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DEPARTMENT OF TRANSPORTATION
BALTIMORE CITY

DRAFT

ROLAND AVENUE CYCLE TRACK EVALUATION

SEPTEMBER 22, 2017

PREPARED BY:

McCORMICK TAYLOR

with:

Connor Support Services, LLC
Daniel Consultants, Inc.

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McCormick Taylor, Inc., with support from Connor Support Services, LLC and Daniel Consultants, Inc., was contracted by the Baltimore City Department of Transportation (BCDOT) to collect and process data in support of an evaluation of the recently completed cycle track in the Roland Avenue corridor between Cold Spring Lane and Northern Parkway, a distance of approximately one mile. This report summarizes that data collection effort and presents the resulting data. In addition, field observations from the data collection period are noted, and an evaluation of an alternate corridor configuration is also considered.

Locations and times for data collection were selected based on coordination with the BCDOT. Figure 1 shows the data collection locations in the corridor and the type of data collected at each location. (For clarity, all figures are located at the end of the report.) Details of the data collection times and the data collection results are summarized below by data type.

Vehicle Speeds

Machine counters and roadway tubes were used to collect vehicle speed data at the following locations on Roland Avenue (see Figure 1):

1. **Between Kenwood Avenue and Oakdale Road**
2. **South of Elmhurst Road**
3. **North of St. Johns Road**
4. **North of Roland Park Elementary School**

Speed data were collected by lane in both directions of travel on Tuesday, March 21, 2017, between 9:00 AM and 3:00 PM, reflecting free-flow conditions outside the traditional morning and afternoon commuter peak periods. Summary graphics for each location are shown in Figure 2 and includes a tabulation of the 85th percentile speed and percentage of traffic over 25 mph, both by lane and by direction, as well as a graph of overall speed distributions.

The posted speed limit in both directions of Roland Avenue within the study area is 25 mph, with a posted school speed limit of 25 mph in effect weekdays from 7:00 AM to 5:00 PM between Elmhurst Road and Northern Parkway. The 85th percentile speeds are generally 8 to 10 mph above the posted speed limit, and are slightly lower at the north end of the corridor on northbound Roland Avenue, as shown in Table 1.

Table 1. Corridor Speeds Summary

Location	Northbound		Southbound	
	85th Percentile	Percent Greater than 25 mph	85th Percentile	Percent Greater than 25 mph
Between Kenwood Road and Oakdale Road	36	79%	39	93%
South of Elmhurst Road	39	96%	38	82%
North of St. Johns Road	33	59%	36	60%
North of Roland Park Elementary School	33	61%	36	79%

Count Date: Tuesday, March 21, 2017; Time Period: 9:00 AM to 3:00 PM

Bicycle Volumes

Bicycle counts were completed at the following locations on Roland Avenue (see Figure 1):

1. **Between Kenwood Avenue and Oakdale Road**
2. **South of Elmhurst Road**
3. **North of St. Johns Road**
4. **North of Roland Park Elementary School**

Volumes were collected on Saturday, April 8, 2017 between 10:00 AM and 3:00 PM. In addition to overall bicycle volumes, data were recorded by location of the bicycle either in the marked bicycle lane or in the vehicular travel lane. Table 2 summarizes the bicycle volume data collected by location. The data suggest that use of the bicycle lane by cyclists varies throughout the corridor but overall approximately 70 to 80 percent of cyclists were observed using the bicycle lane.

Table 2. Weekend Bicycle Volume Summary

Count Location	Southbound			Northbound			Total		
	Marked Bicycle Lane	Vehicular Travel Lane	Percent in Bicycle Lane	Marked Bicycle Lane	Vehicular Travel Lane	Percent in Bicycle Lane	Marked Bicycle Lane	Vehicular Travel Lane	Percent in Bicycle Lane
Between Kenwood Road and Oakdale Road	14	12	54%	17	1	94%	31	13	70%
South of Elmhurst Road	21	8	72%	23	3	88%	44	11	80%
North of St. Johns Road	16	9	64%	21	6	78%	37	15	71%
North of Roland Park Elementary School	26	11	70%	33	3	92%	59	14	81%
Total	**77**	**40**	**66%**	**94**	**13**	**88%**	**171**	**53**	**76%**

Count Date: Saturday, April 8, 2017; Time Period: 10:00 AM to 3:00 PM

Graphs of the hourly variation in bicycle volumes by direction at each location are shown in Figure 3. During the observation period, total bike volumes remained relatively steady at the south end of the corridor (approximately 10 to 15 bikes per hour), but increased to 20 or more near the Roland Park Elementary School.

In addition to the four locations noted above that were counted on a weekend, a weekday bicycle count was also conducted at a location south of Deepdene Road (see Figure 1). The count was conducted from 6:00 AM to 10:00 AM and from 3:00 PM to 7:00 PM, a period covering the traditional morning and afternoon vehicular peak periods. In general, use of the bicycle lane during the weekday count, as shown in Table 3, is slightly greater than what was observed during the weekend data collection period (Table 2).

Table 3. Weekday Bicycle Volume Summary

Time Period	Southbound			Northbound			Total		
	Marked Bicycle Lane	Vehicular Travel Lane	Percent in Bicycle Lane	Marked Bicycle Lane	Vehicular Travel Lane	Percent in Bicycle Lane	Marked Bicycle Lane	Vehicular Travel Lane	Percent in Bicycle Lane
6:00 AM to 10:00 AM	7	1	88%	9	2	82%	16	3	84%
3:00 PM to 7:00 PM	23	7	77%	23	5	82%	46	12	79%
Total	**30**	**8**	**79%**	**23**	**7**	**77%**	**53**	**15**	**78%**

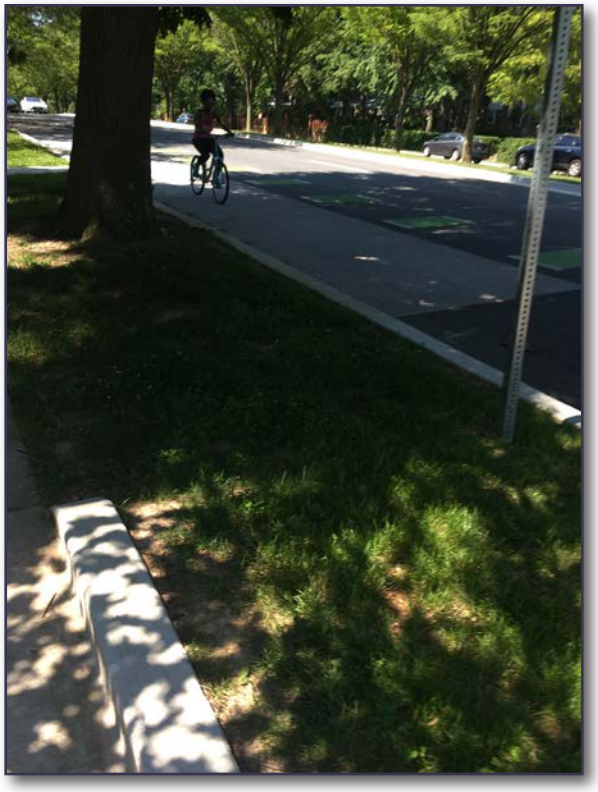
Count Date: Monday, April 10, 2017; Count Location: South of Deepdene Road

Turning Movement Volumes

Thirteen-hour (6:00 AM to 7:00 PM) turning movement counts were conducted at the following signalized Roland Avenue intersections (see Figure 1):

1. **Cold Spring Lane (Wednesday, April 12, 2017)**
2. **Wyndhurst Avenue (Wednesday, April 5, 2017)**
3. **Deepdene Road (Wednesday, April 5, 2017)**
4. **Northern Parkway (Wednesday, April 5, 2017)**

Peak hours volumes are shown in Figure 4. In addition, diurnal curves for the Roland Avenue approach and departure legs at each intersection were also developed, representing the hourly variation in through volumes on Roland Avenue. These curves, shown in Figure 5, indicate that Roland directional volumes peak at approximately 800-900 vehicles per hour (vph) near the south end of the corridor and increase to approximately 1,100-1,200 vph at the north end.



Surveys

Manual surveys of Roland Avenue users were completed on Saturday, April 22, 2017 and Sunday, April 23, 2017. The survey, developed in coordination with Baltimore City Department of Transportation staff, was administered to three separate groups, identified as noted below:

1. **Roland – residential properties that have frontage on or direct access to Roland Avenue;**
2. **Community – residential properties in the Roland Park and Wyndhurst communities, excluding those already included in the Roland group;**
3. **Intercept – "on the street" surveys taken in areas of high activity, generally the commercial areas at the north end of the corridor.**

For the Roland and Community groups, a GIS address database was used to develop survey lists. Door-to-door surveys were attempted at all 67 properties in the Roland list; a random sampling of the 1,145 properties in the Community group was surveyed. For the intercept surveys, efforts were made to collect responses from drivers, pedestrians, and bicyclists.

General Survey Statistics

A total of 179 surveys were completed, including 27 from the Roland list, 44 from the Community list, and 108 Intercept surveys. The general statistics for the surveys of residential properties in the Roland and Community groups and the on-street Intercept surveys are shown in Table 4, and includes tabulation of the residents that did not answer the door or that otherwise declined to respond to the survey.

Table 4. General Survey Statistics

Group	No Answer / Ignored	Declined to Respond	Survey Completed	Total
Roland	37	3	27	67
Community	90	15	44	149
Intercept	14	110	108	232
Total	**141**	**128**	**179**	**448**

Survey Dates: Saturday, April 22, 2017 and Sunday, April 23, 2017

Question 1

Which of the following modes did you use in the Roland Avenue corridor within the last week (Choose all that apply)? **a)** *Driving/Parking* **b)** *Walking* **c)** *Biking* **d)** *Transit*

Table 5. Survey Responses to Question 1

Group	Driving / Parking	Walking	Biking	Transit
Roland	26	23	3	5
Community	39	33	13	3
Intercept	104	60	19	6
Total	**169**	**116**	**35**	**14**

Several responses to Question 1 identified multiple modes, the most frequent combination was Driving/Parking and Walking.

Question 2

How did the PREVIOUS configuration of Roland Avenue (prior to the installation of the cycle track) influence your decision to use the corridor via different transportation modes? (Check one for each item)

Table 6. Survey Responses to Question 2

Transportation Mode	Encouraged	No Effect	Discouraged
Driving/Parking	88	63	15
Walking	74	68	8
Biking	47	58	26
Transit	30	76	6

Question 3

How does the CURRENT configuration of Roland Avenue (with the cycle track) influence your decision to use the corridor via different transportation modes? (Check one for each item)

Table 7. Survey Responses to Question 3

Transportation Mode	Encouraged	No Effect	Discouraged
Driving/Parking	16	46	110
Walking	22	81	49
Biking	29	42	68

Question 4

How do CURRENTLY feel about the following while traveling on Roland Avenue as compared to prior to the installation of the cycle track?

Table 8. Survey Responses to Question 4a

Safety	1 Less Safe	2	3 Safe	4	5 More Safe

Group	1	2	3	4	5	Total Responses	Average Response
Roland	19	4	1	2	1	27	1.59
Community	23	6	7	3	2	41	1.90
Intercept	71	8	9	7	11	106	1.86
Total	**113**	**18**	**17**	**12**	**14**	**174**	**1.83**

Table 9. Survey Responses to Question 4b

Vehicle Speeds	1 Slower	2	3 No Change	4	5 Faster

Group	1	2	3	4	5	Total Responses	Average Response
Roland	2	1	15	2	7	27	3.41
Community	3	4	24	3	7	41	3.17
Intercept	18	9	61	4	13	105	2.86
Total	**23**	**14**	**100**	**9**	**27**	**173**	**3.02**

Table 10. Survey Responses to Question 4c

Aesthetics	1 Less Pleasing	2	3 No Change	4	5 More Pleasing

Group	1	2	3	4	5	Total Responses	Average Response
Roland	18	1	8	0	0	27	1.63
Community	15	3	20	0	5	43	2.47
Intercept	64	10	14	13	5	106	1.92
Total	**97**	**14**	**42**	**13**	**10**	**176**	**2.01**

Question 5

If you use the cycle track, are you comfortable with the width of the bike lane?

Yes (wide enough)

No (too narrow)

Table 11. Survey Responses to Question 5

Group	Yes (wide enough)	No (too narrow)	Total
Roland	7	6	13
Community	9	17	26
Intercept	23	28	51
Total	**39**	**51**	**90**

Question 6

If you use the cycle track, are you comfortable with the width of the buffer lane between the parking lane and the bicycle lane?

a) Yes (wide enough)

b) No (too narrow)

Table 12. Survey Responses to Question 6

Group	Yes (wide enough)	No (too narrow)	Total
Roland	4	10	14
Community	5	20	25
Intercept	18	34	52
Total	**27**	**64**	**91**

Question 7

If you park along Roland Avenue, are you comfortable with the width of the parking lane?

a) Yes (wide enough)

b) No (too narrow)

Table 13. Survey Responses to Question 7

Group	Yes (wide enough)	No (too narrow)	Total
Roland	4	21	25
Community	10	29	39
Intercept	29	71	100
Total	**43**	**121**	**164**

In which block do you usually park? (enter cross streets):

Between _____ *and* _____

Various responses to the parking location question were noted, with many of those surveyed preferring to park in the areas near Deepdene Road and the commercial areas and community amenities at the north end of the study area.

Question 8

Do you have any suggested improvements to the Roland Avenue corridor?

A total of 137 written responses were recorded in response to this question, addressing a wide range of considerations. Several of the written comments, however, could be grouped into general areas, as noted below:

- 42 responses mentioned either returning to the previous configuration (before the cycle track) or placing the parking against the curb, which are essentially the same.
- 30 responses in some way mentioned safety concerns as related to parking, walking, or biking within the corridor.
- 21 responses explicitly requested that the cycle track/bicycle lane be removed.
- Nine responses cited speeding as a concern and/or requested installation of speed control measures.
- Nine responses noted debris in the cycle track as creating unsafe conditions or deterring use of the cycle track.
- Seven responses acknowledged support of the current configuration.
- Five responses requested reducing Roland Avenue to one travel lane in each direction.

Field Observations

Throughout the data collection period and at random times throughout the study period, field observations of general vehicular, bicycle, and pedestrian operations in the corridor were noted. Many of the observations mirror the concerns noted by the survey respondents in response to the question requesting proposed improvements.

Use of Space

The current corridor configuration generally defines areas within the public right of way intended for use by the various users of the corridor. Sidewalks are provided for pedestrian traffic, with marked and signalized crossings throughout the corridor. The cycle track provides space for operation of bicycles, in many locations throughout the corridor buffered from adjacent roadway uses. The roadway uses include travel lanes, typically two in each direction of travel, and on street parking between the travel lane and the cycle track.

Throughout the observation period, and as reflected in the collected data, cyclists were observed using the travel lane instead of the bicycle lane. In addition, pedestrian (typically joggers) were often observed using cycle track or travel lanes. When observed, these uses did not appear to significantly impact overall operations of the corridor.

Parking

As noted, on-street parking is provided throughout the corridor between the travel lanes and the bike lane. In many locations, a two to three foot buffer is provided between the parking lane and the bike lane. In some areas, the parking lane is approximately seven feet wide and larger vehicles are barely contained within the designated parking area, often encroaching on the buffer lane.

Additionally, observations of parking maneuvers and ingress/egress from parked vehicles suggests that some drivers will park partially within the buffer area to provide more room on the roadway side of the vehicle for access to and from their vehicle. This was particularly observed in areas where the buffer area is not supplemented by flexible delineators. In general, however, during the observation periods parking did not impact the availability of the bike lane.

Parking maneuvers within the area where flexible delineators are installed also lead to damage of the delineators by the parking maneuvers. Damaged delineators can become a hazard within the bike lane or the parking lane, and require attention from BCDOT maintenance forces to maintain in proper position.

Bike Lane

In some areas of the corridor, debris and sediment have collected on the curb line, reducing the effective width of the bike lane. Because of the significant number of trees in the corridor, the impact is likely more significant in the fall, potentially obscuring pavement markings and decreasing the visible width of the bike lane.

Traffic Operations Analysis

The current corridor configuration generally provided two travel lanes in each direction of travel on Roland Avenue, with auxiliary turn lanes provided at several intersecting roadways. At the request of BCDOT, a configuration that reduces Roland Avenue to a single travel lane in each direction was evaluated. Such a configuration would allow for wider parking areas, increased buffer space between the parking area and the bike lane, and a wider bike lane.

For preliminary screening of this configuration, the average annual daily traffic (AADT) on Roland Avenue was calculated and compared to general planning-level travel lane capacity criteria for determining the number of lanes to be provided in the corridor. AADT were based on the 12-hour intersection turning movement data previously described and application of AADT conversion factors to convert that 12-hour value into a daily volume. Factors available from the Maryland State Highway Administration Data Services Division were used for this conversion.

Table 14 summarizes the AADT values computed at various locations throughout the corridor. Daily volumes generally range between 16,000 and 18,000 vehicles per day (vpd), with directional volumes approaching 9,400 vpd in some sections. These values are at the boundary of typical volume ranges at which two travel lanes should be considered. A number of factors, including traffic signal density, traffic signal timing, presence of intersection turning lanes, and directional flow variations can influence the need for additional through lanes in the corridor.

Table 14. Corridor Factored Average Annual Daily Traffic (AADT)

Location	Northbound (vpd)	Southbound (vpd)	Total AADT (vpd)
South of Cold Spring Lane	8,850	8,600	17,450
North of Cold Spring Lane	6,350	6,550	12,900
South of Wyndhurst Avenue	7,950	8,250	16,200
North of Wyndhurst Avenue	8,150	7,800	15,950
South of Deepdene Road	9,350	8,250	17,600
North of Deepdene Road	8,500	9,400	17,900
South of Northern Parkway	8,500	9,050	17,550
North of Northern Parkway	6,600	6,400	13,000

Based on 12-hour count volumes and Maryland State Highway Administration AADT conversion factors.

To address some of these considerations, a Synchro traffic model provided by BCDOT was used to complete a more detailed evaluation of traffic operations in the corridor resulting from the proposed capacity reduction. The analysis considers a southbound configuration that tapers from two travel lanes to one south of Northern Parkway and provides two travel lanes from south of Oakdale Road to Cold Spring Lane. Northbound, Roland Avenue is configured to taper from two lanes to one north of Cold Spring Lane and widen to two travel lanes approaching Northern Parkway. Table 15 summarizes the level of service (LOS) and computed delay at corridor intersections. Several minor modifications to lane use and or signal timing were incorporated into the analysis of proposed conditions to optimize operations.

In general, Table 15 suggests that since minimal changes to Roland Avenue are introduced at the Northern Parkway and Cold Spring Lane intersection, negligible change in LOS is anticipated at those locations. At other corridor intersections, delays are generally anticipated to increase at the side street intersection approaches due to the loss of capacity on Roland Avenue. This reflects the redistribution of available traffic signal green time allocated to the various approaches.

Table 15. Roland Avenue Two-Lane v. One-Lane Analysis Summary

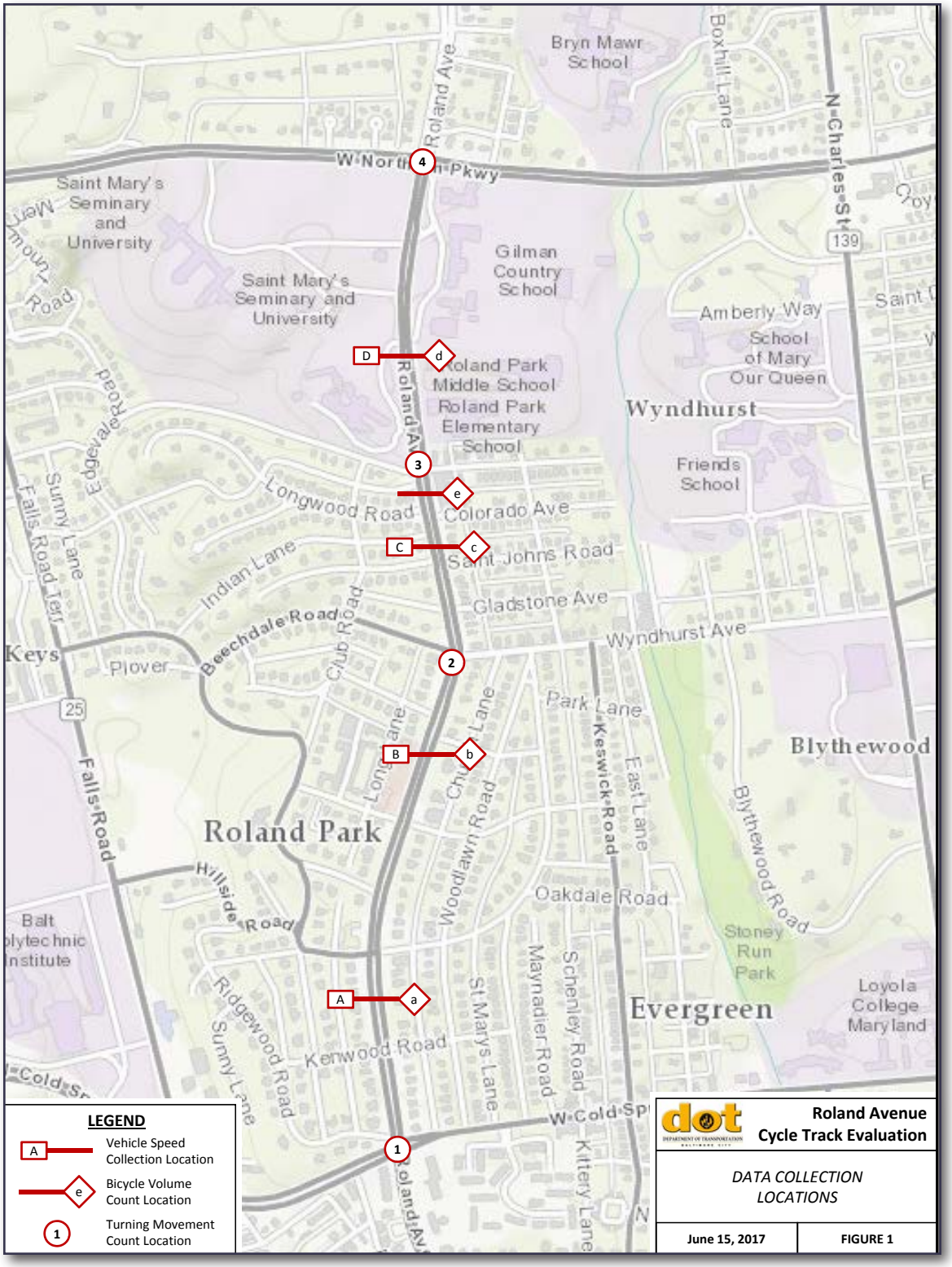
Intersection	Approach	Two Lane				One Lane			
		AM Peak		PM Peak		AM Peak		PM Peak	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Northern Parkway	EB	55.1	E	69.6	E	55.1	E	69.6	E
	WB	44.7	D	44.4	D	44.7	D	44.4	D
	NB	53.3	D	46.2	D	53.3	D	45.3	D
	SB	63.3	E	52.6	D	63.3	E	52.6	D
	Overall	52.4	D	56.1	E	52.4	D	55.9	E
Deepdene Road	EB	13.8	B	29.2	C	28.9	C	37.4	D
	NB	22.7	C	0.6	A	5.5	A	0.9	A
	SB	18.3	B	2.5	A	14.3	B	3.0	A
	Overall	19.8	B	2.4	A	11.6	B	3.0	A
Wyndhurst Avenue	EB	17.4	B	10.6	B	24.1	C	23.8	C
	WB	62.5	E	12.1	B	117.9	F	25.6	C
	NB	10.2	B	14.4	B	42.0	D	34.1	C
	SB	18.7	B	17.1	B	21.5	C	10.6	B
	Overall	24.9	C	15.2	B	44.8	D	23.3	C
Cold Spring Lane	EB	86.4	F	190.2	F	86.4	F	190.2	F
	WB	133.7	F	51.1	D	133.7	F	51.1	D
	NB	41.5	D	57.9	E	57.8	E	57.9	E
	SB	39.5	D	42.9	D	41.2	D	42.9	D
	Overall	77.8	E	113.7	F	80.8	E	113.7	F

Although Table 15 suggests that overall intersection operations under one lane configuration would be comparable to existing operations under two lane configuration, Table 16 provides anticipated queue lengths under a single through lane configuration. At several intersections and at multiple approaches at those intersections, the anticipated queues under one lane configuration will exceed the available storage length for that movement, as shown in red in Table 16. Reconfiguration of some turning lengths may be possible, but may result in a loss of on-street parking to accommodate the traffic queues.

Table 16. Anticipated Queues with One-Lane Roland Avenue

Intersection	Approach	Movement	95th Percentile Queue	
			AM Peak	PM Peak
Northern Parkway	EB	L	300	350
		TR	950	1650
	WB	L	425	375
		TR	600	475
	NB	L	250	200
		T	450	275
		R	225	225
	SB	L	175	150
		T	1375	500
		R	225	200
Deepdene Road	EB	LTR	125	75
	NB	LT	450	300
		R	100	100
	SB	L	150	75
		T	450	250
		R	100	50
Wyndhurst Avenue	EB	LTR	75	50
	WB	LT	250	125
		R	150	75
	NB	T	400	700
		R	200	150
	SB	L	200	100
		T	350	300
Oakdale Road	EB	LTR	100	75
	WB	LTR	125	25
	NB	L	75	25
		TR	50	325
	SB	L	50	50
		TR	75	25
Cold Spring Lane	EB	L	300	300
		TR	1400	2050
	WB	L	175	150
		TR	1825	350
	NB	L	125	350
		T	600	525
		R	125	100
	SB	L	125	150
		T	500	375
		R	125	100

Red values indicate queues that exceed available storage length.


Bryn Mawr School
Boxhill Lane
Roland Ave
W North Ave
N Charles St
139
Saint Mary's Seminary and University
Gilman Country School
Saint Mary's Seminary and University
Amberly Way
School of Mary Our Queen
Roland Park Middle School
Roland Park Elementary School
Wyndhurst
Friends School
Longwood Road
Colorado Ave
Saint Johns Road
Indian Lane
Gladstone Ave
Wyndhurst Ave
Beechdale Road
Club Road
Keys
Plover
Falls Road
25
Park Lane
Keswick Road
East Lane
Blythewood
Blythewood Road
Roland Park
Hillside Road
Woodlawn Road
Oakdale Road
Stoney Run Park
Loyola College Maryland
Evergreen
Kenwood Road
Ridgewood Road
Sunny Lane
St Marys Lane
Maynadier Road
Schenley Road
Kittery Lane
W Cold Spring
Sunny Lane
Falls Road Terr
Edgevale Road
Tunbridge Road
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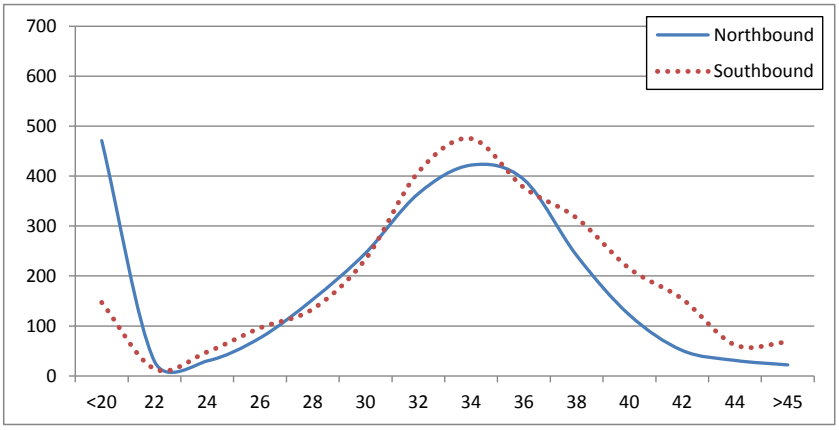
LEGEND
Vehicle Speed Collection Location
Bicycle Volume Count Location
Turning Movement Count Location
dot
Roland Avenue Cycle Track Evaluation
DATA COLLECTION LOCATIONS
June 15, 2017
FIGURE 1

FIGURE 2. ROLAND AVENUE CORRIDOR SPEED PROFILES

Sheet 1 of 2

BETWEEN KENWOOD ROAD AND OAKDALE ROAD						
Tuesday, March 21, 2017	Southbound			Northbound		
9:00 AM to 3:00 PM	Approach	Right Lane	Left Lane	Left Lane	Right Lane	Approach
Speed Collection Location A	↓↓	↓	↓	↑	↑	↑↑
85th Percentile Speed	38	37	39	35	36	36
Greater than 25 mph	91%	89%	93%	63%	92%	79%



SOUTH OF ELMHURST ROAD						
Tuesday, March 21, 2017	Southbound			Northbound		
9:00 AM to 3:00 PM	Approach	Right Lane	Left Lane	Left Lane	Right Lane	Approach
Speed Collection Location B	↓↓	↓	↓	↑	↑	↑↑
85th Percentile Speed	37	36	38	39	38	39
Greater than 25 mph	83%	84%	82%	97%	96%	96%

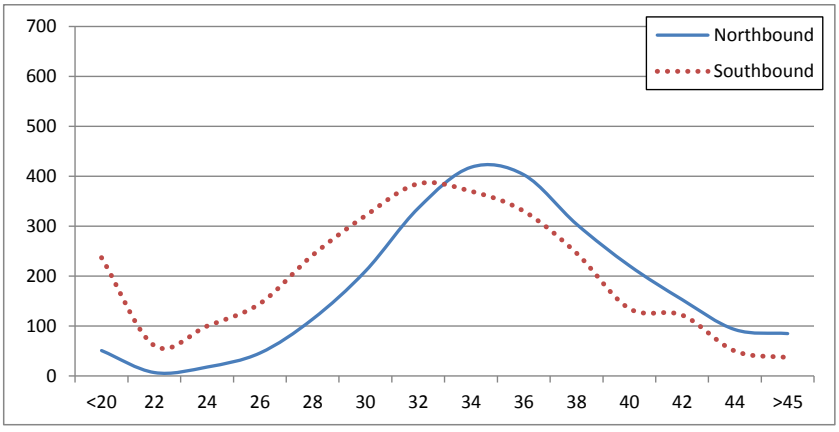
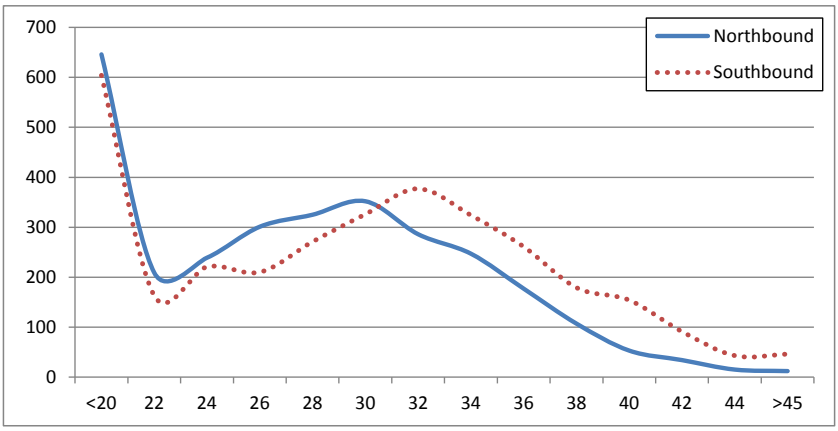


FIGURE 2. ROLAND AVENUE CORRIDOR SPEED PROFILES

Sheet 2 of 2

NORTH OF ST JOHNS ROAD						
Tuesday, March 21, 2017	Southbound			Northbound		
9:00 AM to 3:00 PM	Approach	Right Lane	Left Lane	Left Lane	Right Lane	Approach
Speed Collection Location C	↓↓	↓↓	↓↓	↑↑	↑↑	↑↑
85th Percentile Speed	35	35	36	34	31	33
Greater than 25 mph	67%	72%	60%	69%	49%	59%



NORTH OF ROLAND PARK ELEMENTARY SCHOOL						
Tuesday, March 21, 2017	Southbound			Northbound		
9:00 AM to 3:00 PM	Approach	Right Lane	Left Lane	Left Lane	Right Lane	Approach
Speed Collection Location D	↓↓	↓↓	↓↓	↑↑	↑↑	↑↑
85th Percentile Speed	36	35	36	34	32	33
Greater than 25 mph	79%	80%	79%	63%	55%	61%

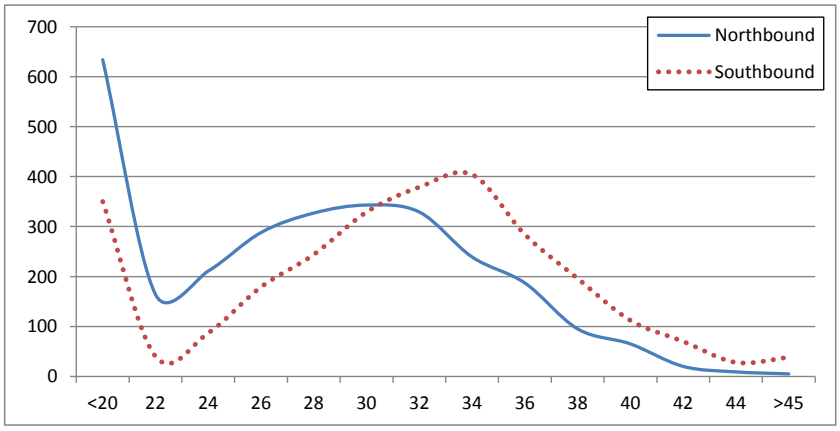
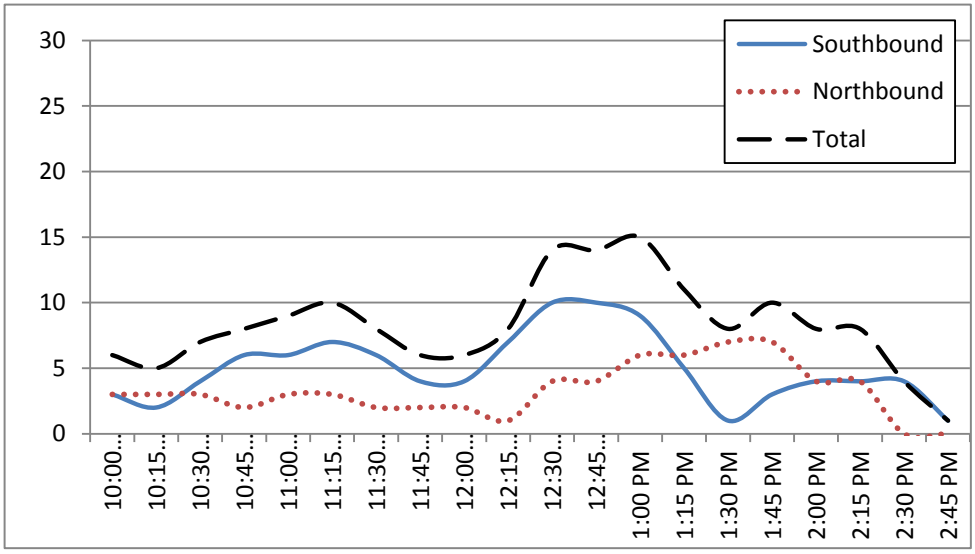


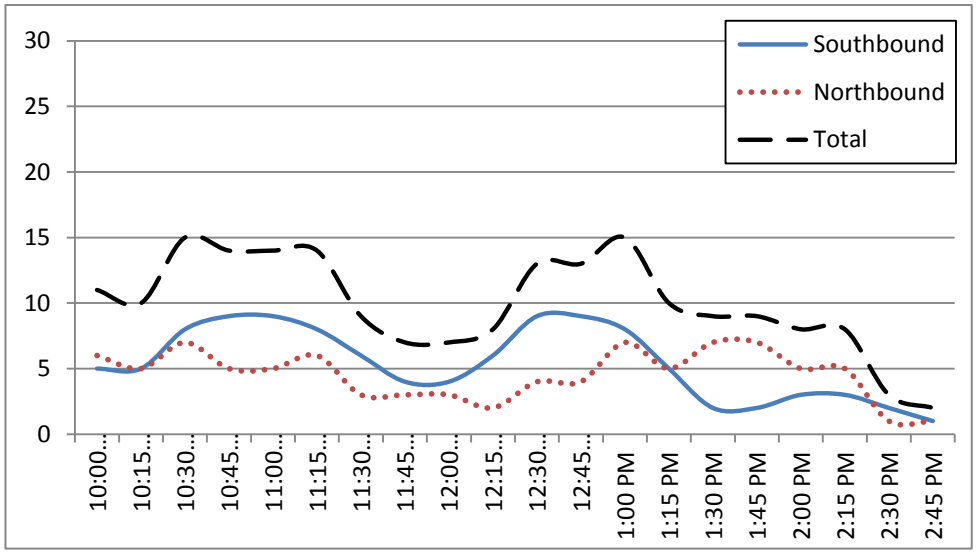
FIGURE 3. ROLAND AVENUE BICYCLE VOLUMES

Sheet 1 of 2

BETWEEN KENWOOD ROAD AND OAKDALE ROAD



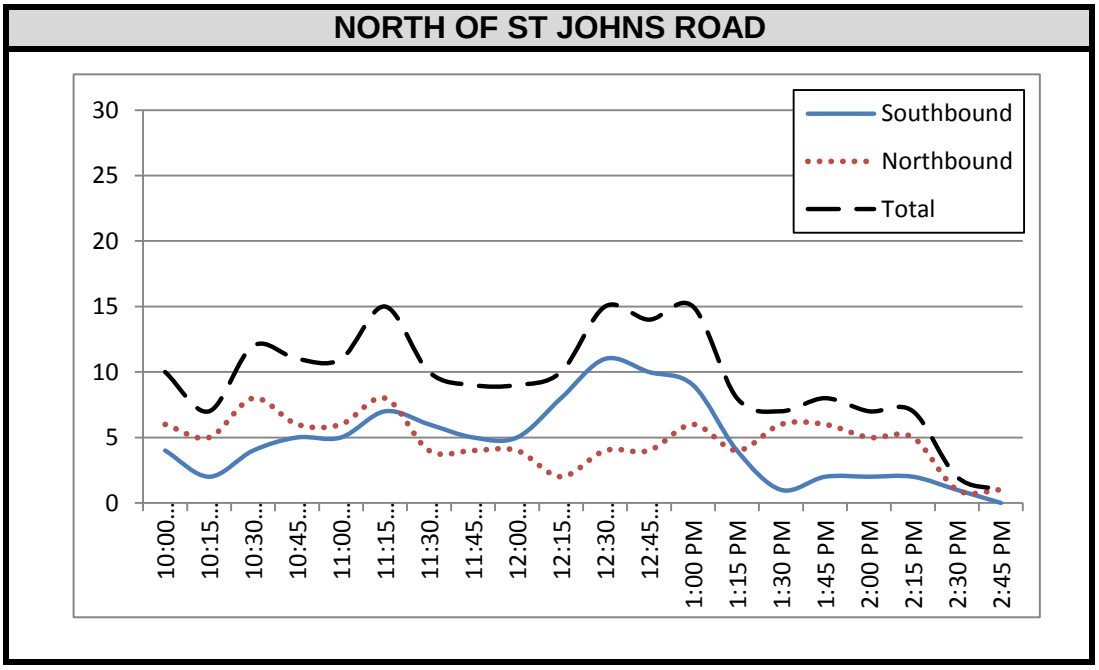
SOUTH OF ELMHURST ROAD

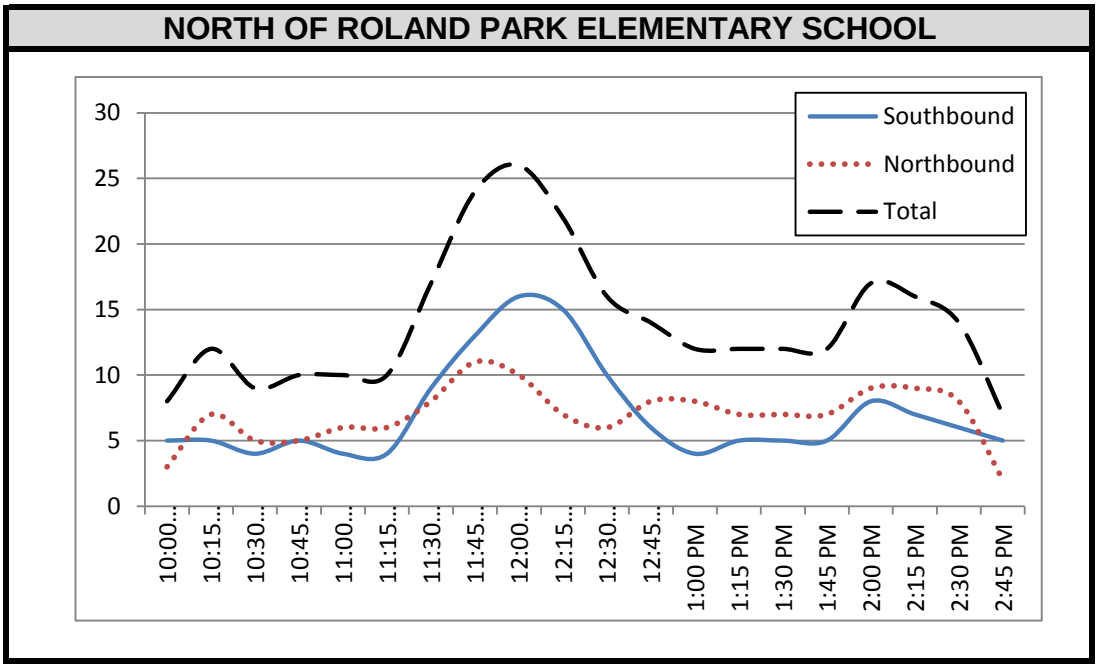


Count Date: Saturday, April 8, 2017

FIGURE 3. ROLAND AVENUE BICYCLE VOLUMES

Sheet 2 of 2





Count Date: Saturday, April 8, 2017

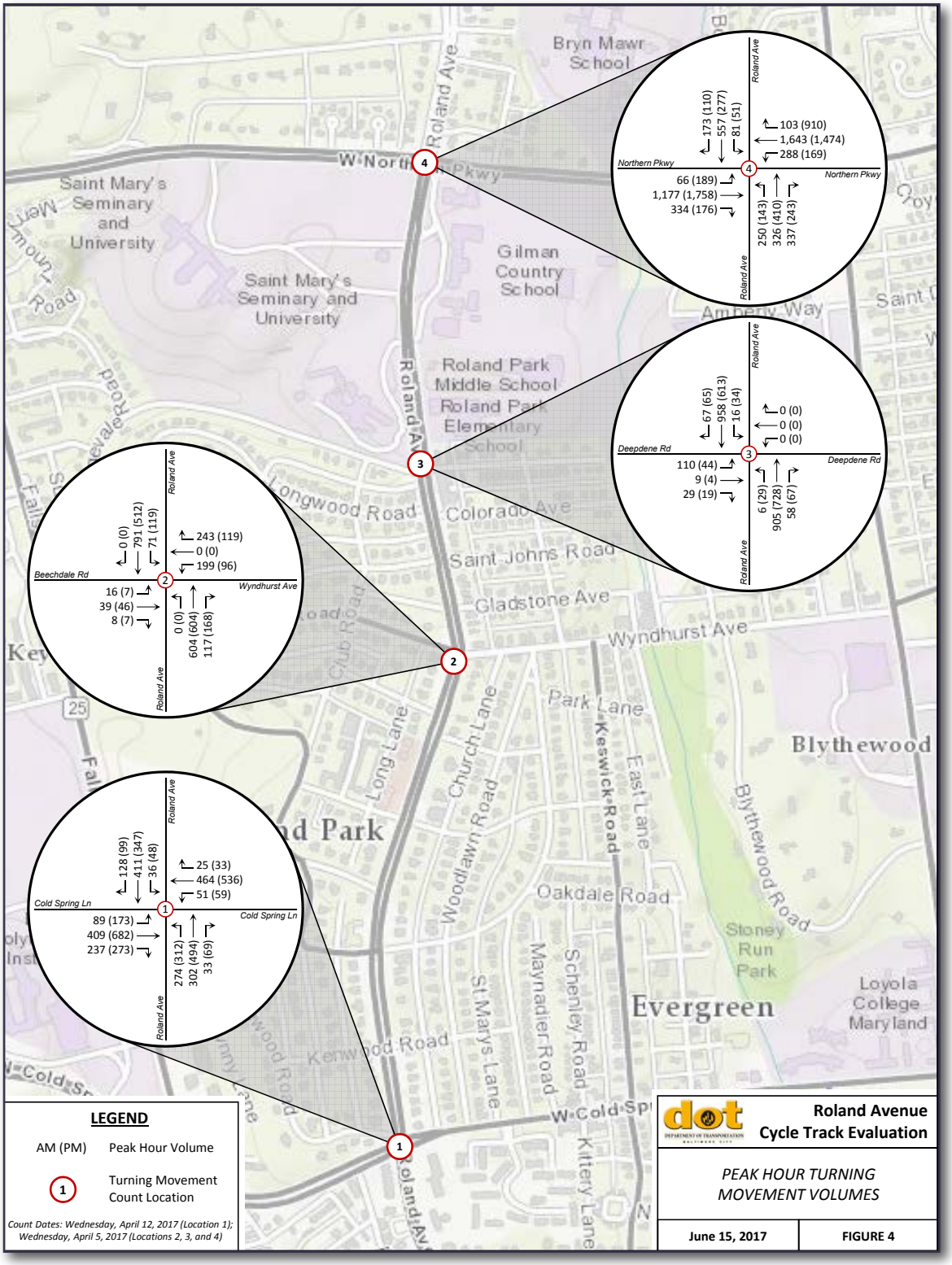
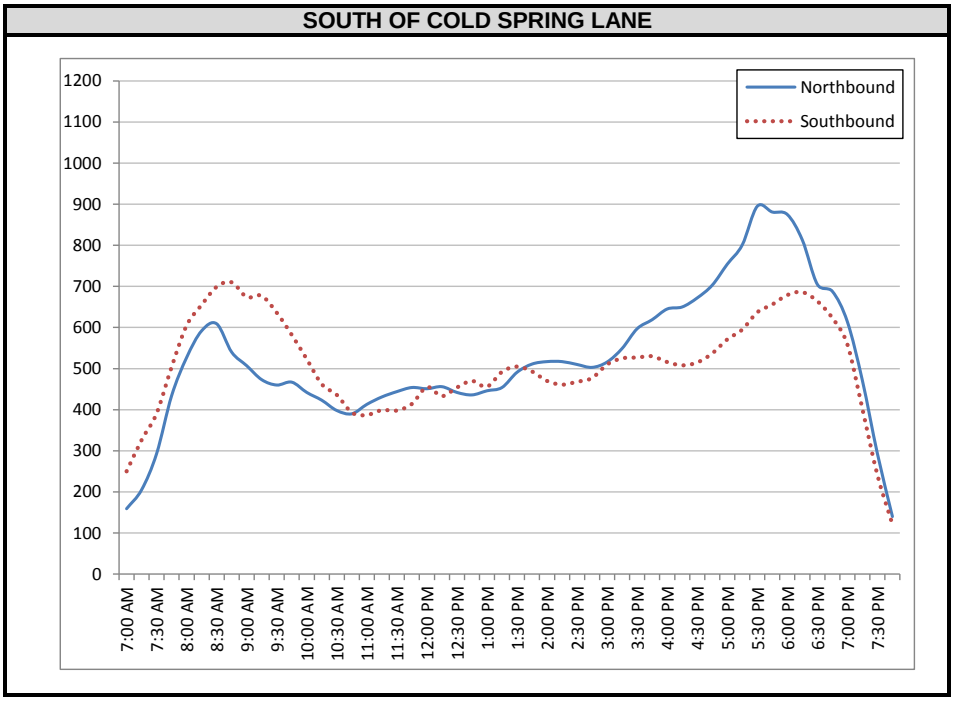
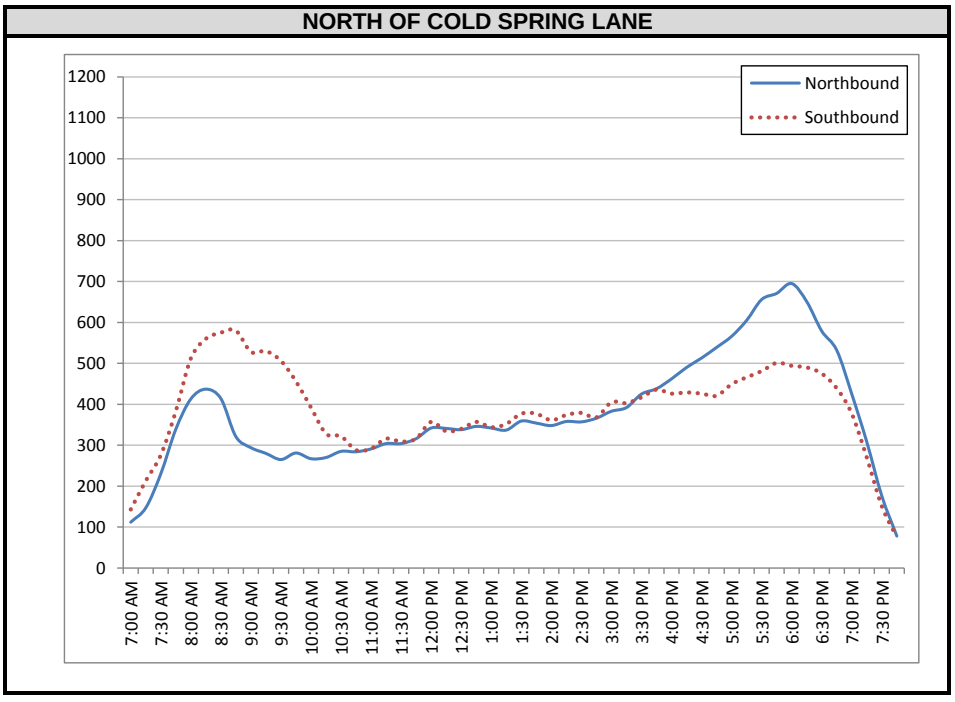

Bryn Mawr School
Roland Ave
W North Ave
Northern Pkwy
Saint Mary's Seminary and University
Gilman Country School
Saint Mary's Seminary and University
Roland Park Middle School
Roland Park Elementary School
Amberley Way
Longwood Road
Colorado Ave
Saint Johns Road
Gladstone Ave
Wyndhurst Ave
Park Lane
Blythewood
Church Lane
Woodlawn Road
Keswick Road
East Lane
Blythewood Road
Oakdale Road
Stoney Run Park
Evergreen
Loyola College Maryland
Kenwood Road
St Marys Lane
Maynadier Road
Schenley Road
Kittery Lane
W Cold Spring Ln
Long Lane
Club Road
Beechdale Rd
Wyndhurst Ave
Deepdene Rd
Cold Spring Ln
25
4
3
2
1
Roland Ave
173 (110)
557 (277)
81 (51)
103 (910)
1,643 (1,474)
288 (169)
66 (189)
1,177 (1,758)
334 (176)
250 (143)
326 (410)
337 (243)
67 (65)
958 (613)
16 (34)
0 (0)
0 (0)
0 (0)
110 (44)
9 (4)
29 (19)
6 (29)
905 (728)
58 (67)
0 (0)
791 (512)
71 (119)
243 (119)
0 (0)
199 (96)
16 (7)
39 (46)
8 (7)
0 (0)
604 (604)
117 (168)
128 (99)
411 (347)
36 (48)
25 (33)
464 (536)
51 (59)
89 (173)
409 (682)
237 (273)
274 (312)
302 (494)
33 (69)
LEGEND
AM (PM) Peak Hour Volume
1 Turning Movement Count Location
Count Dates: Wednesday, April 12, 2017 (Location 1); Wednesday, April 5, 2017 (Locations 2, 3, and 4)
dot
Roland Avenue Cycle Track Evaluation
PEAK HOUR TURNING MOVEMENT VOLUMES
June 15, 2017
FIGURE 4

FIGURE 5. ROLAND AVENUE THROUGH VOLUME DIURNAL CURVES

Sheet 1 of 4

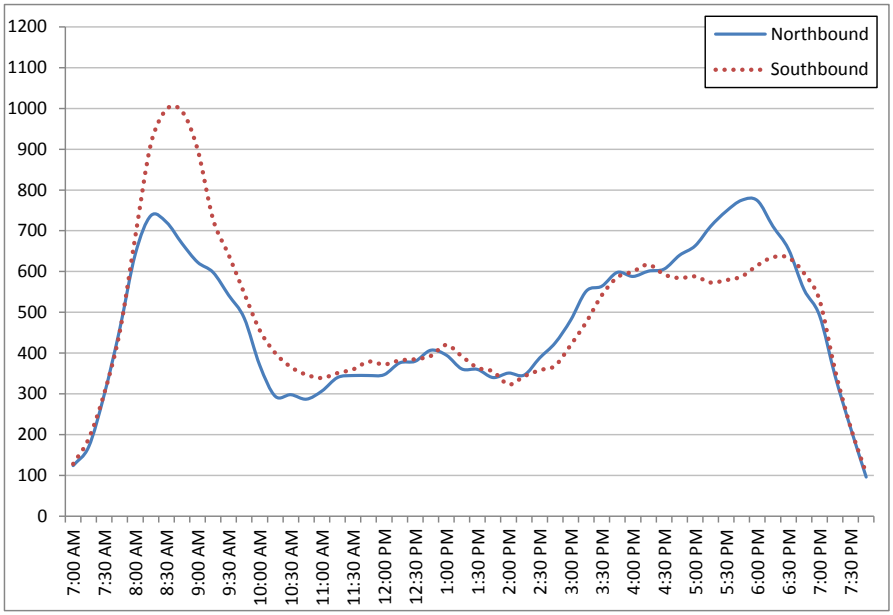




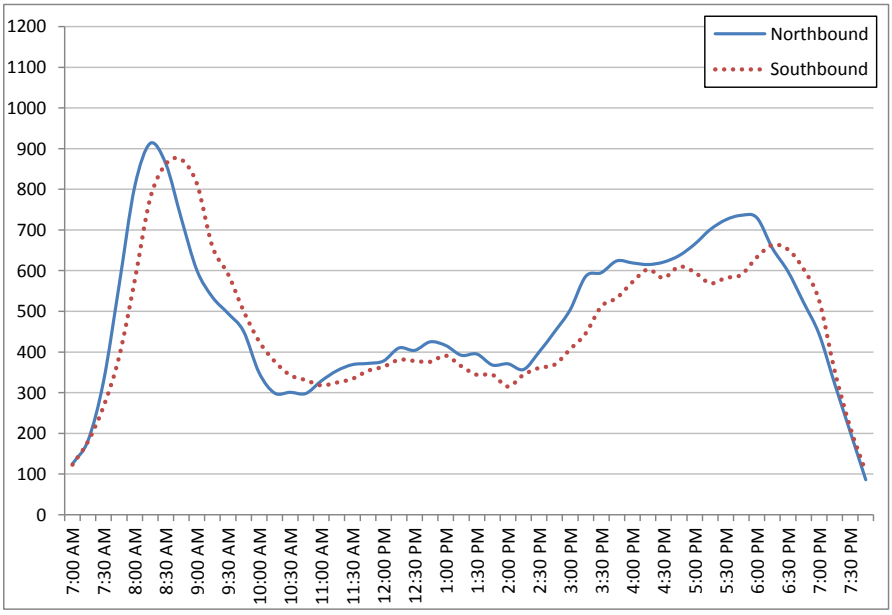
Count Date: Wednesday, April 12, 2017

FIGURE 5. ROLAND AVENUE THROUGH VOLUME DIURNAL CURVES
Sheet 2 of 4

SOUTH OF WYNDHURST AVENUE / BEECHDALE ROAD



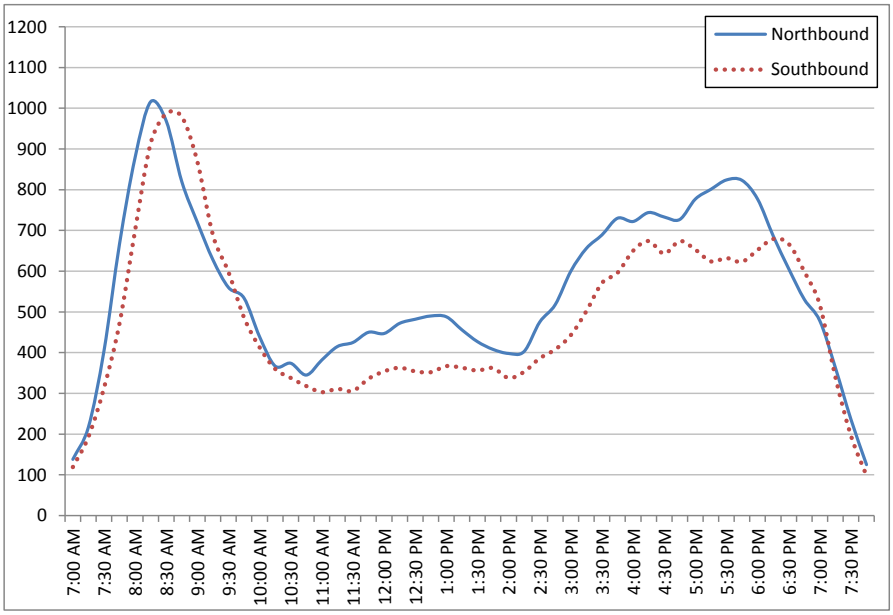
NORTH OF WYNDHURST AVENUE / BEECHDALE ROAD



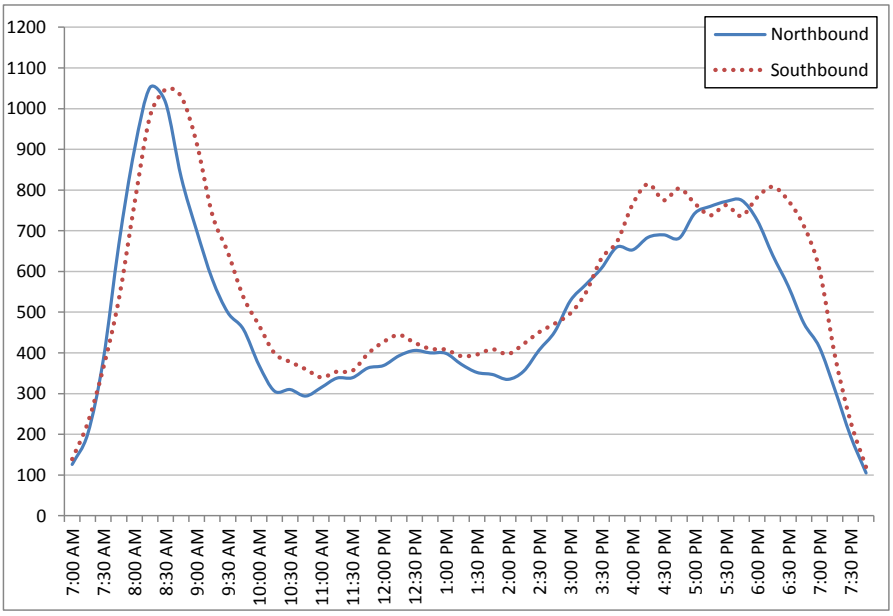
Count Date: Wednesday, April 5, 2017

FIGURE 5. ROLAND AVENUE THROUGH VOLUME DIURNAL CURVES
Sheet 3 of 4

SOUTH OF DEEPDENE ROAD



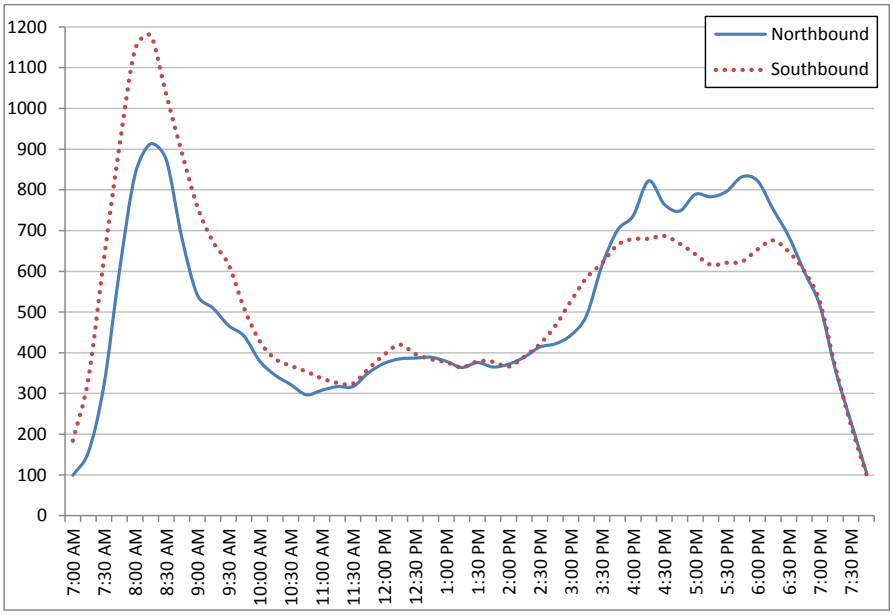
NORTH OF DEEPDENE ROAD



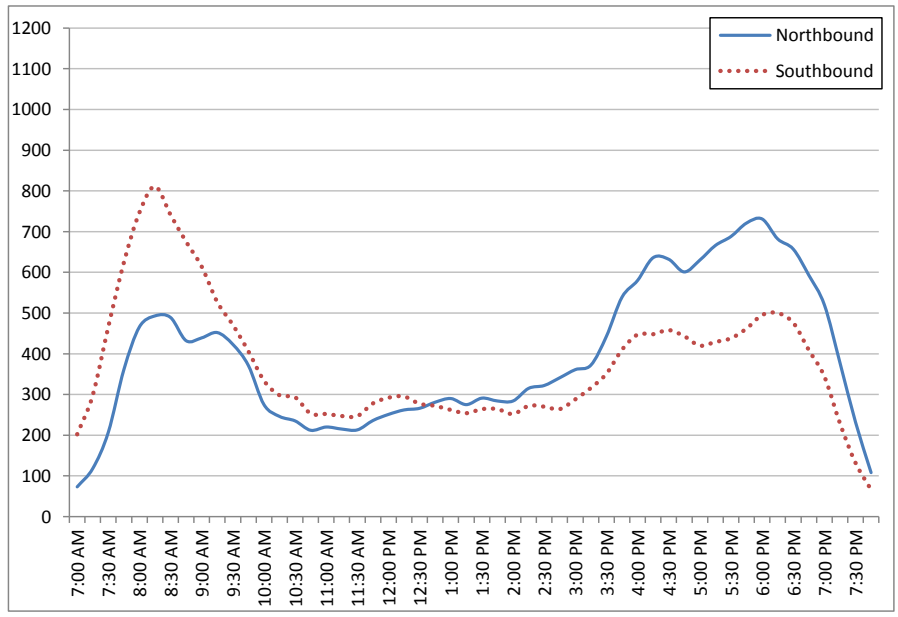
Count Date: Wednesday, April 5, 2017

FIGURE 5. ROLAND AVENUE THROUGH VOLUME DIURNAL CURVES
Sheet 4 of 4

SOUTH OF NORTHERN PARKWAY



NORTH OF NORTHERN PARKWAY



Count Date: Wednesday, April 5, 2017