

Traffic Impact Analysis
Millersville Park
Anne Arundel County
Department of Public Works



Prepared by:



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Traffic Impact Analysis
Millersville Park
Anne Arundel County Department of Public Works

I. INTRODUCTION AND SUMMARY

A. Purpose of Report

The provision of safe and efficient access is critical to any new development. The impacts of the trips to be generated by the new development must be quantified and the impacts to the local street network serving the development assessed. If operational issues are identified, measures must be identified to mitigate the impacts to ensure the safety and efficiency of the roadway network is maintained. Anne Arundel County Department of Public Works (AACO DPW) has tasked Whitney, Bailey, Cox & Magnani, LLC (WBCM) with conducting a Traffic Impact Analysis (TIA) for the proposed Millersville Park Site Development to ensure a safe and efficient transportation network is maintained. The study provides a summary of the proposed project, adjacent street network, COVID-19 and Assembly Hall of Jehovah's Witnesses existing volume adjustments, trips generated by adjacent proposed developments, an annual growth rate for background traffic, trip generation of the proposed recreation park and operational analyses to assess and mitigate impacts of the proposed site generated traffic. The traffic analysis was conducted in accordance with the Anne Arundel County Guidelines for Traffic Impact Studies ("Guidelines").

The following TIA report replaces the previous study dated February 23, 2018, as a result of several comments and questions on the original report that were presented during the January 21, 2020 public meeting for the site. Meeting minutes from the public meeting are included in Appendix A. The scope of the new traffic impact analysis is similar to the original study with additional items to address the public comments and concerns added. The original study, denoted as the 2018 TIA in the report, is provided in Appendix B. AACO DPW changed the use of the park from a tennis center to athletic fields in 2021.

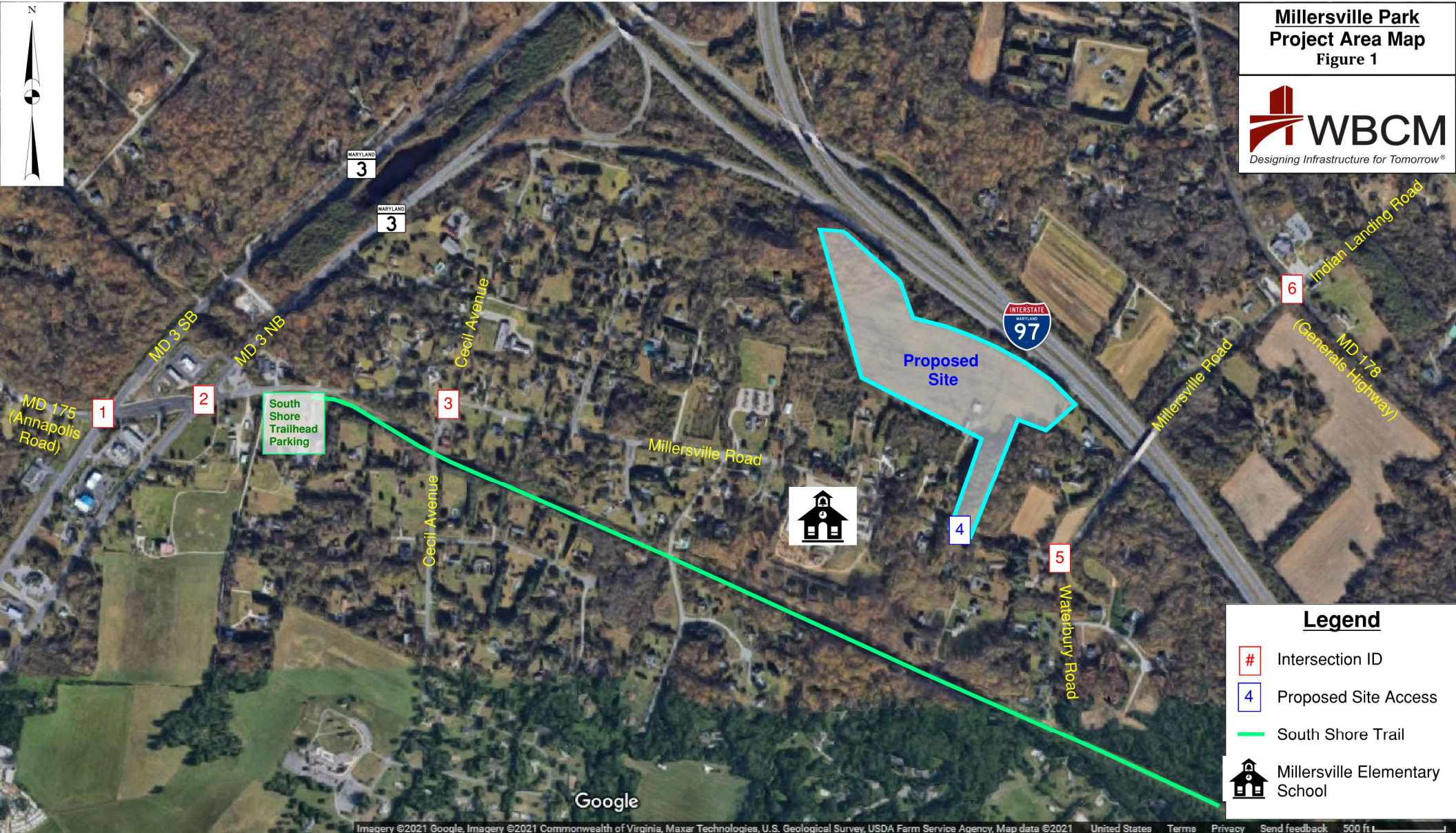
B. Executive Summary

Operational issues are currently experienced along the west end of the existing roadway network. The two MD 3 study intersections at MD 175/Millersville Road are currently experiencing unacceptable side street delays and are operating with little to no reserve capacity to accommodate additional traffic. Background traffic volume increases exacerbate the existing deficiencies at the intersections. The trips generated by the background development will cause additional delays to the roadway network and push the borderline failing intersections into unacceptable operations. Additional trips from the Millersville Park development will further increase delay at intersections that are over capacity; however, several mitigation measures are recommended to ensure the Millersville Park development does not reduce operations beyond projected levels under background development conditions.

C. Site Location and Development

The Millersville Park site development is located to the north of Millersville Road, approximately 1.0 mile east of MD 3 (Crain Highway) and 0.6 miles west of MD 178 (Generals Highway), as shown in Figure 1. The site access driveway is proposed approximately 600 FT east of Millersville Elementary School. The site access driveway will include separate left and right turn lanes to Millersville Road as well as a separate left turn lane along Millersville Road eastbound.

Millersville Park Project Area Map Figure 1



Legend

- # Intersection ID
- 4 Proposed Site Access
- South Shore Trail
- Millersville Elementary School



D. Land Use, Intensity and Site Plan

The TIA is investigating traffic operations associated with the proposed Millersville Park consisting of four (4) athletic fields. The latest Site Plan is provided in Appendix C. It should be noted that the number of fields in the Site Plan is shown as 5.5 as the four fields option has not been designed at the time of the TIA submittal. 371 parking spaces are also proposed as part of the site development.

E. Development Phasing and Timing

The project will be developed in a single phase, with a projected opening year of 2024.

II. STUDY AREA

A. Study Area Size

The proposed community park development is located in Millersville, Anne Arundel County, Maryland. The study area for the project to the east and west extends along Millersville Road, from MD 175 (Annapolis Road)/MD 3 Southbound to MD 178. The study intersections include the following which are also shown on Figure 1 (**bolded** intersections denote signalization; italicized intersection approaches denote stop control):

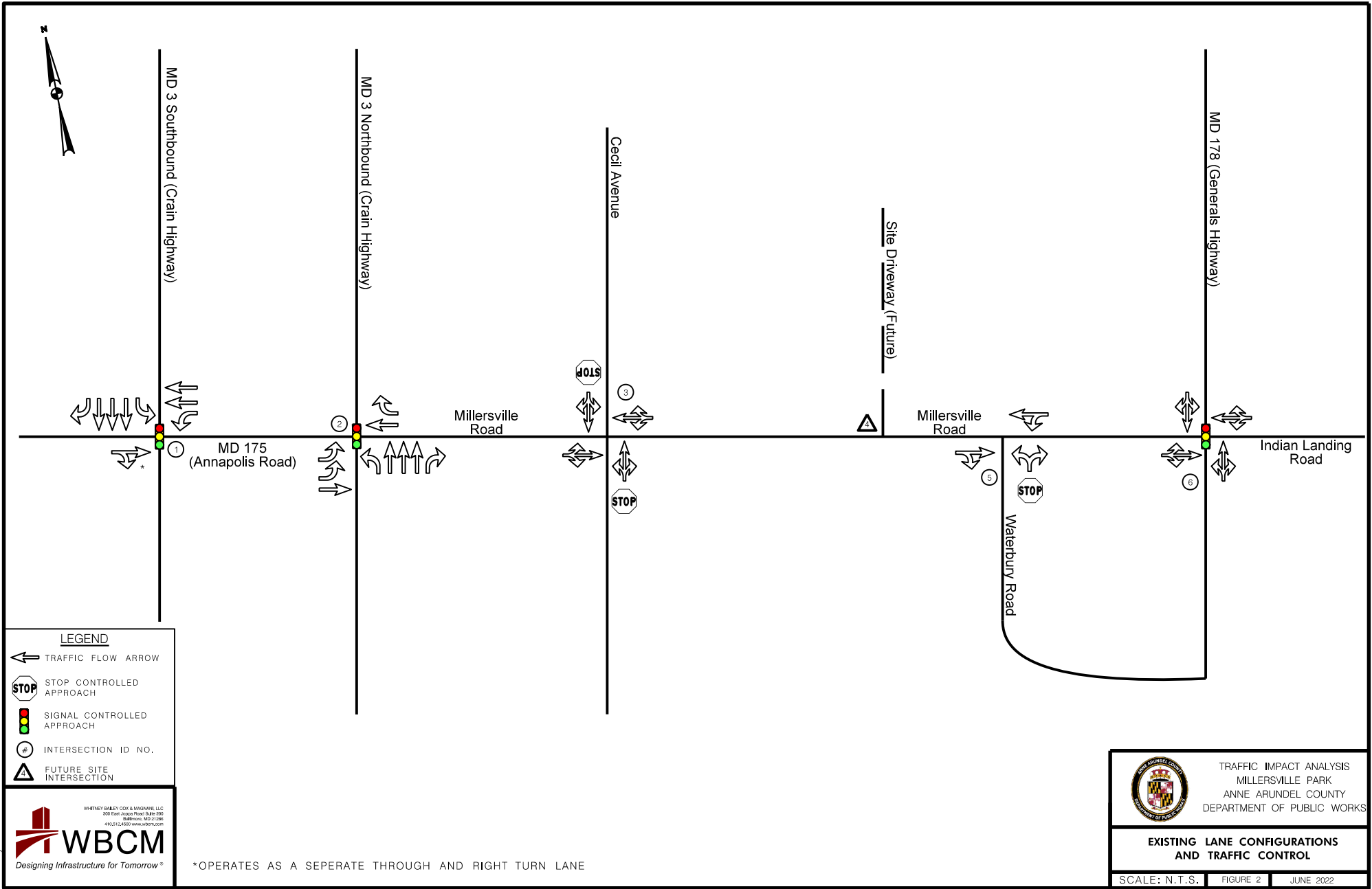
- 1) **MD 175 at MD 3 Southbound**
- 2) **MD 175/Millersville Road at MD 3 Northbound**
- 3) Millersville Road at *Cecil Avenue*
- 4) Millersville Road at *Site Access (Proposed)*
- 5) Millersville Road at *Waterbury Road*
- 6) **Millersville Road/Indian Landing Road at MD 178**

The traffic control and existing lane uses are also provided in Figure 2. The access driveway approach to Millersville Road will be stop-controlled.

B. Site Accessibility

MD 3 (Crain Highway), MD 178 (Generals Highway), MD 175 (Annapolis Road) and Millersville Road will provide the primary regional access to the site. Millersville Road is an Anne Arundel County maintained roadway with a route designation of CO 1207. Millersville Road begins at MD 3 Northbound which provides access to MD 32 (Patuxent Freeway) and I-97 (unnamed). Millersville Road backs to MD 175 (Annapolis Road) which runs east-west and provides access to the developed areas of Gambrills, Odenton, Severn and Jessup to the west. Millersville Road continues 1.7 miles east where it backs to Indian Landing Road at MD 178. Regionally, MD 178 parallels I-97 and provides additional access to MD 32 and I-97 via connecting roadways. Intersecting side roads along Millersville Road between MD 3 and MD 178 do not provide through access with the exception of Cecil Avenue and Waterbury Road. Major regional cities include Annapolis which is approximately 10 miles southeast of the site and Baltimore and Washington, DC located 12 miles north and 20 miles southwest of the site, respectively. A regional area map is provided as Figure 3.

Millersville Road is a two-lane minor arterial roadway adjacent to the future site access. The typical section varies throughout the study corridor from an open to closed section, with and without sidewalks; most of the closed section is from MD 3 southbound to just west of the South Shore Trail access. Millersville Road/MD 175 substantially expands to provide multiple through and turn lanes between MD 3 northbound and southbound including sidewalks on both sides. Millersville Road has a posted speed limit of 35 mph.




LEGEND

- TRAFFIC FLOW ARROW
- STOP CONTROLLED APPROACH
- SIGNAL CONTROLLED APPROACH
- INTERSECTION ID NO.
- FUTURE SITE INTERSECTION

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*OPERATES AS A SEPERATE THROUGH AND RIGHT TURN LANE

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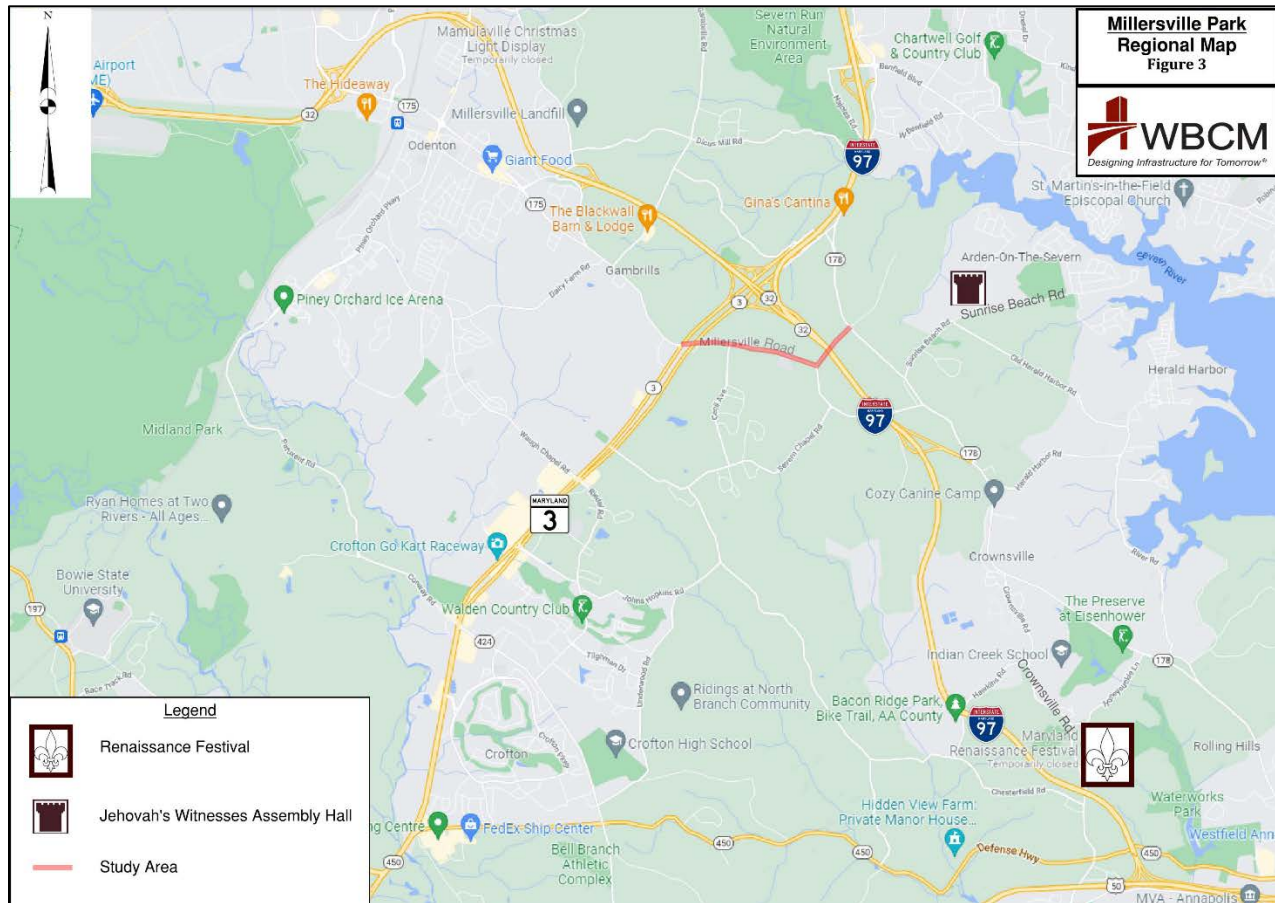
**EXISTING LANE CONFIGURATIONS
 AND TRAFFIC CONTROL**

SCALE: N.T.S. FIGURE 2 JUNE 2022

entry -



Figure 3 – Regional Map



C. Land Use

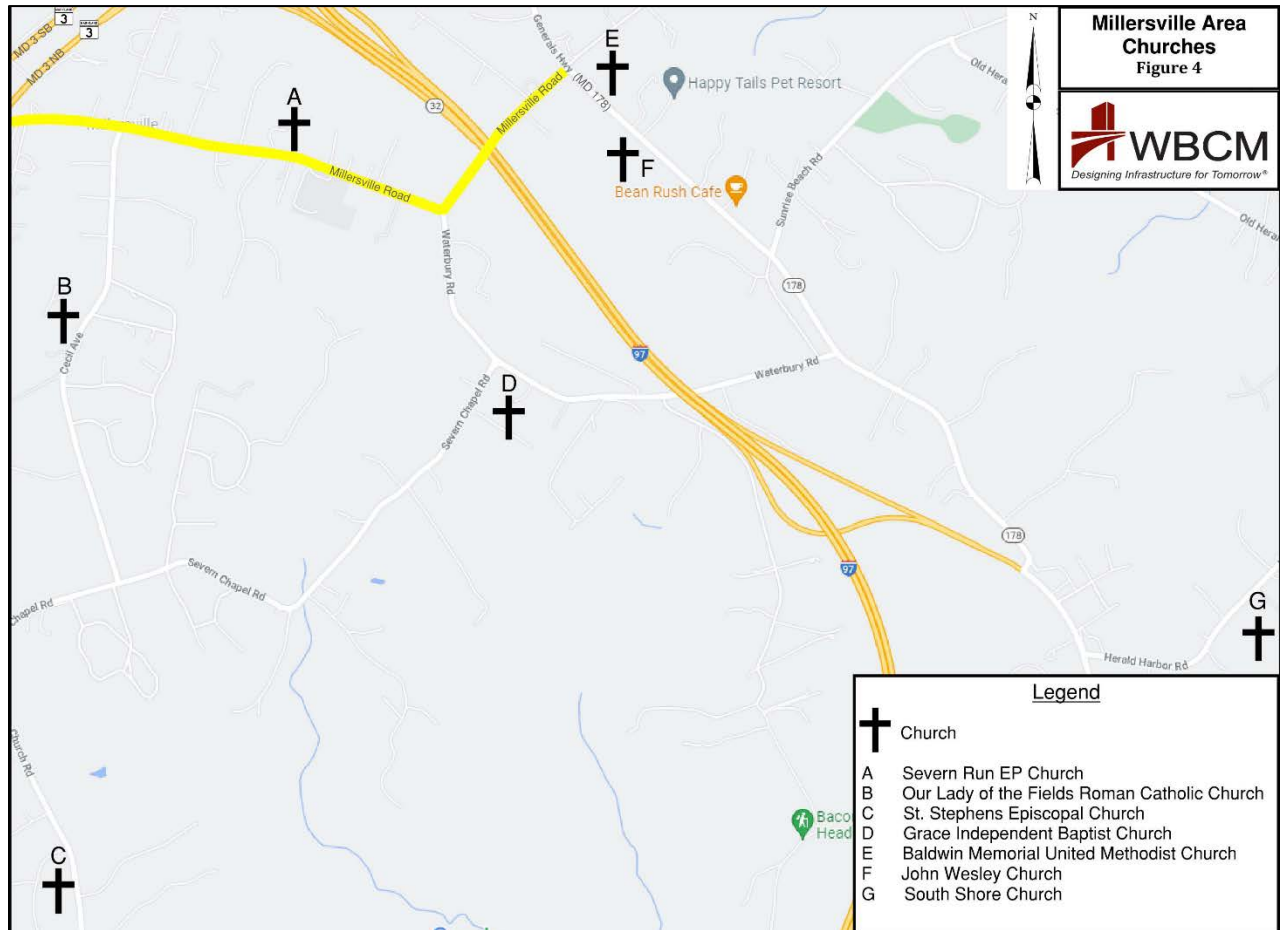
Land use in the study area is generally single family residential along Millersville Road. Limited retail and business establishments are located along MD 175/Millersville Road on the west end of the study corridor, adjacent to MD 3. Parking lot/access to the recreational South Shore Trail is provided along Millersville Road, approximately 900 FT west of Cecil Avenue. Millersville Elementary School is located 600 ft west of the proposed site access, on the opposite (south) side of Millersville Road. Several churches are located along the study corridor that held in-person services during the data collection:

- A) Severn Run EP Church
- B) Our Lady of the Fields Roman Catholic Church
- C) St. Stephens Episcopal Church
- D) Grace Independent Baptist Church
- E) Baldwin Memorial United Methodist Church
- F) John Wesley Church
- G) South Shore Church

Figure 4 provides a map showing the locations of the churches.



Figure 4 – Map of Churches Holding In-Person Services



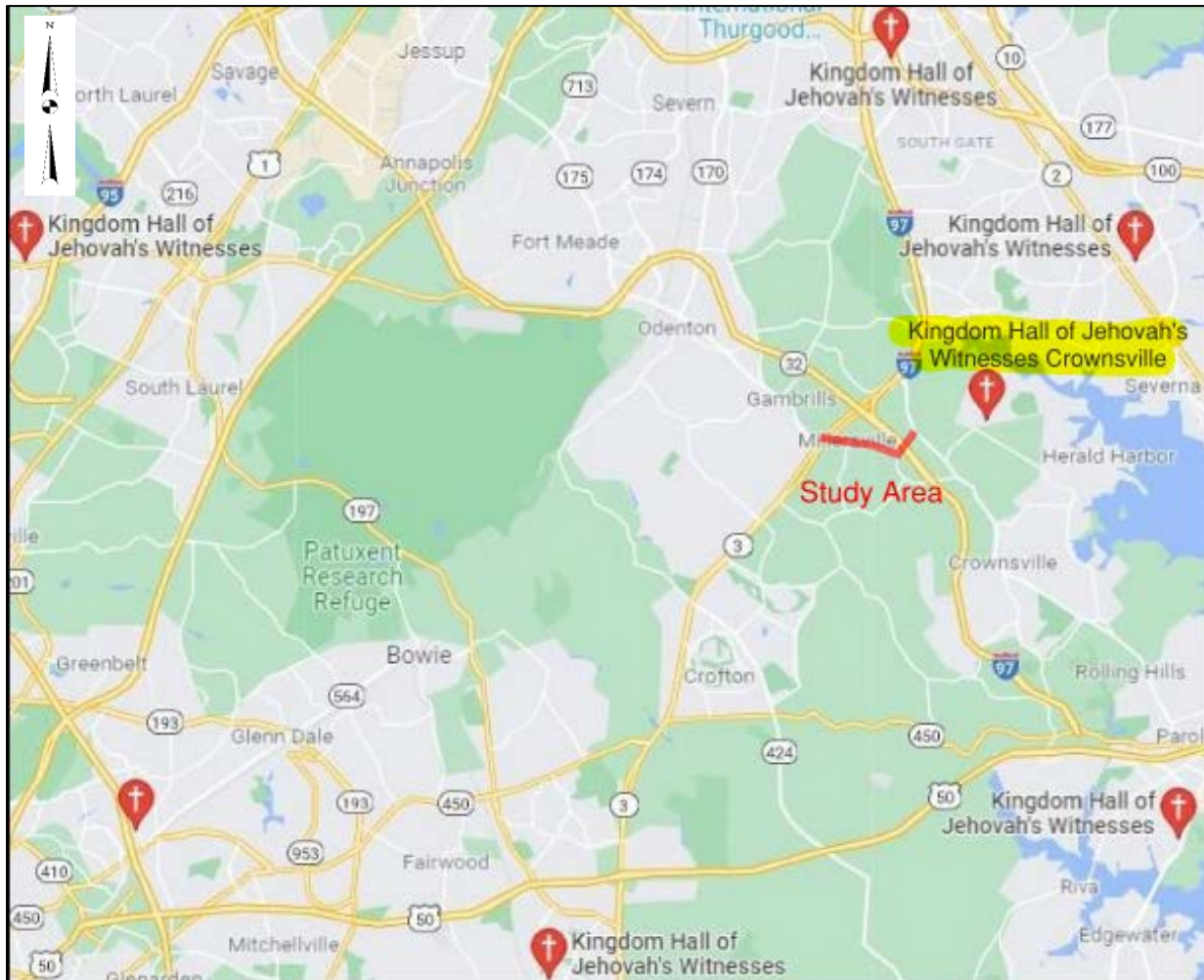
The Assembly Hall of Jehovah’s Witnesses (location provided in Figure 3) was not holding in-person church services at the time of the data collection. The study area (Millersville Road) is approximately 1.5 miles west of the Jehovah’s Witnesses Assembly Hall located on Sunrise Beach Road.

The Jehovah’s Witnesses (JW) Assembly Hall in Crownsville is approximately 47,000 SF; details of the Hall were discussed with the JW staff. The JW staff stated that Saturday and Sunday day-long services take place at the Assembly Hall. The Jehovah’s Witnesses Assembly Hall’s parking lot has 636 spaces but typically 600 spaces (approximately 95% of spaces) are used for the weekend services. A regional map showing the Crownsville JW Assembly Hall and adjacent JW Assembly Halls is provided as Figure 5.

The Maryland Renaissance Festival takes place each year along Crownsville Road in Annapolis, located five (5) miles south of the study area. An average of 300,000 people attend the Maryland Renaissance Festival each year, or approximately 15,800 daily. The Renaissance Festival covers an area of 25 acres and is the second largest Renaissance Festival in the United States. In 2021, the Festival generally took place Friday through Sunday from August 28th, 2021, to October 24th, 2021. Figure 3 shows the location of the Maryland Renaissance Festival.



Figure 5 – Jehovah’s Witnesses Assembly Halls Map



III. EXISTING CONDITIONS ANALYSIS

A. Physical Characteristics

Access: The site is served by Millersville Road, which is east of MD 3 northbound and west of MD 178.

Multi-Modal Elements: Sidewalks nor bike lanes are located along either side of Millersville Road, adjacent to the proposed site access. However, South Shore Trail, a paved walking/biking trail, is located south of Millersville Road. South Shore trail begins 700 feet east of MD 3 northbound where a trailhead for parking is provided, and runs east, intersecting with Waterbury Road, south of Millersville Road. Sidewalks are provided along MD 175 westbound, between MD 3 northbound and southbound.

B. Traffic Data Collection

WBCM performed traffic data collection during both the summer and fall months to ensure traffic associated with activities such as accessing the Severn River for recreation and the Maryland Renaissance Festival were captured. A summer and fall dataset were developed from data collected at the five existing study intersections from August 12th to September 1st, 2021 (Summer) and October 2nd to October 17th, 2021 (Fall).



The following data collection efforts were conducted for the study:

- 13-Hour (6:00 AM to 7:00 PM) Weekday and 11-Hour (8:00 AM to 7:00 PM) Weekend Turning Movement Counts conducted at the following study intersections:
 - 1) MD 3 Southbound/MD 175
 - 2) MD 3 Northbound/MD 175/Millersville Road
 - 3) Millersville Rd/Cecil Avenue
 - 5) Millersville Road/Waterbury Road
 - 6) Millersville Road/MD 178

- A 48-hour Machine Classification/Speed Count was performed 750 ft west of Waterbury Road, adjacent to the future Site Access (Intersection No. 4).

Weekday AM and PM and weekend Saturday and Sunday peak hour volumes were identified from the count data. Two weekdays during the summer and fall were counted to ensure a representative data set. The highest AM and PM peak hours were selected from the two days of data to represent a worst-case scenario. The count dates and peak hours of each study intersection during the fall and summer data collection are provided in Tables 1 and 2, respectively.

Table 1 – Peak Hours Summary (Summer)

Table 1 - Millersville Park - Summer Peak Hour and Count Dates Summary Table								
Int. ID	Peak Hours*							
	AM		PM		SAT		SUN	
	Time	Count Date	Time	Count Date	Time	Count Date	Time	Count Date
1	7:15 AM	WD-9/1/21	4:30 PM	TU-8/17/21	10:45 AM	8/14/21	12:45 PM	8/15/21
2	7:30 AM	WD-8/25/21	4:15 PM	WD-8/25/21	2:30 PM	8/21/21	2:15 PM	8/22/21
3	7:15 AM	TU-8/31/21	4:45 PM	TU-8/31/21	12:45 PM	8/28/21	12:15 PM	8/29/21
4-EB	7:45 AM	WD-8/25/21	5:00 PM	WD-8/25/21	12:30 PM	8/28/21	12:00 PM	8/29/21
4-WB	7:30 AM	TH-8/26/21	5:00 PM	WD-8/25/21	12:30 PM	8/28/21	12:15 PM	8/29/21
5	7:15 AM	WD-8/25/21	4:15 PM	TU-8/24/21	12:15 PM	8/21/21	5:00 PM	8/22/21
6	7:15 AM	TH-8/26/21	4:15 PM	TH-8/26/21	12:00 PM	8/28/21	12:15 PM	8/29/21

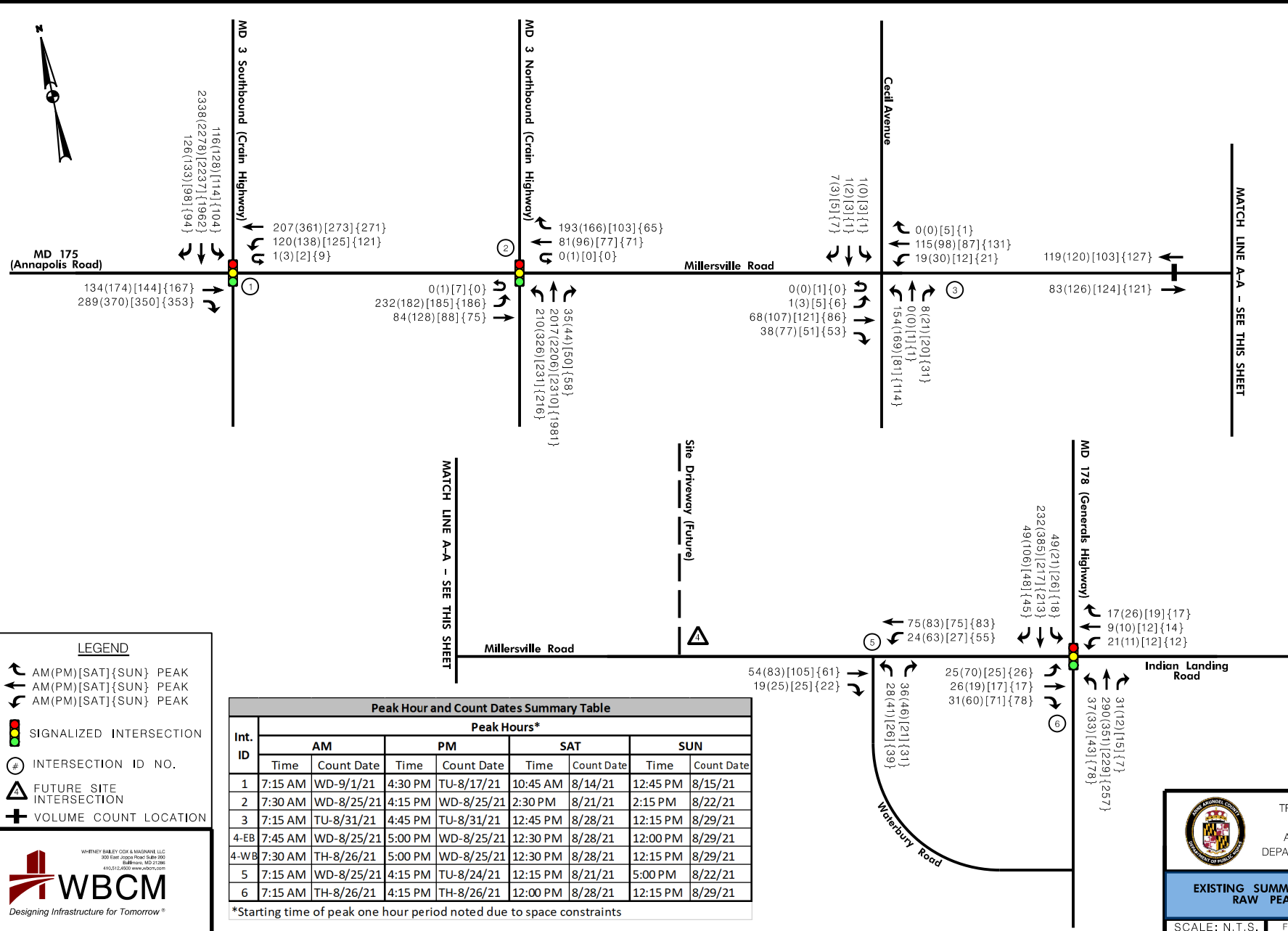
*Starting time of peak one hour period noted due to space constraints

Table 2 – Peak Hours Summary (Fall)

Table 2 - Millersville Park - Fall Peak Hour and Count Dates Summary Table								
Int. ID	Peak Hours*							
	AM		PM		SAT		SUN	
	Time	Count Date	Time	Count Date	Time	Count Date	Time	Count Date
1	7:15 AM	TU-10/5/21	4:45 PM	WD-10/6/21	10:15 AM	10/2/21	12:30 PM	10/3/21
2	7:00 AM	WD-10/6/21	4:15 PM	WD-10/6/21	1:00 PM	10/2/21	12.30 PM	10/3/21
3	7:30 AM	WD-10/13/21	4:45 PM	TH-10/14/21	3:00 PM	10/16/21	10:15 AM	10/17/21
4-EB	8:00 AM	WD-10/6/21	3:00 PM	WD-10/6/21	10:00 AM	10/2/21	12:00 PM	10/3/21
4-WB	8:00 AM	WD-10/6/21	3:00 PM	TH-10/7/21	1:00 PM	10/2/21	11:00 AM	10/3/21
5	8:15 AM	WD-10/13/21	3:45 PM	TU-10/5/21	1:00 PM	10/2/21	11:30 AM	10/3/21
6	7:30 AM	WD-10/13/21	4:15 PM	TH-10/14/21	9:45 AM	10/16/21	10:00 AM	10/17/21

*Starting time of peak one hour period noted due to space constraints

The raw turning movement and volume count data is provided in Appendix D. The raw peak hour traffic volumes for summer and fall are provided in Figures 6 and 7, respectively.



MATCH LINE A-A - SEE THIS SHEET

MATCH LINE A-A - SEE THIS SHEET

Site Driveway (Future)

LEGEND

- AM(PM)[SAT]{SUN} PEAK
- AM(PM)[SAT]{SUN} PEAK
- AM(PM)[SAT]{SUN} PEAK
- SIGNALIZED INTERSECTION
- INTERSECTION ID NO.
- FUTURE SITE INTERSECTION
- VOLUME COUNT LOCATION

Peak Hour and Count Dates Summary Table								
Int. ID	Peak Hours*							
	AM		PM		SAT		SUN	
	Time	Count Date	Time	Count Date	Time	Count Date	Time	Count Date
1	7:15 AM	WD-9/1/21	4:30 PM	TU-8/17/21	10:45 AM	8/14/21	12:45 PM	8/15/21
2	7:30 AM	WD-8/25/21	4:15 PM	WD-8/25/21	2:30 PM	8/21/21	2:15 PM	8/22/21
3	7:15 AM	TU-8/31/21	4:45 PM	TU-8/31/21	12:45 PM	8/28/21	12:15 PM	8/29/21
4-EB	7:45 AM	WD-8/25/21	5:00 PM	WD-8/25/21	12:30 PM	8/28/21	12:00 PM	8/29/21
4-WB	7:30 AM	TH-8/26/21	5:00 PM	WD-8/25/21	12:30 PM	8/28/21	12:15 PM	8/29/21
5	7:15 AM	WD-8/25/21	4:15 PM	TU-8/24/21	12:15 PM	8/21/21	5:00 PM	8/22/21
6	7:15 AM	TH-8/26/21	4:15 PM	TH-8/26/21	12:00 PM	8/28/21	12:15 PM	8/29/21

*Starting time of peak one hour period noted due to space constraints



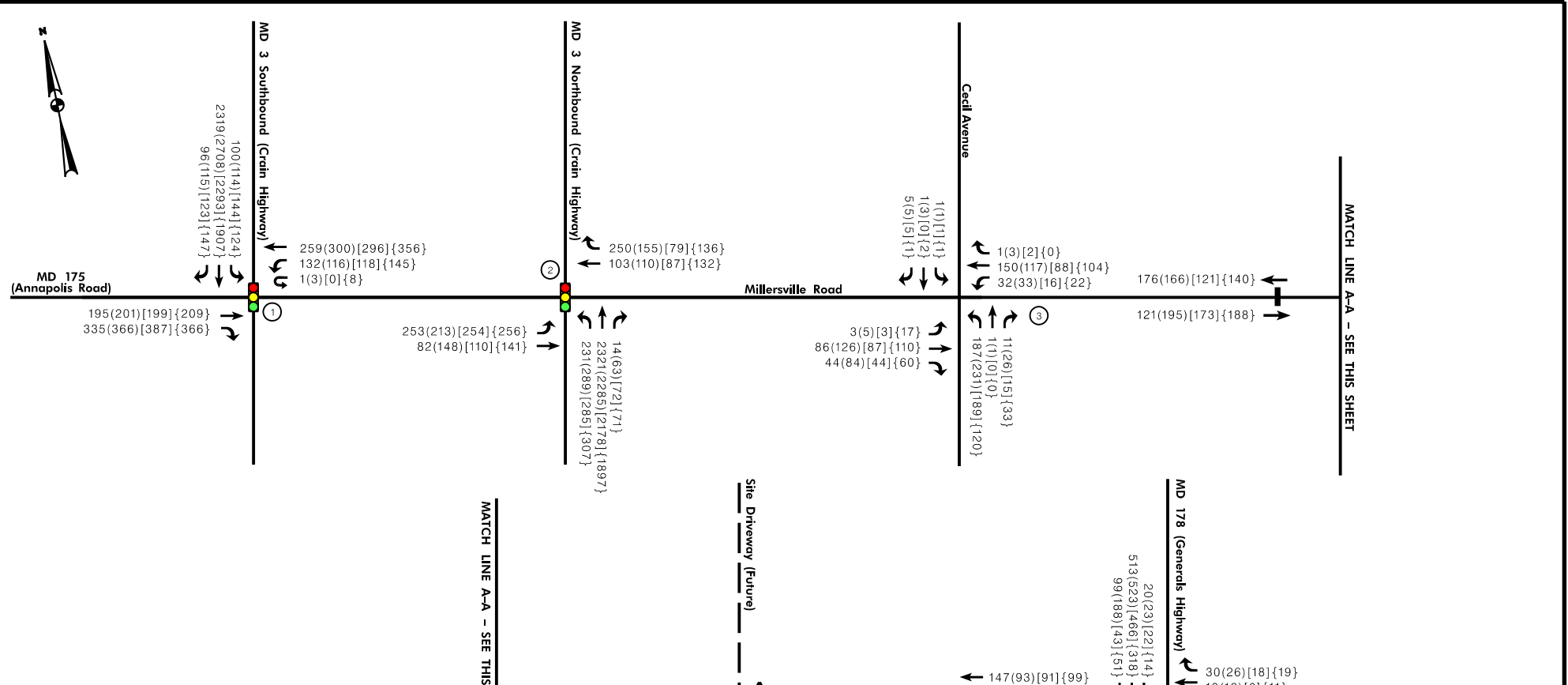
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**EXISTING SUMMER TRAFFIC VOLUMES
RAW PEAK HOUR DATA**

SCALE: N.T.S. FIGURE 6 JUNE 2022



entley - Arley



LEGEND

- AM(PM){SAT}{SUN} PEAK
- AM(PM){SAT}{SUN} PEAK
- AM(PM){SAT}{SUN} PEAK
- SIGNALIZED INTERSECTION
- INTERSECTION ID NO.
- FUTURE SITE INTERSECTION
- VOLUME COUNT LOCATION

Peak Hour and Count Dates Summary Table

Int. ID	Peak Hours*							
	AM		PM		SAT		SUN	
	Time	Count Date	Time	Count Date	Time	Count Date	Time	Count Date
1	7:15 AM	TU-10/5/21	4:45 PM	WD-10/6/21	10:15 AM	10/2/21	12:30 PM	10/3/21
2	7:00 AM	WD-10/6/21	4:15 PM	WD-10/6/21	1:00 PM	10/2/21	12:30 PM	10/3/21
3	7:30 AM	WD-10/13/21	4:45 PM	TH-10/14/21	3:00 PM	10/16/21	10:15 AM	10/17/21
4-EB	8:00 AM	WD-10/6/21	3:00 PM	WD-10/6/21	10:00 AM	10/2/21	12:00 PM	10/3/21
4-WB	8:00 AM	WD-10/6/21	3:00 PM	TH-10/7/21	1:00 PM	10/2/21	11:00 AM	10/3/21
5	8:15 AM	WD-10/13/21	3:45 PM	TU-10/5/21	1:00 PM	10/2/21	11:30 AM	10/3/21
6	7:30 AM	WD-10/13/21	4:15 PM	TH-10/14/21	9:45 AM	10/16/21	10:00 AM	10/17/21

*Starting time of peak one hour period noted due to space constraints

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**EXISTING FALL TRAFFIC VOLUMES
RAW PEAK HOUR DATA**

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A common peak hour was not employed; in each case, the highest recorded volumes were used in the analyses. Volumes between intersections were not balanced due to multiple midblock intersections and generators.

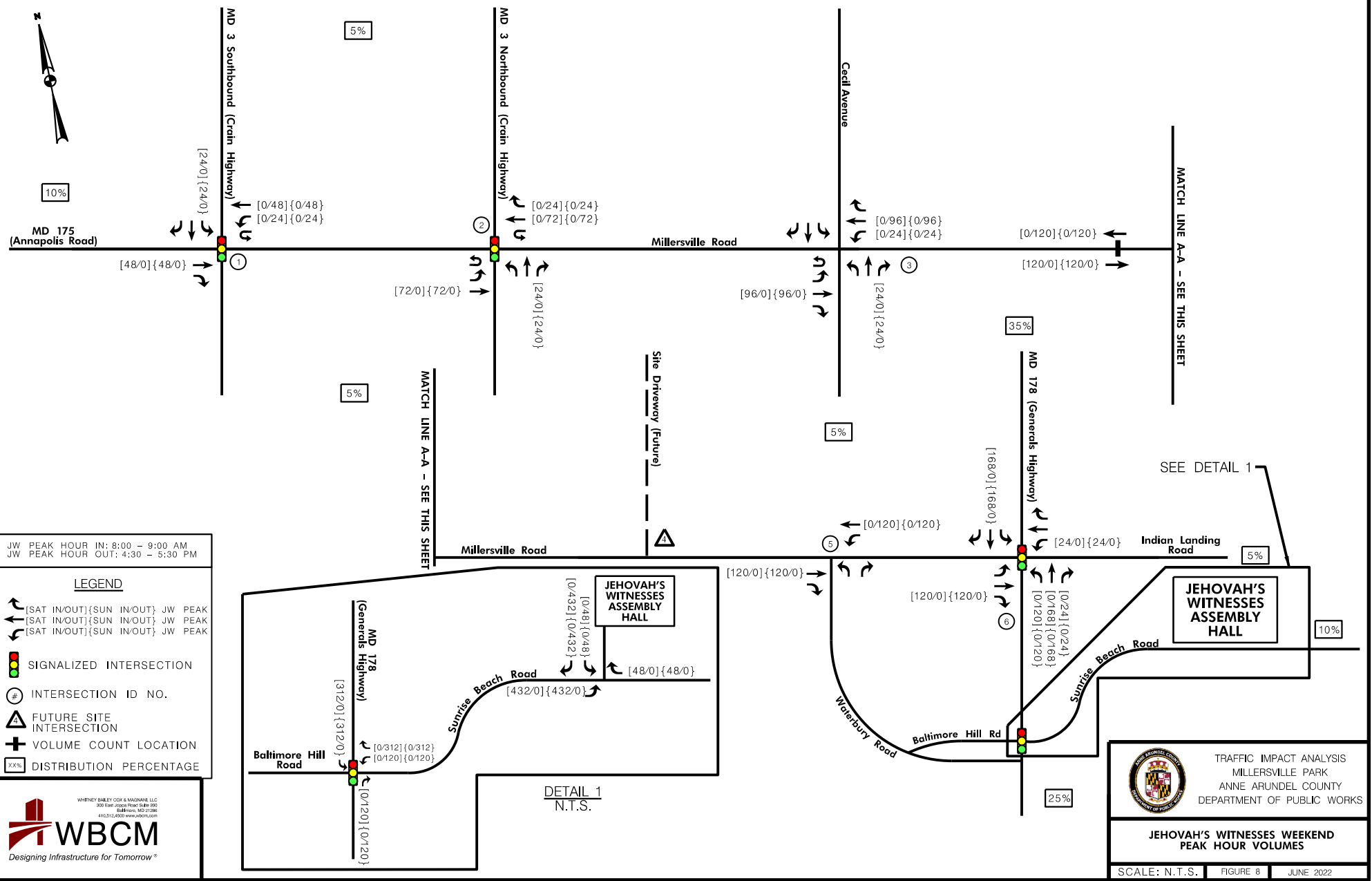
It is important to note that the summer and fall weekend data collection at the MD 178/Millersville Road/Indian Landing Road intersection occurred during the Maryland Renaissance Festival (August 28th, 2021 – October 24th, 2021) to ensure any additional trips from the Festival were captured and distributed throughout the network. Weekend data along Millersville Road was compared to the MD 178/Millersville Road/Indian Landing Road data collected during the Festival. It was determined that the data along Millersville Road was comparable both during and before the Festival; therefore, corrections to the volumes along the network were not required. As previously mentioned, seven churches in the vicinity of the Millersville Park study area held in-person services during the data collection.

C. Jehovah's Witnesses Peak Hour Adjustments

The Jehovah's Witnesses Assembly Hall in Crownsville was not holding in-person services at the time of the data collection. Details of the Hall and typical services were discussed with JW staff to develop volume adjustments to apply to the existing count data. The JW staff stated that Saturday and Sunday day-long services take place at the Assembly Hall. The Jehovah's Witnesses Assembly Hall's parking lot has 636 spaces but typically 600 spaces (approximately 95% of spaces) are used for the weekend services. The Hall indicated one trip per each of the 600 parking spaces. The peak hours when the congregation enters and exits is from 8:00 AM to 9:00 AM and 4:30 PM to 5:30 PM, respectively – denoted as the JW peak hours. Peak hour trips were estimated at 80% (480 trips) of the total in/out trips and off-peak hour trips were estimated at 20% (120 trips) of the total in/out trips based on conversations with JW staff. All trips enter during the morning peak period and exit during the evening peak period (trips out for lunch are negligible). Drop-offs are also considered negligible. Distribution percentages were developed along the roadway network based on the existing traffic patterns, adjacent JW Assembly Halls (Figure 5) and knowledge of the surroundings and roadway network. The resultant JW peak hour data is provided in Figure 8.

The weekend turning movement counts were conducted from 8:00 AM to 7:00 PM. The Jehovah's Witnesses exiting volumes (4:30 – 5:30 PM) were high enough to influence the peak hours (typically from 11:00 AM to 2:00 PM) at several study intersections. Peak hours were influenced by JW volumes at Intersections 3 (Millersville Road at Cecil Avenue), 4 (Millersville Road at Proposed Site Access), 5 (Millersville Road at Waterbury Road) and 6 (Millersville Road/Indian Landing Road at MD 178). It should be noted that the 2018 Millersville Park TIA weekend data collection ended at 2:00 PM, thus the Jehovah's Witnesses exiting volume likely was not captured.

Table 3 provides a summary of the raw peak hour data, JW peak hour volumes and the JW-influenced peak hours at the five study intersections. The raw peak hours and peak hour traffic volumes for summer and fall were adjusted based on the results in Table 3; the summer and fall volume figures are provided as Figures 9 and 10, respectively.

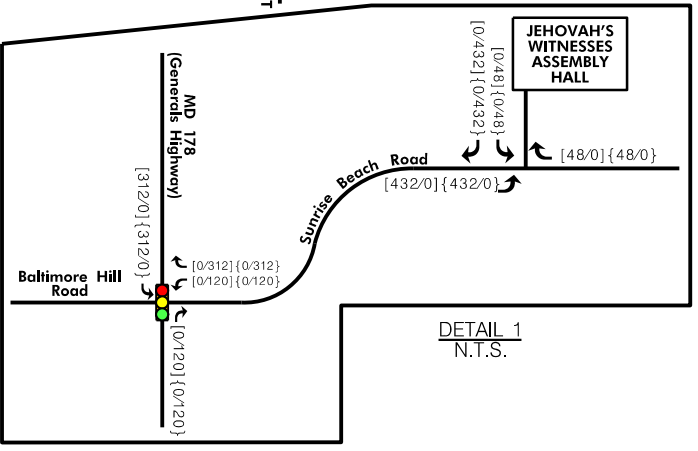


JW PEAK HOUR IN: 8:00 - 9:00 AM
 JW PEAK HOUR OUT: 4:30 - 5:30 PM

- LEGEND**
- [SAT IN/OUT]{[SUN IN/OUT]} JW PEAK
 [SAT IN/OUT]{[SUN IN/OUT]} JW PEAK
 [SAT IN/OUT]{[SUN IN/OUT]} JW PEAK
 - SIGNALIZED INTERSECTION
 - INTERSECTION ID NO.
 - FUTURE SITE INTERSECTION
 - VOLUME COUNT LOCATION
 - DISTRIBUTION PERCENTAGE

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JEHOVAH'S WITNESSES WEEKEND PEAK HOUR VOLUMES

SCALE: N.T.S. FIGURE 8 JUNE 2022



Table 3: Jehovah’s Witnesses Peak Hour Volumes Influence Summary

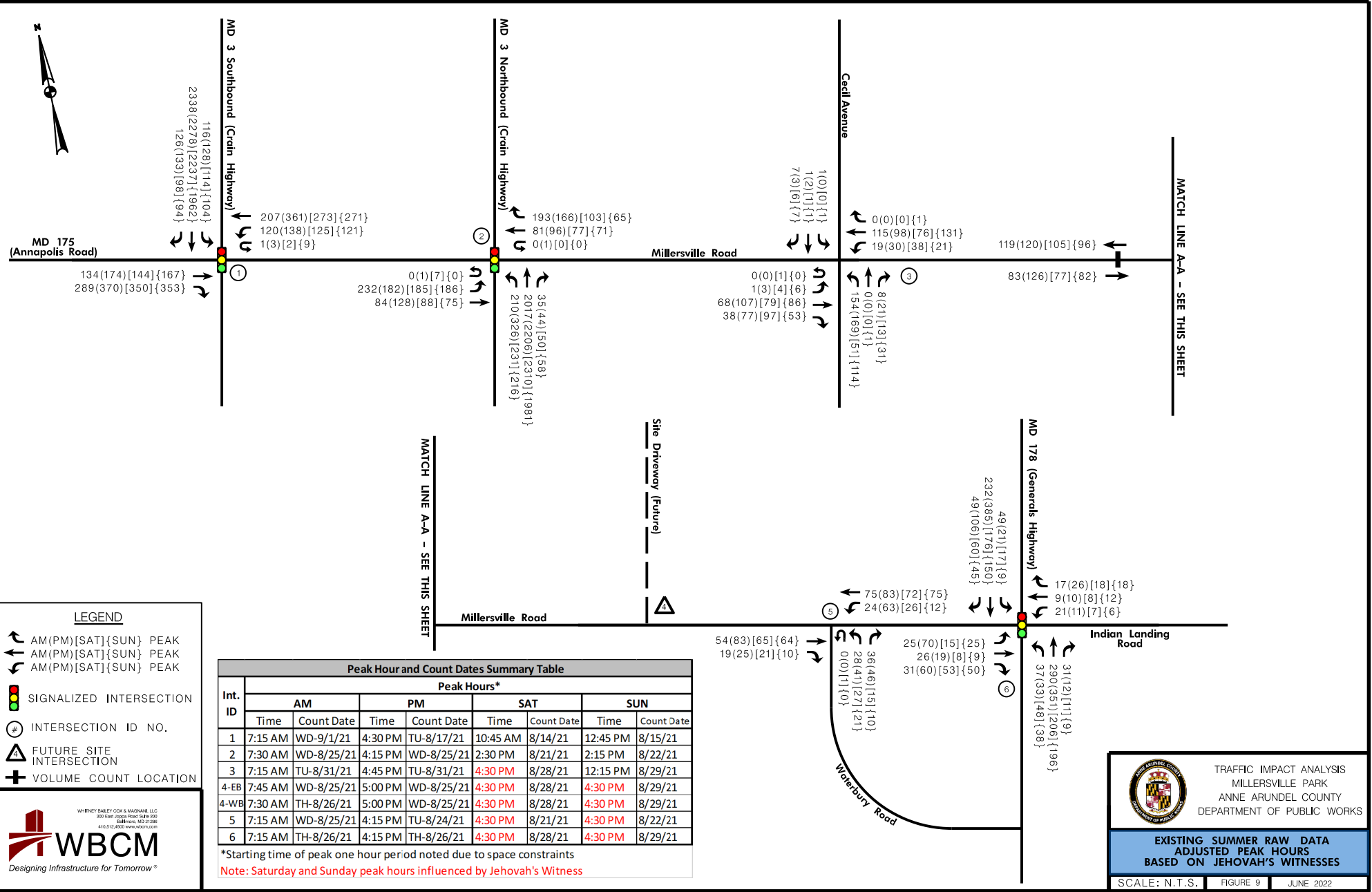
Intersection	Peak Hour	Hourly Volumes from Raw Data						JW Added Peak Hour Volumes (Figure 8)	Summer			Fall		
		Summer			Fall				JW and Unadj. Peak HR Difference		Peak Hour influenced by JW? *	JW and Unadj. Peak HR Difference		Peak Hour influenced by JW? *
		JW Peak Hour		Unadjusted Peak Hour	JW Peak Hour		Unadjusted Peak Hour		IN	OUT		IN	OUT	
		IN	OUT		IN	OUT								
1) MD 175 (Annapolis Rd)/ Millersville Rd at MD 3 Southbound	Sat	2033	2897	3343	2056	3269	3560	72	-1310	-446	N	-1504	-291	N
	Sun	1213	2661	3081	1401	2983	3262	72	-1868	-420	N	-1861	-279	N
2) Millersville Road at MD 3 Northbound	Sat	1828	2659	3051	1896	2628	3065	96	-1223	-392	N	-1169	-437	N
	Sun	1074	2360	2652	1202	2580	2940	96	-1578	-292	N	-1738	-360	N
3) Millersville Road at Cecil Avenue	Sat	216	366	395	220	307	450	120	-179	-29	Y	-230	-143	N
	Sun	196	328	453	230	397	470	120	-257	-125	N	-240	-73	Y
4) Millersville Road at Site Access	Sat	113	182	227	145	186	294	120	-114	-45	Y	-149	-108	Y
	Sun	95	178	248	110	236	328	120	-153	-70	Y	-218	-92	Y
5) Millersville Road at Waterbury Road	Sat	131	227	279	150	205	308	120	-148	-52	Y	-158	-103	Y
	Sun	105	192	291	110	242	324	120	-186	-99	Y	-214	-408	N
6) Millersville Road/Indian Landing Road at MD 178 (Generals Highway)	Sat	406	627	734	492	614	1022	312	-328	-107	Y	-530	-408	N
	Sun	323	567	782	314	623	823	312	-459	-215	Y	-509	-200	Y

*If the Peak Hour was influenced by JW, it was influenced by the Outbound Volume
 JW Peak Hour In: 8:00 - 9:00 AM
 JW Peak Hour Out: 4:30 - 5:30 PM

D. COVID-19 Adjustment Factor

Adjustment factors to account for COVID-19 impacts to traffic along Millersville Road were required. Four Maryland Department of Transportation State Highway Administration (MDOT SHA) Automatic Traffic Recorder (ATR) stations are located within 10 miles of the study area; the sites are noted in Table 4.

WBCM coordinated with MDOT SHA Office of Planning & Preliminary Engineering - Data Services Division (OPPE DSD) to obtain weekly ADT data from the ATR stations prior to COVID-19 and during the data collection from August to October 2021. Data was not available at Station 81. The 2019 and 2021 weekly ADT data supplied to WBCM by MDOT SHA OPPE DSD for the weeks that the five turning movement counts were conducted was used to determine the volume differences. The average percent change in ADT from 2019 to 2021 at the three stations was calculated and a 2% growth factor (see Section III.A in this report) to account for regional growth over the two years was added to develop the COVID-19 Adjustment Factors. The ADT datasheets are included in Appendix E; Tables 5 and 6 present the COVID-19 adjustment factors derivation for summer and fall, respectively.



LEGEND

- AM(PM)[SAT]{SUN} PEAK
- AM(PM)[SAT]{SUN} PEAK
- AM(PM)[SAT]{SUN} PEAK
- SIGNALIZED INTERSECTION
- INTERSECTION ID NO.
- FUTURE SITE INTERSECTION
- VOLUME COUNT LOCATION

Peak Hour and Count Dates Summary Table

Int. ID	Peak Hours*							
	AM		PM		SAT		SUN	
	Time	Count Date	Time	Count Date	Time	Count Date	Time	Count Date
1	7:15 AM	WD-9/1/21	4:30 PM	TU-8/17/21	10:45 AM	8/14/21	12:45 PM	8/15/21
2	7:30 AM	WD-8/25/21	4:15 PM	WD-8/25/21	2:30 PM	8/21/21	2:15 PM	8/22/21
3	7:15 AM	TU-8/31/21	4:45 PM	TU-8/31/21	4:30 PM	8/28/21	12:15 PM	8/29/21
4-EB	7:45 AM	WD-8/25/21	5:00 PM	WD-8/25/21	4:30 PM	8/28/21	4:30 PM	8/29/21
4-WB	7:30 AM	TH-8/26/21	5:00 PM	WD-8/25/21	4:30 PM	8/28/21	4:30 PM	8/29/21
5	7:15 AM	WD-8/25/21	4:15 PM	TU-8/24/21	4:30 PM	8/21/21	4:30 PM	8/22/21
6	7:15 AM	TH-8/26/21	4:15 PM	TH-8/26/21	4:30 PM	8/28/21	4:30 PM	8/29/21

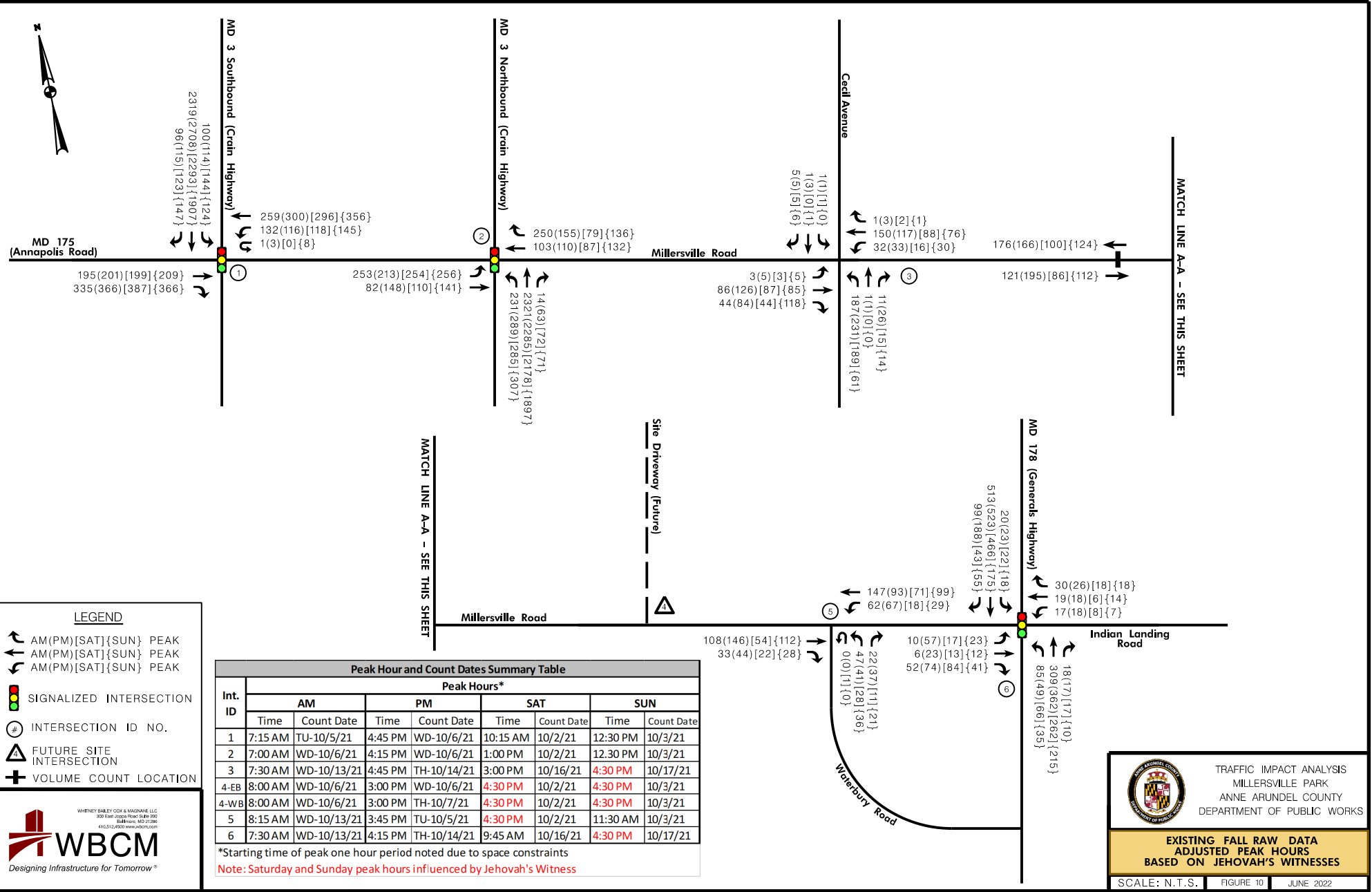
*Starting time of peak one hour period noted due to space constraints
Note: Saturday and Sunday peak hours influenced by Jehovah's Witness



TRAFFIC IMPACT ANALYSIS
 MILLERSVILLE PARK
 ANNE ARUNDEL COUNTY
 DEPARTMENT OF PUBLIC WORKS

**EXISTING SUMMER RAW DATA
 ADJUSTED PEAK HOURS
 BASED ON JEHOVAH'S WITNESSES**

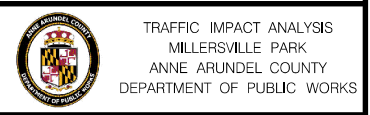




- LEGEND**
- AM(PM){SAT}{SUN} PEAK
 - AM(PM){SAT}{SUN} PEAK
 - AM(PM){SAT}{SUN} PEAK
 - SIGNALIZED INTERSECTION
 - INTERSECTION ID NO.
 - FUTURE SITE INTERSECTION
 - VOLUME COUNT LOCATION

Peak Hour and Count Dates Summary Table								
Int. ID	Peak Hours*							
	AM		PM		SAT		SUN	
	Time	Count Date	Time	Count Date	Time	Count Date	Time	Count Date
1	7:15 AM	TU-10/5/21	4:45 PM	WD-10/6/21	10:15 AM	10/2/21	12:30 PM	10/3/21
2	7:00 AM	WD-10/6/21	4:15 PM	WD-10/6/21	1:00 PM	10/2/21	12:30 PM	10/3/21
3	7:30 AM	WD-10/13/21	4:45 PM	TH-10/14/21	3:00 PM	10/16/21	4:30 PM	10/17/21
4-EB	8:00 AM	WD-10/6/21	3:00 PM	WD-10/6/21	4:30 PM	10/2/21	4:30 PM	10/3/21
4-WB	8:00 AM	WD-10/6/21	3:00 PM	TH-10/7/21	4:30 PM	10/2/21	4:30 PM	10/3/21
5	8:15 AM	WD-10/13/21	3:45 PM	TU-10/5/21	4:30 PM	10/2/21	11:30 AM	10/3/21
6	7:30 AM	WD-10/13/21	4:15 PM	TH-10/14/21	9:45 AM	10/16/21	4:30 PM	10/17/21

*Starting time of peak one hour period noted due to space constraints
Note: Saturday and Sunday peak hours influenced by Jehovah's Witness



**EXISTING FALL RAW DATA
 ADJUSTED PEAK HOURS
 BASED ON JEHOVAH'S WITNESSES**





Table 4: ATR Stations Located Within 10 Miles of Millersville

Table 4 - Millersville Park - ATR Stations Located Within 10 Miles of Millersville		
ATR #	Location	Distance (Miles)
24	US 50/IS 595 West of MD 424	8
25	MD 295 (NB) South of MD 100	9
38	MD 100 West of Oakwood Rd	8
81*	MD 295 (SB) South of MD 100	9

*Data not available

Table 5: COVID Adjustment Derivation: 2021 Summer (ATR #24, #25, & #38)

Table 5 - Millersville Park - COVID Adjustment Derivation: 2021 Summer (ATR #24, #25 & #38)					
	ATR Site	2nd Week in August	3rd Week in August	4th Week in August	1st Week in September
2019 Avg. Daily Volume	ATR #24	101,174	100,489	100,454	93,425
	ATR #25	104,514	107,400	106,049	102,639
	ATR #38	85,247	85,291	85,657	81,491
	Subtotal	290,935	293,180	292,160	277,555
2021 Avg. Daily Volume	ATR #24	91,905	89,039	89,537	87,708
	ATR #25	111,198	108,775	108,678	108,016
	ATR #38	81,657	80,518	81,616	80,764
	Subtotal	284,760	278,332	279,831	276,488
Volume Difference	ATR #24	-9,269	-11,450	-10,917	-5,717
	ATR #25	6,684	1,375	2,629	5,377
	ATR #38	-3,590	-4,773	-4,041	-727
	Subtotal	-6,175	-14,848	-12,329	-1,067
% Adjustment Required (from 2019 to 2021)		2.17%	5.33%	4.41%	0.39%
Avg. % (COVID Adjustment)					3.07%
Growth Rate					2.00%
COVID Adjustment + 2 Years of Growth					7.11%
Net COVID Adjustment					7.50%

Table 6: COVID Adjustment Derivation: 2021 Fall (ATR #24, #25, & #38)

Table 6 - Millersville Park - COVID Adjustment Derivation: 2021 Fall (ATR #24, #25 & #38)					
	ATR Site	1st Week in October	2nd Week in October	3rd Week in October	4th Week in October
2019 Avg. Daily Volume	ATR #24	94,234	94,105	93,558	89,759
	ATR #25	107,539	108,791	107,487	105,951
	ATR #38	86,079	85,618	84,621	83,382
	Subtotal	287,852	288,514	285,666	279,092
2021 Avg. Daily Volume	ATR #24	84,320	85,346	86,407	86,307
	ATR #25	106,744	108,445	107,440	108,726
	ATR #38	81,203	84,215	82,788	84,315
	Subtotal	272,267	278,006	276,635	279,348
Volume Difference	ATR #24	-9,914	-8,759	-7,151	-3,452
	ATR #25	-795	-346	-47	2,775
	ATR #38	-4,876	-1,403	-1,833	933
	Subtotal	-15,585	-10,508	-9,031	256
% Adjustment Required (from 2019 to 2021)		5.72%	3.78%	3.26%	-0.09%
Avg. % (COVID Adjustment)					3.17%
Growth Rate					2.00%
COVID Adjustment + 2 Years of Growth					7.21%
Net COVID Adjustment					7.50%



A 7.5% net COVID adjustment was used to correct the 2021 summer and fall count data (adjusted peak hours based on Jehovah's Witnesses) shown in Figures 9 and 10, respectively, for the effects of COVID-19. The resultant summer and fall volume figures are provided as Figures 11 and 12, respectively.

E. 2021 Existing Traffic Volumes

Following the correction of the raw data for COVID-19, the JW Weekend Peak Hour Volumes (Figure 8) were added to the intersection volumes influenced by Jehovah's Witnesses to establish the 2021 Existing Summer and Fall volumes provided in Figures 13 and 14, respectively. As previously noted, volumes between intersections were not balanced due to multiple midblock intersections and generators.

F. 2018 and 2021 TIA Data Comparison

2018 Existing data was supplied in the 2018 TIA. A comparison of the 2018 Existing and 2021 Existing summer and fall volumes from Figures 13 and 14, respectively, is provided in Table 7. Excluding regional growth, the 2021 Existing data was generally the same or slightly above the 2018 Existing data at the two MD 3 study intersections. The 2021 Sunday data was substantially lower at the Millersville Road at Cecil Avenue, Proposed Site Access, and Waterbury Road intersections with a difference of approximately -30% to -50%. However, the Sunday 2018 to 2021 difference was approximately -10% to -15% at the Millersville Road/Indian Landing Road at MD 178 intersection.

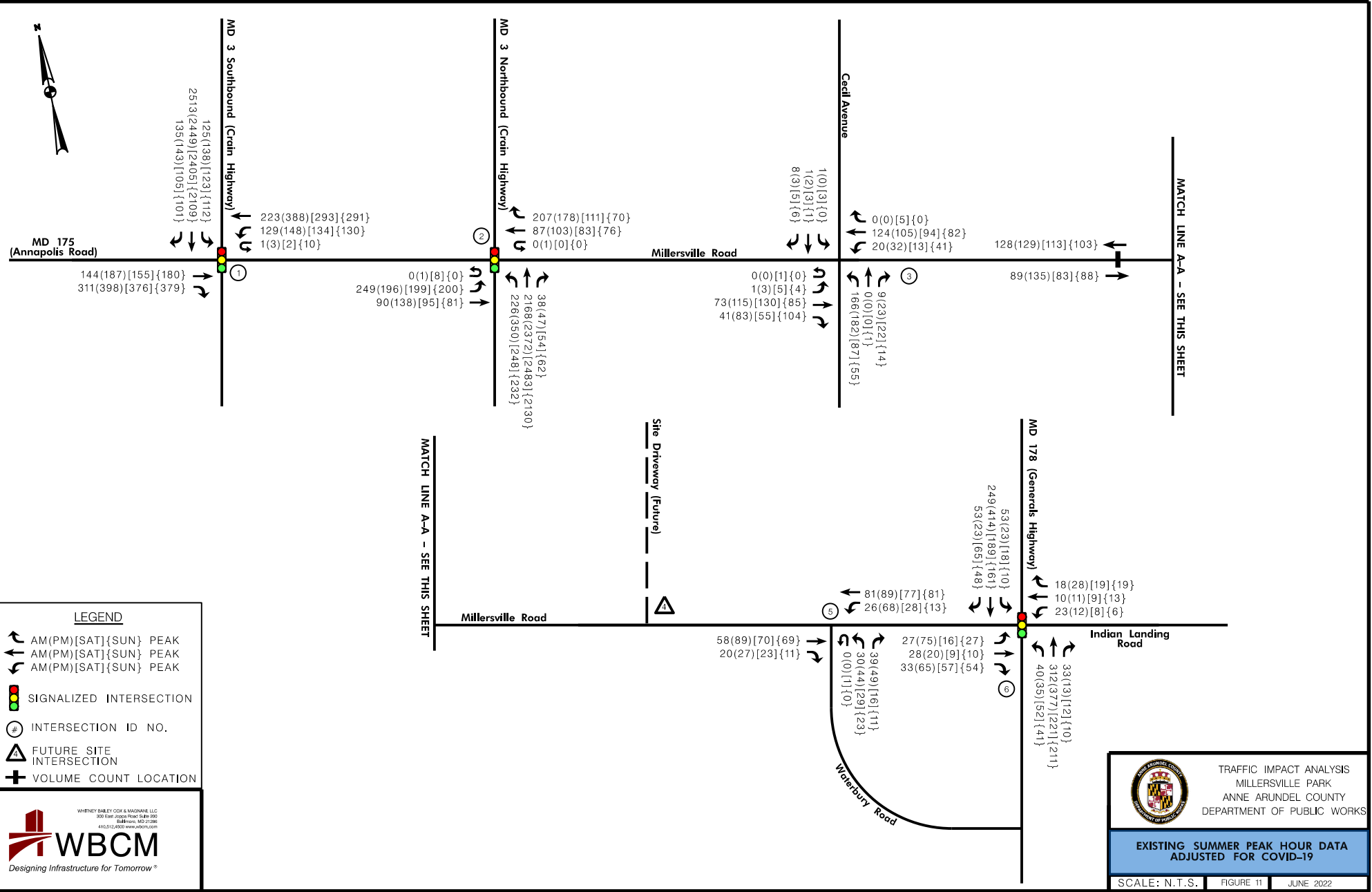
G. Traffic Operations Analyses

Performance measures including Critical Lane Volume (CLV), Volume to Capacity (v/c) ratio and Level of Service (LOS) were used in the analyses to determine existing traffic operations. The results of the analyses were compared to allowable thresholds. Details of the process are found on the following pages. Critical Lane Analysis (CLA) was used to calculate LOS and CLV at the study intersections. Based on the Anne Arundel County Guidelines, the Highway Capacity Manual 6th Edition (HCM) is required to analyze an intersection that has a CLV of 1300 or greater.

H. 2021 Existing Levels of Service

Level of service assessments were conducted with the CLA methodology utilizing the 2021 Existing summer and fall volumes presented in Figures 13 and 14, respectively. Levels of Service below "D" indicate that upgrades are warranted to address intersection capacity deficiencies. Levels of Service below "C" (CLV of 1300) require an HCM analysis per Anne Arundel County Guidelines for Traffic Impact Studies. Levels of Service for the existing conditions, based on existing traffic volumes, lane geometry and traffic control are provided in Table 8. Computation forms are in Appendix F. As shown, the two MD 3 intersections currently operate at unacceptable levels of service or at a low Level of Service "D" indicating minimal reserve capacity is available to accommodate traffic growth.

It should be noted that a 0.50 Lane Use Factor was used on the northbound approach in the MD 175/Millersville Road/MD 3 Northbound CLA analyses to represent the three-lane approach with an impending downstream lane drop at the ramp to I-97 southbound (ramp volume is a maximum 10% of mainline volume) to accurately model capacity based on a road user's tendency to merge into two lanes prior to the lane drop. The historical ramp count data is provided in Appendix E. A 0.45 Lane Use Factor was used on the southbound approach in the MD 175/MD 3 Southbound CLA analyses to represent the three-lane approach with an impending downstream left turn lane drop to businesses in the MD 3 median and McKnew Road to accurately model capacity based on a road user's tendency to merge into two lanes prior to the lane drop. Operations on the MD 3 northbound and southbound approaches were field verified to validate the adjusted Lane Use Factors.



LEGEND

- AM(PM)[SAT]{SUN} PEAK
- AM(PM)[SAT]{SUN} PEAK
- AM(PM)[SAT]{SUN} PEAK
- SIGNALIZED INTERSECTION
- INTERSECTION ID NO.
- FUTURE SITE INTERSECTION
- VOLUME COUNT LOCATION

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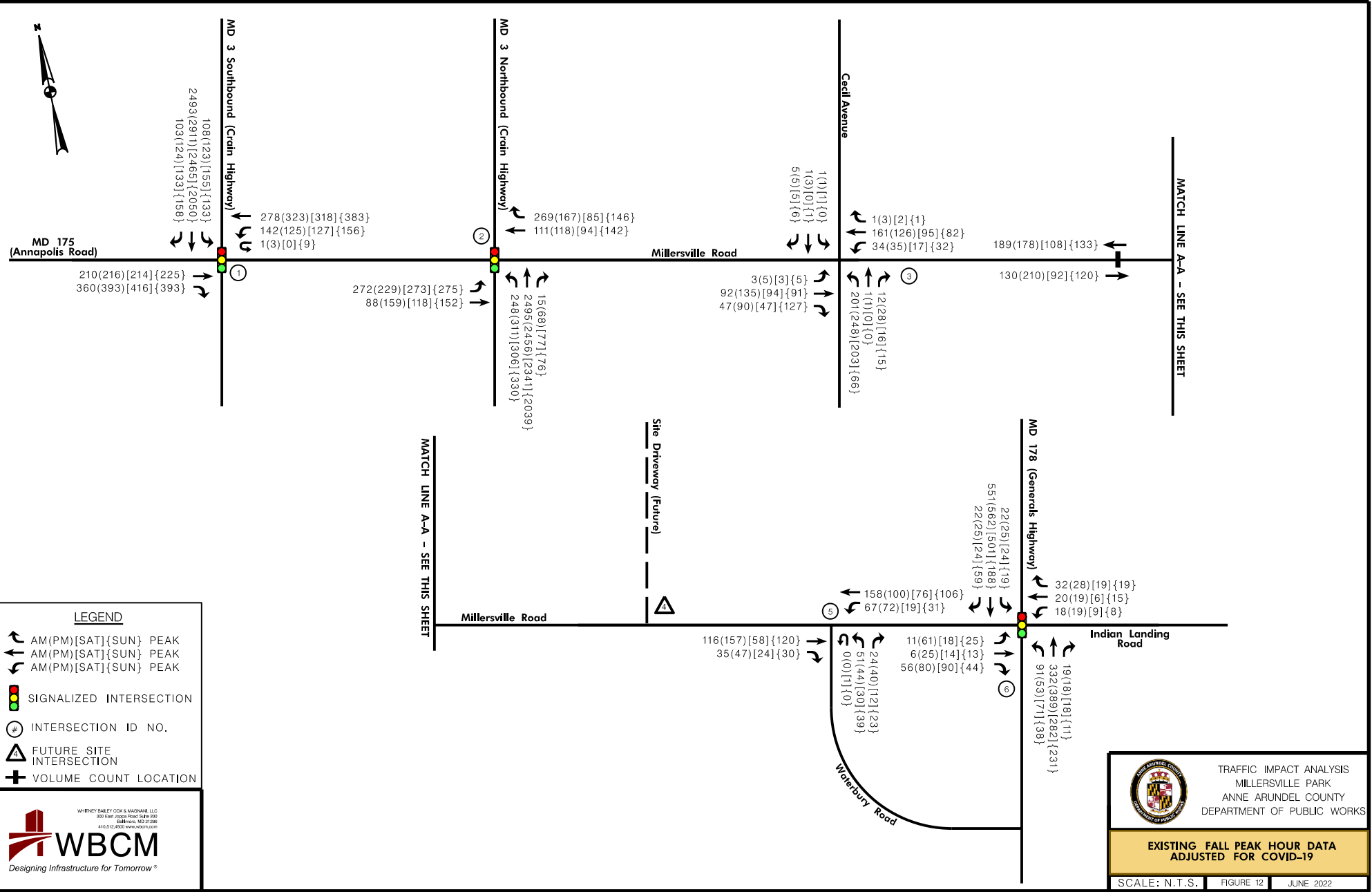
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EXISTING SUMMER PEAK HOUR DATA
 ADJUSTED FOR COVID-19

SCALE: N.T.S. FIGURE 11 JUNE 2022



MATCH LINE A-A - SEE THIS SHEET

MATCH LINE A-A - SEE THIS SHEET

LEGEND

- AM(PM)[SAT]{SUN} PEAK
- AM(PM)[SAT]{SUN} PEAK
- AM(PM)[SAT]{SUN} PEAK
- SIGNALIZED INTERSECTION
- INTERSECTION ID NO.
- FUTURE SITE INTERSECTION
- VOLUME COUNT LOCATION

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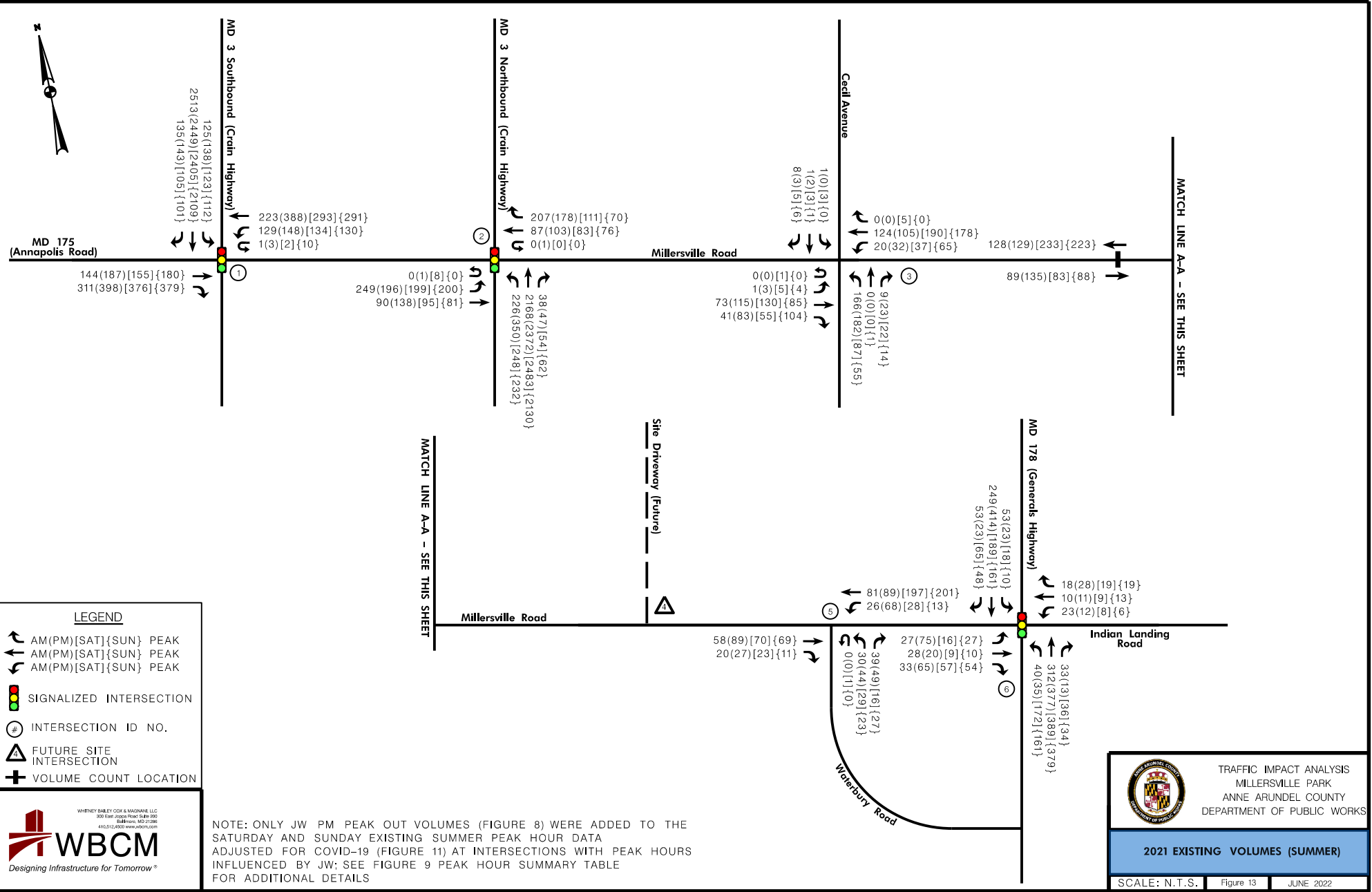
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TRAFFIC IMPACT ANALYSIS
 MILLERSVILLE PARK
 ANNE ARUNDEL COUNTY
 DEPARTMENT OF PUBLIC WORKS

**EXISTING FALL PEAK HOUR DATA
 ADJUSTED FOR COVID-19**

SCALE: N.T.S. FIGURE 12 JUNE 2022

- Bailey



LEGEND

- AM(PM)[SAT]{SUN} PEAK
- AM(PM)[SAT]{SUN} PEAK
- AM(PM)[SAT]{SUN} PEAK
- SIGNALIZED INTERSECTION
- INTERSECTION ID NO.
- FUTURE SITE INTERSECTION
- VOLUME COUNT LOCATION

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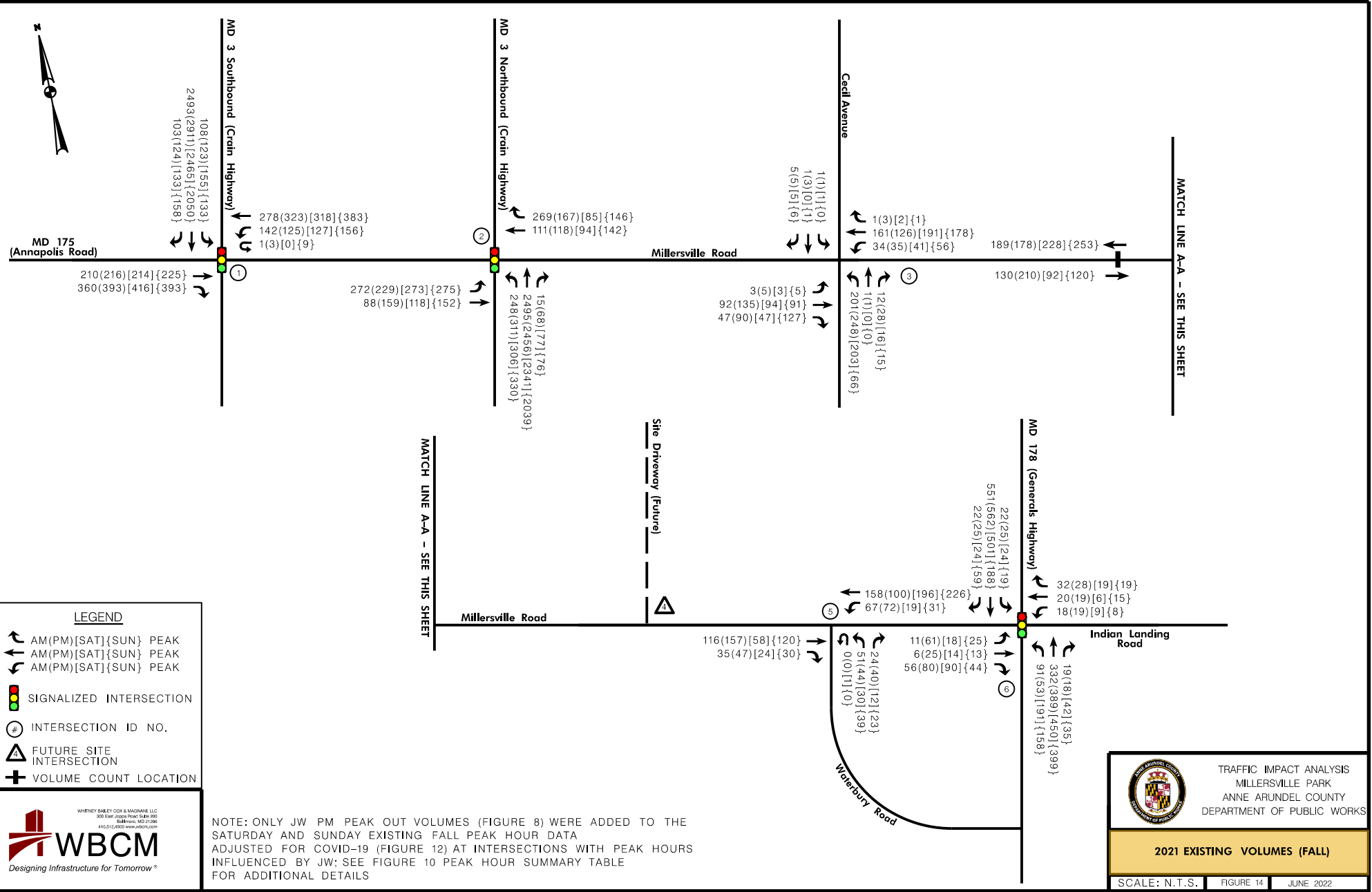
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NOTE: ONLY JW PM PEAK OUT VOLUMES (FIGURE 8) WERE ADDED TO THE SATURDAY AND SUNDAY EXISTING SUMMER PEAK HOUR DATA ADJUSTED FOR COVID-19 (FIGURE 11) AT INTERSECTIONS WITH PEAK HOURS INFLUENCED BY JW; SEE FIGURE 9 PEAK HOUR SUMMARY TABLE FOR ADDITIONAL DETAILS

TRAFFIC IMPACT ANALYSIS
 MILLERSVILLE PARK
 ANNE ARUNDEL COUNTY
 DEPARTMENT OF PUBLIC WORKS

2021 EXISTING VOLUMES (SUMMER)

SCALE: N.T.S. | Figure 13 | JUNE 2022



NOTE: ONLY JW PM PEAK OUT VOLUMES (FIGURE 8) WERE ADDED TO THE SATURDAY AND SUNDAY EXISTING FALL PEAK HOUR DATA ADJUSTED FOR COVID-19 (FIGURE 12) AT INTERSECTIONS WITH PEAK HOURS INFLUENCED BY JW; SEE FIGURE 10 PEAK HOUR SUMMARY TABLE FOR ADDITIONAL DETAILS

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2021 EXISTING VOLUMES (FALL)

SCALE: N.T.S. FIGURE 14 JUNE 2022



Table 7: 2018 and 2021 Existing Volumes Comparison

Table 7 - Millersville Park - 2018 and 2021 Existing Volume Count Data Comparison						
Intersection	Peak Hour	Intersection Volumes			2018-2021 Summer Difference	2018-2021 Fall Difference
		2018 Existing	2021 Summer	2021 Fall		
1) MD 175 (Annapolis Rd)/ Millersville Rd at MD 3 Southbound	AM	3571	3581	3695	0%	3%
	PM	4054	3854	4218	-5%	4%
	Sat	3607	3593	3828	0%	6%
	Sun	3115	3312	3507	6%	13%
2) Millersville Road at MD 3 Northbound	AM	3328	3065	3498	-8%	5%
	PM	2974	3386	3508	14%	18%
	Sat	3104	3281	3294	6%	6%
	Sun	2815	2851	3160	1%	12%
3) Millersville Road at Cecil Avenue	AM	570	444	559	-22%	-2%
	PM	553	548	680	-1%	23%
	Sat	702	543	603	-23%	-14%
	Sun	913	513	546	-44%	-40%
4) Millersville Road at Site Access*	AM	350	211	319	-40%	-9%
	PM	331	223	388	-33%	17%
	Sat	583	316	320	-46%	-45%
	Sun	613	311	373	-49%	-39%
5) Millersville Road at Waterbury Road	AM	365	254	451	-30%	24%
	PM	425	366	460	-14%	8%
	Sat	607	364	340	-40%	-44%
	Sun	663	344	469	-48%	-29%
6) Millersville Road/Indian Landing Road at MD 178 (Generals Hwy)	AM	1115	879	1180	-21%	6%
	PM	1184	1096	1304	-7%	10%
	Sat	1019	987	1388	-3%	36%
	Sun	1096	922	982	-16%	-10%
Color Coding - 2018 to 2021 Volume Diff.		* 2018 Existing: Traffic volumes for the intersection of Millersville Road and the Proposed Site Driveway were derived from the intersection of Millersville Road and Cecil Avenue				
+/- 0% - 10%		Note: 2018 Existing data was obtained from the 2018				
+/- 10% - 30%		Millersville Park Traffic Impact Analysis (p. 10)				
+/- 30% - 60%						
+/- 60% - 100%						



Table 8: 2021 Existing CLA Level of Service Summary

Table 8 - Millersville Park- 2021 Existing Level of Service (CLA)			
Intersection	Peak Hour	CLA LOS (CLV) [v/c]	
		Summer	Fall
(1) MD 175 at MD 3 SB	AM	E (1572) [0.98]	F (1625) [1.02]
	PM	F (1651) [1.03]	F (1831) [1.14]
	Saturday	E (1594) [1.00]	F (1652) [1.03]
	Sunday	E (1468) [0.92]	E (1481) [0.93]
(2) MD 175/Millersville Rd at MD 3 NB	AM	D (1440) [0.90]	F (1680) [1.05]
	PM	E (1502) [0.94]	E (1554) [0.97]
	Saturday	E (1477) [0.92]	D (1429) [0.89]
	Sunday	C (1261) [0.79]	D (1331) [0.83]
(3) Millersville Road at Cecil Avenue	AM	A (340) [0.21]	A (437) [0.27]
	PM	A (456) [0.29]	A (569) [0.36]
	Saturday	A (364) [0.23]	A (481) [0.30]
	Sunday	A (333) [0.21]	A (384) [0.24]
(5) Millersville Road at Waterbury Road	AM	A (179) [0.11]	A (307) [0.19]
	PM	A (277) [0.17]	A (360) [0.23]
	Saturday	A (274) [0.17]	A (260) [0.16]
	Sunday	A (265) [0.17]	A (322) [0.20]
(6) Millersville Road/Indian Landing Road at MD 178	AM	A (592) [0.37]	A (800) [0.50]
	PM	A (698) [0.44]	A (881) [0.55]
	Saturday	A (879) [0.55]	B (1031) [0.64]
	Sunday	A (845) [0.53]	A (862) [0.54]

The MD 175/MD 3 Southbound and MD 175/Millersville Road/MD 3 Northbound CLV results are higher than 1300 for several peak hours in the summer and fall. A Highway Capacity Software Version 7 (HCS 7) Signalized Intersection analysis which utilizes the HCM Version 6 methodology was conducted to satisfy the Anne Arundel County Road Guidelines. The results of the Highway Capacity Analysis for the summer and fall data are provided in Tables 9 and 10, respectively; the calculations can be found in Appendix F.

The results of the HCM analysis indicate that the mainline approach and intersection levels of service operate at an acceptable level of service or slightly below the LOS D/E threshold of 55 seconds/vehicle delay in the four peak hours during the summer and fall. However, the analysis results indicate that the eastbound and westbound levels of service generally operate at a failing level of service E or F which is expected as the signal splits and cycle lengths generally favor the mainline.



Table 9: 2021 Existing (Summer) HCM Signalized Intersection Results Summary

Table 9 - Millersville Park - 2021 Existing (Summer) - HCS Summary						
Intersection	Peak Hour	HCM LOS & Delay (Seconds/Vehicle)				
		NB	SB	EB	WB	Intersection
(1) MD 175 at MD 3 SB	AM		D 35.7	F 90.3	D 49.7	D 44.0
	PM		C 31.9	F 172.5	E 59.7	E 57.1
	Sat		C 30.6	F 138.1	E 58.1	D 49.7
	Sun		C 28.2	D 44.0	C 25.9	C 30.6
(2) MD 175/ Millersville Rd at MD 3 NB	AM	C 22.4		F 100.7	F 94.5	D 38.0
	PM	B 18.7		F 101.3	F 97.7	C 33.4
	Sat	B 13.2		F 105.8	F 105.9	C 27.2
	Sun*					

* Sunday HCS analysis not required per Guidelines as CLV is less than 1300

Table 10: 2021 Existing (Fall) HCM Signalized Intersection Results Summary

Table 10 - Millersville Park - 2021 Existing (Fall) - HCS Summary						
Intersection	Peak Hour	HCM LOS & Delay (Seconds/Vehicle)				
		NB	SB	EB	WB	Intersection
(1) MD 175 at MD 3 SB	AM		D 53.1	F 80.9	D 40.9	E 56.0
	PM		D 43.7	F 139.3	E 58.6	E 59.1
	Sat		D 49.7	D 46.7	C 25.9	D 46.4
	Sun		C 26.3	F 201.8	E 62.9	E 62.9
(2) MD 175/ Millersville Rd at MD 3 NB	AM	D 35.6		F 90.3	F 80.6	D 46.1
	PM	C 20.3		F 99.7	F 98.5	D 35.5
	Sat	B 13.8		E 79.2	F 85.0	C 25.4
	Sun	B 17.0		E 68.2	E 67.9	C 28.5

I. Section Link Analysis

The Anne Arundel County Road Rating System was used to satisfy the Anne Arundel County Road Section Link Analyses requirements on five segments of MD 175/Millersville Road from MD 3 southbound to MD 178. The segments are as follows:

- Segment A: MD 3 Southbound to MD 3 Northbound
- Segment B: MD 3 Northbound to Cecil Avenue
- Segment C: Cecil Avenue to Millersville Elementary School West Entrance
- Segment D: Millersville Elementary School West Entrance to Coleus Drive
- Segment E: Coleus Drive to MD 178



The analysis was performed with the existing volumes and roadway alignments. Detailed results of the analyses are located in Appendix F. Table 11 illustrates the results of the analysis for Segments A through E.

Table 11: 2021 Existing Road Rating Analysis Results

Table 11 - Millersville Park Road Rating - 2021 Existing			
Section ID	MD 175/Millersville Road (From - To)	Roadway Classification	Road Rating
A	Crain Hwy (MD 3) SB - Crain Hwy (MD 3) NB	4	82
B	Crain Hwy (MD 3) NB - Cecil Ave	4	83
C	Cecil Ave - Millersville Elem. School W Entrance	3	81
D	Millersville Elem. School W Entrance - Coleus Dr	3	63
E	Coleus Dr - Generals Hwy (MD 178)	3	78

The analysis results showed that all segments operate under an acceptable Road Rating of 70 or above, excluding Segment D (Millersville Elementary School West Entrance to Coleus Drive) which operates at an unacceptable Road Rating of 63.

J. Safety

Crash data was requested and received from MDOT SHA OOTS for the 2017 to 2020 four-year period; the crash data is provided in Appendix G. The crash data limits along Millersville Rd are from 500 FT west of Cecil Ave to the I-97 overpass. Per the crash data, fifteen crashes were reported from 2017 through 2020. Table 12 summarizes the crash data by type and year.

Table 12: Millersville Road Crash Data

Table 12 - Millersville Park - Crash Table Summary										
Year	2017		2018		2019		2020		Total	
Crash Type	Crashes	Percentage	Crashes	Percentage	Crashes	Percentage	Crashes	Percentage	Crashes	Percentage
Opposite Direction	0	0%	1	25%	0	0%	0	0%	1	7%
Rear End	0	0%	0	0%	1	20%	0	0%	1	7%
Side Swipe	0	0%	1	25%	0	0%	0	0%	1	7%
Angle	2	67%	0	0%	2	40%	1	33%	5	33%
Fixed Object	1	33%	2	50%	2	40%	1	33%	6	40%
Other	0	0%	0	0%	0	0%	1	33%	1	7%
Total Crashes	3		4		5		3		15	



The predominant crash types included fixed object and angle crashes which combined accounted for eleven of the fifteen total crashes (73%). Seven crashes occurred at night. Detailed information from the four-year crash data is provided below:

- 73% of crashes caused property damage
- 27% of crashes involved injuries
- 47% of crashes occurred at night
- 47% of crashes occurred on wet pavement
- Zero crashes resulted in a fatality

Statewide averages were not provided with the crash data. A concentration of seven crashes occurred at the Millersville Road/Waterbury Road intersection; five crashes involved an eastbound vehicle impacting a fixed object. Damage to the w-beam barrier along the eastbound Millersville Road approach to Waterbury Road was noted during field observations. The advisory speed on the Millersville Road approaches to Waterbury Road is 15 mph due to a tight horizontal curve.

Another concentration of crashes occurred at the Millersville Road at Cecil Avenue intersection where five angle crashes were recorded in the four-year period. The five crashes involved northbound and eastbound vehicles.

IV. TOTAL BACKGROUND ANALYSIS

A. 2024 Regional Growth – Base Traffic Volumes

A regional growth rate was required to bring the raw data up to the 2024 design year. AADT information from 2012 through 2019 was obtained at five nearby locations utilizing the MDOT SHA's i-TMS website; the data was used as a baseline to develop a regional growth rate. Table 13 provides a summary of the 2012-2019 AADT data along with a three-year and seven-year growth rate at each location.

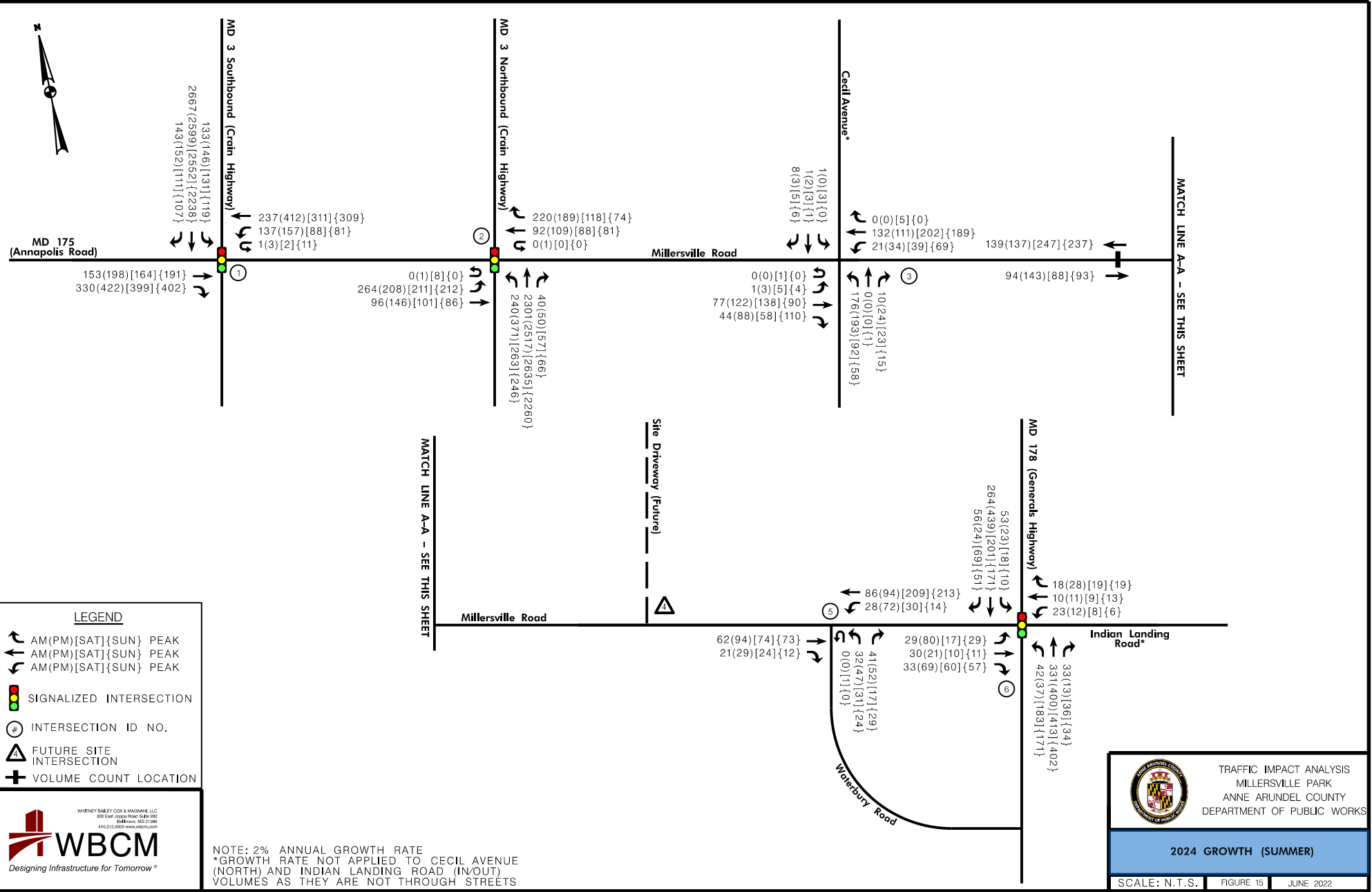
Table 13: Millersville Park Site Development – AADT and Growth Rate Summary Table

Table 13 - Millersville Park - Site Development - AADT and Growth Rate Summary Table												
ID	Location	2012	2013	2014	2015	2016	2017	2018	2019	Avg. AADT	Avg. Growth Rate	
											3 Year	7 Year
A	MD3-.10 MI N OF MD175/MILLERSVILLE RD	65,830	65,961	65,762	66,540	67,801	69,432	74,010	74,011	68,668	3.00%	1.71%
B	MILLERSVILLE RD - .10 MILE EAST OF MD 3	4,961	4,972	4,963	5,094	5,195	5,200	5,151	5,152	5,086	-0.28%	0.55%
C	INDIAN LANDING RD - .10 MILE NORTH OF MD 178	1,021	1,022	1,023	1,054	1,075	900	891	892	985	-5.72%	-1.71%
D	IS97-.10 MI S OF MILLERSVILLE RD STRUC #020148002	105,770	106,721	106,612	98,610	118,530	121,381	118,070	118,901	111,824	0.13%	1.98%
E	MD175-.20 MI N OF MD3	11,102	11,120	11,091	11,382	12,110	12,401	12,292	11,800	11,662	-0.83%	0.92%
										Weighted Average (3 year)		1.03%
										Weighted Average (7 year)		1.77%
										Proposed Growth Rate		2.0%

The proposed growth rate of 2.0% was submitted to the Anne Arundel County DPW and was approved for use in the TIA. The County approved 2% growth rate was applied to all movements excluding the movements in and out of Cecil Avenue (north) and Indian Landing Road (entering/exiting) as both roadways are not through streets. The resultant summer and fall 2024 Growth volumes are illustrated in Figures 15 and 16, respectively.

B. Approved Background Developments

Anne Arundel County DPW identified eight developments to include as background traffic. Information for the majority of background developments was provided in the Gambrills Station TIS; however, the information utilized ITE TripGen 9th Edition.



LEGEND

- AM(PM)[SAT]{SUN} PEAK
- AM(PM)[SAT]{SUN} PEAK
- AM(PM)[SAT]{SUN} PEAK
- SIGNALIZED INTERSECTION
- INTERSECTION ID NO.
- FUTURE SITE INTERSECTION
- VOLUME COUNT LOCATION

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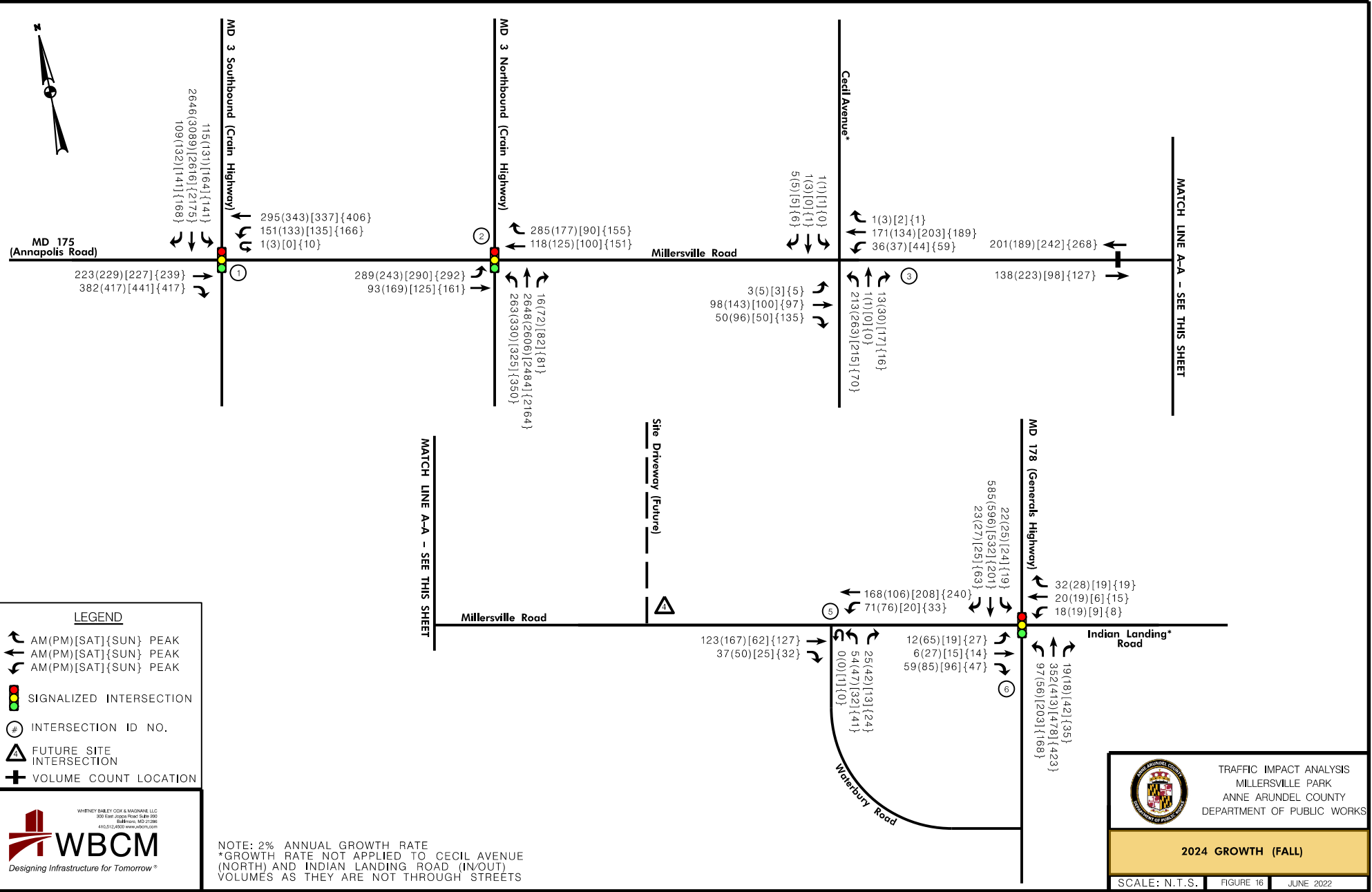
NOTE: 2% ANNUAL GROWTH RATE
 *GROWTH RATE NOT APPLIED TO CECIL AVENUE (NORTH) AND INDIAN LANDING ROAD (IN/OUT) VOLUMES AS THEY ARE NOT THROUGH STREETS

ANN ARUNDEL COUNTY
 DEPARTMENT OF PUBLIC WORKS

TRAFFIC IMPACT ANALYSIS
 MILLERSVILLE PARK
 ANNE ARUNDEL COUNTY
 DEPARTMENT OF PUBLIC WORKS

2024 GROWTH (SUMMER)

SCALE: N.T.S. | FIGURE 15 | JUNE 2022



LEGEND

- AM(PM)[SAT]{SUN} PEAK
- AM(PM)[SAT]{SUN} PEAK
- AM(PM)[SAT]{SUN} PEAK
- SIGNALIZED INTERSECTION
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ANN ARUNDEL COUNTY
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TRAFFIC IMPACT ANALYSIS
 MILLERSVILLE PARK
 ANNE ARUNDEL COUNTY
 DEPARTMENT OF PUBLIC WORKS

2024 GROWTH (FALL)

SCALE: N.T.S. FIGURE 16 JUNE 2022



The background developments were brought up to the latest edition of the ITE TripGen available at the TIA's onset – ITE TripGen 10th Edition. The background development information is provided in Appendix H. Below is a list of the approved background developments:

- A) Gambrills Station
- B) Gambrills Gateway
- C) Gharai Property (810 MD 3)
- D) Severn Chapel Crossing
- E) Lumenary Memorial Care
- F) 696 MD 3
- G) Reed Property (770 MD 3)
- H) Preserve at Severn Run

All background developments excluding 696 MD 3 and the Reed Property (770 MD 3) were provided in the Gambrills Station TIS.

C. Background Development Trip Generation/Distribution

No modal choice discount was assumed – all trips to and from the background developments via automobile are anticipated. Pass-by traffic reductions were taken for selected developments as quantified in ITE TripGen 10th Edition and based on engineering judgement. For certain developments, primarily retail and service-oriented land uses, the traffic entering and exiting the site may be significantly different than the total number of new personal vehicle trips added to the roadway network.

Background Developments B through G are in a cluster along MD 3, located southwest of the study area. The background trip generation is summarized in Table 14. All trip generation was based on the ITE Trip Gen (10th Edition). Background trip distribution percentages were developed based on the existing traffic patterns, background development type and knowledge of the surroundings and roadway network. Background development volume figures for the individual background developments and clusters are provided in Appendix H. The total background development volumes (Background Developments A-H) are provided in Figure 17.

D. 2024 Total Background Traffic Volumes

The summer and fall background traffic volumes are comprised of the annual growth rate volumes (Figures 15 and 16, respectively) and the background development volumes (Figure 17). The resultant 2024 Total Background summer and fall volumes are provided in Figures 18 and 19, respectively.

E. 2024 Total Background Levels of Service

The CLA level of service assessments were recomputed with the 2024 Total Background volumes for summer and fall (Figures 18 and 19, respectively). No future improvements within the study area were included in MDOT's Consolidated Transportation Program (CTP) or noted by Anne Arundel County DPW and MDOT SHA District 5; therefore, the existing lane configurations and traffic control were employed for the 2024 Total Background analyses. The analysis worksheets are provided in Appendix I. The results of the analyses are summarized in Table 15.

Review of the table reveals that levels of service deteriorated for several peak hour scenarios at various intersections with the additional traffic volumes and lack of reserve capacity. Several intersections are projected to operate at unacceptable levels of service or at a low Level of Service "D" with the proposed background development. Similar to the 2021 Existing results, the MD 175/MD 3 southbound and MD 175/Millersville Road/MD 3 northbound CLV results are higher than 1300 for several peak hours in the summer and fall. An HCS 7 Signalized Intersection analysis was conducted to further investigate the marginal to unacceptable operations. The results of the Highway Capacity Analysis for the summer and fall data are provided in Tables 16 and 17, respectively; the calculations can be found in Appendix I.

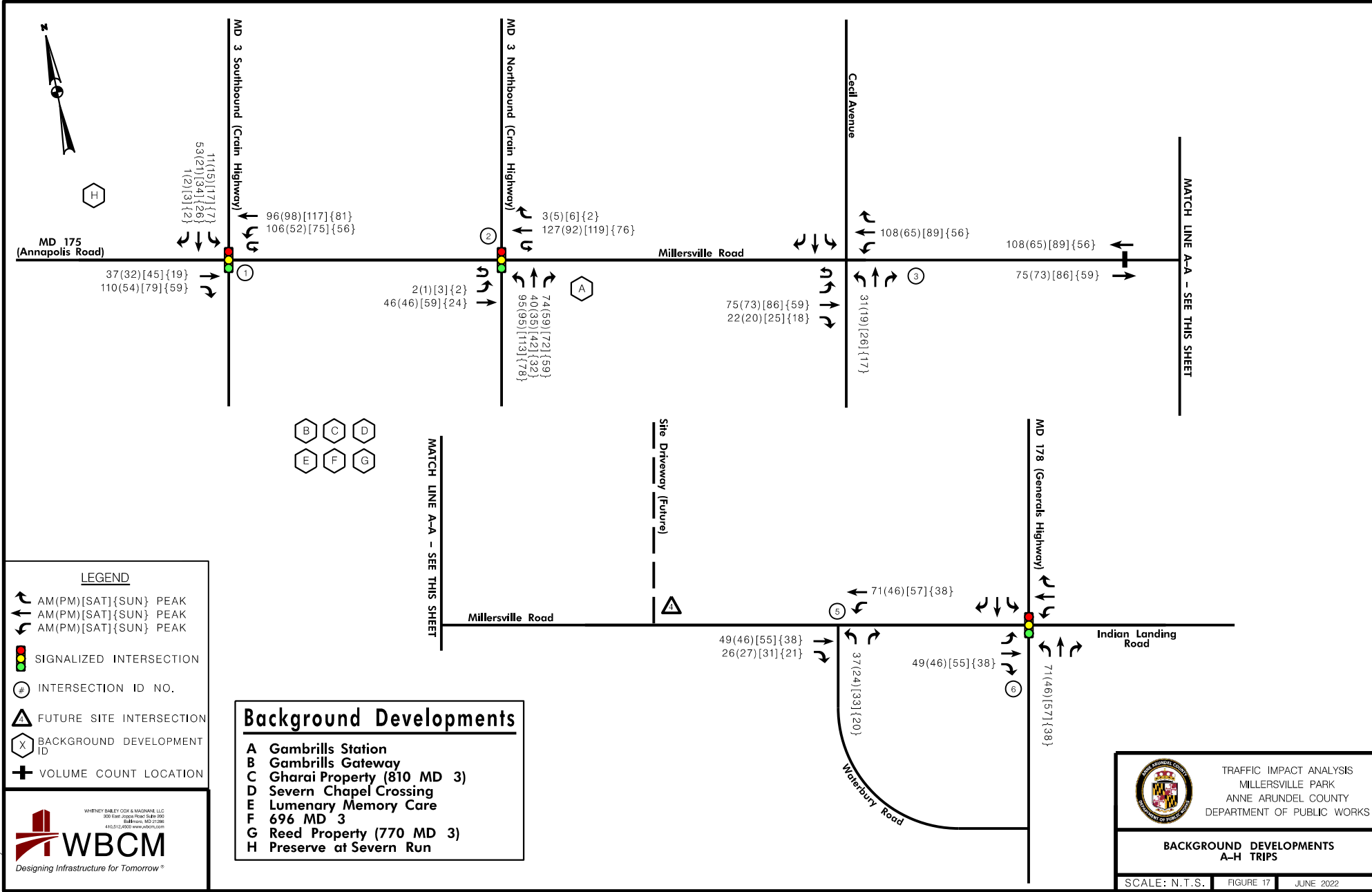


Table 14: Background Development Peak Hour Traffic Volumes

Table 14 - Millersville Park - Background Development																	
ID	Development Name	ITE Trip Generation Manual (10th Edition) - General Urban/Suburban Setting		AM Peak			PM Peak			Sat. Peak			Sun. Peak				
		ITE Land-Use (ITE Code)	Unit	Value	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL	
			Less Pass-by-Trips														
A	Gambrills Station	Shopping Center (820)	KSF	46.3	109	66	175	147	160	307	175	162	337	63	66	129	
		Shopping Center (820) ^{tt}		0% (34%) [26%] [26%]													
		SubTotal			109	66	175	97	106	203	129	120	249	47	49	95	
B	Gambrills Gateway	Drive-in Bank (912)	KSF	3.4	19	13	32	35	35	70	46	44	90	8*	8*	16*	
		Drive-in Bank (912) ^{tt}		29% (35%) [38%] [38%]													
		Fast-Food Restaurant with Drive-Through Window (934)	KSF	4.1	84	81	165	70	64	134	115	110	225	108	118	226	
		Fast-Food Restaurant with Drive-Through Window (934) ^l		49% (50%) [50%] [50%]													
		Shopping Center (820)	KSF	13.6	99	60	159	60	64	124	67	61	128	19	19	38	
		Shopping Center (820) ^{tt}		0% (34%) [26%] [26%]													
SubTotal			155	110	266	98	97	194	136	127	263	73	78	151			
C	Gharai Property (810 MD 3)	Convenience Market with Gasoline Pumps (853) ^l	KSF	3.0	61	61	122	74	74	148	74	74	148	74	74	148	
		Convenience Market with Gasoline Pumps (853) ^l		63% (66%) [66%] [66%]													
		Fast-Food Restaurant with Drive-Through Window (934)	KSF	3.2	66	63	129	55	50	105	90	86	176	84	92	176	
		Fast-Food Restaurant with Drive-Through Window (934) ^l		49% (50%) [50%] [50%]													
		Shopping Center (820)	KSF	2.0	95	58	153	14	16	30	15	13	28	3	3	6	
		Shopping Center (820) ^{tt}		0% (34%) [26%] [26%]													
		Drive-in Bank (912)	KSF	2.0	11	8	19	21	20	41	27	26	53	6*	6*	12*	
Drive-in Bank (912) ^{tt}		29% (35%) [38%] [38%]															
SubTotal			160	119	277	75	74	149	98	94	192	72	76	148			
D	Seyern Chapel Crossing	General Office Building (710)	KSF	34.7	51	8	59	7	35	42	10	8	18	4	3	7	
		Fast-Food Restaurant with Drive-Through Window (934)	KSF	4.4	90	87	177	75	69	144	123	118	241	117	126	243	
		Fast-Food Restaurant with Drive-Through Window (934) ^l		49% (50%) [50%] [50%]													
		SubTotal			97	52	149	45	70	115	73	68	141	64	67	131	
E	Luminary Memory Care	Assisted Living (254)	Beds	75	9	5	14	8	12	20	9	11	20	9	12	21	
F	696 MD 3	Coffee/Donut Shop with Drive-Through Window (937) ^{tt}	KSF	3.5	159	152	311	76	76	152	126	125	251	126	125	251	
		Coffee/Donut Shop with Drive-Through Window (937) ^{ttm}		49% (50%) [50%] [50%]													
		Automobile Sales (Used) [Existing Land Use] ^l	KSF	2.9	-5	-1	-6	-5	-6	-11	-5	-6	-11				
		SubTotal			76	77	153	33	32	65	58	56	114	63	62	125	
G	Reed Property (770 MD 3)	General Office Building (710)	KSF	10.0	31	5	36	2	11	13	3	2	5	1	1	2	
H	Preserve at Seyern Run	Single-Family Detached Housing (210)	DU	20	5	14	19	14	8	22	19	16	35	14	13	27	
Total Trips					642	448	1,089	372	410	781	525	494	1,019	343	358	700	

Small Sample Size
 *Sat. Peak directional distribution used since Sunday data was not available
 ** AM (PM) [Sat.] [Sun.]
^l PM Peak data used for Saturday and Sunday
^{tt} Saturday Peak data used for Sunday
^{ttm} ITE 934 used for percentages
 Not included in Gambrills Station TIS

The results of the HCM analysis indicate that the mainline approach and intersection levels of service generally are reduced to unacceptable levels of service E or F in the four peak hours during the summer and fall with the addition of regional growth and background development volumes. The analysis results indicate that the eastbound and westbound levels of service are generally projected to operate at a failing level of service E or F with a substantial increase in delay from existing conditions along the eastbound approach at the MD 175/MD 3 Southbound intersection. Average approach delays are projected to be as higher as five to seven minutes.



LEGEND

- AM(PM)[SAT]{SUN} PEAK
- AM(PM)[SAT]{SUN} PEAK
- AM(PM)[SAT]{SUN} PEAK
- SIGNALIZED INTERSECTION
- INTERSECTION ID NO.
- FUTURE SITE INTERSECTION
- BACKGROUND DEVELOPMENT ID
- VOLUME COUNT LOCATION

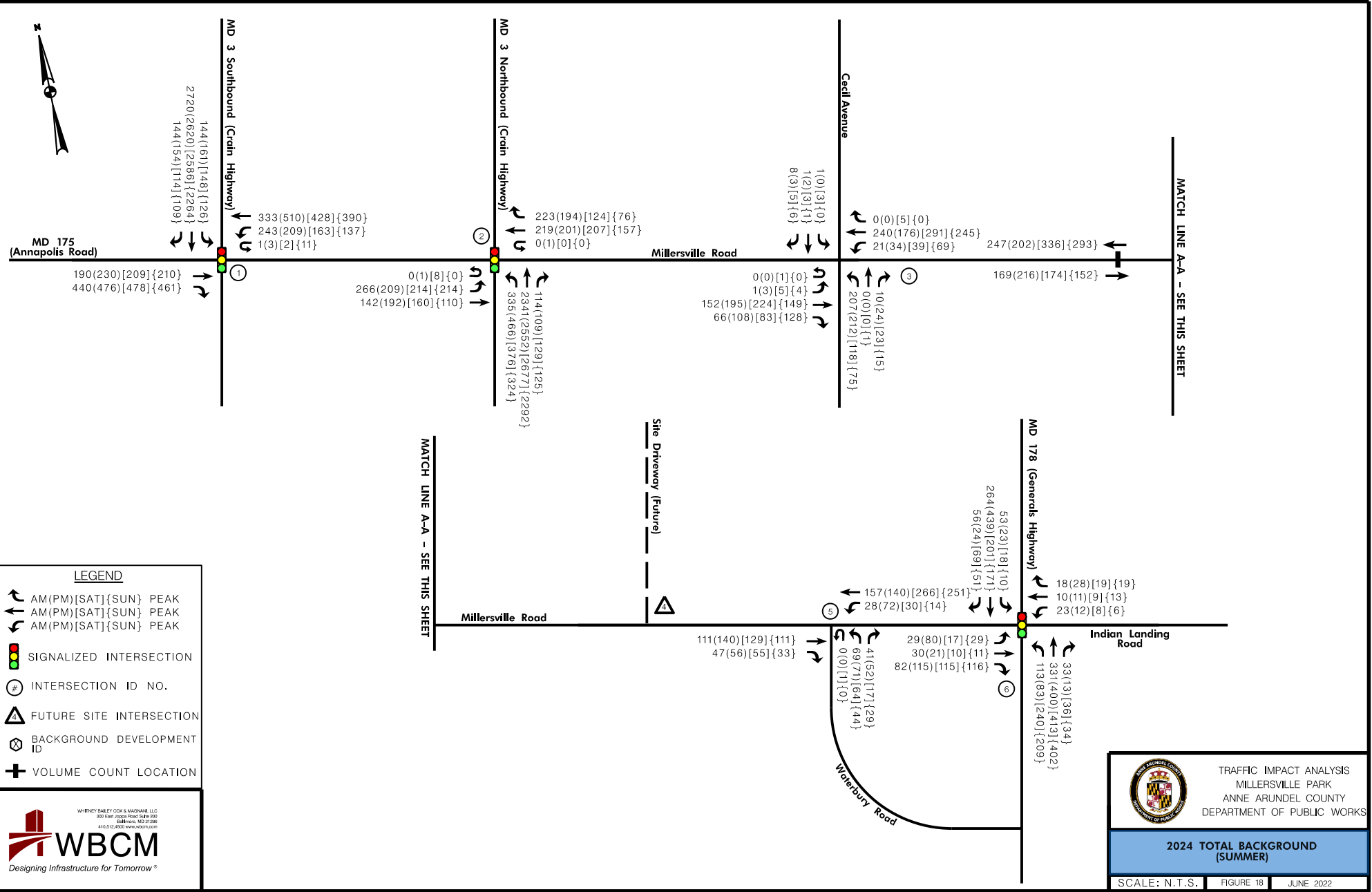
Background Developments

- A** Gambrills Station
- B** Gambrills Gateway
- C** Gharai Property (810 MD 3)
- D** Severn Chapel Crossing
- E** Lumenary Memory Care
- F** 696 MD 3
- G** Reed Property (770 MD 3)
- H** Preserve at Severn Run

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BACKGROUND DEVELOPMENTS A-H TRIPS

SCALE: N.T.S. FIGURE 17 JUNE 2022



LEGEND

- AM(PM)[SAT]{SUN} PEAK
- AM(PM)[SAT]{SUN} PEAK
- AM(PM)[SAT]{SUN} PEAK
- SIGNALIZED INTERSECTION
- INTERSECTION ID NO.
- FUTURE SITE INTERSECTION
- BACKGROUND DEVELOPMENT ID
- VOLUME COUNT LOCATION

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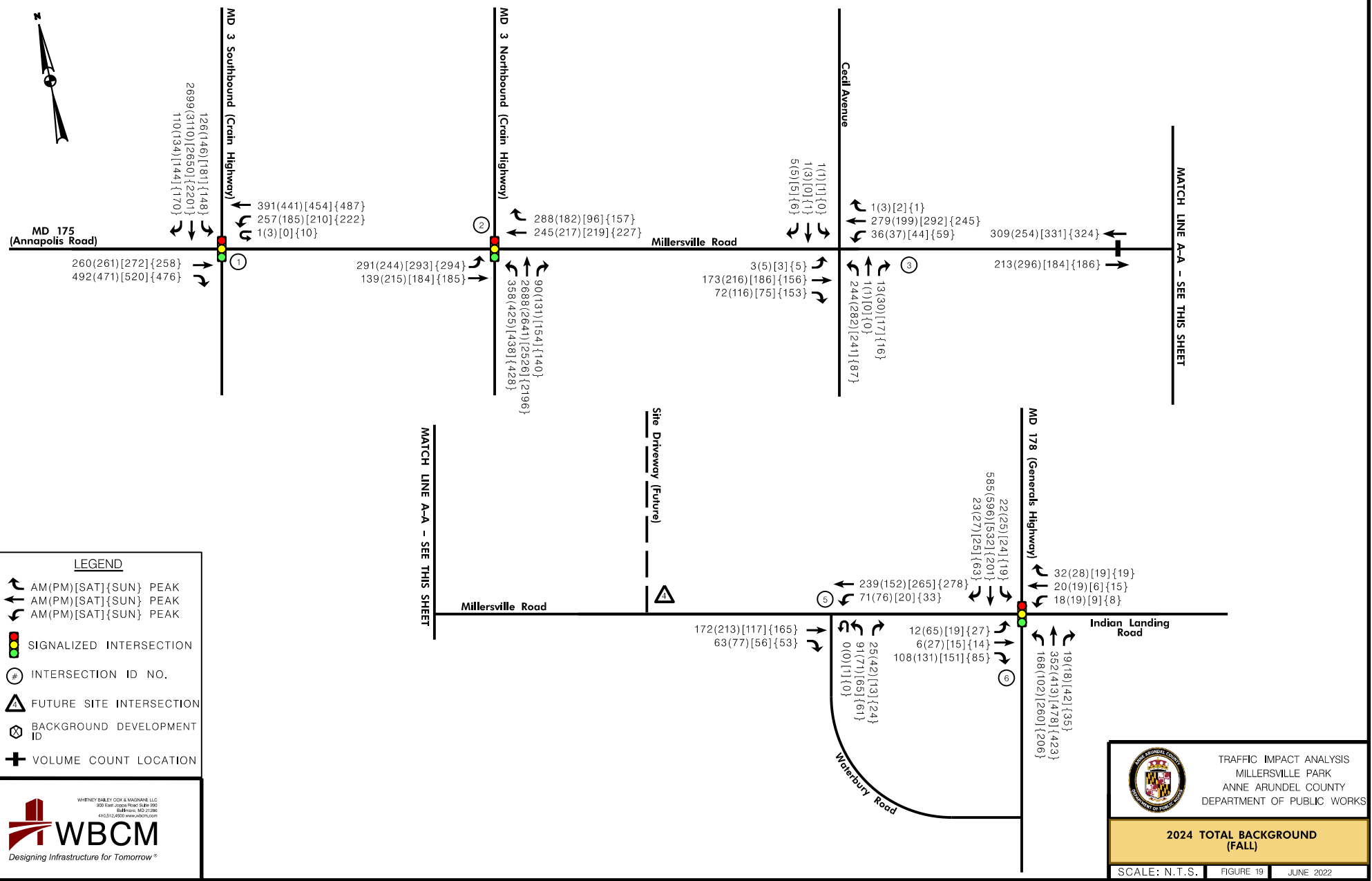
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2024 TOTAL BACKGROUND (SUMMER)

SCALE: N.T.S. FIGURE 18 JUNE 2022



MATCH LINE A-A - SEE THIS SHEET

MATCH LINE A-A - SEE THIS SHEET



TRAFFIC IMPACT ANALYSIS
MILLERSVILLE PARK
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2024 TOTAL BACKGROUND
(FALL)

SCALE: N.T.S. FIGURE 19 JUNE 2022



entley



Table 15: 2024 Total Background CLA Level of Service Summary

Table 15 - Millersville Park - 2024 Background - Level of Service (CLA)				
Intersection	Scenario	Peak Hour	CLA LOS (CLV) [v/c]	
			Summer	Fall
(1) MD 175 at MD 3 SB	2021 Existing	AM	E (1572) [0.98]	F (1625) [1.02]
	2024 Background		F (1908) [1.19]	F (1965) [1.23]
	2021 Existing	PM	F (1651) [1.03]	F (1831) [1.14]
	2024 Background		F (1867) [1.17]	F (2059) [1.29]
	2021 Existing	Saturday	E (1594) [1.00]	F (1652) [1.03]
	2024 Background		F (1807) [1.13]	F (1923) [1.20]
	2021 Existing	Sunday	E (1468) [0.92]	E (1481) [0.93]
	2024 Background		F (1628) [1.02]	F (1698) [1.06]
(2) MD 175/Millersville Rd at MD 3 NB	2021 Existing	AM	D (1440) [0.90]	F (1680) [1.05]
	2024 Background		E (1554) [0.97]	F (1807) [1.13]
	2021 Existing	PM	E (1364) [0.85]	E (1554) [0.97]
	2024 Background		F (1669) [1.04]	F (1753) [1.10]
	2021 Existing	Saturday	E (1477) [0.92]	D (1429) [0.89]
	2024 Background		F (1706) [1.07]	F (1658) [1.04]
	2021 Existing	Sunday	C (1261) [0.79]	D (1331) [0.83]
	2024 Background		D (1431) [0.89]	E (1510) [0.94]
(3) Millersville Road at Cecil Avenue	2021 Existing	AM	A (340) [0.21]	A (437) [0.27]
	2024 Background		A (522) [0.33]	A (638) [0.40]
	2021 Existing	PM	A (456) [0.29]	A (569) [0.36]
	2024 Background		A (597) [0.37]	A (721) [0.45]
	2021 Existing	Saturday	A (364) [0.23]	A (481) [0.30]
	2024 Background		A (536) [0.34]	A (668) [0.42]
	2021 Existing	Sunday	A (333) [0.21]	A (384) [0.24]
	2024 Background		A (486) [0.30]	A (490) [0.31]
(5) Millersville Road at Waterbury Road	2021 Existing	AM	A (179) [0.11]	A (307) [0.19]
	2024 Background		A (298) [0.19]	A (497) [0.31]
	2021 Existing	PM	A (277) [0.17]	A (360) [0.23]
	2024 Background		A (391) [0.24]	A (479) [0.30]
	2021 Existing	Saturday	A (274) [0.17]	A (260) [0.16]
	2024 Background		A (381) [0.24]	A (366) [0.23]
	2021 Existing	Sunday	A (265) [0.17]	A (322) [0.20]
	2024 Background		A (339) [0.21]	A (429) [0.27]
(6) Millersville Road/Indian Landing Road at MD 178	2021 Existing	AM	A (592) [0.37]	A (800) [0.50]
	2024 Background		A (810) [0.51]	B (1042) [0.65]
	2021 Existing	PM	A (698) [0.44]	A (881) [0.55]
	2024 Background		A (838) [0.52]	B (1024) [0.64]
	2021 Existing	Saturday	A (879) [0.55]	B (1031) [0.64]
	2024 Background		B (1099) [0.69]	C (1260) [0.79]
	2021 Existing	Sunday	A (845) [0.53]	A (862) [0.54]
	2024 Background		B (1029) [0.64]	B (1026) [0.64]



Table 16: 2024 Total Background (Summer) HCM Signalized Intersection Results Summary

Table 16 - Millersville Park - 2024 Background (Summer) - HCS Summary							
Intersection	Scenario	Peak Hour	HCM LOS & Delay (Seconds/Vehicle)				
			NB	SB	EB	WB	Intersection
(1) MD 175 at MD 3 SB	2021 Existing	AM		D 35.7	F 90.3	D 49.7	D 44.0
	2024 Background			E 60.4	F 251.5	D 49.8	F 87.5
	2021 Existing	PM		C 31.9	F 172.5	E 59.7	E 57.1
	2024 Background			D 35.3	F 325.2	E 64.0	F 87.0
	2021 Existing	Sat		C 30.6	F 138.1	E 58.1	D 49.7
	2024 Background			C 33.6	F 250.8	E 60.4	E 73.6
	2021 Existing	Sun		C 28.2	D 44.0	C 25.9	C 30.6
	2024 Background			D 53.5	D 44.4	C 22.3	D 47.3
(2) MD 175/ Millersville Rd at MD 3 NB	2021 Existing	AM	C 22.4		F 100.7	F 94.5	D 38.0
	2024 Background		C 26.3		F 101.4	F 93.8	D 42.9
	2021 Existing	PM	B 18.7		F 101.3	F 97.7	C 33.4
	2024 Background		C 25.4		F 97.0	F 100.3	D 40.3
	2021 Existing	Sat	B 13.2		F 105.8	F 105.9	C 27.2
	2024 Background		C 23.0		F 102.0	F 100.2	D 37.3
	2021 Existing*	Sun					
	2024 Background		B 13.5		E 79.6	E 78.1	C 24.5

* 2021 Existing Sunday HCS analysis not required per Guidelines as CLV is less than 1300

Table 17: 2024 Total Background (Fall) HCM Signalized Intersection Results Summary

Table 17 - Millersville Park - 2024 Background (Fall) - HCS Summary							
Intersection	Scenario	Peak Hour	HCM LOS & Delay (Seconds/Vehicle)				
			NB	SB	EB	WB	Intersection
(1) MD 175 at MD 3 SB	2021 Existing	AM		D 53.1	F 80.9	D 40.9	E 56.0
	2024 Background			F 89.2	F 249.6	D 45.0	F 110.4
	2021 Existing	PM		D 43.7	F 139.3	E 58.6	E 59.1
	2024 Background			E 58.1	F 261.0	E 61.9	F 89.8
	2021 Existing	Sat		D 49.7	D 46.7	C 25.9	D 46.4
	2024 Background			F 174.5	D 47.8	B 19.9	F 128.7
	2021 Existing	Sun		C 26.3	F 201.8	E 62.9	E 62.9
	2024 Background			C 28.0	F 408.0	E 74.7	F 106.7
(2) MD 175/ Millersville Rd at MD 3 NB	2021 Existing	AM	D 35.6		F 90.3	F 80.6	D 46.1
	2024 Background		D 48.3		F 90.2	F 80.1	E 56.9
	2021 Existing	PM	C 20.3		F 99.7	F 98.5	D 35.5
	2024 Background		C 28.7		F 95.1	F 99.4	D 43.2
	2021 Existing	Sat	B 13.8		E 79.2	F 85.0	C 25.4
	2024 Background		C 25.7		E 77.5	E 76.4	D 36.1
	2021 Existing	Sun	B 17.0		E 68.2	E 67.9	C 28.5
	2024 Background		C 24.2		E 65.7	E 64.7	C 33.9



F. Section Link Analysis

The Section Link Analysis was recomputed based on 2024 Total Background volumes and existing roadway alignment for the five study segments. Detailed results of the analyses are located in Appendix I. Table 18 provides the results of the analysis for Segments A through E.

Table 18: 2024 Total Background Road Rating Analysis Results

Table 18 - Millersville Park Road Rating - 2024 Background				
Section ID	MD 175/Millersville Road (From - To)	Scenario	Roadway Classification	Road Rating
A	Crain Hwy (MD 3) SB - Crain Hwy (MD 3) NB	2021 Existing	4	82
		2024 Background	5	80
B	Crain Hwy (MD 3) NB - Cecil Ave	2021 Existing	4	83
		2024 Background	4	81
C	Cecil Ave - Millersville Elem. School W Entrance	2021 Existing	3	81
		2024 Background	4	77
D	Millersville Elem. School W Entrance - Coleus Dr	2021 Existing	3	63
		2024 Background	4	62
E	Coleus Dr - Generals Hwy (MD 178)	2021 Existing	3	78
		2024 Background	3	76

The analysis results showed that all segments will continue to operate under an acceptable road rating of 70 or above, excluding Segment D (Millersville Elementary School West Entrance to Coleus Drive) which drops from a 2021 Existing Road Rating of 63 to 62 under 2024 Total Background conditions.

V. SITE GENERATED TRAFFIC

A. Site Trip Generation

The proposed Millersville Park will include four (4) athletic fields. The peak hour trips generated from the proposed development were estimated based on discussions with AACO DPW regarding peak field usage for fall sports. The County’s projected field use is provided in Appendix J. The County’s data provided projected usage for the PM, Saturday and Sunday peak hours. A 75% entering/25% exiting distribution was utilized from a prior recreational park study which captured trips entering and exiting athletic fields; the summary table from the study is provided in Appendix J. AM peak hour data was not provided by the County or the previous study; therefore, ITE TripGen 10th Edition was used for the peak hour data. No reductions were taken for pass-by trips. The trip generation is provided in Table 19 with the trip generation datasheets provided in Appendix J.

Table 19: Proposed Development

Table 19 - Millersville Park - Proposed Development																		
Use	ITE Trip Generation Manual Info					AM Peak			PM Peak*			Sat. Peak*			Sun. Peak*			
	Unit	Value	Setting/Location	Edition	Land-Use Code	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL	
Soccer Complex	Fields	4	General Urban/Suburban	10th	488 (Soccer Complex)	2	2	4	150	50	200	150	50	200	150	50	200	

*Trip generation data based on discussions with Anne Arundel County DPW regarding fall park usage during the peak hours.
Data based on small ITE Trip Generation sample size



B. Trip Distribution

The site generated trips were distributed to the roadway network based on existing traffic patterns, development type and knowledge of the surroundings and roadway network. The site trip distribution is provided in Figure 20. The resultant proposed distributions are as follows:

- To/From east of the Site on Millersville Road - 15%
- To/From west of the Site on Millersville Road - 85%

C. 2024 Total Traffic Volumes

The fall volumes and analysis results generally controlled throughout the network and the site generated trips that Anne Arundel County DPW provided were based on the peak fall sports season; therefore, the summer volumes were abandoned for the 2024 Total scenario. The Site Generated traffic volumes (Figure 20) were added to the 2024 Total Background (Fall) volumes (Figure 19) yielding the 2024 Total Traffic Volumes illustrated in Figure 21.

D. 2024 Total Traffic Levels of Service

The traffic volumes from Figure 21 were employed in recomputing the level of service analyses with existing traffic control and lane configurations. The lane configurations at the Millersville Road/Site Access intersection include a separate left and right turn lane along the site access and a Millersville Road eastbound left turn lane based on the Site Plan provided in Appendix C. The computation forms are located in Appendix K. The results of the CLA analyses are provided in Tables 20 and 21.

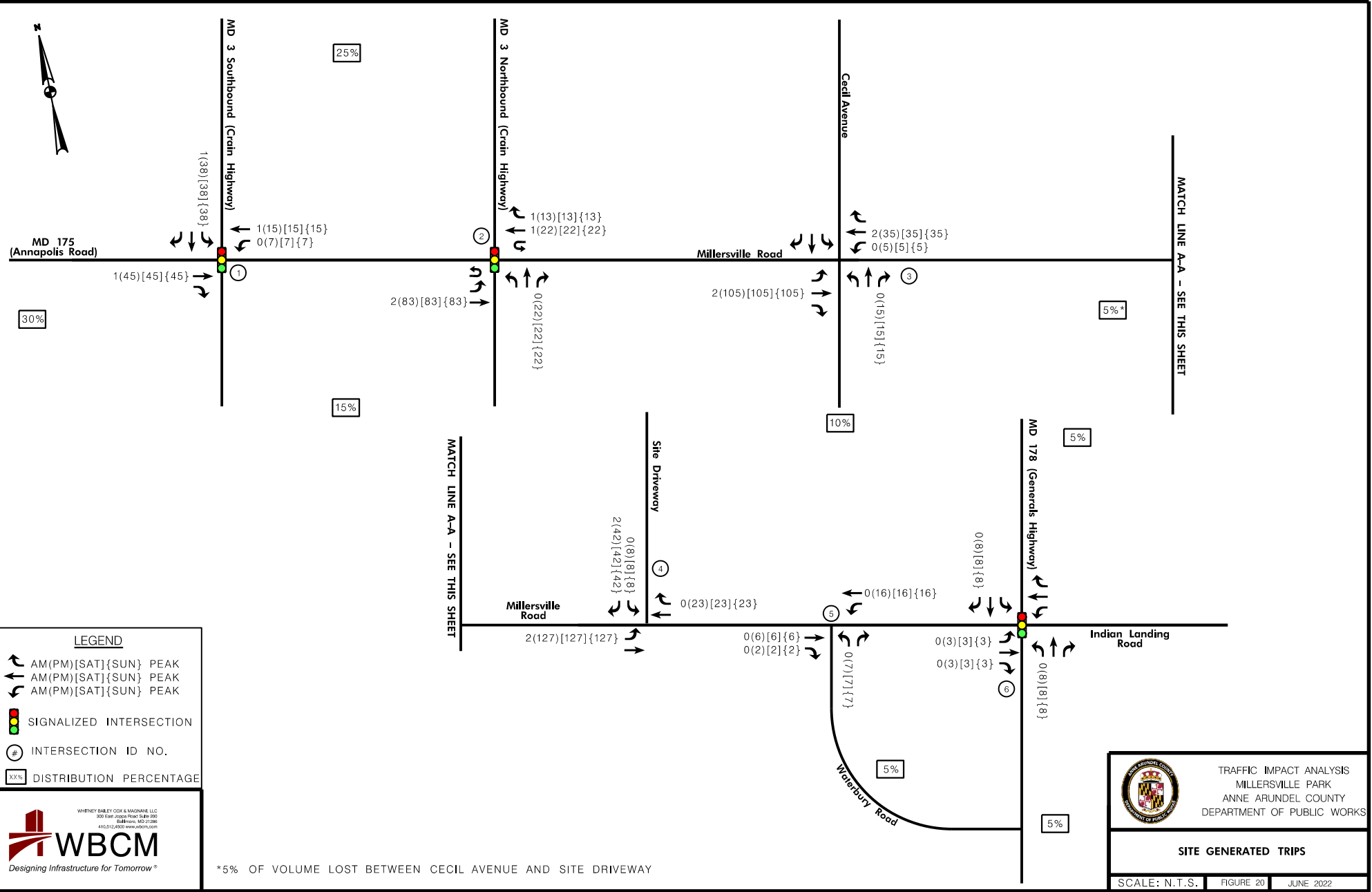
Several intersections will continue to operate at unacceptable levels of service with the proposed site development and no pipeline improvements. Similar to the 2024 Total Background results, the MD 175/MD 3 southbound and MD 175/Millersville Road/MD 3 northbound CLV results are higher than 1300 for several peak hours. The Millersville Road/Site Access intersection will function acceptably based on the CLA results. An HCS 7 Signalized Intersection analysis was conducted to further investigate the unacceptable operations. The results of the Highway Capacity Analysis are provided in Table 22; the calculations can be found in Appendix K.

The results of the HCM analysis indicate that the approach and intersection level of service results generally remain the same as 2024 Total Background but experience a slight increase in delay with the addition of the site development trips. Average delays are projected to be as high as five to seven minutes. The analysis results indicate that mitigation measures are required to improve the delay to 2024 Total Background levels.

E. Section Link Analysis

The Section Link Analysis was recomputed based on 2024 Total volumes and existing roadway alignment for the five study segments. Detailed results of the analyses are located in Appendix K. Table 23 provides the results of the analysis for Segments A through E.

The analysis results show the ratings remain the same for the 2024 Background and 2024 Future scenarios for all segments. All segments operate acceptably excluding Segment D (Millersville Elementary School West Entrance to Coleus Drive) which remains at a Road Rating of 62, eight (8) below the 70 threshold for acceptable operations. Mitigation measures are required to improve the Segment D road rating of 62 to at least 63 as additional trips from the site development slightly decrease the road rating from 2024 Total background conditions (rounding in the analysis masks the increase).



LEGEND

- AM(PM)[SAT]{SUN} PEAK
- AM(PM)[SAT]{SUN} PEAK
- AM(PM)[SAT]{SUN} PEAK
- SIGNALIZED INTERSECTION
- INTERSECTION ID NO.
- DISTRIBUTION PERCENTAGE

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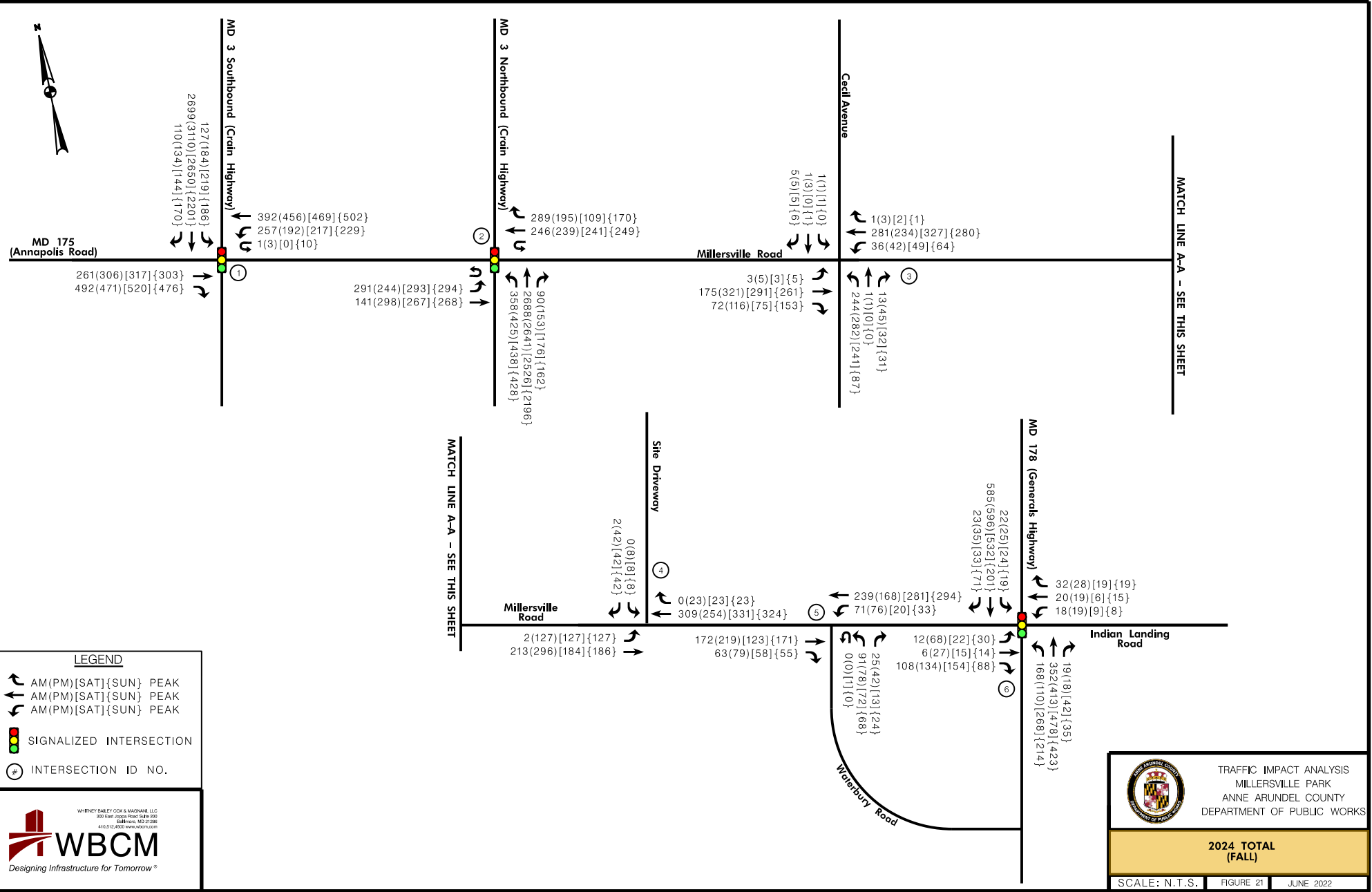
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*5% OF VOLUME LOST BETWEEN CECIL AVENUE AND SITE DRIVEWAY

TRAFFIC IMPACT ANALYSIS
 MILLERSVILLE PARK
 ANNE ARUNDEL COUNTY
 DEPARTMENT OF PUBLIC WORKS

SITE GENERATED TRIPS

entry -



MATCH LINE A-A - SEE THIS SHEET

MATCH LINE A-A - SEE THIS SHEET



TRAFFIC IMPACT ANALYSIS
MILLERSVILLE PARK
ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

2024 TOTAL
(FALL)

SCALE: N.T.S. | FIGURE 21 | JUNE 2022

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Table 20: 2024 Total CLA Level of Service/Delay (Intersections 1 and 2)

Table 20 - Millersville Park- Level of Service (CLA) - Intersections 1 & 2				
Intersection	Scenario	Peak Hour	CLA LOS (CLV) [v/c]	
			Summer	Fall
(1) MD 175 at MD 3 SB	2021 Existing	AM	E (1572) [0.98]	F (1625) [1.02]
	2024 Background		F (1908) [1.19]	F (1965) [1.23]
	2024 Total			F (1965) [1.23]
	2021 Existing	PM	F (1651) [1.03]	F (1831) [1.14]
	2024 Background		F (1867) [1.17]	F (2059) [1.29]
	2024 Total			F (2066) [1.29]
	2021 Existing	Saturday	E (1594) [1.00]	F (1652) [1.03]
	2024 Background		F (1807) [1.13]	F (1923) [1.20]
	2024 Total			F (1930) [1.21]
	2021 Existing	Sunday	E (1468) [0.92]	E (1481) [0.93]
	2024 Background		F (1628) [1.02]	F (1698) [1.06]
	2024 Total			F (1705) [1.07]
(2) MD 175/Millersville Rd at MD 3 NB	2021 Existing	AM	D (1440) [0.90]	F (1680) [1.05]
	2024 Background		E (1554) [0.97]	F (1807) [1.13]
	2024 Total			F (1808) [1.13]
	2021 Existing	PM	E (1502) [0.94]	E (1554) [0.97]
	2024 Background		F (1669) [1.04]	F (1753) [1.10]
	2024 Total			F (1858) [1.16]
	2021 Existing	Saturday	E (1477) [0.92]	D (1429) [0.89]
	2024 Background		F (1706) [1.07]	F (1658) [1.04]
	2024 Total			F (1771) [1.11]
	2021 Existing	Sunday	C (1261) [0.79]	D (1331) [0.83]
	2024 Background		D (1431) [0.89]	E (1510) [0.94]
	2024 Total			F (1615) [1.01]



Table 21: 2024 Total CLA Level of Service/Delay (Intersections 3-6)

Table 21 - Millersville Park- Level of Service (CLA) - Intersections 3 - 6				
Intersection	Scenario	Peak Hour	CLA LOS (CLV) [v/c]	
			Summer	Fall
(3) Millersville Road at Cecil Avenue	2021 Existing	AM	A (340) [0.21]	A (437) [0.27]
	2024 Background		A (522) [0.33]	A (638) [0.40]
	2024 Total			A (640) [0.40]
	2021 Existing	PM	A (456) [0.29]	A (569) [0.36]
	2024 Background		A (597) [0.37]	A (721) [0.45]
	2024 Total			A (846) [0.53]
	2021 Existing	Saturday	A (364) [0.23]	A (481) [0.30]
	2024 Background		A (536) [0.34]	A (668) [0.42]
	2024 Total			A (728) [0.46]
	2021 Existing	Sunday	A (333) [0.21]	A (384) [0.24]
	2024 Background		A (486) [0.30]	A (490) [0.31]
	2024 Total			A (615) [0.38]
4) Millersville Road at Site Access	2024 Total	AM		A (311) [0.19]
		PM		A (412) [0.26]
		Saturday		A (489) [0.31]
		Sunday		A (482) [0.30]
(5) Millersville Road at Waterbury Road	2021 Existing	AM	A (179) [0.11]	A (307) [0.19]
	2024 Background		A (298) [0.19]	A (497) [0.31]
	2024 Total			A (497) [0.31]
	2021 Existing	PM	A (277) [0.17]	A (360) [0.23]
	2024 Background		A (391) [0.24]	A (479) [0.30]
	2024 Total			A (494) [0.31]
	2021 Existing	Saturday	A (274) [0.17]	A (260) [0.16]
	2024 Background		A (381) [0.24]	A (366) [0.23]
	2024 Total			A (389) [0.24]
	2021 Existing	Sunday	A (265) [0.17]	A (322) [0.20]
	2024 Background		A (339) [0.21]	A (429) [0.27]
	2024 Total			A (452) [0.28]
(6) Millersville Road/ Indian Landing Road at MD 178	2021 Existing	AM	A (592) [0.37]	A (800) [0.50]
	2024 Background		A (810) [0.51]	B (1042) [0.65]
	2024 Total			B (1042) [0.65]
	2021 Existing	PM	A (698) [0.44]	A (881) [0.55]
	2024 Background		A (838) [0.52]	B (1024) [0.64]
	2024 Total			B (1046) [0.65]
	2021 Existing	Saturday	A (879) [0.55]	B (1031) [0.64]
	2024 Background		B (1099) [0.69]	C (1260) [0.79]
	2024 Total			C (1282) [0.80]
	2021 Existing	Sunday	A (845) [0.53]	A (862) [0.54]
	2024 Background		B (1029) [0.64]	B (1026) [0.64]
	2024 Total			B (1048) [0.66]



Table 22: 2024 Total (Fall) HCM Signalized Intersection Results Summary

Table 22 - Millersville Park - 2024 Total Fall - HCS Summary							
Intersection	Scenario	Peak Hour	HCM LOS & Delay (Seconds/Vehicle)				
			NB	SB	EB	WB	Intersection
(1) MD 175 at MD 3 SB	2021 Existing	AM		D 53.1	F 80.9	D 40.9	E 56.0
	2024 Background			F 89.2	F 249.6	D 45.0	F 110.4
	2024 Total			F 89.2	F 249.4	D 45.0	F 110.4
	2021 Existing	PM		D 43.7	F 139.3	E 58.6	E 59.1
	2024 Background			E 58.1	F 261.0	E 61.9	F 89.8
	2024 Total			E 57.7	F 264.8	E 64.7	F 91.7
	2021 Existing	Sat		D 49.7	D 46.7	C 25.9	D 46.4
	2024 Background			F 174.5	D 47.8	B 19.9	F 128.7
	2024 Total			F 176.6	D 47.1	B 19.9	F 129.0
	2021 Existing	Sun		C 26.3	F 201.8	E 62.9	E 62.9
	2024 Background			C 28.0	F 408.0	E 74.7	F 106.7
	2024 Total			C 27.9	F 448.0	F 81.2	F 117.8
(2) MD 175/ Millersville Rd at MD 3 NB	2021 Existing	AM	D 35.6		F 90.3	F 80.6	D 46.1
	2024 Background		D 48.3		F 90.2	F 80.1	E 56.9
	2024 Total		D 48.7		F 90.3	F 80.1	E 57.1
	2021 Existing	PM	C 20.3		F 99.7	F 98.5	D 35.5
	2024 Background		C 28.7		F 95.1	F 99.4	D 43.2
	2024 Total		D 39.6		F 89.6	F 97.4	D 52.0
	2021 Existing	Sat	B 13.8		E 79.2	F 85.0	C 25.4
	2024 Background		C 25.7		E 77.5	E 76.4	D 36.1
	2024 Total		D 36.0		E 71.6	E 75.0	D 44.3
	2021 Existing	Sun	B 17.0		E 68.2	E 67.9	C 28.5
	2024 Background		C 24.2		E 65.7	E 64.7	C 33.9
	2024 Total		C 33.0		E 60.5	E 63.6	D 40.5



Table 23: 2024 Total Road Rating Analysis Results

Table 23 - Millersville Park Road Rating - 2024 Total				
Section ID	MD 175/Millersville Road (From - To)	Scenario	Roadway Classification	Road Rating
A	Crain Hwy (MD 3) SB - Crain Hwy (MD 3) NB	2021 Existing	4	82
		2024 Background	5	80
		2024 Total	5	80
B	Crain Hwy (MD 3) NB - Cecil Ave	2021 Existing	4	83
		2024 Background	4	81
		2024 Total	4	81
C	Cecil Ave - Millersville Elem. School W Entrance	2021 Existing	3	81
		2024 Background	4	77
		2024 Total	4	77
D	Millersville Elem. School W Entrance - Coleus Dr	2021 Existing	3	63
		2024 Background	4	62
		2024 Total	4	62
E	Coleus Dr - Generals Hwy (MD 178)	2021 Existing	3	78
		2024 Background	3	76
		2024 Total	3	76

VI. MITIGATION MEASURES

The CLV increases at the two MD 3 intersections with the addition of the Millersville Park development thereby warranting mitigation measures. The following mitigation measures are proposed:

- MD 3 Southbound at MD 175: Provide a narrow pavement marking median from the tip of the southwest quadrant channelization island (theoretical gore) that will extend 200 FT south along MD 3 southbound. Install a rumble strip between the pavement markings to provide a physical deterrent for MD 3 southbound vehicles to enter the auxiliary lane early. The rumble strip would also improve the MD 175 eastbound right turn yield condition and help promote free-flow operations for the movement thus lowering the CLV Lane Use Factor for the eastbound right turn volume from 1.0 to 0.95. Optimize signal timing and increase eastbound right turn traffic flow to improve the HCS intersection delay.
- MD 3 Northbound at MD 175/Millersville Road: Provide concurrent side street phasing to improve operations and lower the CLV (existing side street phasing is split). The eastbound double left turn would operate under a protected left turn phase. Optimize signal timing to improve the HCS intersection delay.

The CLA and HCS results are provided in Tables 24 and 25, respectively. The results of the analyses show that the CLV and intersection delay would improve beyond 2024 Total Background results at the two MD 3 intersections under the four peak hour scenarios with the mitigation measures.

The Site Plan indicates a Millersville Road eastbound left turn lane will be installed to help provide acceptable operations at the Site Access intersection. The road rating within Segment D (Millersville Elementary School West Entrance to Coleus Drive) under 2021 Existing conditions is a 63; however, the rating is reduced to 62 with the volumes generated by the background and site developments.



Table 24 – 2024 Mitigation Measures (Fall) CLA Level of Service Summary

Table 24 - Millersville Park - Level of Service (CLA) - Mitigation Measures				
Intersection	Scenario	Peak Hour	CLA LOS (CLV) [v/c]	
			Summer	Fall
(1) MD 175 at MD 3 SB	2021 Existing	AM	E (1572) [0.98]	F (1625) [1.02]
	2024 Background		F (1908) [1.19]	F (1965) [1.23]
	2024 Total			F (1965) [1.23]
	2024 Mitigation Measures			F (1940) [1.21]
	2021 Existing	PM	F (1651) [1.03]	F (1831) [1.14]
	2024 Background		F (1867) [1.17]	F (2059) [1.29]
	2024 Total			F (2066) [1.29]
	2024 Mitigation Measures			F (2042) [1.28]
	2021 Existing	Saturday	E (1594) [1.00]	F (1652) [1.03]
	2024 Background		F (1807) [1.13]	F (1923) [1.20]
	2024 Total			F (1930) [1.21]
	2024 Mitigation Measures			F (1904) [1.19]
	2021 Existing	Sunday	E (1468) [0.92]	E (1481) [0.93]
	2024 Background		F (1628) [1.02]	F (1698) [1.06]
	2024 Total			F (1705) [1.07]
	2024 Mitigation Measures			F (1681) [1.05]
(2) MD 175/Millersville Rd at MD 3 NB	2021 Existing	AM	D (1440) [0.90]	F (1680) [1.05]
	2024 Background		E (1554) [0.97]	F (1807) [1.13]
	2024 Total			F (1808) [1.13]
	2024 Mitigation Measures			F (1808) [1.13]
	2021 Existing	PM	E (1502) [0.94]	E (1554) [0.97]
	2024 Background		F (1669) [1.04]	F (1753) [1.10]
	2024 Total			F (1858) [1.16]
	2024 Mitigation Measures			F (1706) [1.07]
	2021 Existing	Saturday	E (1477) [0.92]	D (1429) [0.89]
	2024 Background		F (1706) [1.07]	F (1658) [1.04]
	2024 Total			F (1771) [1.11]
	2024 Mitigation Measures			F (1680) [1.05]
	2021 Existing	Sunday	C (1261) [0.79]	D (1331) [0.83]
	2024 Background		D (1431) [0.89]	E (1510) [0.94]
	2024 Total			F (1615) [1.01]
	2024 Mitigation Measures			E (1523) [0.95]



Table 25 – 2024 Mitigation Measures (Fall) HCM Signalized Intersection Results Summary

Table 25 - Millersville Park - 2024 Mitigation Measures Fall - HCS Summary							
Intersection	Scenario	Peak Hour	HCM LOS & Delay (Seconds/Vehicle)				
			NB	SB	EB	WB	Intersection
(1) MD 175 at MD 3 SB	2021 Existing	AM		D 53.1	F 80.9	D 40.9	E 56.0
	2024 Background			F 89.2	F 249.6	D 45.0	F 110.4
	2024 Total			F 89.2	F 249.4	D 45.0	F 110.4
	2024 Mitigation Measures			F 89.2	F 223.7	D 45.0	F 105.2
	2021 Existing	PM		D 43.7	F 139.3	E 58.6	E 59.1
	2024 Background			E 58.1	F 261.0	E 61.9	F 89.8
	2024 Total			E 57.7	F 264.8	E 64.7	F 91.7
	2024 Mitigation Measures			E 57.7	F 240.5	E 64.7	F 87.1
	2021 Existing	Sat		D 49.7	D 46.7	C 25.9	D 46.4
	2024 Background			F 174.5	D 47.8	B 19.9	F 128.7
	2024 Total			F 176.6	D 47.1	B 19.9	F 129.0
	2024 Mitigation Measures			F 158.6	D 47.0	C 21.0	F 117.6
	2021 Existing	Sun		C 26.3	F 201.8	E 62.9	E 62.9
	2024 Background			C 28.0	F 408.0	E 74.7	F 106.7
	2024 Total			C 27.9	F 448.0	F 81.2	F 117.8
	2024 Mitigation Measures			C 27.9	F 397.6	F 81.2	F 105.6
(2) MD 175/ Millersville Rd at MD 3 NB	2021 Existing	AM	D 35.6		F 90.3	F 80.6	D 46.1
	2024 Background		D 48.3		F 90.2	F 80.1	E 56.9
	2024 Total		D 48.7		F 90.3	F 80.1	E 57.1
	2024 Mitigation Measures		D 39.9		D 54.4	F 94.4	D 48.5
	2021 Existing	PM	C 20.3		F 99.7	F 98.5	D 35.5
	2024 Background		C 28.7		F 95.1	F 99.4	D 43.2
	2024 Total		D 39.6		F 89.6	F 97.4	D 52.0
	2024 Mitigation Measures		C 22.0		E 74.8	F 97.4	D 36.6
	2021 Existing	Sat	B 13.8		E 79.2	F 85.0	C 25.4
	2024 Background		C 25.7		E 77.5	E 76.4	D 36.1
	2024 Total		D 36.0		E 71.6	E 75.0	D 44.3
	2024 Mitigation Measures		C 23.4		E 55.4	E 75.3	C 32.3
	2021 Existing	Sun	B 17.0		E 68.2	E 67.9	C 28.5
	2024 Background		C 24.2		E 65.7	E 64.7	C 33.9
	2024 Total		C 33.0		E 60.5	E 63.6	D 40.5
	2024 Mitigation Measures		C 22.0		D 45.2	E 62.8	C 30.0

The parameter which reduces the rating the most is the restricted sight distance at the Waterbury Road intersection. To improve the road rating, the sight distance must be increased, the roadway widened or resurfaced, and/or sidewalks installed along Millersville Road. The sight distance was evaluated for opportunities to improve the road rating. Tree and shrub pruning and clearing along the north side of the Millersville Road/Waterbury Road intersection could be completed to increase the sight distance along the horizontal curve. The minimum sight distance was increased to 300 feet for the 2024 Mitigation Measures scenario assuming tree and shrub pruning which provided a road rating of 66. The results are shown in Table 26.



Table 26 – 2024 Mitigation Measures Road Rating Analysis Results

Table 24 - Millersville Park Road Rating - 2024 Mitigation Measures				
Section ID	MD 175/Millersville Road (From - To)	Scenario	Roadway Classification	Road Rating
D	Millersville Elem. School W Entrance - Coleus Dr	2021 Existing	3	63
		2024 Background	4	62
		2024 Total	4	62
		2024 Mitigation Measures	4	66

VII. CONCLUSIONS

The proposed Millersville Park will include four athletic fields located off Millersville Road, 500 feet west of Waterbury Road. Due to limited or no reserve capacity at the two MD 175/Millersville Road at MD 3 intersections, the intersections will not accommodate the trips generated by the proposed park without minor mitigation measures. The proposed site is not expected to have a significant impact on the remaining study intersections east of MD 3 as all intersections function at an acceptable level of service.

MDOT SHA noted no pipeline projects, particularly to improve operations at the two MD 3 intersections. Intersection improvements are needed at the two MD 3 study intersections to correct existing deficiencies that are exacerbated by background development.

VIII. RECOMMENDATIONS

As noted above, the two MD 175/Millersville Road at MD 3 intersections are not able to accommodate the trips generated by the proposed Millersville Park development as both are currently operating at an unacceptable level of service under existing conditions. No future improvements within the study area were included in MDOT's Consolidated Transportation Program (CTP) or noted by Anne Arundel County DPW and MDOT SHA District 5; however, discussions with MDOT SHA should be initiated to determine future mitigation measures at the two MD 3 intersections to correct existing deficiencies.

Mitigation measures including signal timing optimization, signal phasing adjustments and minor pavement marking modifications for the two MD 3 study intersections are recommended to achieve operations that are at or above the projected 2024 Total Background levels. Trimming vegetation is also recommended along the north side of the Millersville Road/Waterbury Road intersection to increase sight distance and improve the resultant road rating and safety at the intersection.