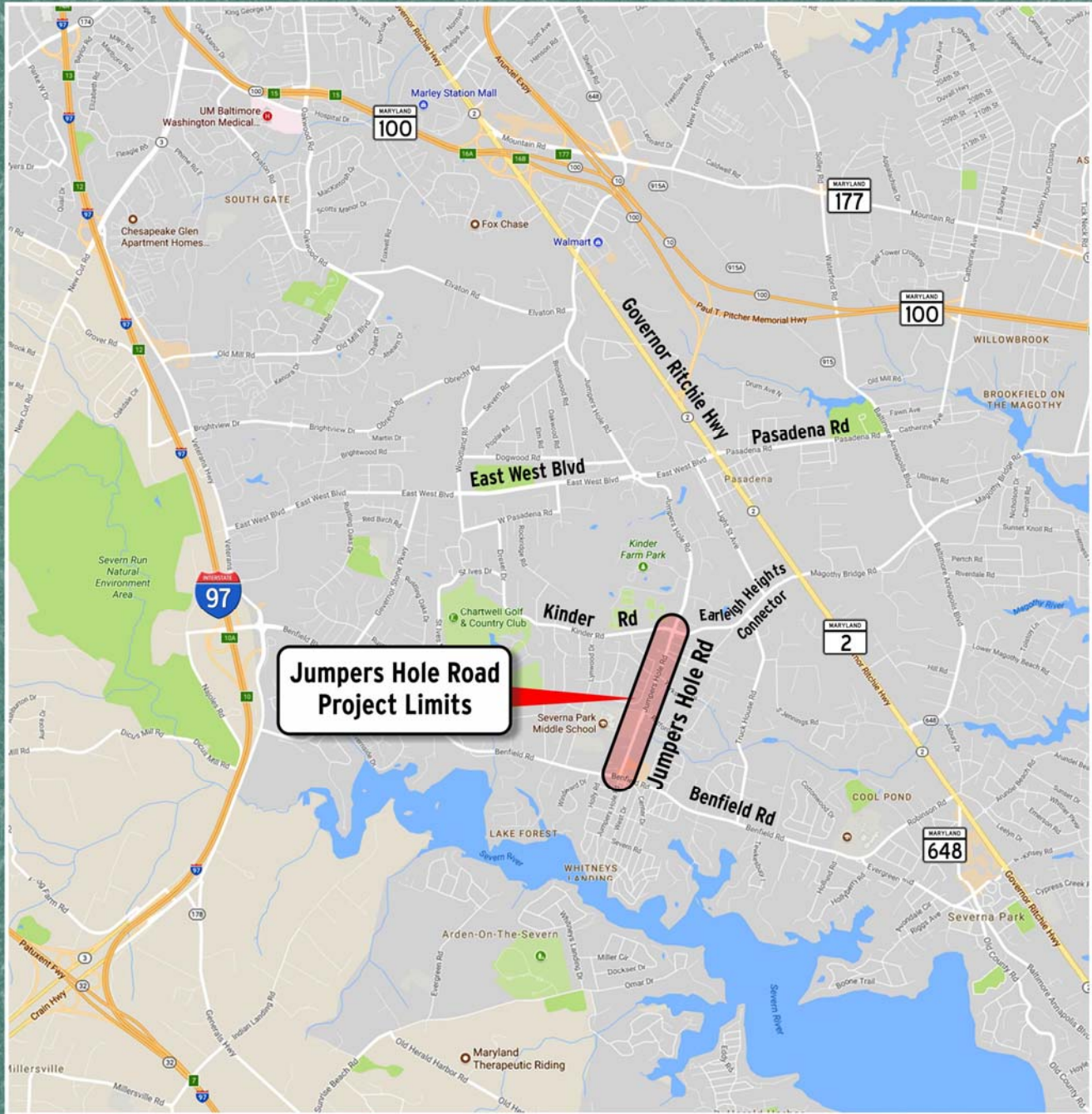


JUMPERS HOLE ROAD IMPROVEMENTS STUDY

From Benfield Road to Kinder Road
Anne Arundel County, Maryland

Project #H539600

Contract #H539613



Prepared for
Anne Arundel County DPW

February 2018

Prepared by





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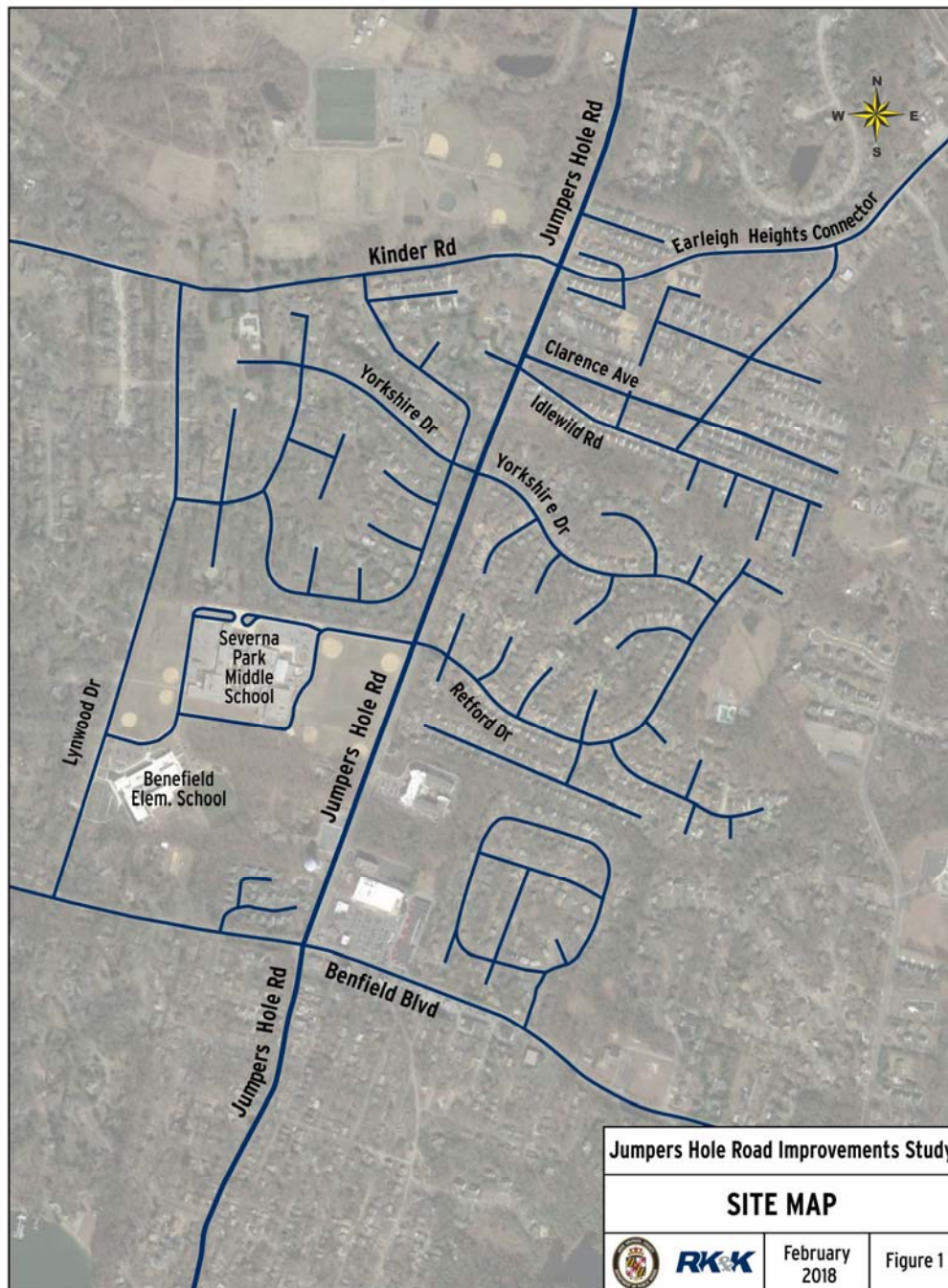
Prepared By: RK&K

February 2018



EXECUTIVE SUMMARY

Background and Purpose: The Anne Arundel County Department of Public Works (DPW) has completed an improvement study for Jumpers Hole Road between Benfield Road and Kinder Road to identify potential near-term and long-term safety, capacity and operational improvements that will enhance auto, bicycle and pedestrian travel in the 0.9 mile corridor. (See map below)





Recent crash data has generated interest by the County and community to reevaluate the project corridor. This study includes traffic counts, analysis of existing and future traffic (2040) operations, speed and crash analysis, assessment of existing roadway geometry and typical section, development of potential typical section and vertical geometric improvements, environmental and utility impact assessment, cost estimates and development of short-term and long-term improvement options.

Existing Conditions: Jumpers Hole Road is classified as a minor arterial and is primarily a two-lane undivided open section roadway with minimal paved shoulders and no sidewalks. Between Benfield Road and Retford Drive, the southbound roadway has been widened to two lanes with curb and gutter and sidewalk. The northbound roadway has also been widened to two lanes with curb and gutter and sidewalk from Benfield Road to approximately 1400 feet north. The roadway carries approximately 11,000 vehicles per day and the posted speed limit is 35 mph.

Land use along the roadway is generally comprised of commercial properties and the Severna Park Middle School in the area immediately north of Benfield Road. Land use is primarily single family residential properties between Retford Road and Kinder Road. Kinder Farm Park and the Garcelon Athletic Complex are located just north of the study limits, west of Jumpers Hole Road.

Traffic Analysis: Traffic data was based on 2015 and 2016 counts provided by DPW as well as new turning movement count data collected during the AM and PM peak periods at several intersections along Jumpers Hole Road. Traffic data was adjusted to Year 2017 and 2040 levels using an annual growth rate of 1.6% as determined using the regional travel demand model. Operational analyses were conducted for the Year 2017 and Year 2040 conditions using Synchro 9 with the HCM Signalized and Unsignalized Intersection methodologies to determine the Level of Service (LOS) and delay at 6 intersections along the corridor:

1. Benfield Road
2. Retford Drive
3. Yorkshire Drive
4. Idlewood Road
5. Clarence Avenue
6. Kinder Road



The results of the analyses indicate the following:

- **2017:** All intersections operate at LOS D or better during AM and PM peak hours except the intersection of Jumpers Hole Road and Retford Drive which operates at LOS F.
- **2040 No-Build:** All intersections operate at LOS D or better during AM and PM peak hours except:
 - Intersections at Benfield Road and Retford Drive operate at LOS F during the AM and PM peak hours
 - The southbound and eastbound approaches at Kinder Road operate at LOS F during the PM peak hour
 - The westbound approach at Yorkshire operates at LOS F during the PM peak hour
- **2040 Improvement Options**
 - Using signal timings optimized for the projected Year 2040 volumes, Jumpers Hole Road at Benfield Road would continue to operate at LOS F during both peak hours, but with reductions in delay, compared to using the existing signal timings:
 - All the approaches would be operating at either LOS E or F
 - Two mitigation options were analyzed to improve operations at Jumpers Hole Road and Benfield Road in Year 2040
 - These options were developed to be implementable without making significant changes to Benfield Road, focusing primarily on Jumpers Hole Road.
 - Option 2 would implement concurrent phasing and two exclusive southbound left-turn lanes to significantly reduce overall delay, particularly along the northbound and southbound approaches; however, the overall LOS would remain LOS F during both peaks
 - Using signal timings optimized for the projected Year 2040 volumes, Jumpers Hole Road at Retford Drive would continue to operate at LOS F during the AM peak hour and operate at LOS E during the PM peak hour
 - The eastbound approach at the intersection would continue to function at LOS F during both peaks
 - Mitigation alternatives were analyzed to improve operations at Jumpers Hole Road and Retford Drive in Year 2040
 - Adding a separate right turn lane on the eastbound approach with a protected phase overlapping the northbound left turn phase would allow the overall intersection to operate at a LOS D or better during both peak hours
 - The eastbound approach departing the school would operate at LOS D and E during the AM and PM peak hours with this configuration.



- Adding a southbound right turn lane on Jumpers Hole Road would allow the intersection to operate at LOS F with the current signal timings and LOS C with optimized signal timings
- A roundabout option would allow the intersection to operate at LOS C or better

Crash History Evaluation: Historical crash data along the 0.9-mile segment of Jumpers Hole Road, from Benfield Road to Kinder Road, was provided by Maryland SHA for 2011 through 2016. During the 6-year crash study period, 31 crashes were reported; 20 crashes (65%) occurred at intersections as follows:

Table 1: Intersection Crashes

Intersection	No. of Crashes
Benfield Road	6
Benfield Village Shopping Center Entrance	3
Retford Drive/School Entrance	3
Yorkshire Drive	2
Kinder Road/Earleigh Heights Connector	6

Table 2 summarizes crashes by lighting condition, severity, and type and shows a prevalence of left turn and angle crashes. The crashes include 12 angle (38%), 7 left-turn (22%), 4 rear-end (16%), 3 side swipe (9%), 3 fixed-object (9%), 1 pedestrian involved (3%), with 1 other (3%) crash whose type was not specified. Fixed-object crashes were associated with utility poles or curbs. There were no fatal crashes reported during the 6-year study period. Eighteen (18) crashes were property damage only (PDO) and 14 crashes resulted in injuries. There are no evident correlations between crash type, severity and time of day.

Table 2: Crash Data Summary

Year	Lighting Conditions		Severity		Crash Type							Total
	Day	Night	PDO	Injury	Pedestrian	Rear End	Side Swipe	Left Turn	Angle	Fixed Object	Other	
2011	6	2	4	4	0	2	0	4	1	1	0	8
2012	2	2	2	2	0	1	0	0	3	0	0	4
2013	5	1	4	2	0	1	1	0	1	2	1	6
2014	1	1	1	1	0	0	0	2	0	0	0	2
2015	5	1	3	3	0	0	0	1	5	0	0	6
2016	6	0	4	2	1	1	2	0	2	0	0	5
Total	25	7	18	14	1	4	3	7	12	3	1	32



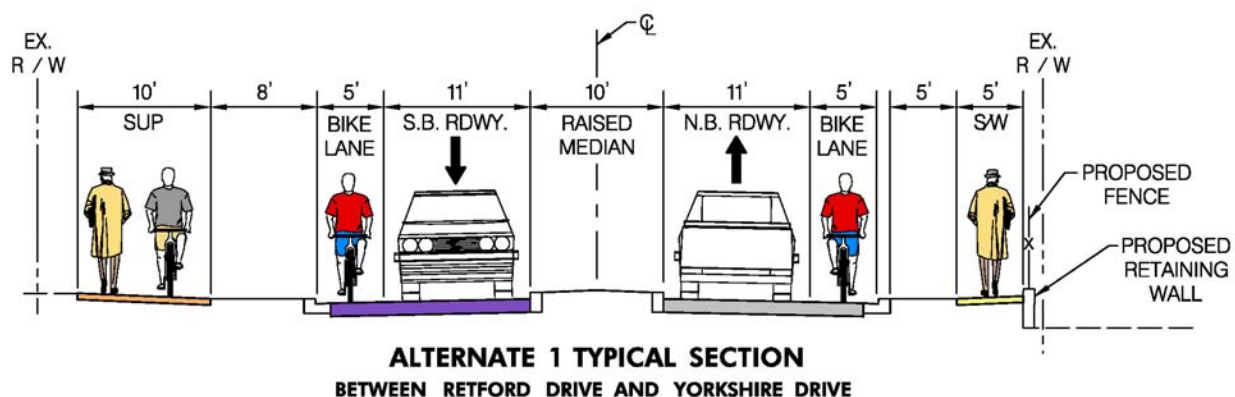
Volume Evaluation: The current average daily traffic (ADT) along Jumpers Hole Road, north of Yorkshire Drive is 10,094 vehicles per day, with a daily truck percentage of approximately 5%. The peak hour traffic volume (two-way) is 1,114 vehicles (448 northbound and 666 southbound). The average daily traffic (ADT) along Jumpers Hole Road, south of Retford Drive is 10,994 vehicles. The peak hour traffic volume (two-way) is 1,177 vehicles (567 northbound and 610 southbound).

Speed Evaluation: Speed studies were performed near the Yorkshire Drive intersection which determined that the 85th-percentile speeds exceed the 35 MPH posted speed. The 85th percentile speed in the northbound and southbound direction was approximately 44 MPH.

Long Term Improvements: Four (4) typical section alternates were evaluated based on their ability to enhance multimodal travel operations and safety and their associated environmental impacts and costs. Alternate 1 is the recommended improvement option based on its ability to most effectively enhance auto, bicycle and pedestrian travel along the corridor. Alternate 1 is illustrated below and includes the following features:

- 11-foot northbound and southbound travel lanes
- 10-foot left turn lanes
- 5-foot bike lanes / shoulders along the northbound and southbound roadways
- 10-foot shared use path along the southbound roadway
- 5-foot sidewalk along the northbound roadway

In addition to providing new facilities for pedestrian and bicycle travel, the proposed typical section improvements will provide wider clear zones which will reduce the likelihood of roadside fixed object crashes.





Other potential long-term improvements for Jumpers Hole Road may include:

- Left turn lanes are proposed at the main intersections to reduce rear end and angle crashes
- Roundabouts at Retford Drive and Kinder Road / Earleigh Heights Connector may be implemented to improve capacity and operations, calm travel speeds and improve intersection safety for motorists, cyclists and pedestrians
- Approximately 750 feet of the roadway may be completely reconstructed between Retford Drive and Yorkshire Drive to improve substandard vertical geometry and provide sufficient stopping sight distance

Short Term Improvements: Proposed short-term improvements may consist of pavement markings, signage, lighting, utility pole relocations, vegetation removal, roundabout intersection improvements, and roadway improvements to enhance driver awareness, improve visibility, reduce roadside obstacles, calm traffic speeds and improve substandard geometric conditions.

Signing and Pavement Marking Improvements: The following signing and pavement marking improvements may be applied along the corridor to further enhance safety and operations:

- Trim vegetation obstructing signs along the corridor in both directions
- Install object markers on utility poles within the clear zone
- Reinstall the raised pavement markers along the corridor to increase nighttime visibility
- Reinstall pavement markings along the entire corridor.

Roundabouts: Roundabouts may be installed along the corridor to help control travel speeds and improve intersection operations and safety. Roundabouts would:

- Eliminate crossing conflicts that are present at conventional intersections, thus reducing the total number of potential conflict points and the potential severity of the conflict points.
- Lower delay (for side street traffic).
- Enhance pedestrian crossings of Jumpers Hole Road by reducing speeds on Jumpers Hole Road and providing refuge islands for pedestrians.

The 2 intersections listed below were identified as potential locations for the installation of roundabouts:

1. Jumpers Hole Road & Retford Drive – Station 30+50
2. Jumpers Hole Road & Kinder Road – Station 57+00

Geometric Improvements: There are 2 vertical crest curves and 1 vertical sag curve that do not provide sufficient stopping sight distance for the 40 mph design speed. The 3 curves are located back to back from approximately 400 feet north of Retford Drive to Yorkshire Drive. The roadway profile could be improved in the short-term as a separate project until funding becomes available for the complete Alternate 1 improvements.



Minor Roadway Improvements: There are other improvements noted below that could be implemented in the near future to improve multimodal travel operations and safety within the corridor.

- **Complete Roadway Widening between Brightview and Retford:** Construct roadway widening and sidewalk along the northbound roadway from its existing terminus at Brightview Development to Retford Drive (approximately 700 feet) to provide full width shoulder and complete sidewalk connection to Severna Park Middle School. This improvement would complete the sidewalk connection between Benfield Road, Retford Drive and the Severna Park Middle School.

Relocate Utility Poles: Several utility poles are located in close proximity (less than 5 feet) to the edge of roadway and should be relocated out of the clear zone (16 feet) where feasible; GIS mapping indicates that additional right-of-way is available in many locations to relocate the poles further from the roadway. The potential pole relocations are listed in the table below:

Potential Utility Pole Relocations

Southbound	
Sta. 33+00	Sta. 41+50
Sta. 34+50	Sta. 44+00
Sta. 36+00	Sta. 45+50
Sta. 37+50	Sta. 47+25

Estimated Costs: Construction, property acquisition and engineering costs for the proposed Alternate 1 improvements are presented below. The estimated costs for the short-term improvements will vary depending on the improvements selected.

Proposed Alternate	Construction Cost (\$)	Property Acquisition Cost (\$)	Preliminary Engineering Cost (\$)	Total Cost (\$)
Alternate 1	\$7,350,000	\$150,000	\$1,100,000	\$8,600,000



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APPENDIX A – Traffic Data

- Synchro software analysis reports:
 - Existing (2017) Conditions
 - Year 2040 Conditions (with existing and optimized signal timings)
- Speed Data Analysis
- Signal Warrant Analysis
- SHA Crash Data from 2011 through 2016

APPENDIX B – Concept Plans for Alternates 1, 2, 3, & 4 (Sheets 1 to 16)

APPENDIX C – Cost Estimates



I. INTRODUCTION

Objective: The Anne Arundel County Department of Public Works (DPW) has prepared a preliminary improvement study for Jumpers Hole Road between Benfield Road and Kinder Road to identify potential near-term and long-term safety, capacity and operational improvements that will enhance auto, bicycle and pedestrian travel in the 0.9 mile corridor (**see Figure 1**). Recent crash data has generated interest by the County to reevaluate the project corridor. This study includes traffic counts, analysis of existing and future traffic (2040) operations, crash analysis, assessment of existing roadway geometry and roadway typical section, development of potential typical section and vertical geometric improvements, environmental and utility impact assessment and cost estimates. The study evaluated four long-term alternatives that will improve operations and safety along Jumpers Hole Road. The four alternatives and various levels of improvements are summarized below:

Alternative 1 – High: Includes a 10-foot shared use path along the southbound roadway, a 5-foot sidewalk along the northbound roadway, 5-foot bike lanes / shoulders along both sides of the roadway, 11-foot northbound and southbound travel lanes, and 10-foot turn lanes. The substandard vertical curves between Retford Drive and Yorkshire Drive are also improved.

Alternative 2 – Moderate: Identical to Alternate 1 except the 10-foot shared use path is excluded along the southbound roadway.

Alternative 3 – Moderate: Identical to Alternate 1 except the 5-foot bike lanes / shoulders are excluded along both sides of the roadway.

Alternative 4 – Low: Includes a 5-foot sidewalk along the northbound roadway and maintains the existing vertical geometry.

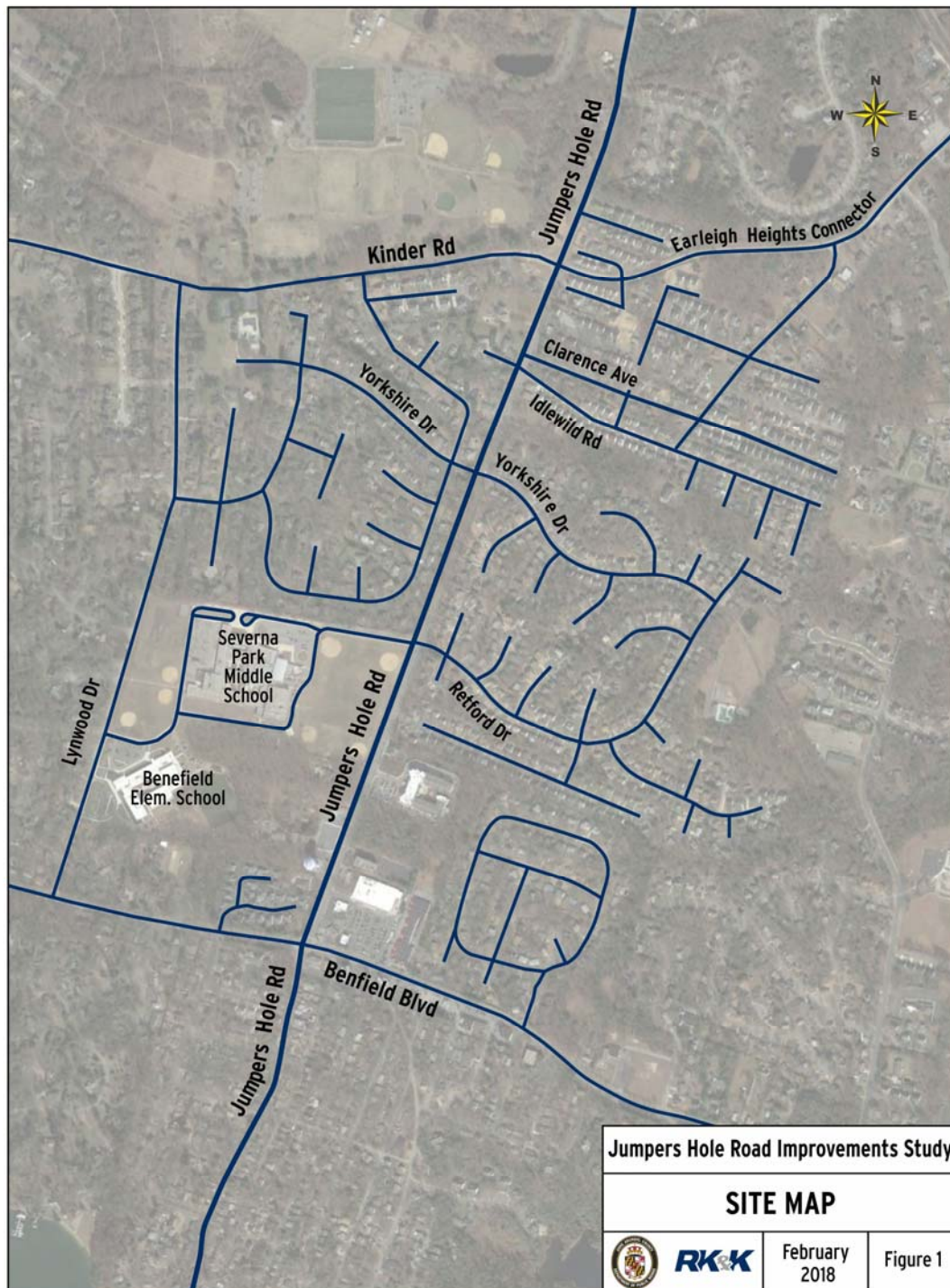
Prior Studies: The Traffic Group performed a study for Jumpers Hole Road in 2004 which included traffic/pedestrian/bicycle counts, field observations, and traffic analysis for existing and future (2008 and 2025) conditions. John E. Harms, Jr. and Associates, Inc. subsequently prepared the Jumpers Hole Road Improvement Alternatives Matrix in 2006, which compared potential improvement alternatives to provide improved pedestrian access from the East side of Jumpers Hole Road to Severna Park Middle School and Kinder Park. Improvement alternatives included additional turn lanes, shoulders, bike lanes, sidewalks and shared use path improvements. Excerpts of these prior studies were provided by the County in a 2016 PowerPoint presentation. The PowerPoint presentation also included recent (2016) community correspondence regarding potential improvements along Jumpers Hole Road. The correspondence indicates that there is support in the local communities (Greater Severna Park Council, Chartwell, Chartridge, Sabrina Park, Severna Chase) for sidewalk and/or shared use path improvements along the corridor.

Other Studies and Projects: Studies and projects in the study area are ongoing or have recently been completed as follows:



1. Brightview Severna Park–Phase II Assisted Living Facility – Morris & Ritchie Associates, Inc.; January 2017
2. Traffic Impact Study – Sabrina Park; Traffic Concepts, Inc.; October 2015
3. Traffic Impact Study – Brightview Severna Park; Traffic Concepts, Inc.; June 2016

Figure 1: Site Map





II. EXISTING CONDITION

Existing Roadway: Jumpers Hole Road is classified as a minor arterial and primarily consists of three different roadway segments. From Benfield Road to Retford Drive, Jumpers Hole Road is an undivided three/four-lane roadway (mostly two southbound and one northbound, with a short segment closest to Benfield Road with two southbound and two northbound). From Retford Drive to Idlewild/Edin Garth Road, the roadway is an undivided two-lane roadway. From Idlewood/ Edin Garth Road to Kinder Road/Earleigh Heights Connector, the roadway is a two-lane roadway with a center two-way left turn lane (TWLTL).

The segment of Jumpers Hole Road north of Retford Drive has very limited clear zones adjacent to the travelways with utility poles and trees frequently located within 10 feet of the roadway. Street lights (cobra head fixtures) are intermittently mounted on the adjacent utility poles. The intersections at Benfield Road, Retford Drive and Kinder Road are signalized. All of the remaining intersections are stop-controlled on the intersecting side street.

The roadway carries approximately 11,000 vehicles per day and the posted speed limit is 35 mph. The roadway design was evaluated for a 40 mph design speed in accordance with the Anne Arundel County DPW design standards. Existing Jumpers Hole Road contains substandard vertical geometry between Retford Drive and Yorkshire Drive (station 35+00 and station 42+50) that needs to be reconstructed to address insufficient stopping sight distance along this segment of the corridor. This substandard segment is discussed in further detail in Section IV of this report.



Jumpers Hole Road – North of Benfield Road



Jumpers Hole Road – South of Yorkshire Drive



Jumpers Hole Road – South of Kinder Road



Land Use: Per the County zoning map, the existing land use generally consists of low and low-medium density residential development in the northern segment of the corridor with commercial/retail development near the Benfield Road intersection. Severna Park Middle School is located at Retford Drive and its primary entrance serves as the western leg of the Retford Drive intersection with Jumpers Hole Road. Kinder Farm Park and the Garcelon Athletic Complex are located just north of the study limits, west of Jumpers Hole Road.

Community Facilities: Several educational, senior living and park facilities are located along the corridor as follows:

- Severna Park KinderCare (Station 14) – 488 Jumpers Hole Road, 400 feet north of Benfield Road
- Brightview Severna Park Senior Living Community (Station 22) – 469 Jumpers Hole Road, 1200 feet north of Benfield Road
- Severna Park Middle School (Station 22 to Station 30) – 450 Jumpers Hole Road; immediately south of Retford Drive along southbound Jumpers Hole Road
- Kinder Farm Park – north of Kinder Road along southbound Jumpers Hole Road



Brightview Severna Park Senior Living Community



Severna Park Middle School



III. TRAFFIC ANALYSIS

TRAFFIC FORECASTING

Existing Traffic: An operational and safety analysis was performed for the study corridor to identify current operational and safety needs and to identify potential roadway improvements. The study corridor contains several commercial and residential entrances as well as 6 intersections with local roadways including three (3) signalized intersections and three (3) unsignalized intersections as noted below.

Signalized intersections:

1. Benfield Road
2. Retford Drive
3. Kinder Road/Earleigh Heights Connector

Unsignalized intersections:

1. Yorkshire Drive
2. Idlewild/Edin Garth Road
3. Clarence Avenue

RK&K utilized 2015 and 2016 traffic volume data from previous studies provided by Anne Arundel County DPW for the following Jumpers Hole Road intersections:

1. Benfield Road
2. Retford Drive
3. Idlewild/Edin Garth Road
4. Clarence Avenue
5. Kinder Road/Earleigh Heights Connector

The data from previous studies was adjusted to Year 2017 levels using an annual growth rate of 1.6% as determined using the regional travel demand model. RK&K collected new turning movement count data at the intersection of Jumpers Hole Road and Yorkshire Drive during the AM and PM peak periods (7:00 – 9:00 AM and 4:00 – 6:00 PM) to supplement the data provided by DPW. RK&K utilized hourly directional volume counts from 2015 (from the prior studies) along Jumpers Hole Road at the following locations:

1. North of Yorkshire Drive
2. South of Retford Drive

The current average daily traffic (ADT) along Jumpers Hole Road, north of Yorkshire Drive is 10,094 vehicles per day, with a daily truck percentage of approximately 5%. The peak hour traffic volume (two-way) is 1,114 vehicles (448 northbound and 666 southbound). The average daily traffic (ADT) along Jumpers Hole Road, south of Retford Drive is 10,994 vehicles. The peak hour traffic volume (two-way) is 1,177 vehicles (567 northbound and 610 southbound). **Table 1** summarizes the balanced AM and PM peak hour volumes along the corridor for the individual turning movements at each intersection.



Table 1: Existing (2017) Balanced Traffic Volumes

Intersections		Northbound			Southbound			Eastbound			Westbound		
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
Benfield Rd	AM	80	50	15	175	15	310	135	665	10	0	755	140
	PM	60	55	15	305	120	185	295	850	25	20	605	185
Retford Dr	AM	120	175	30	30	305	75	50	5	115	80	10	30
	PM	75	390	70	45	500	85	35	0	55	55	5	30
Yorkshire Dr	AM	-	245	10	10	385	-	-	-	-	25	-	40
	PM	-	425	30	55	615	-	-	-	-	15	-	25
Idlewild Rd	AM	20	265	-	-	355	30	15	-	30	10	0	15
	PM	5	445	-	-	645	20	10	-	15	10	0	15
Clarence Ave	AM	-	280	15	5	370	-	-	-	-	15	-	10
	PM	-	440	30	45	655	-	-	-	-	10	-	10
Kinder Rd	AM	20	170	100	65	130	25	25	45	40	205	55	70
	PM	45	240	165	270	450	45	55	120	80	170	65	75

Additionally, RK&K performed new pedestrian and bicycle counts during AM and PM peak periods (7:00 – 9:00 AM and 4:00 – 6:00 PM) at the following intersections, to supplement the volume-only count data provided by DPW:

1. Benfield Road
2. Retford Drive
3. Kinder Road/Earleigh Heights Connector

The existing pedestrian and bicycle volumes are presented in **Table 2**. Existing crosswalks are located at the intersections with Benfield Road and Retford Drive. Most of the pedestrians observed at each location were school children, as expected due to the close proximity of Severna Park Middle School. Per the table, the crosswalks with the most pedestrian activity are connected to the sidewalks at the intersections with Benfield Road and Retford Drive. There are no crosswalks at the intersections with Yorkshire Drive or Kinder Road. However, at the Yorkshire Drive intersection, there is a pedestrian/bicycle path that forms the west leg of this intersection. A relatively low number of bicycles were observed traveling through each intersection. The bicycle volumes shown below include bikes traveling on-road as well as in crosswalks, where crosswalks are present.

Table 2: Existing Pedestrian and Bicycle Volume

Intersection		South Leg		North Leg		West Leg		East Leg	
		Peds	Bikes	Peds	Bikes	Peds	Bikes	Peds	Bikes
Benfield Rd	AM	6	1	0	0	21	0	3	2
	PM	8	1	10	3	49	0	8	4
Retford Dr	AM	0	0	18	0	0	0	0	1
	PM	0	1	42	7	8	1	5	1
Yorkshire Dr	AM	0	0	6	0	0	0	1	0
	PM	2	0	4	0	0	1	0	0
Kinder Rd	AM	1	0	3	0	0	0	3	1
	PM	2	2	2	0	7	8	2	3



Speed Evaluation: The posted speed limit along Jumpers Hole Road is 35 MPH. RK&K conducted a speed study on Jumpers Hole Road to determine the current operational free-flow speeds in the northbound and southbound directions. Speeds were collected near the Yorkshire Drive intersection using automatic data recorders with road tubes over a three-day period. The mean speed in the northbound direction was approximately 40 MPH, and the 85th-percentile speed was approximately 44 MPH. The mean speed in the southbound direction was 39 MPH, and 85th percentile speed was 44 MPH. The results show drivers typically travel approximately 5 MPH over the speed limit and that a majority of the drivers travel within 10 MPH of the posted speed limit.

Crash History Evaluation: Historical crash data along the one-mile segment of Jumpers Hole Road, from Benfield Road to Kinder Road/Earleigh Heights Connector, was provided by Maryland SHA’s Office of Traffic and Safety, Traffic Development and Support Division (OOTTS-TDSD). The crash data included a 6-year period from January 1, 2011 through December 31, 2016. Additional crash data was provided by DPW to verify and supplement the data from SHA. During this crash study period, 31 crashes were reported along Jumpers Hole Road. Of the 31 crashes, 20 were classified as “intersection-related”. The numbers and locations for these intersection-related crashes are as follows:

Table 3: Intersection Crashes

Intersection	No. of Crashes
Benfield Road	6
Benfield Village Shopping Center Entrance (west entrance)	3
Retford Drive/School Entrance	3
Yorkshire Drive	2
Kinder Road/Earleigh Heights Connector	6

Table 4 summarizes crashes by lighting condition, severity, and type, and shows a prevalence of left turn and angle crashes. The crashes include 12 angle (38%), 7 left-turn (22%), 4 rear-end (16%), 3 side swipe (9%), 3 fixed-object (9%), 1 pedestrian involved (3%), with 1 other (3%) crash whose type was not specified. Fixed-object crashes were associated with utility poles or curbs. There were no fatal crashes reported during the 6-year study period. Eighteen (18) crashes (56%) were property damage only (PDO) and 14 crashes (44%) resulted in injuries. There are no evident correlations between crash type, severity and time of day.

Table 4: Crash Data Summary

Year	Lighting Conditions		Severity		Crash Type							Total
	Day	Night	PDO	Injury	Pedestrian	Rear End	Side Swipe	Left Turn	Angle	Fixed Object	Other	
2011	6	2	4	4	0	2	0	4	1	1	0	8
2012	2	2	2	2	0	1	0	0	3	0	0	4
2013	5	1	4	2	0	1	1	0	1	2	1	6
2014	1	1	1	1	0	0	0	2	0	0	0	2
2015	5	1	3	3	0	0	0	1	5	0	0	6
2016	6	0	4	2	1	1	2	0	2	0	0	5
Total	25	7	18	14	1	4	3	7	12	3	1	32



Figure 2 presents information regarding the frequency of crashes by year, month, and day of week. The most crashes along the corridor occurred in April and May (5 crashes each, or 16% each), followed by October and December with 4 crashes each (or 13% of the total crashes, each). The months with the lowest number of crashes were July and September (1 crash each, or 3% each), except for January, which had zero crashes. Considering seasons, it appears that an inordinate percentage of crashes (37%) have occurred during the spring months (March, April, May), considering that the expected percentage should be approximately 25% if not accounting for seasonal VMT variations. Examining crash occurrence by day of the week shows that most crashes (25%) occurred on a Saturday, and the least number of crashes (zero) occurred on a Sunday. The number of crashes increases progressively through each day of the week, with fewer crashes on Monday than on Tuesday, and so forth, such that 61% of the crashes occurred on just three days of the week (Thursday, Friday, and Saturday). During the 6-year crash period, 2011 was the peak year with 8 crashes, while the lowest number of crashes occurred in 2014 with 2 crashes.

Of the 31 crashes reported during the 6-year study period, 25 (78%) crashes occurred during daylight hours, and 7 (22%) occurred during nighttime hours. Per **Figure 3**, three percent of the crashes that occurred during the nighttime involved a vehicle with no headlights on. This indicates that street lighting likely had little impact on the overall crash pattern along the study corridor. Also, 97% of the total crashes occurred during clear/cloudy weather conditions with a dry pavement surface; therefore, it can be concluded that inclement weather and inadequate pavement friction were not likely contributing factors for these crashes.

Figure 2: Crash Data Frequency

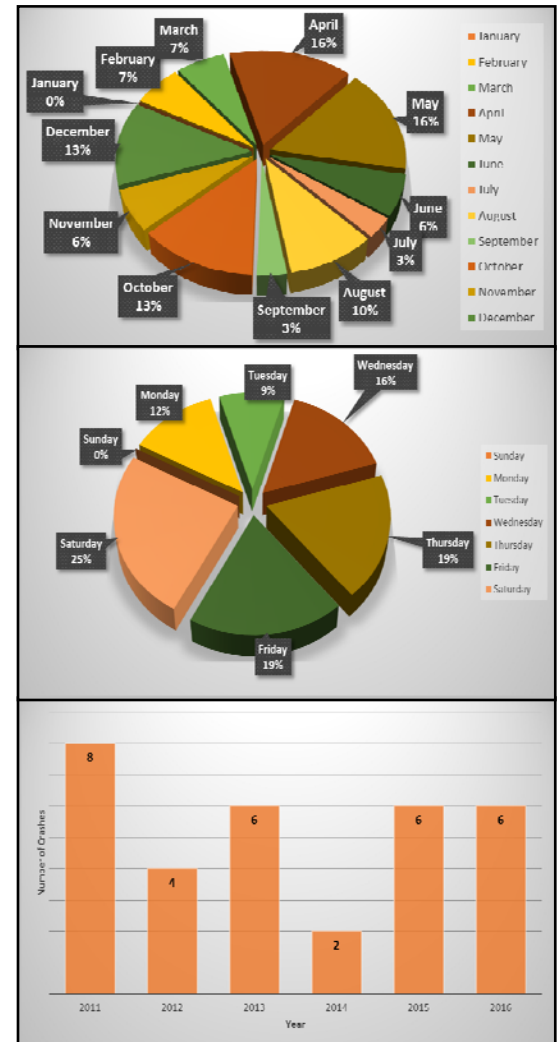
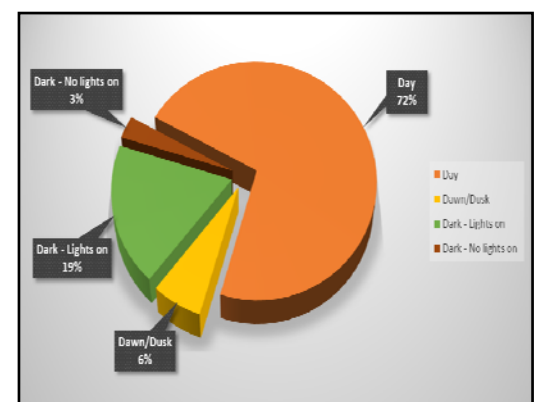


Figure 3: Lighting Conditions





Future Traffic: Current Year 2017 traffic volumes were adjusted using an annual traffic growth rate of 1.6% from the regional travel demand model to reflect traffic conditions in Year 2040. The growth rate was applied to the existing traffic volumes to determine Year 2040 traffic forecasts. The projected 2040 ADT along Jumpers Hole Road north of Yorkshire Drive is 14,550 vehicles. The future peak hour traffic (two-way) is 1,600 vehicles (640 northbound and 960 southbound). The 2040 ADT along Jumpers Hole Road south of Retford Drive is 15,850 vehicles. The future peak hour traffic (two-way) is 1,700 vehicles (820 northbound and 880 southbound). **Table 5** summarizes the projected Year 2040 balanced AM and PM peak hour volumes along the corridor for the individual turning movements at each intersection.

Table 5: Projected Future Balanced Traffic Volume

Intersections		Northbound			Southbound			Eastbound			Westbound		
		Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
Benfield Rd	AM	120	70	20	235	20	430	185	975	15	5	1105	185
	PM	85	85	25	440	170	260	425	1245	35	30	885	255
Retford Dr	AM	120	280	40	40	450	75	50	5	115	120	10	45
	PM	75	585	105	65	735	85	35	0	55	80	5	40
Yorkshire Dr	AM	-	360	15	20	560	-	-	-	-	35	-	60
	PM	-	620	40	80	895	-	-	-	-	20	-	35
Idlewild Rd	AM	30	390	-	-	525	40	25	-	40	15	0	25
	PM	5	650	-	-	940	30	15	-	20	15	0	20
Clarence Ave	AM	-	420	20	10	540	-	-	-	-	25	-	15
	PM	-	640	45	70	960	-	-	-	-	10	-	10
Kinder Rd	AM	25	260	150	95	190	40	35	65	60	300	85	100
	PM	65	340	245	395	665	65	80	175	115	250	95	110

OPERATIONAL ANALYSIS

Existing Conditions: An operational analysis was conducted for existing Year 2017 conditions using Synchro 9 with the HCM Signalized and Unsignalized Intersection methodologies to determine the Level of Service (LOS) and delay. The balanced peak hour volumes and existing lane geometry of the intersections were modeled. However, the intersection of Jumpers Hole Road and Edin Garth/Idlewild Road was modeled based on current operations and not the actual pavement markings. At this intersection, there is a striped median area which is often used as a separate northbound left turn lane. **Table 6** summarizes the results of the analysis of the intersections along the corridor by approach and overall delay, with the analyses incorporating the peak hour factors (PHFs) determined from the traffic volume count data.



Table 6: Existing Conditions Operational Analysis

Intersection		Northbound		Southbound		Eastbound		Westbound		Intersection	
		LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
Benfield Rd	AM	D	46.4	D	40.0	C	30.7	D	41.1	D	37.9
	PM	E	65.5	C	22.3	D	44.3	D	37.1	D	45.3
Retford Dr	AM	C	20.7	D	39.2	F	1,715	D	42.3	F	421
	PM	C	28.6	E	69.3	F	405	D	38.8	F	86.5
Yorkshire Dr	AM	A	0.0	A	0.4	-	-	B	14.6	A	1.4
	PM	A	0.0	A	1.0	-	-	C	21.4	A	1.4
Idlewild Rd	AM	A	0.8	A	0.0	B	13.5	B	13.4	A	2.3
	PM	A	0.2	A	0.0	C	17.4	C	15.7	A	1.0
Clarence Ave	AM	A	0.0	A	0.2	-	-	B	11.9	A	0.8
	PM	A	0.0	A	0.7	-	-	C	16.8	A	0.9
Kinder Rd	AM	B	17.9	B	16.8	C	33.7	B	13.0	B	18.0
	PM	B	16.9	C	30.6	E	57.1	B	17.7	C	28.8

The results indicate the intersections along Jumpers Hole Road operate at LOS D or better in terms of overall delay during the AM and PM peak hours, except at the intersection of Jumpers Hole Road and Retford Drive. This intersection operates at LOS F overall during the AM and PM peak hours. This is a result of the high delay along eastbound Retford Drive, which is caused by the high volume of traffic exiting Severna Park Middle School on a one lane approach during these periods. The eastbound approach at the Jumpers Hole Road and Retford Drive intersection operates at LOS F during the AM and PM peak hours.

An additional analysis was conducted on the three distinct segments of Jumpers Hole Road described earlier in this memo, using the Anne Arundel County Road Rating System. The road rating system scores for each segment were 70 or greater, which is the threshold of what is acceptable (i.e., ratings lower than 70 are considered unacceptable and may warrant remediation). The road rating system scores for each segment are:

- Benfield Road to Retford Drive: Undivided three-lane roadway (two southbound and one northbound) – **85**
- Retford Drive to Idlewild/Edin Garth Road: Undivided two-lane roadway – **74**
- Idlewild/Edin Garth Road to Kinder Road/Earleigh Heights Connector: Two-lane roadway with a center two-way left-turn lane (TWLTL) – **75**

Additionally, Two-Lane Roadway analyses were conducted for each of these segments using the HCM 2016 methodology. The results of the analyses are presented in **Table 7**. Per the results of the Two-Lane HCS analysis, each of the segments in the study corridor operate at LOS D.



Table 7: Existing Conditions Two-Lane HCS Analysis Results

SEGMENT	LOS	
	NB	SB
Benfield Road to Retford Drive	D*	D*
Retford Drive to Idlewild Rod	D	D
Idlewild Road to Kinder Road	D	D

*The segment from Benfield Road to Retford Drive is a three-lane roadway. The Two-Lane HCS methodology is not intended to analyze three-lane roadways. Therefore, this segment was analyzed as a two-lane roadway.

Future Conditions – Year 2040 No-Build Alternative: An operational analysis was conducted for the Year 2040 No-Build Alternative conditions using Synchro 9 with the HCM Signalized and Unsignalized Intersection methodologies to determine the Level of Service (LOS) and delay. Signal timings (cycle lengths, splits and offsets) were held unchanged from the existing conditions analysis so that the results would reflect the true impacts of the projected traffic growth along the corridor. The balanced projected Year 2040 peak hour volumes and existing lane geometry of the intersections were modeled. However, the intersection of Jumpers Hole Road and Edin Garth/Idlewild Road was modeled based on likely operations and not the actual pavement markings. At this intersection, there is striped median area which would continue to be used as a separate northbound left turn lane. **Table 8** summarizes the results of the Year 2040 No-Build Alternative analysis of the intersections along the corridor by approach and overall delay, with the analyses incorporating the peak hour factors (PHFs) determined from the existing traffic volume count data.

Table 8: Year 2040 No-Build Conditions Operational Analysis

Intersection		Northbound		Southbound		Eastbound		Westbound		Intersection	
		LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
Benfield Rd	AM	D	53.1	F	155	F	114	F	151	F	133
	PM	E	60.2	F	157	F	449	D	39.9	F	244
Retford Dr	AM	D	38.1	E	60.6	F	1,799	D	47.0	F	375
	PM	E	71.5	F	201	F	407	D	41.0	F	154
Yorkshire Dr	AM	A	0.0	A	0.6	-	-	D	26.8	A	2.6
	PM	A	0.0	A	1.1	-	-	F	78.6	A	3.5
Idlewild Rd	AM	A	0.9	A	0.0	C	21.2	C	19.0	A	3.4
	PM	A	0.1	A	0.0	D	29.4	D	25.7	A	1.6
Clarence Ave	AM	A	0.0	A	0.3	-	-	C	15.1	A	1.1
	PM	A	0.0	A	0.8	-	-	D	25.6	A	1.0
Kinder Rd	AM	C	26.1	C	21.3	D	48.6	B	18.4	C	25.3
	PM	C	21.9	F	81.5	F	254	C	24.2	F	81.9



The results show the intersections of Jumpers Hole Road at Benfield Road, and Jumpers Hole Road and Retford Drive would operate at LOS F under Year 2040 No-Build conditions during both the AM and PM peak hours. The eastbound and southbound approaches at Jumpers Hole Road and Benfield Road would both operate at LOS F during both the AM and PM peak hours. The westbound approach would operate at LOS F during the AM peak hour. The intersection of Jumpers Hole Road and Kinder Road would operate at LOS F. The stop controlled westbound approach at the unsignalized intersection of Jumpers Hole Road and Yorkshire Drive would operate at a LOS F with a delay of 78.6 sec/veh during the PM peak hour.

An additional analysis was performed to determine if the Year 2040 No-Build Alternative traffic operations at the three intersections shown above as operating at LOS E or LOS F overall could be improved by optimizing the signal timings based on the Year 2040 volumes, which are higher than the existing volumes due to projected traffic growth. The results of this additional analysis for these three intersections are summarized in **Table 9**.

The findings indicate that optimizing the existing signal timings to account for the projected future traffic growth by Year 2040 wouldn't change the LOS but would reduce the overall delays during the AM and PM peak hours at the intersection of Jumpers Hole Road at Benfield Road. Optimizing the signal timing would reduce the overall delays at the intersection of Jumpers Hole Road at Benfield Road by approximately 6 sec/veh, and 88 sec/veh during the AM and PM peak hours, respectively. Although, the overall delay at the intersection of Jumpers Hole Road at Benfield Road would be reduced, the approaches at the intersection would operate at a LOS E or worse. The intersection improvements needed to improve the LOS on this approach to LOS E or better would require significant improvements along Benfield Road as well, and are therefore beyond the scope of the current project.

The intersection of Jumpers Hole Road and Retford Drive would continue to operate at a LOS F during the AM peak hour, but would operate better (LOS E) during the PM peak hour under optimized timing conditions. The overall delays at the Jumpers Hole Road and Retford Drive would reduce significantly, by approximately 170 sec/veh and 90 sec/veh during the AM and PM peak hours, respectively. Also, the eastbound approach at the intersection would continue to function at LOS F during both the AM and PM peak hours; however, the delay for that approach would be significantly lower with the optimized signal timings.

The intersection of Jumpers Hole Road and Kinder Road/Earleigh Heights Connector would operate better with the optimized signal timings; however, the current less-than-optimal signal timing is intentional, in response to community requests to discourage non-local east-west traffic on Kinder Road/Earleigh Heights Connector from driving through the community.



Table 9: Year 2040 No-Build Conditions Operational Analysis with Optimized Signal Timing

Intersection		Northbound		Southbound		Eastbound		Westbound		Intersection	
		LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
Benfield Rd	AM	E	63.8	F	132	F	103	F	158	F	127
	PM	E	63.4	F	170	F	202	F	91.4	F	155
Retford Dr	AM	E	77.5	C	30.7	F	892	C	24.8	F	206
	PM	D	41.3	E	75.7	F	185	C	31.8	E	67.3
Kinder Rd	AM	C	22.4	B	19.7	D	43.4	B	16.7	C	22.5
	PM	C	28.2	D	52.8	F	101	D	37.2	D	51.1

Analyses were conducted on the three distinct segments of Jumpers Hole Road using the Anne Arundel County Road Rating System. The road rating system scores for each segment were 70 or greater, which is the threshold of what is acceptable (i.e., ratings lower than 70 are considered unacceptable and may warrant remediation). The road rating system scores for each segment under Year 2040 No-Build conditions are:

- Three lane roadway (two southbound, and one northbound): From Benfield Road to Retford Drive – **85**
- Undivided Two-lane Roadway: From Retford Drive to Idlewild/Edin Garth Road – **72**
- Two-lane roadway with two-way left turn lane median: From Idlewild/Edin Garth Road to Kinder Road/Earleigh Heights Connector – **74**

Two-Lane Roadway analyses were conducted for each segment using the HCM 2016 methodology. The results of the analyses using projected Year 2040 traffic volumes are presented in **Table 10**. Per these results, the segments in the study corridor would operate at LOS D or better, which is the same as the existing conditions.

Table 10: Year 2040 No-Build Conditions Two-Lane HCS Analysis Results

SEGMENT	LOS	
	NB	SB
Benfield Road to Retford Drive	D*	D*
Retford Drive to Idlewild Road	D	D
Idlewild Road to Kinder Road	D	D

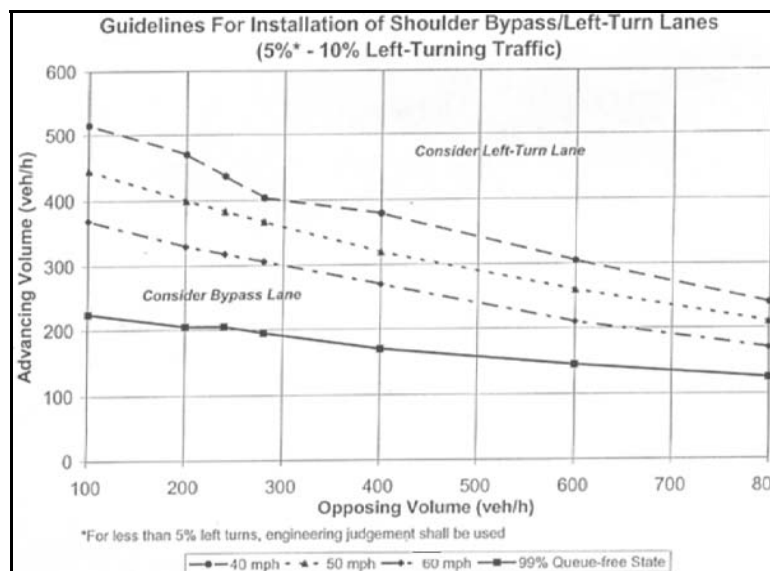
*The segment from Benfield Road to Retford Drive is a three-lane roadway. The Two-Lane HCS methodology is not intended to analyze three-lane roadways. Therefore, this segment was analyzed as a two-lane roadway.



Future Conditions – Year 2040 Build Alternative: Several different typical roadway sections are being considered for implementation along Jumpers Hole Road to improve safety and provide upgraded facilities for pedestrians and bicyclists. However, in terms of traffic operations, all the various typical sections being considered only impact the lane configuration at one intersection along the study corridor: Jumpers Hole Road at Yorkshire Drive, where a southbound left-turn lane would be provided. Therefore, the Year 2040 Build Alternative is identical to the No-Build Alternative except for this change. A marked left-turn lane along northbound Jumpers Hole Road at Edin Garth/Idlewild Road would also be provided; however, the No-Build Alternative analysis already assumes this approach functions as having a separate left-turn lane, even though it is not currently marked as such.

Maryland SHA provides graphical guidelines for installation of shoulder bypass/left-turn lanes. These guidelines base the need for a separate left turn lane on the Advancing Volume (i.e., the combined same direction through and left-turn volume), corresponding left-turn percentage (i.e., the ratio of the left-turn volume to the total advancing volume), the volume of opposite direction traffic, and the measured prevailing travel speed. Using these guidelines, left-turn lanes are justified along southbound Jumpers Hole Road at Yorkshire Drive, and along northbound Jumpers Hole Road at Edin Garth, because the projected Year 2040 advancing volumes at these locations are greater than the Maryland SHA advancing volume thresholds corresponding to a 40-mph operating speed and the projected left-turn percentages (7% at Edin Garth and 8% at Yorkshire Drive). The guideline chart is presented in **Figure 4**, and Year 2040 opposing and advancing volumes for both intersections are presented in **Table 11**.

Figure 4 – SHA Guidelines for Installing Shoulder Bypass/Left-Turn Lanes



Source: Maryland State Highway Administration, *Maryland State Highway Access Manual*.



Table 11: Left-Turn Lane Warrant Volumes

Intersection Approach	Year 2040 Opposing Volume (veh/hr)	Year 2040 Advancing Volume (veh/hr)
SB Jumpers Hole Road at Yorkshire Drive	660	975
NB Jumpers Hole Road at Edin Garth/Idlewild Road	565	420

For the 2040 Build Alternative analysis, a southbound left-turn lane was provided at the intersection of Jumpers Hole Road and Yorkshire Drive (the northbound left-turn lane at Edin Garth was already assumed under 2040 No-Build). The results of the analysis at the intersection of Jumpers Hole Road and Yorkshire Drive are presented in **Table 12**. The traffic operations at the other intersections along the study corridor would remain the same as the Year 2040 No-Build Alternative (see **Table 8** and **Table 9** for those results). During the PM peak hour, the addition of a southbound left-turn lane at the intersection of Jumpers Hole Road and Yorkshire Drive would reduce the overall delay by 0.7 sec/veh, and the westbound approach delay by approximately 20 seconds, compared to the No-Build Alternative. However, the primary benefit of providing a separate left-turn lane at this location is to reduce the likelihood of rear-end crashes.

Table 12: Future Conditions Operational Analysis at Yorkshire Drive

Intersection		Northbound		Southbound		Eastbound		Westbound		Intersection	
		LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
Yorkshire Dr	AM	A	0.0	A	0.6	-	-	C	25.7	A	2.5
	PM	A	0.0	A	1.1	-	-	F	58.7	A	2.8

Future Conditions – Year 2040 Mitigation Alternatives at Jumpers Hole Road and Benfield Road:

The intersection of Jumpers Hole Road and Benfield Road would operate at LOS F in Year 2040 during the AM and PM peak hours, under the current existing signal timings and geometry condition. It would continue to operate at LOS F with optimized signal timing. Therefore, two (2) mitigation options were analyzed for the intersection:

1. Option 1: Split-Phasing Timing on Jumpers Hole Road
2. Option 2: Concurrent Phasing and two exclusive southbound left-turn lanes

The results of the two mitigation alternative analyses are summarized in **Table 13**. The table also includes the result of the No-Build with optimized existing timings.



Table 13: Mitigation Alternatives Analyses Results at Jumpers Hole Road and Benfield Road

Intersection		Northbound		Southbound		Eastbound		Westbound		Intersection	
		LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
No Build Optimized	AM	E	63.8	F	132	F	103	F	158	F	127
	PM	E	63.4	F	170	F	202	F	91.4	F	155
Option 1	AM	E	69.9	F	163	F	154	F	235	F	180
	PM	E	64.8	F	117	F	272	F	127	F	183
Option 2	AM	D	47.1	F	125	F	103	F	158	F	125
	PM	E	58.4	D	37.7	F	246	F	97.6	F	146

The findings indicate that Option 1 would increase the overall delay, and the delay for all the approaches at the intersection, compared to the No-Build with optimized existing timings alternative. This is due to the high traffic volumes on Benfield Road. Option 2 would reduce the overall intersection delay by approximately 3 sec/veh, and 10 sec/veh during the AM and PM peak hours, respectively. This option would also reduce the delays along the northbound and southbound approaches. However, the overall intersection would continue to operate at LOS F during both peak hours. Of the two mitigation options, the intersection of Jumpers Hole Road and Benfield Road would operate better under Option 2.

Additional scenarios were analyzed for the Jumpers Hole Road and Benfield Road intersection to determine the geometry that would be required to achieve LOS D or better overall and on all approaches using Year 2040 volumes with optimized signal timing. The lane configuration that would achieve LOS D or better overall on all approaches is presented in **Table 14**.

Table 14: Analyzed Lane configuration at Jumpers Hole Road and Benfield Road

Approaches	Northbound	Southbound	Eastbound	Westbound
Lane configurations				

The result of the analyses for the lane configuration with Year 2040 volumes is summarized in **Table 15**. The findings confirm the lane configuration shown above would allow Jumpers Hole Road and Benfield Road to operate at a LOS D during the AM and PM peak hours. All the approaches would also operate at a LOS D or better the AM and PM peak hours.



Table 15: Lane Configuration Analysis Result at Jumpers Hole Road and Benfield Road

Intersection		Northbound		Southbound		Eastbound		Westbound		Intersection	
		LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
Lane Configuration Scenario	AM	C	25.4	D	53.1	C	34.7	D	47.3	D	42.9
	PM	D	52.7	C	27.4	D	41.7	D	47.9	D	40.9

Future Conditions – Year 2040 Mitigation Options at Jumpers Hole Road and Retford Drive: The intersection of Jumpers Hole Road and Retford Drive would operate at LOS F in Year 2040 during the AM and PM peak hours, under the current signal timings with existing geometry. As shown earlier in this report, it would continue to operate at LOS F with optimized signal timing during the AM peak hour and operate at LOS E during the PM peak hour. The major cause of the intersection operating at a LOS E or worse is due to the single lane eastbound approach for traffic departing from the school. Most of the eastbound traffic volume are turning right.

The following three lane configuration options were considered for analysis under future traffic conditions:

1. Add a right turn lane to the eastbound approach with an overlap phase concurrent with the northbound left
2. Add a right turn lane to the southbound approach
3. Extend the storage length of the left turn lane on the northbound approach – under this option, only queue lengths were analyzed.

For each of the three considered alternatives, traffic operations were analyzed both under original signal timings and under optimized Synchro signal timings. SimTraffic microsimulations were run to identify queue lengths along the proposed new lanes under each alternative to assess their implementation feasibility. The results of the analysis are presented in **Table 16** through **Table 22**.

Option 1: Add Eastbound Right Turn Lane at Retford Drive

Table 16 shows that the intersection would operate under LOS D during both the AM and PM peak hours. All approaches operate at LOS D or better during both the AM and PM peak hours, except for the eastbound and westbound approaches in the AM peak period, which would operate at a LOS F and LOS E, respectively. Under optimized signal timings, **Table 17** illustrates that the intersection would operate at LOS D and LOS C during the AM and PM peak hours, respectively. **Table 18** shows that the queues on the eastbound right turn lane will extend for 772 feet and 692 feet during the AM and PM peak hours, respectively. Optimizing signal timings for the new lane configuration reduces the eastbound right turn lane queues to 73 feet and 57 feet during the AM and PM peak hours, respectively.



Table 16: Option 1 - Add Eastbound Right Turn Lane at Retford Drive, Current Signal Timings

Intersection		Northbound		Southbound		Eastbound		Westbound		Intersection	
		LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
Retford Drive	AM	C	27.2	C	24.8	F	144.9	E	57.8	D	44.9
	PM	D	40.5	C	27.2	D	53.3	D	53.1	D	35.6

Table 17: Option 1 - Add Eastbound Right Turn Lane at Retford Drive, Optimized Timings

Intersection		Northbound		Southbound		Eastbound		Westbound		Intersection	
		LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
Retford Drive	AM	D	41.7	D	45.0	D	54.0	E	57.4	D	46.6
	PM	D	35.4	C	26.8	E	58.3	D	53.3	C	33.6

Table 18: Option 1 – Add Eastbound Right Turn at Retford Drive, Queue Lengths

Intersection		Eastbound Right Turn Queue Length (ft)
Current Timing	AM	772
	PM	692
Optimized Timing	AM	73
	PM	57

Option 2: Add Southbound Right Turn Lane at Retford Drive

Table 19 shows that the intersection would operate at LOS F and LOS D during the AM and PM peak hours, respectively. The northbound and southbound approaches operate at LOS D or better during both the AM and PM peak hours. The eastbound approach operates at LOS F during both the AM and PM peak hours, while the westbound approach operates at LOS E during the AM peak hour. Under optimized signal timings, **Table 20** illustrates that the intersection would operate at LOS C during both the AM and PM peak hours. The westbound approach, however, would still operate at LOS E during the AM peak hour. **Table 21** demonstrates that the queues along the southbound right turn lane will extend for 1,346 feet and 1,304 feet during the AM and PM peak hours, respectively. Optimizing signal timings for the new lane configuration reduces the southbound right turn lane queues to 47 feet and 39 feet during the AM and PM peak hours, respectively.



Table 19: Option 2 – Add Southbound Right Turn Lane at Retford Drive, Current Signal Timings

Intersection		Northbound		Southbound		Eastbound		Westbound		Intersection	
		LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
Retford Drive	AM	D	35.3	C	30.1	F	642.6	E	57.8	F	112.3
	PM	D	43.0	C	28.1	F	102.5	D	53.1	D	51.2

Table 20: Option 2 – Add Southbound Right Turn Lane at Retford Drive, Optimized Timings

Intersection		Northbound		Southbound		Eastbound		Westbound		Intersection	
		LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
Retford Drive	AM	C	27.7	B	19.7	E	56.1	E	57.4	C	31.7
	PM	C	32.6	B	16.0	C	30.7	D	53.3	C	26.6

Table 21: Option 2 – Add Southbound Right Turn Lane at Retford Drive, Queue Lengths

Intersection		Southbound Queue Length (ft)
Current Timing	AM	1,346
	PM	1,304
Optimized Timing	AM	47
	PM	39

Option 3: Extend Northbound Left Turn Lane:

Under this option, only queue lengths were analyzed to assess the feasibility of extending the northbound left turn lane. **Table 22** illustrates that the 95th percentile queue length along the northbound left turn lane extends for 103 feet and 63 feet during the AM and PM peak periods, respectively. Under optimized signal conditions, the queues would extend for 99 feet and 65 feet during the AM and PM peak periods, respectively. This seems logical since the overall lane configuration at the intersection for this analysis remained the same with and without the optimized signal timing.

Table 22: Extend Northbound Left Turn Lane at Retford Drive, Queue Lengths

Intersection		Northbound Left Queue Length (ft)
Current Timing	AM	103
	PM	63
Optimized Timing	AM	99
	PM	65



Future Conditions – Year 2040 Roundabout Mitigation Options at Retford Drive and Kinder Road

In addition to evaluating traffic operations under signalized intersection conditions for future traffic volumes, SIDRA was used to investigate traffic operations under one-lane roundabout geometric configurations at Retford Drive and Kinder Road. When one-lane roundabout conditions seemed to result in unsatisfactory operations, geometric modifications were introduced to the roundabout in aim to improve the operational conditions. **Table 23** shows the results of this operational analysis. The provided v/c-ratios for each approach under signalized intersection operations are the worst possible ratios across the approach movements, for ease of comparison to the roundabout analysis v/c-ratio results.

Retford Drive: The analysis demonstrates that the roundabout geometry allows Retford Drive intersection to perform much better than under the signalized conditions. All approaches would perform at LOS C or better during both the AM and PM peak hours.

Kinder Road: The analysis shows that the intersection of Jumpers Hole Road and Kinder Road/Earleigh Heights Connector would operate at LOS F under the one-lane roundabout configuration during the PM peak hour. Under signalized intersection conditions, the intersection would operate at LOS C and LOS E during the AM and PM peak hours, respectively. The eastbound approach of the intersection would operate under LOS F with a signal.

Modifications were therefore introduced to accommodate the high PM peak hour traffic volumes at Kinder Road. **Figure 5** illustrates the modified roundabout geometric configuration that would be needed to provide an acceptable LOS and v/c-ratio during the PM peak hour at the intersection of Jumpers Hole Road and Kinder Road/Earleigh Heights Connector. **Table 23** shows that all of the intersection approaches would operate at LOS B or better during the PM peak hour under this modified geometric configuration.



Figure 5: 2040 Roundabout Mitigation Option at Kinder Road

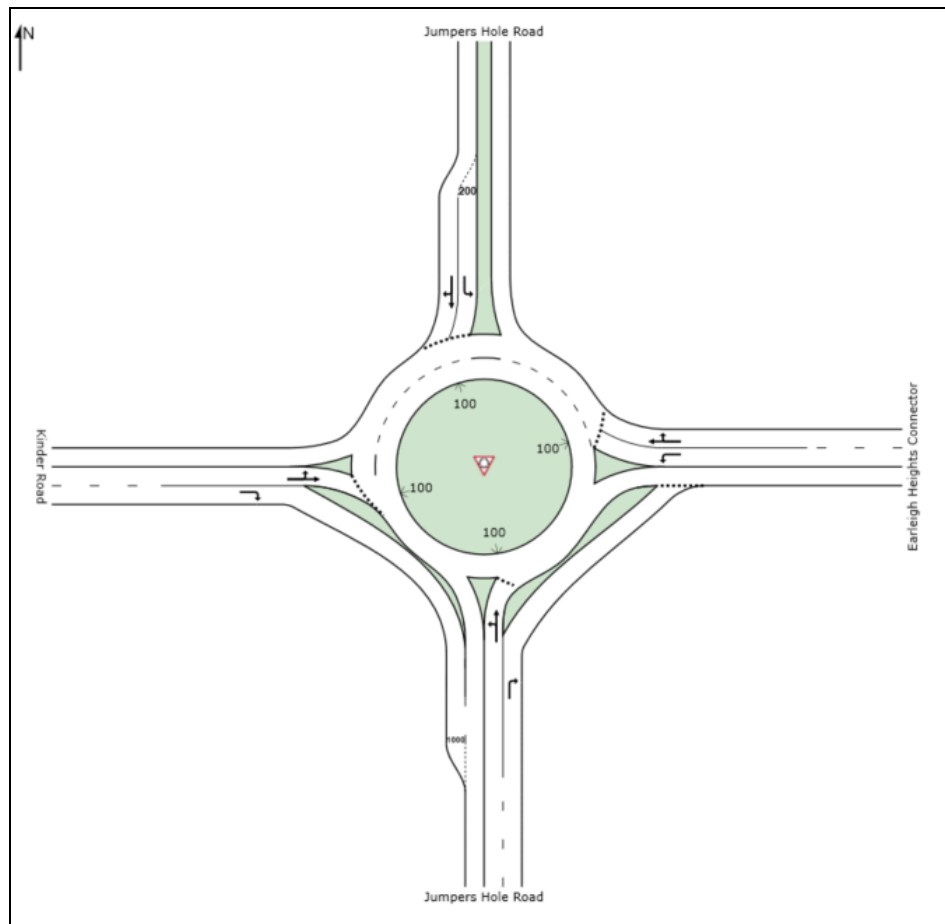




Table 23: 2040 Roundabout Mitigation Options Analysis

Intersection		Northbound		Southbound		Eastbound		Westbound		Intersection	
		v/c	LOS and Delay (sec/veh)	v/c	LOS and Delay (sec/veh)	v/c	LOS and Delay (sec/veh)	v/c	LOS and Delay (sec/veh)	v/c	LOS and Delay (sec/veh)
Jumpers Hole Road at Retford Drive											
1-lane Roundabout	AM	0.43	A (7.4)	0.61	B (12.0)	0.33	A (9.4)	0.26	A (7.1)	0.61	A (9.5)
	PM	0.79	B (17.4)	0.88	C (25.7)	0.28	B (13.9)	0.3	B (11.1)	0.88	C (20.5)
Signalized Intersection	AM	0.33	C (27.2)	0.57	C (24.7)	2.3	F (645.5)	0.65	E (57.8)	2.3	F (107.8)
	PM	0.71	D (43.0)	0.81	C (30.4)	0.98	F (102.5)	0.55	D (53.1)	0.98	D (40.6)
Jumpers Hole Road at Kinder Road/Earleigh Heights Connector											
1-lane Roundabout	AM	0.51	A (9.5)	0.47	B (11.0)	0.32	A (9.1)	0.67	B (14.7)	0.67	B (11.6)
	PM	1.02	E (59.9)	1.63	F (305.4)	1.29	F (178.0)	0.78	C (23.4)	1.63	F (170.5)
Modified Roundabout	AM	-	-	-	-	-	-	-	-	-	-
	PM	0.63	B (12.7)	0.85	C (21.6)	0.65	B (14.6)	0.36	A (8.4)	0.85	B (15.8)
Signalized Intersection	AM	0.51	C (21.8)	0.32	B (19.6)	0.62	D (39.2)	0.54	B (14.6)	0.62	C (20.8)
	PM	0.5	C (21.9)	1.15	E (73.0)	1.35	F (212.9)	0.64	C (23.2)	1.35	E (71.4)

TRAFFIC SUMMARY

Key findings from the traffic analysis are presented below:

1. The posted speed limit on Jumpers Hole Road is 35 MPH and the 85th-percentile speed is 44 mph.
2. There were 31 reported crashes along Jumpers Hole Road during the 6-year period between January 1, 2011 and December 31, 2016; 20 crashes (65%) occurred at intersections.
3. The crash data shows a prevalence of left turn and angle crashes, which comprise 61% of the total crashes within the study corridor.
4. Each of the intersections along Jumpers Hole Road currently operate at LOS D or better during both the AM and PM peak hours, except for Jumpers Hole Road at Retford Drive.
 - a. This intersection operates at LOS F during the AM and PM peak hours due to the high volume of traffic exiting from Severna Park Middle School on the single lane eastbound approach
5. The County Road Rating System scores for the three distinct segments (based on typical section) along Jumpers Hole Road are acceptable under the existing and Year 2040 conditions



6. The three roadway segments operate at LOS D or better under the existing and Year 2040 conditions
7. Using existing signal timings in Year 2040, the intersections of Jumpers Hole Road and Benfield Road, and Jumpers Hole Road and Retford Drive would operate at LOS F during the AM and PM peak hours, and the intersection of Jumpers Hole Road and Kinder Road would operate at LOS F during the PM peak hour
8. Using signal timings optimized for the projected Year 2040 volumes, Jumpers Hole Road at Benfield Road would continue to operate at LOS F during both peak hours, but with reductions in delay, compared to using the existing signal timings
 - a. All the approaches would be operating at either LOS E or F
9. Two mitigation options were analyzed to improve operations at Jumpers Hole Road and Benfield Road in Year 2040
 - a. These options were developed to be implementable without making significant changes to Benfield Road, focusing primarily on Jumpers Hole Road.
 - b. Option 2 (concurrent phasing and two exclusive southbound left-turn lanes) would improve operations with reductions in the overall delay, particularly along the northbound and southbound approaches; however, the overall LOS would remain LOS F during both peaks
10. Using signal timings optimized for the projected Year 2040 volumes, Jumpers Hole Road at Retford Drive would continue to operate at LOS F during the AM peak hour and operate at LOS E during the PM peak hour
 - a. The eastbound approach at the intersection would continue to function at LOS F during both peaks
11. Mitigation options were analyzed to improve operations at Jumpers Hole Road and Retford Drive in Year 2040
 - a. Adding a separate right turn lane on the eastbound approach with a protected phase overlapping the northbound left turn phase would allow the overall intersection to operate at a LOS D or better during both peak hours
 - b. The eastbound approach departing the school would operate at LOS C during the AM and PM peak hours with this configuration.
12. A single-lane roundabout at the intersection of Jumpers Hole Rd and Retford Drive would operate at acceptable levels of service during both the AM and PM peak hours.



13. A single-lane roundabout at the intersection of Jumpers Hole Rd and Kinder Rd/Earliegh Heights Connector would not operate at an acceptable level of service during the PM peak hour; therefore, a multi-lane roundabout with right turn bypass lanes would be required to achieve acceptable traffic operations at this location.

14. A sensitivity analysis was performed to determine what ultimate intersection lane configuration would be needed at Jumpers Hole Road and Benfield Road to achieve LOS D on each approach and for the intersection overall.
 - a. This analysis is a hypothetical scenario that is not being used to determine the improvements to be implemented as part the current project.
 - b. Results show that an increase in the number of lanes on the southbound, eastbound and westbound approaches would allow the intersection to operate at a LOS D overall during both peak hours.
 - c. Each intersection approach would also operate at a LOS D or better.

15. Using Maryland SHA's guidelines, left-turn lanes are warranted along southbound Jumpers Hole Road at Yorkshire Drive, and along northbound Jumpers Hole Road at Edin Garth/Idlewild Road
 - a. During the PM peak hour, the addition of a southbound left-turn lane at the intersection of Jumpers Hole Road and Yorkshire Drive would reduce the overall delay by 0.7 sec/veh, and the westbound approach delay by approximately 20 seconds, compared to the No-Build Alternative
 - b. Primary goal of a left-turn lane here is to improve safety conditions



IV. PROPOSED IMPROVEMENTS

Posted and Design Speeds

Jumpers Hole Road is currently posted for 35 mph along the entire 0.9 mile corridor. The proposed design speed is 40 mph with a design objective to encourage lower travel speeds along the roadway and to make the roadway safer for multimodal travel including autos, bicyclists and pedestrians. Since the speed studies indicate that the 85th-percentile speed is 44 mph, substandard geometry should be improved where feasible to meet the 40 mph design speed, and the roadway improvements should be developed to encourage travel speeds at or below the posted speed limits.

Lower travel speeds are desirable to improve the safety and operational characteristics of the large volume of turning movements from intersecting driveways, entrances and side streets. Lower travel speeds will reduce the probability and severity of potential crashes along the roadway and will increase the safety and comfort level of pedestrians and cyclists using the roadway corridor. With the close proximity of the many surrounding residential neighborhoods, the commercial area at Benfield Road, Severna Park Middle School at Retford Drive and Kinder Park to the north of Kinder Road, there is a strong need to safely and efficiently accommodate all modes of travel including pedestrians, cyclists and motorists. Lower speeds will also reduce clear zone requirements, typical section width, right-of-way requirements and impacts on neighboring communities, environmental features and utilities. A higher design speed would require the reconstruction of a larger quantity of the existing roadway along Jumpers Hole Road, additional retaining walls, and create a significant increase in construction costs.

Criteria utilized for the proposed 40 mph roadway design speed includes the following:

- Maximum superelevation: 0.04 ft./ft. (AASHTO & AA County)
- Minimum radius: 533' (AASHTO) & 637' (AA County)
- Maximum vertical grade: 8.0% (AA County)
- Minimum vertical grade: 1.0% (AA County)

Typical Section

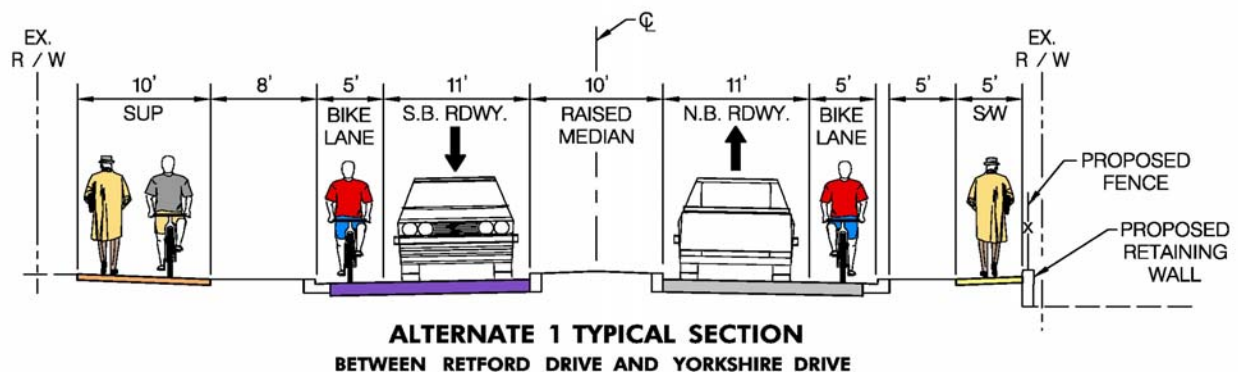
The existing segment of Jumpers Hole Road from Benfield Road to Retford Drive includes an undivided three/four-lane roadway (mostly two southbound and one northbound, with a short segment closest to Benfield Road with two southbound and two northbound). From Retford Drive to Idlewild/Edin Garth Road, the roadway is an undivided two-lane roadway. From Idlewood/Edin Garth Road to Kinder Road/Earleigh Heights Connector the roadway is a two-lane roadway with a center two-way left turn lane (TWLTL). Since the results of the traffic analysis determined that most of the intersections are not in need of additional capacity, the primary goal of the proposed improvements is to increase safety for auto, bicycle and pedestrian travel by widening clear zones and adding paved shoulders, shared-use path and sidewalks along the corridor. Left turn lanes are recommended at a few intersections to provide storage for left turning vehicles and reduce the opportunity for rear-end collisions. A proposed crosswalk is recommended along the west leg of



the Jumpers Hole Road/Kinder Road intersection to provide safe access to Kinder Farm Park. The existing median along Kinder Road could also be removed to narrow the roadway and provide the right-of-way required to construct a sidewalk connection to the park along westbound Kinder Road. Bio-swales are also proposed along the roadway to accommodate conveyance of stormwater runoff from the roadway and provide stormwater treatment to remove sediments and pollutants prior to discharge into local waterways.

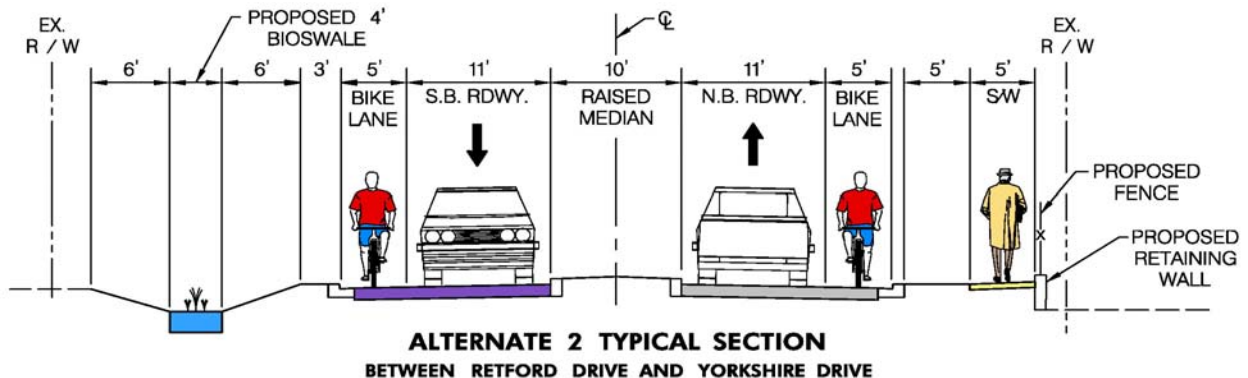
Four (4) typical section alternates were developed and evaluated for Jumpers Hole Road based on their ability to enhance multimodal travel operations and safety and their associated environmental impacts and costs. The proposed typical section alternates are presented below.

Alternate 1: From Retford Drive (Station 31+00) to Yorkshire Drive (Station 42+50) the proposed improvements consist of a two-lane divided closed section roadway with bike lanes, sidewalk and shared use path within an existing right-of-way of approximately 80 feet. Retaining walls are also proposed to reduce impacts and stay within the existing right-of-way.



For the remaining portion of Jumpers Hole Road, the Alternate 1 proposed improvements include various turn lanes as needed in addition to bike lanes, sidewalk, and shared use path.

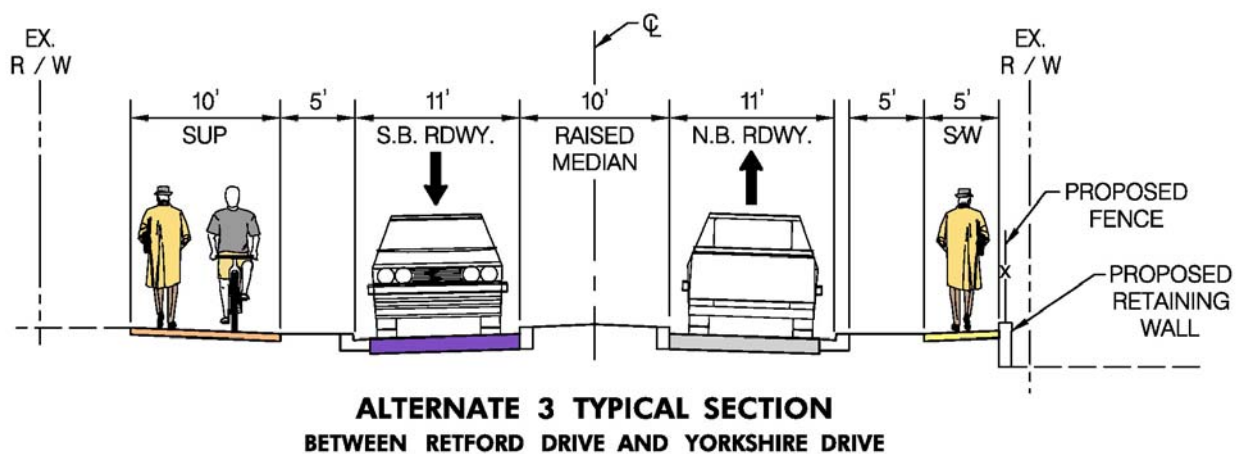
Alternate 2: The Alternate 2 improvements are similar to Alternate 1 except the shared use path is omitted along the southbound roadway. From Retford Drive (Station 31+00) to Yorkshire Drive (Station 42+50) the proposed improvements consist of a two-lane divided closed section roadway with bike lanes, sidewalk and bio-swale within the existing 80-foot right-of-way. Retaining walls are also proposed to reduce impacts and stay within the existing right-of-way.





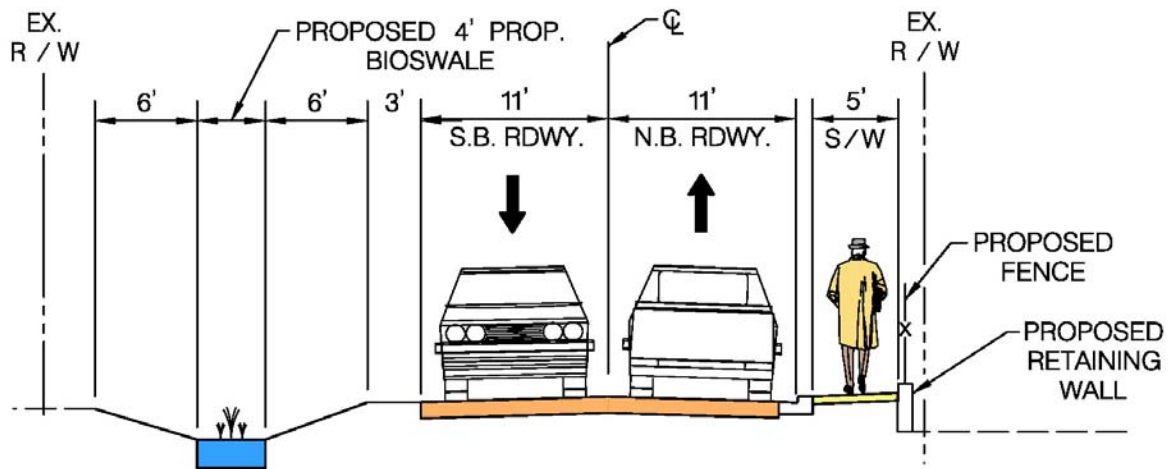
For the remaining portion of Jumpers Hole Road, Alternate 2 proposed improvements include various turn lanes as needed in addition to bike lanes, sidewalk, and bio-swales where right-way is available.

Alternate 3: The Alternate 3 improvements are similar to Alternate 1 except the bike lanes have been omitted along the northbound and southbound roadways. From Retford Drive (Station 31+00) to Yorkshire Drive (Station 42+50), the proposed improvements consist of a two-lane divided closed section roadway with sidewalk and shared use path within the existing 80-foot right-of-way. Retaining walls are also proposed to reduce impacts and stay within the existing right-of-way.



For the remaining portion of Jumpers Hole Road, Alternate 3 improvements include various turn lanes as needed in addition to sidewalk and shared use path.

Alternate 4: The Alternate 4 design was developed to provide the minimal improvements needed to accommodate pedestrians with no additional improvements for cyclists. From Retford Drive (Station 31+00) to Yorkshire Drive (Station 42+50), the improvements consist of maintaining the existing roadway and adding curb and gutter and sidewalk along the northbound roadway and proposed bio-swale along the southbound roadway. Retaining walls are also proposed to reduce impacts and stay within the existing right-of-way.



ALTERNATE 4 TYPICAL SECTION
FROM RETFORD DRIVE TO YORKSHIRE DRIVE

For the remaining portion of Jumpers Hole Road the Alternate 4 improvements include improved pavement markings and curb and gutter and sidewalk along the northbound roadway.

Stormwater Management

Stormwater management facilities must be provided to provide quantitative and qualitative treatment of runoff from the new impervious surface associated with the new roadway, bike and pedestrian facilities. All of the Alternates will include bio-swailes along both sides of the roadway to treat the new impervious areas added by the proposed improvements. Additional methods of treatment may include pervious pavement for the sidewalk and/or shared use path and additional bio-retention facilities within available open space along the corridor.

Horizontal and Vertical Alignment

A review of the existing horizontal and vertical geometry along the Jumpers Hole Road corridor indicates that the roadway's horizontal geometry meets current County and AASHTO design criteria, but that there is substandard vertical geometry for a segment of the roadway between Retford Drive and Yorkshire Drive. Specifically, there are 2 vertical crest curves and 1 vertical sag curve between Station 35+00 and Station 42+50 that do not provide sufficient stopping sight distance for the 40 mph design speed. The 3 curves are located back to back from approximately 400 feet north of Retford Drive to Yorkshire Drive. Approximately 750 feet of the roadway will need to be completely reconstructed to improve the vertical geometry of the roadway.

Clear Zone

The existing clear zones do not meet AASHTO's recommended 16-foot width for a 40 MPH design speed. Several utility poles, street trees and fences are located within close proximity of the existing pavement edge and present a hazard to errant vehicles. Alternates 1-4 will widen the roadway and will relocate many of the utility poles, fences and trees outside the 16-foot clear zone.



Proposed Plans

All of the proposed roadway improvements including travel lanes, shoulders, bike lanes, sidewalk, shared use path, bioswales, retaining walls and grading are presented on 100 scale concept plans included in Appendix B. The improvements generally include widening of the existing roadway. However, complete reconstruction of the roadway is proposed between Station 35+00 and Station 42+50 to improve the substandard vertical geometry between Retford Drive and Yorkshire Drive.



Roundabouts

As noted previously, speed studies indicate that the 85th-percentile speeds in both the northbound and southbound directions are approaching 45 mph and design measures that reduce travel speeds are desirable to improve the safety of multimodal travel. One potential measure to help control travel speeds is the installation of roundabouts at intersections along the corridor. Roundabouts have been routinely employed to calm travel speeds along both rural and urban roadways. Furthermore, numerous studies have shown significant safety improvements at intersections converted from conventional stop-control and signalization to roundabouts. The physical shape of roundabouts eliminates crossing conflicts that are present at conventional intersections, thus reducing the total number of potential conflict points and the most severe of those conflict points. Recent studies of converted intersections have reported overall reductions of 35 percent in total crashes and 76 percent in injury crashes. Severe, incapacitating injuries and fatalities are rare, with one study reporting 89-percent reduction in these types of crashes and another reporting 100-percent reduction in fatalities. Additional potential benefits of roundabouts include:

- Roundabouts typically have lower overall delay than signalized and stop-controlled intersections.
- Roundabouts enhance pedestrian safety by reducing speeds and providing refuge islands for pedestrians.

The 2 intersections listed below were identified as potential locations for the installation of roundabouts:



1. **Retford Road** – Station 30+50: A single lane roundabout would significantly reduce delay and improve level of service compared to a signalized intersection (See Table 23 in Section III).
2. **Kinder Road** - Station 57+00: A single lane roundabout would not reduce delay and improve level of service. A two-lane roundabout with right turn bypass lanes would significantly reduce delay and improve level of service compared to a signalized intersection (See Table 23 in Section III).



V. IMPACT ASSESSMENT

Property Impacts

The existing right-of-way and property boundaries shown on the enclosed plans (Appendix B) are based on County supplied GIS data. The existing roadway generally lies within a right-of-way ranging from 80 to 90 feet. Fortunately, the proposed typical sections will require minimal fee simple right-of-way and easement acquisition from adjacent property owners. There are several locations shown where proposed retaining walls are recommended to reduce property impacts. The estimated property impacts for each of the 4 alternates are noted in table 24 below.

Table 24: Estimated Property Impacts

Proposed Alternate	Fee Simple (sf)	Easement (sf)
Alternate 1	500	9,100
Alternate 2	200	3,400
Alternate 3	300	8,000
Alternate 4	200	6,800

Utilities

Utilities were inventoried based on GIS data, available record plans provided by the utility owners and from field reconnaissance. Potential utility impacts are estimated to include relocation and/or adjustments to both overhead and underground utilities including utility poles, water mains, storm drains, sewers, fire hydrants, gas mains and service lines to adjacent properties. Impacts to other utilities for which records were not available, such as underground cable and electric, are also anticipated and will need to be explored further in final design.

Wetland and Stream Impacts

A desktop investigation and field assessment were performed to identify the presence of jurisdictional wetlands, waterways, and floodplains within the study area. Several published reference maps were reviewed to determine the likelihood of federal or state jurisdictional wetlands or waters within the project study area, including the *National Wetlands Inventory*, *Maryland DNR Wetland Inventory*, *USDA Soil Survey*, *Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM)*, the *USGS Topographic Survey*, and the *USDA Soil Survey*. No wetlands, waters of the U.S., 100-Year FEMA floodplains, or hydric soils were identified within the study area based on these sources. A preliminary field investigation conducted on February 28, 2017 also did not identify the presence of existing jurisdictional waters or wetlands within the study area.



Forest & Roadside Tree Impacts

A preliminary walkthrough forest stand analysis was conducted on February 28, 2017 to characterize and approximate the limits of forest stands and hedgerows within the project study area. The walkthrough identified five hedgerows and four forest stands along the corridor.

Five mid-successional hedgerows (H1, H2, H3, H4, and H5) were identified east and west of Jumpers Hole Road. All hedgerows, except for H4, have a dominant canopy size class of 12 to 20 inches DBH. H4 has a dominant canopy size of 6 to 11 inches DBH. H1 and H2 are volunteer/planted hedgerows dominated by white oak (*Quercus alba*) and northern red oak (*Acer rubrum*). The understory in these hedgerows is dominated by pignut hickory (*Carya glabra*), black cherry (*Prunus serotina*), Leyland cypress (*Cupressus x leylandii*), and American holly (*Ilex opaca*); and the herbaceous layer consists of Japanese honeysuckle (*Lonicera japonica*), garlic mustard (*Alliaria petiolata*), English ivy (*Hedera helix*), ground ivy (*Glechoma hederacea*), and daffodils (*Narcissus sp.*). H1 is in good/fair condition with low downed woody debris and invasive species cover, while H2 is in fair condition due to high invasive cover. H3, H4, and H5 are mixed planted-volunteer hedgerows dominated by white oak, white pine (*Pinus strobus*), and Leyland cypress. Dominant understory species include arborvitae (*Thuja occidentalis*), black locust (*Robinia pseudoacacia*), and red maple (*Acer rubrum*). The herbaceous layer is dominated by tall fescue (*Festuca arundinacea*) and English ivy. H3 is in fair condition with medium amounts of downed woody debris and high invasive species cover, while H4 and H5 are in good and good/fair condition, respectively, with low amounts of downed woody debris and low invasive species cover.

Four mid-successional forest stands (FS1, FS2, FS3, and FS4) were identified east and west of Jumpers Hole Road, ranging in size classes of 6 to 11 inches DBH, 12 to 20 inches DBH, and 20 to 30 inches DBH. Dominant canopy species within these stands include northern red oak, black oak (*Quercus velutina*), white oak, black locust, and scarlet oak (*Quercus coccinea*). Dominant understory species within these stands include American holly, black cherry, mountain laurel (*Kalmia latifolia*), and common blackberry (*Rubus allegheniensis*). Bradford pear (*Callery pear*) and black locust dominate the edges of FS1 and FS4. Herbaceous layer species include greenbrier (*Smilax rotundifolia*), Japanese honeysuckle, and English ivy. FS1 and FS4 are in good condition with low invasive species cover. FS1 has medium amounts of downed woody debris, and FS4 has low amounts of downed woody debris. FS2 is in fair/poor condition, while FS3 is in fair condition. FS2 and FS3 have high amounts of downed woody debris and invasive species cover.

The proposed improvements for each alternate are estimated to impact less than 40,000 square feet of forest so a roadside tree permit application would be required for each alternate. Forest Conservation Plans would not be required. The estimated forest and hedgerow impacts for each alternate are summarized in **Table 25** below.



Table 25: Estimated Forest and Hedgerow Impacts

Proposed Alternate	Proposed Forest Impacts (sf)	Proposed Hedgerow Impacts (sf)
Alternate 1	2,230	36,200
Alternate 2	1,990	28,020
Alternate 3	1,930	23,130
Alternate 4	2,090	1,720

Rare, Threatened, and Endangered Species

A Letter requesting information on the presence of rare, threatened, or endangered species was submitted to the Maryland Department of Natural Resources Wildlife and Heritage Section (MDNR-WH) on March 8, 2017. A response letter was received from MDNR-WHS on March 16, 2017, stating that no official State or Federal records for listed plant or animal species exist within the project area. The U.S. Fish and Wildlife Service (USFWS) online list request service query confirmed on March 15, 2017 that no Federal endangered or threatened species records exist within the project study area.

Historic Resources

A Letter requesting information on historic resources was submitted to the Maryland Historical Trust (MHT) on March 9, 2017. A response was received from MHT on March 28, 2017 stating that there are no historic properties within the project area.



VI. ESTIMATED COSTS

Estimated construction costs were developed for each of the long-term improvement alternates based on a major quantities estimate using SHA Project Planning methodologies. Construction quantities for major items of work including earthwork, paving, and shoulder improvements were computed based on the concept plans and cross sections. Other items of work include maintenance of traffic, drainage, landscaping, and traffic were estimated using percentages established by SHA based on historical project data. The estimates also include proposed right-of-way acquisition, engineering, construction administration and a 35% contingency. Table 26 summarizes the costs for each alternative, detailed estimates are included in Appendix C. The estimated costs for the short-term improvements will vary depending on the improvements selected.

Table 26: Estimated Project Costs

Proposed Alternate	Construction Cost (\$)	Property Acquisition Cost (\$)	Preliminary Engineering Cost (\$)	Total Cost (\$)
Alternate 1	\$7,350,000	\$151,500	\$1,100,000	\$8,601,500
Alternate 2	\$6,330,000	\$57,000	\$950,000	\$7,337,000
Alternate 3	\$6,490,000	\$129,000	\$980,000	\$7,599,000
Alternate 4	\$3,000,000	\$108,000	\$450,000	\$3,558,000



VII. RECOMMENDATIONS

Corridor Needs

The results of the existing conditions assessment and traffic analysis indicate the following:

1. All intersections currently operate at LOS D or better during AM and PM peak hours except the intersection at Retford Drive which operates at LOS F.
2. The 2040 No-Build analysis concluded that all intersections operate at LOS D or better during the AM and PM peak hours except
 - o Intersections at Benfield Road and Retford Drive operate at LOS F during the AM and PM peak hours
 - o The southbound and eastbound approaches at Kinder Road would operate at LOS F during the PM peak hour
 - o The westbound approach at Yorkshire would operate at LOS F during the PM peak hour
3. Two mitigation options were analyzed to improve operations at Jumpers Hole Road and Benfield Road in Year 2040
 - o These options were developed to be implementable without making significant changes to Benfield Road, focusing primarily on Jumpers Hole Road.
 - o Option 2 (concurrent phasing and two exclusive southbound left-turn lanes) would make operations at the intersection better, with reductions in the overall delay, particularly along the northbound and southbound approaches; however, the overall LOS would remain LOS F during both peaks.
4. A mitigation alternative was analyzed to improve operations at Jumpers Hole Road and Retford Drive in Year 2040
 - o Adding a separate right turn lane on the eastbound approach with a protected phase overlapping the northbound left turn phase would allow the overall intersection to operate at a LOS D or better during both peak hours
 - o The eastbound approach departing the school would operate at LOS C during the AM and PM peak hours with this configuration.
5. There were 31 reported crashes along Jumpers Hole Road during the 6-year period between January 1, 2011 and December 31, 2016; 20 crashes (65%) occurred at intersections. The crashes include 12 angle (38%), 7 left-turn (22%), 4 rear-end (16%), 3 side swipe (9%), 3 fixed-object (9%), 1 pedestrian involved (3%), with 1 other (3%) crash



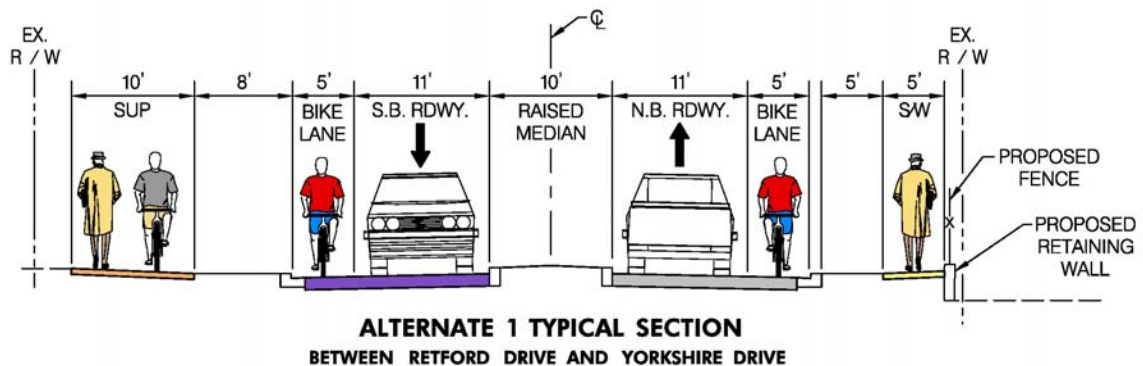
whose type was not specified. Fixed-object crashes were mostly associated with utility poles or curbs.

6. The study corridor is lacking a continuous connection of sidewalks, bike lanes or pathways for bicycle and pedestrian travel.
7. The study corridor possesses substandard vertical geometry, and roadway section and clear zones that do not meet current County and AASHTO recommendations for the 40 mph design speed.
8. The residential communities together with the Severna Park Middle School, Kinder Park and commercial area at Benfield Road will continue to increase demand for auto, bicycle and pedestrian travel.

Long-Term Improvements

1. Four (4) typical section alternates were evaluated based on their ability to enhance multimodal travel operations and safety and their associated environmental impacts and costs. Alternate 1 is the recommended improvement option based on its ability to most effectively enhance auto, bicycle and pedestrian travel along the corridor. Alternate 1 is illustrated below and includes the following features:

- 11-foot northbound and southbound travel lanes
- 10-foot left turn lanes
- 5-foot bike lanes / shoulders along the northbound and southbound roadways
- 10-foot shared use path along the southbound roadway
- 5-foot sidewalk along the northbound roadway





In addition to providing new facilities for pedestrian and bicycle travel, the proposed typical section improvements will provide wider clear zones which will reduce the probability of roadside fixed object crashes. The proposed improvements will also include:

- a. Vertical alignment improvements between Retford Drive and Yorkshire Drive
 - b. Left or right turn lanes at various intersections
 - c. Bioswales, pervious pavement and other BMPs to provide stormwater management
2. The intersection at Jumpers Hole Road and Benfield Road would be improved for the Year 2040 with concurrent phasing and two exclusive southbound left-turn lanes which would make operations at the intersection better, with reductions in the overall delay, particularly along the northbound and southbound approaches; however, the overall LOS would remain LOS F during both peaks.
 3. The intersection at Jumpers Hole Road and Retford Drive would be improved for Year 2040 by adding a separate right turn lane on the eastbound approach with a protected phase overlapping the northbound left turn phase which would allow the overall intersection to operate at a LOS D or better during both peak hours. The eastbound approach departing the school would operate at LOS C during the AM and PM peak hours with this configuration.
 4. Roundabouts may be provided at Retford Drive and Kinder Road to help calm travel speeds, reduced delay, improve level of service and improve pedestrian safety.

Short-Term Improvements

The study also identified several potential short-term safety and operational improvements with lower capital and right-of-way needs that may be implemented in the near future while additional funding is being pursued and/or planning and engineering is being completed for the complete long-term improvements.

Signing and Pavement Marking Improvements: The following signing and pavement marking improvements may be applied along the corridor to further enhance safety and operations:

- Trim vegetation obstructing signs along the corridor in both directions
- Install object markers on utility poles within the clear zone
- Reinstall the raised pavement markers along the corridor to increase nighttime visibility
- Reinstall pavement markings along the entire corridor.

Roundabouts: Roundabouts may be installed along the corridor to help control travel speeds and improve intersection operations and safety. Roundabouts would:



- Eliminate crossing conflicts that are present at conventional intersections, thus reducing the total number of potential conflict points and the potential severity of the conflict points.
- Lower delay (for side street traffic).
- Enhance pedestrian crossings of Jumpers Hole Road by reducing speeds on Jumpers Hole Road and providing refuge islands for pedestrians.

The 2 intersections listed below were identified as potential locations for the installation of roundabouts:

1. Jumpers Hole Road & Retford Drive – Station 30+50
2. Jumpers Hole Road & Kinder Road – Station 57+00

Geometric Improvements: There are 2 vertical crest curves and 1 vertical sag curve that do not provide sufficient stopping sight distance for the 40 mph design speed. The 3 curves are located back to back from approximately 400 feet north of Retford Drive to Yorkshire Drive. The roadway profile could be improved in the short-term as a separate project until funding becomes available for the complete Alternate 1 improvements.

Minor Roadway Improvements: There are other improvements noted below that could be implemented in the near future to improve multimodal travel operations and safety within the corridor.

- **Complete Roadway Widening between Brightview and Retford:** Construct roadway widening and sidewalk along the northbound roadway from its existing terminus at Brightview Development to Retford Drive (approximately 700 feet) to provide full width shoulder and complete sidewalk connection to Severna Park Middle School. This improvement would complete the sidewalk connection between Benfield Road, Retford Drive and the Severna Park Middle School.

Relocate Utility Poles: Several utility poles are located in close proximity (less than 5 feet) to the edge of roadway and should be relocated out of the clear zone (16 feet) where feasible; GIS mapping indicates that additional right-of-way is available in many locations to relocate the poles further from the roadway. The potential pole relocations are listed in the **Table 27** below:

Table 27: Potential Utility Pole Relocations

Southbound Roadway	
Sta. 33+00	Sta. 41+50
Sta. 34+50	Sta. 44+00
Sta. 36+00	Sta. 45+50
Sta. 37+50	Sta. 47+25



APPENDIX A

TRAFFIC DATA

Rummel, Klepper & Kahl

81 Mosher St
Baltimore, MD 21217

Location: Jumpers Hole Rd @ Benfield Rd
County: Anne Arundel
Weather: Clear
Counters: TK

File Name : Jumpers Hole Rd @ Benfield Rd
Site Code : 11036741
Start Date : 3/8/2017
Page No : 1

Groups Printed- Peds

Start Time	Jumpers Hole Rd From North					Benfield Rd From East					Jumpers Hole Rd From South					Benfield Rd From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
08:00 AM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
09:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Rummel, Klepper & Kahl

81 Mosher St
Baltimore, MD 21217

Location: Jumpers Hole Rd @ Benfield Rd
County: Anne Arundel
Weather: Clear
Counters: TK

File Name : Jumpers Hole Rd @ Benfield Rd
Site Code : 11036741
Start Date : 3/8/2017
Page No : 2

Groups Printed- Peds

Start Time	Jumpers Hole Rd From North					Benfield Rd From East					Jumpers Hole Rd From South					Benfield Rd From West					Int. Total	
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total		
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
03:00 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2
03:15 PM	0	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	3
03:30 PM	0	0	0	0	0	0	0	0	5	5	0	0	0	2	2	0	0	0	0	0	0	7
03:45 PM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	1	1	0	0	0	9	9	0	0	0	2	2	0	0	0	1	1	1	13
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1
04:45 PM	0	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	4
Total	0	0	0	0	0	0	0	0	4	4	0	0	0	1	1	0	0	0	0	0	0	5
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1	1	2
05:30 PM	0	0	0	2	2	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	4
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
Total	0	0	0	2	2	0	0	0	0	0	0	0	0	3	3	0	0	0	2	2	2	7
Grand Total	0	0	0	3	3	0	0	0	15	15	0	0	0	6	6	0	0	0	4	4	4	28
Apprch %	0	0	0	100		0	0	0	100		0	0	0	100		0	0	0	100			
Total %	0	0	0	10.7	10.7	0	0	0	53.6	53.6	0	0	0	21.4	21.4	0	0	0	14.3	14.3		

Rummel, Klepper & Kahl

81 Mosher St
Baltimore, MD 21217

Location: Jumpers Hole Rd @ Benfield Rd
County: Anne Arundel
Weather: Clear
Counters: TK

File Name : Jumpers Hole Rd @ Benfield Rd
Site Code : 11036741
Start Date : 3/8/2017
Page No : 3

Start Time	Jumpers Hole Rd From North					Benfield Rd From East					Jumpers Hole Rd From South					Benfield Rd From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
08:00 AM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
Total Volume	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	2
% App. Total	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	100
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.500	.500	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.500
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 02:45 PM																					
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
03:00 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
03:15 PM	0	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	3
03:30 PM	0	0	0	0	0	0	0	0	5	5	0	0	0	2	2	0	0	0	0	0	7
Total Volume	0	0	0	1	1	0	0	0	8	8	0	0	0	2	2	0	0	0	2	2	13
% App. Total	0	0	0	100	100	0	0	0	100	100	0	0	0	100	100	0	0	0	100	100	100
PHF	.000	.000	.000	.250	.250	.000	.000	.000	.400	.400	.000	.000	.000	.250	.250	.000	.000	.000	.500	.500	.464

Rummel, Klepper & Kahl

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File Name : Jumpers Hole Rd @ Benfield Rd
Site Code : 11036741
Start Date : 3/8/2017
Page No : 4

Groups Printed- School Children

Start Time	Jumpers Hole Rd From North					Benfield Rd From East					Jumpers Hole Rd From South					Benfield Rd From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	8	8	9
07:30 AM	0	0	0	0	0	0	0	0	1	1	0	0	0	6	6	0	0	0	13	13	20
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	2	2	0	0	0	6	6	0	0	0	21	21	29
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Rummel, Klepper & Kahl

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Site Code : 11036741
Start Date : 3/8/2017
Page No : 5

Groups Printed- School Children

Start Time	Jumpers Hole Rd From North					Benfield Rd From East					Jumpers Hole Rd From South					Benfield Rd From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3
03:00 PM	0	0	0	9	9	0	0	0	3	3	0	0	0	8	8	0	0	0	43	43	63
03:15 PM	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	1	1	3
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	9	9	0	0	0	5	5	0	0	0	8	8	0	0	0	44	44	66
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	2
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	2
04:45 PM	0	0	0	0	0	0	0	0	8	8	0	0	0	1	1	0	0	0	1	1	10
Total	0	0	0	0	0	0	0	0	10	10	0	0	0	3	3	0	0	0	1	1	14
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Grand Total	0	0	0	9	9	0	0	0	17	17	0	0	0	17	17	0	0	0	70	70	113
Apprch %	0	0	0	100		0	0	0	100		0	0	0	100		0	0	0	100		
Total %	0	0	0	8	8	0	0	0	15	15	0	0	0	15	15	0	0	0	61.9	61.9	

Rummel, Klepper & Kahl

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Site Code : 11036741
Start Date : 3/8/2017
Page No : 6

Start Time	Jumpers Hole Rd From North					Benfield Rd From East					Jumpers Hole Rd From South					Benfield Rd From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	8	8	9
07:30 AM	0	0	0	0	0	0	0	0	1	1	0	0	0	6	6	0	0	0	13	13	20
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	2	2	0	0	0	6	6	0	0	0	21	21	29
% App. Total	0	0	0	0	0	0	0	0	100	100	0	0	0	100	100	0	0	0	100	100	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.500	.500	.000	.000	.000	.250	.250	.000	.000	.000	.404	.404	.363
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 02:30 PM																					
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3
03:00 PM	0	0	0	9	9	0	0	0	3	3	0	0	0	8	8	0	0	0	43	43	63
03:15 PM	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	1	1	3
Total Volume	0	0	0	9	9	0	0	0	5	5	0	0	0	8	8	0	0	0	47	47	69
% App. Total	0	0	0	100	100	0	0	0	100	100	0	0	0	100	100	0	0	0	100	100	
PHF	.000	.000	.000	.250	.250	.000	.000	.000	.417	.417	.000	.000	.000	.250	.250	.000	.000	.000	.273	.273	.274

Rummel, Klepper & Kahl

81 Mosher St
Baltimore, MD 21217

Location: Jumpers Hole Rd @ Benfield Rd
County: Anne Arundel
Weather: Clear
Counters: TK

File Name : Jumpers Hole Rd @ Benfield Rd
Site Code : 11036741
Start Date : 3/8/2017
Page No : 7

Groups Printed- Bikes

Start Time	Jumpers Hole Rd From North					Benfield Rd From East					Jumpers Hole Rd From South					Benfield Rd From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	2	0	0	0	2	0	1	0	0	1	0	0	0	0	0	3
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
09:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Rummel, Klepper & Kahl

81 Mosher St
Baltimore, MD 21217

Location: Jumpers Hole Rd @ Benfield Rd
County: Anne Arundel
Weather: Clear
Counters: TK

File Name : Jumpers Hole Rd @ Benfield Rd
Site Code : 11036741
Start Date : 3/8/2017
Page No : 8

Groups Printed- Bikes

Start Time	Jumpers Hole Rd From North					Benfield Rd From East					Jumpers Hole Rd From South					Benfield Rd From West					Int. Total	
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total		
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 PM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
03:15 PM	0	1	0	0	1	1	1	0	0	2	0	1	0	0	1	0	0	0	0	0	0	4
03:30 PM	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	3	0	0	3	3	1	0	0	4	0	1	0	0	1	0	0	0	0	0	0	8
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	2
05:00 PM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	2
Total	0	1	0	0	1	1	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	3
Grand Total	0	4	0	0	4	6	3	0	0	9	0	2	0	0	2	0	2	0	0	2	0	17
Apprch %	0	100	0	0		66.7	33.3	0	0		0	100	0	0		0	100	0	0		0	
Total %	0	23.5	0	0	23.5	35.3	17.6	0	0	52.9	0	11.8	0	0	11.8	0	11.8	0	0	11.8	0	

Rummel, Klepper & Kahl

81 Mosher St
Baltimore, MD 21217

Location: Jumpers Hole Rd @ Benfield Rd
County: Anne Arundel
Weather: Clear
Counters: TK

File Name : Jumpers Hole Rd @ Benfield Rd
Site Code : 11036741
Start Date : 3/8/2017
Page No : 9

Start Time	Jumpers Hole Rd From North					Benfield Rd From East					Jumpers Hole Rd From South					Benfield Rd From West					Int. Total	
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total		
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																						
Peak Hour for Entire Intersection Begins at 07:00 AM																						
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	2	0	0	0	2	0	1	0	0	1	0	0	0	0	0	0	3
% App. Total	0	0	0	0	0	100	0	0	0	100	0	100	0	0	100	0	0	0	0	0	0	100
PHF	.000	.000	.000	.000	.000	.250	.000	.000	.000	.250	.000	.250	.000	.000	.250	.000	.000	.000	.000	.000	.000	.375
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																						
Peak Hour for Entire Intersection Begins at 02:45 PM																						
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 PM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
03:15 PM	0	1	0	0	1	1	1	0	0	2	0	1	0	0	1	0	0	0	0	0	0	4
03:30 PM	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
Total Volume	0	3	0	0	3	3	1	0	0	4	0	1	0	0	1	0	0	0	0	0	0	8
% App. Total	0	100	0	0	100	75	25	0	0	100	0	100	0	0	100	0	0	0	0	0	0	100
PHF	.000	.375	.000	.000	.375	.375	.250	.000	.000	.500	.000	.250	.000	.000	.250	.000	.000	.000	.000	.000	.000	.500

Rummel, Klepper & Kahl

81 Mosher St
Baltimore, MD 21217

Location: Jumpers Hole Rd @ Retford Dr
County: Anne Arundel
Weather: Clear
Counters: MF

File Name : Jumpers Hole Rd @ Retford Dr-Severna Park Middle School ENT
Site Code : 11036741
Start Date : 3/8/2017
Page No : 1

Groups Printed- Peds

Start Time	Jumpers Hole Rd From North					Retford Dr From East					Jumpers Hole Rd From South					Severna Park Middle School ENT From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
09:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Rummel, Klepper & Kahl

81 Mosher St
Baltimore, MD 21217

Location: Jumpers Hole Rd @ Retford Dr
County: Anne Arundel
Weather: Clear
Counters: MF

File Name : Jumpers Hole Rd @ Retford Dr-Severna Park Middle School ENT
Site Code : 11036741
Start Date : 3/8/2017
Page No : 2

Groups Printed- Peds

Start Time	Jumpers Hole Rd From North					Retford Dr From East					Jumpers Hole Rd From South					Severna Park Middle School ENT From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Total	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	2
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	3
05:00 PM	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	4
Grand Total	0	0	0	5	5	0	0	0	2	2	0	0	0	0	0	0	0	0	4	4	11
Apprch %	0	0	0	100		0	0	0	100		0	0	0	0		0	0	0	100		
Total %	0	0	0	45.5	45.5	0	0	0	18.2	18.2	0	0	0	0	0	0	0	0	36.4	36.4	

Rummel, Klepper & Kahl

81 Mosher St
Baltimore, MD 21217

Location: Jumpers Hole Rd @ Retford Dr
County: Anne Arundel
Weather: Clear
Counters: MF

File Name : Jumpers Hole Rd @ Retford Dr-Severna Park Middle School ENT
Site Code : 11036741
Start Date : 3/8/2017
Page No : 3

Start Time	Jumpers Hole Rd From North					Retford Dr From East					Jumpers Hole Rd From South					Severna Park Middle School ENT From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
Total Volume	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
% App. Total	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	100
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.250	.250	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
05:00 PM	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2
Total Volume	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	6
% App. Total	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100
PHF	.000	.000	.000	.500	.500	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.250	.750

Rummel, Klepper & Kahl

81 Mosher St
Baltimore, MD 21217

Location: Jumpers Hole Rd @ Retford Dr
County: Anne Arundel
Weather: Clear
Counters: MF

File Name : Jumpers Hole Rd @ Retford Dr-Severna Park Middle School ENT
Site Code : 11036741
Start Date : 3/8/2017
Page No : 4

Groups Printed- School Children

Start Time	Jumpers Hole Rd From North					Retford Dr From East					Jumpers Hole Rd From South					Severna Park Middle School ENT From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	11	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11
07:45 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	18	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Rummel, Klepper & Kahl

81 Mosher St
Baltimore, MD 21217

Location: Jumpers Hole Rd @ Retford Dr
County: Anne Arundel
Weather: Clear
Counters: MF

File Name : Jumpers Hole Rd @ Retford Dr-Severna Park Middle School ENT
Site Code : 11036741
Start Date : 3/8/2017
Page No : 5

Groups Printed- School Children

Start Time	Jumpers Hole Rd From North					Retford Dr From East					Jumpers Hole Rd From South					Severna Park Middle School ENT From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	28	28	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	32
Total	0	0	0	28	28	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	32
03:00 PM	0	0	0	7	7	0	0	0	4	4	0	0	0	0	0	0	0	0	3	3	14
03:15 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
03:30 PM	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	6
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	13	13	0	0	0	4	4	0	0	0	0	0	0	0	0	4	4	21
04:00 PM	0	0	0	2	2	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	3
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
Total	0	0	0	3	3	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	5
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	62	62	0	0	0	5	5	0	0	0	0	0	0	0	0	9	9	76
Apprch %	0	0	0	100		0	0	0	100		0	0	0	0		0	0	0	100		
Total %	0	0	0	81.6	81.6	0	0	0	6.6	6.6	0	0	0	0	0	0	0	0	11.8	11.8	

Rummel, Klepper & Kahl

81 Mosher St
Baltimore, MD 21217

Location: Jumpers Hole Rd @ Retford Dr
County: Anne Arundel
Weather: Clear
Counters: MF

File Name : Jumpers Hole Rd @ Retford Dr-Severna Park Middle School ENT
Site Code : 11036741
Start Date : 3/8/2017
Page No : 6

Start Time	Jumpers Hole Rd From North					Retford Dr From East					Jumpers Hole Rd From South					Severna Park Middle School ENT From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
07:30 AM	0	0	0	11	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11
07:45 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total Volume	0	0	0	18	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18
% App. Total	0	0	0	100		0	0	0	0		0	0	0	0		0	0	0	0		
PHF	.000	.000	.000	.409	.409	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.409
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 02:45 PM																					
02:45 PM	0	0	0	28	28	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	32
03:00 PM	0	0	0	7	7	0	0	0	4	4	0	0	0	0	0	0	0	0	3	3	14
03:15 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
03:30 PM	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	6
Total Volume	0	0	0	41	41	0	0	0	4	4	0	0	0	0	0	0	0	0	8	8	53
% App. Total	0	0	0	100		0	0	0	100		0	0	0	0		0	0	0	100		
PHF	.000	.000	.000	.366	.366	.000	.000	.000	.250	.250	.000	.000	.000	.000	.000	.000	.000	.000	.500	.500	.414

Rummel, Klepper & Kahl

81 Mosher St
Baltimore, MD 21217

Location: Jumpers Hole Rd @ Retford Dr
County: Anne Arundel
Weather: Clear
Counters: MF

File Name : Jumpers Hole Rd @ Retford Dr-Severna Park Middle School ENT
Site Code : 11036741
Start Date : 3/8/2017
Page No : 7

Groups Printed- Bikes

Start Time	Jumpers Hole Rd From North					Retford Dr From East					Jumpers Hole Rd From South					Severna Park Middle School ENT From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Rummel, Klepper & Kahl

81 Mosher St
Baltimore, MD 21217

Location: Jumpers Hole Rd @ Retford Dr
County: Anne Arundel
Weather: Clear
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File Name : Jumpers Hole Rd @ Retford Dr-Severna Park Middle School ENT
Site Code : 11036741
Start Date : 3/8/2017
Page No : 8

Groups Printed- Bikes

Start Time	Jumpers Hole Rd From North					Retford Dr From East					Jumpers Hole Rd From South					Severna Park Middle School ENT From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Total	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
03:00 PM	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
03:15 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
03:30 PM	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	2
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	0	0	6	7	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	9
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	2
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	2
Grand Total	1	0	0	6	7	0	3	0	0	3	0	1	0	0	1	2	1	0	0	3	14
Apprch %	14.3	0	0	85.7		0	100	0	0		0	100	0	0		66.7	33.3	0	0		
Total %	7.1	0	0	42.9	50	0	21.4	0	0	21.4	0	7.1	0	0	7.1	14.3	7.1	0	0	21.4	

Rummel, Klepper & Kahl

81 Mosher St
Baltimore, MD 21217

Location: Jumpers Hole Rd @ Retford Dr
County: Anne Arundel
Weather: Clear
Counters: MF

File Name : Jumpers Hole Rd @ Retford Dr-Severna Park Middle School ENT
Site Code : 11036741
Start Date : 3/8/2017
Page No : 9

Start Time	Jumpers Hole Rd From North					Retford Dr From East					Jumpers Hole Rd From South					Severna Park Middle School ENT From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
% App. Total	0	0	0	0	0	0	100	0	0	100	0	0	0	0	0	0	0	0	0	0	100
PHF	.000	.000	.000	.000	.000	.000	.250	.000	.000	.250	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 02:45 PM																					
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
03:00 PM	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
03:15 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
03:30 PM	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	2
Total Volume	1	0	0	6	7	0	1	0	0	1	0	1	0	0	1	0	1	0	0	0	10
% App. Total	14.3	0	0	85.7	100	0	100	0	0	100	0	100	0	0	100	0	100	0	0	0	100
PHF	.250	.000	.000	.250	.292	.000	.250	.000	.000	.250	.000	.250	.000	.000	.250	.000	.250	.000	.000	.250	.417

RKK

81 Mosher Street
Baltimore, MD 21217

Loc: Jumpers Hole Rd & Kinder Rd
County: Anne Arundel
Weather: Cloudy AM/Sunny PM
Counter: CM

File Name : Jumpers Hole Rd@Earleigh Hts Rd_Kinder Rd-CM
Site Code : 11036.74
Start Date : 2/23/2017
Page No : 1

Groups Printed- Peds

Start Time	Jumpers Hole Road From North					Earleigh Heights Connector From East					Jumpers Hole Road From South					Kinder Road From West					Int. Total
	Right	Jaywalkers	Left	Peds	App. Total	Right	Jaywalkers	Left	Peds	App. Total	Right	Jaywalkers	Left	Peds	App. Total	Right	Jaywalkers	Left	Peds	App. Total	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
*** BREAK ***																					
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
08:00 AM	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	2
08:15 AM	0	0	0	2	2	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	4
*** BREAK ***																					
08:45 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	3	3	0	1	0	2	3	0	1	0	0	1	0	0	0	0	0	7
*** BREAK ***																					
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	6	6
02:45 PM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	6	0	0	6	7
*** BREAK ***																					
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	3
04:00 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2
*** BREAK ***																					
04:30 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0	2	3
Total	0	2	0	0	2	0	0	0	0	0	0	0	0	1	1	0	4	0	0	4	7
05:00 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
05:15 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	1	1	0	4	0	0	4	7
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
*** BREAK ***																					
Total	0	0	0	1	1	0	2	0	0	2	0	0	0	1	1	0	6	0	0	6	10
Grand Total	0	2	0	4	6	0	3	0	3	6	0	1	0	2	3	0	21	0	0	21	36
Aprch %	0	33.3	0	66.7		0	50	0	50		0	33.3	0	66.7		0	100	0	0		
Total %	0	5.6	0	11.1	16.7	0	8.3	0	8.3	16.7	0	2.8	0	5.6	8.3	0	58.3	0	0	58.3	

RKK

81 Mosher Street
Baltimore, MD 21217

Loc: Jumpers Hole Rd & Kinder Rd
County: Anne Arundel
Weather: Cloudy AM/Sunny PM
Counter: CM

File Name : Jumpers Hole Rd@Earleigh Hts Rd_Kinder Rd-CM
Site Code : 11036.74
Start Date : 2/23/2017
Page No : 2

Start Time	Jumpers Hole Road From North					Earleigh Heights Connector From East					Jumpers Hole Road From South					Kinder Road From West					Int. Total
	Right	Jaywalkers	Left	Peds	App. Total	Right	Jaywalkers	Left	Peds	App. Total	Right	Jaywalkers	Left	Peds	App. Total	Right	Jaywalkers	Left	Peds	App. Total	
Peak Hour Analysis From 07:00 AM to 12:30 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	2
08:15 AM	0	0	0	2	2	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	4
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total Volume	0	0	0	3	3	0	1	0	2	3	0	1	0	0	1	0	0	0	0	0	7
% App. Total	0	0	0	100		0	33.3	0	66.7		0	100	0	0		0	0	0	0		
PHF	.000	.000	.000	.375	.375	.000	.250	.000	.250	.375	.000	.250	.000	.000	.250	.000	.000	.000	.000	.000	.438

Peak Hour Analysis From 07:00 AM to 12:30 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	08:00 AM					07:30 AM					07:15 AM					07:00 AM					
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
+15 mins.	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
+30 mins.	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	1	1	0	0	0	2	2	0	1	0	0	1	0	0	0	0	0	0
Total Volume	0	0	0	3	3	0	1	0	2	3	0	1	0	0	1	0	2	0	0	0	2
% App. Total	0	0	0	100		0	33.3	0	66.7		0	100	0	0		0	100	0	0		
PHF	.000	.000	.000	.375	.375	.000	.250	.000	.250	.375	.000	.250	.000	.000	.250	.000	.500	.000	.000	.000	.500

Peak Hour Analysis From 12:45 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 04:30 PM

04:30 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0	0	0	2	3
05:00 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
05:15 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	1	1	0	4	0	0	0	4	7
Total Volume	0	1	0	1	2	0	2	0	0	2	0	0	0	2	2	0	7	0	0	0	7	13
% App. Total	0	50	0	50		0	100	0	0		0	0	0	100		0	100	0	0			
PHF	.000	.250	.000	.250	.500	.000	.250	.000	.000	.250	.000	.000	.000	.500	.500	.000	.438	.000	.000	.000	.438	.464

RKK

81 Mosher Street
Baltimore, MD 21217

Loc: Jumpers Hole Rd & Kinder Rd
County: Anne Arundel
Weather: Cloudy AM/Sunny PM
Counter: CM

File Name : Jumpers Hole Rd@Earleigh Hts Rd_Kinder Rd-CM
Site Code : 11036.74
Start Date : 2/23/2017
Page No : 3

Start Time	Jumpers Hole Road From North					Earleigh Heights Connector From East					Jumpers Hole Road From South					Kinder Road From West					Int. Total
	Right	Jaywalkers	Left	Peds	App. Total	Right	Jaywalkers	Left	Peds	App. Total	Right	Jaywalkers	Left	Peds	App. Total	Right	Jaywalkers	Left	Peds	App. Total	

Peak Hour Analysis From 12:45 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	03:45 PM					04:30 PM					04:30 PM					04:45 PM				
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
+15 mins.	0	1	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4
+45 mins.	0	1	0	0	1	0	2	0	0	2	0	0	0	1	1	0	2	0	0	2
Total Volume	0	2	0	0	2	0	2	0	0	2	0	0	0	2	2	0	8	0	0	8
% App. Total	0	100	0	0		0	100	0	0		0	0	0	100		0	100	0	0	
PHF	.000	.500	.000	.000	.500	.000	.250	.000	.000	.250	.000	.000	.000	.500	.500	.000	.500	.000	.000	.500

RKK

81 Mosher Street
Baltimore, MD 21217

Loc: Jumpers Hole Rd & Kinder Rd
County: Anne Arundel
Weather: Cloudy AM/Sunny PM
Counter: CM

File Name : Jumpers Hole Rd@Earleigh Hts Rd_Kinder Rd-CM
Site Code : 11036.74
Start Date : 2/23/2017
Page No : 1

Groups Printed- Bikes

Start Time	Jumpers Hole Road From North					Earleigh Heights Connector From East					Jumpers Hole Road From South					Kinder Road From West					Int. Total
	Right	Thru	Left	Bikes	App. Total	Right	Thru	Left	Bikes	App. Total	Right	Thru	Left	Bikes	App. Total	Right	Thru	Jaywalkers	Bikes	App. Total	
*** BREAK ***																					
07:30 AM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
*** BREAK ***																					
Total	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
*** BREAK ***																					
03:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
*** BREAK ***																					
04:15 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	3	2	0	5	7
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Total	0	0	0	0	0	0	1	0	0	1	0	0	0	2	2	0	6	2	0	8	11
05:00 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	2	0	5	6
*** BREAK ***																					
Total	0	0	0	0	0	0	2	0	0	2	0	0	0	2	2	1	2	2	0	5	9
Grand Total	0	1	0	0	1	1	3	0	0	4	0	0	0	4	4	1	8	4	0	13	22
Apprch %	0	100	0	0		25	75	0	0		0	0	0	100		7.7	61.5	30.8	0		
Total %	0	4.5	0	0	4.5	4.5	13.6	0	0	18.2	0	0	0	18.2	18.2	4.5	36.4	18.2	0	59.1	

RKK

81 Mosher Street
Baltimore, MD 21217

Loc: Jumpers Hole Rd & Kinder Rd
County: Anne Arundel
Weather: Cloudy AM/Sunny PM
Counter: CM

File Name : Jumpers Hole Rd@Earleigh Hts Rd_Kinder Rd-CM
Site Code : 11036.74
Start Date : 2/23/2017
Page No : 2

Start Time	Jumpers Hole Road From North					Earleigh Heights Connector From East					Jumpers Hole Road From South					Kinder Road From West					Int. Total
	Right	Thru	Left	Bikes	App. Total	Right	Thru	Left	Bikes	App. Total	Right	Thru	Left	Bikes	App. Total	Right	Thru	Jaywalkers	Bikes	App. Total	
Peak Hour Analysis From 07:00 AM to 12:30 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
% App. Total	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHF	.000	.000	.000	.000	.000	.250	.000	.000	.000	.250	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250

Peak Hour Analysis From 07:00 AM to 12:30 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM					07:00 AM					07:00 AM					07:00 AM					
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHF	.000	.000	.000	.000	.000	.250	.000	.000	.000	.250	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

Peak Hour Analysis From 12:45 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 04:15 PM

04:15 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	3	2	0	5	7
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
05:00 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
Total Volume	0	0	0	0	0	0	3	0	0	3	0	0	0	2	2	0	6	2	0	8	13
% App. Total	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	75	25	0	0	0
PHF	.000	.000	.000	.000	.000	.000	.375	.000	.000	.375	.000	.000	.000	.250	.250	.000	.500	.250	.000	.400	.464

RKK

81 Mosher Street
Baltimore, MD 21217

Loc: Jumpers Hole Rd & Kinder Rd
County: Anne Arundel
Weather: Cloudy AM/Sunny PM
Counter: CM

File Name : Jumpers Hole Rd@Earleigh Hts Rd_Kinder Rd-CM
Site Code : 11036.74
Start Date : 2/23/2017
Page No : 3

Start Time	Jumpers Hole Road From North					Earleigh Heights Connector From East					Jumpers Hole Road From South					Kinder Road From West					Int. Total
	Right	Thru	Left	Bikes	App. Total	Right	Thru	Left	Bikes	App. Total	Right	Thru	Left	Bikes	App. Total	Right	Thru	Jaywalkers	Bikes	App. Total	

Peak Hour Analysis From 12:45 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	03:00 PM					04:15 PM					04:30 PM					04:00 PM				
+0 mins.	0	0	0	0	0	0	1	0	0	1	0	0	0	2	2	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	0	5
+45 mins.	0	1	0	0	1	0	2	0	0	2	0	0	0	1	1	0	1	0	0	1
Total Volume	0	1	0	0	1	0	3	0	0	3	0	0	0	3	3	0	6	2	0	8
% App. Total	0	100	0	0		0	100	0	0		0	0	0	100		0	75	25	0	
PHF	.000	.250	.000	.000	.250	.000	.375	.000	.000	.375	.000	.000	.000	.375	.375	.000	.500	.250	.000	.400

RKK

81 Mosher Street
Baltimore, MD 21217

Loc: Jumpers Hole Rd & Yorkshire Dr
County: Anne Arundel
Weather: Clear
Counter: RMF

File Name : Jumpers Hole Rd@Yorkshire Dr
Site Code : 11036.74
Start Date : 2/22/2017
Page No : 1

Groups Printed- Vehicles

Start Time	Jumpers Hole Road From North					Yorkshire Drive From East					Jumpers Hole Road From South					- From West					Int. Total
	Right	Thru	Left	U-turn	App. Total	Right	Thru	Left	U-turn	App. Total	Right	Thru	Left	U-turn	App. Total	Right	Thru	Left	U-turn	App. Total	
07:00 AM	0	58	1	0	59	6	0	5	0	11	0	44	0	0	44	0	0	0	0	0	114
07:15 AM	0	63	4	0	67	6	0	5	0	11	2	40	0	0	42	0	0	0	0	0	120
07:30 AM	0	101	7	0	108	10	0	8	0	18	0	66	0	0	66	0	0	0	0	0	192
07:45 AM	0	95	0	0	95	8	0	7	0	15	5	71	0	0	76	0	0	0	0	0	186
Total	0	317	12	0	329	30	0	25	0	55	7	221	0	0	228	0	0	0	0	0	612
08:00 AM	0	58	3	0	61	9	0	4	0	13	3	42	0	0	45	0	0	0	0	0	119
08:15 AM	0	63	0	0	63	10	0	4	0	14	3	45	0	0	48	0	0	0	0	0	125
08:30 AM	0	66	2	0	68	12	0	3	0	15	2	43	0	0	45	0	0	0	0	0	128
08:45 AM	0	78	1	0	79	14	0	2	0	16	1	43	0	0	44	0	0	0	0	0	139
Total	0	265	6	0	271	45	0	13	0	58	9	173	0	0	182	0	0	0	0	0	511
*** BREAK ***																					
04:00 PM	0	83	2	0	85	6	0	4	0	10	6	90	0	0	96	0	0	0	0	0	191
04:15 PM	0	73	7	0	80	4	0	1	0	5	7	88	0	0	95	0	0	0	0	0	180
04:30 PM	0	92	7	0	99	6	0	2	0	8	8	82	0	0	90	0	0	0	0	0	197
04:45 PM	0	86	10	0	96	4	0	1	0	5	4	85	0	0	89	0	0	0	0	0	190
Total	0	334	26	0	360	20	0	8	0	28	25	345	0	0	370	0	0	0	0	0	758
05:00 PM	0	98	2	0	100	6	0	2	0	8	8	93	0	0	101	0	0	0	0	0	209
05:15 PM	0	80	10	0	90	6	0	5	0	11	6	105	0	0	111	0	0	0	0	0	212
05:30 PM	0	98	8	0	106	6	0	4	0	10	9	107	0	0	116	0	0	0	0	0	232
05:45 PM	0	101	12	0	113	4	0	3	0	7	4	102	0	0	106	0	0	0	0	0	226
Total	0	377	32	0	409	22	0	14	0	36	27	407	0	0	434	0	0	0	0	0	879
Grand Total	0	1293	76	0	1369	117	0	60	0	177	68	1146	0	0	1214	0	0	0	0	0	2760
Apprch %	0	94.4	5.6	0		66.1	0	33.9	0		5.6	94.4	0	0		0	0	0	0		
Total %	0	46.8	2.8	0	49.6	4.2	0	2.2	0	6.4	2.5	41.5	0	0	44	0	0	0	0	0	

RKK

81 Mosher Street
Baltimore, MD 21217

Loc: Jumpers Hole Rd & Yorkshire Dr
County: Anne Arundel
Weather: Clear
Counter: RMF

File Name : Jumpers Hole Rd@Yorkshire Dr
Site Code : 11036.74
Start Date : 2/22/2017
Page No : 3

Start Time	Jumpers Hole Road From North					Yorkshire Drive From East					Jumpers Hole Road From South					- From West					Int. Total
	Right	Thru	Left	U-turn	App. Total	Right	Thru	Left	U-turn	App. Total	Right	Thru	Left	U-turn	App. Total	Right	Thru	Left	U-turn	App. Total	

Peak Hour Analysis From 12:45 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	05:00 PM					05:00 PM					05:00 PM					12:45 PM				
+0 mins.	0	98	2	0	100	6	0	2	0	8	8	93	0	0	101	0	0	0	0	0
+15 mins.	0	80	10	0	90	6	0	5	0	11	6	105	0	0	111	0	0	0	0	0
+30 mins.	0	98	8	0	106	6	0	4	0	10	9	107	0	0	116	0	0	0	0	0
+45 mins.	0	101	12	0	113	4	0	3	0	7	4	102	0	0	106	0	0	0	0	0
Total Volume	0	377	32	0	409	22	0	14	0	36	27	407	0	0	434	0	0	0	0	0
% App. Total	0	92.2	7.8	0		61.1	0	38.9	0		6.2	93.8	0	0		0	0	0	0	
PHF	.000	.933	.667	.000	.905	.917	.000	.700	.000	.818	.750	.951	.000	.000	.935	.000	.000	.000	.000	.000

RKK

81 Mosher Street
Baltimore, MD 21217

Loc: Jumpers Hole Rd & Yorkshire Dr
County: Anne Arundel
Weather: Clear
Counter: RMF

File Name : Jumpers Hole Rd@Yorkshire Dr
Site Code : 11036.74
Start Date : 2/22/2017
Page No : 1

Groups Printed- Peds

Start Time	Jumpers Hole Road From North					Yorkshire Drive From East					Jumpers Hole Road From South					- From West					Int. Total	
	Right	Jaywalking Peds	Left	Peds	App. Total	Right	Jaywalking Peds	Left	Peds	App. Total	Right	Jaywalking Peds	Left	Peds	App. Total	Right	Jaywalking Peds	Left	Peds	App. Total		
07:00 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
*** BREAK ***																						
07:30 AM	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
*** BREAK ***																						
Total	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
08:00 AM	0	0	0	2	2	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3
*** BREAK ***																						
08:30 AM	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
*** BREAK ***																						
Total	0	0	0	6	6	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	7
*** BREAK ***																						
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1
04:15 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
*** BREAK ***																						
04:45 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	2
Total	0	0	0	2	2	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	4
05:00 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
05:15 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	2
05:30 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
*** BREAK ***																						
Total	0	0	0	3	3	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	4
Grand Total	0	0	0	15	15	0	1	0	0	1	0	0	0	3	3	0	0	0	0	0	0	19
Apprch %	0	0	0	100		0	100	0	0		0	0	0	100		0	0	0	0	0		
Total %	0	0	0	78.9	78.9	0	5.3	0	0	5.3	0	0	0	15.8	15.8	0	0	0	0	0	0	

RKK

81 Mosher Street
Baltimore, MD 21217

Loc: Jumpers Hole Rd & Yorkshire Dr
County: Anne Arundel
Weather: Clear
Counter: RMF

File Name : Jumpers Hole Rd@Yorkshire Dr
Site Code : 11036.74
Start Date : 2/22/2017
Page No : 3

Start Time	Jumpers Hole Road From North					Yorkshire Drive From East					Jumpers Hole Road From South					- From West					Int. Total
	Right	Jaywalking Peds	Left	Peds	App. Total	Right	Jaywalking Peds	Left	Peds	App. Total	Right	Jaywalking Peds	Left	Peds	App. Total	Right	Jaywalking Peds	Left	Peds	App. Total	

Peak Hour Analysis From 12:45 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:45 PM					12:45 PM					04:00 PM					12:45 PM				
+0 mins.	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
+15 mins.	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
Total Volume	0	0	0	4	4	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0
% App. Total	0	0	0	100		0	0	0	0		0	0	0	100		0	0	0	0	
PHF	.000	.000	.000	1.000	1.000	.000	.000	.000	.000	.000	.000	.000	.000	.500	.500	.000	.000	.000	.000	.000

RKK

81 Mosher Street
Baltimore, MD 21217

Loc: Jumpers Hole Rd & Yorkshire Dr
County: Anne Arundel
Weather: Clear
Counter: RMF

File Name : Jumpers Hole Rd@Yorkshire Dr
Site Code : 11036.74
Start Date : 2/22/2017
Page No : 1

Groups Printed- Bikes

Start Time	Jumpers Hole Road From North					Yorkshire Drive From East					Jumpers Hole Road From South					- From West					Int. Total
	Right	Thru	Left	Bikes	App. Total	Right	Thru	Left	Bikes	App. Total	Right	Thru	Left	Bikes	App. Total	Right	Thru	Left	Bikes	App. Total	
*** BREAK ***																					
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
*** BREAK ***																					
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Apprch %	0	0	0	0		0	0	0	0		0	0	0	0		0	100	0	0		
Total %	0	0	0	0		0	0	0	0		0	0	0	0		0	100	0	0	100	

RKK

81 Mosher Street
Baltimore, MD 21217

Loc: Jumpers Hole Rd & Yorkshire Dr
County: Anne Arundel
Weather: Clear
Counter: RMF

File Name : Jumpers Hole Rd@Yorkshire Dr
Site Code : 11036.74
Start Date : 2/22/2017
Page No : 2

Start Time	Jumpers Hole Road From North					Yorkshire Drive From East					Jumpers Hole Road From South					- From West					Int. Total
	Right	Thru	Left	Bikes	App. Total	Right	Thru	Left	Bikes	App. Total	Right	Thru	Left	Bikes	App. Total	Right	Thru	Left	Bikes	App. Total	
Peak Hour Analysis From 07:00 AM to 12:30 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

Peak Hour Analysis From 07:00 AM to 12:30 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM					07:00 AM					07:00 AM					07:00 AM					
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

Peak Hour Analysis From 12:45 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 04:30 PM

04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
% App. Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	100
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.000	.250	.250

RKK

81 Mosher Street
Baltimore, MD 21217

Loc: Jumpers Hole Rd & Yorkshire Dr
County: Anne Arundel
Weather: Clear
Counter: RMF

File Name : Jumpers Hole Rd@Yorkshire Dr
Site Code : 11036.74
Start Date : 2/22/2017
Page No : 3

Start Time	Jumpers Hole Road From North					Yorkshire Drive From East					Jumpers Hole Road From South					- From West					Int. Total
	Right	Thru	Left	Bikes	App. Total	Right	Thru	Left	Bikes	App. Total	Right	Thru	Left	Bikes	App. Total	Right	Thru	Left	Bikes	App. Total	

Peak Hour Analysis From 12:45 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	12:45 PM					12:45 PM					12:45 PM					04:30 PM				
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
% App. Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.000	.250

Station Name:Jumpers Hole Rd NB south of Yorkshire Dr
Site ID:000000000002
Station Num:000000000001
Description:Jumpers Hole Rd south of Yorkshire Dr
City:Severna Park
County:Anne Arundel
Start Date/Time:04-04-2017 00:00
End Date/Time:04-06-2017 23:59

	10 MPH	15 MPH	20 MPH	25 MPH	30 MPH	35 MPH	40 MPH	45 MPH	50 MPH	55 MPH	60 MPH	> 60 MPH	All Speeds
00:00	0	0	0	0	0	2	9	2	0	1	1	0	15
00:15	0	0	0	0	0	0	3	2	6	0	0	0	11
00:30	0	0	0	0	0	0	2	2	1	0	1	0	6
00:45	0	0	0	0	0	0	0	1	3	2	1	0	7
01:00	0	0	0	0	0	0	0	2	1	2	0	1	6
01:15	0	0	0	0	0	0	2	1	0	0	0	0	3
01:30	0	0	0	0	1	3	4	1	1	1	0	0	10
01:45	0	0	0	0	0	0	0	5	3	2	0	0	10
02:00	0	0	0	0	0	0	0	0	1	0	1	1	3
02:15	0	0	0	0	0	0	2	0	1	2	0	0	5
02:30	0	0	0	0	0	0	0	1	0	1	0	0	2
02:45	0	0	0	0	0	0	2	1	0	0	0	0	3
03:00	0	0	0	0	0	0	1	1	0	0	0	0	2
03:15	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30	0	0	0	0	0	0	0	2	0	0	1	0	3
03:45	0	0	0	0	0	0	0	1	1	0	0	0	2
04:00	0	0	0	0	0	0	1	1	2	1	0	0	5
04:15	0	0	0	0	0	0	1	2	0	1	1	0	5
04:30	0	0	0	0	0	0	0	3	2	1	1	0	7
04:45	0	0	0	0	0	0	0	1	0	1	0	0	2
05:00	0	0	0	0	1	0	2	1	2	0	0	0	6
05:15	0	0	0	0	0	0	2	7	5	5	1	0	20
05:30	0	0	0	0	0	0	1	4	8	3	0	0	16
05:45	0	0	0	0	0	0	7	15	11	6	1	0	40
06:00	0	0	0	0	0	0	8	8	25	8	0	0	49
06:15	0	0	0	0	1	5	27	32	16	2	0	0	83
06:30	0	0	0	2	0	4	24	30	11	2	0	0	73
06:45	0	0	0	0	1	10	39	34	7	6	3	0	100
07:00	0	0	0	0	2	8	43	62	14	6	0	0	135
07:15	0	0	0	0	2	10	47	54	18	1	0	0	132
07:30	0	0	0	0	0	25	75	54	11	1	1	0	167

Station Name:Jumpers Hole Rd NB south of Yorkshire Dr
Site ID:00000000002
Station Num:00000000001
Description:Jumpers Hole Rd south of Yorkshire Dr
City:Severna Park
County:Anne Arundel
Start Date/Time:04-04-2017 00:00
End Date/Time:04-06-2017 23:59

	10 MPH	15 MPH	20 MPH	25 MPH	30 MPH	35 MPH	40 MPH	45 MPH	50 MPH	55 MPH	60 MPH	> 60 MPH	All Speeds
07:45	0	0	0	0	2	47	109	88	14	2	0	0	262
08:00	0	0	0	0	1	23	66	83	16	4	0	0	193
08:15	0	0	0	0	1	19	59	84	20	4	1	1	189
08:30	0	0	0	3	5	17	64	68	21	2	0	0	180
08:45	0	0	0	0	3	18	79	51	15	3	0	0	169
09:00	0	0	0	0	5	11	61	72	18	1	0	0	168
09:15	0	0	0	2	0	5	70	64	17	2	0	0	160
09:30	0	0	0	0	2	8	50	54	14	3	0	0	131
09:45	0	0	0	0	1	14	55	61	19	2	0	0	152
10:00	0	0	0	0	1	6	40	57	20	2	1	0	127
10:15	0	0	0	0	0	13	41	61	14	2	0	0	131
10:30	0	0	0	0	0	8	57	72	25	4	0	1	167
10:45	0	0	0	0	1	13	75	62	16	3	1	1	172
11:00	0	0	0	0	2	19	63	56	18	6	0	1	165
11:15	0	0	0	0	1	25	62	63	18	3	0	2	174
11:30	0	0	0	0	0	8	68	81	27	6	0	0	190
11:45	0	0	0	0	3	17	68	73	24	4	0	0	189
12:00	0	0	0	0	3	34	62	62	24	7	2	0	194
12:15	0	0	0	0	1	19	90	53	18	3	1	0	185
12:30	0	0	0	0	0	12	67	73	25	3	1	0	181
12:45	0	0	0	0	1	9	67	70	30	7	0	0	184
13:00	0	0	0	0	3	14	61	81	24	4	2	0	189
13:15	0	0	0	0	1	20	73	86	24	4	0	0	208
13:30	0	0	0	0	1	14	74	83	30	4	0	0	206
13:45	0	0	0	0	1	12	63	76	21	6	1	0	180
14:00	0	0	0	0	0	10	68	94	27	7	2	0	208
14:15	0	0	0	4	10	22	82	87	23	2	2	0	232
14:30	0	0	0	0	4	28	87	110	25	1	0	0	255
14:45	0	0	0	1	9	54	121	74	17	1	0	0	277
15:00	0	0	0	0	1	24	153	108	30	2	0	0	318
15:15	0	0	0	0	9	47	115	115	37	6	0	0	329

Station Name:Jumpers Hole Rd NB south of Yorkshire Dr
Site ID:000000000002
Station Num:000000000001
Description:Jumpers Hole Rd south of Yorkshire Dr
City:Severna Park
County:Anne Arundel
Start Date/Time:04-04-2017 00:00
End Date/Time:04-06-2017 23:59

	10 MPH	15 MPH	20 MPH	25 MPH	30 MPH	35 MPH	40 MPH	45 MPH	50 MPH	55 MPH	60 MPH	> 60 MPH	All Speeds
15:30	0	0	0	1	0	14	106	113	35	5	1	0	275
15:45	0	0	0	1	1	22	94	98	36	3	0	0	255
16:00	0	0	0	0	1	33	121	118	20	4	1	0	298
16:15	0	0	0	0	1	17	93	128	25	7	1	0	272
16:30	0	0	0	0	7	25	114	102	28	4	1	0	281
16:45	0	0	0	1	2	24	101	130	32	3	0	0	293
17:00	0	0	0	0	0	17	110	130	42	3	1	0	303
17:15	0	0	0	0	7	39	146	129	25	3	0	0	349
17:30	0	0	0	0	1	21	120	123	38	3	0	0	306
17:45	0	0	0	4	12	9	118	103	35	5	0	0	286
18:00	0	0	0	1	1	30	119	108	30	7	1	0	297
18:15	0	0	0	1	1	31	128	121	32	5	0	0	319
18:30	0	0	0	0	3	50	174	104	29	1	1	0	362
18:45	0	0	0	5	2	26	150	109	26	5	1	0	324
19:00	0	0	0	0	3	47	114	90	21	1	1	0	277
19:15	0	0	2	2	8	41	106	69	14	1	1	0	244
19:30	0	0	0	0	0	12	76	81	15	4	3	0	191
19:45	0	0	0	0	0	15	87	62	22	1	0	0	187
20:00	0	0	0	2	5	50	88	59	8	0	0	0	212
20:15	0	0	0	0	4	36	58	38	9	1	0	0	146
20:30	0	0	0	1	2	42	74	40	9	1	0	0	169
20:45	0	0	0	0	7	34	45	27	10	1	0	0	124
21:00	0	0	0	0	1	15	51	37	8	0	0	1	113
21:15	0	0	0	0	0	13	41	38	6	2	1	0	101
21:30	0	0	0	0	0	6	39	27	7	1	0	0	80
21:45	0	0	0	0	0	10	37	17	5	0	0	0	69
22:00	0	0	0	0	0	7	31	13	4	1	0	0	56
22:15	0	0	0	0	2	11	24	8	0	0	0	0	45
22:30	0	0	0	0	0	7	17	14	2	1	0	0	41
22:45	0	0	0	0	1	4	19	13	5	0	0	1	43
23:00	0	0	0	0	0	4	12	9	3	0	0	0	28

Station Name:Jumpers Hole Rd NB south of Yorkshire Dr
Site ID:000000000002
Station Num:000000000001
Description:Jumpers Hole Rd south of Yorkshire Dr
City:Severna Park
County:Anne Arundel
Start Date/Time:04-04-2017 00:00
End Date/Time:04-06-2017 23:59

	10 MPH	15 MPH	20 MPH	25 MPH	30 MPH	35 MPH	40 MPH	45 MPH	50 MPH	55 MPH	60 MPH	> 60 MPH	All Speeds
23:15	0	0	0	0	1	3	6	8	5	0	0	0	23
23:30	0	0	0	0	0	0	12	6	1	1	1	0	21
23:45	0	0	0	0	0	0	12	6	3	1	1	0	23
Total	0	0	2	31	153	1404	5243	4940	1376	212	37	8	13406

Speed Limit	Mean Speed	85th Percentile Speed
35 mph	40 mph	44 mph

Station Name:Jumpers Hole Rd SB South of Yorkshire Dr
Site ID:000000000002
Station Num:000000000002
Description:Jumpers Hole Rd south of Yorkshire Dr
City:Severna Park
County:Anne Arundel
Start Date/Time:04-04-2017 00:00
End Date/Time:04-06-2017 23:59

	10 MPH	15 MPH	20 MPH	25 MPH	30 MPH	35 MPH	40 MPH	45 MPH	50 MPH	55 MPH	60 MPH	> 60 MPH	All Speeds
00:00	0	0	0	0	0	1	4	3	0	0	0	0	8
00:15	0	0	0	0	0	3	4	3	2	0	0	0	12
00:30	0	0	0	0	0	0	0	1	0	3	0	0	4
00:45	0	0	0	0	0	2	3	1	1	1	0	0	8
01:00	0	0	0	0	0	0	1	3	2	0	0	0	6
01:15	0	0	0	0	0	1	0	1	0	2	1	0	5
01:30	0	0	0	0	0	0	1	1	2	0	0	0	4
01:45	0	0	0	0	0	0	1	3	1	0	0	0	5
02:00	0	0	0	0	0	0	1	1	0	0	0	0	2
02:15	0	0	0	0	0	0	0	2	2	0	0	0	4
02:30	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	1	0	0	0	1
03:15	0	0	0	0	0	0	0	0	2	4	0	0	6
03:30	0	0	0	0	0	0	2	0	0	0	0	0	2
03:45	0	0	0	0	0	0	1	4	2	4	0	0	11
04:00	0	0	0	0	0	0	4	4	3	1	0	0	12
04:15	0	0	0	0	0	1	0	6	6	4	1	0	18
04:30	0	0	0	0	0	1	1	7	10	5	1	0	25
04:45	0	0	0	0	0	1	2	19	13	6	4	0	45
05:00	0	0	0	0	0	1	4	6	15	9	3	0	38
05:15	0	0	0	0	0	1	15	11	27	15	0	1	70
05:30	0	0	0	0	1	2	13	23	35	14	1	2	91
05:45	0	0	0	0	0	2	7	32	38	19	6	1	106
06:00	0	0	0	0	0	1	11	29	39	12	3	0	95
06:15	0	0	0	0	0	2	22	88	54	23	0	2	191
06:30	0	0	0	0	0	4	29	99	55	22	3	2	214
06:45	0	0	0	0	0	10	37	125	90	28	4	1	295
07:00	0	0	0	0	1	9	45	97	79	25	4	0	260
07:15	0	0	0	0	0	4	45	99	100	19	2	1	270
07:30	0	0	0	2	9	26	83	133	61	19	1	0	334

Station Name:Jumpers Hole Rd SB South of Yorkshire Dr
Site ID:000000000002
Station Num:000000000002
Description:Jumpers Hole Rd south of Yorkshire Dr
City:Severna Park
County:Anne Arundel
Start Date/Time:04-04-2017 00:00
End Date/Time:04-06-2017 23:59

	10 MPH	15 MPH	20 MPH	25 MPH	30 MPH	35 MPH	40 MPH	45 MPH	50 MPH	55 MPH	60 MPH	> 60 MPH	All Speeds
07:45	0	0	10	14	42	42	74	69	11	3	0	0	265
08:00	0	0	0	0	0	36	131	79	25	3	1	0	275
08:15	0	0	0	0	7	45	105	81	26	6	1	0	271
08:30	0	0	0	0	15	53	111	73	16	3	0	0	271
08:45	0	0	0	1	13	34	113	60	25	3	0	0	249
09:00	0	0	0	0	3	37	105	65	13	3	0	0	226
09:15	0	0	0	0	1	26	87	59	21	3	0	0	197
09:30	0	0	0	0	2	15	92	57	17	1	0	0	184
09:45	0	0	0	0	7	24	75	61	24	3	0	0	194
10:00	0	0	0	0	0	17	60	57	15	2	2	1	154
10:15	0	0	0	0	2	20	57	62	16	6	0	0	163
10:30	0	0	0	0	4	24	66	51	7	4	0	0	156
10:45	0	0	0	0	3	31	68	39	10	0	0	0	151
11:00	0	0	0	3	1	18	69	77	13	2	1	0	184
11:15	0	0	0	0	5	25	81	57	14	0	1	0	183
11:30	0	0	0	0	0	20	80	63	18	3	1	1	186
11:45	0	0	0	0	2	21	79	47	16	7	2	0	174
12:00	0	0	0	1	5	35	80	58	16	3	1	3	202
12:15	0	0	0	0	4	29	76	55	14	3	0	1	182
12:30	0	0	0	0	1	17	71	62	12	5	1	0	169
12:45	0	0	0	0	1	20	75	63	18	6	0	0	183
13:00	0	0	0	1	1	25	66	63	11	0	1	0	168
13:15	0	0	0	0	1	21	82	57	11	3	1	0	176
13:30	0	0	0	0	3	29	72	50	19	2	0	0	175
13:45	0	0	0	0	3	16	80	77	16	4	1	0	197
14:00	0	0	0	1	2	27	65	65	12	1	0	0	173
14:15	0	0	0	0	4	31	82	51	16	2	0	0	186
14:30	0	0	0	0	7	48	124	81	12	1	0	0	273
14:45	0	0	0	0	2	28	99	78	16	3	0	0	226
15:00	0	0	0	0	2	51	100	65	16	2	0	0	236
15:15	0	0	0	0	1	29	71	76	19	1	1	0	198

Station Name:Jumpers Hole Rd SB South of Yorkshire Dr
Site ID:00000000002
Station Num:00000000002
Description:Jumpers Hole Rd south of Yorkshire Dr
City:Severna Park
County:Anne Arundel
Start Date/Time:04-04-2017 00:00
End Date/Time:04-06-2017 23:59

	10 MPH	15 MPH	20 MPH	25 MPH	30 MPH	35 MPH	40 MPH	45 MPH	50 MPH	55 MPH	60 MPH	> 60 MPH	All Speeds
15:30	0	0	0	0	1	39	103	92	24	2	2	0	263
15:45	0	0	0	1	2	39	127	73	28	1	0	2	273
16:00	0	0	0	1	8	21	108	85	13	0	2	0	238
16:15	0	0	0	0	1	27	118	107	19	1	1	0	274
16:30	0	0	0	0	1	43	137	109	23	2	0	0	315
16:45	0	0	0	0	1	45	147	118	23	5	0	0	339
17:00	0	0	0	0	2	40	147	100	27	7	2	0	325
17:15	0	0	0	0	4	77	202	109	18	5	0	0	415
17:30	0	0	0	0	5	30	185	129	29	3	0	0	381
17:45	0	0	0	0	5	53	125	123	28	2	0	0	336
18:00	0	0	0	0	3	40	114	108	29	2	0	0	296
18:15	0	0	0	0	3	19	123	79	26	8	1	0	259
18:30	0	0	0	0	6	28	104	84	17	5	0	0	244
18:45	0	0	0	0	3	40	124	85	14	3	1	1	271
19:00	0	0	0	0	2	30	100	72	17	4	1	0	226
19:15	0	0	0	0	4	20	85	63	10	6	1	0	189
19:30	0	0	0	0	1	16	80	58	13	1	1	0	170
19:45	0	0	0	0	2	30	79	44	13	2	0	0	170
20:00	0	0	0	0	2	40	78	42	5	2	0	0	169
20:15	0	0	0	0	3	40	61	57	10	3	0	0	174
20:30	0	0	0	0	4	25	71	32	9	3	1	0	145
20:45	0	0	0	1	0	23	39	33	9	6	1	0	112
21:00	0	0	0	1	0	14	36	27	7	1	0	1	87
21:15	0	0	0	0	1	19	31	24	4	1	0	1	81
21:30	0	0	0	0	1	9	30	36	10	1	0	0	87
21:45	0	0	0	0	0	4	24	24	6	2	0	0	60
22:00	0	0	0	0	0	5	17	17	5	1	0	0	45
22:15	0	0	0	0	0	3	15	12	5	3	0	0	38
22:30	0	0	0	0	1	5	6	20	1	0	0	0	33
22:45	0	0	0	0	1	2	8	12	2	2	0	0	27
23:00	0	0	0	0	0	2	7	12	4	1	0	0	26

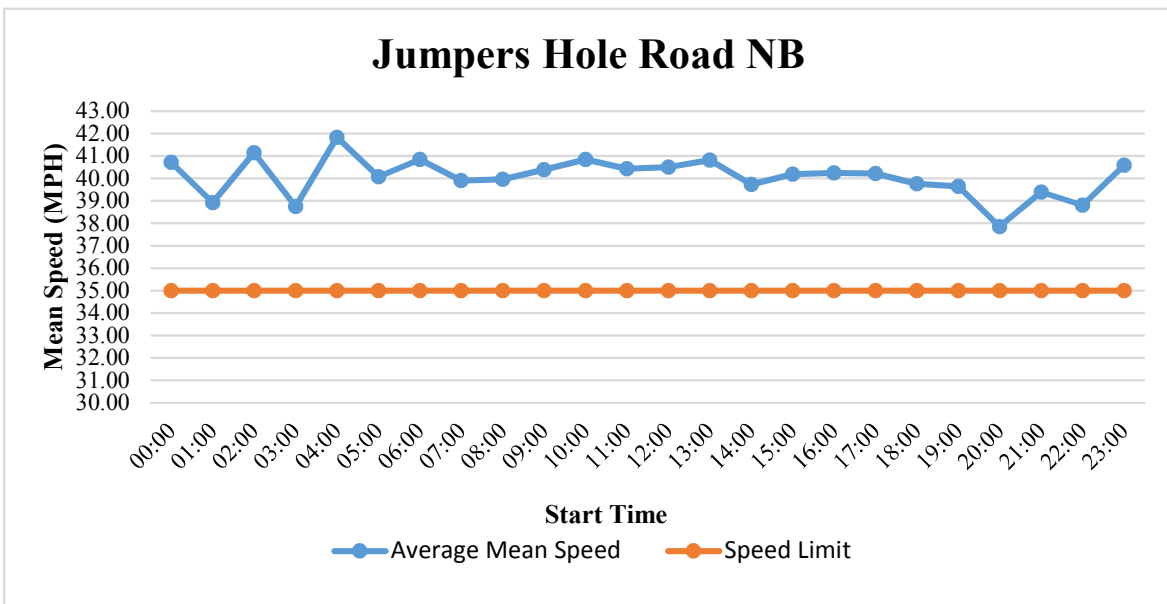
Station Name:Jumpers Hole Rd SB South of Yorkshire Dr
Site ID:000000000002
Station Num:000000000002
Description:Jumpers Hole Rd south of Yorkshire Dr
City:Severna Park
County:Anne Arundel
Start Date/Time:04-04-2017 00:00
End Date/Time:04-06-2017 23:59

	10 MPH	15 MPH	20 MPH	25 MPH	30 MPH	35 MPH	40 MPH	45 MPH	50 MPH	55 MPH	60 MPH	> 60 MPH	All Speeds
23:15	0	0	0	0	0	2	5	5	3	0	0	0	15
23:30	0	0	0	0	0	4	2	7	2	0	0	1	16
23:45	0	0	0	0	0	2	2	6	1	1	1	0	13
Total	0	0	12	36	282	2063	6038	4605	1184	208	40	13	14481

Speed Limit	Mean Speed	85th Percentile Speed
35 mph	39 mph	44 mph

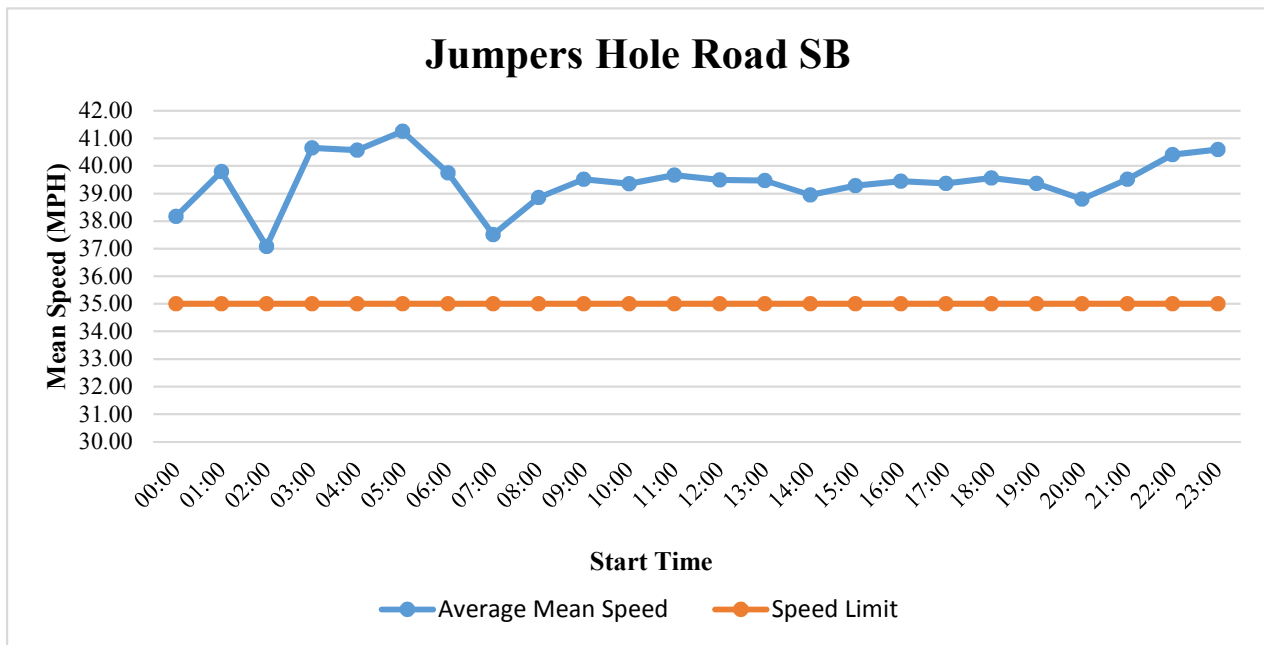
Station Name:Jumpers Hole Rd NB South of Yorkshire Dr
Description:Jumpers Hole Rd south of Yorkshire Dr
City:Severna Park
County:Anne Arundel

Start Time	Average Mean Speed	Speed Limit
00:00	40.72	35
01:00	38.92	35
02:00	41.15	35
03:00	38.75	35
04:00	41.83	35
05:00	40.07	35
06:00	40.85	35
07:00	39.91	35
08:00	39.97	35
09:00	40.39	35
10:00	40.84	35
11:00	40.44	35
12:00	40.50	35
13:00	40.82	35
14:00	39.73	35
15:00	40.19	35
16:00	40.24	35
17:00	40.22	35
18:00	39.76	35
19:00	39.64	35
20:00	37.85	35
21:00	39.39	35
22:00	38.81	35
23:00	40.58	35



Station Name:Jumpers Hole Rd SB South of Yorkshire Dr
Description:Jumpers Hole Rd south of Yorkshire Dr
City:Severna Park
County:Anne Arundel

Start Time	Average Mean Speed	Speed Limit
00:00	38.17	35
01:00	39.79	35
02:00	37.08	35
03:00	40.66	35
04:00	40.57	35
05:00	41.26	35
06:00	39.75	35
07:00	37.51	35
08:00	38.86	35
09:00	39.51	35
10:00	39.36	35
11:00	39.66	35
12:00	39.50	35
13:00	39.47	35
14:00	38.95	35
15:00	39.28	35
16:00	39.44	35
17:00	39.37	35
18:00	39.56	35
19:00	39.37	35
20:00	38.80	35
21:00	39.51	35
22:00	40.41	35
23:00	40.59	35



Lanes, Volumes, Timings
1: Jumpers Hole Road & Benfield Road

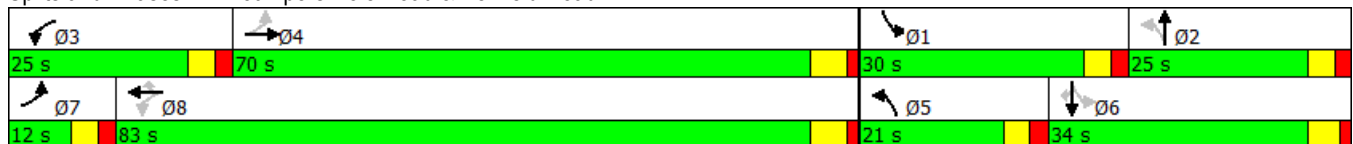
Existing 2017 Conditions
AM PEAK

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	135	665	10	0	755	140	80	50	15	175	15	310
Future Volume (vph)	135	665	10	0	755	140	80	50	15	175	15	310
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	340		0	200		250	85		0	0		250
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (ft)	75			75			75			75		
Satd. Flow (prot)	1719	1801	0	1810	1810	1538	1719	1736	0	1719	1810	1538
Flt Permitted	0.070						0.743			0.505		
Satd. Flow (perm)	127	1801	0	1810	1810	1538	1284	1736	0	906	1810	1437
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				124		8				267
Link Speed (mph)		40			40			35				35
Link Distance (ft)		1671			1311			861				962
Travel Time (s)		28.5			22.3			16.8				18.7
Lane Group Flow (vph)	153	733	0	0	848	179	110	92	0	219	22	419
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		6
Total Split (s)	12.0	70.0		25.0	83.0	83.0	21.0	25.0		30.0	34.0	34.0
Total Lost Time (s)	5.0	5.5		5.0	5.5	5.5	5.0	5.0		5.0	5.0	5.0
Act Effect Green (s)	76.6	76.1			63.5	63.5	27.5	16.4		39.3	23.3	23.3
Actuated g/C Ratio	0.60	0.60			0.50	0.50	0.22	0.13		0.31	0.18	0.18
v/c Ratio	0.91	0.68			0.93	0.22	0.35	0.40		0.55	0.07	0.87
Control Delay	73.7	21.8			48.3	6.9	38.2	56.3		41.8	48.2	38.6
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	73.7	21.8			48.3	6.9	38.2	56.3		41.8	48.2	38.6
LOS	E	C			D	A	D	E		D	D	D
Approach Delay		30.7			41.1			46.4			40.0	
Approach LOS		C			D			D			D	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 126.8
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.93
 Intersection Signal Delay: 37.9 Intersection LOS: D
 Intersection Capacity Utilization 77.6% ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 1: Jumpers Hole Road & Benfield Road



Lanes, Volumes, Timings
 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Existing 2017 Conditions
 AM PEAK

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	5	115	80	10	30	120	175	30	30	305	75
Future Volume (vph)	50	5	115	80	10	30	120	175	30	30	305	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		0	250		0	145		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	75			75			75			75		
Satd. Flow (prot)	0	1675	0	0	1788	1583	1770	1766	0	1770	1743	0
Flt Permitted		0.130			0.960		0.194			0.599		
Satd. Flow (perm)	0	221	0	0	1788	1505	361	1766	0	1114	1743	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		50				80		7			15	
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		653			733			1130			1177	
Travel Time (s)		17.8			20.0			22.0			22.9	
Lane Group Flow (vph)	0	381	0	0	129	46	279	260	0	60	490	0
Turn Type	Perm	NA		Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		3		4	4		5	2		1	6	
Permitted Phases	3					4	2			6		
Total Split (s)	24.5	24.5		50.5	50.5	50.5	23.5	50.5		24.5	51.5	
Total Lost Time (s)		4.5			4.5	4.5	4.5	5.0		4.5	5.0	
Act Effct Green (s)		20.2			14.5	14.5	62.6	51.3		48.3	38.6	
Actuated g/C Ratio		0.18			0.13	0.13	0.56	0.46		0.44	0.35	
v/c Ratio		4.70			0.55	0.17	0.63	0.32		0.11	0.80	
Control Delay		1715.8			56.0	3.9	20.4	21.0		12.6	42.5	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		1715.8			56.0	3.9	20.4	21.0		12.6	42.5	
LOS		F			E	A	C	C		B	D	
Approach Delay		1715.8			42.3			20.7			39.2	
Approach LOS		F			D			C			D	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 111
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 4.70
 Intersection Signal Delay: 421.8
 Intersection Capacity Utilization 55.7%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service B

Splits and Phases: 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Ø1 24.5 s	Ø2 50.5 s	Ø3 24.5 s	Ø4 50.5 s
Ø5 23.5 s	Ø6 51.5 s		

Intersection

Int Delay, s/veh 1.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		P			4
Traffic Vol, veh/h	25	40	245	10	10	385
Future Vol, veh/h	25	40	245	10	10	385
Conflicting Peds, #/hr	0	5	0	1	1	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	72	93	79	55	36	78
Heavy Vehicles, %	2	2	5	2	2	5
Mvmt Flow	35	43	310	18	28	494

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	869	325	0	0	329	0
Stage 1	320	-	-	-	-	-
Stage 2	549	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	322	716	-	-	1231	-
Stage 1	736	-	-	-	-	-
Stage 2	579	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	312	712	-	-	1225	-
Mov Cap-2 Maneuver	312	-	-	-	-	-
Stage 1	735	-	-	-	-	-
Stage 2	561	-	-	-	-	-

Approach	WB		NB		SB
HCM Control Delay, s	14.6		0		0.4
HCM LOS	B				

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	453	1225
HCM Lane V/C Ratio	-	-	0.172	0.023
HCM Control Delay (s)	-	-	14.6	8
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.6	0.1

Intersection

Int Delay, s/veh 2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↑			↕	
Traffic Vol, veh/h	15	0	30	10	0	15	20	265	0	0	355	30
Future Vol, veh/h	15	0	30	10	0	15	20	265	0	0	355	30
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	50	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	50	92	39	53	92	68	55	78	92	92	91	38
Heavy Vehicles, %	2	2	2	2	2	2	2	5	2	2	5	2
Mvmt Flow	30	0	77	19	0	22	36	340	0	0	390	79

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	854	842	430	880	881	340	469	0	-	-	-	0
Stage 1	430	430	-	412	412	-	-	-	-	-	-	-
Stage 2	424	412	-	468	469	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	-	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	-	-	-
Pot Cap-1 Maneuver	279	301	625	268	285	702	1093	-	0	0	-	-
Stage 1	603	583	-	617	594	-	-	-	0	0	-	-
Stage 2	608	594	-	575	561	-	-	-	0	0	-	-
Platoon blocked, %								-				
Mov Cap-1 Maneuver	263	291	625	229	276	702	1093	-	-	-	-	-
Mov Cap-2 Maneuver	383	397	-	341	376	-	-	-	-	-	-	-
Stage 1	583	583	-	597	574	-	-	-	-	-	-	-
Stage 2	569	574	-	504	561	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.5	13.4	0.8	0
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	1093	-	531	472	-	-
HCM Lane V/C Ratio	0.033	-	0.201	0.087	-	-
HCM Control Delay (s)	8.4	-	13.5	13.4	-	-
HCM Lane LOS	A	-	B	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.7	0.3	-	-

Intersection

Int Delay, s/veh 0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘		↘		↘	↗
Traffic Vol, veh/h	15	10	280	15	5	370
Future Vol, veh/h	15	10	280	15	5	370
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	65	42	83	58	44	97
Heavy Vehicles, %	2	2	5	2	2	5
Mvmt Flow	23	24	337	26	11	381

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	754	350	0	0	363	0
Stage 1	350	-	-	-	-	-
Stage 2	404	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	377	693	-	-	1196	-
Stage 1	713	-	-	-	-	-
Stage 2	674	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	374	693	-	-	1196	-
Mov Cap-2 Maneuver	485	-	-	-	-	-
Stage 1	713	-	-	-	-	-
Stage 2	668	-	-	-	-	-

Approach	WB		NB		SB
HCM Control Delay, s	11.9		0		0.2
HCM LOS	B				

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	- 572	1196	-
HCM Lane V/C Ratio	-	- 0.082	0.01	-
HCM Control Delay (s)	-	- 11.9	8	-
HCM Lane LOS	-	- B	A	-
HCM 95th %tile Q(veh)	-	- 0.3	0	-

Lanes, Volumes, Timings
6: Jumpers Hole Road & Kinder Road/Earleigh Heights Conn

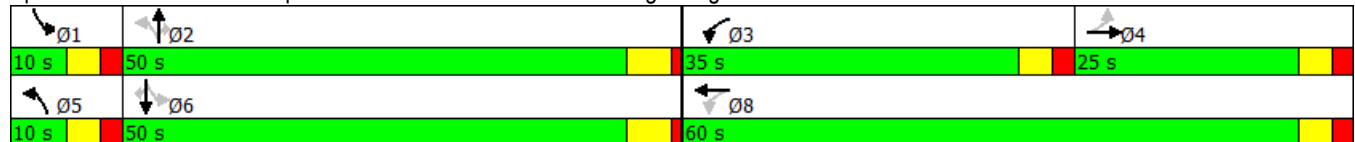
Existing 2017 Conditions
AM PEAK

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	45	40	205	55	70	20	170	100	65	130	25
Future Volume (vph)	25	45	40	205	55	70	20	170	100	65	130	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	225		0	85		85	85		85
Storage Lanes	0		0	1		0	1		1	1		1
Taper Length (ft)	75			75			75			75		
Satd. Flow (prot)	0	1687	0	1719	1643	0	1719	1810	1538	1719	1810	1538
Flt Permitted		0.919		0.428			0.667			0.529		
Satd. Flow (perm)	0	1561	0	774	1643	0	1207	1810	1501	955	1810	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23			65				131			109
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		1280			789			625			942	
Travel Time (s)		29.1			17.9			12.2			18.4	
Lane Group Flow (vph)	0	155	0	259	168	0	21	213	132	78	141	33
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Total Split (s)	25.0	25.0		35.0	60.0		10.0	50.0	50.0	10.0	50.0	50.0
Total Lost Time (s)		5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Act Effct Green (s)		11.5		32.3	32.3		24.9	21.2	21.2	27.0	25.2	25.2
Actuated g/C Ratio		0.16		0.45	0.45		0.35	0.30	0.30	0.38	0.35	0.35
v/c Ratio		0.57		0.46	0.22		0.05	0.40	0.25	0.19	0.22	0.05
Control Delay		33.7		15.9	8.4		15.3	25.4	6.3	16.3	21.0	0.2
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		33.7		15.9	8.4		15.3	25.4	6.3	16.3	21.0	0.2
LOS		C		B	A		B	C	A	B	C	A
Approach Delay		33.7			13.0			17.9			16.8	
Approach LOS		C			B			B			B	

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 71.3
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.57
 Intersection Signal Delay: 18.0 Intersection LOS: B
 Intersection Capacity Utilization 54.5% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 6: Jumpers Hole Road & Kinder Road/Earleigh Heights Conn



Lanes, Volumes, Timings
1: Jumpers Hole Road & Benfield Road

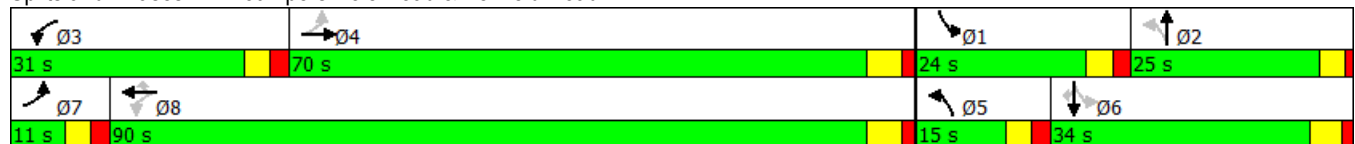
Existing 2017 Conditions
PM PEAK

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	295	850	25	20	605	185	60	55	15	305	120	185
Future Volume (vph)	295	850	25	20	605	185	60	55	15	305	120	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	340		0	200		250	85		0	0		250
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (ft)	75			75			75			75		
Satd. Flow (prot)	1719	1799	0	1719	1810	1538	1719	1753	0	1719	1810	1538
Flt Permitted	0.209			0.066			0.667			0.437		
Satd. Flow (perm)	378	1799	0	119	1810	1515	1196	1753	0	791	1810	1491
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				198		7				234
Link Speed (mph)		40			40			35			35	
Link Distance (ft)		1671			1311			861			962	
Travel Time (s)		28.5			22.3			16.8			18.7	
Lane Group Flow (vph)	321	1001	0	21	658	215	72	93	0	335	141	234
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		6
Total Split (s)	11.0	70.0		31.0	90.0	90.0	15.0	25.0		24.0	34.0	34.0
Total Lost Time (s)	5.0	5.5		5.0	5.5	5.5	5.0	4.0		5.0	5.0	5.0
Act Effct Green (s)	67.5	64.8		63.3	57.7	57.7	19.9	13.1		36.2	25.5	25.5
Actuated g/C Ratio	0.58	0.56		0.55	0.50	0.50	0.17	0.11		0.31	0.22	0.22
v/c Ratio	1.10	0.99		0.15	0.73	0.25	0.30	0.46		0.84	0.35	0.46
Control Delay	104.7	52.9		12.6	28.7	3.6	33.8	52.5		54.3	43.6	8.5
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	104.7	52.9		12.6	28.7	3.6	33.8	52.5		54.3	43.6	8.5
LOS	F	D		B	C	A	C	D		D	D	A
Approach Delay		65.5			22.3			44.3			37.1	
Approach LOS		E			C			D			D	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 115.5
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.10
 Intersection Signal Delay: 45.3
 Intersection LOS: D
 Intersection Capacity Utilization 86.1%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 1: Jumpers Hole Road & Benfield Road



Lanes, Volumes, Timings
 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Existing 2017 Conditions
 PM PEAK

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	0	55	55	5	30	75	390	70	45	500	85
Future Volume (vph)	35	0	55	55	5	30	75	390	70	45	500	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		0	250		0	145		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	75			75			75			75		
Satd. Flow (prot)	0	1687	0	0	1792	1583	1770	1770	0	1770	1735	0
Flt Permitted		0.144			0.962		0.077			0.312		
Satd. Flow (perm)	0	248	0	0	1792	1544	143	1770	0	581	1735	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		80				80		7			13	
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		653			733			1130			1177	
Travel Time (s)		17.8			20.0			22.0			22.9	
Lane Group Flow (vph)	0	196	0	0	93	41	174	545	0	62	769	0
Turn Type	Perm	NA		Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		3		4	4		5	2		1	6	
Permitted Phases	3					4	2			6		
Total Split (s)	24.5	24.5		50.5	50.5	50.5	23.5	50.5		24.5	51.5	
Total Lost Time (s)		4.5			4.5	4.5	4.5	5.0		4.5	5.0	
Act Effect Green (s)		20.1			12.1	12.1	63.0	52.5		56.3	46.7	
Actuated g/C Ratio		0.18			0.11	0.11	0.57	0.48		0.51	0.43	
v/c Ratio		1.78			0.47	0.17	0.66	0.64		0.16	1.03	
Control Delay		404.5			54.6	2.8	33.1	27.1		11.8	74.0	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		404.5			54.6	2.8	33.1	27.1		11.8	74.0	
LOS		F			D	A	C	C		B	E	
Approach Delay		404.5			38.8			28.6			69.3	
Approach LOS		F			D			C			E	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 109.8
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.78
 Intersection Signal Delay: 86.5
 Intersection Capacity Utilization 59.3%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service B

Splits and Phases: 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Ø1 24.5 s	Ø2 50.5 s	Ø3 24.5 s	Ø4 50.5 s
Ø5 23.5 s	Ø6 51.5 s		

Intersection

Int Delay, s/veh 1.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		P			4
Traffic Vol, veh/h	15	25	425	30	55	615
Future Vol, veh/h	15	25	425	30	55	615
Conflicting Peds, #/hr	1	3	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	70	92	95	75	67	93
Heavy Vehicles, %	2	2	5	2	2	5
Mvmt Flow	21	27	447	40	82	661

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1293	470	0	0	487	0
Stage 1	467	-	-	-	-	-
Stage 2	826	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	180	594	-	-	1076	-
Stage 1	631	-	-	-	-	-
Stage 2	430	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	158	592	-	-	1073	-
Mov Cap-2 Maneuver	158	-	-	-	-	-
Stage 1	631	-	-	-	-	-
Stage 2	378	-	-	-	-	-

Approach	WB		NB		SB
HCM Control Delay, s	21.4		0		1
HCM LOS	C				

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	- 268	1073	-
HCM Lane V/C Ratio	-	- 0.181	0.077	-
HCM Control Delay (s)	-	- 21.4	8.6	0
HCM Lane LOS	-	- C	A	A
HCM 95th %tile Q(veh)	-	- 0.6	0.2	-

Intersection												
Int Delay, s/veh	1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↑	↑			↔	
Traffic Vol, veh/h	10	0	15	10	0	15	5	445	0	0	645	20
Future Vol, veh/h	10	0	15	10	0	15	5	445	0	0	645	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	50	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	55	92	75	56	92	65	50	89	92	92	89	69
Heavy Vehicles, %	2	2	2	2	2	2	2	5	2	2	5	2
Mvmt Flow	18	0	20	18	0	23	10	500	0	0	725	29

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1271	1259	739	1269	1274	500	754	0	-	-	-	0
Stage 1	739	739	-	520	520	-	-	-	-	-	-	-
Stage 2	532	520	-	749	754	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	-	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	-	-	-
Pot Cap-1 Maneuver	145	171	417	145	167	571	856	-	0	0	-	-
Stage 1	409	424	-	539	532	-	-	-	0	0	-	-
Stage 2	531	532	-	404	417	-	-	-	0	0	-	-
Platoon blocked, %								-			-	
Mov Cap-1 Maneuver	138	169	417	137	165	571	856	-	-	-	-	-
Mov Cap-2 Maneuver	267	290	-	261	283	-	-	-	-	-	-	-
Stage 1	404	424	-	533	526	-	-	-	-	-	-	-
Stage 2	504	526	-	385	417	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	17.4	15.7	0.2	0
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	856	-	329	376	-	-
HCM Lane V/C Ratio	0.012	-	0.116	0.109	-	-
HCM Control Delay (s)	9.3	-	17.4	15.7	-	-
HCM Lane LOS	A	-	C	C	-	-
HCM 95th %tile Q(veh)	0	-	0.4	0.4	-	-

Intersection

Int Delay, s/veh 0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↕		↔		↕	↕
Traffic Vol, veh/h	10	10	440	30	45	655
Future Vol, veh/h	10	10	440	30	45	655
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	40	67	87	75	73	91
Heavy Vehicles, %	2	2	5	2	2	5
Mvmt Flow	25	15	506	40	62	720

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1369	526	0	0	546	0
Stage 1	526	-	-	-	-	-
Stage 2	843	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	162	552	-	-	1023	-
Stage 1	593	-	-	-	-	-
Stage 2	422	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	152	552	-	-	1023	-
Mov Cap-2 Maneuver	282	-	-	-	-	-
Stage 1	593	-	-	-	-	-
Stage 2	396	-	-	-	-	-

Approach	WB		NB		SB
HCM Control Delay, s	16.8		0		0.7
HCM LOS	C				

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	- 345	1023	-
HCM Lane V/C Ratio	-	- 0.116	0.06	-
HCM Control Delay (s)	-	- 16.8	8.7	-
HCM Lane LOS	-	- C	A	-
HCM 95th %tile Q(veh)	-	- 0.4	0.2	-

Lanes, Volumes, Timings
6: Jumpers Hole Road & Kinder Road/Earleigh Heights Conn

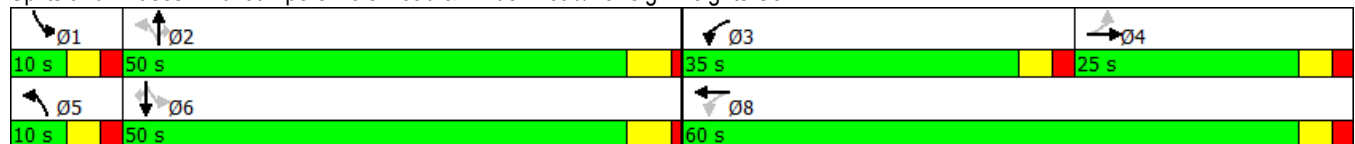
Existing 2017 Conditions
PM PEAK

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	120	80	170	65	75	45	240	165	270	450	45
Future Volume (vph)	55	120	80	170	65	75	45	240	165	270	450	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	225		0	85		85	85		85
Storage Lanes	0		0	1		0	1		1	1		1
Taper Length (ft)	75			75			75			75		
Satd. Flow (prot)	0	1693	0	1719	1656	0	1719	1810	1538	1719	1810	1538
Flt Permitted		0.894		0.339			0.243			0.501		
Satd. Flow (perm)	0	1529	0	613	1656	0	439	1810	1503	905	1810	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		19			56				159			109
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		1280			789			625			942	
Travel Time (s)		29.1			17.9			12.2			18.4	
Lane Group Flow (vph)	0	288	0	187	161	0	49	250	188	297	500	56
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Total Split (s)	25.0	25.0		35.0	60.0		10.0	50.0	50.0	10.0	50.0	50.0
Total Lost Time (s)		5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Act Effct Green (s)		20.4		40.8	40.8		37.7	32.7	32.7	39.0	35.2	35.2
Actuated g/C Ratio		0.22		0.43	0.43		0.40	0.35	0.35	0.42	0.38	0.38
v/c Ratio		0.83		0.42	0.21		0.20	0.40	0.30	0.71	0.74	0.09
Control Delay		57.1		21.8	13.0		16.4	24.9	6.5	31.0	33.7	0.4
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		57.1		21.8	13.0		16.4	24.9	6.5	31.0	33.7	0.4
LOS		E		C	B		B	C	A	C	C	A
Approach Delay		57.1			17.7			16.9			30.6	
Approach LOS		E			B			B			C	

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 93.8
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.83
 Intersection Signal Delay: 28.8 Intersection LOS: C
 Intersection Capacity Utilization 72.0% ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 6: Jumpers Hole Road & Kinder Road/Earleigh Heights Conn



Lanes, Volumes, Timings
1: Jumpers Hole Road & Benfield Road

Future 2040 Conditions
AM PEAK

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	185	975	15	5	1105	185	120	70	20	235	20	430
Future Volume (vph)	185	975	15	5	1105	185	120	70	20	235	20	430
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	340		0	200		250	85		0	0		250
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (ft)	75			75			75			75		
Satd. Flow (prot)	1719	1801	0	1719	1810	1538	1719	1736	0	1719	1810	1538
Flt Permitted	0.047			0.050			0.738			0.402		
Satd. Flow (perm)	85	1801	0	90	1810	1538	1276	1736	0	722	1810	1437
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				124		8				178
Link Speed (mph)		40			40			35			35	
Link Distance (ft)		1671			1311			861			962	
Travel Time (s)		28.5			22.3			16.8			18.7	
Lane Group Flow (vph)	210	1075	0	10	1242	237	164	129	0	294	29	581
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		6
Total Split (s)	12.0	70.0		25.0	83.0	83.0	21.0	25.0		30.0	34.0	34.0
Total Lost Time (s)	5.0	5.5		5.0	5.5	5.5	5.0	5.0		5.0	5.0	5.0
Act Effct Green (s)	88.7	85.5		82.9	77.5	77.5	34.1	20.1		48.1	29.0	29.0
Actuated g/C Ratio	0.60	0.58		0.56	0.52	0.52	0.23	0.14		0.32	0.20	0.20
v/c Ratio	1.64	1.03		0.10	1.31	0.27	0.49	0.53		0.76	0.08	1.37
Control Delay	349.3	68.4		14.2	179.0	10.0	43.5	65.3		54.4	50.3	211.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	349.3	68.4		14.2	179.0	10.0	43.5	65.3		54.4	50.3	211.0
LOS	F	E		B	F	B	D	E		D	D	F
Approach Delay		114.3			151.0			53.1			154.9	
Approach LOS		F			F			D			F	

Intersection Summary

Area Type: Other

Cycle Length: 150

Actuated Cycle Length: 148.1

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.64

Intersection Signal Delay: 132.8

Intersection LOS: F

Intersection Capacity Utilization 105.7%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 1: Jumpers Hole Road & Benfield Road



Lanes, Volumes, Timings
2: Jumpers Hole Road & Severna Park MS/Retford Drive

Future 2040 Conditions
AM PEAK

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	5	115	120	10	45	120	280	40	40	450	75
Future Volume (vph)	50	5	115	120	10	45	120	280	40	40	450	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		0	250		0	145		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	75			75			75			75		
Satd. Flow (prot)	0	1675	0	0	1785	1583	1770	1771	0	1770	1759	0
Flt Permitted		0.131			0.958		0.078			0.462		
Satd. Flow (perm)	0	223	0	0	1785	1505	145	1771	0	861	1759	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		50				80		6			10	
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		653			733			1130			1177	
Travel Time (s)		17.8			20.0			22.0			22.9	
Lane Group Flow (vph)	0	381	0	0	182	69	279	405	0	80	653	0
Turn Type	Perm	NA		Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		3		4	4		5	2		1	6	
Permitted Phases	3					4	2			6		
Total Split (s)	24.5	24.5		50.5	50.5	50.5	23.5	50.5		24.5	51.5	
Total Lost Time (s)		4.5			4.5	4.5	4.5	5.0		4.5	5.0	
Act Effct Green (s)		20.0			18.8	18.8	70.6	55.6		57.1	46.6	
Actuated g/C Ratio		0.16			0.15	0.15	0.57	0.45		0.46	0.38	
v/c Ratio		4.88			0.67	0.23	0.84	0.50		0.17	0.97	
Control Delay		1798.5			61.4	9.0	53.7	27.4		14.3	66.3	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		1798.5			61.4	9.0	53.7	27.4		14.3	66.3	
LOS		F			E	A	D	C		B	E	
Approach Delay		1798.5			47.0			38.1			60.6	
Approach LOS		F			D			D			E	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 122.9
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 4.88
 Intersection Signal Delay: 374.6 Intersection LOS: F
 Intersection Capacity Utilization 64.1% ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 2: Jumpers Hole Road & Severna Park MS/Retford Drive

24.5 s	50.5 s	24.5 s	50.5 s
23.5 s	51.5 s		

Intersection						
Int Delay, s/veh	2.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		P			A
Traffic Vol, veh/h	35	60	360	15	20	560
Future Vol, veh/h	35	60	360	15	20	560
Conflicting Peds, #/hr	0	5	0	1	1	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	72	93	79	55	36	78
Heavy Vehicles, %	2	2	5	2	2	5
Mvmt Flow	49	65	456	27	56	718
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	1299	475	0	0	484	0
Stage 1	470	-	-	-	-	-
Stage 2	829	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	178	590	-	-	1079	-
Stage 1	629	-	-	-	-	-
Stage 2	429	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	162	587	-	-	1074	-
Mov Cap-2 Maneuver	162	-	-	-	-	-
Stage 1	628	-	-	-	-	-
Stage 2	392	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	26.8	0		0.6		
HCM LOS	D					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	276	1074	-	
HCM Lane V/C Ratio	-	-	0.41	0.052	-	
HCM Control Delay (s)	-	-	26.8	8.5	0	
HCM Lane LOS	-	-	D	A	A	
HCM 95th %tile Q(veh)	-	-	1.9	0.2	-	

Intersection

Int Delay, s/veh 3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↑			↕	
Traffic Vol, veh/h	25	0	40	15	0	25	30	390	0	0	525	40
Future Vol, veh/h	25	0	40	15	0	25	30	390	0	0	525	40
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	50	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	50	92	39	53	92	68	55	78	92	92	91	38
Heavy Vehicles, %	2	2	2	2	2	2	2	5	2	2	5	2
Mvmt Flow	50	0	103	28	0	37	55	500	0	0	577	105

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1257	1239	630	1290	1291	500	682	0	-	-	-	0
Stage 1	630	630	-	609	609	-	-	-	-	-	-	-
Stage 2	627	609	-	681	682	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	-	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	-	-	-
Pot Cap-1 Maneuver	148	175	482	140	163	571	911	-	0	0	-	-
Stage 1	470	475	-	482	485	-	-	-	0	0	-	-
Stage 2	471	485	-	440	450	-	-	-	0	0	-	-
Platoon blocked, %								-				
Mov Cap-1 Maneuver	132	164	482	105	153	571	911	-	-	-	-	-
Mov Cap-2 Maneuver	255	287	-	206	262	-	-	-	-	-	-	-
Stage 1	442	475	-	453	456	-	-	-	-	-	-	-
Stage 2	414	456	-	346	450	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	21.2	19	0.9	0
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	911	-	373	322	-	-
HCM Lane V/C Ratio	0.06	-	0.409	0.202	-	-
HCM Control Delay (s)	9.2	-	21.2	19	-	-
HCM Lane LOS	A	-	C	C	-	-
HCM 95th %tile Q(veh)	0.2	-	1.9	0.7	-	-

Intersection						
Int Delay, s/veh	1.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		P		T	T
Traffic Vol, veh/h	25	15	420	20	10	540
Future Vol, veh/h	25	15	420	20	10	540
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	65	42	83	58	44	97
Heavy Vehicles, %	2	2	5	2	2	5
Mvmt Flow	38	36	506	34	23	557

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1125	523	0	0	541	0
Stage 1	523	-	-	-	-	-
Stage 2	602	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	227	554	-	-	1028	-
Stage 1	595	-	-	-	-	-
Stage 2	547	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	222	554	-	-	1028	-
Mov Cap-2 Maneuver	358	-	-	-	-	-
Stage 1	595	-	-	-	-	-
Stage 2	535	-	-	-	-	-

Approach	WB		NB		SB
HCM Control Delay, s	15.1		0		0.3
HCM LOS	C				

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	432	1028
HCM Lane V/C Ratio	-	-	0.172	0.022
HCM Control Delay (s)	-	-	15.1	8.6
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0.6	0.1

Lanes, Volumes, Timings
6: Jumpers Hole Road & Kinder Road/Earleigh Heights Conn

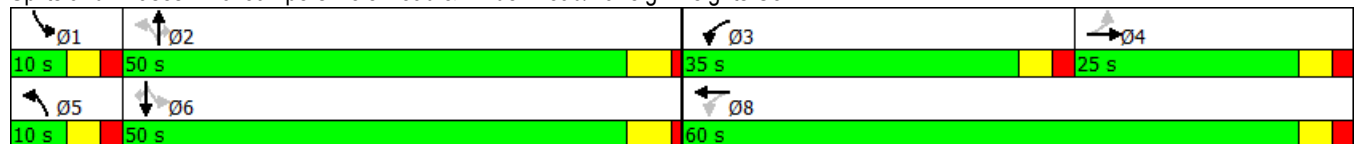
Future 2040 Conditions
AM PEAK

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	65	60	300	85	100	25	260	150	95	190	40
Future Volume (vph)	35	65	60	300	85	100	25	260	150	95	190	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	225		0	85		85	85		85
Storage Lanes	0		0	1		0	1		1	1		1
Taper Length (ft)	75			75			75			75		
Satd. Flow (prot)	0	1683	0	1719	1649	0	1719	1810	1538	1719	1810	1538
Flt Permitted		0.908		0.335			0.628			0.350		
Satd. Flow (perm)	0	1539	0	606	1649	0	1136	1810	1501	632	1810	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		24			60				128			109
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		1280			789			625			942	
Travel Time (s)		29.1			17.9			12.2			18.4	
Lane Group Flow (vph)	0	227	0	380	250	0	26	325	197	114	207	53
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Total Split (s)	25.0	25.0		35.0	60.0		10.0	50.0	50.0	10.0	50.0	50.0
Total Lost Time (s)		5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Act Effct Green (s)		16.9		43.8	43.8		31.0	26.1	26.1	34.6	32.9	32.9
Actuated g/C Ratio		0.19		0.48	0.48		0.34	0.29	0.29	0.38	0.36	0.36
v/c Ratio		0.74		0.68	0.30		0.06	0.62	0.38	0.38	0.31	0.08
Control Delay		48.6		22.7	12.0		19.0	34.9	12.7	23.8	25.3	0.3
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		48.6		22.7	12.0		19.0	34.9	12.7	23.8	25.3	0.3
LOS		D		C	B		B	C	B	C	C	A
Approach Delay		48.6			18.4			26.1			21.3	
Approach LOS		D			B			C			C	

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 90.4
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.74
 Intersection Signal Delay: 25.3 Intersection LOS: C
 Intersection Capacity Utilization 64.3% ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 6: Jumpers Hole Road & Kinder Road/Earleigh Heights Conn



Lanes, Volumes, Timings
1: Jumpers Hole Road & Benfield Road

Future 2040 Conditions
PM PEAK

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	425	1245	35	30	885	255	85	85	25	440	170	260
Future Volume (vph)	425	1245	35	30	885	255	85	85	25	440	170	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	340		0	200		250	85		0	0		250
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (ft)	75			75			75			75		
Satd. Flow (prot)	1719	1799	0	1719	1810	1538	1719	1752	0	1719	1810	1538
Flt Permitted	0.051			0.051			0.632			0.293		
Satd. Flow (perm)	92	1799	0	92	1810	1515	1135	1752	0	530	1810	1491
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				187		8				211
Link Speed (mph)		40			40			35			35	
Link Distance (ft)		1671			1311			861			962	
Travel Time (s)		28.5			22.3			16.8			18.7	
Lane Group Flow (vph)	462	1464	0	32	962	297	102	146	0	484	200	329
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		6
Total Split (s)	11.0	70.0		31.0	90.0	90.0	15.0	25.0		24.0	34.0	34.0
Total Lost Time (s)	5.0	5.5		5.0	5.5	5.5	5.0	4.0		5.0	5.0	5.0
Act Effct Green (s)	85.7	81.9		82.9	76.9	76.9	25.4	17.4		40.6	26.5	26.5
Actuated g/C Ratio	0.62	0.59		0.60	0.55	0.55	0.18	0.12		0.29	0.19	0.19
v/c Ratio	3.64	1.39		0.27	0.96	0.32	0.42	0.65		1.52	0.58	0.72
Control Delay	1220.3	205.9		15.5	50.9	6.9	45.8	70.3		282.3	60.8	29.9
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	1220.3	205.9		15.5	50.9	6.9	45.8	70.3		282.3	60.8	29.9
LOS	F	F		B	D	A	D	E		F	E	C
Approach Delay		449.2			39.9			60.2			156.6	
Approach LOS		F			D			E			F	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 139.3
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 3.64
 Intersection Signal Delay: 243.5 Intersection LOS: F
 Intersection Capacity Utilization 117.6% ICU Level of Service H
 Analysis Period (min) 15

Splits and Phases: 1: Jumpers Hole Road & Benfield Road



Lanes, Volumes, Timings
2: Jumpers Hole Road & Severna Park MS/Retford Drive

Future 2040 Conditions
PM PEAK

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	0	55	80	5	40	75	585	105	65	735	85
Future Volume (vph)	35	0	55	80	5	40	75	585	105	65	735	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		0	250		0	145		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	75			75			75			75		
Satd. Flow (prot)	0	1687	0	0	1788	1583	1770	1770	0	1770	1755	0
Flt Permitted		0.144			0.960		0.082			0.086		
Satd. Flow (perm)	0	248	0	0	1788	1544	153	1770	0	160	1755	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		80				80		7			9	
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		653			733			1130			1177	
Travel Time (s)		17.8			20.0			22.0			22.9	
Lane Group Flow (vph)	0	196	0	0	127	55	174	818	0	89	1030	0
Turn Type	Perm	NA		Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		3		4	4		5	2		1	6	
Permitted Phases	3					4	2			6		
Total Split (s)	24.5	24.5		50.5	50.5	50.5	23.5	50.5		24.5	51.5	
Total Lost Time (s)		4.5			4.5	4.5	4.5	5.0		4.5	5.0	
Act Effct Green (s)		20.1			14.3	14.3	61.5	48.8		57.4	46.7	
Actuated g/C Ratio		0.18			0.13	0.13	0.55	0.44		0.51	0.42	
v/c Ratio		1.78			0.56	0.21	0.66	1.06		0.39	1.40	
Control Delay		407.4			56.2	6.0	33.5	79.6		19.6	216.4	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		407.4			56.2	6.0	33.5	79.6		19.6	216.4	
LOS		F			E	A	C	E		B	F	
Approach Delay		407.4			41.0			71.5			200.7	
Approach LOS		F			D			E			F	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 112
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.78
 Intersection Signal Delay: 153.8
 Intersection LOS: F
 Intersection Capacity Utilization 71.7%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 2: Jumpers Hole Road & Severna Park MS/Retford Drive

24.5 s	50.5 s	24.5 s	50.5 s
23.5 s	51.5 s		

Intersection						
Int Delay, s/veh	3.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		T			T
Traffic Vol, veh/h	20	35	620	40	80	895
Future Vol, veh/h	20	35	620	40	80	895
Conflicting Peds, #/hr	1	3	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	70	92	95	75	67	93
Heavy Vehicles, %	2	2	5	2	2	5
Mvmt Flow	29	38	653	53	119	962
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1881	682	0	0	706	0
Stage 1	679	-	-	-	-	-
Stage 2	1202	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	78	450	-	-	892	-
Stage 1	504	-	-	-	-	-
Stage 2	285	-	-	-	-	-
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	55	449	-	-	889	-
Mov Cap-2 Maneuver	55	-	-	-	-	-
Stage 1	504	-	-	-	-	-
Stage 2	203	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	78.6		0		1.1	
HCM LOS	F					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	- 110	889	-		
HCM Lane V/C Ratio	-	- 0.606	0.134	-		
HCM Control Delay (s)	-	- 78.6	9.7	0		
HCM Lane LOS	-	- F	A	A		
HCM 95th %tile Q(veh)	-	- 3	0.5	-		

Intersection												
Int Delay, s/veh	1.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↑	↑			↔	
Traffic Vol, veh/h	15	0	20	15	0	20	5	650	0	0	940	30
Future Vol, veh/h	15	0	20	15	0	20	5	650	0	0	940	30
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	50	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	55	92	75	56	92	65	50	89	92	92	89	69
Heavy Vehicles, %	2	2	2	2	2	2	2	5	2	2	5	2
Mvmt Flow	27	0	27	27	0	31	10	730	0	0	1056	43
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1844	1828	1078	1841	1850	730	1100	0	-	-	-	0
Stage 1	1078	1078	-	750	750	-	-	-	-	-	-	-
Stage 2	766	750	-	1091	1100	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	-	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	-	-	-
Pot Cap-1 Maneuver	58	77	266	58	74	422	635	-	0	0	-	-
Stage 1	265	295	-	403	419	-	-	-	0	0	-	-
Stage 2	395	419	-	260	288	-	-	-	0	0	-	-
Platoon blocked, %								-				
Mov Cap-1 Maneuver	53	76	266	52	73	422	635	-	-	-	-	-
Mov Cap-2 Maneuver	162	190	-	152	183	-	-	-	-	-	-	-
Stage 1	261	295	-	397	412	-	-	-	-	-	-	-
Stage 2	360	412	-	234	288	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	29.4			25.7			0.1			0		
HCM LOS	D			D								
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	WBLn1	SBT	SBR						
Capacity (veh/h)	635	-	201	231	-	-						
HCM Lane V/C Ratio	0.016	-	0.268	0.249	-	-						
HCM Control Delay (s)	10.8	-	29.4	25.7	-	-						
HCM Lane LOS	B	-	D	D	-	-						
HCM 95th %tile Q(veh)	0	-	1	1	-	-						

Intersection						
Int Delay, s/veh	1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		P		T	T
Traffic Vol, veh/h	10	10	640	45	70	960
Future Vol, veh/h	10	10	640	45	70	960
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	40	67	87	75	73	91
Heavy Vehicles, %	2	2	5	2	2	5
Mvmt Flow	25	15	736	60	96	1055

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2013	766	0	0	796	0
Stage 1	766	-	-	-	-	-
Stage 2	1247	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	65	403	-	-	826	-
Stage 1	459	-	-	-	-	-
Stage 2	271	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	57	403	-	-	826	-
Mov Cap-2 Maneuver	167	-	-	-	-	-
Stage 1	459	-	-	-	-	-
Stage 2	240	-	-	-	-	-

Approach	WB		NB		SB
HCM Control Delay, s	25.6		0		0.8
HCM LOS	D				

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	- 214	826	-
HCM Lane V/C Ratio	-	- 0.187	0.116	-
HCM Control Delay (s)	-	- 25.6	9.9	-
HCM Lane LOS	-	- D	A	-
HCM 95th %tile Q(veh)	-	- 0.7	0.4	-

Lanes, Volumes, Timings
6: Jumpers Hole Road & Kinder Road/Earleigh Heights Conn

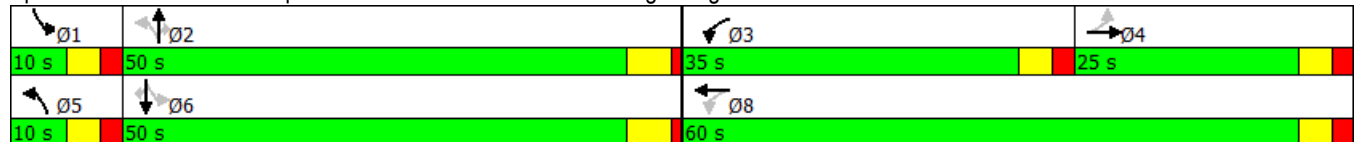
Future 2040 Conditions
PM PEAK

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	175	115	250	95	110	65	340	245	395	665	65
Future Volume (vph)	80	175	115	250	95	110	65	340	245	395	665	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	225		0	85		85	85		85
Storage Lanes	0		0	1		0	1		1	1		1
Taper Length (ft)	75			75			75			75		
Satd. Flow (prot)	0	1694	0	1719	1656	0	1719	1810	1538	1719	1810	1538
Flt Permitted		0.865		0.218			0.090			0.401		
Satd. Flow (perm)	0	1479	0	394	1656	0	163	1810	1503	725	1810	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		19			56				166			109
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		1280			789			625			942	
Travel Time (s)		29.1			17.9			12.2			18.4	
Lane Group Flow (vph)	0	418	0	275	235	0	71	354	278	434	739	81
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Total Split (s)	25.0	25.0		35.0	60.0		10.0	50.0	50.0	10.0	50.0	50.0
Total Lost Time (s)		5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Act Effct Green (s)		20.1		46.0	46.0		48.0	43.0	43.0	49.2	45.3	45.3
Actuated g/C Ratio		0.18		0.42	0.42		0.44	0.39	0.39	0.45	0.42	0.42
v/c Ratio		1.45		0.66	0.32		0.50	0.50	0.40	1.17	0.98	0.12
Control Delay		254.3		30.1	17.3		28.8	28.5	11.7	127.9	62.8	2.5
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		254.3		30.1	17.3		28.8	28.5	11.7	127.9	62.8	2.5
LOS		F		C	B		C	C	B	F	E	A
Approach Delay		254.3			24.2			21.9			81.5	
Approach LOS		F			C			C			F	

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 109.1
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.45
 Intersection Signal Delay: 81.9
 Intersection Capacity Utilization 91.0%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service E

Splits and Phases: 6: Jumpers Hole Road & Kinder Road/Earleigh Heights Conn



Lanes, Volumes, Timings
1: Jumpers Hole Road & Benfield Road

Future 2040 Conditions
AM PEAK

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	185	975	15	5	1105	185	120	70	20	235	20	430
Future Volume (vph)	185	975	15	5	1105	185	120	70	20	235	20	430
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	340		0	200		250	85		0	0		250
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (ft)	75			75			75			75		
Satd. Flow (prot)	1719	1801	0	1719	1810	1538	1719	1736	0	1719	1810	1538
Flt Permitted	0.047			0.050			0.738			0.402		
Satd. Flow (perm)	85	1801	0	90	1810	1538	1276	1736	0	722	1810	1437
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				124		8				178
Link Speed (mph)		40			40			35				35
Link Distance (ft)		1671			1311			861				962
Travel Time (s)		28.5			22.3			16.8				18.7
Lane Group Flow (vph)	210	1075	0	10	1242	237	164	129	0	294	29	581
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		6
Total Split (s)	12.0	70.0		25.0	83.0	83.0	21.0	25.0		30.0	34.0	34.0
Total Lost Time (s)	5.0	5.5		5.0	5.5	5.5	5.0	5.0		5.0	5.0	5.0
Act Effct Green (s)	88.7	85.5		82.9	77.5	77.5	34.1	20.1		48.1	29.0	29.0
Actuated g/C Ratio	0.60	0.58		0.56	0.52	0.52	0.23	0.14		0.32	0.20	0.20
v/c Ratio	1.64	1.03		0.10	1.31	0.27	0.49	0.53		0.76	0.08	1.37
Control Delay	349.3	68.4		14.2	179.0	10.0	43.5	65.3		54.4	50.3	211.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	349.3	68.4		14.2	179.0	10.0	43.5	65.3		54.4	50.3	211.0
LOS	F	E		B	F	B	D	E		D	D	F
Approach Delay		114.3			151.0			53.1			154.9	
Approach LOS		F			F			D			F	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 148.1
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.64
 Intersection Signal Delay: 132.8 Intersection LOS: F
 Intersection Capacity Utilization 105.7% ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 1: Jumpers Hole Road & Benfield Road



Lanes, Volumes, Timings
 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Future 2040 Conditions - Optimization
 AM PEAK

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	5	115	120	10	45	120	280	40	40	450	75
Future Volume (vph)	50	5	115	120	10	45	120	280	40	40	450	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		0	250		0	145		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	75			75			75			75		
Satd. Flow (prot)	0	1675	0	0	1785	1583	1770	1771	0	1770	1759	0
Flt Permitted		0.404			0.958		0.171			0.413		
Satd. Flow (perm)	0	687	0	0	1785	1524	319	1771	0	769	1759	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		78				133		10			18	
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		653			733			1130			1177	
Travel Time (s)		17.8			20.0			22.0			22.9	
Lane Group Flow (vph)	0	381	0	0	182	69	279	405	0	80	653	0
Turn Type	Perm	NA		Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		3		4	4		5	2		1	6	
Permitted Phases	3					4	2			6		
Total Split (s)	11.0	11.0		34.5	34.5	34.5	8.0	35.9		8.6	36.5	
Total Lost Time (s)		4.5			4.5	4.5	4.5	5.0		4.5	5.0	
Act Effct Green (s)		6.5			13.7	13.7	36.1	32.8		36.2	31.6	
Actuated g/C Ratio		0.09			0.19	0.19	0.49	0.44		0.49	0.43	
v/c Ratio		2.91			0.55	0.18	1.25	0.51		0.19	0.86	
Control Delay		892.3			33.6	1.5	162.7	18.9		10.3	33.2	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		892.3			33.6	1.5	162.7	18.9		10.3	33.2	
LOS		F			C	A	F	B		B	C	
Approach Delay		892.3			24.8			77.5			30.7	
Approach LOS		F			C			E			C	

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 73.9
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 2.91
 Intersection Signal Delay: 205.8
 Intersection LOS: F
 Intersection Capacity Utilization 64.1%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Ø1	Ø2	Ø3	Ø4
8.6 s	35.9 s	11 s	34.5 s
Ø5	Ø6		
8 s	36.5 s		

Intersection						
Int Delay, s/veh	2.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		P			A
Traffic Vol, veh/h	35	60	360	15	20	560
Future Vol, veh/h	35	60	360	15	20	560
Conflicting Peds, #/hr	0	5	0	1	1	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	72	93	79	55	36	78
Heavy Vehicles, %	2	2	5	2	2	5
Mvmt Flow	49	65	456	27	56	718
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	1299	475	0	0	484	0
Stage 1	470	-	-	-	-	-
Stage 2	829	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	178	590	-	-	1079	-
Stage 1	629	-	-	-	-	-
Stage 2	429	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	162	587	-	-	1074	-
Mov Cap-2 Maneuver	162	-	-	-	-	-
Stage 1	628	-	-	-	-	-
Stage 2	392	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	26.8	0		0.6		
HCM LOS	D					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	276	1074	-	
HCM Lane V/C Ratio	-	-	0.41	0.052	-	
HCM Control Delay (s)	-	-	26.8	8.5	0	
HCM Lane LOS	-	-	D	A	A	
HCM 95th %tile Q(veh)	-	-	1.9	0.2	-	

Intersection

Int Delay, s/veh 3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↑	↑			↔	
Traffic Vol, veh/h	25	0	40	15	0	25	30	390	0	0	525	40
Future Vol, veh/h	25	0	40	15	0	25	30	390	0	0	525	40
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	50	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	50	92	39	53	92	68	55	78	92	92	91	38
Heavy Vehicles, %	2	2	2	2	2	2	2	5	2	2	5	2
Mvmt Flow	50	0	103	28	0	37	55	500	0	0	577	105

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1257	1239	630	1290	1291	500	682	0	-	-	-	0
Stage 1	630	630	-	609	609	-	-	-	-	-	-	-
Stage 2	627	609	-	681	682	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	-	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	-	-	-
Pot Cap-1 Maneuver	148	175	482	140	163	571	911	-	0	0	-	-
Stage 1	470	475	-	482	485	-	-	-	0	0	-	-
Stage 2	471	485	-	440	450	-	-	-	0	0	-	-
Platoon blocked, %								-				
Mov Cap-1 Maneuver	132	164	482	105	153	571	911	-	-	-	-	-
Mov Cap-2 Maneuver	255	287	-	206	262	-	-	-	-	-	-	-
Stage 1	442	475	-	453	456	-	-	-	-	-	-	-
Stage 2	414	456	-	346	450	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	21.2	19	0.9	0
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	911	-	373	322	-	-
HCM Lane V/C Ratio	0.06	-	0.409	0.202	-	-
HCM Control Delay (s)	9.2	-	21.2	19	-	-
HCM Lane LOS	A	-	C	C	-	-
HCM 95th %tile Q(veh)	0.2	-	1.9	0.7	-	-

Intersection						
Int Delay, s/veh	1.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↕		↔		↕	↕
Traffic Vol, veh/h	25	15	420	20	10	540
Future Vol, veh/h	25	15	420	20	10	540
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	65	42	83	58	44	97
Heavy Vehicles, %	2	2	5	2	2	5
Mvmt Flow	38	36	506	34	23	557

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1125	523	0	0	541	0
Stage 1	523	-	-	-	-	-
Stage 2	602	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	227	554	-	-	1028	-
Stage 1	595	-	-	-	-	-
Stage 2	547	-	-	-	-	-
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	222	554	-	-	1028	-
Mov Cap-2 Maneuver	358	-	-	-	-	-
Stage 1	595	-	-	-	-	-
Stage 2	535	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.1	0	0.3
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	432	1028
HCM Lane V/C Ratio	-	-	0.172	0.022
HCM Control Delay (s)	-	-	15.1	8.6
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0.6	0.1

Lanes, Volumes, Timings

Future 2040 Conditions - Optimization

6: Jumpers Hole Road & Kinder Road/Earleigh Heights Conn

AM PEAK

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	65	60	300	85	100	25	260	150	95	190	40
Future Volume (vph)	35	65	60	300	85	100	25	260	150	95	190	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	225		0	85		85	85		85
Storage Lanes	0		0	1		0	1		1	1		1
Taper Length (ft)	75			75			75			75		
Satd. Flow (prot)	0	1683	0	1719	1649	0	1719	1810	1538	1719	1810	1538
Flt Permitted		0.906		0.332			0.617			0.380		
Satd. Flow (perm)	0	1536	0	600	1649	0	1116	1810	1500	686	1810	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		33			85				152			145
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		1280			789			625			942	
Travel Time (s)		29.1			17.9			12.2			18.4	
Lane Group Flow (vph)	0	227	0	380	250	0	26	325	197	114	207	53
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Total Split (s)	23.0	23.0		26.0	49.0		9.0	32.0	32.0	9.0	32.0	32.0
Total Lost Time (s)		5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Act Effct Green (s)		14.3		37.9	37.9		26.7	23.7	23.7	28.7	27.3	27.3
Actuated g/C Ratio		0.18		0.48	0.48		0.34	0.30	0.30	0.36	0.35	0.35
v/c Ratio		0.74		0.69	0.30		0.06	0.60	0.35	0.38	0.33	0.08
Control Delay		43.4		21.5	9.5		16.9	30.8	9.3	22.2	23.3	0.3
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		43.4		21.5	9.5		16.9	30.8	9.3	22.2	23.3	0.3
LOS		D		C	A		B	C	A	C	C	A
Approach Delay		43.4			16.7			22.4			19.7	
Approach LOS		D			B			C			B	

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 78.7
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.74
 Intersection Signal Delay: 22.5 Intersection LOS: C
 Intersection Capacity Utilization 64.3% ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 6: Jumpers Hole Road & Kinder Road/Earleigh Heights Conn

Ø1	Ø2	Ø3	Ø4
9 s	32 s	26 s	23 s
Ø5	Ø6	Ø8	
9 s	32 s	49 s	

Lanes, Volumes, Timings
1: Jumpers Hole Road & Benfield Road

Future 2040 Conditions
PM PEAK

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	425	1245	35	30	885	255	85	85	25	440	170	260
Future Volume (vph)	425	1245	35	30	885	255	85	85	25	440	170	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	340		0	200		250	85		0	0		250
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (ft)	75			75			75			75		
Satd. Flow (prot)	1719	1799	0	1719	1810	1538	1719	1752	0	1719	1810	1538
Flt Permitted	0.051			0.051			0.632			0.293		
Satd. Flow (perm)	92	1799	0	92	1810	1515	1135	1752	0	530	1810	1491
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				187		8				211
Link Speed (mph)		40			40			35			35	
Link Distance (ft)		1671			1311			861			962	
Travel Time (s)		28.5			22.3			16.8			18.7	
Lane Group Flow (vph)	462	1464	0	32	962	297	102	146	0	484	200	329
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		6
Total Split (s)	11.0	70.0		31.0	90.0	90.0	15.0	25.0		24.0	34.0	34.0
Total Lost Time (s)	5.0	5.5		5.0	5.5	5.5	5.0	4.0		5.0	5.0	5.0
Act Effct Green (s)	85.7	81.9		82.9	76.9	76.9	25.4	17.4		40.6	26.5	26.5
Actuated g/C Ratio	0.62	0.59		0.60	0.55	0.55	0.18	0.12		0.29	0.19	0.19
v/c Ratio	3.64	1.39		0.27	0.96	0.32	0.42	0.65		1.52	0.58	0.72
Control Delay	1220.3	205.9		15.5	50.9	6.9	45.8	70.3		282.3	60.8	29.9
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	1220.3	205.9		15.5	50.9	6.9	45.8	70.3		282.3	60.8	29.9
LOS	F	F		B	D	A	D	E		F	E	C
Approach Delay		449.2			39.9			60.2			156.6	
Approach LOS		F			D			E			F	

Intersection Summary

Area Type:	Other
Cycle Length:	150
Actuated Cycle Length:	139.3
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	3.64
Intersection Signal Delay:	243.5
Intersection LOS:	F
Intersection Capacity Utilization:	117.6%
ICU Level of Service:	H
Analysis Period (min):	15

Splits and Phases: 1: Jumpers Hole Road & Benfield Road

Ø3	Ø4	Ø1	Ø2
31 s	70 s	24 s	25 s
Ø7	Ø8	Ø5	Ø6
11 s	90 s	15 s	34 s

Lanes, Volumes, Timings
2: Jumpers Hole Road & Severna Park MS/Retford Drive

Future 2040 Conditions - Optimization
PM PEAK

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	0	55	80	5	40	75	585	105	65	735	85
Future Volume (vph)	35	0	55	80	5	40	75	585	105	65	735	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		0	250		0	145		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	75			75			75			75		
Satd. Flow (prot)	0	1687	0	0	1788	1583	1770	1770	0	1770	1755	0
Flt Permitted		0.386			0.960		0.077			0.154		
Satd. Flow (perm)	0	666	0	0	1788	1546	143	1770	0	287	1755	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		109				109		13			16	
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		653			733			1130			1177	
Travel Time (s)		17.8			20.0			22.0			22.9	
Lane Group Flow (vph)	0	196	0	0	127	55	174	818	0	89	1030	0
Turn Type	Perm	NA		Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		3		4	4		5	2		1	6	
Permitted Phases	3					4	2			6		
Total Split (s)	12.0	12.0		34.5	34.5	34.5	9.0	54.9		8.6	54.5	
Total Lost Time (s)		4.5			4.5	4.5	4.5	5.0		4.5	5.0	
Act Effct Green (s)		7.5			12.8	12.8	55.8	51.8		54.2	49.6	
Actuated g/C Ratio		0.08			0.14	0.14	0.60	0.56		0.58	0.53	
v/c Ratio		1.27			0.52	0.18	1.06	0.82		0.38	1.09	
Control Delay		184.7			44.8	1.8	108.2	27.0		12.2	81.1	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		184.7			44.8	1.8	108.2	27.0		12.2	81.1	
LOS		F			D	A	F	C		B	F	
Approach Delay		184.7			31.8			41.3			75.7	
Approach LOS		F			C			D			E	

Intersection Summary

Area Type: Other
 Cycle Length: 110
 Actuated Cycle Length: 92.9
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.27
 Intersection Signal Delay: 67.3
 Intersection LOS: E
 Intersection Capacity Utilization 71.7%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Ø1	Ø2	Ø3	Ø4
8.6 s	54.9 s	12 s	34.5 s
Ø5	Ø6		
9 s	54.5 s		

Intersection

Int Delay, s/veh 3.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		P			4
Traffic Vol, veh/h	20	35	620	40	80	895
Future Vol, veh/h	20	35	620	40	80	895
Conflicting Peds, #/hr	1	3	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	70	92	95	75	67	93
Heavy Vehicles, %	2	2	5	2	2	5
Mvmt Flow	29	38	653	53	119	962

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1881	682	0
Stage 1	679	-	-
Stage 2	1202	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	78	450	892
Stage 1	504	-	-
Stage 2	285	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	55	449	889
Mov Cap-2 Maneuver	55	-	-
Stage 1	504	-	-
Stage 2	203	-	-

Approach	WB	NB	SB
HCM Control Delay, s	78.6	0	1.1
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	- 110	889	-
HCM Lane V/C Ratio	-	- 0.606	0.134	-
HCM Control Delay (s)	-	- 78.6	9.7	0
HCM Lane LOS	-	- F	A	A
HCM 95th %tile Q(veh)	-	- 3	0.5	-

Intersection

Int Delay, s/veh 1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↑	↑			↔	
Traffic Vol, veh/h	15	0	20	15	0	20	5	650	0	0	940	30
Future Vol, veh/h	15	0	20	15	0	20	5	650	0	0	940	30
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	50	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	55	92	75	56	92	65	50	89	92	92	89	69
Heavy Vehicles, %	2	2	2	2	2	2	2	5	2	2	5	2
Mvmt Flow	27	0	27	27	0	31	10	730	0	0	1056	43

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1844	1828	1078	1841	1850	730	1100	0	-	-	-	0
Stage 1	1078	1078	-	750	750	-	-	-	-	-	-	-
Stage 2	766	750	-	1091	1100	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	-	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	-	-	-
Pot Cap-1 Maneuver	58	77	266	58	74	422	635	-	0	0	-	-
Stage 1	265	295	-	403	419	-	-	-	0	0	-	-
Stage 2	395	419	-	260	288	-	-	-	0	0	-	-
Platoon blocked, %								-			-	
Mov Cap-1 Maneuver	53	76	266	52	73	422	635	-	-	-	-	-
Mov Cap-2 Maneuver	162	190	-	152	183	-	-	-	-	-	-	-
Stage 1	261	295	-	397	412	-	-	-	-	-	-	-
Stage 2	360	412	-	234	288	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	29.4	25.7	0.1	0
HCM LOS	D	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	635	-	201	231	-	-
HCM Lane V/C Ratio	0.016	-	0.268	0.249	-	-
HCM Control Delay (s)	10.8	-	29.4	25.7	-	-
HCM Lane LOS	B	-	D	D	-	-
HCM 95th %tile Q(veh)	0	-	1	1	-	-

Intersection						
Int Delay, s/veh	1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		P		T	T
Traffic Vol, veh/h	10	10	640	45	70	960
Future Vol, veh/h	10	10	640	45	70	960
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	40	67	87	75	73	91
Heavy Vehicles, %	2	2	5	2	2	5
Mvmt Flow	25	15	736	60	96	1055
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2013	766	0	0	796	0
Stage 1	766	-	-	-	-	-
Stage 2	1247	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	65	403	-	-	826	-
Stage 1	459	-	-	-	-	-
Stage 2	271	-	-	-	-	-
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	57	403	-	-	826	-
Mov Cap-2 Maneuver	167	-	-	-	-	-
Stage 1	459	-	-	-	-	-
Stage 2	240	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	25.6		0		0.8	
HCM LOS	D					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	- 214	826	-		
HCM Lane V/C Ratio	-	- 0.187	0.116	-		
HCM Control Delay (s)	-	- 25.6	9.9	-		
HCM Lane LOS	-	- D	A	-		
HCM 95th %tile Q(veh)	-	- 0.7	0.4	-		

Lanes, Volumes, Timings

Future 2040 Conditions - Optimization

6: Jumpers Hole Road & Kinder Road/Earleigh Heights Conn

PM PEAK

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	175	115	250	95	110	65	340	245	395	665	65
Future Volume (vph)	80	175	115	250	95	110	65	340	245	395	665	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	225		0	85		85	85		85
Storage Lanes	0		0	1		0	1		1	1		1
Taper Length (ft)	75			75			75			75		
Satd. Flow (prot)	0	1694	0	1719	1656	0	1719	1810	1538	1719	1810	1538
Flt Permitted		0.868		0.278			0.165			0.245		
Satd. Flow (perm)	0	1485	0	503	1656	0	298	1810	1502	443	1810	1496
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		28			66				206			145
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		1280			789			625			942	
Travel Time (s)		29.1			17.9			12.2			18.4	
Lane Group Flow (vph)	0	418	0	275	235	0	71	354	278	434	739	81
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Total Split (s)	27.0	27.0		13.0	40.0		9.0	29.0	29.0	21.0	41.0	41.0
Total Lost Time (s)		5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Act Effct Green (s)		22.0		35.0	35.0		27.2	23.2	23.2	44.2	37.0	37.0
Actuated g/C Ratio		0.25		0.39	0.39		0.30	0.26	0.26	0.50	0.41	0.41
v/c Ratio		1.08		0.90	0.34		0.46	0.75	0.51	0.97	0.98	0.11
Control Delay		101.2		55.9	15.2		24.1	41.9	11.8	54.7	57.4	0.7
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		101.2		55.9	15.2		24.1	41.9	11.8	54.7	57.4	0.7
LOS		F		E	B		C	D	B	D	E	A
Approach Delay		101.2			37.2			28.2			52.8	
Approach LOS		F			D			C			D	

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 89.2
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.08
 Intersection Signal Delay: 51.1 Intersection LOS: D
 Intersection Capacity Utilization 91.0% ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 6: Jumpers Hole Road & Kinder Road/Earleigh Heights Conn



Intersection

Int Delay, s/veh 2.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		P		T	T
Traffic Vol, veh/h	35	60	360	15	20	560
Future Vol, veh/h	35	60	360	15	20	560
Conflicting Peds, #/hr	0	5	0	1	1	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	72	93	79	55	36	78
Heavy Vehicles, %	2	2	5	2	2	5
Mvmt Flow	49	65	456	27	56	718

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1299	475	0	0	484	0
Stage 1	470	-	-	-	-	-
Stage 2	829	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	178	590	-	-	1079	-
Stage 1	629	-	-	-	-	-
Stage 2	429	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	169	587	-	-	1074	-
Mov Cap-2 Maneuver	169	-	-	-	-	-
Stage 1	628	-	-	-	-	-
Stage 2	407	-	-	-	-	-

Approach	WB		NB		SB
HCM Control Delay, s	25.7		0		0.6
HCM LOS	D				

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	- 285	1074	-
HCM Lane V/C Ratio	-	- 0.397	0.052	-
HCM Control Delay (s)	-	- 25.7	8.5	-
HCM Lane LOS	-	- D	A	-
HCM 95th %tile Q(veh)	-	- 1.8	0.2	-

Intersection

Int Delay, s/veh 2.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘		↗		↘	↗
Traffic Vol, veh/h	20	35	620	40	80	895
Future Vol, veh/h	20	35	620	40	80	895
Conflicting Peds, #/hr	1	3	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	70	92	95	75	67	93
Heavy Vehicles, %	2	2	5	2	2	5
Mvmt Flow	29	38	653	53	119	962

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1881	682	0	0	706	0
Stage 1	679	-	-	-	-	-
Stage 2	1202	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	78	450	-	-	892	-
Stage 1	504	-	-	-	-	-
Stage 2	285	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	67	449	-	-	889	-
Mov Cap-2 Maneuver	67	-	-	-	-	-
Stage 1	504	-	-	-	-	-
Stage 2	247	-	-	-	-	-

Approach	WB		NB		SB
HCM Control Delay, s	58.7		0		1.1
HCM LOS	F				

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	- 130	889	-
HCM Lane V/C Ratio	-	- 0.512	0.134	-
HCM Control Delay (s)	-	- 58.7	9.7	-
HCM Lane LOS	-	- F	A	-
HCM 95th %tile Q(veh)	-	- 2.4	0.5	-

Lanes, Volumes, Timings
1: Jumpers Hole Road & Benfield Road

Future 2040 Conditions - Benfield Rd Option 1
AM PEAK

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	185	975	15	5	1105	185	120	70	20	235	20	430
Future Volume (vph)	185	975	15	5	1105	185	120	70	20	235	20	430
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	340		0	200		250	85		0	0		250
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (ft)	75			75			75			75		
Satd. Flow (prot)	1719	1801	0	1719	1810	1538	1719	1741	0	1633	1652	1538
Flt Permitted	0.056			0.060			0.950			0.950	0.961	
Satd. Flow (perm)	101	1801	0	109	1810	1538	1657	1741	0	1624	1645	1440
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				93		8				120
Link Speed (mph)		40			40			35				35
Link Distance (ft)		1671			1311			861				962
Travel Time (s)		28.5			22.3			16.8				18.7
Lane Group Flow (vph)	210	1075	0	10	1242	237	164	129	0	162	161	581
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	7	4		3	8		2	2		1	1	
Permitted Phases	4			8		8						1
Total Split (s)	12.0	73.0		8.0	69.0	69.0	27.0	27.0		37.0	37.0	37.0
Total Lost Time (s)	5.0	5.5		5.0	5.5	5.5	5.0	5.0		5.0	5.0	5.0
Act Effct Green (s)	75.6	72.4		67.0	63.5	63.5	19.2	19.2		32.0	32.0	32.0
Actuated g/C Ratio	0.53	0.51		0.47	0.45	0.45	0.14	0.14		0.23	0.23	0.23
v/c Ratio	1.58	1.17		0.12	1.54	0.32	0.71	0.54		0.44	0.43	1.39
Control Delay	317.9	122.1		19.6	278.3	16.6	76.0	62.2		52.5	52.2	224.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	317.9	122.1		19.6	278.3	16.6	76.0	62.2		52.5	52.2	224.0
LOS	F	F		B	F	B	E	E		D	D	F
Approach Delay		154.1			234.9			69.9			162.7	
Approach LOS		F			F			E			F	

Intersection Summary

Area Type: Other
 Cycle Length: 145
 Actuated Cycle Length: 142.2
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.58
 Intersection Signal Delay: 180.2 Intersection LOS: F
 Intersection Capacity Utilization 106.6% ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 1: Jumpers Hole Road & Benfield Road



Lanes, Volumes, Timings
1: Jumpers Hole Road & Benfield Road

Future 2040 Conditions - Benfield Rd Option 1
PM PEAK

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	425	1245	35	30	885	255	85	85	25	440	170	260
Future Volume (vph)	425	1245	35	30	885	255	85	85	25	440	170	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	340		0	200		250	85		0	0		250
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (ft)	75			75			75			75		
Satd. Flow (prot)	1719	1799	0	1719	1810	1538	1719	1752	0	1633	1683	1538
Flt Permitted	0.061			0.066			0.950			0.950	0.979	
Satd. Flow (perm)	110	1799	0	119	1810	1515	1708	1752	0	1633	1683	1492
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				141		8				299
Link Speed (mph)		40			40			35			35	
Link Distance (ft)		1671			1311			861			962	
Travel Time (s)		28.5			22.3			16.8			18.7	
Lane Group Flow (vph)	462	1464	0	32	962	297	102	146	0	339	345	329
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	7	4		3	8		2	2		1	1	
Permitted Phases	4			8		8						1
Total Split (s)	23.0	79.0		8.0	64.0	64.0	29.0	29.0		29.0	29.0	29.0
Total Lost Time (s)	5.0	5.5		5.0	5.5	5.5	5.0	5.0		5.0	5.0	5.0
Act Effct Green (s)	82.1	76.8		62.0	58.5	58.5	17.9	17.9		24.0	24.0	24.0
Actuated g/C Ratio	0.59	0.55		0.45	0.42	0.42	0.13	0.13		0.17	0.17	0.17
v/c Ratio	1.69	1.47		0.37	1.26	0.41	0.46	0.63		1.20	1.19	0.65
Control Delay	356.7	245.0		27.2	163.7	16.6	62.7	66.3		168.4	162.6	14.9
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	356.7	245.0		27.2	163.7	16.6	62.7	66.3		168.4	162.6	14.9
LOS	F	F		C	F	B	E	E		F	F	B
Approach Delay		271.8			126.5			64.8			116.6	
Approach LOS		F			F			E			F	

Intersection Summary

Area Type: Other
 Cycle Length: 145
 Actuated Cycle Length: 139
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.69
 Intersection Signal Delay: 183.3 Intersection LOS: F
 Intersection Capacity Utilization 110.8% ICU Level of Service H
 Analysis Period (min) 15

Splits and Phases: 1: Jumpers Hole Road & Benfield Road



Lanes, Volumes, Timings
1: Jumpers Hole Road & Benfield Road

Future 2040 Conditions - Benfield Rd Option 2
AM PEAK

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	185	975	15	5	1105	185	120	70	20	235	20	430
Future Volume (vph)	185	975	15	5	1105	185	120	70	20	235	20	430
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	340		0	200		250	85		0	250		250
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (ft)	75			75			75			75		
Satd. Flow (prot)	1719	1801	0	1719	1810	1538	1719	1741	0	3335	1810	1538
Flt Permitted	0.047			0.050			0.738			0.544		
Satd. Flow (perm)	85	1801	0	90	1810	1538	1276	1741	0	1895	1810	1437
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				104		9				93
Link Speed (mph)		40			40			35			35	
Link Distance (ft)		1671			1311			861			962	
Travel Time (s)		28.5			22.3			16.8			18.7	
Lane Group Flow (vph)	210	1075	0	10	1242	237	164	129	0	294	29	581
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		6
Total Split (s)	13.0	88.0		8.0	83.0	83.0	8.0	42.0		12.0	46.0	46.0
Total Lost Time (s)	5.0	5.5		5.0	5.5	5.5	5.0	5.0		5.0	5.0	5.0
Act Effect Green (s)	91.0	87.3		81.0	77.5	77.5	40.0	37.0		48.0	41.0	41.0
Actuated g/C Ratio	0.61	0.58		0.54	0.52	0.52	0.27	0.25		0.32	0.27	0.27
v/c Ratio	1.52	1.02		0.12	1.33	0.28	0.47	0.30		0.44	0.06	1.26
Control Delay	296.7	65.5		15.2	186.9	12.0	49.0	44.8		40.3	40.9	171.9
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	296.7	65.5		15.2	186.9	12.0	49.0	44.8		40.3	40.9	171.9
LOS	F	E		B	F	B	D	D		D	D	F
Approach Delay		103.3			157.9			47.1			124.9	
Approach LOS		F			F			D			F	

Intersection Summary

Area Type:	Other
Cycle Length:	150
Actuated Cycle Length:	150
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	1.52
Intersection Signal Delay:	124.5
Intersection LOS:	F
Intersection Capacity Utilization:	105.7%
ICU Level of Service:	G
Analysis Period (min):	15

Splits and Phases: 1: Jumpers Hole Road & Benfield Road



Lanes, Volumes, Timings
1: Jumpers Hole Road & Benfield Road

Future 2040 Conditions - Benfield Rd Option 2
PM PEAK

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	425	1245	35	30	885	255	85	85	25	440	170	260
Future Volume (vph)	425	1245	35	30	885	255	85	85	25	440	170	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	340		0	200		250	85		0	250		250
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (ft)	75			75			75			75		
Satd. Flow (prot)	1719	1799	0	1719	1810	1538	1719	1752	0	3335	1810	1538
Flt Permitted	0.057			0.061			0.632			0.341		
Satd. Flow (perm)	103	1799	0	110	1810	1499	1135	1752	0	1197	1810	1492
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				162		8				252
Link Speed (mph)		40			40			35			35	
Link Distance (ft)		1671			1311			861			962	
Travel Time (s)		28.5			22.3			16.8			18.7	
Lane Group Flow (vph)	462	1464	0	32	962	297	102	146	0	484	200	329
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		6
Total Split (s)	23.0	84.0		8.0	69.0	69.0	11.8	27.0		26.0	41.2	41.2
Total Lost Time (s)	5.0	5.5		5.0	5.5	5.5	4.5	5.0		5.0	5.0	5.0
Act Effct Green (s)	87.1	81.9		67.1	63.6	63.6	25.5	17.6		43.2	31.4	31.4
Actuated g/C Ratio	0.62	0.58		0.48	0.45	0.45	0.18	0.13		0.31	0.22	0.22
v/c Ratio	1.70	1.39		0.37	1.17	0.39	0.43	0.64		0.71	0.50	0.62
Control Delay	361.2	209.8		25.8	126.2	13.0	44.0	68.5		45.5	51.9	17.5
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	361.2	209.8		25.8	126.2	13.0	44.0	68.5		45.5	51.9	17.5
LOS	F	F		C	F	B	D	E		D	D	B
Approach Delay		246.1			97.6			58.4			37.7	
Approach LOS		F			F			E			D	

Intersection Summary

Area Type:	Other
Cycle Length:	145
Actuated Cycle Length:	140.3
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	1.70
Intersection Signal Delay:	145.8
Intersection LOS:	F
Intersection Capacity Utilization:	106.6%
ICU Level of Service:	G
Analysis Period (min):	15

Splits and Phases: 1: Jumpers Hole Road & Benfield Road

Ø3	Ø4	Ø1	Ø2
8 s	84 s	26 s	27 s
Ø7	Ø8	Ø5	Ø6
23 s	69 s	11.8 s	41.2 s

Lanes, Volumes, Tim
1: Jumpers Hole Road & Benfield Road

Future 2040 Conditions - Benfield Rd Ult. Scenario

Timing Plan: AM PEAK

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	185	975	15	5	1105	185	120	70	20	235	20	430
Future Volume (vph)	185	975	15	5	1105	185	120	70	20	235	20	430
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	340		0	200		250	85		0	250		250
Storage Lanes	1		0	1		1	1		0	2		1
Taper Length (ft)	75			75			75			75		
Satd. Flow (prot)	1719	3422	0	1719	3438	1538	1719	1742	0	3335	1810	1538
Flt Permitted	0.088			0.182			0.738			0.617		
Satd. Flow (perm)	159	3422	0	329	3438	1538	1312	1742	0	2153	1810	1492
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3				226		15				136
Link Speed (mph)		40			40			35				35
Link Distance (ft)		1671			1311			861				962
Travel Time (s)		28.5			22.3			16.8				18.7
Lane Group Flow (vph)	210	1075	0	10	1242	237	164	129	0	294	29	581
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		6
Total Split (s)	13.0	47.0		8.0	42.0	42.0	8.0	35.0		10.0	37.0	37.0
Total Lost Time (s)	5.0	5.5		5.0	5.5	5.5	5.0	5.0		5.0	5.0	5.0
Act Effect Green (s)	50.0	47.9		40.0	36.5	36.5	33.0	30.0		37.0	32.0	32.0
Actuated g/C Ratio	0.50	0.48		0.40	0.36	0.36	0.33	0.30		0.37	0.32	0.32
v/c Ratio	1.03	0.66		0.06	0.99	0.34	0.37	0.24		0.34	0.05	1.02
Control Delay	96.2	22.6		13.8	55.7	5.0	26.0	24.7		21.7	23.9	70.5
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	96.2	22.6		13.8	55.7	5.0	26.0	24.7		21.7	23.9	70.5
LOS	F	C		B	E	A	C	C		C	C	E
Approach Delay		34.7			47.3			25.4			53.1	
Approach LOS		C			D			C			D	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.03
 Intersection Signal Delay: 42.9
 Intersection LOS: D
 Intersection Capacity Utilization 78.1%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 1: Jumpers Hole Road & Benfield Road



Lanes, Volumes, Tim
1: Jumpers Hole Road & Benfield Road

Future 2040 Conditions - Benfield Rd Ult. Scenario

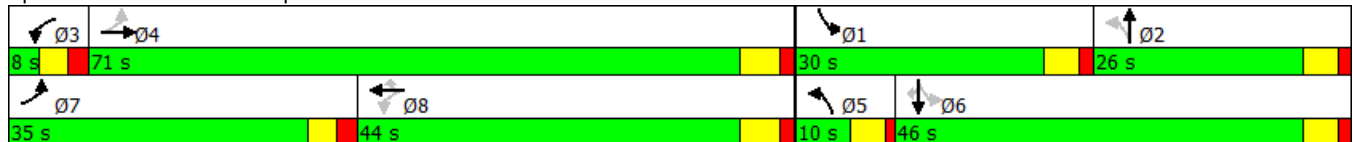
Timing Plan: PM PEAK

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	425	1245	35	30	885	255	85	85	25	440	170	260
Future Volume (vph)	425	1245	35	30	885	255	85	85	25	440	170	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	340		0	200		250	85		0	250		250
Storage Lanes	1		0	1		1	1		0	2		1
Taper Length (ft)	75			75			75			75		
Satd. Flow (prot)	1719	3418	0	1719	3438	1538	1719	1752	0	3335	1810	1538
Flt Permitted	0.088			0.129			0.632			0.359		
Satd. Flow (perm)	159	3418	0	233	3438	1500	1139	1752	0	1260	1810	1511
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4				241		9				329
Link Speed (mph)		40			40			35			35	
Link Distance (ft)		1671			1311			861			962	
Travel Time (s)		28.5			22.3			16.8			18.7	
Lane Group Flow (vph)	462	1464	0	32	962	297	102	146	0	484	200	329
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		6
Total Split (s)	35.0	71.0		8.0	44.0	44.0	10.0	26.0		30.0	46.0	46.0
Total Lost Time (s)	5.0	5.5		5.0	5.5	5.5	4.5	5.0		5.0	5.0	5.0
Act Effect Green (s)	73.8	68.7		41.6	38.1	38.1	22.6	16.6		43.3	33.3	33.3
Actuated g/C Ratio	0.58	0.54		0.33	0.30	0.30	0.18	0.13		0.34	0.26	0.26
v/c Ratio	1.00	0.79		0.29	0.93	0.48	0.45	0.62		0.62	0.42	0.52
Control Delay	80.7	29.4		24.7	60.0	11.2	40.5	61.2		35.8	41.5	6.7
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	80.7	29.4		24.7	60.0	11.2	40.5	61.2		35.8	41.5	6.7
LOS	F	C		C	E	B	D	E		D	D	A
Approach Delay		41.7			47.9			52.7			27.4	
Approach LOS		D			D			D			C	

Intersection Summary

Area Type: Other
 Cycle Length: 135
 Actuated Cycle Length: 127.1
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.00
 Intersection Signal Delay: 40.9
 Intersection Capacity Utilization 83.6%
 Analysis Period (min) 15
 Intersection LOS: D
 ICU Level of Service E

Splits and Phases: 1: Jumpers Hole Road & Benfield Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	5	115	120	10	45	120	280	40	40	450	75
Future Volume (vph)	50	5	115	120	10	45	120	280	40	40	450	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		100	200		0	250		0	145		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	75			75			75			75		
Satd. Flow (prot)	0	1785	1583	0	1785	1583	1770	1771	0	1770	1759	0
Flt Permitted		0.958			0.958		0.111			0.524		
Satd. Flow (perm)	0	1785	1583	0	1785	1518	207	1771	0	975	1759	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			245			154		10			15	
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		653			733			1130			1177	
Travel Time (s)		17.8			20.0			22.0			22.9	
Lane Group Flow (vph)	0	136	245	0	182	69	279	405	0	80	653	0
Turn Type	Split	NA	pm+ov	Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	3	3	5	4	4		5	2		1	6	
Permitted Phases			3			4	2			6		
Total Split (s)	13.8	13.8	18.2	34.5	34.5	34.5	18.2	51.7		10.0	43.5	
Total Lost Time (s)		4.5	4.5		4.5	4.5	4.5	5.0		4.5	5.0	
Act Effect Green (s)		9.3	23.0		16.0	16.0	57.3	48.9		44.6	38.6	
Actuated g/C Ratio		0.10	0.24		0.17	0.17	0.60	0.51		0.46	0.40	
v/c Ratio		0.79	0.43		0.61	0.18	0.81	0.45		0.16	0.91	
Control Delay		74.6	4.8		46.2	1.0	38.6	18.2		10.9	47.0	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		74.6	4.8		46.2	1.0	38.6	18.2		10.9	47.0	
LOS		E	A		D	A	D	B		B	D	
Approach Delay		29.7			33.8			26.5			43.1	
Approach LOS		C			C			C			D	

Intersection Summary

Area Type: Other
 Cycle Length: 110
 Actuated Cycle Length: 96.2
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.91
 Intersection Signal Delay: 33.9 Intersection LOS: C
 Intersection Capacity Utilization 64.1% ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Ø1	Ø2	Ø3	Ø4
10 s	51.7 s	13.8 s	34.5 s
Ø5	Ø6		
18.2 s	43.5 s		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	0	55	80	5	40	75	585	105	65	735	85
Future Volume (vph)	35	0	55	80	5	40	75	585	105	65	735	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		0	250		0	145		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	75			75			75			75		
Satd. Flow (prot)	0	1770	1583	0	1788	1583	1770	1770	0	1770	1755	0
Flt Permitted		0.950			0.960		0.071			0.155		
Satd. Flow (perm)	0	1770	1583	0	1788	1545	132	1770	0	289	1755	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			108			100		12			14	
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		653			733			1130			1177	
Travel Time (s)		17.8			20.0			22.0			22.9	
Lane Group Flow (vph)	0	88	108	0	127	55	174	818	0	89	1030	0
Turn Type	Split	NA	pm+ov	Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	3	3	5	4	4		5	2		1	6	
Permitted Phases			3			4	2			6		
Total Split (s)	16.0	16.0	10.0	34.5	34.5	34.5	10.0	60.7		8.8	59.5	
Total Lost Time (s)		4.5	4.5		4.5	4.5	4.5	5.0		4.5	5.0	
Act Effect Green (s)		10.7	14.2		13.4	13.4	62.3	56.2		59.9	55.0	
Actuated g/C Ratio		0.11	0.14		0.13	0.13	0.62	0.56		0.60	0.55	
v/c Ratio		0.47	0.34		0.53	0.19	1.01	0.82		0.38	1.06	
Control Delay		52.8	7.7		50.0	2.8	95.6	28.3		13.0	72.3	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		52.8	7.7		50.0	2.8	95.6	28.3		13.0	72.3	
LOS		D	A		D	A	F	C		B	E	
Approach Delay		28.0			35.7			40.1			67.6	
Approach LOS		C			D			D			E	

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 100.2
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.06
 Intersection Signal Delay: 51.2
 Intersection Capacity Utilization 71.9%
 Analysis Period (min) 15
 Intersection LOS: D
 ICU Level of Service C

Splits and Phases: 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Ø1	Ø2	Ø3	Ø4
8.8 s	60.7 s	16 s	34.5 s
Ø5	Ø6		
10 s	59.5 s		

Intersection: 1: Jumpers Hole Road & Benfield Road

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (ft)	415	1622	123	1314	325	159	269	237	430	324
Average Queue (ft)	332	1126	5	1267	176	94	94	116	110	230
95th Queue (ft)	526	1942	41	1397	420	162	193	205	413	372
Link Distance (ft)		1628		1258			823	882	882	
Upstream Blk Time (%)		16		55						
Queuing Penalty (veh)		0		0						
Storage Bay Dist (ft)	340		200		250	85				250
Storage Blk Time (%)	16	28		47		25	12		1	16
Queuing Penalty (veh)	160	52		89		23	15		5	3

Intersection: 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	TR	L	TR
Maximum Queue (ft)	212	608	272	56	111	216	119	348
Average Queue (ft)	108	533	117	25	41	63	20	118
95th Queue (ft)	465	772	206	52	83	153	65	258
Link Distance (ft)	600	600	695	695		1055		1101
Upstream Blk Time (%)	16	79						
Queuing Penalty (veh)	0	0						
Storage Bay Dist (ft)					250		145	
Storage Blk Time (%)						0		5
Queuing Penalty (veh)						0		2

Intersection: 3: Jumpers Hole Road & Yorkshire Drive

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	82	47
Average Queue (ft)	39	6
95th Queue (ft)	64	28
Link Distance (ft)	610	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		50
Storage Blk Time (%)		0
Queuing Penalty (veh)		0

Intersection: 4: Jumpers Hole Road & Edin Garth Road/Idlewild Road

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	T	TR
Maximum Queue (ft)	64	53	44	9	14
Average Queue (ft)	32	24	9	0	0
95th Queue (ft)	59	49	31	6	5
Link Distance (ft)	240	468		699	36
Upstream Blk Time (%)					0
Queuing Penalty (veh)					0
Storage Bay Dist (ft)			50		
Storage Blk Time (%)			0	0	
Queuing Penalty (veh)			1	0	

Intersection: 5: Jumpers Hole Road & Clarence Avenue

Movement	WB	NB	SB
Directions Served	LR	TR	L
Maximum Queue (ft)	52	19	31
Average Queue (ft)	22	1	2
95th Queue (ft)	48	8	15
Link Distance (ft)	592	36	
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			150
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Jumpers Hole Road & Kinder Road/Earleigh Heights Conn

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	179	257	227	100	266	160	147	222	116
Average Queue (ft)	80	121	72	14	98	45	50	76	19
95th Queue (ft)	143	209	153	52	191	106	99	156	59
Link Distance (ft)	1234		742		570			908	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		225		85		85	85		85
Storage Blk Time (%)		0	0	0	11	0	1	6	
Queuing Penalty (veh)		1	1	0	19	1	3	8	

Network Summary

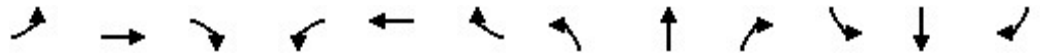
Network wide Queuing Penalty: 383

Lanes, Volumes, Timings

Future 2040 Conditions - EB RT - Original Timings

2: Jumpers Hole Road & Severna Park MS/Retford Drive

Timing Plan: AM PEAK



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↖	↗	↖	↗	↖	↗	↖	↗
Traffic Volume (vph)	50	5	115	120	10	45	120	280	40	40	450	75
Future Volume (vph)	50	5	115	120	10	45	120	280	40	40	450	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		0	250		0	145		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	75			75			75			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.981			0.978	
Flt Protected		0.956			0.956		0.950			0.950		
Satd. Flow (prot)	0	1781	1583	0	1781	1583	1770	1827	0	1770	1822	0
Flt Permitted		0.185			0.956		0.296			0.501		
Satd. Flow (perm)	0	345	1583	0	1781	1583	551	1827	0	933	1822	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			125			80		5			6	
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		653			733			1130			1177	
Travel Time (s)		17.8			20.0			22.0			22.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	5	125	130	11	49	130	304	43	43	489	82
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	59	125	0	141	49	130	347	0	43	571	0
Turn Type	Perm	NA	NA	Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		3		4	4		5	2		1	6	
Permitted Phases	3					4	2			6		
Detector Phase	3	3		4	4	4	5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	3.0	20.0		4.0	20.0	
Minimum Split (s)	8.5	8.5		34.5	34.5	34.5	7.5	25.0		8.5	35.0	
Total Split (s)	24.5	24.5		50.5	50.5	50.5	23.5	50.5		24.5	51.5	
Total Split (%)	16.3%	16.3%		33.7%	33.7%	33.7%	15.7%	33.7%		16.3%	34.3%	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	4.0		3.0	4.0	
All-Red Time (s)	1.5	1.5		1.5	1.5	1.5	1.5	1.0		1.5	1.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.5			4.5	4.5	4.5	5.0		4.5	5.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Act Effct Green (s)		20.7	0.0		18.2	18.2	95.4	86.2		91.8	82.5	
Actuated g/C Ratio		0.14	0.00		0.12	0.12	0.64	0.57		0.61	0.55	
v/c Ratio		1.26	1.00		0.65	0.19	0.30	0.33		0.07	0.57	
Control Delay		261.3	90.0		76.4	4.4	19.1	30.2		10.7	25.9	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		261.3	90.0		76.4	4.4	19.1	30.2		10.7	25.9	
LOS		F	F		E	A	B	C		B	C	
Approach Delay		144.9			57.8			27.2			24.8	
Approach LOS		F			E			C			C	
Queue Length 50th (ft)		~73	0		134	0	70	230		14	344	
Queue Length 95th (ft)		#175	#140		201	13	m103	m293		33	547	

Lanes, Volumes, Timings
 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Future 2040 Conditions - EB RT - Original Timings
 Timing Plan: AM PEAK

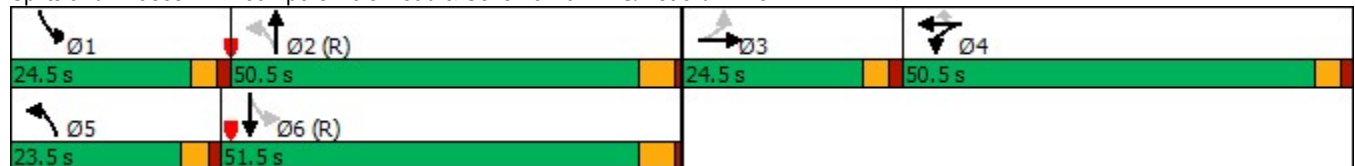


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		573			653			1050			1097	
Turn Bay Length (ft)							250			145		
Base Capacity (vph)		47	125		546	540	512	1051		718	1004	
Starvation Cap Reductn		0	0		0	0	0	0		0	0	
Spillback Cap Reductn		0	0		0	0	0	0		0	0	
Storage Cap Reductn		0	0		0	0	0	0		0	0	
Reduced v/c Ratio		1.26	1.00		0.26	0.09	0.25	0.33		0.06	0.57	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.26
 Intersection Signal Delay: 44.9
 Intersection LOS: D
 Intersection Capacity Utilization 60.4%
 ICU Level of Service B
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Jumpers Hole Road & Severna Park MS/Retford Drive



Intersection: 1: Jumpers Hole Road & Benfield Road

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB	B21	B21
Directions Served	L	TR	L	T	R	L	TR	L	T	R	T	T
Maximum Queue (ft)	415	1679	274	1310	325	150	196	877	671	245	53	75
Average Queue (ft)	414	1649	38	1241	218	65	97	562	169	121	4	3
95th Queue (ft)	419	1665	159	1485	446	120	167	927	526	211	33	44
Link Distance (ft)		1628		1258			823	882	882		1055	1055
Upstream Blk Time (%)		81		42				4	1			
Queuing Penalty (veh)		0		0				17	5			
Storage Bay Dist (ft)	340		200		250	85					250	
Storage Blk Time (%)	91	4		41		6	18				1	
Queuing Penalty (veh)	1168	17		116		6	16				1	

Intersection: 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	TR	L	TR
Maximum Queue (ft)	357	616	169	56	192	309	129	326
Average Queue (ft)	268	573	77	25	30	95	24	108
95th Queue (ft)	721	692	144	51	100	238	72	248
Link Distance (ft)	600	600	695	695		1055		1101
Upstream Blk Time (%)	16	79						
Queuing Penalty (veh)	0	0						
Storage Bay Dist (ft)					250		145	
Storage Blk Time (%)						1		4
Queuing Penalty (veh)						1		3

Intersection: 3: Jumpers Hole Road & Yorkshire Drive

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	75	58
Average Queue (ft)	34	18
95th Queue (ft)	61	47
Link Distance (ft)	610	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		50
Storage Blk Time (%)		0
Queuing Penalty (veh)		4

Intersection: 4: Jumpers Hole Road & Edin Garth Road/Idlewild Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	TR
Maximum Queue (ft)	70	64	27	6
Average Queue (ft)	26	25	2	0
95th Queue (ft)	56	52	14	4
Link Distance (ft)	240	468		36
Upstream Blk Time (%)				0
Queuing Penalty (veh)				0
Storage Bay Dist (ft)			50	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: Jumpers Hole Road & Clarence Avenue

Movement	WB	NB	SB
Directions Served	LR	TR	L
Maximum Queue (ft)	52	21	47
Average Queue (ft)	14	2	15
95th Queue (ft)	42	13	42
Link Distance (ft)	592	36	
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			150
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Jumpers Hole Road & Kinder Road/Earleigh Heights Conn

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	1273	258	258	113	282	160	160	962	160
Average Queue (ft)	959	119	89	35	126	78	151	930	37
95th Queue (ft)	1508	203	188	78	231	161	186	949	126
Link Distance (ft)	1234		742		570			908	
Upstream Blk Time (%)	41							68	
Queuing Penalty (veh)	0							0	
Storage Bay Dist (ft)		225		85		85	85		85
Storage Blk Time (%)		1	0	0	18	1	55	44	0
Queuing Penalty (veh)		2	1	2	57	5	403	204	0

Network Summary

Network wide Queuing Penalty: 2028

Lanes, Volumes, Timings

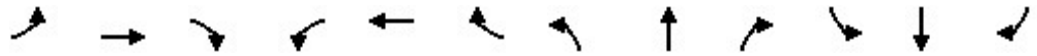
Future 2040 Conditions - EB RT - Original Timings

2: Jumpers Hole Road & Severna Park MS/Retford Drive

Timing Plan: PM PEAK



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↖	↗	↖	↗	↖	↗	↖	↗
Traffic Volume (vph)	35	0	55	80	5	40	75	585	105	65	735	85
Future Volume (vph)	35	0	55	80	5	40	75	585	105	65	735	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		0	250		0	145		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	75			75			75			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.977			0.985	
Flt Protected		0.950			0.955		0.950			0.950		
Satd. Flow (prot)	0	1770	1583	0	1779	1583	1770	1820	0	1770	1835	0
Flt Permitted		0.250			0.955		0.158			0.222		
Satd. Flow (perm)	0	466	1583	0	1779	1583	294	1820	0	414	1835	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			113			80		6			4	
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		653			733			1130			1177	
Travel Time (s)		17.8			20.0			22.0			22.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	0	60	87	5	43	82	636	114	71	799	92
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	38	60	0	92	43	82	750	0	71	891	0
Turn Type	Perm	NA	NA	Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		3		4	4		5	2		1	6	
Permitted Phases	3					4	2			6		
Detector Phase	3	3		4	4	4	5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	3.0	20.0		4.0	20.0	
Minimum Split (s)	8.5	8.5		34.5	34.5	34.5	7.5	25.0		8.5	35.0	
Total Split (s)	24.5	24.5		50.5	50.5	50.5	23.5	50.5		24.5	51.5	
Total Split (%)	16.3%	16.3%		33.7%	33.7%	33.7%	15.7%	33.7%		16.3%	34.3%	
Maximum Green (s)	20.0	20.0		46.0	46.0	46.0	19.0	45.5		20.0	46.5	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	4.0		3.0	4.0	
All-Red Time (s)	1.5	1.5		1.5	1.5	1.5	1.5	1.0		1.5	1.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.5			4.5	4.5	4.5	5.0		4.5	5.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	5.0	5.0		4.0	4.0	4.0	3.0	5.0		5.0	5.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Walk Time (s)				12.0	12.0	12.0		10.0			12.0	
Flash Dont Walk (s)				18.0	18.0	18.0		10.0			18.0	
Pedestrian Calls (#/hr)				0	0	0		0			0	
Act Effct Green (s)		18.4	0.0		14.1	14.1	100.6	92.3		105.0	94.5	
Actuated g/C Ratio		0.12	0.00		0.09	0.09	0.67	0.62		0.70	0.63	
v/c Ratio		0.67	0.53		0.55	0.19	0.30	0.67		0.19	0.77	
Control Delay		111.2	16.7		76.6	3.0	17.4	43.0		9.5	28.6	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		111.2	16.7		76.6	3.0	17.4	43.0		9.5	28.6	

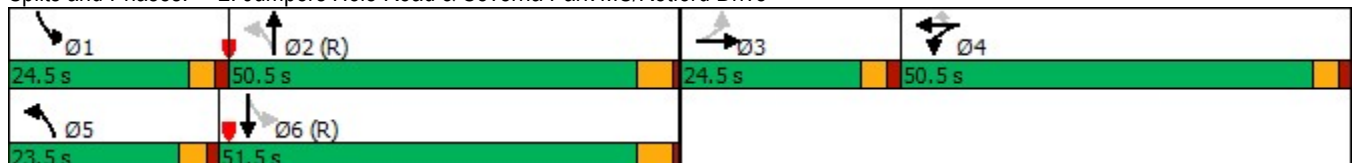


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F	B		E	A	B	D		A	C	
Approach Delay		53.3			53.1			40.5			27.2	
Approach LOS		D			D			D			C	
Queue Length 50th (ft)		36	0		88	0	52	681		21	651	
Queue Length 95th (ft)		#97	0		144	5	m50	m497		44	#998	
Internal Link Dist (ft)		573			653			1050			1097	
Turn Bay Length (ft)							250			145		
Base Capacity (vph)		62	113		545	540	397	1122		476	1157	
Starvation Cap Reductn		0	0		0	0	0	0		0	0	
Spillback Cap Reductn		0	0		0	0	0	0		0	0	
Storage Cap Reductn		0	0		0	0	0	0		0	0	
Reduced v/c Ratio		0.61	0.53		0.17	0.08	0.21	0.67		0.15	0.77	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.77
 Intersection Signal Delay: 35.6
 Intersection LOS: D
 Intersection Capacity Utilization 71.0%
 ICU Level of Service C
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Jumpers Hole Road & Severna Park MS/Retford Drive



Intersection: 1: Jumpers Hole Road & Benfield Road

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB	B21
Directions Served	L	TR	L	T	R	L	TR	L	T	R	T
Maximum Queue (ft)	415	1542	125	1309	325	159	265	410	918	325	44
Average Queue (ft)	320	1081	10	1278	166	107	105	166	613	318	7
95th Queue (ft)	504	1896	86	1294	410	169	216	337	1022	369	50
Link Distance (ft)		1628		1258			823	882	882		1067
Upstream Blk Time (%)		12		56					6		
Queuing Penalty (veh)		0		0					21		
Storage Bay Dist (ft)	340		200		250	85				250	
Storage Blk Time (%)	13	30		47		33	12		0	75	
Queuing Penalty (veh)	132	56		90		30	14		0	15	

Intersection: 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	L	TR	L	TR
Maximum Queue (ft)	267	249	67	132	270	219	466
Average Queue (ft)	117	118	28	55	119	29	215
95th Queue (ft)	217	206	57	103	233	112	404
Link Distance (ft)	602	695	695		1067		1101
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)				400		145	
Storage Blk Time (%)							16
Queuing Penalty (veh)							7

Intersection: 3: Jumpers Hole Road & Yorkshire Drive

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	88	35
Average Queue (ft)	42	5
95th Queue (ft)	71	22
Link Distance (ft)	610	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		50
Storage Blk Time (%)		0
Queuing Penalty (veh)		0

Intersection: 4: Jumpers Hole Road & Edin Garth Road/Idlewild Road

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	T	TR
Maximum Queue (ft)	62	56	39	3	18
Average Queue (ft)	31	25	11	0	1
95th Queue (ft)	57	50	34	2	9
Link Distance (ft)	240	468		699	36
Upstream Blk Time (%)					0
Queuing Penalty (veh)					0
Storage Bay Dist (ft)			50		
Storage Blk Time (%)			0		
Queuing Penalty (veh)			1		

Intersection: 5: Jumpers Hole Road & Clarence Avenue

Movement	WB	NB	SB	SB
Directions Served	LR	TR	L	T
Maximum Queue (ft)	48	33	31	4
Average Queue (ft)	23	2	2	0
95th Queue (ft)	50	14	15	3
Link Distance (ft)	592	36		570
Upstream Blk Time (%)		0		
Queuing Penalty (veh)		0		
Storage Bay Dist (ft)			150	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Jumpers Hole Road & Kinder Road/Earleigh Heights Conn

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	202	238	194	117	213	160	111	189	68
Average Queue (ft)	81	129	71	18	107	49	46	79	14
95th Queue (ft)	156	215	144	71	192	116	86	156	47
Link Distance (ft)	1234		742		570			908	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		225		85		85	85		85
Storage Blk Time (%)		0	0		12	0	1	6	0
Queuing Penalty (veh)		1	0		22	1	3	8	0

Network Summary

Network wide Queuing Penalty: 400

Lanes, Volumes, Timings

Future 2040 Conditions - NB LT - Original Timings

2: Jumpers Hole Road & Severna Park MS/Retford Drive

Timing Plan: AM PEAK



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↕	↕	↕		↕	↕	
Traffic Volume (vph)	50	5	115	120	10	45	120	280	40	40	450	75
Future Volume (vph)	50	5	115	120	10	45	120	280	40	40	450	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		0	400		0	145		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	75			75			75			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.908				0.850		0.981			0.978	
Flt Protected		0.986			0.956		0.950			0.950		
Satd. Flow (prot)	0	1668	0	0	1781	1583	1770	1827	0	1770	1822	0
Flt Permitted		0.125			0.956		0.296			0.501		
Satd. Flow (perm)	0	211	0	0	1781	1583	551	1827	0	933	1822	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		59				80		5			6	
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		653			733			1130			1177	
Travel Time (s)		17.8			20.0			22.0			22.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	5	125	130	11	49	130	304	43	43	489	82
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	184	0	0	141	49	130	347	0	43	571	0
Turn Type	Perm	NA		Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		3		4	4		5	2		1	6	
Permitted Phases	3					4	2			6		
Detector Phase	3	3		4	4	4	5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	3.0	20.0		4.0	20.0	
Minimum Split (s)	8.5	8.5		34.5	34.5	34.5	7.5	25.0		8.5	35.0	
Total Split (s)	24.5	24.5		50.5	50.5	50.5	23.5	50.5		24.5	51.5	
Total Split (%)	16.3%	16.3%		33.7%	33.7%	33.7%	15.7%	33.7%		16.3%	34.3%	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	4.0		3.0	4.0	
All-Red Time (s)	1.5	1.5		1.5	1.5	1.5	1.5	1.0		1.5	1.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.5			4.5	4.5	4.5	5.0		4.5	5.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Act Effct Green (s)		20.7			18.2	18.2	95.4	86.2		91.8	82.5	
Actuated g/C Ratio		0.14			0.12	0.12	0.64	0.57		0.61	0.55	
v/c Ratio		2.30			0.65	0.19	0.30	0.33		0.07	0.57	
Control Delay		645.5			76.4	4.4	19.1	30.2		10.7	25.9	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		645.5			76.4	4.4	19.1	30.2		10.7	25.9	
LOS		F			E	A	B	C		B	C	
Approach Delay		645.5			57.8			27.2			24.8	
Approach LOS		F			E			C			C	
Queue Length 50th (ft)		~242			134	0	70	230		14	344	
Queue Length 95th (ft)		#383			201	13	m103	m293		33	547	

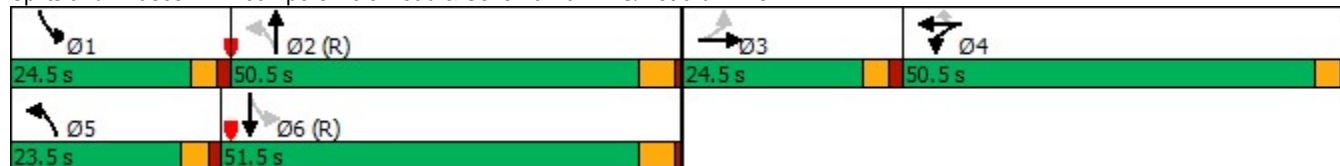


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		573			653			1050			1097	
Turn Bay Length (ft)							400			145		
Base Capacity (vph)		80			546	540	512	1051		718	1004	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		2.30			0.26	0.09	0.25	0.33		0.06	0.57	

Intersection Summary

Area Type:	Other
Cycle Length:	150
Actuated Cycle Length:	150
Offset:	0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	2.30
Intersection Signal Delay:	107.8
Intersection LOS:	F
Intersection Capacity Utilization	63.3%
ICU Level of Service	B
Analysis Period (min)	15
~	Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.
#	95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m	Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Jumpers Hole Road & Severna Park MS/Retford Drive



Intersection: 1: Jumpers Hole Road & Benfield Road

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB	B21	B21
Directions Served	L	TR	L	T	R	L	TR	L	T	R	T	T
Maximum Queue (ft)	415	1682	274	1310	325	148	216	932	827	279	576	593
Average Queue (ft)	413	1650	45	1195	232	70	98	786	538	135	198	194
95th Queue (ft)	431	1669	183	1513	454	128	172	1132	1219	259	618	629
Link Distance (ft)		1628		1258			823	882	882		1067	1067
Upstream Blk Time (%)		82		36				50	22		0	0
Queuing Penalty (veh)		0		0				218	96		0	0
Storage Bay Dist (ft)	340		200		250	85				250		
Storage Blk Time (%)	92	4		41		7	21		0	3		
Queuing Penalty (veh)	1174	18		116		8	18		1	4		

Intersection: 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	L	TR	L	TR
Maximum Queue (ft)	172	152	60	87	326	186	471
Average Queue (ft)	66	74	25	28	146	28	186
95th Queue (ft)	128	139	54	63	291	95	385
Link Distance (ft)	602	695	695		1067		1101
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)				400		145	
Storage Blk Time (%)					0		11
Queuing Penalty (veh)					0		7

Intersection: 3: Jumpers Hole Road & Yorkshire Drive

Movement	WB	SB	SB
Directions Served	LR	L	T
Maximum Queue (ft)	79	57	18
Average Queue (ft)	34	21	1
95th Queue (ft)	65	49	13
Link Distance (ft)	610		699
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		50	
Storage Blk Time (%)		1	
Queuing Penalty (veh)		6	

Intersection: 4: Jumpers Hole Road & Edin Garth Road/Idlewild Road

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	T	TR
Maximum Queue (ft)	75	58	21	3	13
Average Queue (ft)	26	23	2	0	0
95th Queue (ft)	57	49	12	2	7
Link Distance (ft)	240	468		699	36
Upstream Blk Time (%)					0
Queuing Penalty (veh)					0
Storage Bay Dist (ft)			50		
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Jumpers Hole Road & Clarence Avenue

Movement	WB	NB	SB
Directions Served	LR	TR	L
Maximum Queue (ft)	52	26	55
Average Queue (ft)	15	1	18
95th Queue (ft)	43	11	47
Link Distance (ft)	592	36	
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			150
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Jumpers Hole Road & Kinder Road/Earleigh Heights Conn

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	1267	254	254	159	293	160	160	960	160
Average Queue (ft)	997	123	89	44	130	67	154	929	40
95th Queue (ft)	1492	213	185	110	231	146	181	954	136
Link Distance (ft)	1234		742		570			908	
Upstream Blk Time (%)	38							68	
Queuing Penalty (veh)	0							0	
Storage Bay Dist (ft)		225		85		85	85		85
Storage Blk Time (%)		1	0	0	19	2	61	46	0
Queuing Penalty (veh)		3	0	0	59	7	443	211	0

Network Summary

Network wide Queuing Penalty: 2391

Lanes, Volumes, Timings

Future 2040 Conditions - NB LT - Original Timings

2: Jumpers Hole Road & Severna Park MS/Retford Drive

Timing Plan: PM PEAK



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↕	↕	↕		↕	↕	
Traffic Volume (vph)	35	0	55	80	5	40	75	585	105	65	735	85
Future Volume (vph)	35	0	55	80	5	40	75	585	105	65	735	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		0	400		0	145		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	75			75			75			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.917				0.850		0.977			0.985	
Flt Protected		0.981			0.955		0.950			0.950		
Satd. Flow (prot)	0	1676	0	0	1779	1583	1770	1820	0	1770	1835	0
Flt Permitted		0.139			0.955		0.135			0.202		
Satd. Flow (perm)	0	237	0	0	1779	1583	251	1820	0	376	1835	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		80				80		6			4	
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		653			733			1130			1177	
Travel Time (s)		17.8			20.0			22.0			22.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	0	60	87	5	43	82	636	114	71	799	92
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	98	0	0	92	43	82	750	0	71	891	0
Turn Type	Perm	NA		Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		3		4	4		5	2		1	6	
Permitted Phases	3					4	2			6		
Detector Phase	3	3		4	4	4	5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	3.0	20.0		4.0	20.0	
Minimum Split (s)	8.5	8.5		34.5	34.5	34.5	7.5	25.0		8.5	35.0	
Total Split (s)	24.5	24.5		50.5	50.5	50.5	23.5	50.5		24.5	51.5	
Total Split (%)	16.3%	16.3%		33.7%	33.7%	33.7%	15.7%	33.7%		16.3%	34.3%	
Maximum Green (s)	20.0	20.0		46.0	46.0	46.0	19.0	45.5		20.0	46.5	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	4.0		3.0	4.0	
All-Red Time (s)	1.5	1.5		1.5	1.5	1.5	1.5	1.0		1.5	1.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.5			4.5	4.5	4.5	5.0		4.5	5.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	5.0	5.0		4.0	4.0	4.0	3.0	5.0		5.0	5.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Walk Time (s)				12.0	12.0	12.0		10.0			12.0	
Flash Dont Walk (s)				18.0	18.0	18.0		10.0			18.0	
Pedestrian Calls (#/hr)				0	0	0		0			0	
Act Effct Green (s)		20.0			14.1	14.1	95.7	87.3		100.1	89.5	
Actuated g/C Ratio		0.13			0.09	0.09	0.64	0.58		0.67	0.60	
v/c Ratio		0.98			0.55	0.19	0.34	0.71		0.21	0.81	
Control Delay		102.5			76.6	3.0	18.2	45.8		10.0	32.0	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		102.5			76.6	3.0	18.2	45.8		10.0	32.0	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F			E	A	B	D		A	C	
Approach Delay		102.5			53.1			43.0			30.4	
Approach LOS		F			D			D			C	
Queue Length 50th (ft)		21			88	0	52	681		21	651	
Queue Length 95th (ft)		#152			144	5	m50	m497		44	#998	
Internal Link Dist (ft)		573			653			1050			1097	
Turn Bay Length (ft)							400			145		
Base Capacity (vph)		100			545	540	363	1062		442	1096	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.98			0.17	0.08	0.23	0.71		0.16	0.81	

Intersection Summary

Area Type: Other

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.98

Intersection Signal Delay: 40.6

Intersection LOS: D

Intersection Capacity Utilization 71.6%

ICU Level of Service C

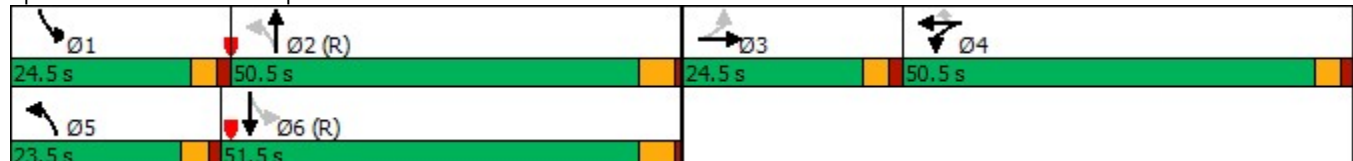
Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Jumpers Hole Road & Severna Park MS/Retford Drive



Intersection: 1: Jumpers Hole Road & Benfield Road

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB	B21
Directions Served	L	TR	L	T	R	L	TR	L	T	R	T
Maximum Queue (ft)	415	1525	173	1310	325	159	250	276	751	325	48
Average Queue (ft)	253	737	9	1278	168	98	99	102	261	208	3
95th Queue (ft)	475	1450	74	1295	411	161	199	206	768	404	40
Link Distance (ft)		1628		1258			823	882	882		1067
Upstream Blk Time (%)		3		54					2		
Queuing Penalty (veh)		0		0					8		
Storage Bay Dist (ft)	340		200		250	85				250	
Storage Blk Time (%)	2	22		45		24	11		1	31	
Queuing Penalty (veh)	18	42		85		22	13		3	6	

Intersection: 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Movement	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	LTR	LT	R	L	TR	L	T	R
Maximum Queue (ft)	234	249	71	121	280	185	382	1106
Average Queue (ft)	103	113	28	49	121	14	85	942
95th Queue (ft)	193	206	59	99	244	79	285	1346
Link Distance (ft)	602	695	695		1067		1101	1101
Upstream Blk Time (%)								61
Queuing Penalty (veh)								180
Storage Bay Dist (ft)				250		145		
Storage Blk Time (%)					1		6	
Queuing Penalty (veh)					1		2	

Intersection: 3: Jumpers Hole Road & Yorkshire Drive

Movement	WB	SB	SB
Directions Served	LR	L	T
Maximum Queue (ft)	508	25	705
Average Queue (ft)	196	2	403
95th Queue (ft)	569	16	967
Link Distance (ft)	610		699
Upstream Blk Time (%)	15		55
Queuing Penalty (veh)	0		312
Storage Bay Dist (ft)		50	
Storage Blk Time (%)		0	59
Queuing Penalty (veh)		0	11

Intersection: 4: Jumpers Hole Road & Edin Garth Road/Idlewild Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	TR
Maximum Queue (ft)	243	343	35	38
Average Queue (ft)	124	90	6	20
95th Queue (ft)	281	257	24	49
Link Distance (ft)	240	468		36
Upstream Blk Time (%)	40			55
Queuing Penalty (veh)	0			302
Storage Bay Dist (ft)			50	
Storage Blk Time (%)			0	
Queuing Penalty (veh)			0	

Intersection: 5: Jumpers Hole Road & Clarence Avenue

Movement	WB	NB	SB	SB
Directions Served	LR	TR	L	T
Maximum Queue (ft)	394	7	24	572
Average Queue (ft)	130	0	1	303
95th Queue (ft)	384	5	12	764
Link Distance (ft)	592	36		570
Upstream Blk Time (%)	4			50
Queuing Penalty (veh)	0			268
Storage Bay Dist (ft)			150	
Storage Blk Time (%)				53
Queuing Penalty (veh)				5

Intersection: 6: Jumpers Hole Road & Kinder Road/Earleigh Heights Conn

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	1234	286	749	74	207	160	110	915	64
Average Queue (ft)	427	205	378	16	104	56	28	436	10
95th Queue (ft)	1180	341	921	52	188	135	82	1088	42
Link Distance (ft)	1234		742		570			908	
Upstream Blk Time (%)	13		43					38	
Queuing Penalty (veh)	0		0					0	
Storage Bay Dist (ft)		225		85		85	85		85
Storage Blk Time (%)		48	0	0	11	0	1	51	
Queuing Penalty (veh)		87	0	0	19	0	1	68	

Network Summary

Network wide Queuing Penalty: 1455

Lanes, Volumes, Timings

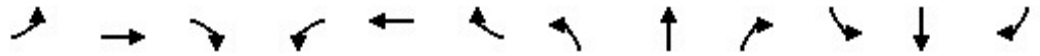
Future 2040 Conditions - SB RT - Original Timings

2: Jumpers Hole Road & Severna Park MS/Retford Drive

Timing Plan: AM PEAK



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔	↔	↔	↔		↔	↔	↔
Traffic Volume (vph)	50	5	115	120	10	45	120	280	40	40	450	75
Future Volume (vph)	50	5	115	120	10	45	120	280	40	40	450	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		0	250		0	145		0
Storage Lanes	0		0	0		1	1		0	1		1
Taper Length (ft)	75			75			75			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.908				0.850		0.981				0.850
Flt Protected		0.986			0.956		0.950			0.950		
Satd. Flow (prot)	0	1668	0	0	1781	1583	1770	1827	0	1770	1863	1583
Flt Permitted		0.095			0.956		0.309			0.475		
Satd. Flow (perm)	0	161	0	0	1781	1583	576	1827	0	885	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		59				80		5				113
Link Speed (mph)		25			25			35				35
Link Distance (ft)		653			733			1130				1177
Travel Time (s)		17.8			20.0			22.0				22.9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	5	125	130	11	49	130	304	43	43	489	82
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	184	0	0	141	49	130	347	0	43	489	82
Turn Type	Perm	NA		Split	NA	Perm	pm+pt	NA		pm+pt	NA	NA
Protected Phases		3		4	4		5	2		1	6	
Permitted Phases	3					4	2			6		
Detector Phase	3	3		4	4	4	5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	3.0	20.0		4.0	20.0	
Minimum Split (s)	8.5	8.5		34.5	34.5	34.5	7.5	25.0		8.5	35.0	
Total Split (s)	24.5	24.5		50.5	50.5	50.5	23.5	50.5		24.5	51.5	
Total Split (%)	16.3%	16.3%		33.7%	33.7%	33.7%	15.7%	33.7%		16.3%	34.3%	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	4.0		3.0	4.0	
All-Red Time (s)	1.5	1.5		1.5	1.5	1.5	1.5	1.0		1.5	1.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.5			4.5	4.5	4.5	5.0		4.5	5.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Act Effct Green (s)		31.2			18.2	18.2	84.8	75.5		81.1	71.6	0.0
Actuated g/C Ratio		0.21			0.12	0.12	0.57	0.50		0.54	0.48	0.00
v/c Ratio		2.30			0.65	0.19	0.32	0.38		0.08	0.55	0.73
Control Delay		642.6			76.4	4.4	25.2	39.1		13.3	30.5	37.0
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		642.6			76.4	4.4	25.2	39.1		13.3	30.5	37.0
LOS		F			E	A	C	D		B	C	D
Approach Delay		642.6			57.8			35.3			30.1	
Approach LOS		F			E			D			C	
Queue Length 50th (ft)		~214			134	0	92	295		18	338	0
Queue Length 95th (ft)		#396			201	13	m103	m293		33	431	#55

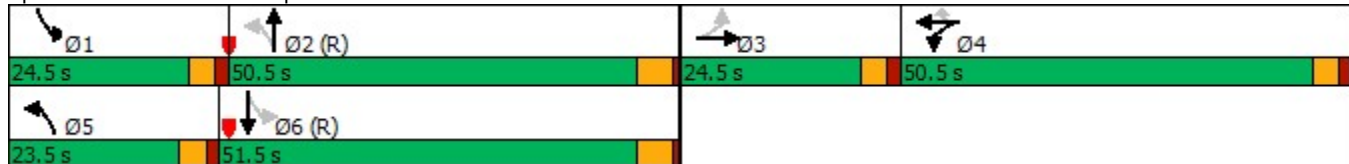


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		573			653			1050			1097	
Turn Bay Length (ft)							250			145		
Base Capacity (vph)		80			546	540	485	921		631	889	113
Starvation Cap Reductn		0			0	0	0	0		0	0	0
Spillback Cap Reductn		0			0	0	0	0		0	0	0
Storage Cap Reductn		0			0	0	0	0		0	0	0
Reduced v/c Ratio		2.30			0.26	0.09	0.27	0.38		0.07	0.55	0.73

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 2.30
 Intersection Signal Delay: 112.3
 Intersection LOS: F
 Intersection Capacity Utilization 58.8%
 ICU Level of Service B
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Jumpers Hole Road & Severna Park MS/Retford Drive



Intersection: 1: Jumpers Hole Road & Benfield Road

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB	B21	B21
Directions Served	L	TR	L	T	R	L	TR	L	T	R	T	T
Maximum Queue (ft)	415	1682	275	1302	325	155	206	830	552	227	80	63
Average Queue (ft)	413	1627	48	1216	227	66	94	371	151	75	8	5
95th Queue (ft)	427	1850	190	1453	453	124	168	906	569	180	78	67
Link Distance (ft)		1628		1258			823	882	882		1067	1067
Upstream Blk Time (%)		68		35				5	1			
Queuing Penalty (veh)		0		0				25	4			
Storage Bay Dist (ft)	340		200		250	85					250	
Storage Blk Time (%)	78	7		40		8	18		0	1		
Queuing Penalty (veh)	1008	28		114		9	16		0	1		

Intersection: 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Movement	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	LTR	LT	R	L	TR	L	T	R
Maximum Queue (ft)	178	179	56	73	334	143	332	1106
Average Queue (ft)	63	73	24	20	145	16	78	973
95th Queue (ft)	127	137	51	55	304	79	247	1304
Link Distance (ft)	602	695	695		1067		1101	1101
Upstream Blk Time (%)								59
Queuing Penalty (veh)								266
Storage Bay Dist (ft)				250		145		
Storage Blk Time (%)					2		3	
Queuing Penalty (veh)					2		2	

Intersection: 3: Jumpers Hole Road & Yorkshire Drive

Movement	WB	NB	SB	SB
Directions Served	LR	TR	L	T
Maximum Queue (ft)	243	4	56	704
Average Queue (ft)	62	0	10	393
95th Queue (ft)	229	3	36	960
Link Distance (ft)	610	1101		699
Upstream Blk Time (%)				54
Queuing Penalty (veh)				516
Storage Bay Dist (ft)			50	
Storage Blk Time (%)			0	57
Queuing Penalty (veh)			2	45

Intersection: 4: Jumpers Hole Road & Edin Garth Road/Idlewild Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	TR
Maximum Queue (ft)	249	332	31	39
Average Queue (ft)	117	106	2	20
95th Queue (ft)	281	327	14	50
Link Distance (ft)	240	468		36
Upstream Blk Time (%)	33	4		54
Queuing Penalty (veh)	0	0		513
Storage Bay Dist (ft)			50	
Storage Blk Time (%)			0	
Queuing Penalty (veh)			1	

Intersection: 5: Jumpers Hole Road & Clarence Avenue

Movement	WB	NB	SB	SB
Directions Served	LR	TR	L	T
Maximum Queue (ft)	146	6	44	575
Average Queue (ft)	44	0	9	303
95th Queue (ft)	130	4	34	766
Link Distance (ft)	592	36		570
Upstream Blk Time (%)		0		52
Queuing Penalty (veh)		0		518
Storage Bay Dist (ft)			150	
Storage Blk Time (%)				53
Queuing Penalty (veh)				37

Intersection: 6: Jumpers Hole Road & Kinder Road/Earleigh Heights Conn

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	1252	286	749	120	313	160	160	962	160
Average Queue (ft)	1001	202	391	31	126	75	77	919	22
95th Queue (ft)	1534	347	917	85	240	162	204	945	103
Link Distance (ft)	1234		742		570			908	
Upstream Blk Time (%)	57		43					85	
Queuing Penalty (veh)	0		0					0	
Storage Bay Dist (ft)		225		85		85	85		85
Storage Blk Time (%)		49	0	0	17	1	29	72	
Queuing Penalty (veh)		97	0	0	54	3	217	327	

Network Summary

Network wide Queuing Penalty: 3805

Lanes, Volumes, Timings

Future 2040 Conditions - SB RT - Original Timings

2: Jumpers Hole Road & Severna Park MS/Retford Drive

Timing Plan: PM PEAK



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↕	↕	↕		↕	↕	
Traffic Volume (vph)	35	0	55	80	5	40	75	585	105	65	735	85
Future Volume (vph)	35	0	55	80	5	40	75	585	105	65	735	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		0	250		0	145		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	75			75			75			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.917				0.850		0.977			0.985	
Flt Protected		0.981			0.955		0.950			0.950		
Satd. Flow (prot)	0	1676	0	0	1779	1583	1770	1820	0	1770	1835	0
Flt Permitted		0.139			0.955		0.135			0.202		
Satd. Flow (perm)	0	237	0	0	1779	1583	251	1820	0	376	1835	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		80				80		6			4	
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		653			733			1130			1177	
Travel Time (s)		17.8			20.0			22.0			22.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	0	60	87	5	43	82	636	114	71	799	92
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	98	0	0	92	43	82	750	0	71	891	0
Turn Type	Perm	NA		Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		3		4	4		5	2		1	6	
Permitted Phases	3					4	2			6		
Detector Phase	3	3		4	4	4	5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	3.0	20.0		4.0	20.0	
Minimum Split (s)	8.5	8.5		34.5	34.5	34.5	7.5	25.0		8.5	35.0	
Total Split (s)	24.5	24.5		50.5	50.5	50.5	23.5	50.5		24.5	51.5	
Total Split (%)	16.3%	16.3%		33.7%	33.7%	33.7%	15.7%	33.7%		16.3%	34.3%	
Maximum Green (s)	20.0	20.0		46.0	46.0	46.0	19.0	45.5		20.0	46.5	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	4.0		3.0	4.0	
All-Red Time (s)	1.5	1.5		1.5	1.5	1.5	1.5	1.0		1.5	1.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.5			4.5	4.5	4.5	5.0		4.5	5.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	5.0	5.0		4.0	4.0	4.0	3.0	5.0		5.0	5.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Walk Time (s)				12.0	12.0	12.0		10.0			12.0	
Flash Dont Walk (s)				18.0	18.0	18.0		10.0			18.0	
Pedestrian Calls (#/hr)				0	0	0		0			0	
Act Effct Green (s)		20.0			14.1	14.1	95.7	87.3		100.1	89.5	
Actuated g/C Ratio		0.13			0.09	0.09	0.64	0.58		0.67	0.60	
v/c Ratio		0.98			0.55	0.19	0.34	0.71		0.21	0.81	
Control Delay		102.5			76.6	3.0	18.2	45.8		10.0	32.0	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		102.5			76.6	3.0	18.2	45.8		10.0	32.0	

Lanes, Volumes, Timings
 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Future 2040 Conditions - SB RT - Original Timings
 Timing Plan: PM PEAK

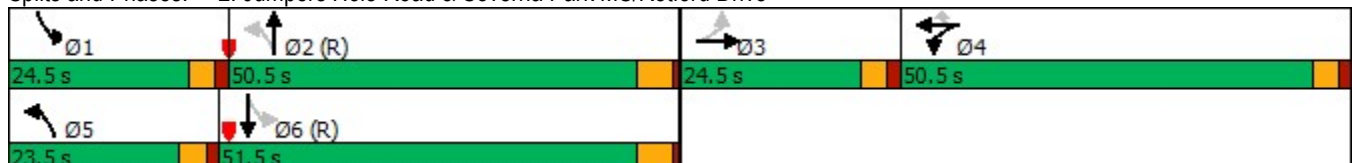


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F			E	A	B	D		A	C	
Approach Delay		102.5			53.1			43.0			30.4	
Approach LOS		F			D			D			C	
Queue Length 50th (ft)		21			88	0	52	681		21	651	
Queue Length 95th (ft)		#152			144	5	m50	m497		44	#998	
Internal Link Dist (ft)		573			653			1050			1097	
Turn Bay Length (ft)							250			145		
Base Capacity (vph)		100			545	540	363	1062		442	1096	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.98			0.17	0.08	0.23	0.71		0.16	0.81	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.98
 Intersection Signal Delay: 40.6
 Intersection LOS: D
 Intersection Capacity Utilization 71.6%
 ICU Level of Service C
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Jumpers Hole Road & Severna Park MS/Retford Drive



Intersection: 1: Jumpers Hole Road & Benfield Road

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB	B21
Directions Served	L	TR	L	T	R	L	TR	L	T	R	T
Maximum Queue (ft)	415	1525	173	1310	325	159	250	276	751	325	48
Average Queue (ft)	253	737	9	1278	168	98	99	102	261	208	3
95th Queue (ft)	475	1450	74	1295	411	161	199	206	768	404	40
Link Distance (ft)		1628		1258			823	882	882		1067
Upstream Blk Time (%)		3		54					2		
Queuing Penalty (veh)		0		0					8		
Storage Bay Dist (ft)	340		200		250	85				250	
Storage Blk Time (%)	2	22		45		24	11		1	31	
Queuing Penalty (veh)	18	42		85		22	13		3	6	

Intersection: 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Movement	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	LTR	LT	R	L	TR	L	T	R
Maximum Queue (ft)	234	249	71	121	280	185	382	1106
Average Queue (ft)	103	113	28	49	121	14	85	942
95th Queue (ft)	193	206	59	99	244	79	285	1346
Link Distance (ft)	602	695	695		1067		1101	1101
Upstream Blk Time (%)								61
Queuing Penalty (veh)								180
Storage Bay Dist (ft)				250		145		
Storage Blk Time (%)					1		6	
Queuing Penalty (veh)					1		2	

Intersection: 3: Jumpers Hole Road & Yorkshire Drive

Movement	WB	SB	SB
Directions Served	LR	L	T
Maximum Queue (ft)	508	25	705
Average Queue (ft)	196	2	403
95th Queue (ft)	569	16	967
Link Distance (ft)	610		699
Upstream Blk Time (%)	15		55
Queuing Penalty (veh)	0		312
Storage Bay Dist (ft)		50	
Storage Blk Time (%)		0	59
Queuing Penalty (veh)		0	11

Intersection: 4: Jumpers Hole Road & Edin Garth Road/Idlewild Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	TR
Maximum Queue (ft)	243	343	35	38
Average Queue (ft)	124	90	6	20
95th Queue (ft)	281	257	24	49
Link Distance (ft)	240	468		36
Upstream Blk Time (%)	40			55
Queuing Penalty (veh)	0			302
Storage Bay Dist (ft)			50	
Storage Blk Time (%)			0	
Queuing Penalty (veh)			0	

Intersection: 5: Jumpers Hole Road & Clarence Avenue

Movement	WB	NB	SB	SB
Directions Served	LR	TR	L	T
Maximum Queue (ft)	394	7	24	572
Average Queue (ft)	130	0	1	303
95th Queue (ft)	384	5	12	764
Link Distance (ft)	592	36		570
Upstream Blk Time (%)	4			50
Queuing Penalty (veh)	0			268
Storage Bay Dist (ft)			150	
Storage Blk Time (%)				53
Queuing Penalty (veh)				5

Intersection: 6: Jumpers Hole Road & Kinder Road/Earleigh Heights Conn

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	1234	286	749	74	207	160	110	915	64
Average Queue (ft)	427	205	378	16	104	56	28	436	10
95th Queue (ft)	1180	341	921	52	188	135	82	1088	42
Link Distance (ft)	1234		742		570			908	
Upstream Blk Time (%)	13		43					38	
Queuing Penalty (veh)	0		0					0	
Storage Bay Dist (ft)		225		85		85	85		85
Storage Blk Time (%)		48	0	0	11	0	1	51	
Queuing Penalty (veh)		87	0	0	19	0	1	68	

Network Summary

Network wide Queuing Penalty: 1455

Lanes, Volumes, Timings

Future 2040 Conditions - No Change - Original Timings

2: Jumpers Hole Road & Severna Park MS/Retford Drive

Timing Plan: AM PEAK



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↕	↕	↕		↕	↕	
Traffic Volume (vph)	50	5	115	120	10	45	120	280	40	40	450	75
Future Volume (vph)	50	5	115	120	10	45	120	280	40	40	450	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		0	250		0	145		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	75			75			75			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.908				0.850		0.981			0.978	
Flt Protected		0.986			0.956		0.950			0.950		
Satd. Flow (prot)	0	1668	0	0	1781	1583	1770	1827	0	1770	1822	0
Flt Permitted		0.125			0.956		0.296			0.501		
Satd. Flow (perm)	0	211	0	0	1781	1583	551	1827	0	933	1822	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		59				80		5			6	
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		653			733			1130			1177	
Travel Time (s)		17.8			20.0			22.0			22.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	5	125	130	11	49	130	304	43	43	489	82
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	184	0	0	141	49	130	347	0	43	571	0
Turn Type	Perm	NA		Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		3		4	4		5	2		1	6	
Permitted Phases	3					4	2			6		
Detector Phase	3	3		4	4	4	5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	3.0	20.0		4.0	20.0	
Minimum Split (s)	8.5	8.5		34.5	34.5	34.5	7.5	25.0		8.5	35.0	
Total Split (s)	24.5	24.5		50.5	50.5	50.5	23.5	50.5		24.5	51.5	
Total Split (%)	16.3%	16.3%		33.7%	33.7%	33.7%	15.7%	33.7%		16.3%	34.3%	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	4.0		3.0	4.0	
All-Red Time (s)	1.5	1.5		1.5	1.5	1.5	1.5	1.0		1.5	1.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.5			4.5	4.5	4.5	5.0		4.5	5.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Act Effct Green (s)		20.7			18.2	18.2	95.4	86.2		91.8	82.5	
Actuated g/C Ratio		0.14			0.12	0.12	0.64	0.57		0.61	0.55	
v/c Ratio		2.30			0.65	0.19	0.30	0.33		0.07	0.57	
Control Delay		645.5			76.4	4.4	19.1	30.2		10.7	25.9	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		645.5			76.4	4.4	19.1	30.2		10.7	25.9	
LOS		F			E	A	B	C		B	C	
Approach Delay		645.5			57.8			27.2			24.8	
Approach LOS		F			E			C			C	
Queue Length 50th (ft)		~242			134	0	70	230		14	344	
Queue Length 95th (ft)		#383			201	13	m103	m293		33	547	

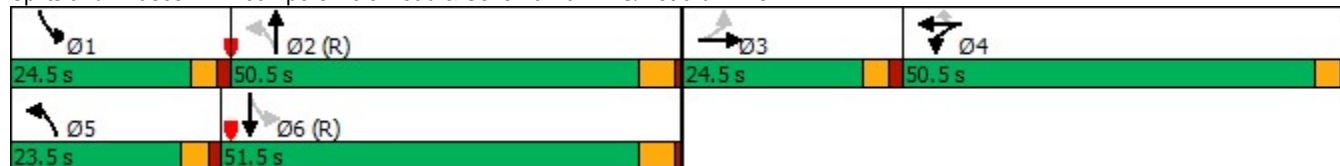


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		573			653			1050			1097	
Turn Bay Length (ft)							250			145		
Base Capacity (vph)		80			546	540	512	1051		718	1004	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		2.30			0.26	0.09	0.25	0.33		0.06	0.57	

Intersection Summary

Area Type:	Other
Cycle Length:	150
Actuated Cycle Length:	150
Offset:	0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	2.30
Intersection Signal Delay:	107.8
Intersection LOS:	F
Intersection Capacity Utilization:	63.3%
ICU Level of Service:	B
Analysis Period (min):	15
~	Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.
#	95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m	Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Jumpers Hole Road & Severna Park MS/Retford Drive



Intersection: 1: Jumpers Hole Road & Benfield Road

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB	B21	B21
Directions Served	L	TR	L	T	R	L	TR	L	T	R	T	T
Maximum Queue (ft)	415	1682	275	1302	325	155	206	830	552	227	80	63
Average Queue (ft)	413	1627	48	1216	227	66	94	371	151	75	8	5
95th Queue (ft)	427	1850	190	1453	453	124	168	906	569	180	78	67
Link Distance (ft)		1628		1258			823	882	882		1067	1067
Upstream Blk Time (%)		68		35				5	1			
Queuing Penalty (veh)		0		0				25	4			
Storage Bay Dist (ft)	340		200		250	85					250	
Storage Blk Time (%)	78	7		40		8	18		0	1		
Queuing Penalty (veh)	1008	28		114		9	16		0	1		

Intersection: 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Movement	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	LTR	LT	R	L	TR	L	T	R
Maximum Queue (ft)	178	179	56	73	334	143	332	1106
Average Queue (ft)	63	73	24	20	145	16	78	973
95th Queue (ft)	127	137	51	55	304	79	247	1304
Link Distance (ft)	602	695	695		1067		1101	1101
Upstream Blk Time (%)								59
Queuing Penalty (veh)								266
Storage Bay Dist (ft)				250		145		
Storage Blk Time (%)					2		3	
Queuing Penalty (veh)					2		2	

Intersection: 3: Jumpers Hole Road & Yorkshire Drive

Movement	WB	NB	SB	SB
Directions Served	LR	TR	L	T
Maximum Queue (ft)	243	4	56	704
Average Queue (ft)	62	0	10	393
95th Queue (ft)	229	3	36	960
Link Distance (ft)	610	1101		699
Upstream Blk Time (%)				54
Queuing Penalty (veh)				516
Storage Bay Dist (ft)			50	
Storage Blk Time (%)			0	57
Queuing Penalty (veh)			2	45

Intersection: 4: Jumpers Hole Road & Edin Garth Road/Idlewild Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	TR
Maximum Queue (ft)	249	332	31	39
Average Queue (ft)	117	106	2	20
95th Queue (ft)	281	327	14	50
Link Distance (ft)	240	468		36
Upstream Blk Time (%)	33	4		54
Queuing Penalty (veh)	0	0		513
Storage Bay Dist (ft)			50	
Storage Blk Time (%)			0	
Queuing Penalty (veh)			1	

Intersection: 5: Jumpers Hole Road & Clarence Avenue

Movement	WB	NB	SB	SB
Directions Served	LR	TR	L	T
Maximum Queue (ft)	146	6	44	575
Average Queue (ft)	44	0	9	303
95th Queue (ft)	130	4	34	766
Link Distance (ft)	592	36		570
Upstream Blk Time (%)		0		52
Queuing Penalty (veh)		0		518
Storage Bay Dist (ft)			150	
Storage Blk Time (%)				53
Queuing Penalty (veh)				37

Intersection: 6: Jumpers Hole Road & Kinder Road/Earleigh Heights Conn

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	1252	286	749	120	313	160	160	962	160
Average Queue (ft)	1001	202	391	31	126	75	77	919	22
95th Queue (ft)	1534	347	917	85	240	162	204	945	103
Link Distance (ft)	1234		742		570			908	
Upstream Blk Time (%)	57		43					85	
Queuing Penalty (veh)	0		0					0	
Storage Bay Dist (ft)		225		85		85	85		85
Storage Blk Time (%)		49	0	0	17	1	29	72	
Queuing Penalty (veh)		97	0	0	54	3	217	327	

Network Summary

Network wide Queuing Penalty: 3805

Lanes, Volumes, Timings

Future 2040 Conditions - No Change - Original Timings

2: Jumpers Hole Road & Severna Park MS/Retford Drive

Timing Plan: PM PEAK



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↕	↕	↕		↕	↕	↕
Traffic Volume (vph)	35	0	55	80	5	40	75	585	105	65	735	85
Future Volume (vph)	35	0	55	80	5	40	75	585	105	65	735	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		0	250		0	145		0
Storage Lanes	0		0	0		1	1		0	1		1
Taper Length (ft)	75			75			75			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.917				0.850		0.977				0.850
Flt Protected		0.981			0.955		0.950			0.950		
Satd. Flow (prot)	0	1676	0	0	1779	1583	1770	1820	0	1770	1863	1583
Flt Permitted		0.139			0.955		0.193			0.202		
Satd. Flow (perm)	0	237	0	0	1779	1583	360	1820	0	376	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		80				80		6				113
Link Speed (mph)		25			25			35				35
Link Distance (ft)		653			733			1130				1177
Travel Time (s)		17.8			20.0			22.0				22.9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	0	60	87	5	43	82	636	114	71	799	92
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	98	0	0	92	43	82	750	0	71	799	92
Turn Type	Perm	NA		Split	NA	Perm	pm+pt	NA		pm+pt	NA	NA
Protected Phases		3		4	4		5	2		1	6	
Permitted Phases	3					4	2			6		
Detector Phase	3	3		4	4	4	5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	3.0	20.0		4.0	20.0	
Minimum Split (s)	8.5	8.5		34.5	34.5	34.5	7.5	25.0		8.5	35.0	
Total Split (s)	24.5	24.5		50.5	50.5	50.5	23.5	50.5		24.5	51.5	
Total Split (%)	16.3%	16.3%		33.7%	33.7%	33.7%	15.7%	33.7%		16.3%	34.3%	
Maximum Green (s)	20.0	20.0		46.0	46.0	46.0	19.0	45.5		20.0	46.5	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	4.0		3.0	4.0	
All-Red Time (s)	1.5	1.5		1.5	1.5	1.5	1.5	1.0		1.5	1.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.5			4.5	4.5	4.5	5.0		4.5	5.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	5.0	5.0		4.0	4.0	4.0	3.0	5.0		5.0	5.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Walk Time (s)				12.0	12.0	12.0		10.0			12.0	
Flash Dont Walk (s)				18.0	18.0	18.0		10.0			18.0	
Pedestrian Calls (#/hr)				0	0	0		0			0	
Act Effct Green (s)		20.0			14.1	14.1	95.7	87.3		100.1	89.5	0.0
Actuated g/C Ratio		0.13			0.09	0.09	0.64	0.58		0.67	0.60	0.00
v/c Ratio		0.98			0.55	0.19	0.27	0.71		0.21	0.72	0.81
Control Delay		102.5			76.6	3.0	18.1	45.8		10.0	27.1	50.9
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		102.5			76.6	3.0	18.1	45.8		10.0	27.1	50.9

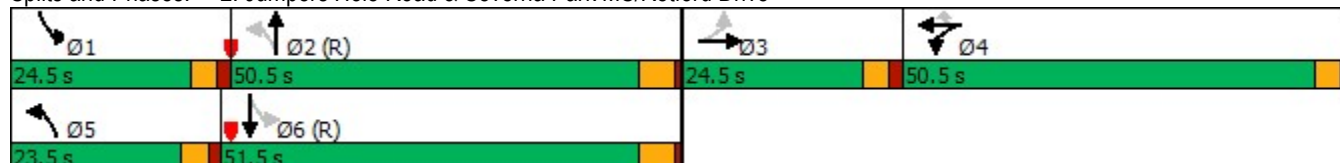


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F			E	A	B	D		A	C	D
Approach Delay		102.5			53.1			43.0			28.1	
Approach LOS		F			D			D			C	
Queue Length 50th (ft)		21			88	0	52	681		21	529	0
Queue Length 95th (ft)		#152			144	5	m50	m497		44	785	#79
Internal Link Dist (ft)		573			653			1050			1097	
Turn Bay Length (ft)							250			145		
Base Capacity (vph)		100			545	540	424	1062		442	1111	113
Starvation Cap Reductn		0			0	0	0	0		0	0	0
Spillback Cap Reductn		0			0	0	0	0		0	0	0
Storage Cap Reductn		0			0	0	0	0		0	0	0
Reduced v/c Ratio		0.98			0.17	0.08	0.19	0.71		0.16	0.72	0.81

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.98
 Intersection Signal Delay: 39.5
 Intersection LOS: D
 Intersection Capacity Utilization 66.5%
 ICU Level of Service C
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Jumpers Hole Road & Severna Park MS/Retford Drive



Intersection: 1: Jumpers Hole Road & Benfield Road

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB	B21	B21
Directions Served	L	TR	L	T	R	L	TR	L	T	R	T	T
Maximum Queue (ft)	415	1671	124	1305	325	159	264	684	971	325	140	255
Average Queue (ft)	349	1271	6	1278	174	103	96	193	683	316	5	63
95th Queue (ft)	517	2041	60	1294	416	164	202	467	1174	367	68	252
Link Distance (ft)		1628		1258			823	882	882		1055	1055
Upstream Blk Time (%)		24		56				0	26			
Queuing Penalty (veh)		0		0				1	88			
Storage Bay Dist (ft)	340		200		250	85					250	
Storage Blk Time (%)	29	29		48		30	10		1	72		
Queuing Penalty (veh)	285	54		90		27	13		6	14		

Intersection: 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	TR	L	TR
Maximum Queue (ft)	125	84	258	62	97	245	219	398
Average Queue (ft)	52	42	116	25	45	96	35	184
95th Queue (ft)	103	73	206	53	87	198	133	343
Link Distance (ft)	600	600	695	695		1055		1101
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)					250		145	
Storage Blk Time (%)						0	12	
Queuing Penalty (veh)						1	5	

Intersection: 3: Jumpers Hole Road & Yorkshire Drive

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	99	31
Average Queue (ft)	40	5
95th Queue (ft)	71	23
Link Distance (ft)	610	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		50
Storage Blk Time (%)		0
Queuing Penalty (veh)		0

Intersection: 4: Jumpers Hole Road & Edin Garth Road/Idlewild Road

Movement	EB	WB	NB	NB
Directions Served	LTR	LTR	L	T
Maximum Queue (ft)	68	56	44	13
Average Queue (ft)	33	26	10	0
95th Queue (ft)	60	50	33	9
Link Distance (ft)	240	468		699
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			50	
Storage Blk Time (%)			0	0
Queuing Penalty (veh)			1	0

Intersection: 5: Jumpers Hole Road & Clarence Avenue

Movement	WB	NB	SB
Directions Served	LR	TR	L
Maximum Queue (ft)	57	13	31
Average Queue (ft)	24	1	4
95th Queue (ft)	51	8	19
Link Distance (ft)	592	36	
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			150
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Jumpers Hole Road & Kinder Road/Earleigh Heights Conn

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	172	261	224	120	240	160	119	183	91
Average Queue (ft)	77	122	74	20	106	57	47	74	18
95th Queue (ft)	142	211	167	73	200	132	92	144	57
Link Distance (ft)	1234		742		570			908	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		225		85		85	85		85
Storage Blk Time (%)		1	0	0	12	0	1	6	
Queuing Penalty (veh)		1	0	0	22	0	3	8	

Network Summary

Network wide Queuing Penalty: 617

Lanes, Volumes, Timings

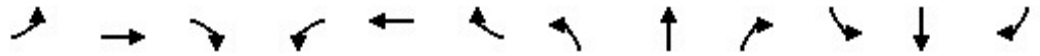
Future 2040 Conditions - EB RT - Optimized Timings

2: Jumpers Hole Road & Severna Park MS/Retford Drive

Timing Plan: AM PEAK



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↖	↗	↖	↗	↖	↗	↖	↗
Traffic Volume (vph)	50	5	115	120	10	45	120	280	40	40	450	75
Future Volume (vph)	50	5	115	120	10	45	120	280	40	40	450	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		0	250		0	145		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	75			75			75			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.981			0.978	
Flt Protected		0.956			0.956		0.950			0.950		
Satd. Flow (prot)	0	1781	1583	0	1781	1583	1770	1827	0	1770	1822	0
Flt Permitted		0.125			0.956		0.175			0.457		
Satd. Flow (perm)	0	233	1583	0	1781	1583	326	1827	0	851	1822	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			125			113		5			6	
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		653			733			1130			1177	
Travel Time (s)		17.8			20.0			22.0			22.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	5	125	130	11	49	130	304	43	43	489	82
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	59	125	0	141	49	130	347	0	43	571	0
Turn Type	Perm	NA	pm+ov	Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		3	5	4	4		5	2		1	6	
Permitted Phases	3		3			4	2			6		
Detector Phase	3	3	5	4	4	4	5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0	3.0	4.0	4.0	4.0	3.0	20.0		4.0	20.0	
Minimum Split (s)	8.5	8.5	7.5	34.5	34.5	34.5	7.5	25.0		8.5	35.0	
Total Split (s)	45.0	45.0	14.0	35.0	35.0	35.0	14.0	61.0		9.0	56.0	
Total Split (%)	30.0%	30.0%	9.3%	23.3%	23.3%	23.3%	9.3%	40.7%		6.0%	37.3%	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	4.0		3.0	4.0	
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.0		1.5	1.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.5	4.5		4.5	4.5	4.5	5.0		4.5	5.0	
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	C-Min		None	C-Min	
Act Effct Green (s)		39.6	51.7		18.1	18.1	77.8	67.0		71.4	61.7	
Actuated g/C Ratio		0.26	0.34		0.12	0.12	0.52	0.45		0.48	0.41	
v/c Ratio		0.97	0.20		0.66	0.17	0.46	0.42		0.09	0.76	
Control Delay		161.1	3.4		76.9	1.3	34.5	44.4		20.3	46.8	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		161.1	3.4		76.9	1.3	34.5	44.4		20.3	46.8	
LOS		F	A		E	A	C	D		C	D	
Approach Delay		54.0			57.4			41.7			45.0	
Approach LOS		D			E			D			D	
Queue Length 50th (ft)		57	0		134	0	86	276		20	474	
Queue Length 95th (ft)		#157	27		201	0	m111	m303		45	#761	

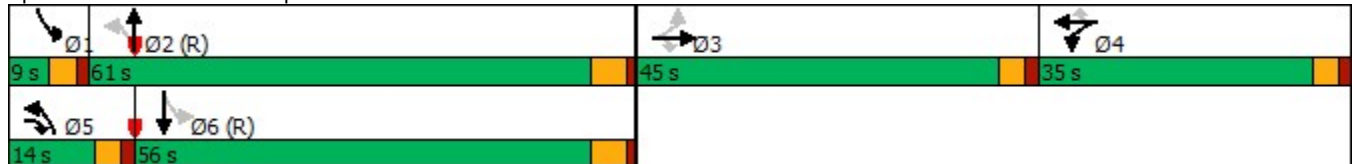


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		573			653			1050			1097	
Turn Bay Length (ft)							250			145		
Base Capacity (vph)		63	630		362	411	288	818		461	752	
Starvation Cap Reductn		0	0		0	0	0	0		0	0	
Spillback Cap Reductn		0	0		0	0	0	0		0	0	
Storage Cap Reductn		0	0		0	0	0	0		0	0	
Reduced v/c Ratio		0.94	0.20		0.39	0.12	0.45	0.42		0.09	0.76	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 46.6
 Intersection LOS: D
 Intersection Capacity Utilization 60.4%
 ICU Level of Service B
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Jumpers Hole Road & Severna Park MS/Retford Drive



Intersection: 1: Jumpers Hole Road & Benfield Road

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB	B21	B21
Directions Served	L	TR	L	T	R	L	TR	L	T	R	T	T
Maximum Queue (ft)	415	1680	274	1302	325	152	217	965	960	278	301	274
Average Queue (ft)	414	1644	41	1219	226	68	100	697	349	131	50	46
95th Queue (ft)	417	1742	171	1507	451	131	182	1035	934	241	297	301
Link Distance (ft)		1628		1258			823	882	882		1055	1055
Upstream Blk Time (%)		83		39				19	7		0	
Queuing Penalty (veh)		0		0				82	30		0	
Storage Bay Dist (ft)	340		200		250	85				250		
Storage Blk Time (%)	94	5		41		8	21		0	2		
Queuing Penalty (veh)	1200	19		117		9	18		1	3		

Intersection: 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	TR	L	TR
Maximum Queue (ft)	96	69	185	55	83	280	186	400
Average Queue (ft)	32	28	76	24	28	112	34	173
95th Queue (ft)	72	57	143	49	62	240	119	358
Link Distance (ft)	600	600	695	695		1055		1101
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)					250		145	
Storage Blk Time (%)						1		9
Queuing Penalty (veh)						1		6

Intersection: 3: Jumpers Hole Road & Yorkshire Drive

Movement	WB	NB	SB
Directions Served	LR	TR	L
Maximum Queue (ft)	69	4	52
Average Queue (ft)	33	0	19
95th Queue (ft)	61	3	48
Link Distance (ft)	610	1101	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			50
Storage Blk Time (%)			1
Queuing Penalty (veh)			5

Intersection: 4: Jumpers Hole Road & Edin Garth Road/Idlewild Road

Movement	EB	WB	NB
Directions Served	LTR	LTR	L
Maximum Queue (ft)	75	54	27
Average Queue (ft)	27	24	1
95th Queue (ft)	55	50	11
Link Distance (ft)	240	468	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			50
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Jumpers Hole Road & Clarence Avenue

Movement	WB	NB	SB
Directions Served	LR	TR	L
Maximum Queue (ft)	52	26	48
Average Queue (ft)	14	2	18
95th Queue (ft)	42	13	46
Link Distance (ft)	592	36	
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			150
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Jumpers Hole Road & Kinder Road/Earleigh Heights Conn

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	1267	207	212	159	323	160	160	967	160
Average Queue (ft)	975	118	82	43	137	75	156	930	45
95th Queue (ft)	1509	195	169	112	254	162	178	950	143
Link Distance (ft)	1234		742		570			908	
Upstream Blk Time (%)	39							68	
Queuing Penalty (veh)	0							0	
Storage Bay Dist (ft)		225		85		85	85		85
Storage Blk Time (%)		0	0	1	21	1	56	43	0
Queuing Penalty (veh)		0	1	3	66	5	412	197	0

Network Summary

Network wide Queuing Penalty: 2174

Lanes, Volumes, Timings

Future 2040 Conditions - EB RT - Optimized Timings

2: Jumpers Hole Road & Severna Park MS/Retford Drive

Timing Plan: PM PEAK



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↖	↗	↖	↗	↖	↗	↖	↗
Traffic Volume (vph)	35	0	55	80	5	40	75	585	105	65	735	85
Future Volume (vph)	35	0	55	80	5	40	75	585	105	65	735	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		0	250		0	145		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	75			75			75			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.977			0.985	
Flt Protected		0.950			0.955		0.950			0.950		
Satd. Flow (prot)	0	1770	1583	0	1779	1583	1770	1820	0	1770	1835	0
Flt Permitted		0.248			0.955		0.154			0.226		
Satd. Flow (perm)	0	462	1583	0	1779	1583	287	1820	0	421	1835	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			80			80		9			6	
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		653			733			1130			1177	
Travel Time (s)		17.8			20.0			22.0			22.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	0	60	87	5	43	82	636	114	71	799	92
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	38	60	0	92	43	82	750	0	71	891	0
Turn Type	Perm	NA	Perm	Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		3		4	4		5	2		1	6	
Permitted Phases	3		3			4	2			6		
Detector Phase	3	3	3	4	4	4	5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	3.0	20.0		4.0	20.0	
Minimum Split (s)	8.5	8.5	8.5	34.5	34.5	34.5	7.5	25.0		8.5	35.0	
Total Split (s)	20.0	20.0	20.0	34.8	34.8	34.8	11.0	85.8		9.4	84.2	
Total Split (%)	13.3%	13.3%	13.3%	23.2%	23.2%	23.2%	7.3%	57.2%		6.3%	56.1%	
Maximum Green (s)	15.5	15.5	15.5	30.3	30.3	30.3	6.5	80.8		4.9	79.2	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	4.0		3.0	4.0	
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.0		1.5	1.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.5	4.5		4.5	4.5	4.5	5.0		4.5	5.0	
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	5.0	5.0	5.0	4.0	4.0	4.0	3.0	5.0		5.0	5.0	
Recall Mode	None	None	None	None	None	None	None	C-Min		None	C-Min	
Walk Time (s)				12.0	12.0	12.0		10.0			12.0	
Flash Dont Walk (s)				18.0	18.0	18.0		10.0			18.0	
Pedestrian Calls (#/hr)				0	0	0		0			0	
Act Effct Green (s)		16.1	16.1		14.1	14.1	100.5	91.9		103.1	93.2	
Actuated g/C Ratio		0.11	0.11		0.09	0.09	0.67	0.61		0.69	0.62	
v/c Ratio		0.78	0.25		0.55	0.19	0.30	0.67		0.19	0.78	
Control Delay		137.2	8.4		76.8	3.0	17.1	37.4		8.7	28.2	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		137.2	8.4		76.8	3.0	17.1	37.4		8.7	28.2	

Lanes, Volumes, Timings
 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Future 2040 Conditions - EB RT - Optimized Timings
 Timing Plan: PM PEAK



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F	A		E	A	B	D		A	C	
Approach Delay		58.3			53.3			35.4			26.8	
Approach LOS		E			D			D			C	
Queue Length 50th (ft)		35	0		88	0	30	497		22	664	
Queue Length 95th (ft)		#112	27		144	5	m25	m304		39	924	
Internal Link Dist (ft)		573			653			1050			1097	
Turn Bay Length (ft)							250			145		
Base Capacity (vph)		52	250		359	383	273	1118		374	1142	
Starvation Cap Reductn		0	0		0	0	0	0		0	0	
Spillback Cap Reductn		0	0		0	0	0	0		0	0	
Storage Cap Reductn		0	0		0	0	0	0		0	0	
Reduced v/c Ratio		0.73	0.24		0.26	0.11	0.30	0.67		0.19	0.78	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 33.6
 Intersection LOS: C
 Intersection Capacity Utilization 71.0%
 ICU Level of Service C
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Jumpers Hole Road & Severna Park MS/Retford Drive



Intersection: 1: Jumpers Hole Road & Benfield Road

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB	B21	B21
Directions Served	L	TR	L	T	R	L	TR	L	T	R	T	T
Maximum Queue (ft)	415	1670	172	1312	325	159	274	499	908	325	127	160
Average Queue (ft)	310	1139	6	1278	194	105	106	195	592	317	14	46
95th Queue (ft)	515	1977	61	1295	435	167	222	427	1030	374	147	302
Link Distance (ft)		1628		1258			823	882	882		1067	1067
Upstream Blk Time (%)		20		56					9			
Queuing Penalty (veh)		0		0					32			
Storage Bay Dist (ft)	340		200		250	85				250		
Storage Blk Time (%)	13	29		47		31	10		1	72		
Queuing Penalty (veh)	124	55		90		28	13		6	14		

Intersection: 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	L	TR	L	TR
Maximum Queue (ft)	265	281	67	121	266	190	478
Average Queue (ft)	109	117	28	54	118	31	226
95th Queue (ft)	207	214	58	99	229	113	419
Link Distance (ft)	602	695	695		1067		1101
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)				1000		145	
Storage Blk Time (%)							18
Queuing Penalty (veh)							7

Intersection: 3: Jumpers Hole Road & Yorkshire Drive

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	77	35
Average Queue (ft)	40	6
95th Queue (ft)	64	26
Link Distance (ft)	610	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		50
Storage Blk Time (%)		0
Queuing Penalty (veh)		0

Intersection: 4: Jumpers Hole Road & Edin Garth Road/Idlewild Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	TR
Maximum Queue (ft)	70	48	31	11
Average Queue (ft)	30	24	9	0
95th Queue (ft)	57	48	31	0
Link Distance (ft)	240	468		36
Upstream Blk Time (%)				0
Queuing Penalty (veh)				0
Storage Bay Dist (ft)			50	
Storage Blk Time (%)			0	
Queuing Penalty (veh)			0	

Intersection: 5: Jumpers Hole Road & Clarence Avenue

Movement	WB	NB	SB
Directions Served	LR	TR	L
Maximum Queue (ft)	64	14	31
Average Queue (ft)	24	1	3
95th Queue (ft)	52	8	17
Link Distance (ft)	592	36	
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			150
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Jumpers Hole Road & Kinder Road/Earleigh Heights Conn

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	187	218	220	87	224	159	109	150	52
Average Queue (ft)	82	117	75	16	100	50	47	72	16
95th Queue (ft)	156	192	155	55	187	117	82	127	43
Link Distance (ft)	1234		742		570			908	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		225		85		85	85		85
Storage Blk Time (%)		0	0		11	0	1	4	0
Queuing Penalty (veh)		1	1		20	1	3	5	0

Network Summary

Network wide Queuing Penalty: 400

Lanes, Volumes, Timings

Future 2040 Conditions - NB LT - Optimized Timings

2: Jumpers Hole Road & Severna Park MS/Retford Drive

Timing Plan: AM PEAK



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↕	↕	↕		↕	↕	
Traffic Volume (vph)	50	5	115	120	10	45	120	280	40	40	450	75
Future Volume (vph)	50	5	115	120	10	45	120	280	40	40	450	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		0	1000		0	145		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	75			75			75			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.908				0.850		0.981			0.978	
Flt Protected		0.986			0.956		0.950			0.950		
Satd. Flow (prot)	0	1668	0	0	1781	1583	1770	1827	0	1770	1822	0
Flt Permitted		0.151			0.956		0.078			0.426		
Satd. Flow (perm)	0	255	0	0	1781	1583	145	1827	0	794	1822	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		77				80		5			6	
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		653			733			1130			1177	
Travel Time (s)		17.8			20.0			22.0			22.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	5	125	130	11	49	130	304	43	43	489	82
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	184	0	0	141	49	130	347	0	43	571	0
Turn Type	Perm	NA		Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		3		4	4		5	2		1	6	
Permitted Phases	3					4	2			6		
Detector Phase	3	3		4	4	4	5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	3.0	20.0		4.0	20.0	
Minimum Split (s)	8.5	8.5		34.5	34.5	34.5	7.5	25.0		8.5	35.0	
Total Split (s)	56.0	56.0		34.5	34.5	34.5	11.0	50.7		8.8	48.5	
Total Split (%)	37.3%	37.3%		23.0%	23.0%	23.0%	7.3%	33.8%		5.9%	32.3%	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	4.0		3.0	4.0	
All-Red Time (s)	1.5	1.5		1.5	1.5	1.5	1.5	1.0		1.5	1.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.5			4.5	4.5	4.5	5.0		4.5	5.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Act Effct Green (s)		51.5			18.1	18.1	66.4	55.1		56.9	47.1	
Actuated g/C Ratio		0.34			0.12	0.12	0.44	0.37		0.38	0.31	
v/c Ratio		1.33			0.66	0.19	0.58	0.52		0.12	0.99	
Control Delay		214.6			76.9	4.4	51.5	57.2		26.5	85.6	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		214.6			76.9	4.4	51.5	57.2		26.5	85.6	
LOS		F			E	A	D	E		C	F	
Approach Delay		214.6			58.2			55.6			81.4	
Approach LOS		F			E			E			F	
Queue Length 50th (ft)		~182			134	0	105	297		24	~558	
Queue Length 95th (ft)		#262			201	13	m135	m342		52	#855	

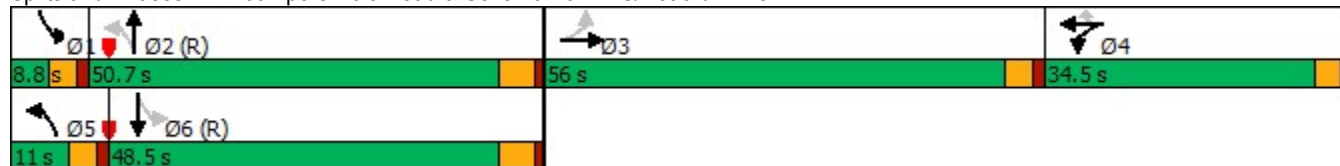


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		573			653			1050			1097	
Turn Bay Length (ft)							1000			145		
Base Capacity (vph)		138			356	380	224	673		361	576	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		1.33			0.40	0.13	0.58	0.52		0.12	0.99	

Intersection Summary

Area Type:	Other
Cycle Length:	150
Actuated Cycle Length:	150
Offset:	0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	1.33
Intersection Signal Delay:	86.7
Intersection LOS:	F
Intersection Capacity Utilization:	63.3%
ICU Level of Service:	B
Analysis Period (min):	15
~	Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.
#	95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m	Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Jumpers Hole Road & Severna Park MS/Retford Drive



Intersection: 1: Jumpers Hole Road & Benfield Road

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB	B21	B21
Directions Served	L	TR	L	T	R	L	TR	L	T	R	T	T
Maximum Queue (ft)	415	1677	229	1307	325	147	195	963	961	314	526	562
Average Queue (ft)	414	1649	34	1228	225	66	101	744	459	135	177	175
95th Queue (ft)	420	1666	147	1496	448	128	173	1099	1117	253	669	676
Link Distance (ft)		1628		1258			823	882	882		1067	1067
Upstream Blk Time (%)		84		39				39	20		1	1
Queuing Penalty (veh)		0		0				167	88		3	3
Storage Bay Dist (ft)	340		200		250	85				250		
Storage Blk Time (%)	94	3		40		9	22		1	4		
Queuing Penalty (veh)	1202	11		113		10	18		1	6		

Intersection: 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	L	TR	L	TR
Maximum Queue (ft)	151	167	55	87	308	190	446
Average Queue (ft)	61	77	24	28	141	32	174
95th Queue (ft)	119	142	50	65	288	105	376
Link Distance (ft)	602	695	695		1067		1101
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)				400		145	
Storage Blk Time (%)							10
Queuing Penalty (veh)							7

Intersection: 3: Jumpers Hole Road & Yorkshire Drive

Movement	WB	NB	SB
Directions Served	LR	TR	L
Maximum Queue (ft)	77	9	58
Average Queue (ft)	31	0	20
95th Queue (ft)	60	5	49
Link Distance (ft)	610	1101	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			50
Storage Blk Time (%)			0
Queuing Penalty (veh)			3

Intersection: 4: Jumpers Hole Road & Edin Garth Road/Idlewild Road

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	T	TR
Maximum Queue (ft)	53	57	26	16	6
Average Queue (ft)	24	22	2	1	0
95th Queue (ft)	49	49	12	10	4
Link Distance (ft)	240	468		699	36
Upstream Blk Time (%)					0
Queuing Penalty (veh)					0
Storage Bay Dist (ft)			50		
Storage Blk Time (%)				0	
Queuing Penalty (veh)				0	

Intersection: 5: Jumpers Hole Road & Clarence Avenue

Movement	WB	NB	SB
Directions Served	LR	TR	L
Maximum Queue (ft)	56	37	49
Average Queue (ft)	16	2	16
95th Queue (ft)	44	17	44
Link Distance (ft)	592	36	
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			150
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Jumpers Hole Road & Kinder Road/Earleigh Heights Conn

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	1232	252	215	159	311	160	160	965	159
Average Queue (ft)	950	121	80	41	130	79	153	929	34
95th Queue (ft)	1469	206	164	103	250	165	182	949	121
Link Distance (ft)	1234		742		570			908	
Upstream Blk Time (%)	39							71	
Queuing Penalty (veh)	0							0	
Storage Bay Dist (ft)		225		85		85	85		85
Storage Blk Time (%)		1	0	0	18	1	61	40	0
Queuing Penalty (veh)		1	1	1	55	5	449	182	0

Network Summary

Network wide Queuing Penalty: 2328

Lanes, Volumes, Timings

Future 2040 Conditions - NB LT - Optimized Timings

2: Jumpers Hole Road & Severna Park MS/Retford Drive

Timing Plan: PM PEAK

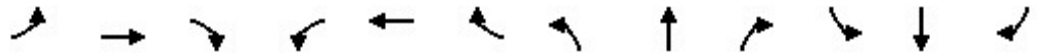


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↕	↕	↕		↕	↕	
Traffic Volume (vph)	35	0	55	80	5	40	75	585	105	65	735	85
Future Volume (vph)	35	0	55	80	5	40	75	585	105	65	735	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		0	400		0	145		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	75			75			75			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.917				0.850		0.977			0.985	
Flt Protected		0.981			0.955		0.950			0.950		
Satd. Flow (prot)	0	1676	0	0	1779	1583	1770	1820	0	1770	1835	0
Flt Permitted		0.130			0.955		0.100			0.187		
Satd. Flow (perm)	0	222	0	0	1779	1583	186	1820	0	348	1835	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		80				80		9			6	
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		653			733			1130			1177	
Travel Time (s)		17.8			20.0			22.0			22.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	0	60	87	5	43	82	636	114	71	799	92
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	98	0	0	92	43	82	750	0	71	891	0
Turn Type	Perm	NA		Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		3		4	4		5	2		1	6	
Permitted Phases	3					4	2			6		
Detector Phase	3	3		4	4	4	5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	3.0	20.0		4.0	20.0	
Minimum Split (s)	8.5	8.5		34.5	34.5	34.5	7.5	25.0		8.5	35.0	
Total Split (s)	23.0	23.0		34.8	34.8	34.8	10.4	83.0		9.2	81.8	
Total Split (%)	15.3%	15.3%		23.2%	23.2%	23.2%	6.9%	55.3%		6.1%	54.5%	
Maximum Green (s)	18.5	18.5		30.3	30.3	30.3	5.9	78.0		4.7	76.8	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	4.0		3.0	4.0	
All-Red Time (s)	1.5	1.5		1.5	1.5	1.5	1.5	1.0		1.5	1.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.5			4.5	4.5	4.5	5.0		4.5	5.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	5.0	5.0		4.0	4.0	4.0	3.0	5.0		5.0	5.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Walk Time (s)				12.0	12.0	12.0		10.0			12.0	
Flash Dont Walk (s)				18.0	18.0	18.0		10.0			18.0	
Pedestrian Calls (#/hr)				0	0	0		0			0	
Act Effct Green (s)		24.0			14.1	14.1	93.4	83.9		94.5	84.4	
Actuated g/C Ratio		0.16			0.09	0.09	0.62	0.56		0.63	0.56	
v/c Ratio		0.96			0.55	0.19	0.39	0.73		0.23	0.86	
Control Delay		96.3			76.8	3.0	23.7	42.0		10.6	37.6	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		96.3			76.8	3.0	23.7	42.0		10.6	37.6	

Lanes, Volumes, Timings
 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Future 2040 Conditions - NB LT - Optimized Timings

Timing Plan: PM PEAK



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F			E	A	C	D		B	D	
Approach Delay		96.3			53.3			40.2			35.6	
Approach LOS		F			D			D			D	
Queue Length 50th (ft)		~23			88	0	35	452		21	636	
Queue Length 95th (ft)		#154			144	5	m39	m337		42	#1051	
Internal Link Dist (ft)		573			653			1050			1097	
Turn Bay Length (ft)							400			145		
Base Capacity (vph)		102			359	383	211	1021		310	1035	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.96			0.26	0.11	0.39	0.73		0.23	0.86	

Intersection Summary

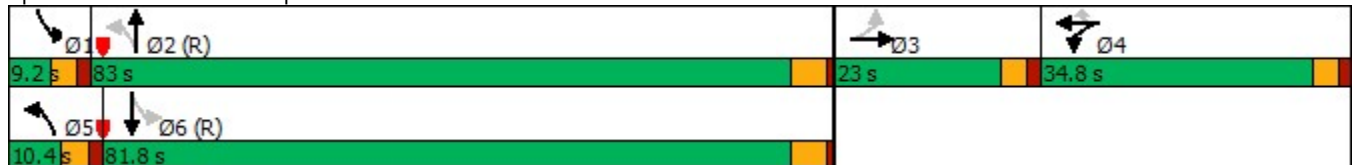
Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.96
 Intersection Signal Delay: 41.6
 Intersection Capacity Utilization 71.6%
 Analysis Period (min) 15
 Intersection LOS: D
 ICU Level of Service C

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Jumpers Hole Road & Severna Park MS/Retford Drive



Intersection: 1: Jumpers Hole Road & Benfield Road

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB	B21	B21
Directions Served	L	TR	L	T	R	L	TR	L	T	R	T	T
Maximum Queue (ft)	415	1658	26	1315	325	159	262	640	943	325	157	286
Average Queue (ft)	334	1167	3	1278	188	107	106	188	699	316	13	87
95th Queue (ft)	506	1915	15	1297	430	172	213	452	1174	381	113	331
Link Distance (ft)		1628		1258			823	882	882		1067	1067
Upstream Blk Time (%)		16		57				0	30			
Queuing Penalty (veh)		0		0				0	103			
Storage Bay Dist (ft)	340		200		250	85					250	
Storage Blk Time (%)	19	29		47		30	12		0	74		
Queuing Penalty (veh)	188	53		90		27	15		1	15		

Intersection: 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Movement	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	LTR	LT	R	L	TR	L	T	R
Maximum Queue (ft)	263	257	62	121	268	190	386	55
Average Queue (ft)	116	118	28	57	120	30	176	19
95th Queue (ft)	221	207	57	111	233	108	327	47
Link Distance (ft)	602	695	695		1067		1101	1101
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)				250		145		
Storage Blk Time (%)					1		14	
Queuing Penalty (veh)					1		6	

Intersection: 3: Jumpers Hole Road & Yorkshire Drive

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	81	35
Average Queue (ft)	39	6
95th Queue (ft)	64	25
Link Distance (ft)	610	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		50
Storage Blk Time (%)		0
Queuing Penalty (veh)		0

Intersection: 4: Jumpers Hole Road & Edin Garth Road/Idlewild Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	TR
Maximum Queue (ft)	62	60	35	16
Average Queue (ft)	32	24	12	1
95th Queue (ft)	58	50	35	13
Link Distance (ft)	240	468		36
Upstream Blk Time (%)				0
Queuing Penalty (veh)				0
Storage Bay Dist (ft)			50	
Storage Blk Time (%)			0	
Queuing Penalty (veh)			1	

Intersection: 5: Jumpers Hole Road & Clarence Avenue

Movement	WB	NB	SB
Directions Served	LR	TR	L
Maximum Queue (ft)	56	12	31
Average Queue (ft)	25	0	3
95th Queue (ft)	51	6	17
Link Distance (ft)	592	36	
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			150
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Jumpers Hole Road & Kinder Road/Earleigh Heights Conn

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	164	244	207	75	240	148	130	175	115
Average Queue (ft)	79	121	74	16	100	51	46	76	18
95th Queue (ft)	148	201	150	55	189	119	89	140	62
Link Distance (ft)	1234		742		570			908	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		225		85		85	85		85
Storage Blk Time (%)		0	0		11	0	1	5	0
Queuing Penalty (veh)		1	0		20	1	2	7	0

Network Summary

Network wide Queuing Penalty: 530

Lanes, Volumes, Timings

Future 2040 Conditions - SB RT - Optimized Timings

2: Jumpers Hole Road & Severna Park MS/Retford Drive

Timing Plan: AM PEAK



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔	↔	↔	↔		↔	↔	↔
Traffic Volume (vph)	50	5	115	120	10	45	120	280	40	40	450	75
Future Volume (vph)	50	5	115	120	10	45	120	280	40	40	450	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		0	250		0	145		0
Storage Lanes	0		0	0		1	1		0	1		1
Taper Length (ft)	75			75			75			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.908				0.850		0.981				0.850
Flt Protected		0.986			0.956		0.950			0.950		
Satd. Flow (prot)	0	1668	0	0	1781	1583	1770	1827	0	1770	1863	1583
Flt Permitted		0.986			0.956		0.365			0.504		
Satd. Flow (perm)	0	1668	0	0	1781	1583	680	1827	0	939	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		61				113		6				109
Link Speed (mph)		25			25			35				35
Link Distance (ft)		653			733			1130				1177
Travel Time (s)		17.8			20.0			22.0				22.9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	5	125	130	11	49	130	304	43	43	489	82
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	184	0	0	141	49	130	347	0	43	489	82
Turn Type	Split	NA		Split	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	3	3		4	4		5	2		1	6	
Permitted Phases						4	2			6		6
Detector Phase	3	3		4	4	4	5	2		1	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	3.0	20.0		4.0	20.0	20.0
Minimum Split (s)	8.5	8.5		34.5	34.5	34.5	7.5	25.0		8.5	35.0	35.0
Total Split (s)	29.0	29.0		37.0	37.0	37.0	15.0	75.0		9.0	69.0	69.0
Total Split (%)	19.3%	19.3%		24.7%	24.7%	24.7%	10.0%	50.0%		6.0%	46.0%	46.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	4.0		3.0	4.0	4.0
All-Red Time (s)	1.5	1.5		1.5	1.5	1.5	1.5	1.0		1.5	1.0	1.0
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		4.5			4.5	4.5	4.5	5.0		4.5	5.0	5.0
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	C-Min
Act Effct Green (s)		18.6			18.1	18.1	97.3	88.4		94.4	85.1	85.1
Actuated g/C Ratio		0.12			0.12	0.12	0.65	0.59		0.63	0.57	0.57
v/c Ratio		0.71			0.66	0.17	0.25	0.32		0.07	0.46	0.09
Control Delay		56.1			76.9	1.3	19.4	30.7		11.5	23.4	1.9
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		56.1			76.9	1.3	19.4	30.7		11.5	23.4	1.9
LOS		E			E	A	B	C		B	C	A
Approach Delay		56.1			57.4			27.7				19.7
Approach LOS		E			E			C				B
Queue Length 50th (ft)		118			134	0	83	265		14	270	0
Queue Length 95th (ft)		194			201	0	m99	m281		36	471	17

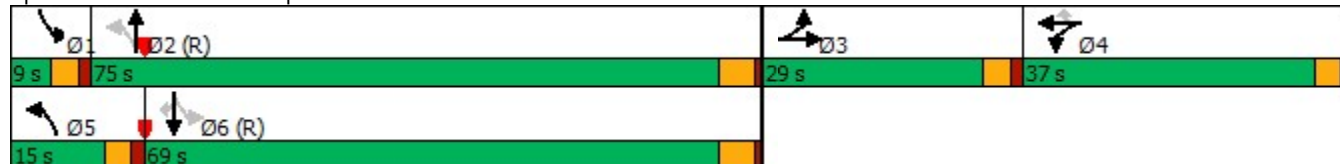


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		573			653			1050			1097	
Turn Bay Length (ft)							250			145		
Base Capacity (vph)		327			385	431	526	1078		640	1056	944
Starvation Cap Reductn		0			0	0	0	0		0	0	0
Spillback Cap Reductn		0			0	0	0	0		0	0	0
Storage Cap Reductn		0			0	0	0	0		0	0	0
Reduced v/c Ratio		0.56			0.37	0.11	0.25	0.32		0.07	0.46	0.09

Intersection Summary

Area Type:	Other
Cycle Length:	150
Actuated Cycle Length:	150
Offset:	0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.71
Intersection Signal Delay:	31.7
Intersection LOS:	C
Intersection Capacity Utilization	58.8%
ICU Level of Service	B
Analysis Period (min)	15
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 2: Jumpers Hole Road & Severna Park MS/Retford Drive



Intersection: 1: Jumpers Hole Road & Benfield Road

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB	B21	B21
Directions Served	L	TR	L	T	R	L	TR	L	T	R	T	T
Maximum Queue (ft)	415	1675	274	1310	325	159	230	992	967	271	694	723
Average Queue (ft)	414	1648	48	1238	225	72	103	806	571	129	272	265
95th Queue (ft)	422	1664	197	1480	449	136	185	1137	1248	251	849	851
Link Distance (ft)		1628		1258			823	882	882		1067	1067
Upstream Blk Time (%)		82		41				54	26		2	2
Queuing Penalty (veh)		0		0				231	113		8	9
Storage Bay Dist (ft)	340		200		250	85				250		
Storage Blk Time (%)	91	4		41		11	20		1	3		
Queuing Penalty (veh)	1166	17		117		12	17		2	5		

Intersection: 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Movement	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	LTR	LT	R	L	TR	L	T	R
Maximum Queue (ft)	154	186	55	129	312	190	456	52
Average Queue (ft)	63	81	24	31	132	38	176	14
95th Queue (ft)	121	155	50	83	272	131	379	39
Link Distance (ft)	602	695	695		1067		1101	1101
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)				250		145		
Storage Blk Time (%)					1		11	
Queuing Penalty (veh)					1		7	

Intersection: 3: Jumpers Hole Road & Yorkshire Drive

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	75	63
Average Queue (ft)	35	21
95th Queue (ft)	64	48
Link Distance (ft)	610	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		50
Storage Blk Time (%)		1
Queuing Penalty (veh)		5

Intersection: 4: Jumpers Hole Road & Edin Garth Road/Idlewild Road

Movement	EB	WB	NB	NB
Directions Served	LTR	LTR	L	T
Maximum Queue (ft)	65	59	32	3
Average Queue (ft)	26	26	2	0
95th Queue (ft)	53	50	15	2
Link Distance (ft)	240	468		699
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			50	
Storage Blk Time (%)			0	
Queuing Penalty (veh)			1	

Intersection: 5: Jumpers Hole Road & Clarence Avenue

Movement	WB	NB	SB
Directions Served	LR	TR	L
Maximum Queue (ft)	52	34	48
Average Queue (ft)	15	2	16
95th Queue (ft)	42	16	44
Link Distance (ft)	592	36	
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			150
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Jumpers Hole Road & Kinder Road/Earleigh Heights Conn

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	1222	255	265	142	301	160	160	967	160
Average Queue (ft)	1006	123	86	40	129	69	153	930	39
95th Queue (ft)	1544	207	178	98	236	148	184	950	138
Link Distance (ft)	1234		742		570			908	
Upstream Blk Time (%)	51							70	
Queuing Penalty (veh)	0							0	
Storage Bay Dist (ft)		225		85		85	85		85
Storage Blk Time (%)		1	0	0	19	1	59	46	0
Queuing Penalty (veh)		3	1	1	58	5	433	209	0

Network Summary

Network wide Queuing Penalty: 2419

Lanes, Volumes, Timings

Future 2040 Conditions - SB RT - Optimized Timings

2: Jumpers Hole Road & Severna Park MS/Retford Drive

Timing Plan: PM PEAK



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↕	↕	↕		↕	↕	↕
Traffic Volume (vph)	35	0	55	80	5	40	75	585	105	65	735	85
Future Volume (vph)	35	0	55	80	5	40	75	585	105	65	735	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		0	250		0	145		0
Storage Lanes	0		0	0		1	1		0	1		1
Taper Length (ft)	75			75			75			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.917				0.850		0.977				0.850
Flt Protected		0.981			0.955		0.950			0.950		
Satd. Flow (prot)	0	1676	0	0	1779	1583	1770	1820	0	1770	1863	1583
Flt Permitted		0.981			0.955		0.243			0.255		
Satd. Flow (perm)	0	1676	0	0	1779	1583	453	1820	0	475	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		80				80		10				76
Link Speed (mph)		25			25			35				35
Link Distance (ft)		653			733			1130				1177
Travel Time (s)		17.8			20.0			22.0				22.9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	0	60	87	5	43	82	636	114	71	799	92
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	98	0	0	92	43	82	750	0	71	799	92
Turn Type	Split	NA		Split	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	3	3		4	4		5	2		1	6	
Permitted Phases						4	2			6		6
Detector Phase	3	3		4	4	4	5	2		1	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	3.0	20.0		4.0	20.0	20.0
Minimum Split (s)	8.5	8.5		34.5	34.5	34.5	7.5	25.0		8.5	35.0	35.0
Total Split (s)	16.0	16.0		34.5	34.5	34.5	11.0	89.2		10.3	88.5	88.5
Total Split (%)	10.7%	10.7%		23.0%	23.0%	23.0%	7.3%	59.5%		6.9%	59.0%	59.0%
Maximum Green (s)	11.5	11.5		30.0	30.0	30.0	6.5	84.2		5.8	83.5	83.5
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	4.0		3.0	4.0	4.0
All-Red Time (s)	1.5	1.5		1.5	1.5	1.5	1.5	1.0		1.5	1.0	1.0
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		4.5			4.5	4.5	4.5	5.0		4.5	5.0	5.0
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	5.0	5.0		4.0	4.0	4.0	3.0	5.0		5.0	5.0	5.0
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	C-Min
Walk Time (s)				12.0	12.0	12.0		10.0			12.0	12.0
Flash Dont Walk (s)				18.0	18.0	18.0		10.0			18.0	18.0
Pedestrian Calls (#/hr)				0	0	0		0			0	0
Act Effct Green (s)		9.4			14.1	14.1	106.8	98.9		110.3	100.7	100.7
Actuated g/C Ratio		0.06			0.09	0.09	0.71	0.66		0.74	0.67	0.67
v/c Ratio		0.55			0.55	0.19	0.21	0.62		0.17	0.64	0.08
Control Delay		30.7			76.8	3.0	11.8	34.9		6.4	18.4	3.3
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		30.7			76.8	3.0	11.8	34.9		6.4	18.4	3.3



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		C			E	A	B	C		A	B	A
Approach Delay		30.7			53.3			32.6			16.0	
Approach LOS		C			D			C			B	
Queue Length 50th (ft)		17			88	0	46	600		16	417	5
Queue Length 95th (ft)		78			144	5	m18	m234		36	665	29
Internal Link Dist (ft)		573			653			1050			1097	
Turn Bay Length (ft)							250			145		
Base Capacity (vph)		202			355	380	388	1203		428	1250	1087
Starvation Cap Reductn		0			0	0	0	0		0	0	0
Spillback Cap Reductn		0			0	0	0	0		0	0	0
Storage Cap Reductn		0			0	0	0	0		0	0	0
Reduced v/c Ratio		0.49			0.26	0.11	0.21	0.62		0.17	0.64	0.08

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.64
 Intersection Signal Delay: 26.0
 Intersection LOS: C
 Intersection Capacity Utilization 66.5%
 ICU Level of Service C
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Jumpers Hole Road & Severna Park MS/Retford Drive



Intersection: 1: Jumpers Hole Road & Benfield Road

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB	B21	B21
Directions Served	L	TR	L	T	R	L	TR	L	T	R	T	T
Maximum Queue (ft)	415	1658	26	1315	325	159	262	640	943	325	157	286
Average Queue (ft)	334	1167	3	1278	188	107	106	188	699	316	13	87
95th Queue (ft)	506	1915	15	1297	430	172	213	452	1174	381	113	331
Link Distance (ft)		1628		1258			823	882	882		1067	1067
Upstream Blk Time (%)		16		57				0	30			
Queuing Penalty (veh)		0		0				0	103			
Storage Bay Dist (ft)	340		200		250	85					250	
Storage Blk Time (%)	19	29		47		30	12		0	74		
Queuing Penalty (veh)	188	53		90		27	15		1	15		

Intersection: 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Movement	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	LTR	LT	R	L	TR	L	T	R
Maximum Queue (ft)	263	257	62	121	268	190	386	55
Average Queue (ft)	116	118	28	57	120	30	176	19
95th Queue (ft)	221	207	57	111	233	108	327	47
Link Distance (ft)	602	695	695		1067		1101	1101
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)				250		145		
Storage Blk Time (%)					1		14	
Queuing Penalty (veh)					1		6	

Intersection: 3: Jumpers Hole Road & Yorkshire Drive

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	81	35
Average Queue (ft)	39	6
95th Queue (ft)	64	25
Link Distance (ft)	610	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		50
Storage Blk Time (%)		0
Queuing Penalty (veh)		0

Intersection: 4: Jumpers Hole Road & Edin Garth Road/Idlewild Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	TR
Maximum Queue (ft)	62	60	35	16
Average Queue (ft)	32	24	12	1
95th Queue (ft)	58	50	35	13
Link Distance (ft)	240	468		36
Upstream Blk Time (%)				0
Queuing Penalty (veh)				0
Storage Bay Dist (ft)			50	
Storage Blk Time (%)			0	
Queuing Penalty (veh)			1	

Intersection: 5: Jumpers Hole Road & Clarence Avenue

Movement	WB	NB	SB
Directions Served	LR	TR	L
Maximum Queue (ft)	56	12	31
Average Queue (ft)	25	0	3
95th Queue (ft)	51	6	17
Link Distance (ft)	592	36	
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			150
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Jumpers Hole Road & Kinder Road/Earleigh Heights Conn

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	164	244	207	75	240	148	130	175	115
Average Queue (ft)	79	121	74	16	100	51	46	76	18
95th Queue (ft)	148	201	150	55	189	119	89	140	62
Link Distance (ft)	1234		742		570			908	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		225		85		85	85		85
Storage Blk Time (%)		0	0		11	0	1	5	0
Queuing Penalty (veh)		1	0		20	1	2	7	0

Network Summary

Network wide Queuing Penalty: 530

Lanes, Volumes, Timings

Future 2040 Conditions - No Change - Optimized Timings

2: Jumpers Hole Road & Severna Park MS/Retford Drive

Timing Plan: AM PEAK



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↕	↕	↕		↕	↕	↕
Traffic Volume (vph)	50	5	115	120	10	45	120	280	40	40	450	75
Future Volume (vph)	50	5	115	120	10	45	120	280	40	40	450	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		0	250		0	145		0
Storage Lanes	0		0	0		1	1		0	1		1
Taper Length (ft)	75			75			75			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.908				0.850		0.981				0.850
Flt Protected		0.986			0.956		0.950			0.950		
Satd. Flow (prot)	0	1668	0	0	1781	1583	1770	1827	0	1770	1863	1583
Flt Permitted		0.986			0.956		0.365			0.504		
Satd. Flow (perm)	0	1668	0	0	1781	1583	680	1827	0	939	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		61				113		6				109
Link Speed (mph)		25			25			35				35
Link Distance (ft)		653			733			1130				1177
Travel Time (s)		17.8			20.0			22.0				22.9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	5	125	130	11	49	130	304	43	43	489	82
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	184	0	0	141	49	130	347	0	43	489	82
Turn Type	Split	NA		Split	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	3	3		4	4		5	2		1	6	
Permitted Phases						4	2			6		6
Detector Phase	3	3		4	4	4	5	2		1	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	3.0	20.0		4.0	20.0	20.0
Minimum Split (s)	8.5	8.5		34.5	34.5	34.5	7.5	25.0		8.5	35.0	35.0
Total Split (s)	29.0	29.0		37.0	37.0	37.0	15.0	75.0		9.0	69.0	69.0
Total Split (%)	19.3%	19.3%		24.7%	24.7%	24.7%	10.0%	50.0%		6.0%	46.0%	46.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	4.0		3.0	4.0	4.0
All-Red Time (s)	1.5	1.5		1.5	1.5	1.5	1.5	1.0		1.5	1.0	1.0
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		4.5			4.5	4.5	4.5	5.0		4.5	5.0	5.0
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	C-Min
Act Effct Green (s)		18.6			18.1	18.1	97.3	88.4		94.4	85.1	85.1
Actuated g/C Ratio		0.12			0.12	0.12	0.65	0.59		0.63	0.57	0.57
v/c Ratio		0.71			0.66	0.17	0.25	0.32		0.07	0.46	0.09
Control Delay		56.1			76.9	1.3	19.4	30.7		11.5	23.4	1.9
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		56.1			76.9	1.3	19.4	30.7		11.5	23.4	1.9
LOS		E			E	A	B	C		B	C	A
Approach Delay		56.1			57.4			27.7			19.7	
Approach LOS		E			E			C			B	
Queue Length 50th (ft)		118			134	0	83	265		14	270	0
Queue Length 95th (ft)		194			201	0	m99	m281		36	471	17

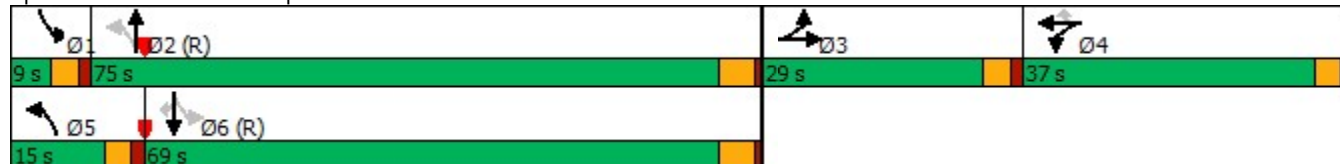


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		573			653			1050			1097	
Turn Bay Length (ft)							250			145		
Base Capacity (vph)		327			385	431	526	1078		640	1056	944
Starvation Cap Reductn		0			0	0	0	0		0	0	0
Spillback Cap Reductn		0			0	0	0	0		0	0	0
Storage Cap Reductn		0			0	0	0	0		0	0	0
Reduced v/c Ratio		0.56			0.37	0.11	0.25	0.32		0.07	0.46	0.09

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.71
 Intersection Signal Delay: 31.7
 Intersection LOS: C
 Intersection Capacity Utilization 58.8%
 ICU Level of Service B
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Jumpers Hole Road & Severna Park MS/Retford Drive



Intersection: 1: Jumpers Hole Road & Benfield Road

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB	B21	B21
Directions Served	L	TR	L	T	R	L	TR	L	T	R	T	T
Maximum Queue (ft)	415	1675	274	1310	325	159	230	992	967	271	694	723
Average Queue (ft)	414	1648	48	1238	225	72	103	806	571	129	272	265
95th Queue (ft)	422	1664	197	1480	449	136	185	1137	1248	251	849	851
Link Distance (ft)		1628		1258			823	882	882		1067	1067
Upstream Blk Time (%)		82		41				54	26		2	2
Queuing Penalty (veh)		0		0				231	113		8	9
Storage Bay Dist (ft)	340		200		250	85				250		
Storage Blk Time (%)	91	4		41		11	20		1	3		
Queuing Penalty (veh)	1166	17		117		12	17		2	5		

Intersection: 2: Jumpers Hole Road & Severna Park MS/Retford Drive

Movement	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	LTR	LT	R	L	TR	L	T	R
Maximum Queue (ft)	154	186	55	129	312	190	456	52
Average Queue (ft)	63	81	24	31	132	38	176	14
95th Queue (ft)	121	155	50	83	272	131	379	39
Link Distance (ft)	602	695	695		1067		1101	1101
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)				250		145		
Storage Blk Time (%)					1		11	
Queuing Penalty (veh)					1		7	

Intersection: 3: Jumpers Hole Road & Yorkshire Drive

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	75	63
Average Queue (ft)	35	21
95th Queue (ft)	64	48
Link Distance (ft)	610	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		50
Storage Blk Time (%)		1
Queuing Penalty (veh)		5

Intersection: 4: Jumpers Hole Road & Edin Garth Road/Idlewild Road

Movement	EB	WB	NB	NB
Directions Served	LTR	LTR	L	T
Maximum Queue (ft)	65	59	32	3
Average Queue (ft)	26	26	2	0
95th Queue (ft)	53	50	15	2
Link Distance (ft)	240	468		699
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			50	
Storage Blk Time (%)			0	
Queuing Penalty (veh)			1	

Intersection: 5: Jumpers Hole Road & Clarence Avenue

Movement	WB	NB	SB
Directions Served	LR	TR	L
Maximum Queue (ft)	52	34	48
Average Queue (ft)	15	2	16
95th Queue (ft)	42	16	44
Link Distance (ft)	592	36	
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			150
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Jumpers Hole Road & Kinder Road/Earleigh Heights Conn

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	1222	255	265	142	301	160	160	967	160
Average Queue (ft)	1006	123	86	40	129	69	153	930	39
95th Queue (ft)	1544	207	178	98	236	148	184	950	138
Link Distance (ft)	1234		742		570			908	
Upstream Blk Time (%)	51							70	
Queuing Penalty (veh)	0							0	
Storage Bay Dist (ft)		225		85		85	85		85
Storage Blk Time (%)		1	0	0	19	1	59	46	0
Queuing Penalty (veh)		3	1	1	58	5	433	209	0

Network Summary

Network wide Queuing Penalty: 2419

Lanes, Volumes, Timings

Future 2040 Conditions - No Change - Optimized Timings

2: Jumpers Hole Road & Severna Park MS/Retford Drive

Timing Plan: PM PEAK



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕	↕	↕	↕		↕	↕	↕
Traffic Volume (vph)	35	0	55	80	5	40	75	585	105	65	735	85
Future Volume (vph)	35	0	55	80	5	40	75	585	105	65	735	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		0	250		0	145		0
Storage Lanes	0		0	0		1	1		0	1		1
Taper Length (ft)	75			75			75			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.917				0.850		0.977				0.850
Flt Protected		0.981			0.955		0.950			0.950		
Satd. Flow (prot)	0	1676	0	0	1779	1583	1770	1820	0	1770	1863	1583
Flt Permitted		0.981			0.955		0.243			0.255		
Satd. Flow (perm)	0	1676	0	0	1779	1583	453	1820	0	475	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		80				80		10				76
Link Speed (mph)		25			25			35				35
Link Distance (ft)		653			733			1130				1177
Travel Time (s)		17.8			20.0			22.0				22.9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	0	60	87	5	43	82	636	114	71	799	92
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	98	0	0	92	43	82	750	0	71	799	92
Turn Type	Split	NA		Split	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	3	3		4	4		5	2		1	6	
Permitted Phases						4	2			6		6
Detector Phase	3	3		4	4	4	5	2		1	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	3.0	20.0		4.0	20.0	20.0
Minimum Split (s)	8.5	8.5		34.5	34.5	34.5	7.5	25.0		8.5	35.0	35.0
Total Split (s)	16.0	16.0		34.5	34.5	34.5	11.0	89.2		10.3	88.5	88.5
Total Split (%)	10.7%	10.7%		23.0%	23.0%	23.0%	7.3%	59.5%		6.9%	59.0%	59.0%
Maximum Green (s)	11.5	11.5		30.0	30.0	30.0	6.5	84.2		5.8	83.5	83.5
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	4.0		3.0	4.0	4.0
All-Red Time (s)	1.5	1.5		1.5	1.5	1.5	1.5	1.0		1.5	1.0	1.0
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		4.5			4.5	4.5	4.5	5.0		4.5	5.0	5.0
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	5.0	5.0		4.0	4.0	4.0	3.0	5.0		5.0	5.0	5.0
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	C-Min
Walk Time (s)				12.0	12.0	12.0		10.0			12.0	12.0
Flash Dont Walk (s)				18.0	18.0	18.0		10.0			18.0	18.0
Pedestrian Calls (#/hr)				0	0	0		0			0	0
Act Effct Green (s)		9.4			14.1	14.1	106.8	98.9		110.3	100.7	100.7
Actuated g/C Ratio		0.06			0.09	0.09	0.71	0.66		0.74	0.67	0.67
v/c Ratio		0.55			0.55	0.19	0.21	0.62		0.17	0.64	0.08
Control Delay		30.7			76.8	3.0	11.8	34.9		6.4	18.4	3.3
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay		30.7			76.8	3.0	11.8	34.9		6.4	18.4	3.3



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		C			E	A	B	C		A	B	A
Approach Delay		30.7			53.3			32.6			16.0	
Approach LOS		C			D			C			B	
Queue Length 50th (ft)		17			88	0	46	600		16	417	5
Queue Length 95th (ft)		78			144	5	m18	m234		36	665	29
Internal Link Dist (ft)		573			653			1050			1097	
Turn Bay Length (ft)							250			145		
Base Capacity (vph)		202			355	380	388	1203		428	1250	1087
Starvation Cap Reductn		0			0	0	0	0		0	0	0
Spillback Cap Reductn		0			0	0	0	0		0	0	0
Storage Cap Reductn		0			0	0	0	0		0	0	0
Reduced v/c Ratio		0.49			0.26	0.11	0.21	0.62		0.17	0.64	0.08

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.64
 Intersection Signal Delay: 26.0
 Intersection LOS: C
 Intersection Capacity Utilization 66.5%
 ICU Level of Service C
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

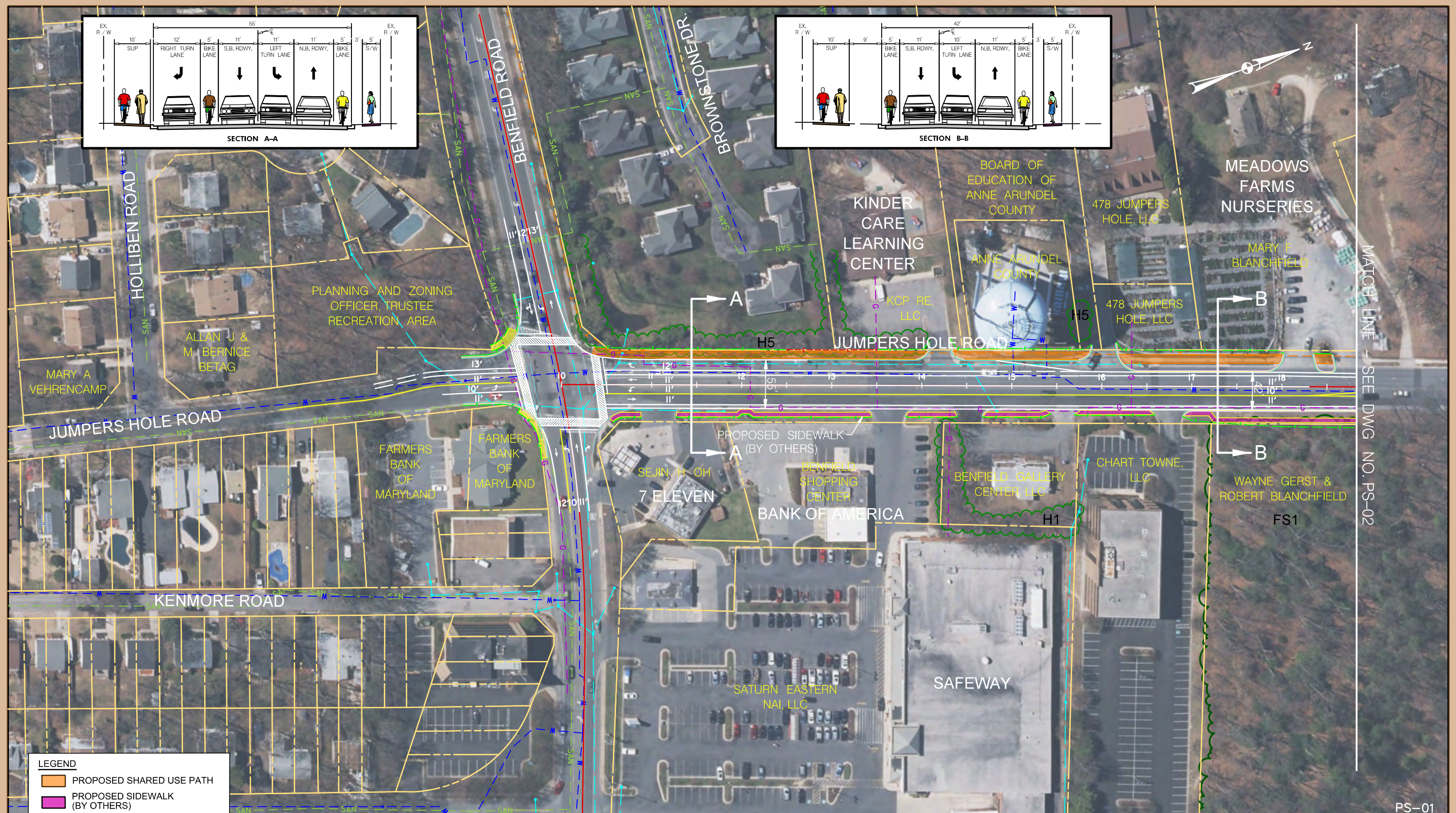
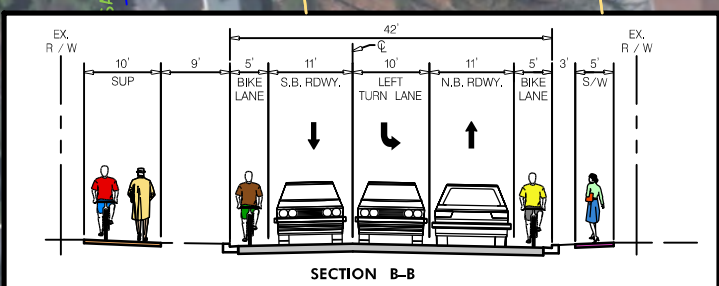
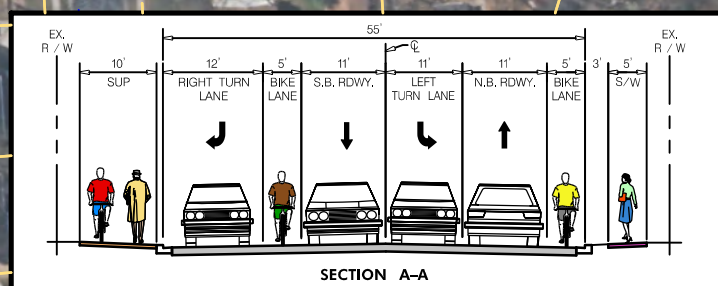
Splits and Phases: 2: Jumpers Hole Road & Severna Park MS/Retford Drive





APPENDIX B

CONCEPT PLANS



MATCH LINE - SEE DWG. NO. PS-02

LEGEND

- PROPOSED SHARED USE PATH
- PROPOSED SIDEWALK (BY OTHERS)
- PROPOSED SIDEWALK
- PROPOSED GRASS MEDIAN
- PROPOSED ROADWAY WIDENING

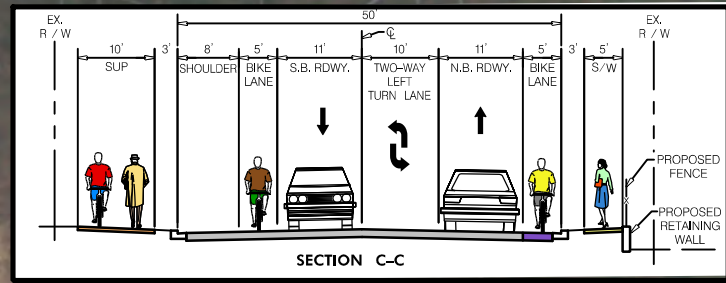
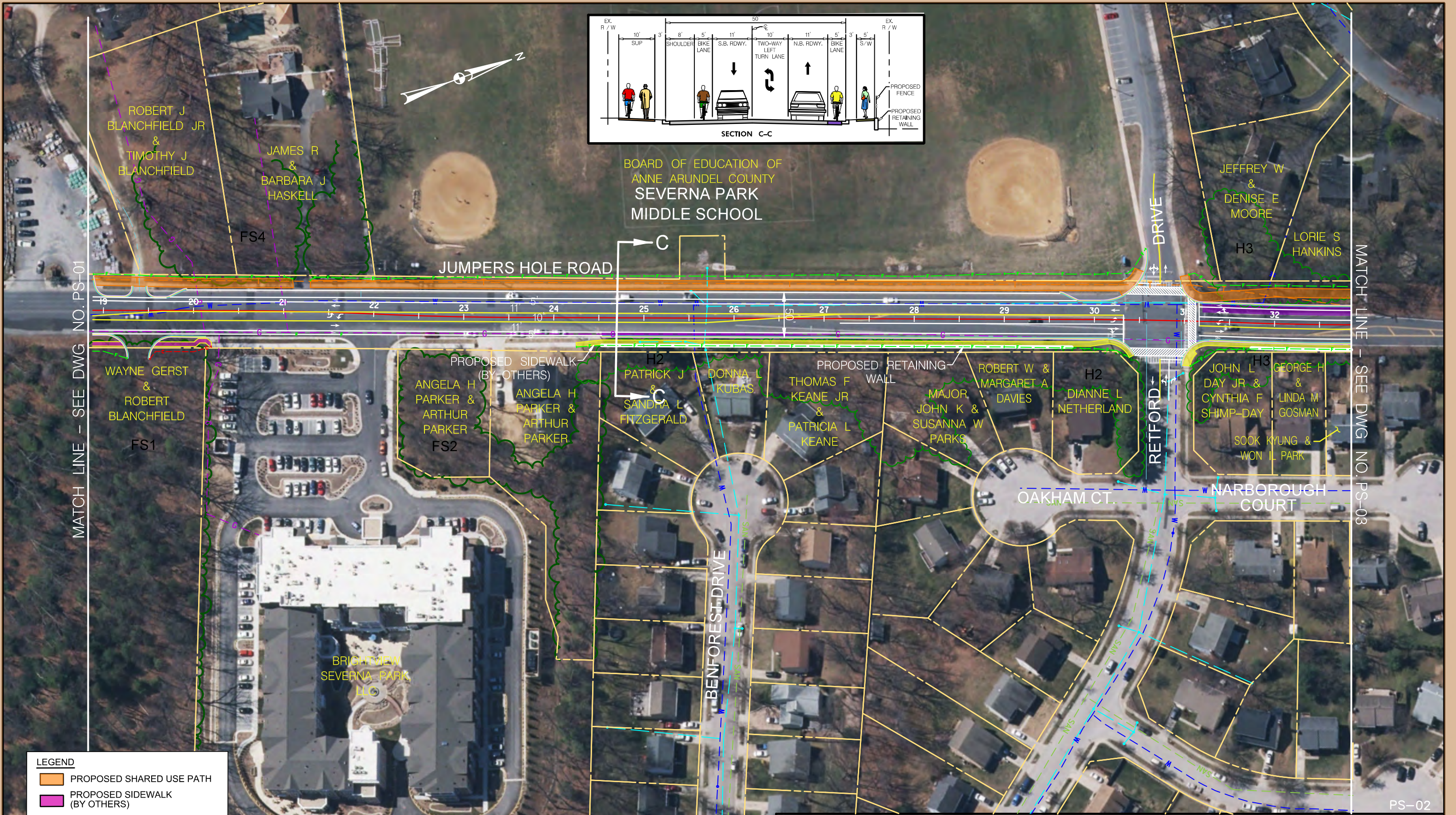
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NO.	DESCRIPTION	DATE	BY	DATE	DATE	DATE	DATE	DRAWN BY: TMB / TTS		
								CHECKED BY: TMB		
								SHEET NO. 1 OF 16		
								PROJECT NO: H539600		
								PROPOSAL NO: H539613		

PS-01

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MIDDLE SCHOOL

LEGEND

- PROPOSED SHARED USE PATH
- PROPOSED SIDEWALK (BY OTHERS)
- PROPOSED SIDEWALK
- PROPOSED GRASS MEDIAN
- PROPOSED ROADWAY WIDENING

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NO.	DESCRIPTION	DATE	BY				

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APPROVED	APPROVED
ASSISTANT CHIEF ENGINEER	CHIEF RIGHT-OF-WAY

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PROJECT NO: H539600

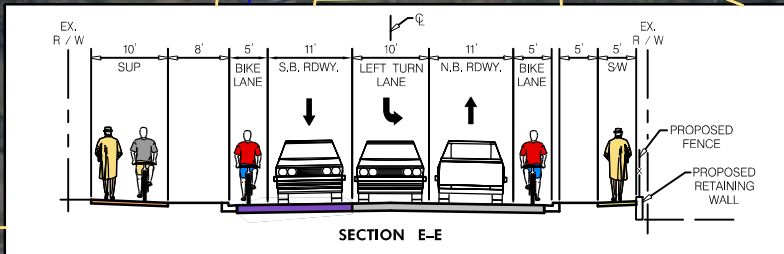
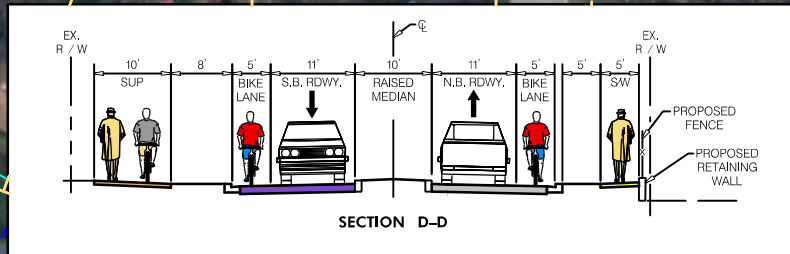
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SITE PLAN - ALTERNATE 1

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MATCH LINE - SEE DWG. NO. PS-02

MATCH LINE - SEE DWG. NO. PS-04



LEGEND

- PROPOSED SHARED USE PATH
- PROPOSED SIDEWALK (BY OTHERS)
- PROPOSED SIDEWALK
- PROPOSED GRASS MEDIAN
- PROPOSED ROADWAY WIDENING

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PROJECT NO: H539600
PROPOSAL NO: H539613

SITE PLAN - ALTERNATE 1

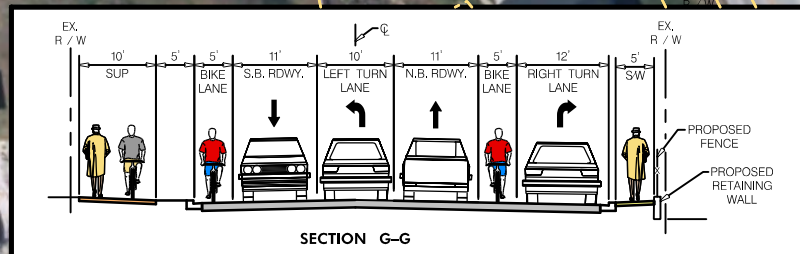
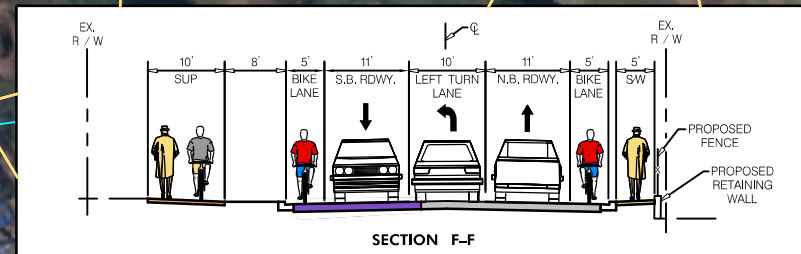
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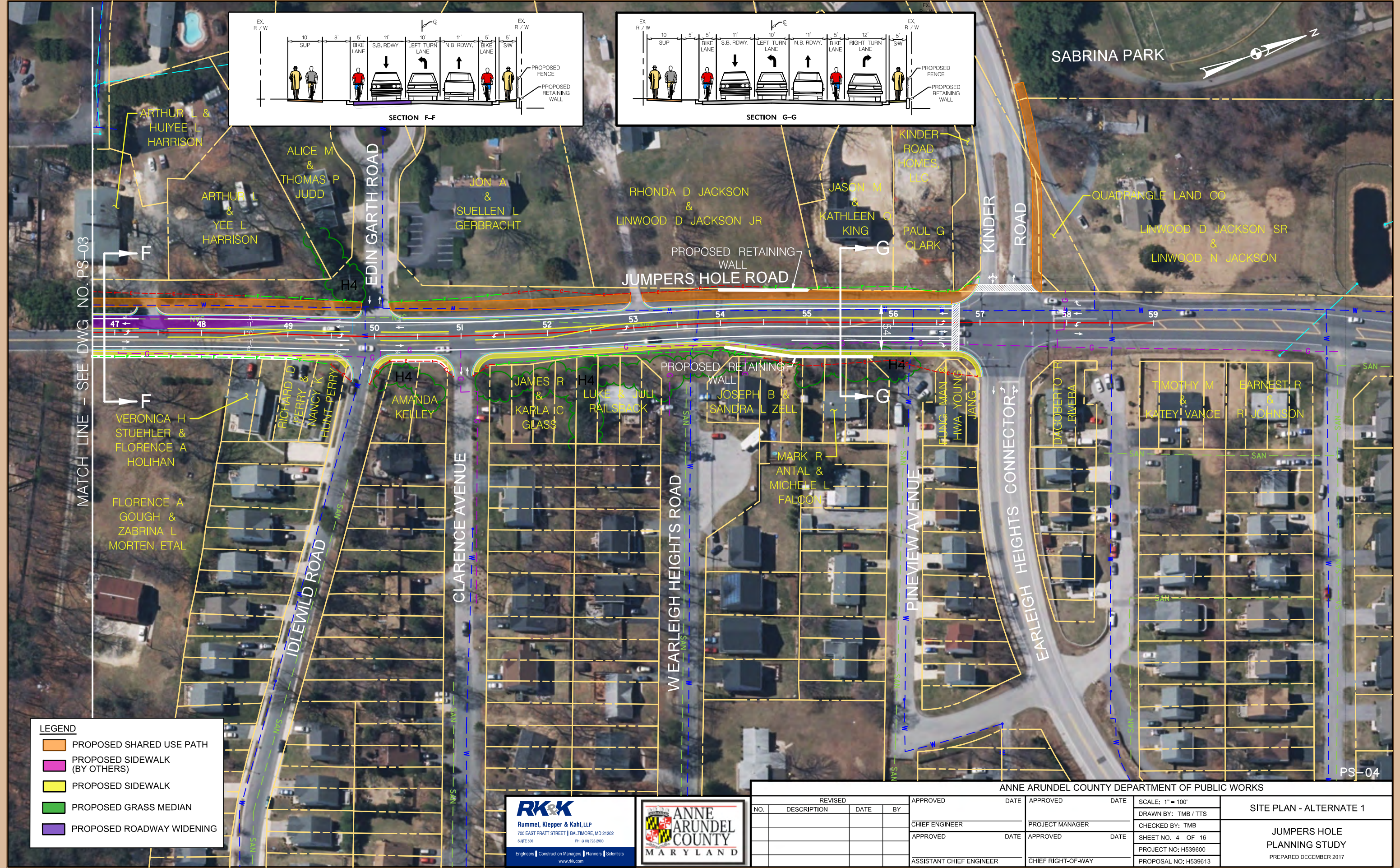
PS-03

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MATCH LINE - SEE DWG NO. PS-03



LEGEND

- PROPOSED SHARED USE PATH
- PROPOSED SIDEWALK (BY OTHERS)
- PROPOSED SIDEWALK
- PROPOSED GRASS MEDIAN
- PROPOSED ROADWAY WIDENING

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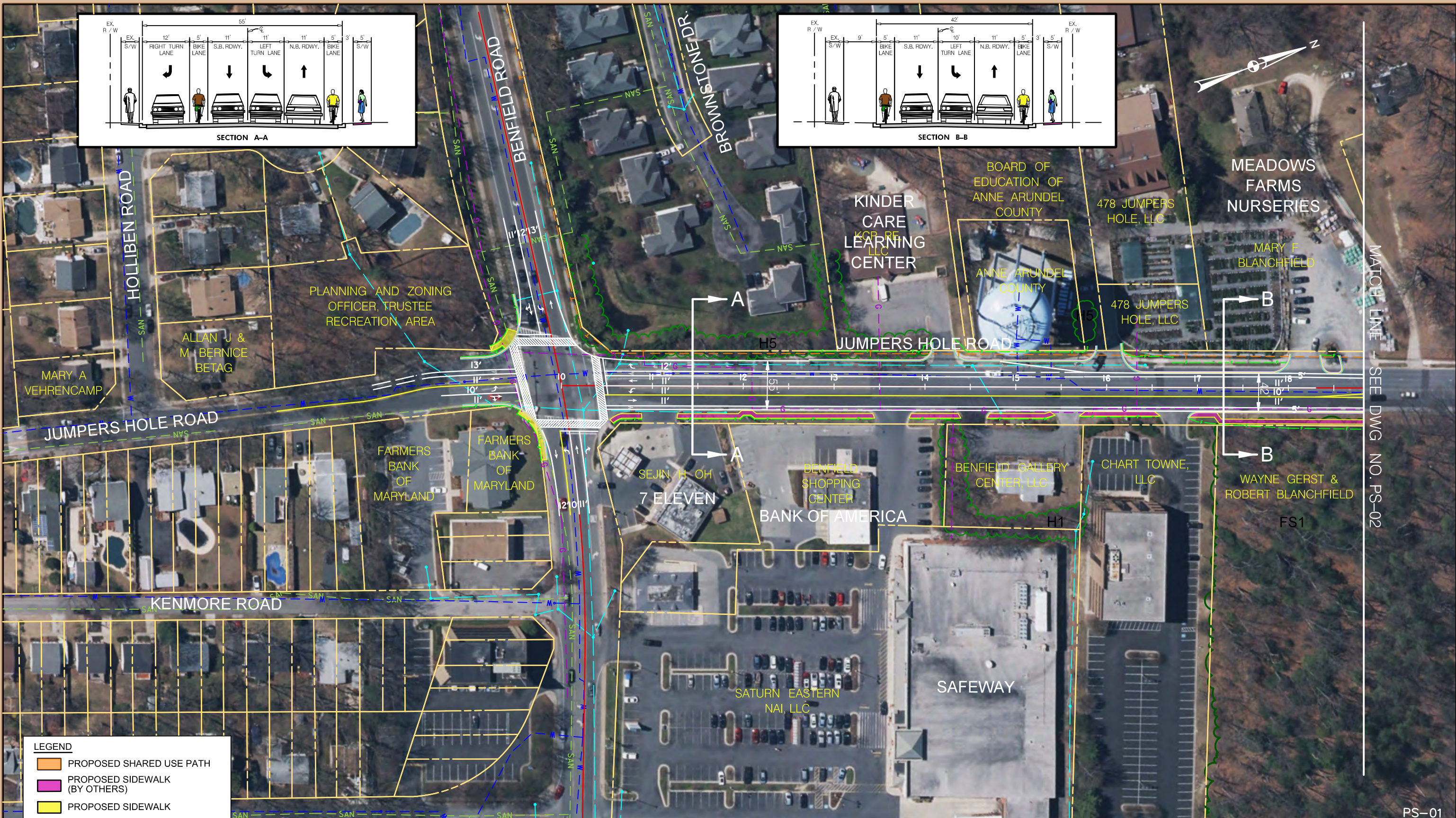
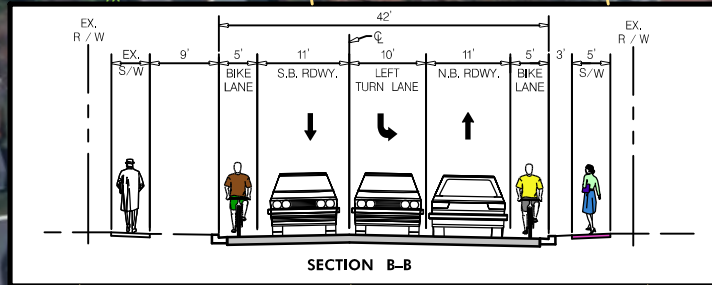
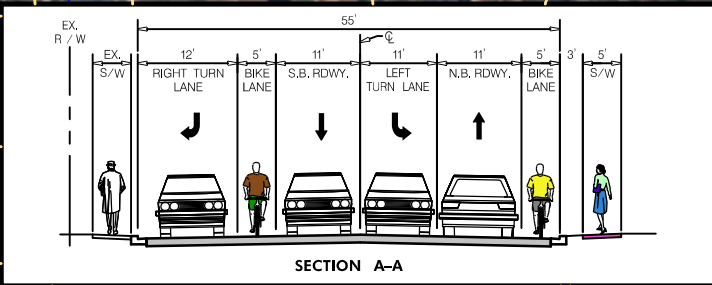
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								PROPOSAL NO: H539613	

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PS-04

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JUMPERS HOLE
 PLANNING STUDY
 PREPARED DECEMBER 2017



MATCH LINE - SEE DWG. NO. PS-02

PS-01

LEGEND

- PROPOSED SHARED USE PATH
- PROPOSED SIDEWALK (BY OTHERS)
- PROPOSED SIDEWALK
- PROPOSED GRASS MEDIAN
- PROPOSED ROADWAY WIDENING
- PROPOSED 4-FOOT BIOSWALE

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								PROPOSAL NO: H539613		

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MATCH LINE - SEE DWG. NO. PS-01

MATCH LINE - SEE DWG. NO. PS-03

PS-02

LEGEND

- PROPOSED SHARED USE PATH
- PROPOSED SIDEWALK (BY OTHERS)
- PROPOSED SIDEWALK
- PROPOSED GRASS MEDIAN
- PROPOSED ROADWAY WIDENING
- PROPOSED 4-FOOT BIOSWALE

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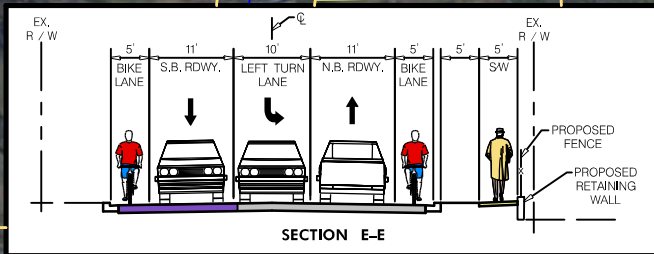
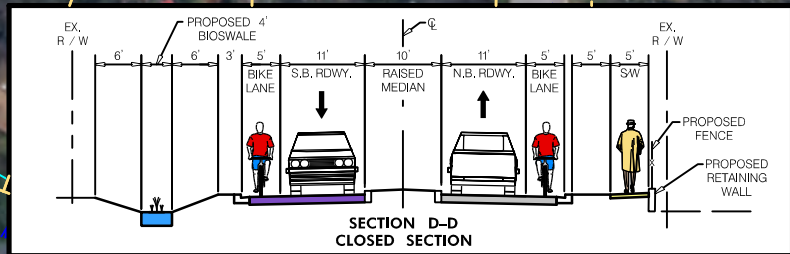
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APPROVED	APPROVED
ASSISTANT CHIEF ENGINEER	CHIEF RIGHT-OF-WAY

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SHEET NO. 6 OF 16	PROJECT NO: H539600
PROPOSAL NO: H539613	

SITE PLAN - ALTERNATE 2

JUMPERS HOLE PLANNING STUDY
 PREPARED DECEMBER 2017

\$ DATES
\$ FILES



MATCH LINE - SEE DWG NO. PS-02

MATCH LINE - SEE DWG NO. PS-04

PS-03

- LEGEND**
- PROPOSED SHARED USE PATH
 - PROPOSED SIDEWALK (BY OTHERS)
 - PROPOSED SIDEWALK
 - PROPOSED GRASS MEDIAN
 - PROPOSED ROADWAY WIDENING
 - PROPOSED 4-FOOT BIOSWALE

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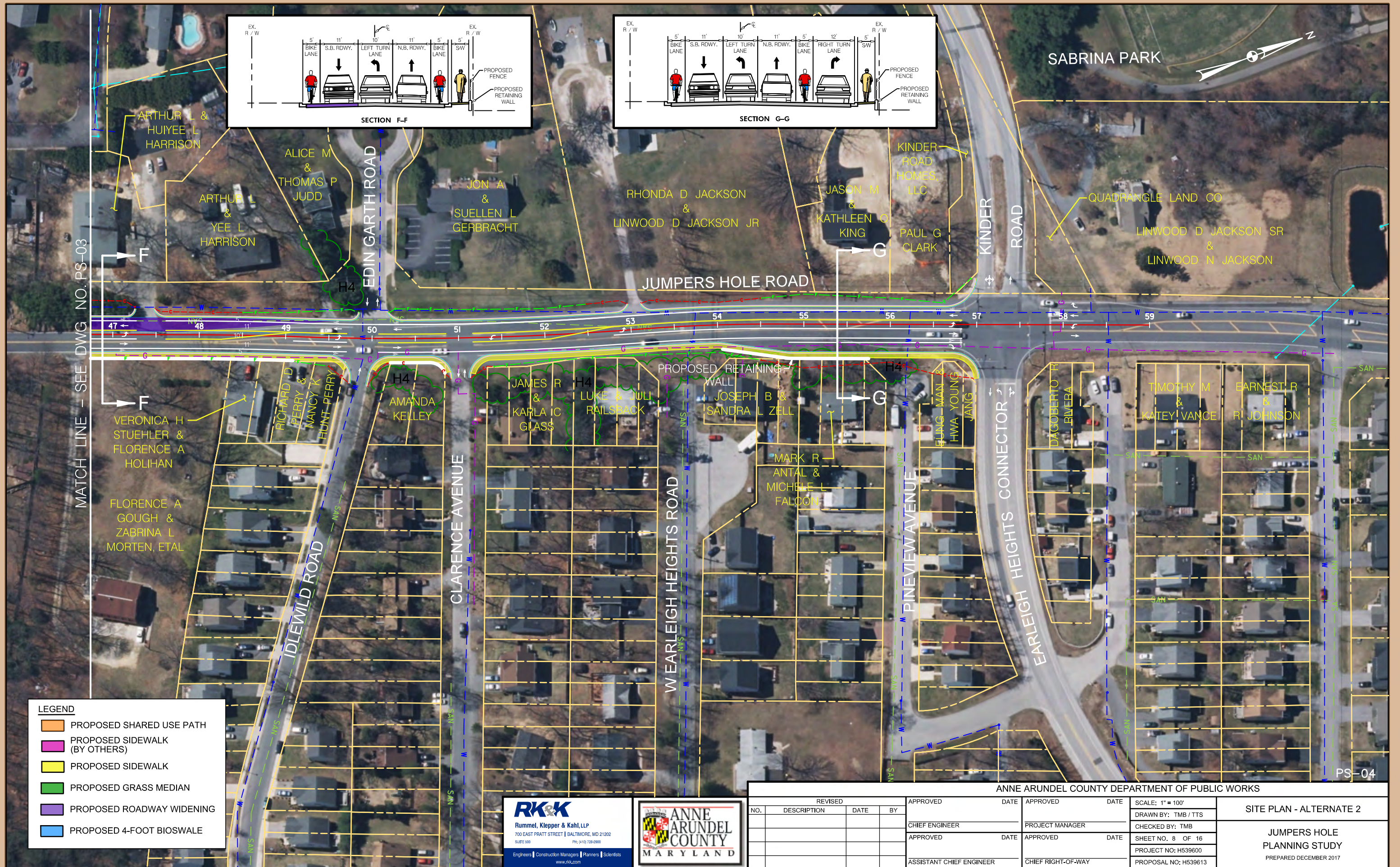
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APPROVED	APPROVED
ASSISTANT CHIEF ENGINEER	CHIEF RIGHT-OF-WAY

SCALE: 1" = 100'
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SHEET NO. 7 OF 16
PROJECT NO: H539600
PROPOSAL NO: H539613

SITE PLAN - ALTERNATE 2

JUMPERS HOLE PLANNING STUDY
 PREPARED DECEMBER 2017

\$ DATES
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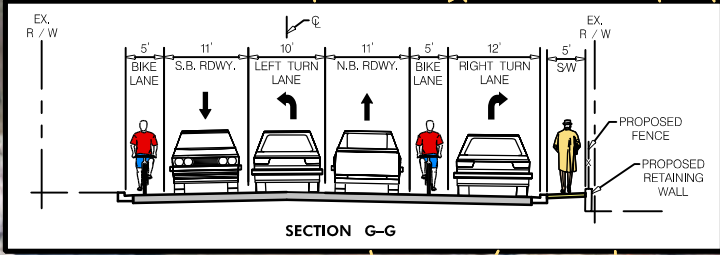
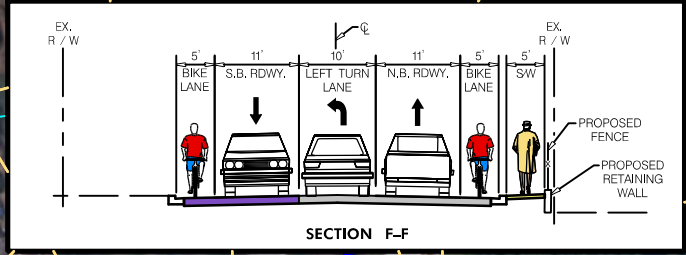


MATCH LINE - SEE DWG NO. PS-03

MATCH LINE - SEE DWG NO. PS-04

LEGEND

- PROPOSED SHARED USE PATH
- PROPOSED SIDEWALK (BY OTHERS)
- PROPOSED SIDEWALK
- PROPOSED GRASS MEDIAN
- PROPOSED ROADWAY WIDENING
- PROPOSED 4-FOOT BIOSWALE



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APPROVED	DATE	APPROVED	DATE
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APPROVED	DATE	APPROVED	DATE
ASSISTANT CHIEF ENGINEER		CHIEF RIGHT-OF-WAY	

SCALE: 1" = 100'

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SHEET NO. 8 OF 16

PROJECT NO: H539600

PROPOSAL NO: H539613

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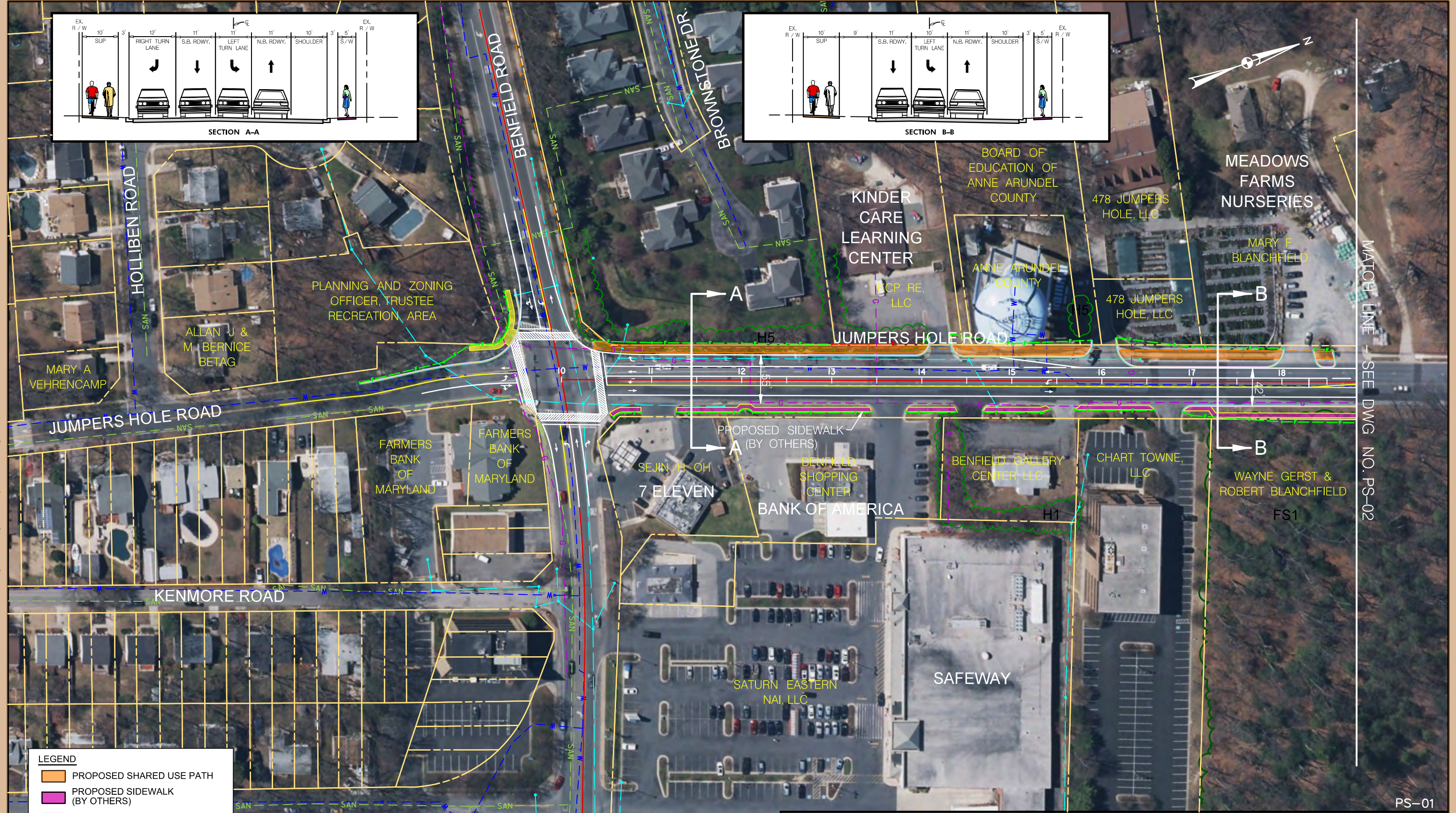
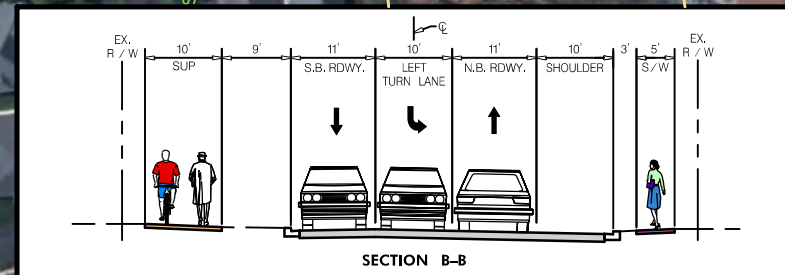
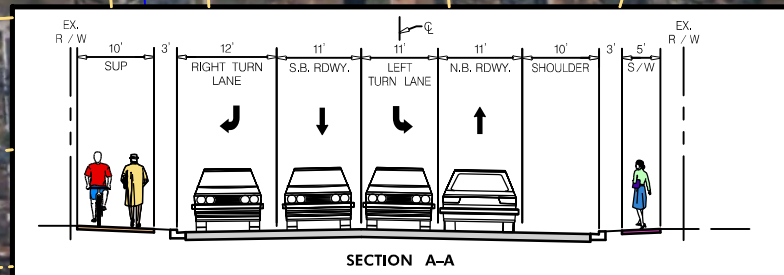
SITE PLAN - ALTERNATE 2

JUMPERS HOLE PLANNING STUDY

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Wednesday, December 06, 2017 AT 09:19 AM
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LEGEND

- PROPOSED SHARED USE PATH
- PROPOSED SIDEWALK (BY OTHERS)
- PROPOSED SIDEWALK
- PROPOSED GRASS MEDIAN
- PROPOSED ROADWAY WIDENING

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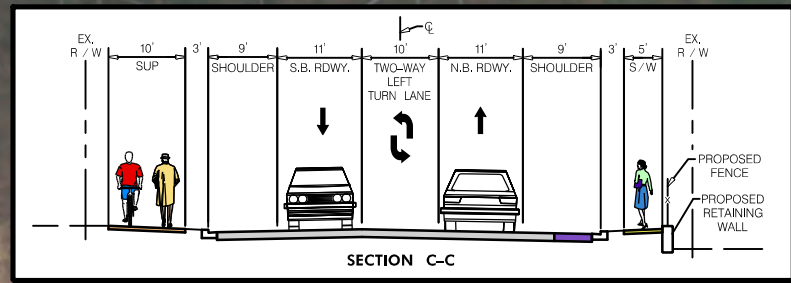


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								SHEET NO. 9 OF 16		
								PROJECT NO: H539600		
								PROPOSAL NO: H539613		

MATCH LINE - SEE DWG. NO. PS-02

PS-01

Wednesday, December 06, 2017 AT 09:34 AM
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MATCH LINE - SEE DWG. NO. PS-01

MATCH LINE - SEE DWG. NO. PS-03

LEGEND

- PROPOSED SHARED USE PATH
- PROPOSED SIDEWALK (BY OTHERS)
- PROPOSED SIDEWALK
- PROPOSED GRASS MEDIAN
- PROPOSED ROADWAY WIDENING

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SHEET NO. 10 OF 16
 PROJECT NO: H539600
 PROPOSAL NO: H539613

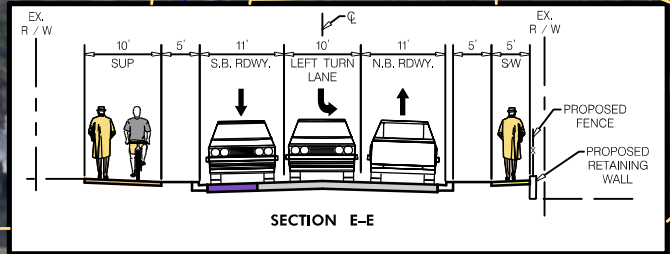
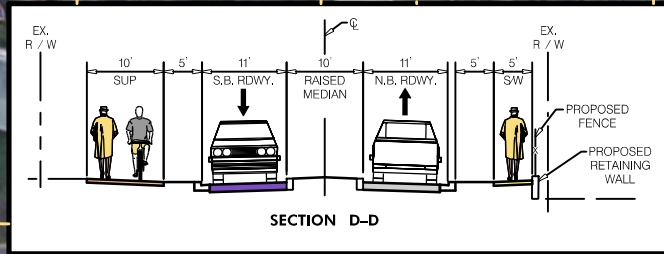
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SITE PLAN - ALTERNATE 3

JUMPERS HOLE PLANNING STUDY
 PREPARED DECEMBER 2017

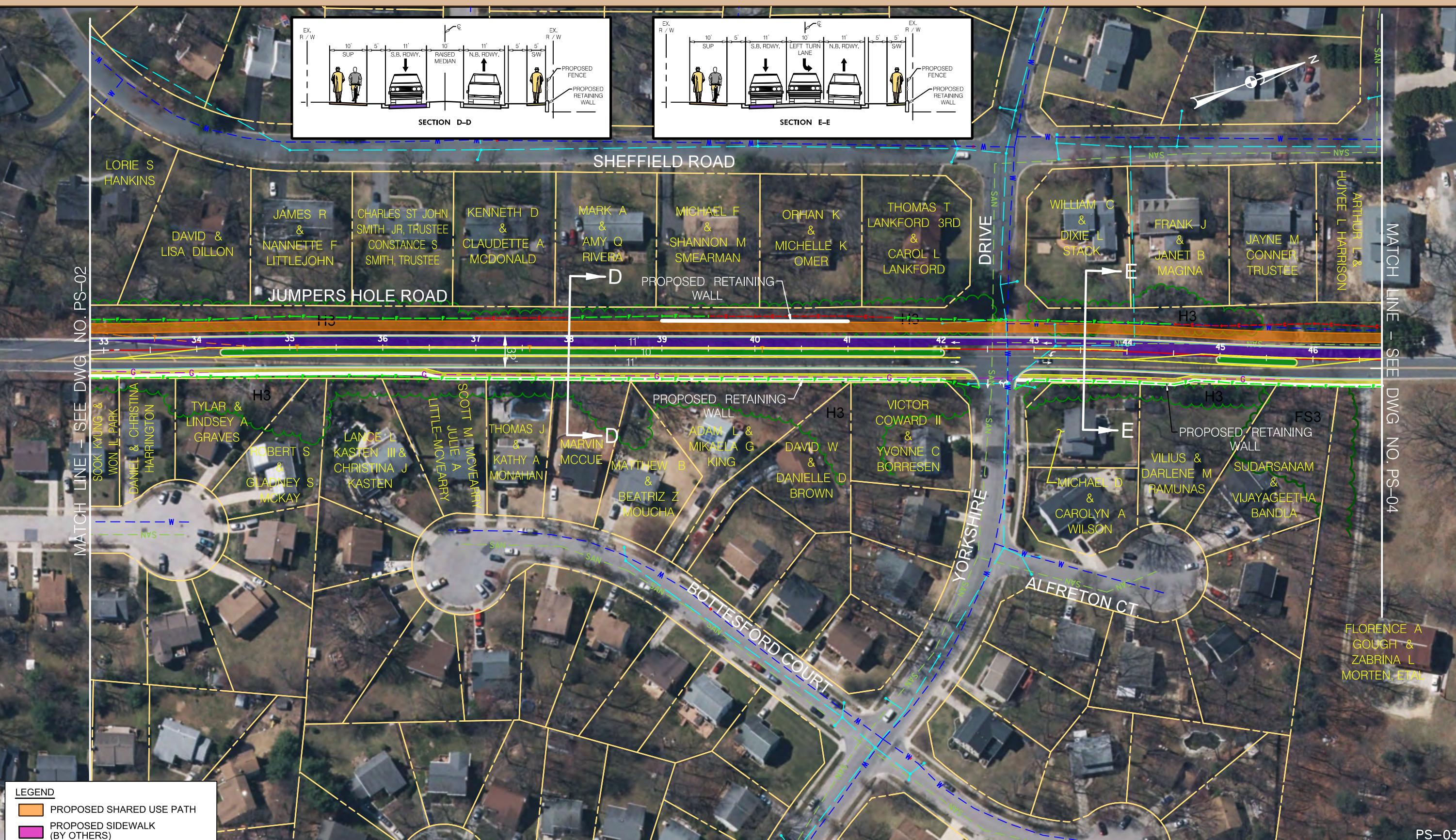
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MATCH LINE - SEE DWG. NO. PS-02

MATCH LINE - SEE DWG. NO. PS-04



LEGEND

- PROPOSED SHARED USE PATH
- PROPOSED SIDEWALK (BY OTHERS)
- PROPOSED SIDEWALK
- PROPOSED GRASS MEDIAN
- PROPOSED ROADWAY WIDENING

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CHIEF ENGINEER	PROJECT MANAGER	SCALE: 1" = 100'
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ASSISTANT CHIEF ENGINEER	CHIEF RIGHT-OF-WAY	CHECKED BY: TMB
		SHEET NO. 11 OF 16
		PROJECT NO: H539600
		PROPOSAL NO: H539613

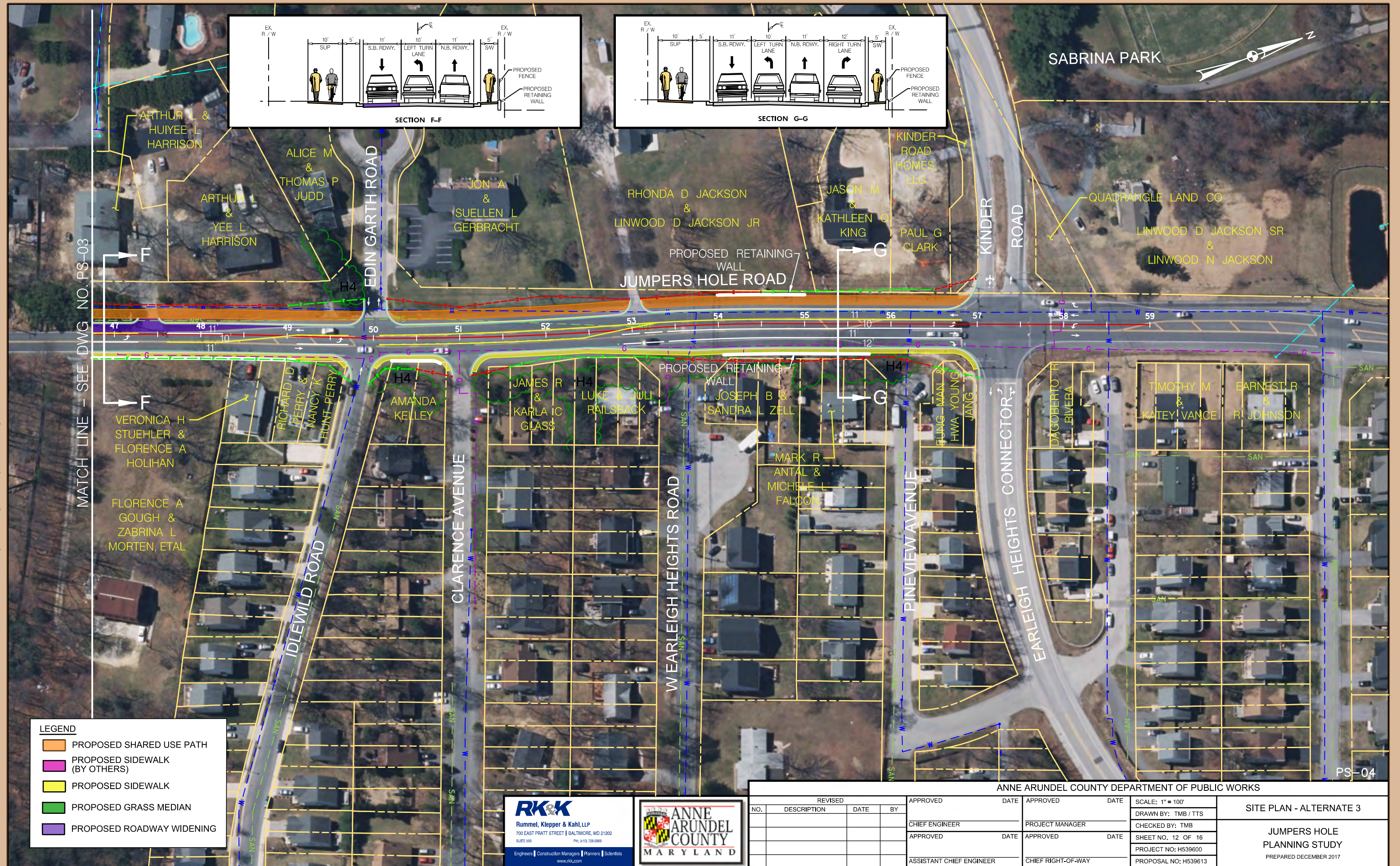
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SITE PLAN - ALTERNATE 3

JUMPERS HOLE PLANNING STUDY
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PS-03

Wednesday, December 06, 2017 AT 09:50 AM
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MATCH LINE - SEE DWG NO. PS-03

SABRINA PARK



LEGEND

- PROPOSED SHARED USE PATH
- PROPOSED SIDEWALK (BY OTHERS)
- PROPOSED SIDEWALK
- PROPOSED GRASS MEDIAN
- PROPOSED ROADWAY WIDENING

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APPROVED	DATE	APPROVED	DATE
CHIEF ENGINEER		PROJECT MANAGER	
APPROVED	DATE	APPROVED	DATE
ASSISTANT CHIEF ENGINEER		CHIEF RIGHT-OF-WAY	

SCALE: 1" = 100'

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SHEET NO. 12 OF 16

PROJECT NO: H539600

PROPOSAL NO: H539613

SITE PLAN - ALTERNATE 3

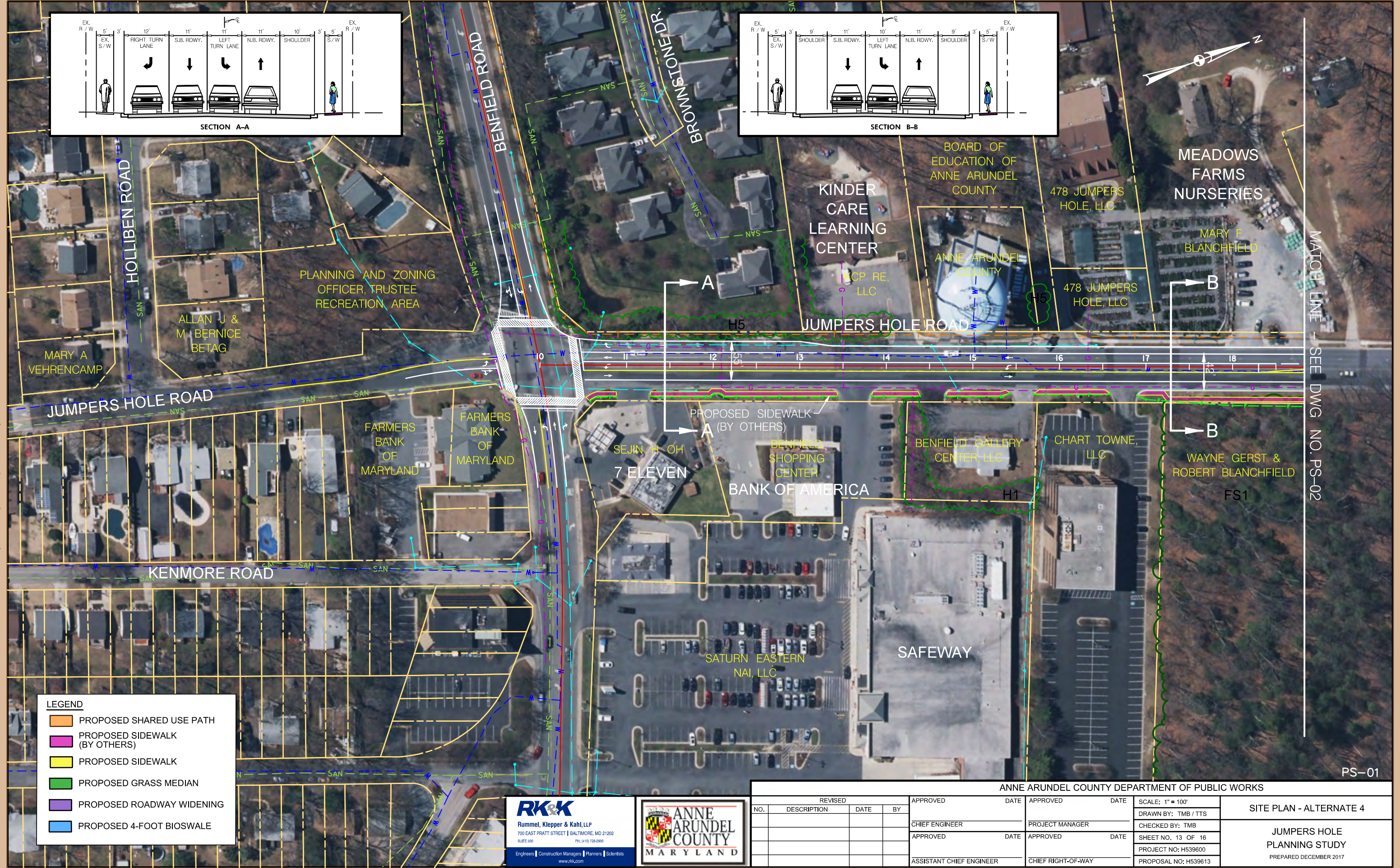
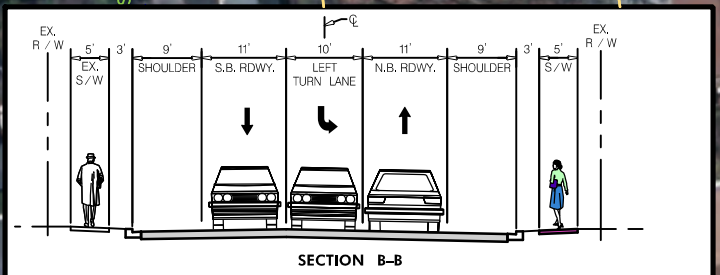
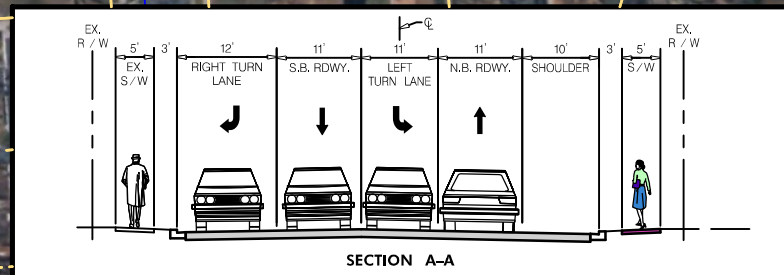
JUMPERS HOLE PLANNING STUDY

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PS-04

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MATCH LINE - SEE DWG. NO. PS-02

LEGEND

- PROPOSED SHARED USE PATH
- PROPOSED SIDEWALK (BY OTHERS)
- PROPOSED SIDEWALK
- PROPOSED GRASS MEDIAN
- PROPOSED ROADWAY WIDENING
- PROPOSED 4-FOOT BIOSWALE

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								CHECKED BY: TMB		
								SHEET NO. 13 OF 16		
								PROJECT NO: H539600		
								PROPOSAL NO: H539613		

PS-01

Wednesday, December 06, 2017 AT 10:00 AM
 \\balisrv02\2017\2017\11036_AACoOE\Task 74 - Jumpers Hole Rd Study\CADD\Dgn\PS02_jump_Alt4.dgn



MATCH LINE - SEE DWG. NO. PS-01

MATCH LINE - SEE DWG. NO. PS-03

LEGEND

- PROPOSED SHARED USE PATH
- PROPOSED SIDEWALK (BY OTHERS)
- PROPOSED SIDEWALK
- PROPOSED GRASS MEDIAN
- PROPOSED ROADWAY WIDENING
- PROPOSED 4-FOOT BIOSWALE

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PROJECT NO: H539600

PROPOSAL NO: H539613

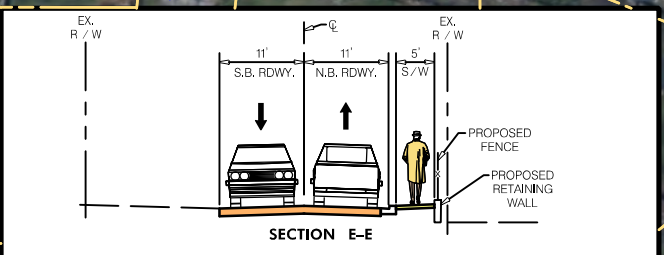
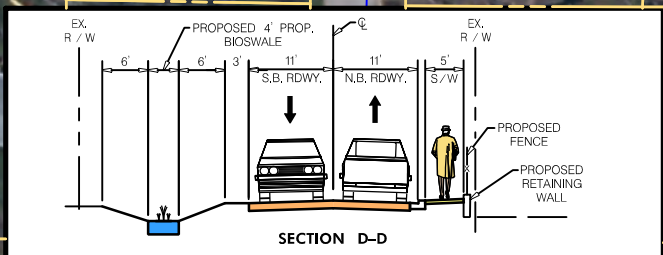
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SITE PLAN - ALTERNATE 4

JUMPERS HOLE PLANNING STUDY
 PREPARED DECEMBER 2017

PS-02

Wednesday, December 06, 2017 AT 10:07 AM
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MATCH LINE - SEE DWG. NO. PS-04



LEGEND

- PROPOSED SHARED USE PATH
- PROPOSED SIDEWALK (BY OTHERS)
- PROPOSED SIDEWALK
- PROPOSED GRASS MEDIAN
- PROPOSED ROADWAY WIDENING
- PROPOSED 4-FOOT BIOSWALE

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NO.	DESCRIPTION	DATE	BY

APPROVED	DATE	APPROVED	DATE

SCALE: 1" = 100'

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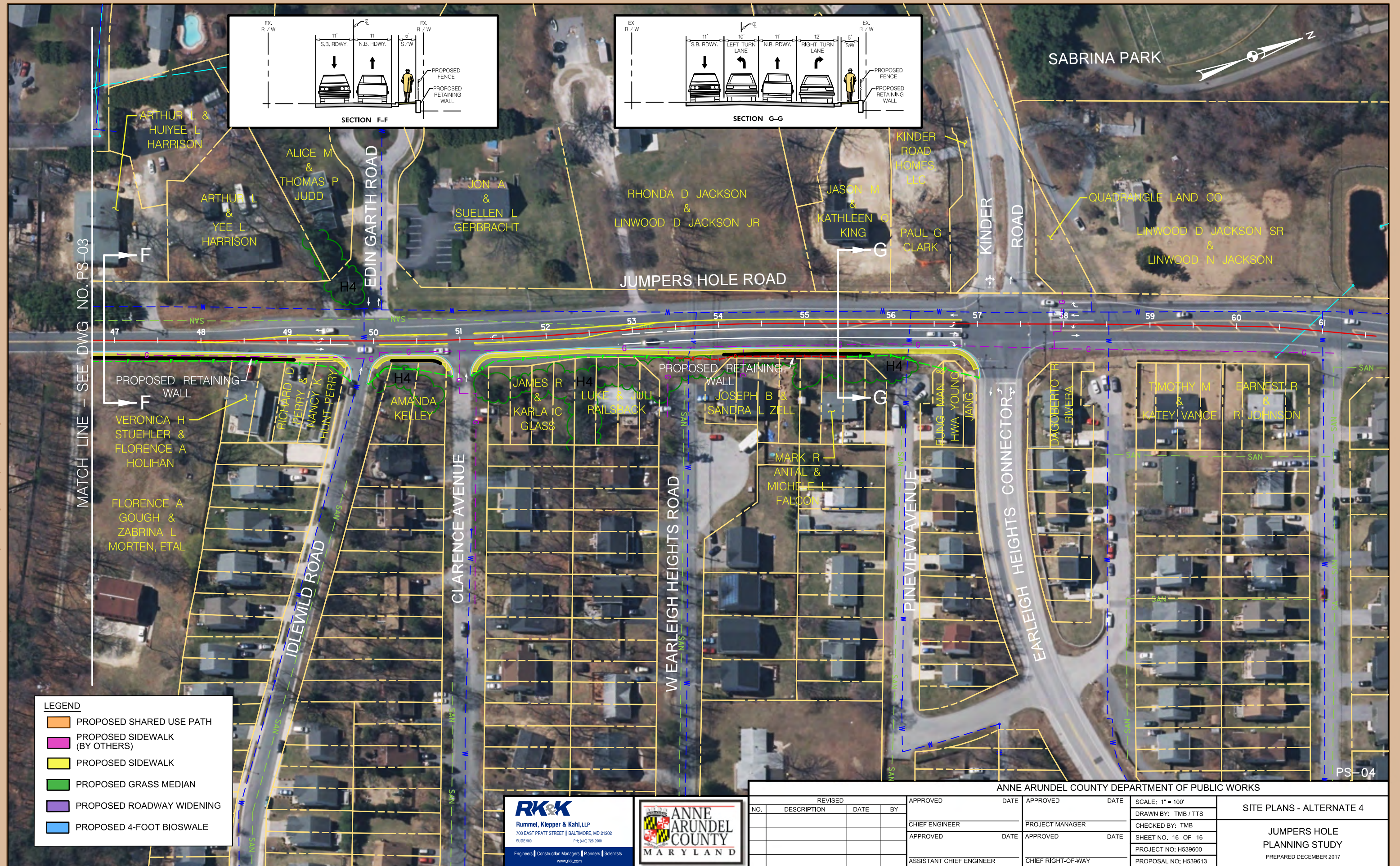
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 PROJECT NO: H539600
 PROPOSAL NO: H539613

SITE PLAN - ALTERNATE 4

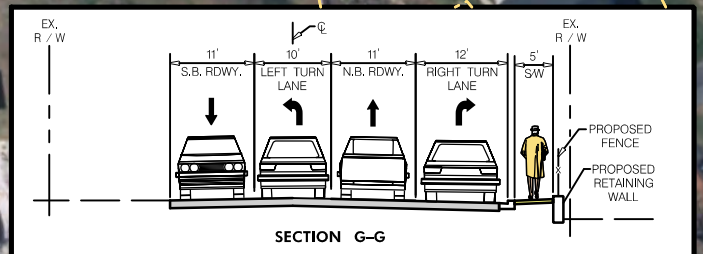
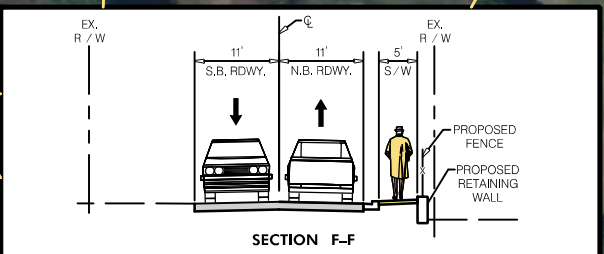
JUMPERS HOLE PLANNING STUDY
 PREPARED DECEMBER 2017

PS-03

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MATCH LINE - SEE DWG NO. PS-03



SABRINA PARK



LEGEND

- PROPOSED SHARED USE PATH
- PROPOSED SIDEWALK (BY OTHERS)
- PROPOSED SIDEWALK
- PROPOSED GRASS MEDIAN
- PROPOSED ROADWAY WIDENING
- PROPOSED 4-FOOT BIOSWALE

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NO.	DESCRIPTION	DATE	BY

APPROVED	DATE	APPROVED	DATE
CHIEF ENGINEER		PROJECT MANAGER	
APPROVED	DATE	APPROVED	DATE
ASSISTANT CHIEF ENGINEER		CHIEF RIGHT-OF-WAY	

SCALE: 1" = 100'

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PROJECT NO: H539600

PROPOSAL NO: H539613

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SITE PLANS - ALTERNATE 4

JUMPERS HOLE PLANNING STUDY

PREPARED DECEMBER 2017

PS-04



APPENDIX C

COST ESTIMATE

Jumpers Hole Road - Alternate 1 Concept Design Cost Estimate				
	Quantity	Unit	Unit Price	Cost
CATEGORY 1 - PRELIMINARY / MOT				
25% of Category 2, 4, 5 & 6				\$702,064
CATEGORY 2 - EARTHWORK				
Removal of Existing Pavement	75	CY	\$65	\$4,875
Common Borrow	3,300	CY	\$40	\$132,000
Class 2 Excavation	7,235	CY	\$50	\$361,750
Sub-total				\$498,625
CATEGORY 3 - DRAINAGE				
25% of Category 2, 4, 5 & 6				\$702,064
CATEGORY 4 - STRUCTURES				
Retaining Wall	1	LS	\$815,110	\$815,110
Sub-total				\$815,110
CATEGORY 5 - PAVING				
2 Inch HMA 9.5mm for Surface	3,500	TONS	\$110	\$385,000
3 Inch HMA 19.0mm for Base (Full Depth)	1,930	TONS	\$100	\$193,000
4 Inch HMA 19.0mm for Base (SUP)	1,300	TONS	\$100	\$130,000
6 Inch Graded Aggregate Base Course	16,460	SY	\$20	\$329,200
Sub-total				\$1,037,200
CATEGORY 6 - SHOULDERS				
Concrete Curb and Gutter	8,780	LF	\$30	\$263,400
5 Inch Concrete Sidewalk	16,470	SF	\$8	\$131,760
Detectable Warning Surface for Curb Ramps	330	SF	\$40	\$13,200
3 Foot Galvanized Chain Link Fence	2,720	LF	\$18	\$48,960
Sub-total				\$457,320
CATEGORY 7 - LANDSCAPING				
5% of Category 2, 4, 5 & 6				\$140,413
CATEGORY 8 - SIGNING / MARKING / UTILITIES				
Relocate Existing Utility Poles	8	EA	\$25,000	\$200,000
Relocate Existing 12 Inch Watermain	1,100	LF	\$180	\$198,000
Relocate Fire Hydrant	2	EA	\$7,500	\$15,000
Relocate 8 Inch Sanitary Sewer	750	LF	\$175	\$131,250
Relocate 4/6 Inch Gas Main	1,850	LF	\$50	\$92,500
Sub-total				\$636,750
NEAT SUB-TOTAL				
				\$4,989,545
35% Contingency				\$1,746,341
Construction Overhead				\$613,714
TOTAL CONSTRUCTION COST				\$7,349,600
Property Acquisition Cost				
Fee simple	500	SF	\$30	\$15,000
Easement	9,100	SF	\$15	\$136,500
Planning and Preliminary Engineering				\$1,102,440
TOTAL				\$8,603,540

Jumpers Hole Road - Alternate 2 Concept Design Cost Estimate				
	Quantity	Unit	Unit Price	Cost
CATEGORY 1 - PRELIMINARY / MOT				
25% of Category 2, 4, 5 & 6				\$618,773
CATEGORY 2 - EARTHWORK				
Removal of Existing Pavement	500	CY	\$65	\$32,500
Common Borrow	3,100	CY	\$40	\$124,000
Class 2 Excavation	4,900	CY	\$50	\$245,000
Sub-total				\$401,500
CATEGORY 3 - DRAINAGE				
25% of Category 2, 4, 5 & 6				\$618,773
CATEGORY 4 - STRUCTURES				
Retaining Wall	1	LS	\$724,710	\$724,710
Sub-total				\$724,710
CATEGORY 5 - PAVING				
2 Inch HMA 9.5mm for Surface	3,500	TONS	\$110	\$385,000
3 Inch HMA 19.0mm for Base (Full Depth)	2,460	TONS	\$100	\$246,000
6 Inch Graded Aggregate Base Course	13,930	SY	\$20	\$278,600
Sub-total				\$909,600
CATEGORY 6 - SHOULDERS				
Concrete Curb and Gutter	8,780	LF	\$30	\$263,400
5 Inch Concrete Sidewalk	15,890	SF	\$8	\$127,120
Detectable Warning Surface for Curb Ramps	130	SF	\$40	\$5,200
3 Foot Galvanized Chain Link Fence	2,420	LF	\$18	\$43,560
Sub-total				\$439,280
CATEGORY 7 - LANDSCAPING				
5% of Category 2, 4, 5 & 6				\$123,755
CATEGORY 8 - SIGNING / MARKING / UTILITIES				
Relocate Existing Utility Poles	8	EA	\$25,000	\$200,000
Relocate Existing 12 Inch Watermain	100	LF	\$180	\$18,000
Relocate Fire Hydrant	2	EA	\$7,500	\$15,000
Relocate 8 Inch Sanitary Sewer	750	LF	\$175	\$131,250
Relocate 4/6 Inch Gas Main	1,850	LF	\$50	\$92,500
Sub-total				\$456,750
NEAT SUB-TOTAL				
				\$4,293,140
35% Contingency				\$1,502,599
Construction Overhead				\$528,056
TOTAL CONSTRUCTION COST				\$6,323,794
Property Acquisition Cost				
Fee simple	200	SF	\$30	\$6,000
Easement	3,400	SF	\$15	\$51,000
Planning and Preliminary Engineering				\$948,569
TOTAL				\$7,329,364

Jumpers Hole Road - Alternate 3 Concept Design Cost Estimate				
	Quantity	Unit	Unit Price	Cost
CATEGORY 1 - PRELIMINARY / MOT				
25% of Category 2, 4, 5 & 6				\$607,345
CATEGORY 2 - EARTHWORK				
Removal of Existing Pavement	700	CY	\$65	\$45,500
Common Borrow	3,800	CY	\$40	\$152,000
Class 2 Excavation	3,900	CY	\$50	\$195,000
Sub-total				\$392,500
CATEGORY 3 - DRAINAGE				
25% of Category 2, 4, 5 & 6				\$607,345
CATEGORY 4 - STRUCTURES				
Retaining Wall	1	LS	\$811,520	\$811,520
Sub-total				\$811,520
CATEGORY 5 - PAVING				
2 Inch HMA 9.5mm for Surface	3,300	TONS	\$110	\$363,000
3 Inch HMA 19.0mm for Base (Full Depth)	770	TONS	\$100	\$77,000
4 Inch HMA 19.0mm for Base (SUP)	1,220	TONS	\$100	\$122,000
6 Inch Graded Aggregate Base Course	9,570	SY	\$20	\$191,400
Sub-total				\$753,400
CATEGORY 6 - SHOULDERS				
Concrete Curb and Gutter	9,325	LF	\$30	\$279,750
5 Inch Concrete Sidewalk	16,440	SF	\$8	\$131,520
Detectable Warning Surface for Curb Ramps	300	SF	\$40	\$12,000
3 Foot Galvanized Chain Link Fence	2,705	LF	\$18	\$48,690
Sub-total				\$471,960
CATEGORY 7 - LANDSCAPING				
5% of Category 2, 4, 5 & 6				\$121,469
CATEGORY 8 - SIGNING / MARKING / UTILITIES				
Relocate Existing Utility Poles	8	EA	\$25,000	\$200,000
Relocate Existing 12 Inch Watermain	1,100	LF	\$180	\$198,000
Relocate Fire Hydrant	2	EA	\$7,500	\$15,000
Relocate 8 Inch Sanitary Sewer	750	LF	\$175	\$131,250
Relocate 4/6 Inch Gas Main	1,850	LF	\$50	\$92,500
Sub-total				\$636,750
NEAT SUB-TOTAL				
				\$4,402,289
35% Contingency				
				\$1,540,801
Construction Overhead				
				\$541,482
TOTAL CONSTRUCTION COST				
				\$6,484,572
Property Acquisition Cost				
Fee simple	300	SF	\$30	\$9,000
Easement	8,000	SF	\$15	\$120,000
Planning and Preliminary Engineering				
				\$972,686
TOTAL				
				\$7,586,257

Jumpers Hole Road - Alternate 4 Concept Design Cost Estimate				
	Quantity	Unit	Unit Price	Cost
CATEGORY 1 - PRELIMINARY / MOT				
25% of Category 2, 4, 5 & 6				\$326,440
CATEGORY 2 - EARTHWORK				
Removal of Existing Pavement	130	CY	\$65	\$8,450
Common Borrow	1,100	CY	\$40	\$44,000
Class 2 Excavation	960	CY	\$50	\$48,000
Sub-total				\$100,450
CATEGORY 3 - DRAINAGE				
25% of Category 2, 4, 5 & 6				\$326,440
CATEGORY 4 - STRUCTURES				
Retaining Wall	1	LS	\$724,060	\$724,060
Sub-total				\$724,060
CATEGORY 5 - PAVING				
2 Inch HMA 9.5mm for Surface	10	TONS	\$110	\$1,100
3 Inch HMA 19.0mm for Base (Full Depth)	40	TONS	\$100	\$4,000
6 Inch Graded Aggregate Base Course	220	SY	\$20	\$4,400
Sub-total				\$9,500
CATEGORY 6 - SHOULDERS				
Concrete Curb and Gutter	9,940	LF	\$30	\$298,200
5 Inch Concrete Sidewalk	15,760	SF	\$8	\$126,080
Detectable Warning Surface for Curb Ramps	100	SF	\$40	\$4,000
3 Foot Galvanized Chain Link Fence	2,415	LF	\$18	\$43,470
Sub-total				\$471,750
CATEGORY 7 - LANDSCAPING				
5% of Category 2, 4, 5 & 6				\$65,288
CATEGORY 8 - SIGNING / MARKING / UTILITIES				
Relocate Existing Utility Poles	0	EA	\$25,000	\$0
Relocate Fire Hydrant	1	EA	\$7,500	\$7,500
Sub-total				\$7,500
NEAT SUB-TOTAL				
				\$2,031,428
35% Contingency				\$711,000
Construction Overhead				\$249,866
TOTAL CONSTRUCTION COST				\$2,992,293
Property Acquisition Cost				
Fee simple	200	SF	\$30	\$6,000
Easement	6,800	SF	\$15	\$102,000
Planning and Preliminary Engineering				\$448,844
TOTAL				\$3,549,137