

INTERSECTION ANALYSIS

FOR

PARK AVENUE AND BRADDOCK ROAD (FROSTBURG, MD)

Prepared for:

**City of Frostburg, Maryland
& Allegany County Commissioners**

Prepared by:

LENHART TRAFFIC CONSULTING, INC.

TRAFFIC ENGINEERING & TRANSPORTATION PLANNING

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Section 1 Introduction

1.1 Project Description

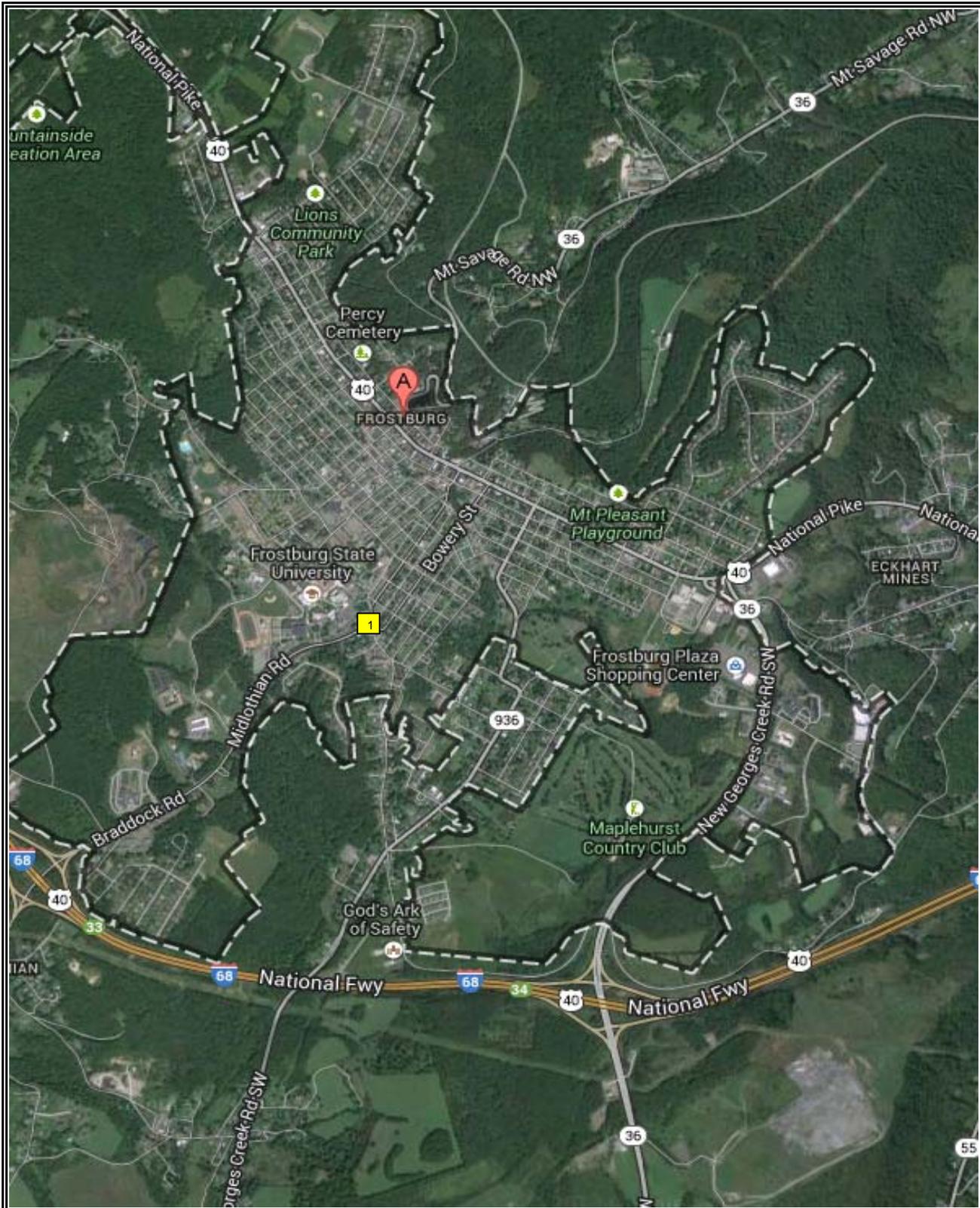
This study was prepared to evaluate the existing traffic conditions and provide recommendations for future improvements at the intersection of Braddock Road & Park Avenue.

In Frostburg, the Park Avenue and Braddock Road intersection is the thoroughfare between Exit 33 on Interstate 68 to the City of Frostburg, and Frostburg State University. This intersection involves Braddock Road, a state highway (MD 736), and City streets: Bowery Street, Center Street, Park Avenue, and Alley 33. In close proximity to the intersection are entrances to commercial and multi-family residential buildings. As the intersection is immediately adjacent to Frostburg State University, there is substantial pedestrian traffic in the area as students walk between their off-campus housing and the campus.

However, because of the complexity of traffic patterns and the alignment of the intersection, the City is concerned about the capacity and safety of the intersection as the University's enrollment and the City's population continues to grow. An evaluation of the existing traffic conditions, recommendation for future improvements, and preliminary design are requested. This project is included on the Allegany County transportation priority list; the preliminary work being requested will provide a plan to address the needs identified.

1.2 Scope of Study

This study was conducted in accordance with the Request for Proposals (RFP) and the subsequent kick-off meeting and scoping parameters with the City of Frostburg, State Highway Administration, and Frostburg State University.



<p>Intersection Study</p>	<p>Location Map</p>	<p>Exhibit</p>
<p>Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning</p>		<p>1</p>

Section 2 Existing Conditions

2.1 Description of Road Network

The key roads in the study area are as follows:

- Park Avenue is one-way (northbound) to the north of the intersection which turns into Center Street, a one way road (northbound) connecting to Alternate Route 40.
- Park Avenue is two-way to the south of the intersection.
- Braddock Road is a two-lane road connecting Frostburg to the interchange of I-68.
- Bowery Street is a one-way street (southbound) from Alternate Route 40.

2.2 Existing Lane Configurations

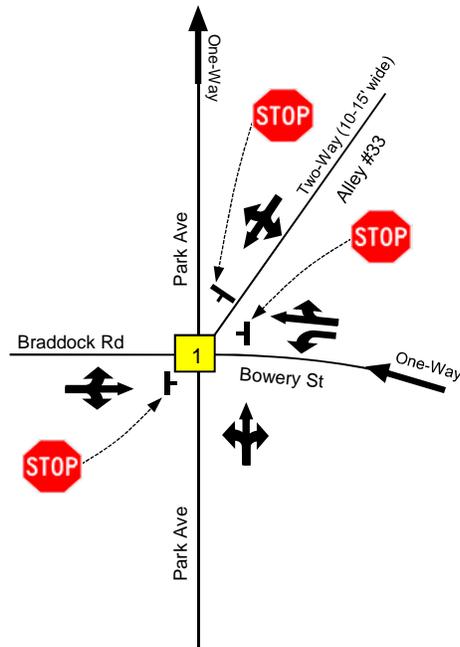
The Existing Lane Use & Traffic Control Devices are shown on Exhibit 2.

2.3 Existing Traffic Counts

Peak Hour Traffic counts were conducted, and the results are shown on Exhibit 3a. The existing intersection was evaluated using the Critical Lane Volume (CLV) methodology and the results are shown on Exhibit 7. The results show that the intersection currently operates at a Level of Service (LOS) “A”. The existing intersection was also evaluated using the Synchro-SimTraffic software, and the results are contained in Appendix C. Observations and analyses of the traffic data show that the intersection operates at very good levels of service, and there are no existing capacity problems associated with the intersection.

Observations at the intersection, however, did reveal that there are operational concerns related to the current design of the intersection. Exhibit 3b shows a graphical representation of some of the observations.

1. There is a gap in sidewalk along the north side of Braddock Road to the west of Park Avenue.
2. The crosswalk across the west leg of the intersection (Braddock Road) is much longer than it should be due to the missing sidewalk on the north side of Braddock Road.



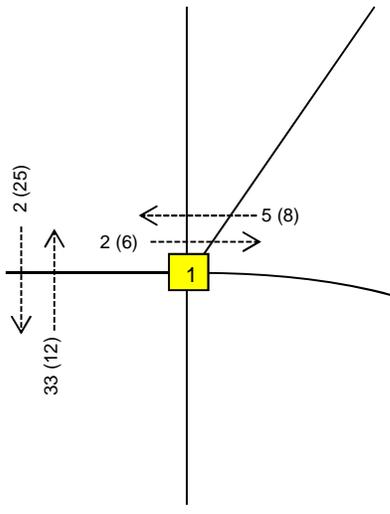
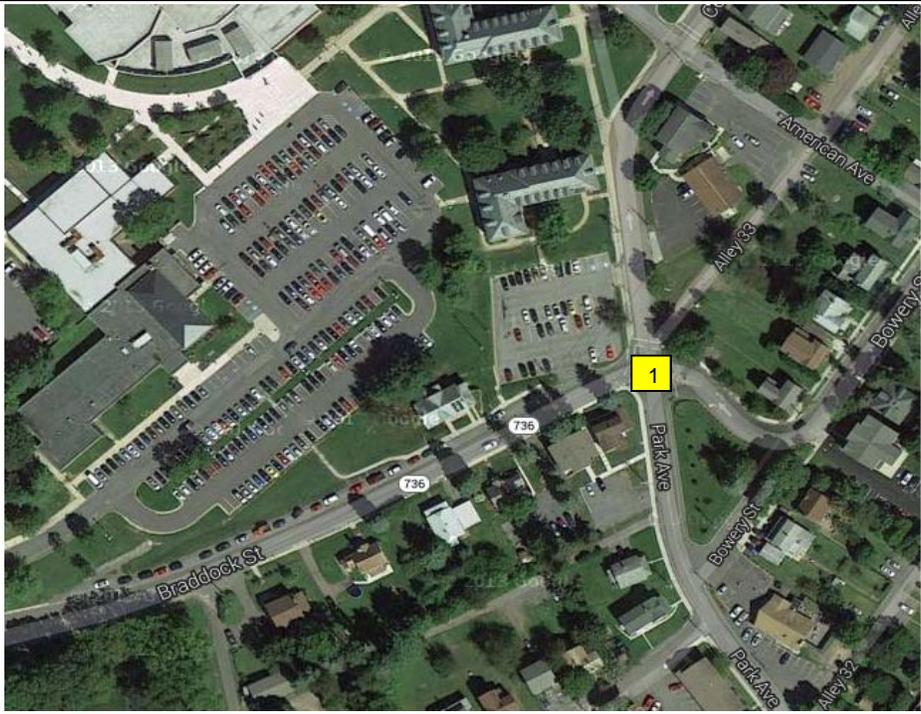
Traffic Impact Analysis

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Traffic Engineering & Transportation Planning

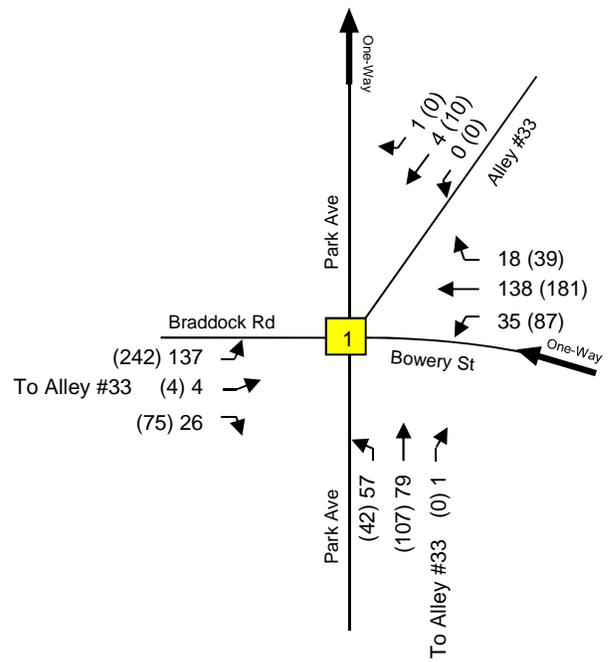
Existing Lane Use & Traffic Controls

Key: xx = AM Peak Vol's (xx) = PM Peak Vol's

**Exhibit
2**



Pedestrian Traffic Counts



Intersection #1
 AM Peak Hr: 7:15-8:15 AM
 PM Peak Hr: 4:45-5:45 PM

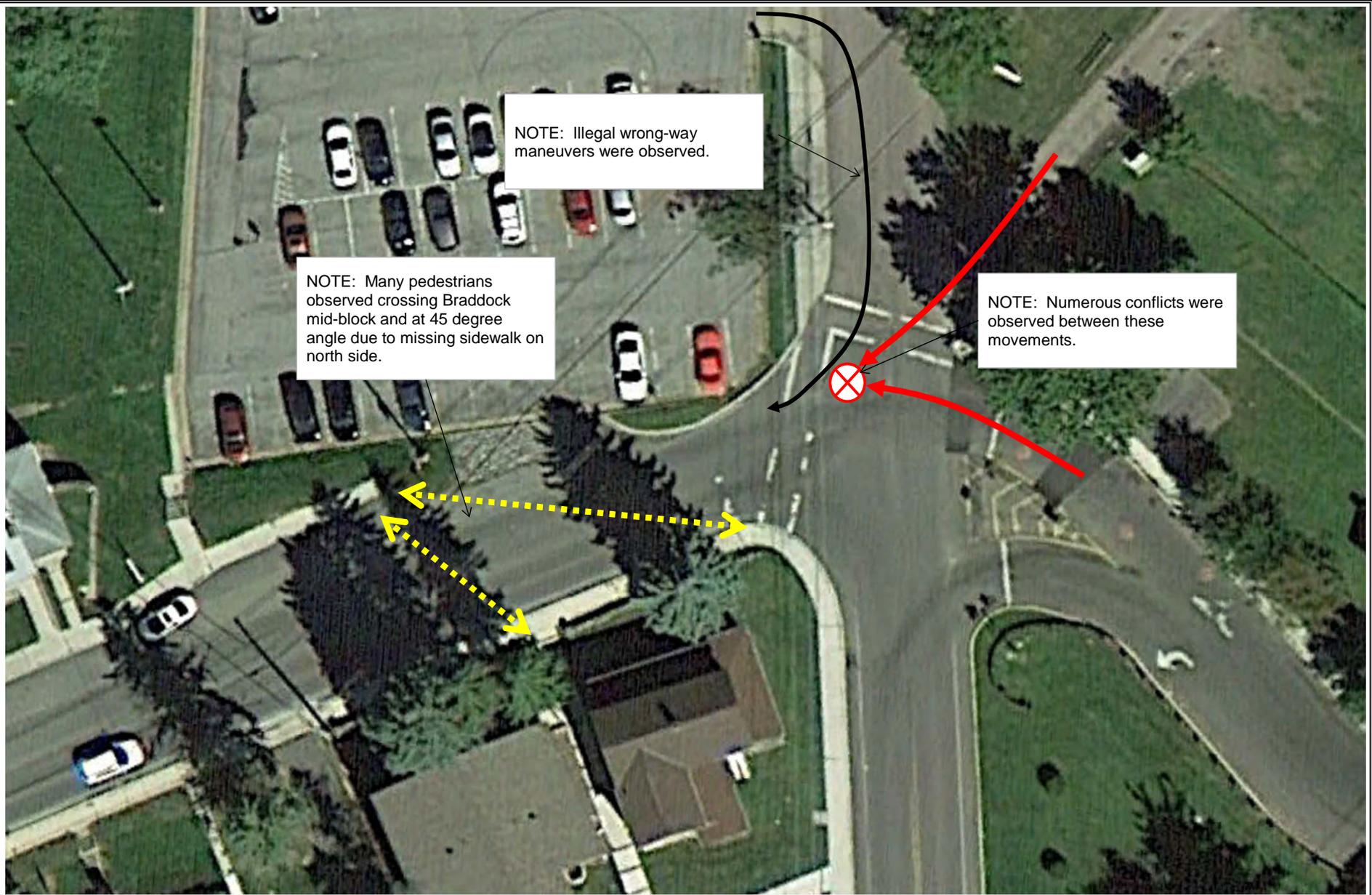
Traffic Impact Analysis

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Existing (2013)
 Peak Hour Volumes

Key: xx = AM Peak Vol's (xx) = PM Peak Vol's

**Exhibit
 3a**



Traffic Impact Analysis

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Traffic Engineering & Transportation Planning

Existing Intersection
Observations

**Exhibit
3b**

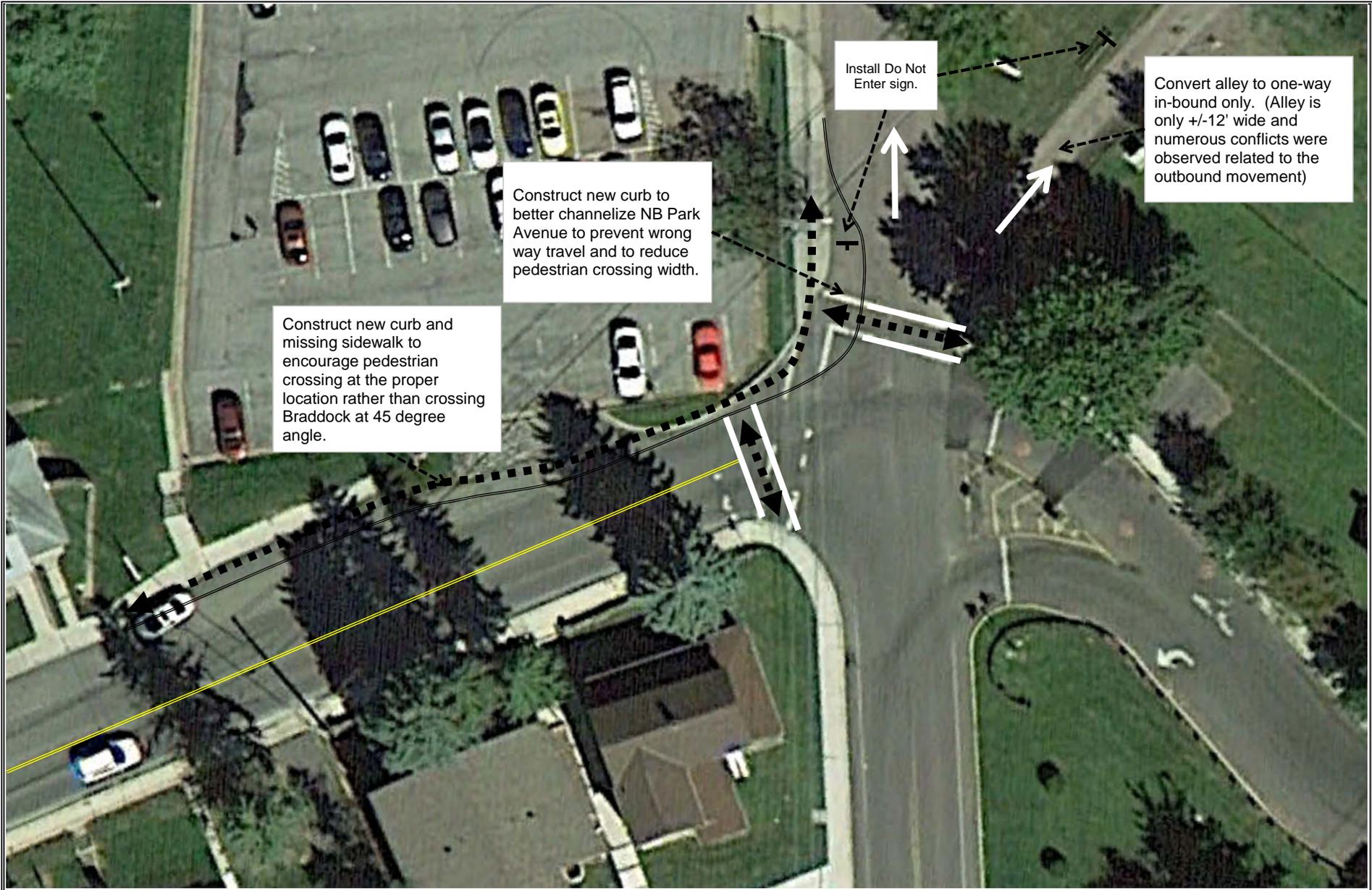
3. Many pedestrians were observed crossing Braddock Road at a 45 degree angle or at mid-block locations due to the missing sidewalk.
4. Vehicular conflicts were observed between vehicles exiting Bowery Street and Alley 33 at the same time. Often times, vehicles tried to enter the intersection at the same time and came to a stop in the middle of the intersection.
5. Alley 33 is very narrow (12-14 feet) and is not wide enough to support two-way traffic.
6. There were illegal wrong-way maneuvers exiting the campus parking lot in the northwest quadrant of the intersection, driving south on Park Avenue (wrong-way), and turning right onto Braddock Road.
7. Park Avenue to the north of the intersection is a one-way street, however it is very wide and currently unmarked and unchannelized. This results in a wider pedestrian crossing than necessary, and also promotes illegal maneuvers since the road is wider than needed.

Exhibit 4a shows recommended intersection improvements to address the existing pedestrian and vehicular concerns.

1. Construct sidewalk along the north side of Braddock Road to the west of Park Avenue to connect to the existing sidewalks.
2. Install a new pedestrian crossing on the west leg of Braddock Road to take advantage of the shorter pedestrian path.
3. Install new curb on Park Avenue on the northwest side of the intersection to reduce the width of Park Avenue. This provides a shorter pedestrian crossing of the north leg, and also provides enhanced channelization to prevent illegal wrong-way traffic.
4. Convert Alley 33 to a one-way road (northbound) away from the intersection.

Exhibit 4b shows adjustments to the existing peak hour traffic volumes to reflect the conversion of Alley 33 to a one-way road. Exhibit 5 shows the adjusted existing peak hour traffic volumes.

The adjusted peak hour traffic volumes were also evaluated using the Critical Lane Volume (CLV) methodology and the results show that the conversion of Alley 33 will not substantially change the overall intersection capacity; however, this change will have significant benefits due to the elimination of the observed conflicts that occur between Alley 33 and Bowery Street.



Construct new curb and missing sidewalk to encourage pedestrian crossing at the proper location rather than crossing Braddock at 45 degree angle.

Construct new curb to better channelize NB Park Avenue to prevent wrong way travel and to reduce pedestrian crossing width.

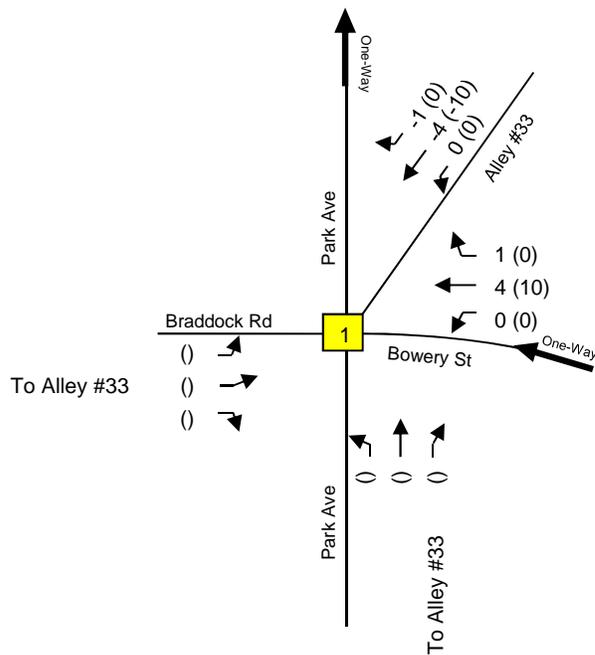
Install Do Not Enter sign.

Convert alley to one-way in-bound only. (Alley is only +/-12' wide and numerous conflicts were observed related to the outbound movement)

Traffic Impact Analysis
Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning

Suggested Intersection Improvements & Modifications

**Exhibit
4a**



Note: Convert Alley #33 to One-Way inbound

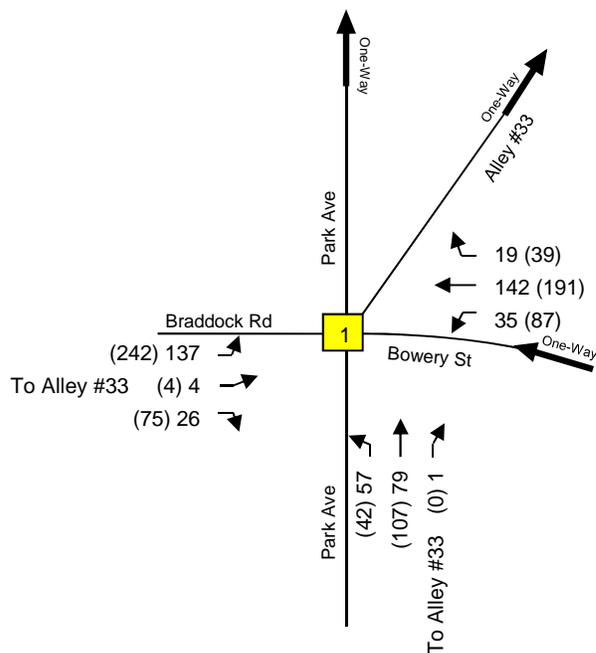
Traffic Impact Analysis

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Traffic Adjustments to
Convert Alley 33 to One-Way

Key: xx = AM Peak Vol's (xx) = PM Peak Vol's

**Exhibit
4b**



Note: Convert Alley #33 to One-Way inbound

Traffic Impact Analysis	<h2>Adjusted Existing (2013) Peak Hour Volumes</h2>	<h1>Exhibit 5</h1>
Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning		

Key: xx = AM Peak Vol's (xx) = PM Peak Vol's

Section 3 Informational Meeting & Community Feedback

3.1 Details of Meeting

An informational public meeting was held at Dunkle Hall on April 1, 2014 at the Frostburg State Campus. The purpose of the meeting was two-fold. The first order of business was to present the status of the project including the methodologies, conclusions, and recommendations. The second order of business was to obtain feedback from the community including any observations or suggestions.

The following comments were obtained from those in attendance.

- There was a comment to consider constructing a new egress out of university parking lot on to Braddock Rd. (NOTE: There is a significant grade difference that would make this connection problematic.)
- There was an acknowledgement of conflict between Alley #33 and Bowery St. traffic, and the conversion of Alley #33 to one-way would resolve this.
- There was a comment that converting Alley #33 to one-way may be an inconvenience. There was concern that after a large event, a train of traffic will go through the intersection in the wrong direction
 - This results in 10 or fewer diverted vehicles in the peak hour. Those diverted trips have easy alternate access via American Avenue to Bowery Street.
 - The alley will be very well signed to alert motorists that it is a one-way and there will be “Do Not Enter” signs from the parking lot to the alley.
- There is support for improved intersection lighting.
- There was a comment that SHA snow plows on Braddock Road currently make 3-point turns at Park Avenue. Design should accommodate this maneuver.
- There was discussion related to reversing direction of traffic flows on Center and Bowery Streets.
 - Consideration of reopening Bowery St in front of bar to left turn only traffic
 - It was noted that in the 50’s, they tried reversing direction of Center and Bowery Streets, cars couldn’t get up the hill to turn on to Main Street off of Bowery. Bowery Street does appear to have a much steeper grade than Center Street approaching Main Street which could cause problems with vehicles going up the grade and turning at Main Street.
 - It was noted that this concept was outside the scope for this intersection study.

Section 4 Future Conditions

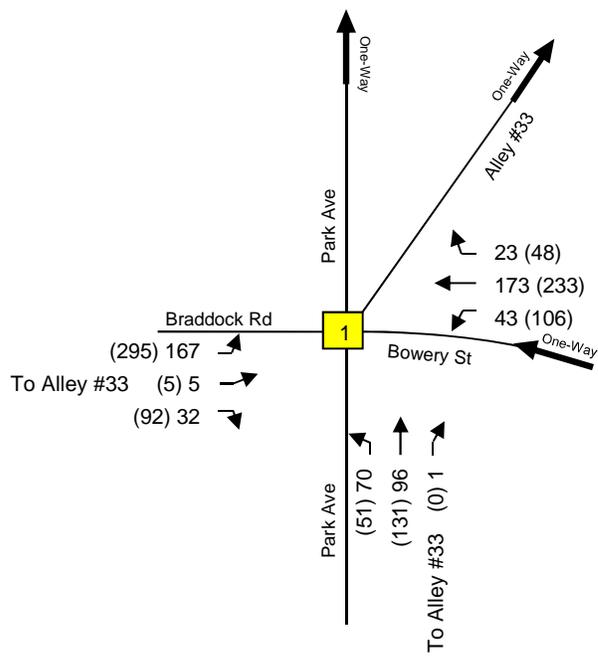
4.1 Future Traffic Volumes

The intersection was also evaluated for future traffic operations. Appendix A contains the historical Average Daily Traffic (ADT) volumes on MD 736 to the west of the intersection. The ADT data reveals that the traffic volumes have increased at approximately 0.75% per year over the past ten years.

In order to project future traffic volumes, the intersection traffic volumes were increased at one (1%) percent per year for twenty years. The resulting 2033 peak hour traffic volumes are shown on Exhibit 6.

4.2 Projected Level of Service

The future intersection was evaluated using the Critical Lane Volume (CLV) methodology and the results are shown on Exhibit 7. The results show that the intersection is still projected to operate at a Level of Service (LOS) “A”.



1% Annual Growth
20 Year Projection

Traffic Impact Analysis

Future (2033) Peak Hour Volumes

Exhibit 6

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Key: xx = AM Peak Vol's (xx) = PM Peak Vol's

Level-of-Service Results

Morning Peak Hour	Existing	Adjusted Existing	Future	LOS D or better?
1). Braddock Road & Park Ave / Bowery Street	A / 475	A / 480	A / 584	Y
Evening Peak Hour	Existing	Background	Total	LOS D or better?
1). Braddock Road & Park Ave / Bowery Street	A / 803	A / 803	A / 980	Y

NOTES:

1. All intersections satisfy MD SHA Guidelines.
2. Results above are represented in terms of Level of Service and Critical Lane Volume.

Traffic Impact Analysis	Results of Level-of-Service Analyses	Exhibit 7
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Section 5 Conclusions / Recommendations

5.1 Results of Analysis

This study was prepared to evaluate the existing traffic conditions and provide recommendations for future improvements at the intersection of Braddock Road & Park Avenue.

The intersection is in close proximity to commercial and multi-family residential buildings. As the intersection is immediately adjacent to Frostburg State University, it was noted that there is substantial pedestrian traffic in the area as students walk between their off-campus housing and the campus.

Based on the analyses and findings contained in this report:

- The intersection is not experiencing any congestion or capacity related issues.
- There are vehicular conflicts related to the current design of Park Avenue, Braddock Road, and Alley 33.
 - Park Avenue is one-way to the north of the intersection, but is very wide and unchannelized. It is recommended that Park Avenue be redesigned to reduce the road section to the north of the intersection. This will reduce the width of the pedestrian crossing, thereby resulting in enhanced pedestrian safety. This will also limit the ability of motorists to travel the wrong way on Park Avenue by reducing the width of the road section.
 - Alley 33 is too narrow to support two-way travel and should be converted to one-way road going away from the intersection. This will eliminate conflicts between two-way vehicles and will eliminate conflicts between Alley 33 and Bowery Street.
- Braddock Road to the west of the intersection does not have adequate pedestrian accommodations. A sidewalk should be constructed on the north side of Braddock Road to connect the existing sidewalk areas.

In light of the results of this study and the recommendations noted above, it is our opinion that the intersection will operate at good levels of service with improved pedestrian and vehicular operations well into the foreseeable future.

Appendix A

Supplemental Information
Condition Diagrams
Turning Movement Counts



Intersection: Braddock Rd & Park Ave / Bowery St

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County: Allegany

Pedestrians & Bicycles													
Time:	Park Ave North Leg			Park Ave South Leg (No Crossing)			Braddock Rd West Leg			Park Ave Bike Traffic			Total
	EB Peds	WB Peds	Total	EB Peds	WB Peds	Total	NB Peds	SB Peds	Total	NB	SB	Total	
7:00-7:15	0	0	0	0	0	0	1	0	1			0	2
7:15-7:30	0	0	0	0	0	0	2	0	2			0	4
7:30-7:45	1	1	2	0	0	0	6	0	6			0	16
7:45-8:00	1	2	3	0	0	0	20	1	21			0	48
8:00-8:15	0	2	2	0	0	0	5	1	6			0	16
8:15-8:30	0	0	0	0	0	0	2	1	3			0	6
8:30-8:45	1	1	2	0	0	0	6	0	6			0	16
8:45-9:00	1	2	3	0	0	0	21	3	24			0	54
9:00-9:15	0	3	3	0	0	0	6	1	7	1 Bike		1	21
9:15-9:30	0	0	0	0	0	0	2	1	3			0	6
9:30-9:45	0	0	0	0	0	0	3	5	8			0	16
9:45-10:00	0	6	6	0	0	0	24	7	31	1 Bike		1	75
10:00-10:15	2	1	3	0	0	0	6	7	13			0	32
10:15-10:30	0	0	0	0	0	0	4	6	10			0	20
10:30-10:45	1	1	2	0	0	0	9	9	18		1 Bike	1	41
10:45-11:00	1	2	3	0	0	0	20	6	26			0	58
11:00-11:15	0	3	3	0	0	0	9	5	14			0	34
11:15-11:30	2	1	3	0	0	0	4	7	11			0	28
11:30-11:45	1	0	1	0	0	0	4	9	13			0	28
11:45-12:00	0	7	7	0	0	0	18	6	24			0	62
12:00-12:15	2	1	3	0	0	0	8	12	20	1 Bike		1	47
12:15-12:30	1	4	5	0	0	0	2	14	16			0	42
12:30-12:45	0	0	0	0	0	0	5	7	12			0	24
12:45-1:00	2	0	2	0	0	0	3	4	7			0	18
1:00-1:15	0	3	3	0	0	0	9	17	26			0	58
1:15-1:30	1	4	5	0	0	0	2	13	15		1 Bike	1	41
1:30-1:45	0	0	0	0	0	0	4	4	8			0	16
1:45-2:00	2	0	2	0	0	0	3	4	7	1 Bike		1	19
2:00-2:15	0	3	3	0	0	0	8	15	23			0	52
2:15-2:30	1	4	5	0	0	0	2	12	14			0	38
2:30-2:45	0	0	0	0	0	0	1	1	2			0	4
2:45-3:00	2	0	2	0	0	0	3	4	7			0	18
3:00-3:15	0	3	3	0	0	0	7	14	21			0	48
3:15-3:30	1	4	5	0	0	0	2	11	13			0	36
3:30-3:45	1	1	2	0	0	0	1	1	2			0	8
3:45-4:00	7	0	7	0	0	0	1	5	6			0	26
4:00-4:15	1	1	2	0	0	0	3	3	6			0	16
4:15-4:30	1	6	7	0	0	0	4	5	9	1 Bike		1	33
4:30-4:45	0	2	2	0	0	0	0	4	4		1 Bike	1	13
4:45-5:00	2	0	2	0	0	0	3	4	7			0	18
5:00-5:15	2	3	5	0	0	0	6	13	19			0	48
5:15-5:30	1	4	5	0	0	0	2	6	8			0	26
5:30-5:45	1	1	2	0	0	0	1	2	3			0	10
5:45-6:00	6	2	8	0	0	0	0	5	5			0	26
7:15-8:15 AM	2	5	7	0	0	0	33	2	35	0	0	0	84
4:45-5:45 PM	6	8	14	0	0	0	12	25	37	0	0	0	102

Hourly Totals	Park Ave North Leg			Park Ave South Leg (No Crossing)			Braddock Rd West Leg			Park Ave Bike Traffic			Total
	EB Peds	WB Peds	Total	EB Peds	WB Peds	Total	NB Peds	SB Peds	Total	NB	SB	Total	
7:00-8:00	2	3	5	0	0	0	29	1	30	0	0	0	70
8:00-9:00	2	5	7	0	0	0	34	5	39	0	0	0	92
9:00-10:00	0	9	9	0	0	0	35	14	49	2	0	2	120
10:00-11:00	4	4	8	0	0	0	39	28	67	0	1	1	152
11:00-12:00	3	11	14	0	0	0	35	27	62	0	0	0	152
12:00-1:00	5	5	10	0	0	0	18	37	55	1	0	1	132
1:00-2:00	3	7	10	0	0	0	18	38	56	1	1	2	136
2:00-3:00	3	7	10	0	0	0	14	32	46	0	0	0	112
3:00-4:00	9	8	17	0	0	0	11	31	42	0	0	0	118
4:00-5:00	4	9	13	0	0	0	10	16	26	1	1	2	82
5:00-6:00	10	10	20	0	0	0	9	26	35	0	0	0	110

Pedestrians & Bicycles
Turning Movement Count

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Intersection: Braddock Rd & Park Ave / Bowery St
Weather: Clear
Count by: ML
Count Day/Date: December 3 & 4, 2013
County: Allegany

Cars & Light (2-Axle) Trucks													
Time:	Park Ave Northbound			Alley 33 Westbound			Braddock Rd Eastbound			Bowery St Westbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00-7:15	8	15	0	0	0	0	27	0	5	4	26	4	89
7:15-7:30	16	16	0	0	1	0	30	0	9	5	30	3	110
7:30-7:45	12	17	0	0	1	1	31	1	9	8	29	5	114
7:45-8:00	22	26	1	0	0	0	40	1	3	12	42	7	154
8:00-8:15	7	20	0	0	2	0	30	2	5	10	31	3	110
8:15-8:30	3	21	0	0	1	1	41	1	5	10	29	1	113
8:30-8:45	7	18	0	0	3	0	29	1	3	6	22	3	92
8:45-9:00	10	29	0	0	3	0	50	4	5	6	45	3	155
9:00-9:15	6	16	1	0	2	2	27	0	6	6	35	6	107
9:15-9:30	6	12	0	0	2	0	18	1	2	6	13	6	66
9:30-9:45	6	11	0	0	0	1	20	0	3	5	20	2	68
9:45-10:00	7	22	0	0	2	2	37	2	2	6	34	9	123
10:00-10:15	5	17	0	1	5	1	34	0	3	8	27	3	104
10:15-10:30	8	23	0	0	2	0	40	3	4	5	36	2	123
10:30-10:45	5	13	1	0	2	2	22	0	5	5	28	5	88
10:45-11:00	5	10	0	0	2	0	14	1	2	5	10	5	54
11:00-11:15	5	9	0	0	0	1	16	0	2	4	16	2	55
11:15-11:30	6	18	0	0	2	2	30	2	2	5	27	7	101
11:30-11:45	4	14	0	1	4	1	27	0	2	6	22	2	83
11:45-12:00	6	18	0	0	2	0	32	2	3	4	29	2	98
12:00-12:15	5	5	0	0	1	1	29	0	13	12	16	1	83
12:15-12:30	6	13	1	2	4	0	44	3	5	12	24	5	119
12:30-12:45	5	18	1	0	5	0	19	3	8	5	20	3	87
12:45-1:00	5	17	0	0	6	0	41	2	5	8	24	2	110
1:00-1:15	7	16	0	0	7	0	43	2	6	8	27	4	120
1:15-1:30	6	16	0	0	5	0	45	4	14	16	37	5	148
1:30-1:45	7	10	0	0	2	1	38	1	10	14	39	5	127
1:45-2:00	7	15	0	0	3	0	33	1	11	13	30	2	115
2:00-2:15	6	6	0	0	1	1	32	0	14	13	18	1	92
2:15-2:30	7	14	1	2	4	0	49	3	6	13	27	6	132
2:30-2:45	6	20	1	0	5	0	21	3	9	5	22	3	95
2:45-3:00	6	19	0	0	7	0	45	2	5	9	27	2	122
3:00-3:15	8	18	0	0	8	0	48	2	7	9	30	4	134
3:15-3:30	7	18	0	0	5	0	50	4	16	18	41	6	165
3:30-3:45	8	11	0	0	2	1	42	1	11	15	43	5	139
3:45-4:00	8	17	0	0	3	0	37	1	12	14	33	2	127
4:00-4:15	7	7	0	0	1	1	35	0	15	14	20	1	101
4:15-4:30	8	16	1	2	4	0	54	3	7	14	30	7	146
4:30-4:45	2	20	0	0	3	0	62	1	19	11	46	3	167
4:45-5:00	13	33	0	0	2	0	55	1	25	27	48	8	212
5:00-5:15	8	23	0	0	4	0	61	2	17	14	30	13	172
5:15-5:30	8	27	0	0	3	0	62	0	17	23	44	8	192
5:30-5:45	13	23	0	0	1	0	62	1	16	23	57	10	206
5:45-6:00	4	30	0	0	2	0	59	0	21	34	47	7	204

Hourly Totals	Park Ave Northbound			Alley 33 Westbound			Braddock Rd Eastbound			Bowery St Westbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00-8:00	58	74	1	0	2	1	128	2	26	29	127	19	467
8:00-9:00	27	88	0	0	9	1	150	8	18	32	127	10	470
9:00-10:00	25	61	1	0	6	5	102	3	13	23	102	23	364
10:00-11:00	23	63	1	1	11	3	110	4	14	23	101	15	369
11:00-12:00	21	59	0	1	8	4	105	4	9	19	94	13	337
12:00-1:00	21	53	2	2	16	1	133	8	31	37	84	11	399
1:00-2:00	27	57	0	0	17	1	159	8	41	51	133	16	510
2:00-3:00	25	59	2	2	17	1	147	8	34	40	94	12	441
3:00-4:00	31	64	0	0	18	1	177	8	46	56	147	17	565
4:00-5:00	30	76	1	2	10	1	206	5	66	66	144	19	626
5:00-6:00	33	103	0	0	10	0	244	3	71	94	178	38	774

Cars & Light (2-Axle) Trucks	Intersection: Braddock Rd & Park Ave / Bowery St Weather: Clear Count by: ML Count Day/Date: December 3 & 4, 2013 County: Allegany
Turning Movement Count	
Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning	

Buses and 3-axle (or greater) trucks													
Time:	Park Ave Northbound			Alley 33 Westbound			Braddock Rd Eastbound			Bowery St Westbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00-7:15													0
7:15-7:30							2				3		5
7:30-7:45							3				1		4
7:45-8:00											2		2
8:00-8:15							1						1
8:15-8:30													0
8:30-8:45			1				1				1		3
8:45-9:00							1						1
9:00-9:15													0
9:15-9:30							1						1
9:30-9:45										1			1
9:45-10:00												1	1
10:00-10:15							1						1
10:15-10:30											1		1
10:30-10:45													0
10:45-11:00			1										1
11:00-11:15							1						1
11:15-11:30	1												1
11:30-11:45											2		2
11:45-12:00			1										1
12:00-12:15													0
12:15-12:30													0
12:30-12:45							1						1
12:45-1:00													0
1:00-1:15											1		1
1:15-1:30	1												1
1:30-1:45							2				1		3
1:45-2:00													0
2:00-2:15													0
2:15-2:30													0
2:30-2:45							4				1	1	6
2:45-3:00							1				3		4
3:00-3:15							1						1
3:15-3:30							1				2		3
3:30-3:45			3										3
3:45-4:00	1						2				2		5
4:00-4:15			1				1				1		3
4:15-4:30											1		1
4:30-4:45							2						2
4:45-5:00			1										1
5:00-5:15											1		1
5:15-5:30							1						1
5:30-5:45							1				1		2
5:45-6:00													0

NOTE: WB-50 was the largest truck observed (Five WB-50's observed throughout 11 hour period)

Hourly Totals	Park Ave Northbound			Alley 33 Westbound			Braddock Rd Eastbound			Bowery St Westbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00-8:00	0	0	0	0	0	0	5	0	0	0	6	0	11
8:00-9:00	0	1	0	0	0	0	3	0	0	0	1	0	5
9:00-10:00	0	0	0	0	0	0	1	0	0	1	0	1	3
10:00-11:00	0	1	0	0	0	0	1	0	0	0	1	0	3
11:00-12:00	1	1	0	0	0	0	1	0	0	0	2	0	5
12:00-1:00	0	0	0	0	0	0	1	0	0	0	0	0	1
1:00-2:00	1	0	0	0	0	0	2	0	0	0	2	0	5
2:00-3:00	0	0	0	0	0	0	5	0	0	0	4	1	10
3:00-4:00	1	3	0	0	0	0	4	0	0	0	4	0	12
4:00-5:00	0	2	0	0	0	0	3	0	0	0	2	0	7
5:00-6:00	0	0	0	0	0	0	2	0	0	0	2	0	4

Buses and 3-axle (or greater) trucks
Turning Movement Count

Lenhart Traffic Consulting, Inc.
Traffic Engineering & Transportation Planning

Intersection: Braddock Rd & Park Ave / Bowery St
Weather: Clear
Count by: ML
Count Day/Date: December 3 & 4, 2013
County: Allegany

Total (Cars, Buses, and Trucks)													
Time:	Park Ave Northbound			Alley 33 Westbound			Braddock Rd Eastbound			Bowery St Westbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00-7:15	8	15	0	0	0	0	27	0	5	4	26	4	89
7:15-7:30	16	16	0	0	1	0	32	0	9	5	33	3	115
7:30-7:45	12	17	0	0	1	1	34	1	9	8	30	5	118
7:45-8:00	22	26	1	0	0	0	40	1	3	12	44	7	156
8:00-8:15	7	20	0	0	2	0	31	2	5	10	31	3	111
8:15-8:30	3	21	0	0	1	1	41	1	5	10	29	1	113
8:30-8:45	7	19	0	0	3	0	30	1	3	6	23	3	95
8:45-9:00	10	29	0	0	3	0	51	4	5	6	45	3	156
9:00-9:15	6	16	1	0	2	2	27	0	6	6	35	6	107
9:15-9:30	6	12	0	0	2	0	19	1	2	6	13	6	67
9:30-9:45	6	11	0	0	0	1	20	0	3	6	20	2	69
9:45-10:00	7	22	0	0	2	2	37	2	2	6	34	10	124
10:00-10:15	5	17	0	1	5	1	35	0	3	8	27	3	105
10:15-10:30	8	23	0	0	2	0	40	3	4	5	37	2	124
10:30-10:45	5	13	1	0	2	2	22	0	5	5	28	5	88
10:45-11:00	5	11	0	0	2	0	14	1	2	5	10	5	55
11:00-11:15	5	9	0	0	0	1	17	0	2	4	16	2	56
11:15-11:30	7	18	0	0	2	2	30	2	2	5	27	7	102
11:30-11:45	4	14	0	1	4	1	27	0	2	6	24	2	85
11:45-12:00	6	19	0	0	2	0	32	2	3	4	29	2	99
12:00-12:15	5	5	0	0	1	1	29	0	13	12	16	1	83
12:15-12:30	6	13	1	2	4	0	44	3	5	12	24	5	119
12:30-12:45	5	18	1	0	5	0	20	3	8	5	20	3	88
12:45-1:00	5	17	0	0	6	0	41	2	5	8	24	2	110
1:00-1:15	7	16	0	0	7	0	43	2	6	8	28	4	121
1:15-1:30	7	16	0	0	5	0	45	4	14	16	37	5	149
1:30-1:45	7	10	0	0	2	1	40	1	10	14	40	5	130
1:45-2:00	7	15	0	0	3	0	33	1	11	13	30	2	115
2:00-2:15	6	6	0	0	1	1	32	0	14	13	18	1	92
2:15-2:30	7	14	1	2	4	0	49	3	6	13	27	6	132
2:30-2:45	6	20	1	0	5	0	25	3	9	5	23	4	101
2:45-3:00	6	19	0	0	7	0	46	2	5	9	30	2	126
3:00-3:15	8	18	0	0	8	0	49	2	7	9	30	4	135
3:15-3:30	7	18	0	0	5	0	51	4	16	18	43	6	168
3:30-3:45	8	14	0	0	2	1	42	1	11	15	43	5	142
3:45-4:00	9	17	0	0	3	0	39	1	12	14	35	2	132
4:00-4:15	7	8	0	0	1	1	36	0	15	14	21	1	104
4:15-4:30	8	16	1	2	4	0	54	3	7	14	31	7	147
4:30-4:45	2	20	0	0	3	0	64	1	19	11	46	3	169
4:45-5:00	13	34	0	0	2	0	55	1	25	27	48	8	213
5:00-5:15	8	23	0	0	4	0	61	2	17	14	31	13	173
5:15-5:30	8	27	0	0	3	0	63	0	17	23	44	8	193
5:30-5:45	13	23	0	0	1	0	63	1	16	23	58	10	208
5:45-6:00	4	30	0	0	2	0	59	0	21	34	47	7	204
7:15-8:15 AM	57	79	1	0	4	1	137	4	26	35	138	18	500
4:45-5:45 PM	42	107	0	0	10	0	242	4	75	87	181	39	787

Hourly Totals	Park Ave Northbound			Alley 33 Westbound			Braddock Rd Eastbound			Bowery St Westbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00-8:00	58	74	1	0	2	1	133	2	26	29	133	19	478
8:00-9:00	27	89	0	0	9	1	153	8	18	32	128	10	475
9:00-10:00	25	61	1	0	6	5	103	3	13	24	102	24	367
10:00-11:00	23	64	1	1	11	3	111	4	14	23	102	15	372
11:00-12:00	22	60	0	1	8	4	106	4	9	19	96	13	342
12:00-1:00	21	53	2	2	16	1	134	8	31	37	84	11	400
1:00-2:00	28	57	0	0	17	1	161	8	41	51	135	16	515
2:00-3:00	25	59	2	2	17	1	152	8	34	40	98	13	451
3:00-4:00	32	67	0	0	18	1	181	8	46	56	151	17	577
4:00-5:00	30	78	1	2	10	1	209	5	66	66	146	19	633
5:00-6:00	33	103	0	0	10	0	246	3	71	94	180	38	778

Total (Cars, Buses, and Trucks)	Intersection: Braddock Rd & Park Ave / Bowery St Weather: Clear Count by: ML Count Day/Date: December 3 & 4, 2013 County: Allegany
Turning Movement Count	
Lenhart Traffic Consulting, Inc. Traffic Engineering & Transportation Planning	

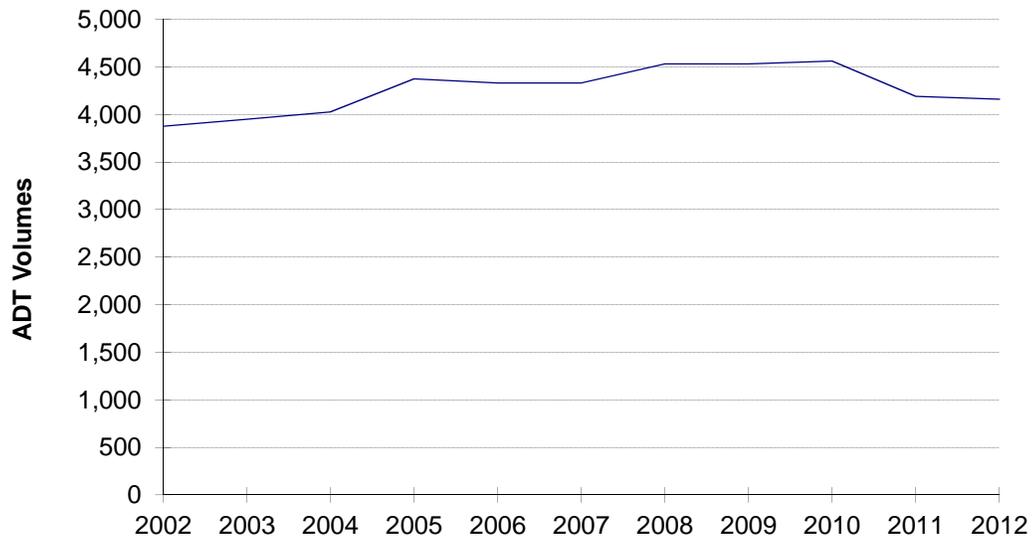
TRAFFIC GROWTH PROJECTION

LOCATION: MD 736 (Between I-68 & Park Ave)

REPORT DATE: 28-Mar-14

AVERAGE GROWTH:	0.80%
MATHEMATICAL GROWTH:	0.71%

Year	ADT Volume	Vol. increase	% increase	Average %
2002	3,875			
2003	3,950	75	1.94%	1.94%
2004	4,025	75	1.90%	1.92%
2005	4,375	350	8.70%	4.18%
2006	4,331	-44	-1.01%	2.88%
2007	4,332	1	0.02%	2.31%
2008	4,530	198	4.57%	2.69%
2009	4,531	1	0.02%	2.31%
2010	4,562	31	0.68%	2.10%
2011	4,190	-372	-8.15%	0.96%
2012	4,161	-29	-0.69%	0.80%



TRAFFIC GROWTH
MD 736 (Between I-68 & Park Ave)

Appendix B

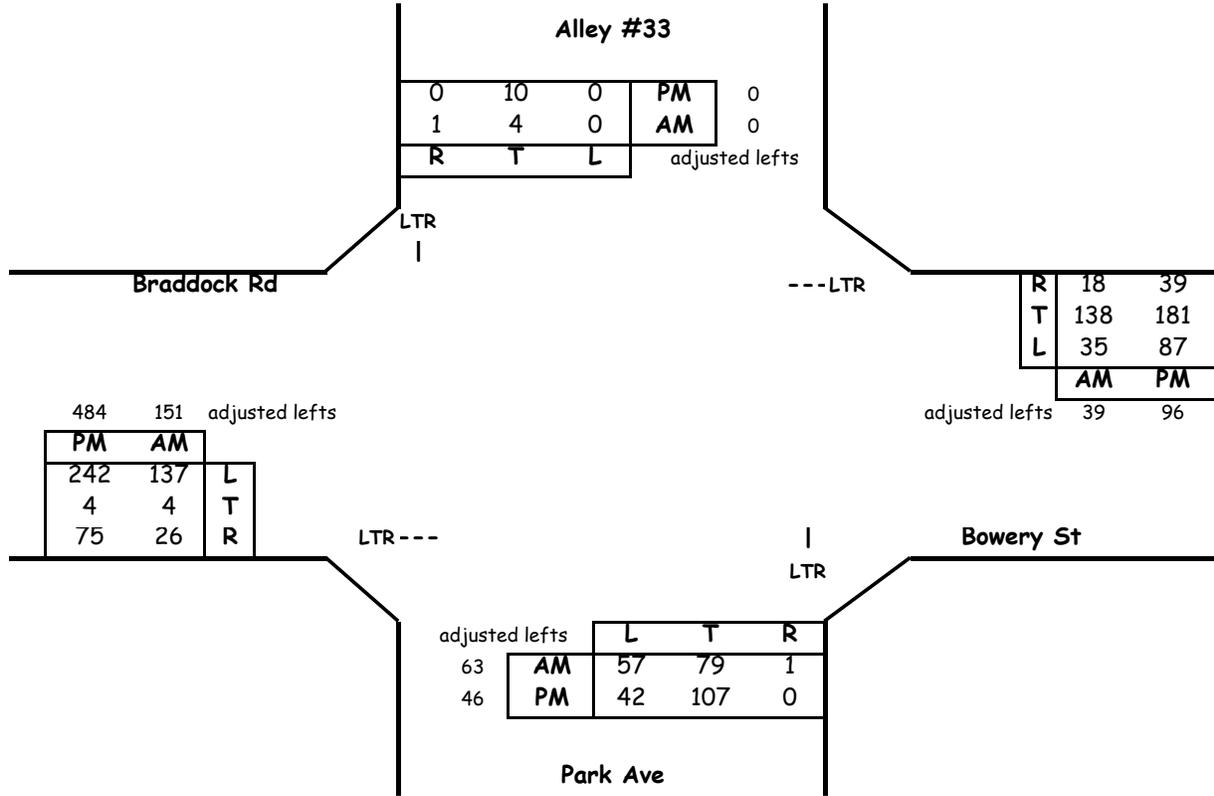
Critical Lane Volume worksheets

CRITICAL LANE VOLUME (CLV) METHODOLOGY for MSHA

Main Line: Park Ave
Minor Street: Bowery St
Study Period: EXISTING TRAFFIC

Date of Count: December 3 & 4, 2013
Analyst: ml

Lane Use + Traffic Volumes



Critical Lane Volume Analysis

Morning Peak Hour							
Dir	Thru Volumes			+ Opposing Lefts			AM CLV
	VOL	x LUF	= Total	VOL	x LUF	= Total	
NB	143	1.00	143	0	1	0	143
SB	5	1.00	5	57	1	57	
EB	181	1	181	35	1	35	332
WB	195	1	195	137	1	137	
CLV TOTAL=							475
Level of Service (LOS)=-							A

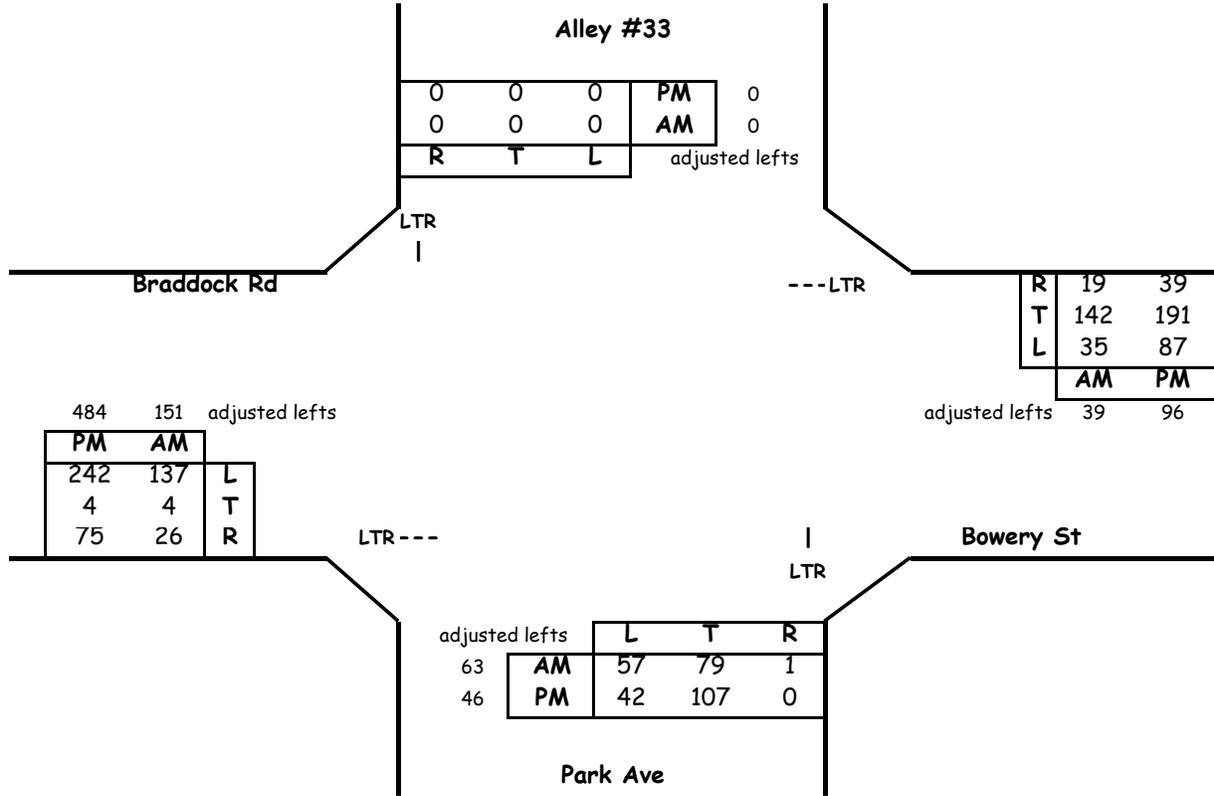
Evening Peak Hour							
Dir	Thru Volumes			+ Opposing Lefts			PM CLV
	VOL	x LUF	= Total	VOL	x LUF	= Total	
NB	153	1.00	153	0	1	0	153
SB	10	1.00	10	42	1	42	
EB	563	1	563	87	1	87	650
WB	316	1	316	242	1	242	
CLV TOTAL=							803
Level of Service (LOS)=-							A

Critical Lane Volume Analysis		Park Ave & Bowery St (EXISTING TRAFFIC)	Intersection 1
Lenhart Traffic Consulting Traffic Engineering & Transportation Planning			

CRITICAL LANE VOLUME (CLV) METHODOLOGY for MSHA

Main Line: Park Ave **Date of Count:** December 3 & 4, 2013
Minor Street: Bowery St **Analyst:** ml
Study Period: ADJUSTED EXISTING TRAFFIC

Lane Use + Traffic Volumes



Critical Lane Volume Analysis

Morning Peak Hour							
Dir	Thru Volumes			+ Opposing Lefts			AM
	VOL	x LUF	= Total	VOL	x LUF	= Total	CLV
NB	143	1.00	143	0	1	0	143
SB	0	1.00	0	57	1	57	
EB	181	1	181	35	1	35	337
WB	200	1	200	137	1	137	
CLV TOTAL=							480
Level of Service (LOS)=-							A

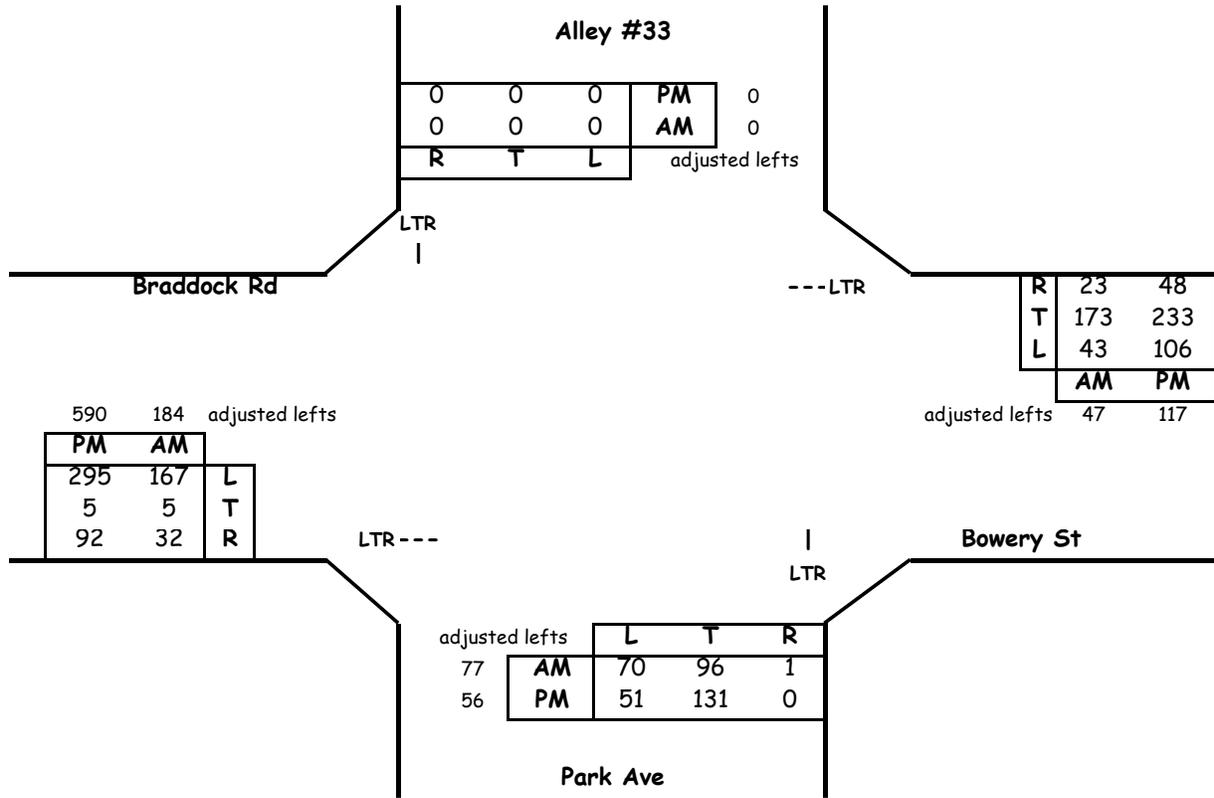
Evening Peak Hour							
Dir	Thru Volumes			+ Opposing Lefts			PM
	VOL	x LUF	= Total	VOL	x LUF	= Total	CLV
NB	153	1.00	153	0	1	0	153
SB	0	1.00	0	42	1	42	
EB	563	1	563	87	1	87	650
WB	326	1	326	242	1	242	
CLV TOTAL=							803
Level of Service (LOS)=-							A

Critical Lane Volume Analysis		Park Ave & Bowery St	Intersection 1
Lenhart Traffic Consulting Traffic Engineering & Transportation Planning		(ADJUSTED EXISTING TRAFFIC)	

CRITICAL LANE VOLUME (CLV) METHODOLOGY for MSHA

Main Line: Park Ave **Date of Count:** December 3 & 4, 2013
Minor Street: Bowery St **Analyst:** ml
Study Period: FUTURE 2033 TRAFFIC

Lane Use + Traffic Volumes



Critical Lane Volume Analysis

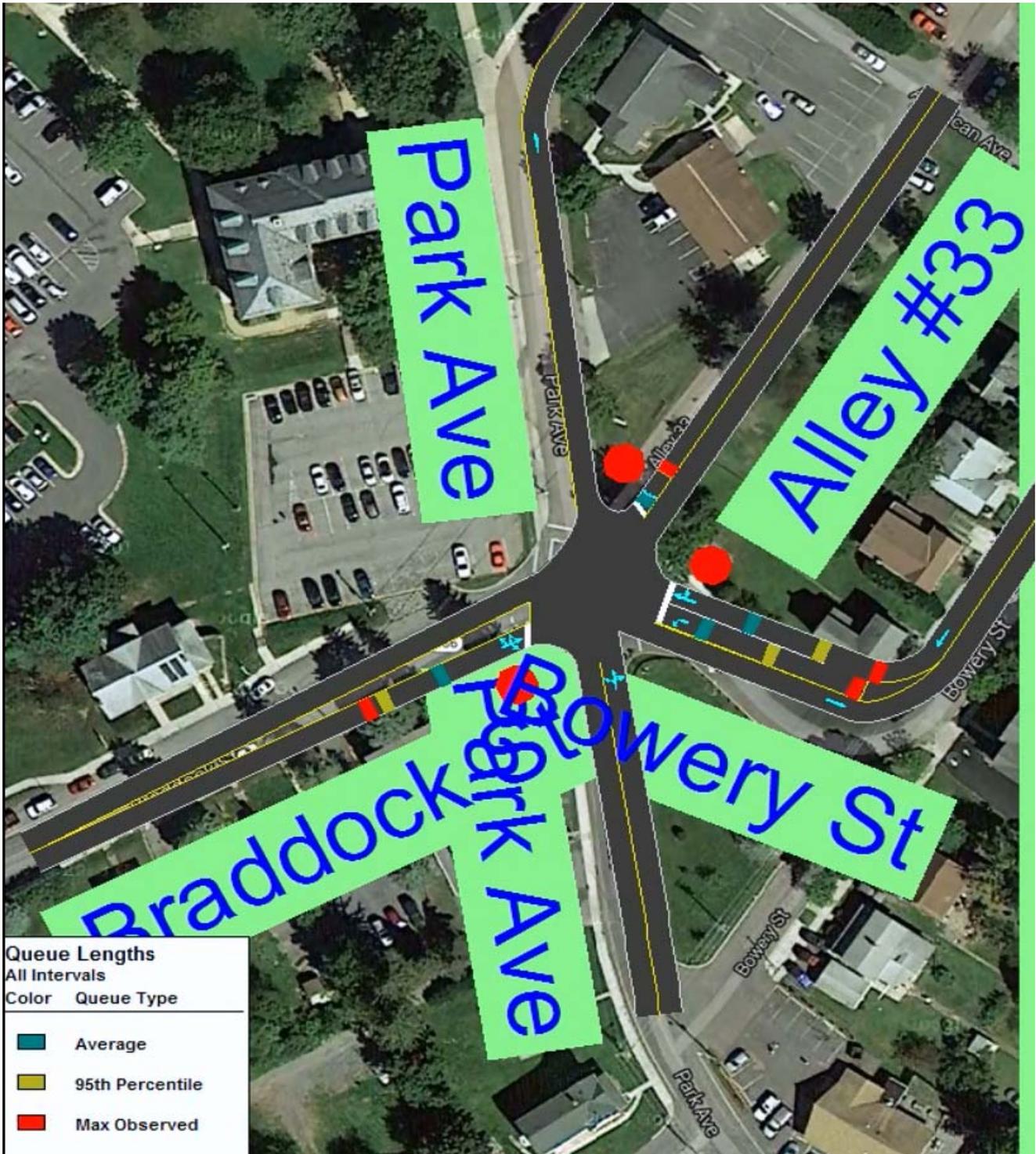
Morning Peak Hour							
Dir	Thru Volumes			+ Opposing Lefts			AM CLV
	VOL	x LUF	= Total	VOL	x LUF	= Total	
NB	174	1.00	174	0	1	0	174
SB	0	1.00	0	70	1	70	
EB	221	1	221	43	1	43	410
WB	243	1	243	167	1	167	
CLV TOTAL=							584
Level of Service (LOS)=-							A

Evening Peak Hour							
Dir	Thru Volumes			+ Opposing Lefts			PM CLV
	VOL	x LUF	= Total	VOL	x LUF	= Total	
NB	187	1.00	187	0	1	0	187
SB	0	1.00	0	51	1	51	
EB	687	1	687	106	1	106	793
WB	398	1	398	295	1	295	
CLV TOTAL=							980
Level of Service (LOS)=-							A

Critical Lane Volume Analysis		Park Ave & Bowery St (FUTURE 2033 TRAFFIC)	Intersection 1
Lenhart Traffic Consulting Traffic Engineering & Transportation Planning			

Appendix C

Synchro Worksheets



AM Queuing Exhibit

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:57	6:57	6:57	6:57	6:57	6:57
End Time	8:00	8:00	8:00	8:00	8:00	8:00
Total Time (min)	63	63	63	63	63	63
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded mScheduledIntervals	1	1	1	1	1	1
Vehs Entered	486	498	507	504	501	499
Vehs Exited	486	502	507	506	504	500
Starting Vehs	4	7	2	3	4	3
Ending Vehs	4	3	2	1	1	2
Travel Distance (mi)	66	67	68	68	67	67
Travel Time (hr)	3.5	3.6	3.6	3.7	3.6	3.6
Total Delay (hr)	0.8	0.9	0.8	1.0	0.8	0.8
Total Stops	347	361	356	397	366	366
Fuel Used (gal)	3.1	3.3	3.2	3.3	3.2	3.2

Interval #0 Information Seeding

Start Time	6:57
End Time	7:00
Total Time (min)	3
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	7:00
End Time	8:00
Total Time (min)	60
Volumes adjusted by Growth Factors.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	486	498	507	504	501	499
Vehs Exited	486	502	507	506	504	500
Starting Vehs	4	7	2	3	4	3
Ending Vehs	4	3	2	1	1	2
Travel Distance (mi)	66	67	68	68	67	67
Travel Time (hr)	3.5	3.6	3.6	3.7	3.6	3.6
Total Delay (hr)	0.8	0.9	0.8	1.0	0.8	0.8
Total Stops	347	361	356	397	366	366
Fuel Used (gal)	3.1	3.3	3.2	3.3	3.2	3.2

4: Park Ave & Braddock St/Bowery St & Alley #33 Performance by movement

Movement	EBL2	EBL	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SWR	SWR2	All
Denied Del/Veh (s)	0.2	0.3	0.2	0.0	0.0	0.0	0.2	0.2	0.1	0.1	0.1	0.1
Total Del/Veh (s)	6.7	8.8	4.5	5.3	6.8	4.4	0.1	0.3	0.1	5.1	7.3	4.7

Total Network Performance

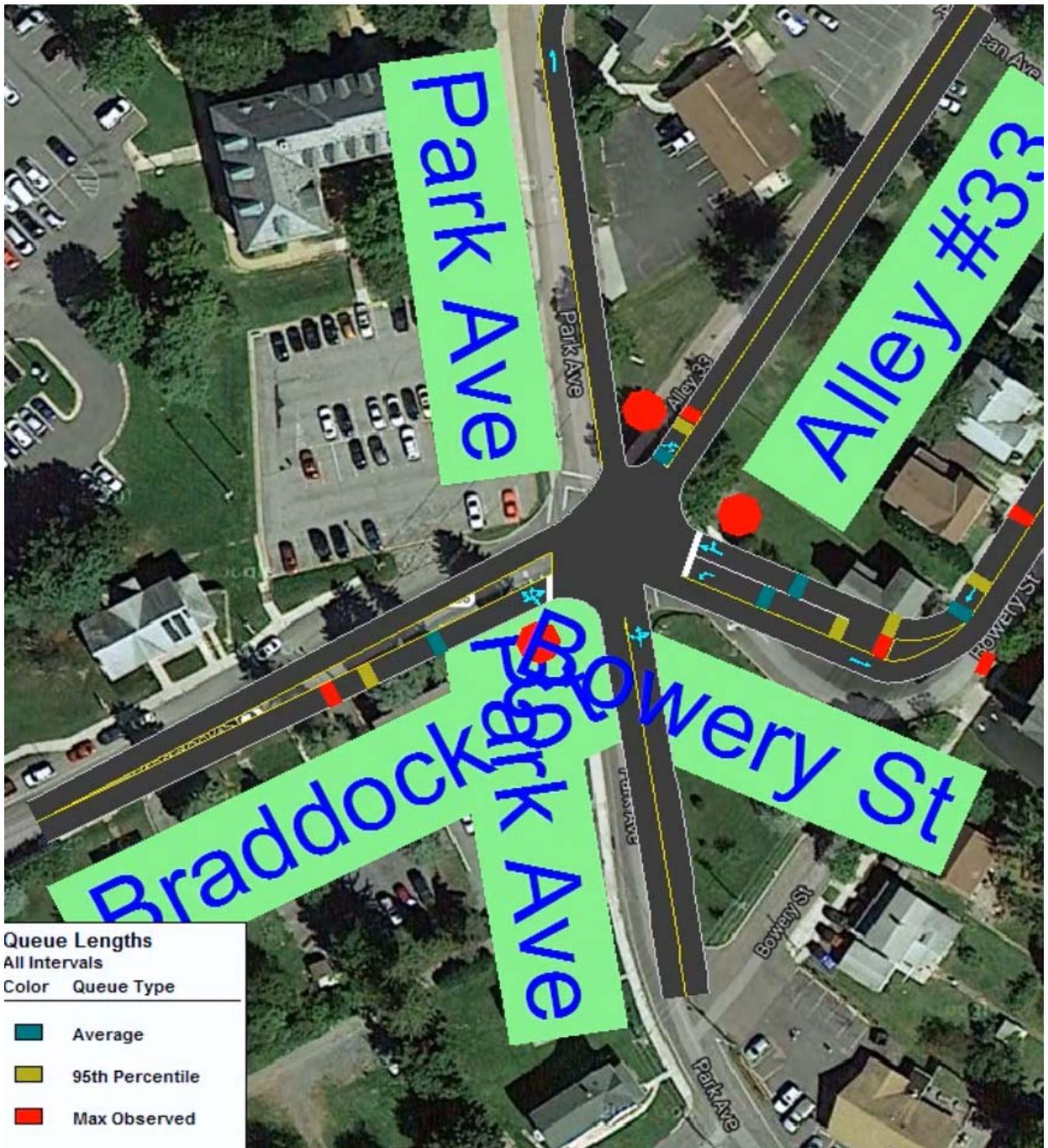
Denied Del/Veh (s)	0.2
Total Del/Veh (s)	5.8

Intersection: 4: Park Ave & Braddock St/Bowery St & Alley #33

Movement	EB	WB	WB	SW
Directions Served	<LTR	L	TR	<LR>
Maximum Queue (ft)	96	66	85	30
Average Queue (ft)	47	22	44	5
95th Queue (ft)	77	54	75	23
Link Distance (ft)	280		113	277
Upstream Blk Time (%)		0	0	
Queuing Penalty (veh)		0	0	
Storage Bay Dist (ft)		150		
Storage Blk Time (%)		0	0	
Queuing Penalty (veh)		0	0	

Network Summary

Network wide Queuing Penalty: 0



PM Queuing Exhibit

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:57	6:57	6:57	6:57	6:57	6:57
End Time	8:00	8:00	8:00	8:00	8:00	8:00
Total Time (min)	63	63	63	63	63	63
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded mScheduledIntervals	1	1	1	1	1	1
Vehs Entered	802	771	833	822	798	806
Vehs Exited	800	774	829	822	795	804
Starting Vehs	4	9	6	7	6	5
Ending Vehs	6	6	10	7	9	7
Travel Distance (mi)	108	105	111	111	107	109
Travel Time (hr)	6.5	6.3	6.6	7.0	6.3	6.5
Total Delay (hr)	2.0	2.0	2.0	2.4	1.8	2.1
Total Stops	663	621	653	657	640	647
Fuel Used (gal)	5.5	5.2	5.5	5.6	5.4	5.4

Interval #0 Information Seeding

Start Time	6:57
End Time	7:00
Total Time (min)	3
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	7:00
End Time	8:00
Total Time (min)	60
Volumes adjusted by Growth Factors.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	802	771	833	822	798	806
Vehs Exited	800	774	829	822	795	804
Starting Vehs	4	9	6	7	6	5
Ending Vehs	6	6	10	7	9	7
Travel Distance (mi)	108	105	111	111	107	109
Travel Time (hr)	6.5	6.3	6.6	7.0	6.3	6.5
Total Delay (hr)	2.0	2.0	2.0	2.4	1.8	2.1
Total Stops	663	621	653	657	640	647
Fuel Used (gal)	5.5	5.2	5.5	5.6	5.4	5.4

4: Park Ave & Braddock St/Bowery St & Alley #33 Performance by movement

Movement	EBL2	EBL	EBR	WBL	WBT	WBR	NBL	NBT	SWR	All
Denied Del/Veh (s)	0.3	0.4	0.3	0.0	0.0	0.0	0.2	0.2	0.1	0.2
Total Del/Veh (s)	10.7	10.6	7.6	5.9	10.4	7.4	0.2	0.4	5.8	7.6

Total Network Performance

Denied Del/Veh (s)	0.3
Total Del/Veh (s)	8.9

Intersection: 4: Park Ave & Braddock St/Bowery St & Alley #33

Movement	EB	WB	WB	B5	SW
Directions Served	<LTR	L	TR	T	<LR
Maximum Queue (ft)	166	101	144	29	34
Average Queue (ft)	78	38	61	1	7
95th Queue (ft)	135	70	111	16	29
Link Distance (ft)	280		109	206	282
Upstream Blk Time (%)		0	2		
Queuing Penalty (veh)		0	0		
Storage Bay Dist (ft)		150			
Storage Blk Time (%)		0	2		
Queuing Penalty (veh)		0	2		

Network Summary

Network wide Queuing Penalty: 2