ft)	261	261	261
Upstream Blk Time (%)	7	0	0
Queuing Penalty (veh)	15	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)	2		
Queuing Penalty (veh)	3		

Intersection: 2: Sam Newell Road & Site Drive 1

Movement	EB	EB	NB	SB	SB
Directions Served	L	R	L	T	TR
Maximum Queue (ft)	62	78	66	87	59
Average Queue (ft)	17	30	23	15	5
95th Queue (ft)	45	60	54	94	47
Link Distance (ft)	347	347	261	502	502
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 3: Matthews Township Parkway & Site Drive 2

Movement	EB	EB	SB
Directions Served	T	T	R
Maximum Queue (ft)	375	380	69
Average Queue (ft)	95	91	32
95th Queue (ft)	284	286	59
Link Distance (ft)	2634	2634	194
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 1165

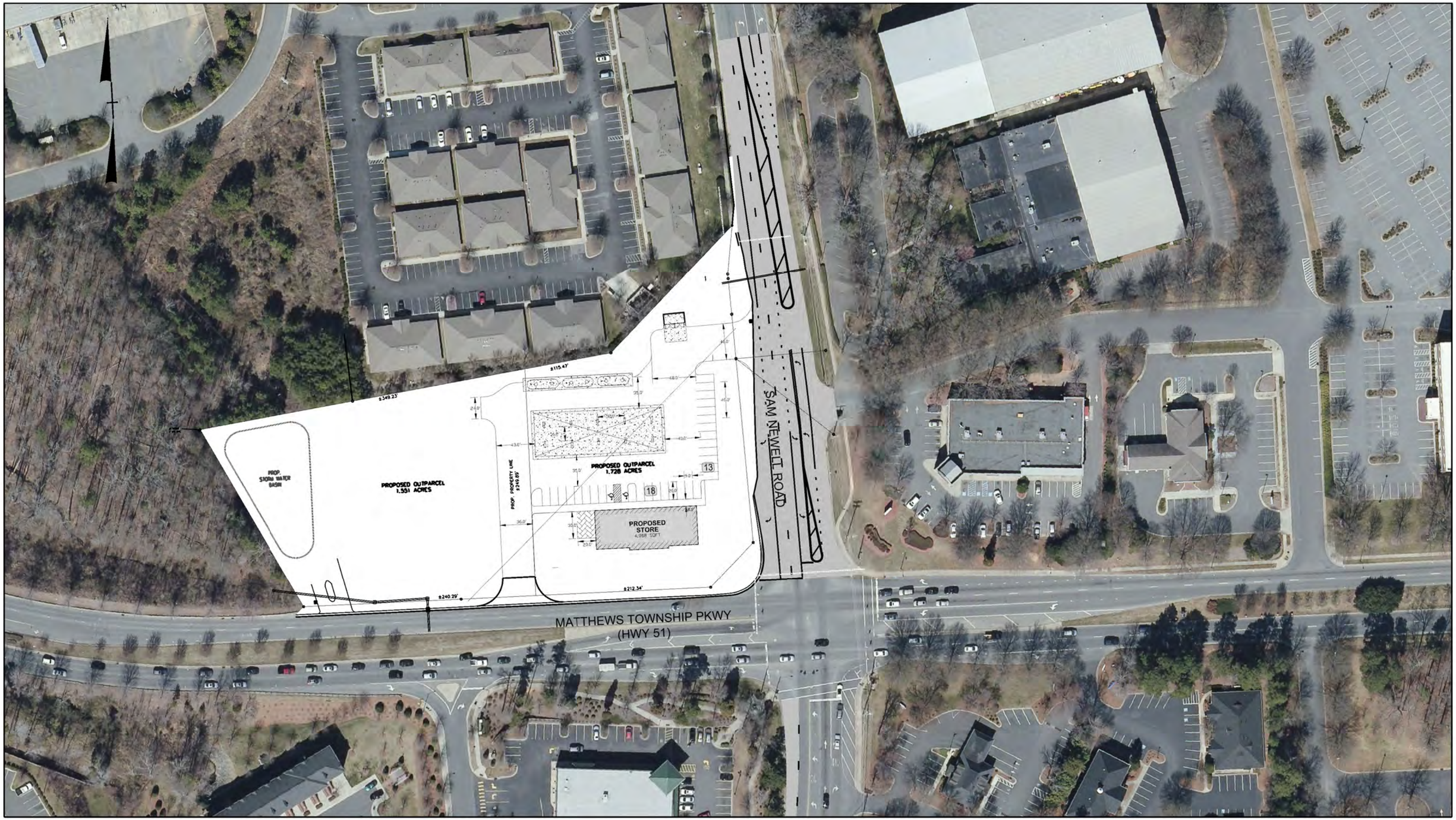
APPENDIX D

NCDOT CONCEPTUAL DESIGN

SAM NEWELL RD.
(SR-3474)
NC 51
NC 51
NC 51
NC 51
S.TRADE ST.
(SR-5612)

APPENDIX E

PROPOSED IMPROVEMENTS BY DEVELOPER



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SCALE
0 100' 200' 300'

DWG: 17367
DATE: Janurary 30, 2018

NEWELL CORNER

Sam Newell Gas Station
Matthews, NC