ATLANTIC TRAFFIC+DESIGN

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Warren, New Jersey 07059
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TRAFFIC SIGNAL WARRANT ANALYSIS

FOR

THE HAMPSHIRE COMPANIES, LLC

PROPOSED MEDICAL OFFICE BUILDING

BLOCK 4215, LOT 1
TOWNSHIP OF MONTCLAIR
BLOCK 106; LOTS 15, 35 & 39
BOROUGH OF GLEN RIDGE
1 BAY AVENUE (CR 654)
ESSEX COUNTY, NEW JERSEY

JOHN R. HARTER
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Atlantic Traffic & Design Engineers, Inc.
NJ Certificate of Authorization No. 24A27957900

October 13, 2017
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INTRODUCTION

Atlantic Traffic & Design Engineers, Inc. (ATDE) has prepared this Traffic Signal Warrant Analysis for the Bay Avenue (CR 654) intersection with Walnut Crescent and the proposed medical office building (MOB) site access in the Township of Montclair/Borough of Glen Ridge, Essex County, New Jersey. (See **Figure 1** in **Appendix A**.) Currently the intersection operates as a three-leg STOP-controlled intersection on the northbound Walnut Crescent approach. The medical office development proposal includes a 45,210 square foot building on the northeast quadrant of the Bay Avenue (CR 654) intersection with Walnut Crescent. A full-movement driveway aligned opposite Walnut Crescent will serve as the sole access for the development. This analysis addresses the warrants for traffic signal control based on the future intersection volumes with the construction of the proposed 45,210 square foot MOB. Additionally, a new parking lot for the Mountainside Hospital is proposed on the west side of Walnut Crescent, south of its intersection with Bay Avenue. It was assumed vehicles utilizing the parking lot are already circulating on the roadway network and would not significantly alter traffic patterns at the subject intersection.

As part of this study, automatic traffic recorders were installed and data was compiled at the subject intersection of Bay Avenue (CR 654) and Walnut Crescent. The data was then utilized to determine whether traffic volumes at the intersection meet the warrants for signalization as set forth in the Manual on Uniform Traffic Control Devices (MUTCD), published by the Federal Highway Administration.

MUTCD Section 4C.01 (Studies and Factors for Justifying Traffic Control Signals) states that, *"A traffic control signal should not be installed unless one or more of the factors described in this section are met."* Specifically, these Warrants are as follows:

Warrant 1	-	Eight-Hour Vehicular Volume
Warrant 2	-	Four-Hour Vehicular Volume
Warrant 3	-	Peak Hour
Warrant 4	-	Pedestrian Volume
Warrant 5	-	School Crossing

Warrant 6	-	Coordinated Signal System
Warrant 7	-	Crash Experience
Warrant 8	-	Roadway Network
Warrant 9	-	Intersection Near a Grade Crossing

EXISTING CONDITIONS

EXISTING ROADWAY CONDITIONS

The following is a description of the adjacent roadway network:

Bay Avenue (CR 654)

- Designated as an urban minor arterial under Essex County jurisdiction.
- Has a general east/west orientation along the property frontage.
- Provides 1 lane to accommodate each direction of travel.
- Has a posted speed limit of 25 miles per hour in the vicinity of the site.

Walnut Crescent

- Local roadway under municipal jurisdiction.
- Has a general north/south orientation.
- Provides 1 lane to accommodate each direction of travel.

The Bay Avenue (CR 654) intersects with Walnut Crescent to form a 3-leg unsignalized intersection. Walnut Crescent forms the northbound and eastbound approaches to the intersection. Bay Avenue (CR 654) forms the westbound approach to the intersection. One lane of travel is currently provided on all approaches to the intersection. The intersection is STOP-controlled on the northbound approach.

EXISTING TRAFFIC VOLUMES

Automatic traffic recorders (ATRs) were placed on each approach to the intersection during the following dates:

- Eastbound Walnut Crescent west of Bay Avenue (CR 654) from March 30, 2015 to April 3, 2015
- Westbound Bay Avenue (CR 654) east of Walnut Crescent from December 1, 2014 to December 5, 2014
- Northbound Walnut Crescent south of Bay Avenue (CR 654) from March 30, 2015 to April 3, 2015

The traffic volume data and associated summaries are contained in **Appendix B**. The resulting hourly volumes were averaged for the typical weekday and a 1% annual growth rate was applied to develop the future 2018 traffic volumes consistent with data published by NJDOT for Essex County.

FUTURE TRAFFIC VOLUMES

The development proposal includes a 45,210 square foot MOB on the northeast quadrant of the study intersection. The proposed full-movement driveway will form the fourth leg of the existing three-leg Bay Avenue (CR 654) intersection with Walnut Crescent.

Traffic projections for the proposed MOB were prepared utilizing data published by the Institute of Transportation Engineers (ITE) in the 10th Edition of *Trip Generation*. Specifically, trip generation for the proposed 45,210 square foot MOB was prepared utilizing ITE Land Use Code 720: "Medical-Dental Office Building."

The hourly weekday site traffic volumes were developed based on variation data for office buildings published by the Institute of Transportation Engineers (ITE) in the January 2015 ITE Journal article entitled "Hourly Variation in Trip Generation for Office and Residential Uses." The hourly trip generation projections are contained in **Appendix B**.

The additional hourly entering site traffic volumes were then added to future average weekday volumes to develop the major street approach volumes along eastbound Walnut Crescent and westbound Bay Avenue (CR 654) based on the site traffic distribution utilized in the Traffic Impact Analysis prepared by our office. The minor street volumes were developed by adding the appropriate percentage of the hourly entering site traffic volumes to the future northbound Walnut Crescent average weekday volumes.

TRAFFIC SIGNAL WARRANTS

Warrant 1, the Eight-Hour Vehicular Volume Warrant, is intended for application in a situation where "a large volume of intersecting traffic is the principal reason to consider installing a traffic control signal." Warrant 1 is met when the traffic volumes exceed the volumes established in the MUTCD for at least 8 hours. To satisfy the "Interruption of Continuous Traffic" condition, the two-way major street volumes must exceed 900 vehicles per hour, and the one-way minor street approach volume must exceed 100 vehicles per hour, as shown in the MUTCD tables contained in **Appendix D**. As can be seen from the Traffic Signal Warrant Analysis summary contained in **Appendix C**, these volumes are met during 9 hours of a typical day **which satisfies Warrant 1**.

Warrant 2 is satisfied when the minor street volume approaches versus the major street volume approaches fall above the curve (2 major approach lanes and 2 minor approach lanes) in Figure 4C-2, from the MUTCD (see **Appendix D**) for 4 hours on an average day. As can be seen, this warrant is not satisfied at the subject intersection during any of the study hours **which does not satisfy Warrant 2**.

Warrant 3 is satisfied when the minor street volume approaches versus the major street volume approaches fall above the curve (2 major approach lanes and 2 minor approach lanes) in Figure 4C-4, from the MUTCD (see **Appendix D**) for 1 peak hour on an average day. This warrant applies with high-occupancy vehicle facilities that attract or discharge a large number of vehicles over a short time, which is not applicable for this situation, however the warrant was still evaluated for presentation purposes. As can be seen, this warrant is not satisfied at the subject intersection during any of the study hours **which does not satisfy Warrant 3**.

Warrant 4 is satisfied when the traffic volume on a major street is so heavy that pedestrians experience excessive delay in crossing the major street. While the addition of a traffic signal at this location may facilitate some pedestrian crossings, no notable pedestrian volumes were recorded during the survey, nor can they be projected by any certain means. As such, **Warrant 4 is not applicable**.

Warrant 5 is intended for application where school children crossing the major street are the principal reason to consider installing a traffic control signal. School children crossing the major street is not the principal reason for installing a traffic signal, therefore, **Warrant 5 is not applicable at the subject intersection**.

Warrant 6 is satisfied with the installation of traffic control signals when they are needed in order to maintain proper platooning of vehicles at intersections where traffic signals have not been warranted. **Warrant 6 is not applicable** at the subject intersection since the primary reason for the signal is not to maintain a progressive operation.

Warrant 7 is satisfied when the severity and frequency of crashes are the principal reasons to consider installing a traffic control signal. Since the crash frequency is not the principal reason for installing a traffic signal, **Warrant 7 is not satisfied**.

Warrant 8 is satisfied when the intersection has a total entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday or for 5 consecutive hours on a Saturday or Sunday. These requirements are **not** met at the intersection in question. Further, this warrant is only applicable for the intersection of two "major routes". As such, **Warrant 8 is not applicable**.

Warrant 9 is intended for use near an at-grade rail crossing. As such, **Warrant 9 is not applicable**.

CONCLUSIONS

Based on the Traffic Signal Warrant Analysis and an evaluation of MUTCD Warrants 1 through 9 prepared by ATDE, signalization is warranted at the Bay Avenue (CR 654) intersection with Walnut Crescent. Warrant 1 is satisfied during an average weekday under the Build conditions. This warrant is the most appropriate to evaluate for the operational conditions of the intersection and adjacent roadway network. Therefore, we recommend the signalization of Bay Avenue (CR 654) intersection with Walnut Crescent and the site access.

TECHNICAL APPENDIX

APPENDIX A – SITE LOCATION MAP

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Figure 1

PROPOSED MEDICAL OFFICE BUILDING
TOWNSHIP OF MONTCLAIR/BOROUGH OF GLEN RIDGE
ESSEX COUNTY, NEW JERSEY

SITE LOCATION MAP

K:\2015\AJ15088\TRAFFIC DATA\FIGURES – OCTOBER 2017\AJ14201 FIGURES-->>LAYOUT: FIG 1

APPENDIX B – TRAFFIC VOLUME DATA

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Proposed Medical Office Building
Walnut Crescent & Bay Avenue
Township of Montclair/Borough of Glen Ridge
Essex County, New Jersey
ATDE Project No. AJ15088

TRAFFIC VOLUME SUMMARY

Walnut Crescent Eastbound Approach

Time	Monday, March 30, 2015	Tuesday, March 31, 2015	Wednesday, April 01, 2015	Thursday, April 02, 2015	Friday, April 03, 2015	Average
7 AM - 8 AM	426	385	425	252	145	327
8 AM - 9 AM	480	496	474	363	237	410
9 AM - 10 AM	438	461	441	343	345	406
10 AM - 11 AM	451	400	402	389	421	413
11 AM - 12 PM	463	442	459	423	511	460
12 PM - 1 PM	492	455	458	453	536	479
1 PM - 2 PM	509	532	454	416	477	478
2 PM - 3 PM	515	550	520	452	491	506
3 PM - 4 PM	559	579	570	493	479	536
4 PM -5 PM	573	567	568	495	483	537
5 PM - 6 PM	689	641	626	477	412	569
6 PM - 7 PM	582	569	561	449	334	499

Bay Avenue Westbound Approach

Time	Monday, December 01, 2014	Tuesday, December 02, 2014	Wednesday, December 03, 2014	Thursday, December 04, 2014	Friday, December 05, 2014	Average
7 AM - 8 AM	517	558	556	584	516	546
8 AM - 9 AM	630	625	643	618	602	624
9 AM - 10 AM	476	509	527	524	501	507
10 AM - 11 AM	419	409	387	124	404	349
11 AM - 12 PM	334	331	111	99	384	252
12 PM - 1 PM	377	403	114	388	340	324
1 PM - 2 PM	402	373	174	402	392	349
2 PM - 3 PM	469	414	109	470	420	376
3 PM - 4 PM	404	430	91	472	410	361
4 PM -5 PM	429	391	68	478	437	361
5 PM - 6 PM	411	369	283	495	418	395
6 PM - 7 PM	404	403	447	509	449	442

	Walnut Crescent/Bay Avenue (Major Street) Average Weekday	
Time	Existing Total Two-Way Volume	Future Total Two-Way Volume
7 AM - 8 AM	873	908
8 AM - 9 AM	1034	1076
9 AM - 10 AM	913	950
10 AM - 11 AM	761	792
11 AM - 12 PM	711	740
12 PM - 1 PM	803	836
1 PM - 2 PM	826	860
2 PM - 3 PM	882	918
3 PM - 4 PM	897	934
4 PM -5 PM	898	934
5 PM - 6 PM	964	1003
6 PM - 7 PM	941	980

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Proposed Medical Office Building
Walnut Crescent & Bay Avenue
Township of Montclair/Borough of Glen Ridge
Essex County, New Jersey
ATDE Project No. AJ14201

TRAFFIC VOLUME SUMMARY

Walnut Crescent Northbound Approach

Time	Monday, March 30, 2015	Tuesday, March 31, 2015	Wednesday, April 01, 2015	Thursday, April 02, 2015	Friday, April 03, 2015	Average
7 AM - 8 AM	105	103	87	62	50	81
8 AM - 9 AM	113	110	101	80	66	94
9 AM - 10 AM	115	135	128	95	57	106
10 AM - 11 AM	113	134	117	96	93	111
11 AM - 12 PM	140	144	147	131	101	133
12 PM - 1 PM	134	164	157	143	95	139
1 PM - 2 PM	140	123	130	129	83	121
2 PM - 3 PM	184	169	174	172	83	156
3 PM - 4 PM	198	224	229	158	88	179
4 PM -5 PM	174	185	194	145	84	156
5 PM - 6 PM	160	156	140	91	66	123
6 PM - 7 PM	115	129	119	87	59	102

	Northbound Walnut Crescent (Minor Street) Average Weekday	
Time	Existing Total Two-Way Volume	Future Total Two-Way Volume
7 AM - 8 AM	81	85
8 AM - 9 AM	94	98
9 AM - 10 AM	106	110
10 AM - 11 AM	111	115
11 AM - 12 PM	133	138
12 PM - 1 PM	139	144
1 PM - 2 PM	121	126
2 PM - 3 PM	156	163
3 PM - 4 PM	179	187
4 PM -5 PM	156	163
5 PM - 6 PM	123	128
6 PM - 7 PM	102	106

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Proposed Medical Office Building
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Township of Montclair/Borough of Glen Ridge
Essex County, New Jersey
ATDE Project No. AJ15088

HOURLY SITE TRAFFIC VOLUME CALCULATIONS

	PERCENT OF 24-HOUR ENTERING TRAFFIC*	PERCENT OF 24-HOUR EXITING TRAFFIC*	WALNUT CRESCENT/BAY AVENUE	SITE DRIVEWAY	WALNUT CRESCENT/BAY AVENUE	WALNUT CRESCENT
			ENTERING VOLUME	EXITING VOLUME	EB/WB ENTERING VOLUME	NB ENTERING VOLUME
7 - 8 AM	14.9%	1.9%	117	15	99	18
8 - 9 AM	20.7%	3.0%	163	24	139	24
9 - 10 AM	8.2%	3.2%	65	25	55	10
10 - 11 AM	5.0%	3.9%	39	31	33	6
11 - 12 N	5.1%	8.6%	40	68	34	6
12 - 1 PM	8.7%	10.5%	68	83	58	10
1 - 2 PM	10.0%	6.6%	79	52	67	12
2 - 3 PM	5.9%	6.3%	46	50	39	7
3 - 4 PM	4.3%	9.5%	34	75	29	5
4 - 5 PM	3.4%	15.4%	27	121	23	4
5 - 6 PM	2.5%	16.5%	20	130	17	3
6 - 7 PM	1.4%	5.5%	11	43	9	2

*Based on data contained in the ITE Journal article "Hourly Variation In Trip Generation For Office And Residential Land Uses."

Traffic Databank

716 South Sixth Ave
Mt Vernon, NY 10550
www.trafficdatabank.com

Site Code:
Station ID:
WALNUT BTWN BAY AND CLAREMONT
MONTCLAIR, NJ
Latitude: 0' 0.0000 Undefined

Start	30-Mar-15		Tue		Wed		Thu		Fri		Sat		Sun		Week Average	
Time	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB
12:00 AM	36	32	27	48	34	43	58	88	70	90	55	107	*	*	47	68
01:00	21	23	18	31	25	27	43	47	38	81	57	61	*	*	34	45
02:00	26	18	7	9	13	15	17	18	34	37	46	40	*	*	24	23
03:00	11	15	11	18	19	21	18	18	25	18	30	26	*	*	19	19
04:00	26	19	34	23	32	28	32	14	32	28	22	20	*	*	30	22
05:00	78	78	76	75	85	68	75	76	46	46	26	31	*	*	64	62
06:00	198	244	214	218	205	260	177	202	93	92	69	86	*	*	159	184
07:00	461	426	469	385	468	425	322	252	212	145	119	102	*	*	342	289
08:00	**554**	**480**	**554**	**496**	**499**	**474**	389	363	338	237	168	184	*	*	**417**	372
09:00	492	438	434	461	483	441	**442**	343	386	345	257	193	*	*	416	370
10:00	382	451	383	400	421	402	405	389	421	421	287	**301**	*	*	383	394
11:00	365	463	375	442	422	459	419	**423**	**463**	**511**	**297**	278	*	*	390	**429**
12:00 PM	369	492	393	455	463	458	420	453	390	**536**	**361**	382	*	*	399	463
01:00	390	509	406	532	396	454	416	416	**409**	477	359	**404**	*	*	396	465
02:00	427	515	422	550	401	520	**440**	452	405	491	315	368	*	*	402	483
03:00	**443**	559	420	579	**497**	570	425	493	394	479	243	322	*	*	**404**	500
04:00	402	573	454	567	446	568	378	**495**	359	483	209	253	*	*	375	490
05:00	420	**689**	438	**641**	425	**626**	385	477	327	412	189	255	*	*	364	**517**
06:00	374	582	**459**	569	446	561	352	449	275	334	247	304	*	*	359	466
07:00	316	414	369	494	388	452	323	340	269	297	252	293	*	*	320	382
08:00	213	376	260	411	261	369	224	363	237	280	192	273	*	*	231	345
09:00	157	280	174	309	182	361	222	300	190	281	160	192	*	*	181	287
10:00	104	185	127	177	149	245	149	256	155	229	70	76	*	*	126	195
11:00	69	99	83	108	100	140	121	174	122	156	35	50	*	*	88	121
Lane	6334	7960	6607	7998	6860	7987	6252	6901	5690	6506	4065	4601	0	0	5970	6991
Day	14294		14605		14847		13153		12196		8666		0		12961	
AM Peak	08:00	08:00	08:00	08:00	08:00	08:00	09:00	11:00	11:00	11:00	11:00	10:00	-	-	08:00	11:00
Vol.	554	480	554	496	499	474	442	423	463	511	297	301	-	-	417	429
PM Peak	15:00	17:00	18:00	17:00	15:00	17:00	14:00	16:00	13:00	12:00	12:00	13:00	-	-	15:00	17:00
Vol.	443	689	459	641	497	626	440	495	409	536	361	404	-	-	404	517

Comb. Total	14294	14605	14847	13153	12196	8666	6542	19503
ADT	ADT 12,043	AADT 12,043						

Site Code:
Station ID:
WB BAY AVE, EAST OF WALNUT RIDGE
GLEN RIDGE, NJ
Latitude: 0' 0.0000 Undefined

Start Time	Mon 01-Dec-14	Tue 02-Dec-14	Wed 03-Dec-14	Thu 04-Dec-14	Fri 05-Dec-14	Average Day	Sat 06-Dec-14	Sun 07-Dec-14	Week Average
12:00 AM	27	31	42	45	33	36	69	81	47
01:00	9	24	22	25	25	21	55	44	29
02:00	15	8	21	18	18	16	36	36	22
03:00	16	16	11	18	14	15	28	28	19
04:00	37	31	38	34	38	36	25	19	32
05:00	108	116	117	118	99	112	57	30	92
06:00	300	330	318	288	315	310	131	99	254
07:00	517	558	556	584	516	546	219	129	440
08:00	**630**	**625**	**643**	**618**	**602**	**624**	358	188	**523**
09:00	476	509	527	524	501	507	368	265	453
10:00	419	409	387	124	404	349	**428**	309	354
11:00	334	331	111	99	384	252	413	**320**	285
12:00 PM	377	403	114	388	340	324	**416**	325	338
01:00	402	373	174	402	392	349	367	332	349
02:00	**469**	414	109	470	420	376	408	**339**	376
03:00	404	**430**	91	472	410	361	358	337	357
04:00	429	391	68	478	437	361	337	293	348
05:00	411	369	283	495	418	395	331	266	368
06:00	404	403	**447**	**509**	**449**	**442**	311	238	**394**
07:00	273	298	295	326	319	302	242	180	276
08:00	164	190	205	226	219	201	187	154	192
09:00	129	124	167	145	163	146	182	108	145
10:00	110	119	137	119	146	126	163	90	126
11:00	79	75	67	73	126	84	124	46	84
Day Total	6539	6577	4950	6598	6788	6291	5613	4256	5903
% Avg. WkDay	103.9%	104.5%	78.7%	104.9%	107.9%				
% Avg. Week	110.8%	111.4%	83.9%	111.8%	115.0%	106.6%	95.1%	72.1%	
AM Peak	08:00	08:00	08:00	08:00	08:00	- 08:00	- 10:00	11:00	- 08:00 - -
Vol.	630	625	643	618	602	- 624	- 428	320	- 523 - -
PM Peak	14:00	15:00	18:00	18:00	18:00	- 18:00	- 12:00	14:00	- 18:00 - -
Vol.	469	430	447	509	449	- 442	- 416	339	- 394 - -

Traffic Databank

716 South Sixth Ave
Mt Vernon, NY 10550
www.trafficdatabank.com

Site Code:
Station ID:
WALNUT CRESENT, S OF BAY ST
MONTCLAIR, NJ
Latitude: 0' 0.0000 Undefined

Start	30-Mar-15		Tue		Wed		Thu		Fri		Sat		Sun		Week Average	
Time	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB
12:00 AM	12	9	23	8	16	10	24	10	28	11	37	12	*	*	23	10
01:00	11	7	10	5	7	8	9	4	26	12	11	10	*	*	12	8
02:00	6	9	2	4	5	5	8	5	17	11	10	8	*	*	8	7
03:00	3	1	1	5	11	4	11	6	12	7	2	2	*	*	7	4
04:00	22	1	13	3	15	1	12	0	12	4	12	2	*	*	14	2
05:00	49	10	57	14	39	15	46	15	17	7	11	2	*	*	36	10
06:00	208	20	211	27	239	22	**232**	19	99	15	97	18	*	*	181	20
07:00	**260**	105	270	103	246	87	231	62	76	50	62	55	*	*	191	77
08:00	251	113	**285**	110	**288**	101	199	80	94	66	79	48	*	*	**199**	86
09:00	231	115	246	135	235	128	155	95	112	57	67	50	*	*	174	97
10:00	197	113	204	134	228	117	177	96	134	93	**110**	57	*	*	175	102
11:00	194	**140**	176	**144**	197	**147**	165	**131**	**156**	**101**	85	**58**	*	*	162	**120**
12:00 PM	214	134	203	164	195	157	173	143	149	**95**	126	67	*	*	177	127
01:00	217	140	210	123	183	130	168	129	145	83	**131**	54	*	*	176	110
02:00	**238**	184	**261**	169	**265**	174	**192**	**172**	154	83	131	**75**	*	*	**207**	143
03:00	195	**198**	217	**224**	221	**229**	139	158	**163**	88	105	68	*	*	173	**161**
04:00	173	174	190	185	192	194	141	145	148	84	96	56	*	*	157	140
05:00	198	160	200	156	169	140	122	91	110	66	62	36	*	*	144	108
06:00	177	115	188	129	183	119	134	87	123	59	117	42	*	*	154	92
07:00	110	106	151	107	129	106	93	81	83	64	91	59	*	*	110	87
08:00	87	72	97	101	98	73	78	43	85	73	72	53	*	*	86	69
09:00	82	49	83	53	65	38	67	39	76	28	58	24	*	*	72	38
10:00	70	25	74	52	67	31	81	38	61	24	35	36	*	*	65	34
11:00	41	36	45	40	38	42	43	33	42	35	28	34	*	*	40	37
Lane	3246	2036	3417	2195	3331	2078	2700	1682	2122	1216	1635	926	0	0	2743	1689
Day	5282		5612		5409		4382		3338		2561		0		4432	
AM Peak	07:00	11:00	08:00	11:00	08:00	11:00	06:00	11:00	11:00	11:00	10:00	11:00	-	-	08:00	11:00
Vol.	260	140	285	144	288	147	232	131	156	101	110	58	-	-	199	120
PM Peak	14:00	15:00	14:00	15:00	14:00	15:00	14:00	14:00	15:00	12:00	13:00	14:00	-	-	14:00	15:00
Vol.	238	198	261	224	265	229	192	172	163	95	131	75	-	-	207	161

Comb. Total	5282	5612	5409	4382	3338	2561	2328	6760

ADT ADT 4,130 AADT 4,130

APPENDIX C – TRAFFIC SIGNAL WARRANT ANALYSIS SUMMARY

ATLANTIC TRAFFIC+DESIGN

35 Technology Drive
Warren, NJ 07059
908.769.5588
fax 908.769.7733
atde@atlantictraffic.com

Major Street: Bay Avenue/Walnut Crescent) [2 Lanes]
Minor Street: Walnut Crescent [2 Lanes]
Township of Montclair/Borough of Glen Ridge
Essex County, New Jersey
ATDE Project No. AJ15088 **October 11, 2017**

TABLE I
TRAFFIC SIGNAL WARRANT ANALYSES
(Major Street speed less than or equal to 40 mph)

Start Time	Major Street			Minor	Warrant 1 - Eight Hour			Warrant 2	Warrant 3
	EB	WB	TOTAL	NB	Condition A*	Condition B*	A & B (80%)*	Four Hour**	Peak Hour***
12:00 AM	0	0	0	0					
1:00 AM	0	0	0	0					
2:00 AM	0	0	0	0					
3:00 AM	0	0	0	0					
4:00 AM	0	0	0	0					
5:00 AM	0	0	0	0					
6:00 AM	0	0	0	0					
7:00 AM	390	617	1007	103		X			
8:00 AM	497	718	1215	122		X			
9:00 AM	450	555	1005	120		X			
10:00 AM	447	378	825	121					
11:00 AM	496	278	774	144					
12:00 PM	528	366	894	154					
1:00 PM	532	395	927	138		X			
2:00 PM	547	410	957	170		X	X		
3:00 PM	573	390	963	192		X	X		
4:00 PM	571	386	957	167		X	X		
5:00 PM	601	419	1020	131		X			
6:00 PM	525	464	989	108		X			
7:00 PM	0	0	0	0					
8:00 PM	0	0	0	0					
9:00 PM	0	0	0	0					
10:00 PM	0	0	0	0					
11:00 PM	0	0	0	0					
Number of Hours Conditions are Met					**0**	**9**	**3**	**0**	**0**
Is Warrant Met?					**NO**	**YES**	**NO**	**NO**	**NO**

* MUTCD Table 4C-1 for 2 Major Street lanes on both approaches and 2 Minor Street lanes on 1 approach
** MUTCD Figure 4C-1 for 2 Major Street lanes on both approaches and 2 Minor Street lanes on 1 approach
*** MUTCD Figure 4C-3 for 2 Major Street lanes on both approaches and 2 Minor Street lanes on 1 approach

APPENDIX D – MUTCD WARRANT CHARTS

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A—Minimum Vehicular Volume									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112
Condition B—Interruption of Continuous Traffic									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

[a] Basic minimum hourly volume

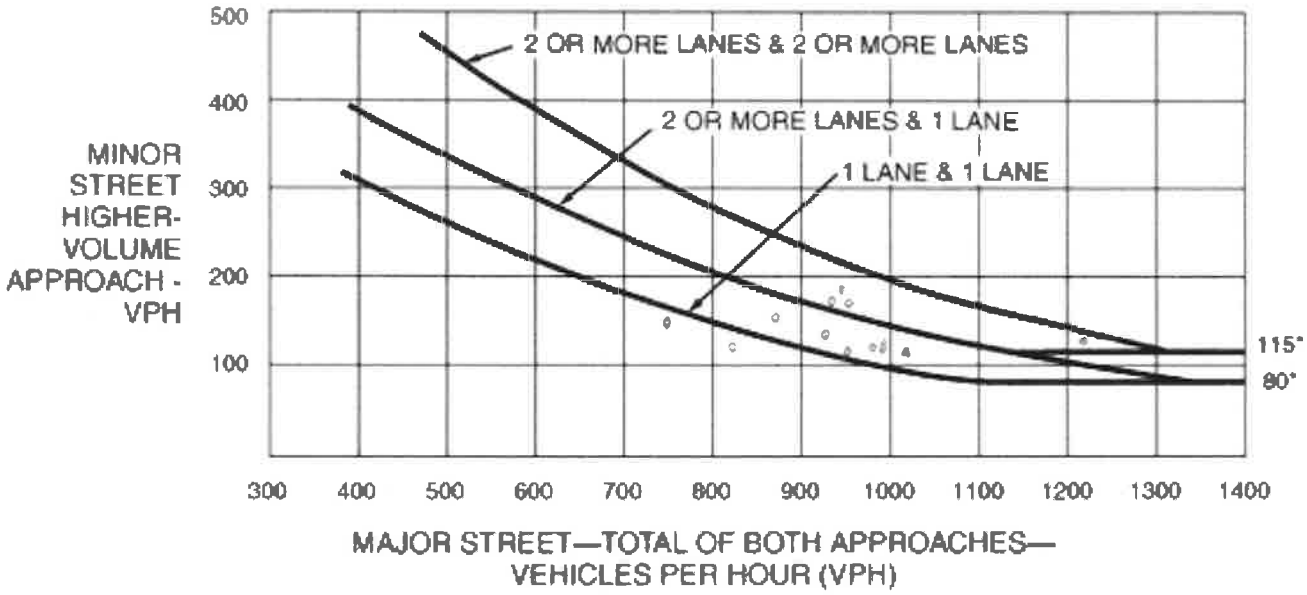
[b] Used for combination of Conditions A and B after adequate trial of other remedial measures

[c] May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

[d] May be used for combination of Conditions A and B after adequate trial of other remedial measures when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

2009 Edition Part 4 Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume

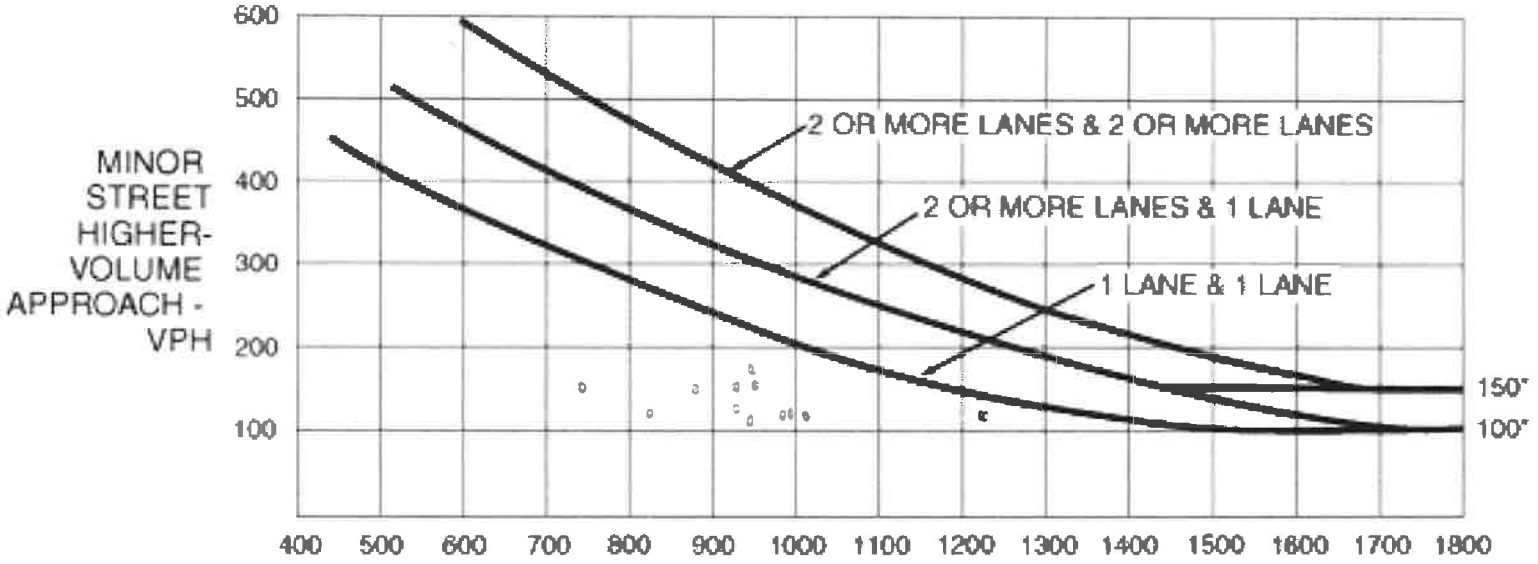
Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.

2009 Edition Part 4 Figure 4C-3. Warrant 3, Peak Hour

Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.