TRAFFIC IMPACT STUDY
FOR
VOICE OF AMERICA PARK

TYLERSVILLE ROAD & BUTLER WARREN COUNTY LINE ROAD

WEST CHESTER TOWNSHIP,
BUTLER COUNTY, OHIO

FEBRUARY 2009

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EXECUTIVE SUMMARY

The proposed Voice of America Park development is situated on approximately 257.565 acres in West Chester Township, Butler County, Ohio. The site is located at the northwest corner of the intersection of Tylersville Road and Butler Warren County Line Road.

The proposed development is to consist of 24 soccer fields, four softball fields, five baseball fields, two tennis courts, and two basketball courts. Shelters, restrooms, concessions, and playgrounds are located throughout the complex. For purposes of this study, the proposed development is assumed to be fully built-out in 2018.

Access to the proposed Voice of America Park development will be provided at two proposed locations. Proposed Access Drive #1 is to be located on Tylersville Road opposite Pepper Pike. Proposed Access Drive #2 is to be located on Butler Warren County Line Road opposite Tyler Court. An existing access drive to the Voice of America Park is currently provided on Cox Road. Interconnection is planned as part of this development between the existing Voice of America Park and the proposed Voice of America Park development.

The following intersections define the study area of this report:

- Tylersville Road and Pepper Pike/Proposed Access Drive #1.
- Butler Warren County Line Road and Tyler Courts/Proposed Access Drive #2.

The proposed development is expected to generate 342 entering new trips and 154 exiting new trips during the PM peak hour (of adjacent street traffic), and 378 entering new trips and 409 exiting new trips during the Saturday noon peak hour (of generator).

The intersections within the study area of this report were analyzed to determine the levels of service during the 2009 existing year, the 2018 full build-out year, and the 2030 horizon year conditions.

The site is located at the northwest corner of the intersection of Tylersville Road and Butler Warren County Line Road. To the south of the site is Tylersville Road and to the east of the site is Butler Warren County Line Road. Retail, commercial, residential, and undeveloped property surrounds the site.

The need for improvements was based on the analysis contained within this report. Based on the aforementioned analysis, the following roadway improvements are recommended for construction to accommodate ***2009 existing traffic*** (excluding site traffic):

- Provide striping for a 175' (including 50' diverging taper) westbound left turn lane on Tylersville Road at Pepper Pike.
- Construct a 175' (including 50' diverging taper) northbound right turn lane on Butler Warren County Line Road at Tyler Court.

Based on the aforementioned analysis, the following additional roadway improvements are recommended to accommodate ***2018 background traffic and 2030 background traffic*** (excluding site traffic):

- Install a traffic signal at the intersection of Tylersville Road and Pepper Pike.
- Provide striping for a 325' (including 50' diverging taper) westbound left turn lane on Tylersville Road at Pepper Pike.
- Provide striping for a 175' (including 50' diverging taper) southbound left turn lane on Butler Warren County Line Road at Tyler Court.

Based on the aforementioned analysis, the following additional roadway improvements are recommended to accommodate ***2018 total conditions and 2030 total conditions*** (including site traffic):

- Provide striping for a 350' (including 50' diverging taper) eastbound left turn lane on Tylersville Road at VOA Proposed Access Drive #1.
- Construct a 225' (including 50' diverging taper) northbound left turn lane on Pepper Pike at Tylersville Road.
- Construct a 250' (including 50' diverging taper) southbound left turn lane on VOA Proposed Access Drive #1 at Tylersville Road.
- Provide striping for a 175' (including 50' diverging taper) northbound left turn lane on Butler Warren County Line Road at VOA Proposed Access Drive #2.

All roadway improvements shall be constructed in accordance with the Butler County Engineer's Office requirements, as appropriate and applicable.

Based upon engineering judgment and the analyses contained herein, the proposed Voice of America Park development, with the improvements discussed herein, will not significantly impact operations on the adjacent road network.

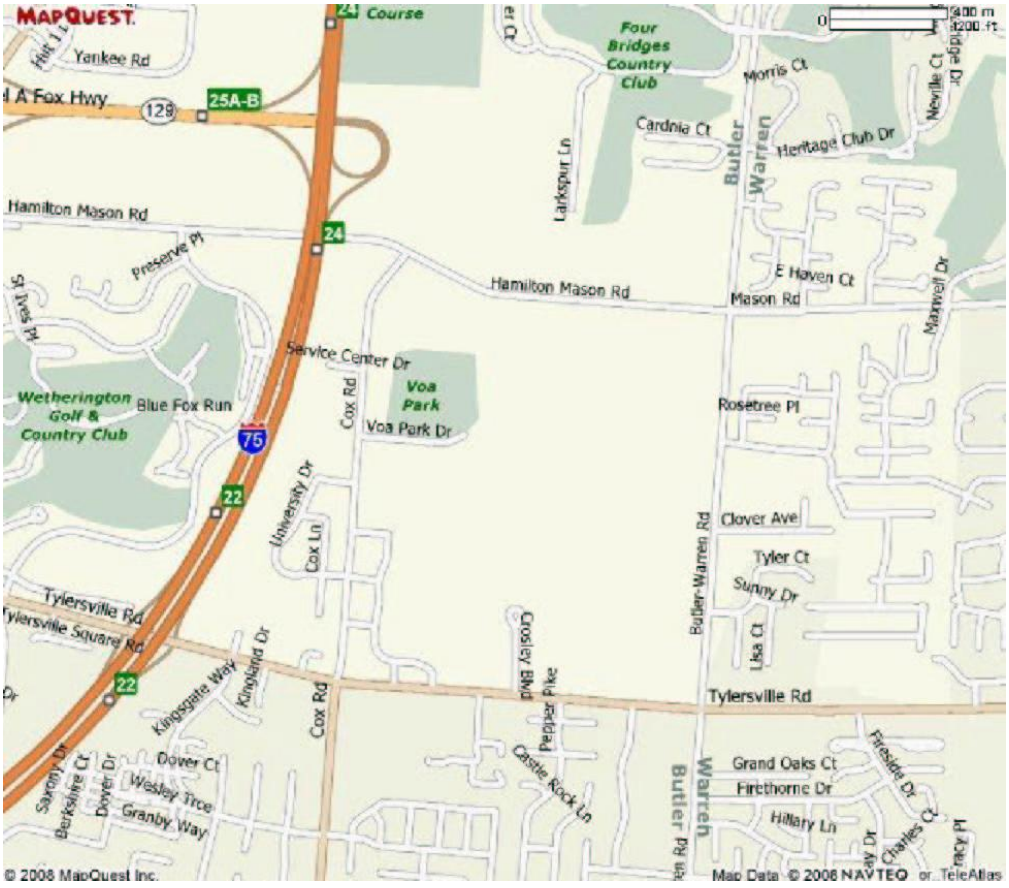
INTRODUCTION

The purpose of this study is to determine the traffic impacts of the proposed Voice of America Park development is situated on approximately 257.565 acres in West Chester Township, Butler County, Ohio and to satisfy the Butler County Engineer's Office requirements for traffic impact studies.

This study describes the existing roadway network, identifies peak traffic conditions, forecasts and distributes future traffic volumes, and projects the impact of this proposed development. Conclusions relative to the impact of the increased traffic on the roadway system have been identified and recommendations for mitigating any possible traffic impacts are provided.

The proposed development is located at the northwest corner of the intersection of Tylersville Road and Butler Warren County Line Road. A vicinity map is provided in Figure 1.

Figure 1
Vicinity Map



Access to the proposed Voice of America Park development will be provided at two proposed locations. Proposed Access Drive #1 is to be located on Tylersville Road opposite Pepper Pike. Proposed Access Drive #2 is to be located on Butler Warren County Line Road opposite Tyler Court. An existing access drive to the Voice of America Park is currently provided on Cox Road. Interconnection is planned as part of this development between the existing Voice of America Park and the proposed Voice of America Park development.

The following intersections define the study area of this report:

- Tylersville Road and Pepper Pike/Proposed Access Drive #1.
- Butler Warren County Line Road and Tyler Courts/Proposed Access Drive #2.

The proposed development is to consist of 24 soccer fields, four softball fields, five baseball fields, two tennis courts, and two basketball courts. Shelters, restrooms, concessions, and playgrounds are located throughout the complex. For purposes of this study, the proposed development is assumed to be fully built-out in 2018.

PROPOSED SITE DEVELOPMENT

The technical material and data contained in this document was prepared by Bayer Becker under the supervision and direction of a Professional Engineer licensed to practice in the State of Ohio, using the following resources in the development of the analysis:

1. Site reconnaissance and field observations by Bayer Becker.
2. Voice of America Enhancement Plan prepared by McGill Smith Punshon, Inc., dated July 11, 2008.
3. Communications with the Butler County Engineer's Office (BCEO).
4. Institute of Traffic Engineer's (ITE), *Traffic Access and Impact Studies and Site Development-A Recommended Practice.*
5. *Highway Capacity Manual, 2000*.
6. Institute of Traffic Engineer's (ITE), *Trip Generation Manual 8th, Edition.*
7. *Trip Generation Handbook, An ITE Proposed Recommended Practice.*
8. Ohio Department of Transportation (ODOT) *Location and Design Manual, Volume One*.
9. ODOT *State Highway Access Management Manual*, issued December 2001, Version August 15, 2003.
10. *Butler County Access Management Regulations*, effective January 1, 2005.
11. Highway Capacity Software, HCS+, version 5.3.
12. Ohio Manual of Uniform Traffic Control Devices (OMUTCD).
13. Butler County Thoroughfare Plan dated 2007.

The proposed Voice of America Park development is situated on approximately 257.565 acres, at the northwest corner of the intersection of Tylersville Road and Butler Warren County Line Road, in West Chester Township, Butler County, Ohio.

The proposed development is to consist of 24 soccer fields, four softball fields, five baseball fields, two tennis courts, and two basketball courts. Shelters, restrooms, concessions, and playgrounds are located throughout the complex. For purposes of this study, the proposed development is assumed to be fully built-out in 2018.

The Voice of America Enhancement Plan is provided in Appendix A.

AREA CONDITIONS

Study Area

The proposed Voice of America Park development is located at the northwest corner of the intersection of Tylersville Road and Butler Warren County Line Road.

Access to the proposed Voice of America Park development will be provided at two proposed locations. Proposed Access Drive #1 is to be located on Tylersville Road opposite Pepper Pike. Proposed Access Drive #2 is to be located on Butler Warren County Line Road opposite Tyler Court. An existing access drive to the Voice of America Park is currently provided on Cox Road. Interconnection is planned as part of this development between the existing Voice of America Park and the proposed Voice of America Park development.

As previously mentioned, the following intersections define the study area of this report:

- Tylersville Road and Pepper Pike/Proposed Access Drive #1.
- Butler Warren County Line Road and Tyler Courts/Proposed Access Drive #2.

Study Area Land Use

The site is located at the northwest corner of the intersection of Tylersville Road and Butler Warren County Line Road. To the south of the site is Tylersville Road and to the east of the site is Butler Warren County Line Road. Retail, commercial, residential, and undeveloped property surrounds the site.

BCEO currently has plans to widen Butler Warren County Line Road, within the study area, from a two-lane roadway to a five-lane roadway. An additional through lane will be provided in each direction and a center two-way left turn lane will also be provided. Widening of Butler Warren County Line Road is expected to be complete in 2012.

There are no other known developments or improvements planned within the study area at this time.

Site Accessibility

The roadways that will provide major access to the proposed development are Tylersville Road and Butler Warren County Line Road.

Access to the proposed Voice of America Park development will be provided at two proposed locations. Proposed Access Drive #1 is to be located on Tylersville Road opposite Pepper Pike. Proposed Access Drive #2 is to be located on Butler Warren County Line Road opposite Tyler Court. An existing access drive to the Voice of America Park is currently provided on Cox Road. Interconnection is planned as part of this development between the existing Voice of America Park and the proposed Voice of America Park development.

Tylersville Road, within the study area, is an east-west, five-lane roadway, including a center two-way left turn lane, with a legal and posted speed limit of 45 mph. According to the Butler County Thoroughfare Plan, Tylersville Road is classified as a minor arterial.

Pepper Pike is a north-south, two-lane roadway, with posted speed limit of 25 mph. It is classified as a neighborhood collector in the Butler County Thoroughfare plan.

The intersection of Tylersville Road and Pepper Pike is currently a stop-controlled intersection, with Tylersville Road as a continuous free flowing movement. There is currently a westbound left turn lane on Tylersville Road at Pepper Pike.

Within the study area, Butler Warren County Line Road is a north-south, two-lane roadway, with a legal and posted speed limit of 45 mph. As previously stated, BCEO currently has plans to widen Butler Warren County Line Road, within the study area, from a two-lane roadway to a five-lane roadway. According to the Butler County Thoroughfare Plan, Butler Warren County Line Road is classified as a major collector.

Tyler Court is an east-west, two-lane roadway, with a posted speed limit of 25 mph. It is classified as a local roadway.

The intersection of Butler Warren County Line Road and Tyler Court is also currently a stop-controlled intersection, with Butler Warren County Line Road as a continuous free flowing movement. There are currently no turn lanes provided at the intersection. However, as previously stated, BCEO has plans to widen Butler Warren County Line Road to a five lane roadway. As such, a southbound left turn lane on Butler Warren County Line Road at Tyler

Court will be provided. Widening of Butler Warren County Line Road is expected to be complete in 2012.

To determine the existing weekday PM peak hour traffic volumes and the existing Saturday noon peak hour traffic volumes at the intersection of Tylersville Road and Pepper Pike and at the intersection of Butler Warren County Line Road and Tyler Court, Bayer Becker conducted turning movement traffic counts at both intersections. The traffic counts were performed on Wednesday, January 21, 2009, from 4:00 PM to 6:00 PM, and on Saturday, January 24, 2009, from 12:00 PM to 2:00 PM.

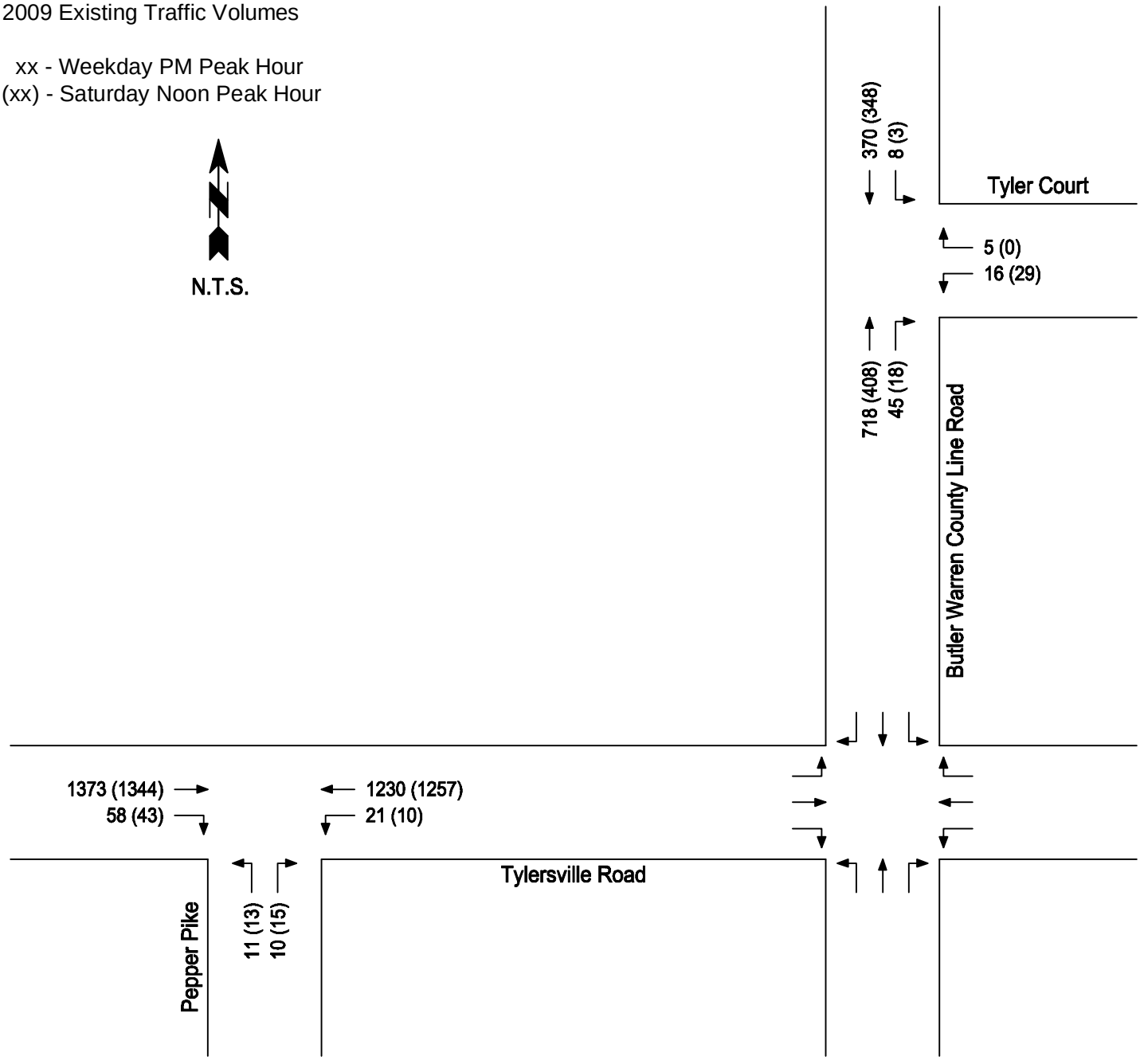
The complete count information is provided in Appendix B. The 2009 existing weekday PM peak hour traffic volumes and the 2009 Saturday noon peak hour traffic volumes are presented in Figure 2.

Figure 2

Voice of America Park
Tylersville Road & Butler Warren
County Line Road
West Chester Township, Butler County, Ohio

2009 Existing Traffic Volumes

xx - Weekday PM Peak Hour
(xx) - Saturday Noon Peak Hour



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PROJECTED TRAFFIC

Site Traffic

The proposed Voice of America Park development is to consist of 24 soccer fields, four softball fields, five baseball fields, two tennis courts, and two basketball courts. Shelters, restrooms, concessions, and playgrounds are located throughout the complex. For purposes of this study, the proposed development is assumed to be fully built-out in 2018.

Trip generation information for the proposed development was determined using data from the ITE *Trip Generation Manual, 8th Edition* and the ITE *Trip Generation Handbook* (March 2001). Site trips generated during the weekday PM peak hour and the Saturday noon peak hour are presented in Table 1 and trip generation rate information is provided in Appendix C.

Table 1
Trip Generation

Land Use	ITE Code	Size	Units	Weekday PM Peak Hour			Saturday Noon Peak Hour		
				Enter	Exit	Total	Enter	Exit	Total
Soccer Complex	488	24	Fields	342	154	496	378	409	787

Peak hour trips generated by the proposed development were distributed through the study area based upon the knowledge of development in the surrounding area, existing traffic patterns, and the expected traffic patterns of the site traffic. Therefore, it was estimated that approximately 30% of the peak hour site traffic enters/exits the study area to/from the east on Tylersville Road, approximately 30% to/from the west on Tylersville Road, approximately 1% to/from the south on Pepper Pike, approximately 1% to/from the east on Tyler Court, approximately 10% to/from the north on Butler Warren County Line Road, and approximately 10% to/from the south on Butler Warren County Line Road. The remaining 18% of peak hour site traffic is assumed to utilize the existing park entrance on Cox Road.

Projected site traffic volumes are presented in Figure 3.

Background Traffic

As previously mentioned, the proposed Voice of America Park development is assumed to be fully built-out in 2018. To assess the future impact of the site traffic on the adjacent roadway

network, traffic volumes for the full build-out year (2018) and for the twenty-year horizon (2030) were evaluated. In order to determine the future background traffic volumes, a growth rate of one percent (1%) compounded annually was applied to the existing traffic volumes on Tylersville Road and Butler Warren County Line Road. The growth rate was provided by BCEO and also was confirmed based on information published by the Ohio Kentucky Indiana Regional Council of Governments.

Pepper Pike and Tyler Court are residential streets with little to no growth expected. Therefore, the growth rate was not applied to the existing volumes entering or exiting Pepper Pike or Tyler Court. However, based on information provided by BCEO, a traffic signal is currently warranted and planned for installation at the intersection of Tylersville Road and Pepper Pike. Therefore, additional traffic entering and exiting Pepper Pike was assumed to utilize the proposed signalized intersection during 2018 background conditions and 2030 background conditions. An aerial photograph of the surrounding area at Tylersville Road and Pepper Pike, combined with trip generation calculations for single family detached housing (ITE land use code 210), were used to estimate the additional traffic.

The 2018 background traffic volumes and the 2030 background traffic volumes for the study area are presented in Figures 4 and 5, respectively.

Total Traffic

The 2018 total traffic volumes were obtained by adding the proposed site traffic volumes from Figure 3 with the future 2018 background volumes from Figure 4. Similarly, the 2030 total traffic volumes were obtained by adding the proposed site traffic volumes from Figure 3 with the future 2030 background traffic volumes from Figure 5.

The 2018 and 2030 anticipated total traffic volumes at the key intersections are presented in Figures 6 and 7, respectively.

Figure 3

Voice of America Park
Tylersville Road & Butler Warren
County Line Road
West Chester Township, Butler County, Ohio

Site Traffic Volumes

xx - Weekday PM Peak Hour
(xx) - Saturday Noon Peak Hour

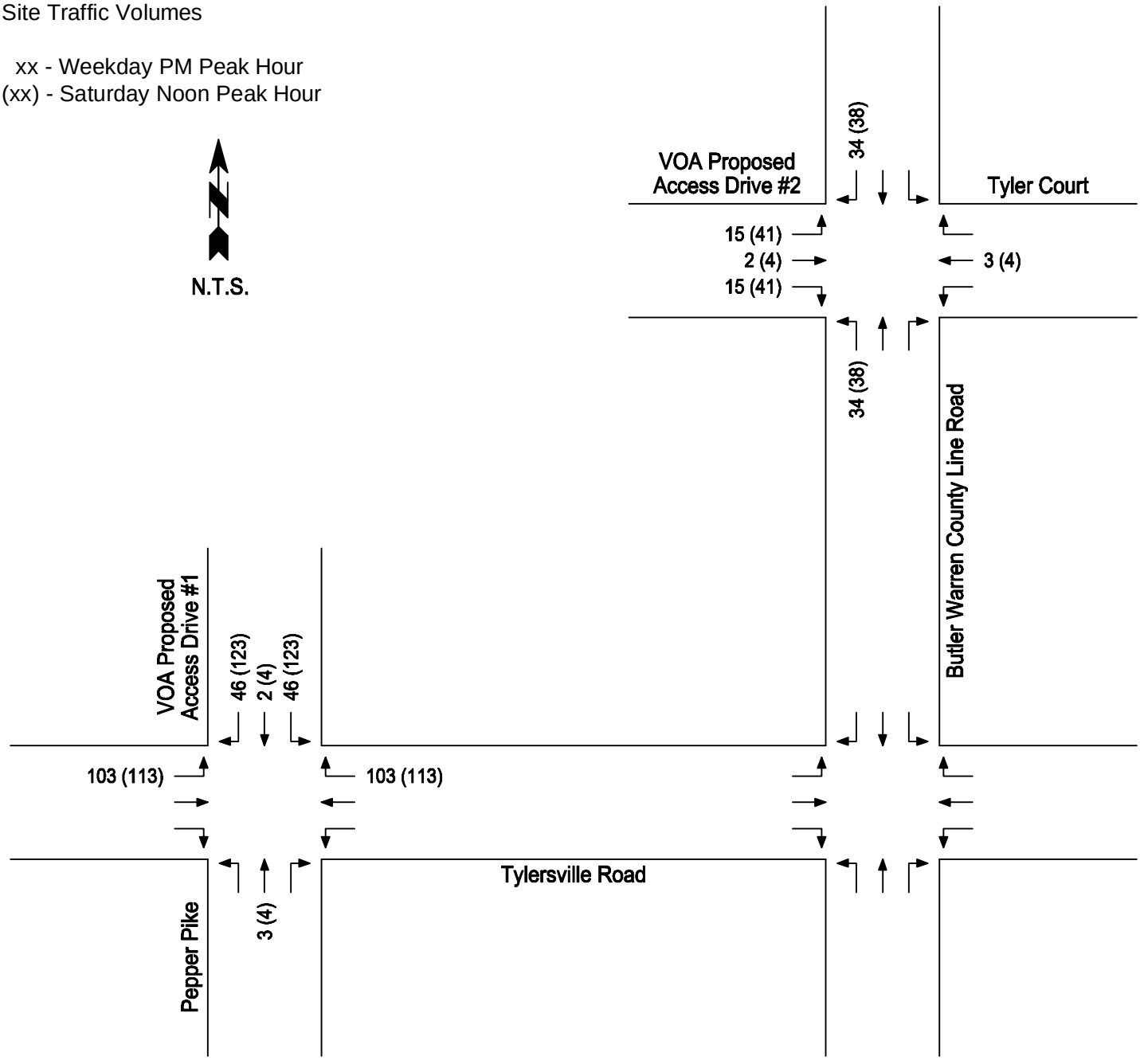

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Figure 4

Voice of America Park
Tylersville Road & Butler Warren
County Line Road
West Chester Township, Butler County, Ohio

2018 Background Traffic Volumes

xx - Weekday PM Peak Hour
(xx) - Saturday Noon Peak Hour

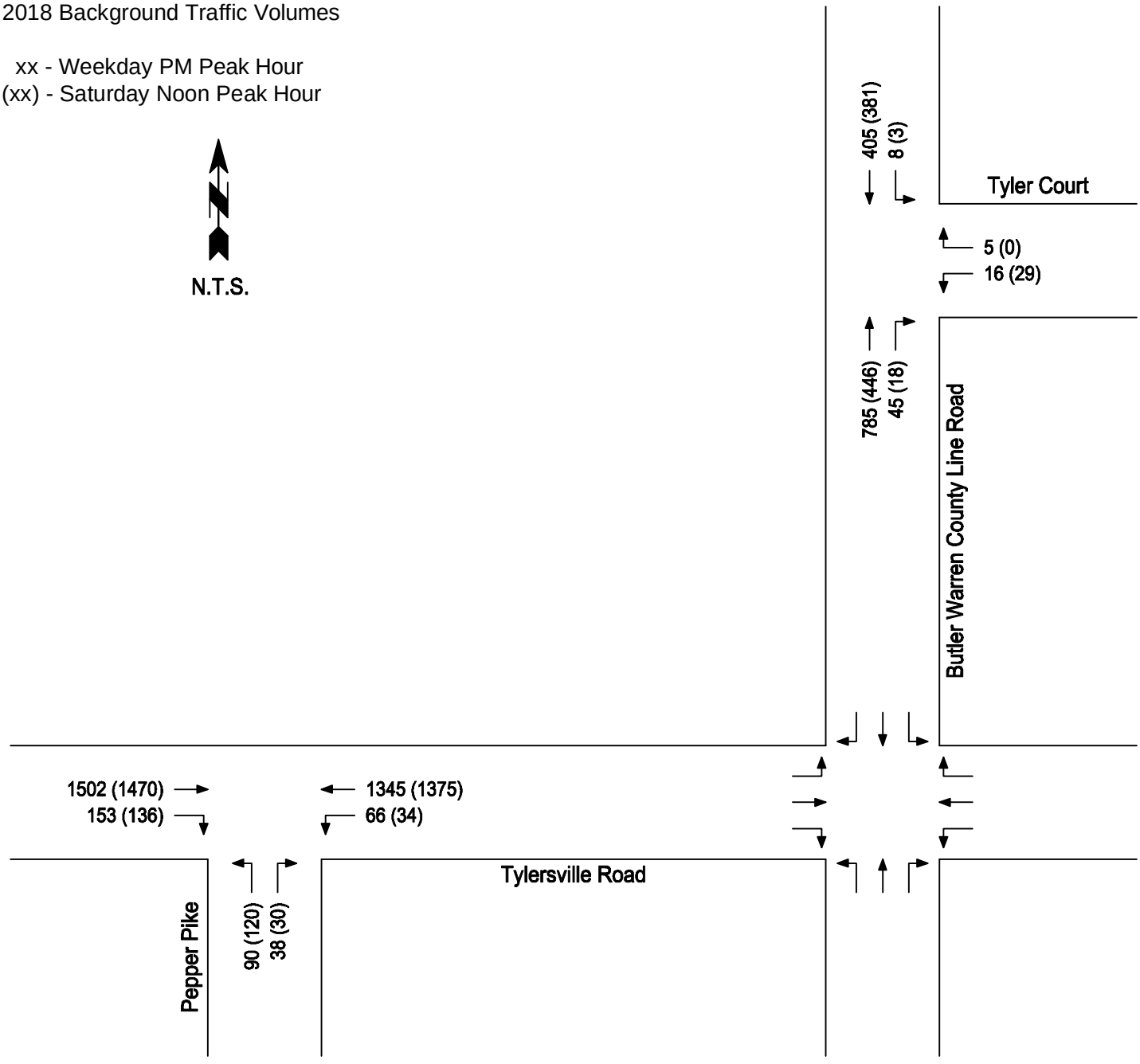

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Figure 5

Voice of America Park
Tylersville Road & Butler Warren
County Line Road
West Chester Township, Butler County, Ohio

2030 Background Traffic Volumes

xx - Weekday PM Peak Hour
(xx) - Saturday Noon Peak Hour

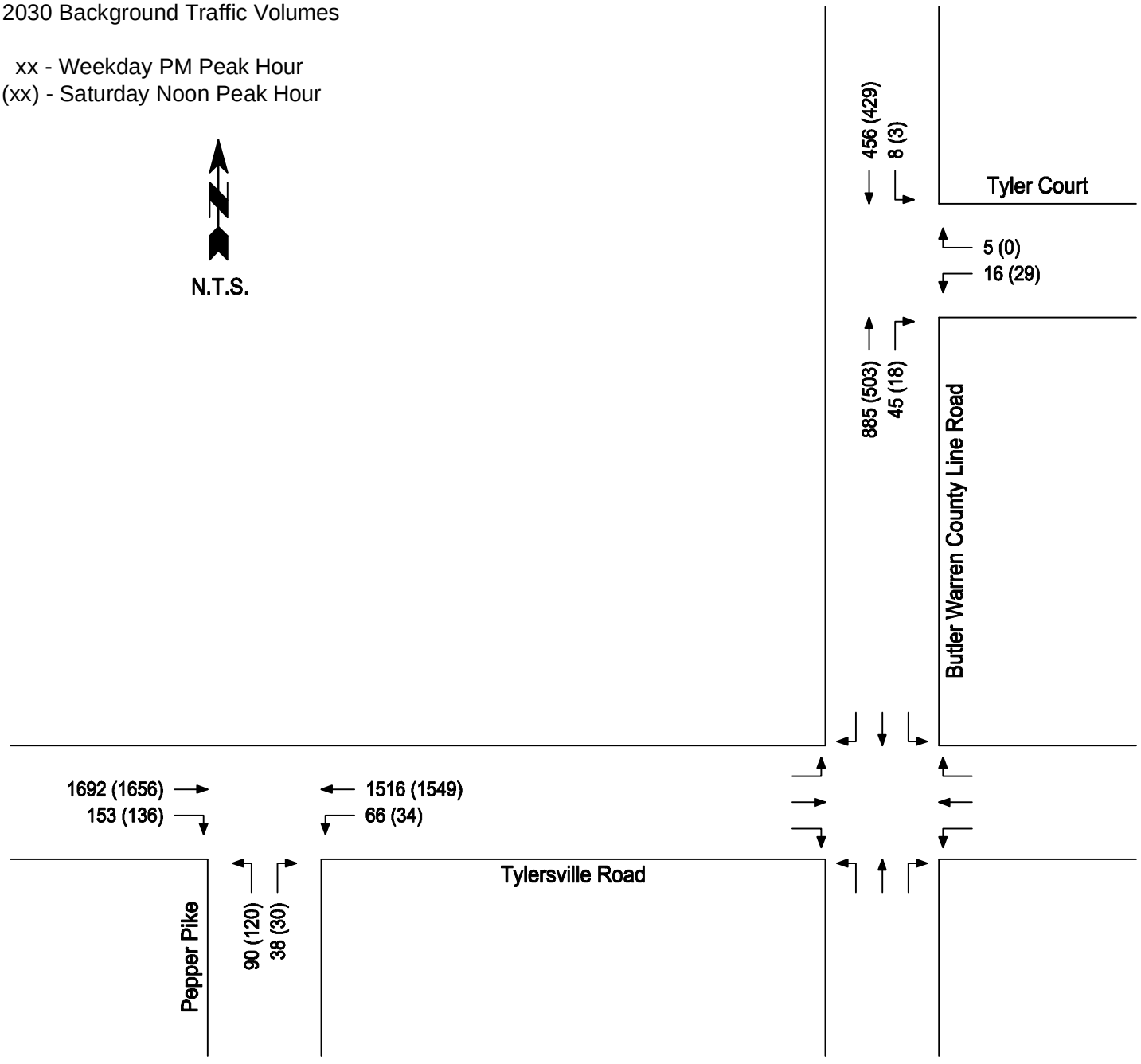

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Figure 6

Voice of America Park
Tylersville Road & Butler Warren
County Line Road
West Chester Township, Butler County, Ohio

2018 Total Traffic Volumes

xx - Weekday PM Peak Hour
(xx) - Saturday Noon Peak Hour

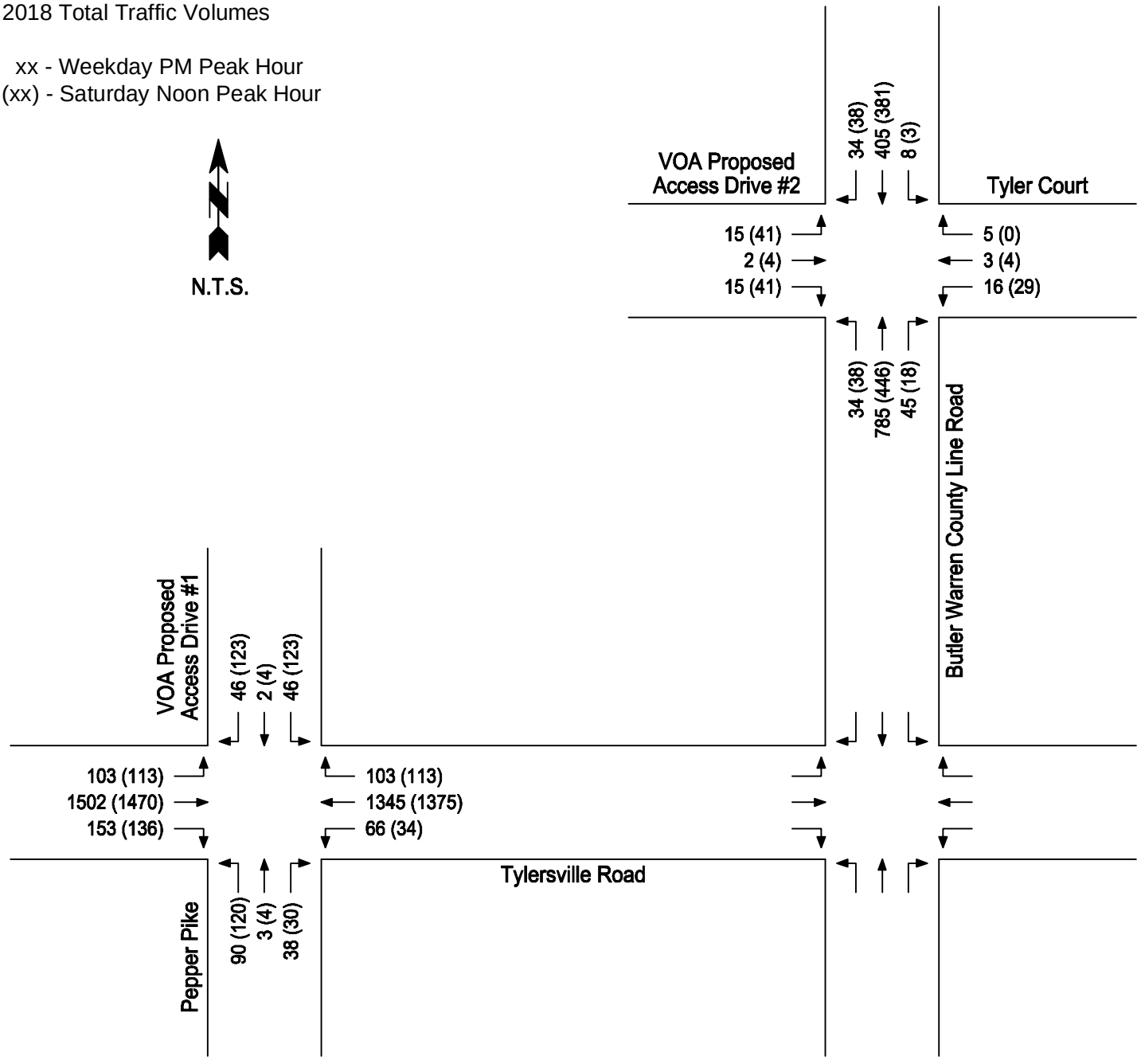

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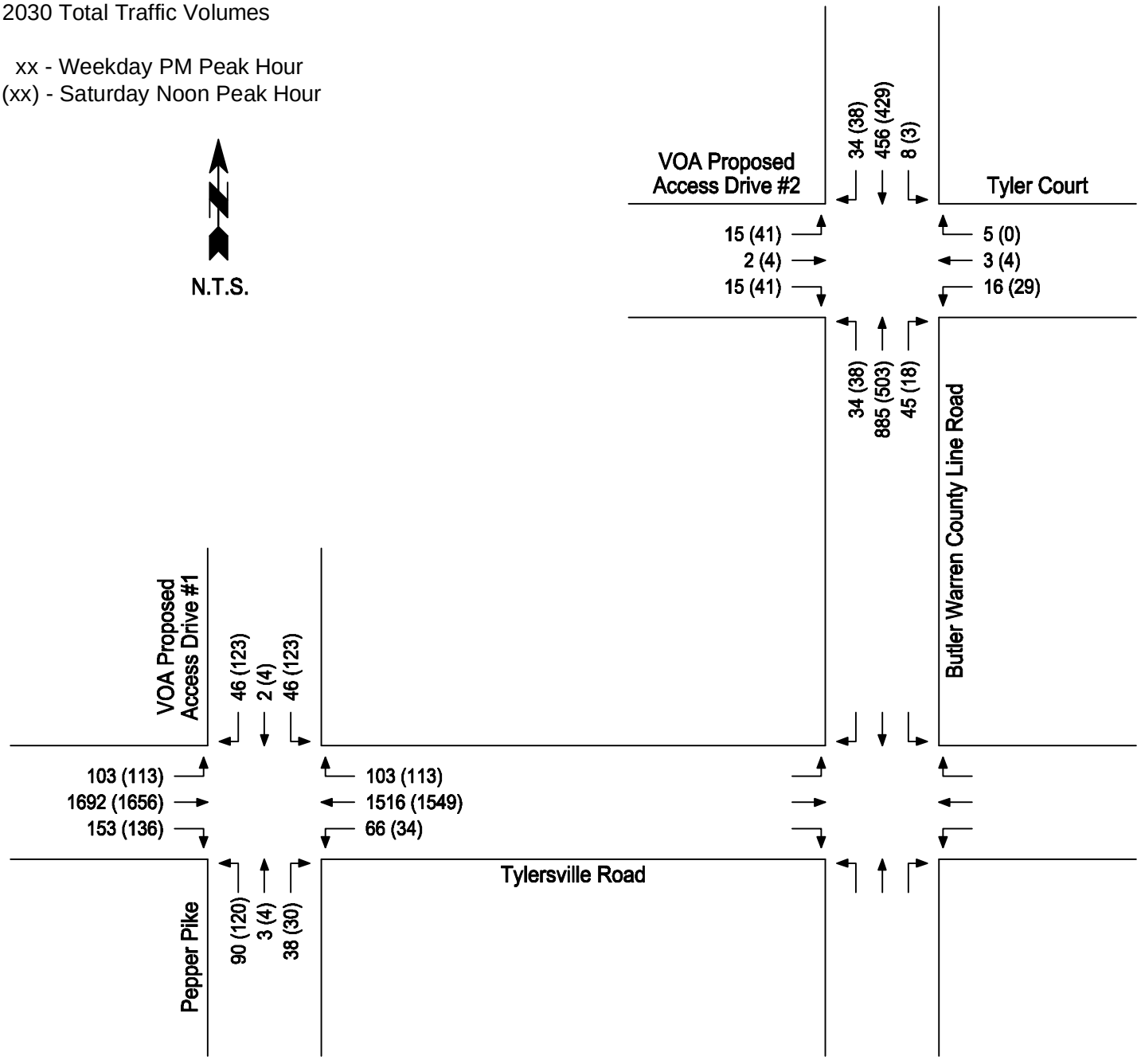
Figure 7

Voice of America Park
Tylersville Road & Butler Warren
County Line Road
West Chester Township, Butler County, Ohio

2030 Total Traffic Volumes

xx - Weekday PM Peak Hour
(xx) - Saturday Noon Peak Hour



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TRAFFIC ANALYSIS

Site Access

The roadways that will provide major access to the proposed Voice of America Park development are Tylersville Road and Butler Warren County Line Road. Access to the proposed Voice of America Park development will be provided at two proposed locations. Proposed Access Drive #1 is to be located on Tylersville Road opposite Pepper Pike. Proposed Access Drive #2 is to be located on Butler Warren County Line Road opposite Tyler Court. An existing access drive to the Voice of America Park is currently provided on Cox Road. Interconnection is planned as part of this development between the existing Voice of America Park and the proposed Voice of America Park development.

Traffic Signal Warrant Analysis

The determination of the need for a traffic signal at a particular location is based on whether or not a signal is *warranted.* Traffic signals are considered to be the most restrictive traffic control device and are considered only when all other, less restrictive devices cannot provide adequate control and/or safety. If a traffic signal has been warranted, the signal and all related traffic control devices and markings should be installed according to the standards set forth in the *Ohio Manual on Uniform Traffic Control Devices* (OMUTCD) and should be properly maintained. The warrants listed represent minimum levels at which signal operations may be desirable.

The following eight warrants for signalization are identified in the OMUTCD:

- Warrant 1 – Eight-Hour Vehicular Volume.
- Warrant 2 – Four-Hour Vehicular Volume.
- Warrant 3 – Peak Hour.
- Warrant 4 – Pedestrian Volume.
- Warrant 5 – School Crossing.
- Warrant 6 – Coordinated Signal System.
- Warrant 7 – Crash Experience.
- Warrant 8 – Roadway Network.

Based on information provided by BCEO, a traffic signal is currently warranted and planned for installation at the intersection of Tylersville Road and Pepper Pike (Warrant 6). Therefore, additional traffic signal warrant analysis was not performed as part of this study.

Turn Lane Warrant Analysis

The need for left turn lanes and right turn lanes at the intersection of Butler Warren County Line Road and Tyler Court/VOA Proposed Access Drive #2 was determined using the "2-Lane Highway Left Turn Lane Warrant (Low Speed)" auxiliary graph, the "2-Lane Highway Right Turn Lane Warrant (Low Speed)" auxiliary graph, and the "4-Lane Highway Right Turn Lane Warrant (Low Speed)" auxiliary graph contained in the ODOT *Highway Access Management Manual* and provided in Appendix D. The need for turn lanes at the planned signalized intersection of Tylersville Road and Pepper Pike was determined using capacity (level of service) analysis, as described in the following section.

As previously stated, there is currently a westbound left turn lane on Tylersville Road at Pepper Pike. In addition, the existing center two-way left turn lane along Tylersville Road will serve as an eastbound left turn lane on Tylersville Road at the VOA Proposed Access Drive #1. Based on this information, the need for any left turn lanes on Tylersville Road at Pepper Pike/Proposed Access Drive #1 was not evaluated.

Also previously stated, there are currently no turn lanes provided at the intersection of Butler Warren County Line Road and Tyler Court; however, there are plans to widen Butler Warren County Line Road to five lanes. As such, a southbound left turn lane on Butler Warren County Line Road at Tyler Court and a northbound left turn lane on Butler Warren County Line Road at the VOA Proposed Access Drive #2 will be provided. Widening of Butler Warren County Line Road is expected to be complete in 2012. Based on this information, the need for left turn lanes on Butler Warren County Line Road at Tyler Court/Proposed Access Drive #2 was not evaluated.

The following turn lane, in addition to those existing and/or planned, is warranted at the intersection of Butler Warren County Line Road and Tyler Court based on ***2009 existing conditions*** (excluding site traffic):

- Northbound right turn lane on Butler Warren County Line Road at Tyler Court.

No additional turn lanes are warranted at the intersection of Tylersville Road and Pepper Pike/VOA Proposed Access Drive #1 based on ***2018 background conditions and 2030 background conditions*** (excluding site traffic).

The following additional turn lanes are warranted at the intersection of Tylersville Road and Pepper Pike/VOA Proposed Access Drive #1 based on ***2018 total conditions and 2030 total conditions*** (including site traffic):

- Northbound left turn lane on Pepper Pike at Tylersville Road.
- Southbound left turn lane on VOA Proposed Access Drive #1 at Tylersville Road.

Storage lengths were calculated using the ODOT *Location and Design Manual, Volume One*, Section 401-9 "Basis for Computing Length of Turn Lanes" and Figure 401-10, "Storage Length at Intersections."

The following turn lane storage lengths (including 50' diverging taper) are recommended for ***2009 existing conditions*** (excluding site traffic):

- 175' westbound left turn lane on Tylersville Road at Pepper Pike.
- 175' northbound right turn lane on Butler Warren County Line Road at Tyler Court.

The following additional turn lane storage length (including 50' diverging taper) is recommended to accommodate ***2018 background conditions and 2030 background conditions*** (excluding site traffic):

- 325' westbound left turn lane on Tylersville Road at Pepper Pike.
- 175' southbound left turn lane on Butler Warren County Line Road at Tyler Court.

The following additional turn lane storage lengths (including 50' diverging taper) are recommended to accommodate ***2018 total conditions and 2030 total conditions*** (including site traffic):

- 350' eastbound left turn lane on Tylersville Road at VOA Proposed Access Drive #1.
- 225' northbound left turn lane on Pepper Pike at Tylersville Road.
- 250' southbound left turn lane on VOA Proposed Access Drive #1 at Tylersville Road.
- 175' northbound left turn lane on Butler Warren County Line Road at VOA Proposed Access Drive #2.

Storage length calculations are provided in Appendix E.

Capacity and Level of Service

Level of service (LOS), as defined in the *Highway Capacity Manual 2000* (HCM) is "a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience." LOS is a function of the control delay per vehicle, and it is the standard used to evaluate traffic flow at an intersection. Butler County's goal for operation of its roadways is an overall level of service "D" or better during the peak hour of the roadway system.

The criteria used by *HCM* are provided in Table 2 and Table 3 below.

Table 2
Level of Service Criteria for Unsignalized Intersections

Level of Service	Delay Range (sec/veh)	Expected Delay
A	≤ 10	Little or no delay.
B	>10 and ≤ 15	Short traffic delay.
C	>15 and ≤ 25	Average traffic delay.
D	>25 and ≤ 35	Long traffic delay.
E	>35 and ≤ 50	Very long traffic delay
F	> 50	Excessive traffic delay

Table 3
Level of Service Criteria for Signalized Intersections

Level of Service	Delay Range (sec/veh)	Expected Delay
A	≤10	Extremely Favorable Progression.
B	>10 and ≤ 20	Good Progression.
C	>20 and ≤ 35	Fair progression.
D	>35 and ≤ 55	Unfavorable progression.
E	>55 and ≤ 80	Poor progression
F	> 80	Excessive traffic delay.

Capacity analysis of the study area intersections was performed for 2009 existing conditions, 2018 background conditions, 2018 total conditions, 2030 background conditions, and 2030 total conditions.

For the 2009 existing analysis, the intersection of Tylersville Road and Pepper Pike and the intersection of Butler Warren County Line Road and Tyler Court were evaluated as they currently exist (i.e., without a traffic signal or additional turn lanes at the intersections). For the

2018 and 2030 background analysis and for the 2018 and 2030 total analysis, the intersections were evaluated with the improvements currently planned by BCEO, including a traffic signal at the intersection of Tylersville Road and Pepper Pike and additional turn lanes at the intersection of Butler Warren County Line Road and Tyler Court. The turn lanes recommended as part of this study were also incorporated into the 2018 and 2030 analysis.

Intersection LOS are presented in Table 4. For the complete LOS analysis, see Appendix F.

Table 4
Levels of Service

		2009 Existing Conditions		2018 Background Conditions		2018 Total Conditions		2030 Background Conditions		2030 Total Conditions	
		Weekday PM	Saturday Noon	Weekday PM	Saturday Noon	Weekday PM	Saturday Noon	Weekday PM	Saturday Noon	Weekday PM	Saturday Noon
Tylersville Road and Pepper Pike/VOA Proposed Access Drive #1											
EB	L	-	-	-	-	C (27.5)	C (33.6)	-	-	C (27.9)	C (32.4)
	TTR	-	-	C (34.4)	C (30.9)	D (44.6)	D (38.5)	C (33.5)	C (34.5)	D (54.0)	D (45.8)
	Approach	-	-	C (34.4)	C (30.9)	D (43.6)	D (38.2)	C (33.5)	C (34.5)	D (52.7)	D (45.0)
WB	L	B (14.1)	B (13.5)	C (25.5)	C (22.1)	C (26.6)	C (24.3)	C (28.5)	C (26.2)	C (27.4)	C (25.9)
	TTR	-	-	B (11.3)	B (11.5)	C (28.7)	C (30.5)	A (9.0)	B (10.4)	C (29.4)	C (32.0)
	Approach	-	-	B (11.9)	B (11.7)	C (28.6)	C (30.3)	A (9.8)	B (10.8)	C (29.3)	C (31.9)
NB	LR/LTR	F (105.6)	F (90.5)	D (41.6)	D (42.3)	D (40.5)	D (48.8)	D (47.8)	D (46.8)	D (48.4)	F (80.9)
	Approach	F (105.6)	F (90.5)	D (41.6)	D (42.3)	D (40.5)	D (48.8)	D (47.8)	D (46.8)	D (48.4)	F (80.9)
SB	LTR	-	-	-	-	D (38.6)	E (62.7)	-	-	D (44.3)	F (123.0)
	Approach	-	-	-	-	D (38.6)	E (62.7)	-	-	D (44.3)	F (123.0)
Overall Intersection		-	-	C (24.8)	C (22.9)	D (36.9)	D (37.0)	C (23.5)	C (24.3)	D (42.1)	D (45.7)
Butler Warren County Line Road and Tyler Court/VOA Proposed Access Drive #2											
NB	L	-	-	-	-	A (8.4)	A (8.4)	-	-	A (8.6)	A (8.5)
SB	LT/L	A (9.6)	A (8.3)	A (9.9)	A (8.4)	A (9.9)	A (8.4)	B (10.3)	A (8.6)	B (10.3)	A (8.6)
WB	LTR	C (23.6)	C (17.1)	C (21.4)	C (15.6)	D (31.8)	C (21.9)	D (25.6)	C (17.3)	E (40.2)	D (25.4)
	Approach	C (23.6)	C (17.1)	C (21.4)	C (15.6)	D (31.8)	C (21.9)	D (25.6)	C (17.3)	E (40.2)	D (25.4)
EB	LTR	-	-	-	-	C (19.5)	C (16.9)	-	-	C (22.7)	C (19.0)
	Approach	-	-	-	-	C (19.5)	C (16.9)	-	-	C (22.7)	C (19.0)

Table 4 shows that at the intersection of Tylersville Road and Pepper Pike/VOA Proposed Access Drive #1, the LOS for Tylersville Road is a B and the LOS for Pepper Pike is an F, for the weekday PM peak hour and the Saturday noon peak hour, for 2009 existing conditions. Incorporating the proposed improvements at the intersection including the proposed traffic signal, the LOS for Tylersville Road varies from an A to a C and the LOS for Pepper Pike/VOA Proposed Access Drive #1 is a D, for the weekday PM peak hour and the Saturday noon peak hour, for 2018 background conditions and 2030 background conditions. The LOS for Tylersville

Road varies from a C to a D and the LOS for Pepper Pike/VOA Proposed Access Drive #1 varies from a D to an F, for the weekday PM peak hour and the Saturday noon peak hour, for 2018 total conditions and 2030 total conditions.

The overall intersection of Tylersville Road and Pepper Pike/VOA Proposed Access Drive #1 operates at a LOS of C for background conditions at a LOS of D for total conditions.

At the intersection of Butler Warren County Line Road and Tyler Court/VOA Proposed Access Drive #2, the LOS for Butler Warren County Line Road is an A and the LOS for Tyler Court is a C, for the weekday PM peak hour and the Saturday noon peak hour, for 2009 existing conditions. Including the planned and recommended improvements at the intersection, the LOS for Butler Warren County Line Road varies from A to B and the LOS for Tyler Court/VOA Proposed Access Drive #2 varies from C to E, for the weekday PM peak hour and Saturday noon peak hour, for 2018 background conditions, 2018 total conditions, 2030 background conditions, and 2030 total conditions.

Additional capacity analysis of the intersection of Tylersville Road and Pepper Pike/VOA Proposed Access Drive #1 was performed to determine whether a northbound left turn lane on Pepper Pike and a southbound left turn lane on VOA Proposed Access Drive #1 would further improve the intersection.

Updated intersection LOS incorporating additional left turn lanes at the key intersections are presented in Table 5. The complete additional LOS analysis is provided in Appendix G.

Table 5
Updated Levels of Service

		2018 Background Conditions		2018 Total Conditions		2030 Background Conditions		2030 Total Conditions	
		Weekday PM	Saturday Noon	Weekday PM	Saturday Noon	Weekday PM	Saturday Noon	Weekday PM	Saturday Noon
Tylersville Road and Pepper Pike/VOA Proposed Access Drive #1									
EB	L	-	-	C (27.9)	C (33.7)	-	-	C (27.9)	C (34.9)
	TTR	C (34.4)	C (30.9)	C (34.4)	C (33.1)	C (33.5)	C (34.5)	C (33.5)	C (34.7)
	Approach	C (34.4)	C (30.9)	C (34.0)	C (33.1)	C (33.5)	C (34.5)	C (33.2)	C (34.8)
WB	L	C (25.5)	C (22.1)	C (25.5)	C (22.8)	C (28.5)	C (26.2)	C (27.7)	C (26.0)
	TTR	B (11.3)	B (11.5)	C (24.9)	C (27.4)	A (9.0)	B (10.4)	C (22.3)	C (26.6)
	Approach	B (11.9)	B (11.7)	C (24.9)	C (27.3)	A (9.8)	B (10.8)	C (22.5)	C (26.6)
NB	LR/LTR/L	D (40.2)	D (41.2)	D (41.3)	D (42.9)	D (45.7)	D (45.0)	D (50.0)	D (54.7)
	TR	D (38.8)	D (38.5)	D (38.8)	D (37.8)	D (43.9)	D (41.9)	D (45.9)	D (42.5)
	Approach	D (39.8)	D (40.6)	D (40.5)	D (41.8)	D (45.2)	D (44.4)	D (48.7)	D (52.0)
SB	LTR/L	-	-	D (39.3)	D (41.9)	-	-	D (46.6)	D (43.9)
	TR	-	-	D (39.1)	D (41.1)	-	-	D (46.2)	D (46.9)
	Approach	-	-	D (39.2)	D (41.5)	-	-	D (46.4)	D (48.1
Overall Intersection		C (24.7)	C (22.8)	C (30.5)	C (31.6)	C (23.4)	C (24.2)	C (29.4)	C (32.8)

Based on the additional analysis of the intersection of Tylersville Road and Pepper Pike/VOA Proposed Access Drive #1, the LOS for the northbound approach is a D, for the weekday PM peak hour and the Saturday noon peak hour, for 2018 background conditions, 2018 total conditions, 2030 background conditions, and 2030 total conditions. This is an improvement from a LOS of F for the Saturday noon peak hour, for 2030 total conditions, without a northbound left turn lane or a southbound left turn lane.

The LOS for the southbound approach is also a D, for the weekday PM peak hour and the Saturday noon peak hour, for 2018 total conditions and 2030 total conditions. This is an improvement from a LOS of E and F for the Saturday noon peak hour, for 2018 total conditions and 2030 total conditions, without a northbound left turn lane or a southbound left turn lane.

TRAFFIC SAFETY

Site Access

Access to the proposed Voice of America Park development will be provided at two proposed locations. Proposed Access Drive #1 is to be located on Tylersville Road opposite Pepper Pike. Proposed Access Drive #2 is to be located on Butler Warren County Line Road opposite Tyler Court. An existing access drive to the Voice of America Park is currently provided on Cox Road. Interconnection is planned as part of this development between the existing Voice of America Park and the proposed Voice of America Park development.

Intersection Sight Distance

Intersection sight distance was considered and observed during the site visit conducted by Bayer Becker. Based on field observations, adequate intersection sight distance is provided along Tylersville Road at Pepper Pike/VOA Proposed Access Drive #1 and adequate intersection sight distance is provided along Butler Warren County Line Road at Tyler Court/ VOA Proposed Access Drive #2.

Access Management

According to the *Butler County Access Management Regulations*, the minimum roadway/street spacing for both a minor arterial (Tylersville Road) and a major collector (Butler Warren County Line Road) is 1000'. However, whenever possible, a proposed street or driveway shall align with an existing street or driveway.

As previously identified, Proposed Access Drive #1 is to be located on Tylersville Road opposite Pepper Pike. Pepper Pike is located approximately 600' east of Crosley Way (adjacent driveway) and approximately 1700' east of VOA Park Drive (adjacent signalized intersection). Pepper Pike is also located approximately 1000' west of Tylers Way (adjacent intersection) and approximately 1800' west of Butler Warren County Line Road (adjacent signalized intersection).

Proposed Access Drive #2 is to be located on Butler Warren County Line Road opposite Tyler Way. Tyler Way is located approximately 1300' north of Tylersville Road (adjacent intersection and adjacent signalized intersection), approximately 1100' south of Clover Drive (adjacent intersection), and approximately 4000' south of Hamilton Mason Road (adjacent signalized intersection).

Based on the existing/proposed intersection spacing as compared to the required intersection spacing for roadway/street spacing, Pepper Pike/VOA Proposed Access Drive #1 does not met the *Butler County Access Management Regulations*. However, VOA Proposed Access Drive #1 is to be located opposite Pepper Pike and is therefore, the preferred location.

Based on the existing/proposed intersection spacing as compared to the required intersection spacing, Tyler Court/VOA Proposed Access Drive #2 meets and exceeds the *Butler County Access Management Regulations*.

Additional Information

It is understood that once VOA Proposed Access Drive #1 is constructed and operational, then the adjacent driveway to the west on Tylersville Road, Crosley Way, will be modified to a right-in/right-out access drive. Currently, Crosley Way is a full movement access drive that serves the VOA Museum. As part of the proposed VOA development, internal access will be provided from VOA Proposed Access Drive #1 to Crosley Way. Therefore, while the modification of Crosley Way to a right-in/right-out will restrict turning movements at the intersection, full movement access will be provided to the VOA Museum via the VOA Proposed Access Drive #1.

The analysis of the intersection of Tylersville Road and Pepper Pike/VOA Proposed Access Drive #1 contained herein did not account for additional traffic from Crosley Way. However, based on the minimal amount of expected traffic associated with the VOA Museum, the results of the analysis are anticipated to be unchanged with or without the interconnection to Crosley Way.

Intersection spacing with regard to the internal access road from VOA Proposed Access Drive #1 to Crosley Way was evaluated. As previously identified, a 250’ (including 50’ diverging taper) southbound left turn lane on VOA Proposed Access Drive #1 at Tylersville Road is recommended. Based on the *Butler County Access Management Regulations*, access within the functional area of a turn lane is not permitted. Therefore, the internal access road should be located at a minimum of 300’ north of Tylersville Road. Queue analysis of the intersection of Tylersville Road and VOA Proposed Access Drive #1 for 2018 and 2030 total conditions was also utilized in determining the location of the internal access road. The queue analysis is provided by the capacity analysis and is included in Appendix H. Based on the queue analysis,

a southbound stacking length of four vehicles (approximately 80') is needed on VOA Proposed Access Drive #1 for 2018 and 2030 total conditions, during the weekday PM peak hour, nine vehicles (approximately 180') is needed for 2018 total conditions, during the Saturday noon peak hour, and ten vehicles (approximately 200') is needed for 2030 total conditions, during the Saturday noon peak hour. Therefore, the proposed location of the internal access road (a minimum of 300' north of Tylersville Road) will not interfere with site traffic traveling southbound on VOA Proposed Access Drive #1.

The location of the VOA park entrance/exit gate and booth on VOA Proposed Access Drive #1 was also considered. According to the latest site concept plan, the proposed gate/booth is to be located approximately 400' north of Tylersville Road. Two lanes for site traffic entering the proposed VOA development will be provided. Therefore, storage for approximately 40 vehicles (approximately 800') will be available between Tylersville Road and the proposed park gate/booth.

According to Figure 7, 2030 Total Traffic Volumes, approximately 209 vehicles will be entering VOA Proposed Access Drive #1 during the weekday PM peak hour and approximately 230 vehicles during the Saturday noon peak hour. Considering the higher number of vehicles only (230) results in approximately 2 vehicles per minute per lane entering the VOA park through VOA Proposed Access Drive #1. In order to avoid stacking traffic from the proposed park gate/ booth to Tylersville Road, each vehicle would need to pass through the proposed gate/booth in their respective lane in approximately 30 seconds. Based on the typical operations expected of a park gate/booth, a 30 second passage rate is reasonable. Furthermore, a 30 second passage time would result in no stacking and as previously stated, storage for approximately 40 vehicles (approximately 800') will be available between Tylersville Road and the proposed park gate/booth.

The location of the VOA park entrance/exit gate and booth on VOA Proposed Access Drive #2 was also considered. According to the latest site concept plan, the proposed gate/booth is to be located approximately 350' west of Butler Warren County Line Road. One lane for site traffic entering the proposed VOA development will be provided. Therefore, storage for approximately 17 vehicles (approximately 340') will be available between Butler Warren County Line Road and the proposed park gate/booth.

According to Figure 7, 2030 Total Traffic Volumes, approximately 71 vehicles will be entering VOA Proposed Access Drive #2 during the weekday PM peak hour and approximately 80 vehicles during the Saturday noon peak hour. Considering the higher number of vehicles only (80) results in approximately 2 vehicles per minute per lane entering the VOA park through VOA Proposed Access Drive #2. In order to avoid stacking traffic from the proposed park gate/booth to Butler Warren County Line Road, each vehicle would need to pass through the proposed gate/booth in their respective lane in approximately 30 seconds. As previously stated, based on the typical operations expected of a park gate/booth, a 30 second passage rate is reasonable and a 30 second passage time would result in no stacking. Storage for approximately 17 vehicles (approximately 340') will be available between Butler Warren County Line Road and the proposed park gate/booth.

Based on the above information, site traffic entering via VOA Proposed Access Drive #1 should not impede with through traffic on Tylersville Road and site traffic entering via VOA Proposed Access Drive #2 should not impede with through traffic on Butler Warren County Line Road.

IMPROVEMENT ANALYSIS

Improvements to Accommodate Base Traffic

Based on the analyses contained herein, the following roadway improvements are recommended for construction to accommodate ***2009 existing traffic*** (excluding site traffic):

- Provide striping for a 175' (including 50' diverging taper) westbound left turn lane on Tylersville Road at Pepper Pike.
- Construct a 175' (including 50' diverging taper) northbound right turn lane on Butler Warren County Line Road at Tyler Court.

Based on the aforementioned analyses, the following additional roadway improvements are recommended to accommodate ***2018 background traffic and 2030 background traffic*** (excluding site traffic):

- Install a traffic signal at the intersection of Tylersville Road and Pepper Pike.
- Provide striping for a 325' (including 50' diverging taper) westbound left turn lane on Tylersville Road at Pepper Pike.
- Provide striping for a 175' (including 50' diverging taper) southbound left turn lane on Butler Warren County Line Road at Tyler Court.

Additional Improvements to Accommodate Site Traffic

Based on the aforementioned analysis, the following additional roadway improvements are recommended to accommodate ***2018 total conditions and 2030 total conditions*** (including site traffic):

- Provide striping for a 350' (including 50' diverging taper) eastbound left turn lane on Tylersville Road at VOA Proposed Access Drive #1.
- Construct a 225' (including 50' diverging taper) northbound left turn lane on Pepper Pike at Tylersville Road.
- Construct a 250' (including 50' diverging taper) southbound left turn lane on VOA Proposed Access Drive #1 at Tylersville Road.
- Provide striping for a 175' (including 50' diverging taper) northbound left turn lane on Butler Warren County Line Road at VOA Proposed Access Drive #2.

Status of Improvements Already Funded

BCEO currently has plans to widen Butler Warren County Line Road, within the study area, from a two-lane roadway to a five-lane roadway. An additional through lane will be provided in each direction and a center two-way left turn lane will also be provided. Widening of Butler Warren County Line Road is expected to be complete in 2012.

There are no other known developments or improvements planned within the study area at this time.

FINDINGS AND RECOMMENDATIONS

Site Accessibility

The proposed Voice of America Park development is located at the northwest corner of the intersection of Tylersville Road and Butler Warren County Line Road.

Access to the proposed Voice of America Park development will be provided at two proposed locations. Proposed Access Drive #1 is to be located on Tylersville Road opposite Pepper Pike. Proposed Access Drive #2 is to be located on Butler Warren County Line Road opposite Tyler Court. An existing access drive to the Voice of America Park is currently provided on Cox Road. Interconnection is planned as part of this development between the existing Voice of America Park and the proposed Voice of America Park development.

Traffic Impacts

The proposed development is expected to generate 342 entering new trips and 154 exiting new trips during the PM peak hour (of adjacent street traffic), and 378 entering new trips and 409 exiting new trips during the Saturday noon peak hour (of generator).

The following intersections define the study area of this report:

- Tylersville Road and Pepper Pike/Proposed Access Drive #1.
- Butler Warren County Line Road and Tyler Courts/Proposed Access Drive #2.

The intersections within the study area of this report were analyzed to determine the levels of service during the 2009 existing year, the 2009 build-out year, and the 2029 horizon year conditions.

Need for Improvements

The need for improvements was based on the analysis contained within this report. Based on the aforementioned analysis, the following roadway improvements are recommended for construction to accommodate ***2009 existing traffic*** (excluding site traffic):

- Install a traffic signal at the intersection of Tylersville Road and Pepper Pike.
- Provide striping for a 175’ (including 50’ diverging taper) westbound left turn lane on Tylersville Road at Pepper Pike.

- Construct a 175' (including 50' diverging taper) northbound right turn lane on Butler Warren County Line Road at Tyler Court.

Based on the aforementioned analysis, the following additional roadway improvements are recommended for construction to accommodate ***2018 background traffic and 2030 background traffic*** (excluding site traffic):

- Install a traffic signal at the intersection of Tylersville Road and Pepper Pike.
- Provide striping for a 325' (including 50' diverging taper) westbound left turn lane on Tylersville Road at Pepper Pike.
- Provide striping for a 175' (including 50' diverging taper) southbound left turn lane on Butler Warren County Line Road at Tyler Court.

Based on the aforementioned analysis, the following additional roadway improvements are recommended to accommodate ***2018 total conditions and 2030 total conditions*** (including site traffic):

- Provide striping for a 350' (including 50' diverging taper) eastbound left turn lane on Tylersville Road at VOA Proposed Access Drive #1.
- Construct a 225' (including 50' diverging taper) northbound left turn lane on Pepper Pike at Tylersville Road.
- Construct a 250' (including 50' diverging taper) southbound left turn lane on VOA Proposed Access Drive #1 at Tylersville Road.
- Provide striping for a 175' (including 50' diverging taper) northbound left turn lane on Butler Warren County Line Road at VOA Proposed Access Drive #2.

Compliance with Applicable Codes

All roadway improvements shall be constructed in accordance with the Butler County Engineer's Office requirements, as appropriate and applicable.

Based upon engineering judgment and the analyses contained herein, the proposed Voice of America Park development, with the improvements discussed herein, will not significantly impact operations on the adjacent road network.

APPENDIX A
VOICE OF AMERICA ENHANCEMENT PLAN

VOICE OF AMERICA PARK

ENHANCEMENT PLAN

NORTH

LEGEND

A. LODGE
B. AMPHITHEATER
C. WET/DRY PLAYGROUND
D. SLEDDING HILL
E. ROPES COURSE
F. LEO'S PARK
G. PICNIC GROVE
H. HABITAT/NATURAL AREA
I. SERVICE AREA
J. OVERFLOW PARKING
K. IRRIGATION LAKE
L. SOFTBALL FIELDS
M. BASEBALL COMPLEX
N. WIGGLY FIELD
O. SOCCER COMPLEX
P. CENTRAL GREEN
Q. MULTI-PURPOSE FIELDS
R. CONCESSIONS/RESTROOMS
S. SHELTER/RESTROOMS
T. SHELTERS
U. VIEWING SLOPE
V. SECONDARY ACCESS
W. WETLANDS
X. GATE HOUSE
Y. PLAY GROUND
Z. SAND VOLLEYBALL
AA. BASKETBALL
BB. MULTI-PURPOSE TRAIL

metroparks OF BUTLER COUNTY

GRAPHIC SCALE

(IN FEET)
1 inch = 200 ft.

McGill Smith Punshon, Inc.
3700 Park 42 Drive Suite 190B
Cincinnati, Ohio 45241-2097
Tel 513-759-0004 • Fax 513-563-7099
Engineers • Architects • Surveyors
Planners • Landscape Architects

JULY 15, 2008 07164100

APPENDIX B
TRAFFIC COUNTS

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6900 Tylersville Road, Suite A
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07M056.000
Voice of America Park
Tylersville Road & Pepper Pike

File Name : 07M056_000_Tylersville & Pepper_PM_090121
Site Code : 00000000
Start Date : 1/21/2009
Page No : 1

Groups Printed- 1 - Unshifted

	Pepper Pike Southbound					Tylersville Road Westbound					Pepper Pike Northbound					Tylersville Road Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
05:00 PM	0	0	0	0	0	0	292	5	0	297	5	0	3	0	8	23	297	0	0	320	625
05:15 PM	0	0	0	0	0	0	319	3	0	322	0	0	3	0	3	13	368	0	0	381	706
05:30 PM	0	0	0	0	0	0	328	7	0	335	2	0	1	0	3	12	337	0	0	349	687
05:45 PM	0	0	0	0	0	0	291	6	0	297	3	0	4	0	7	10	371	0	0	381	685
Total	0	0	0	0	0	0	1230	21	0	1251	10	0	11	0	21	58	1373	0	0	1431	2703
Grand Total	0	0	0	0	0	0	1230	21	0	1251	10	0	11	0	21	58	1373	0	0	1431	2703
Apprch %	0.0	0.0	0.0	0.0		0.0	98.3	1.7	0.0		47.6	0.0	52.4	0.0		4.1	95.9	0.0	0.0		
Total %	0.0	0.0	0.0	0.0	0.0	0.0	45.5	0.8	0.0	46.3	0.4	0.0	0.4	0.0	0.8	2.1	50.8	0.0	0.0	52.9	

	Pepper Pike Southbound					Tylersville Road Westbound					Pepper Pike Northbound					Tylersville Road Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From	05:00 PM to 05:45 PM - Peak 1 of 1																				
Intersection	05:00 PM																				
Volume	0	0	0	0	0	0	1230	21	0	1251	10	0	11	0	21	58	1373	0	0	1431	2703
Percent	0.0	0.0	0.0	0.0		0.0	98.3	1.7	0.0		47.6	0.0	52.4	0.0		4.1	95.9	0.0	0.0		
05:15 Volume	0	0	0	0	0	0	319	3	0	322	0	0	3	0	3	13	368	0	0	381	706
Peak Factor																					0.957
High Int.	4:45:00 PM					05:30 PM					05:00 PM					05:15 PM					
Volume	0	0	0	0	0	0	328	7	0	335	5	0	3	0	8	13	368	0	0	381	
Peak Factor										0.934					0.656					0.939	

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07M056.000
Voice of America Park
Tylersville Road & Pepper Pike

File Name : 07M056_000_Tylersville & Pepper_Noon_090124
Site Code : 00000000
Start Date : 1/24/2009
Page No : 1

Groups Printed- 1 - Unshifted

	Pepper Pike Southbound					Tylersville Road Westbound					Pepper Pike Northbound					Tylersville Road Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
12:00 PM	0	0	0	0	0	0	315	0	0	315	0	0	4	0	4	13	290	0	0	303	622
12:15 PM	0	0	0	0	0	0	349	1	0	350	4	0	4	0	8	7	319	0	0	326	684
12:30 PM	0	0	0	0	0	0	297	1	0	298	4	0	4	0	8	9	326	0	0	335	641
12:45 PM	0	0	0	0	0	0	294	2	0	296	6	0	3	0	9	15	317	0	0	332	637
Total	0	0	0	0	0	0	1255	4	0	1259	14	0	15	0	29	44	1252	0	0	1296	2584
01:00 PM	0	0	0	0	0	0	343	1	0	344	2	0	1	0	3	9	338	0	0	347	694
01:15 PM	0	0	0	0	0	0	323	6	0	329	3	0	5	0	8	10	363	0	0	373	710
01:30 PM	0	0	0	0	0	0	283	1	0	284	2	0	4	0	6	7	292	0	0	299	589
01:45 PM	0	0	0	0	0	0	308	5	0	313	2	0	6	0	8	11	312	0	0	323	644
Total	0	0	0	0	0	0	1257	13	0	1270	9	0	16	0	25	37	1305	0	0	1342	2637
Grand Total	0	0	0	0	0	0	2512	17	0	2529	23	0	31	0	54	81	2557	0	0	2638	5221
Apprch %	0.0	0.0	0.0	0.0		0.0	99.3	0.7	0.0		42.6	0.0	57.4	0.0		3.1	96.9	0.0	0.0		
Total %	0.0	0.0	0.0	0.0	0.0	0.0	48.1	0.3	0.0	48.4	0.4	0.0	0.6	0.0	1.0	1.6	49.0	0.0	0.0	50.5	

	Pepper Pike Southbound					Tylersville Road Westbound					Pepper Pike Northbound					Tylersville Road Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From	12:00 PM to 01:45 PM - Peak 1 of 1																				
Intersection	12:30 PM																				
Volume	0	0	0	0	0	0	1257	10	0	1267	15	0	13	0	28	43	1344	0	0	1387	2682
Percent	0.0	0.0	0.0	0.0		0.0	99.2	0.8	0.0		53.6	0.0	46.4	0.0		3.1	96.9	0.0	0.0		
01:15 Volume	0	0	0	0	0	0	323	6	0	329	3	0	5	0	8	10	363	0	0	373	710
Peak Factor																					0.944
High Int.	11:45:00 AM					01:00 PM					12:45 PM					01:15 PM					
Volume	0	0	0	0	0	0	343	1	0	344	6	0	3	0	9	10	363	0	0	373	
Peak Factor										0.921					0.778					0.930	

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07M056.000
Voice of America Park
Butler Warren County Line Road &
Tyler Court

File Name : 07M056_000_Butler Warren & Tyler_PM_090121
Site Code : 00000000
Start Date : 1/21/2009
Page No : 1

Groups Printed- 1 - Unshifted

	Butler Warren County Line Road Southbound					Tyler Court Westbound					Butler Warren County Line Road Northbound					Tyler Court Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
05:00 PM	0	92	1	0	93	2	0	5	0	7	14	155	0	0	169	0	0	0	0	0	269
05:15 PM	0	96	1	0	97	1	0	2	0	3	15	205	0	0	220	0	0	0	0	0	320
05:30 PM	0	85	2	0	87	2	0	6	0	8	8	188	0	0	196	0	0	0	0	0	291
05:45 PM	0	97	4	0	101	0	0	3	0	3	8	170	0	0	178	0	0	0	0	0	282
Total	0	370	8	0	378	5	0	16	0	21	45	718	0	0	763	0	0	0	0	0	1162
Grand Total	0	370	8	0	378	5	0	16	0	21	45	718	0	0	763	0	0	0	0	0	1162
Apprch %	0.0	97.9	2.1	0.0		23.8	0.0	76.2	0.0		5.9	94.1	0.0	0.0		0.0	0.0	0.0	0.0		
Total %	0.0	31.8	0.7	0.0	32.5	0.4	0.0	1.4	0.0	1.8	3.9	61.8	0.0	0.0	65.7	0.0	0.0	0.0	0.0	0.0	

	Butler Warren County Line Road Southbound					Tyler Court Westbound					Butler Warren County Line Road Northbound					Tyler Court Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From	05:00 PM to 05:45 PM - Peak 1 of 1																				
Intersection	05:00 PM																				
Volume	0	370	8	0	378	5	0	16	0	21	45	718	0	0	763	0	0	0	0	0	1162
Percent	0.0	97.9	2.1	0.0		23.8	0.0	76.2	0.0		5.9	94.1	0.0	0.0		0.0	0.0	0.0	0.0		
05:15 Volume	0	96	1	0	97	1	0	2	0	3	15	205	0	0	220	0	0	0	0	0	320
Peak Factor																					0.908
High Int.	05:45 PM					05:30 PM					05:15 PM					4:45:00 PM					
Volume	0	97	4	0	101	2	0	6	0	8	15	205	0	0	220						
Peak Factor					0.936					0.656					0.867						

Bayer Becker
6900 Tylersville Road, Suite A
Mason, OH 45040
513.336.6600

07M056.000
Voice of America Park
Butler Warren County Line Road &
Tyler Court

File Name : 07M056_000_Butler Warren & Tyler_Noon_090124
Site Code : 00000000
Start Date : 1/24/2009
Page No : 1

Groups Printed- 1 - Unshifted

	Butler Warren County Line Road Southbound					Tyler Court Westbound					Butler Warren County Line Road Northbound					Tyler Court Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
12:00 PM	0	67	1	0	68	1	0	7	0	8	13	88	0	0	101	0	0	0	0	0	177
12:15 PM	0	87	2	0	89	0	0	7	0	7	1	109	0	0	110	0	0	0	0	0	206
12:30 PM	0	75	0	0	75	0	0	11	0	11	6	89	0	0	95	0	0	0	0	0	181
12:45 PM	0	95	0	0	95	0	0	5	0	5	6	104	0	0	110	0	0	0	0	0	210
Total	0	324	3	0	327	1	0	30	0	31	26	390	0	0	416	0	0	0	0	0	774
01:00 PM	0	91	1	0	92	0	0	6	0	6	5	106	0	0	111	0	0	0	0	0	209
01:15 PM	0	93	0	0	93	0	0	3	0	3	6	85	0	0	91	0	0	0	0	0	187
01:30 PM	0	80	1	0	81	0	0	4	0	4	5	75	0	0	80	0	0	0	0	0	165
01:45 PM	0	92	1	0	93	0	0	4	0	4	8	105	0	0	113	0	0	0	0	0	210
Total	0	356	3	0	359	0	0	17	0	17	24	371	0	0	395	0	0	0	0	0	771
Grand Total	0	680	6	0	686	1	0	47	0	48	50	761	0	0	811	0	0	0	0	0	1545
Apprch %	0.0	99.1	0.9	0.0		2.1	0.0	97.9	0.0		6.2	93.8	0.0	0.0		0.0	0.0	0.0	0.0		
Total %	0.0	44.0	0.4	0.0	44.4	0.1	0.0	3.0	0.0	3.1	3.2	49.3	0.0	0.0	52.5	0.0	0.0	0.0	0.0	0.0	

	Butler Warren County Line Road Southbound					Tyler Court Westbound					Butler Warren County Line Road Northbound					Tyler Court Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From	12:00 PM to 01:45 PM - Peak 1 of 1																				
Intersection	12:15 PM																				
Volume	0	348	3	0	351	0	0	29	0	29	18	408	0	0	426	0	0	0	0	0	806
Percent	0.0	99.1	0.9	0.0		0.0	0.0	100.0	0.0		4.2	95.8	0.0	0.0		0.0	0.0	0.0	0.0		
12:45 Volume	0	95	0	0	95	0	0	5	0	5	6	104	0	0	110	0	0	0	0	0	210
Peak Factor																					0.960
High Int.	12:45 PM					12:30 PM					01:00 PM					11:45:00 AM					
Volume	0	95	0	0	95	0	0	11	0	11	5	106	0	0	111						
Peak Factor					0.924					0.659					0.959						

APPENDIX C
TRIP GENERATION

Land Use: 488
Soccer Complex

Description

Soccer complexes are outdoor parks that are used for non-professional soccer games. They may consist of one or more fields, and the size of each field within the land use may vary to accommodate games for different age groups. Ancillary amenities may include a fitness trail, activities shelter, aquatic center, picnic grounds, basketball and tennis courts and a playground.

Additional Data

Caution should be used when applying these data. Peaking at soccer complexes typically occurred in time periods shorter than one hour. These peaking periods may have durations of 10 to 15 minutes.

One study noted that ridesharing was common for teams traveling to out-of-town matches.

The sites were surveyed in the 1990s in Indiana and Washington.

To assist in the future analysis of this land use, it is important to collect driveway counts in 10-minute intervals.

Source Numbers

377, 519, 565

Land Use: 488
Soccer Complex
Independent Variables with One Observation

The following trip generation data are for independent variables with only one observation. This information is shown in this table only; there are no related plots for these data.

Users are cautioned to use data with care because of the small sample size.

Independent Variable	Trip Generation Rate	Size of Independent Variable	Number of Studies	Directional Distribution
Fields				
Saturday	117.43	7	1	50% entering, 50% exiting

Soccer Complex
(488)

Average Vehicle Trip Ends vs: **Fields**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Number of Studies: 3
Average Number of Fields: 10
Directional Distribution: 69% entering, 31% exiting

Trip Generation per Field

24 fields

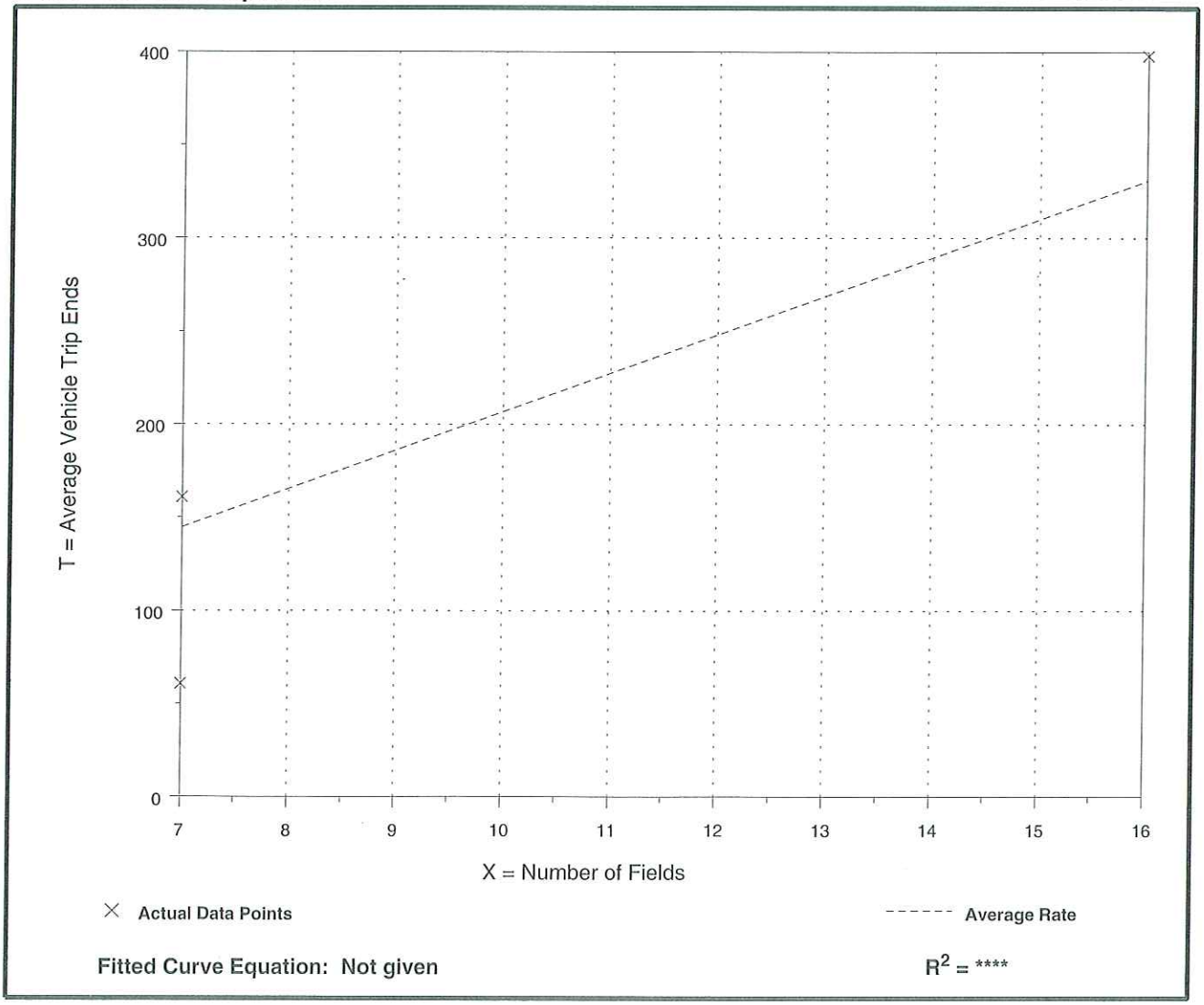
Average Rate	Range of Rates	Standard Deviation
20.67	8.71 - 24.88	8.06

T = (20.67)(24) = 496

Enter = (0.69)(496) = 342
Exit = (0.31)(496) = 154

Data Plot and Equation

Caution - Use Carefully - Small Sample Size



Fitted Curve Equation: Not given

R^2 = ****

Soccer Complex
(488)

Average Vehicle Trip Ends vs: Fields
On a: Saturday,
Peak Hour of Generator

Number of Studies: 5
Average Number of Fields: 10
Directional Distribution: 48% entering, 52% exiting

Trip Generation per Field

24 fields

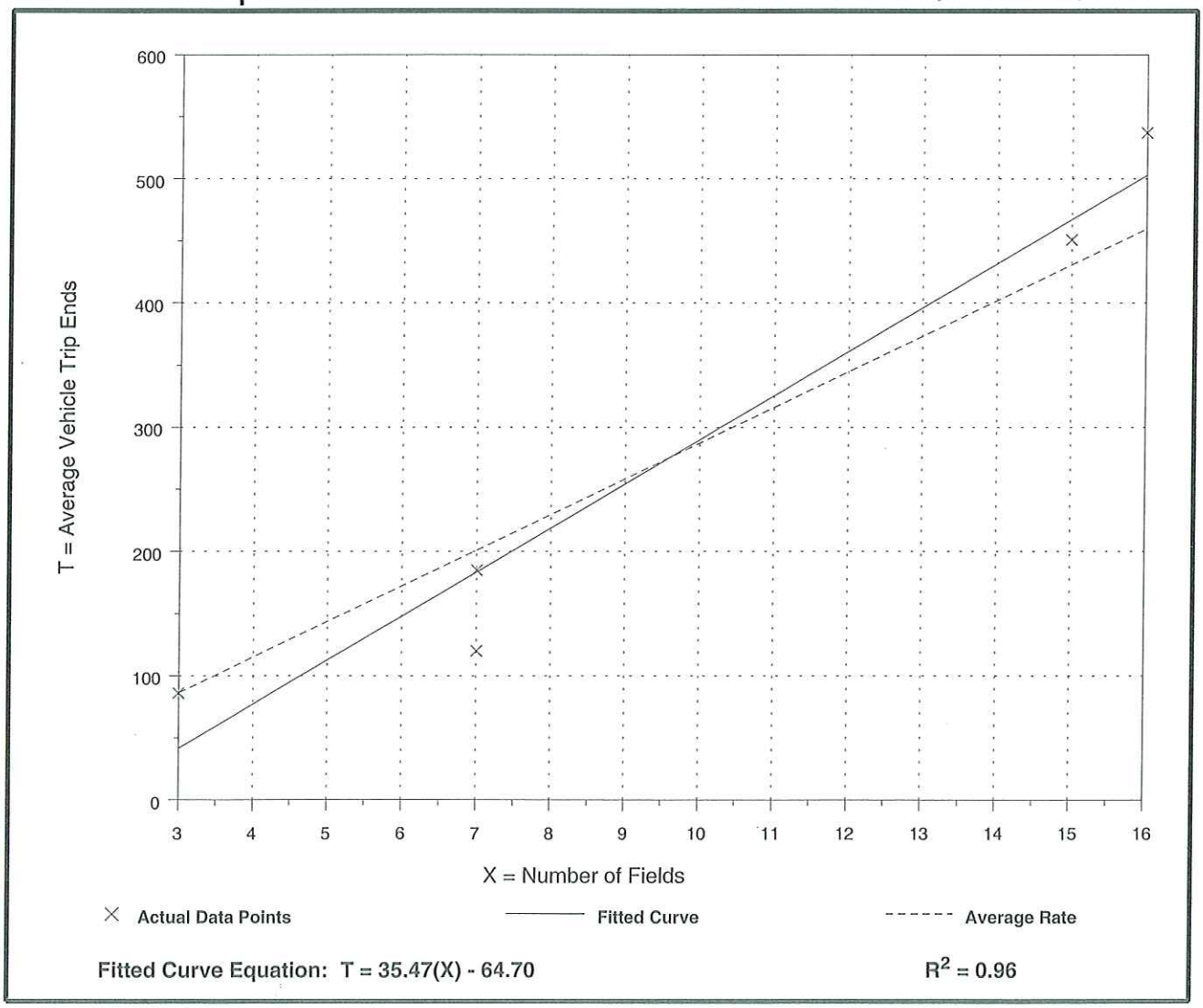
Average Rate	Range of Rates	Standard Deviation
28.73	17.14 - 33.56	7.47

$T = (28.73)(24) = 690$

Enter $= (0.48)(787) = 378$
Exit $= (0.52)(787) = 409$

Data Plot and Equation

Caution - Use Carefully - Small Sample Size



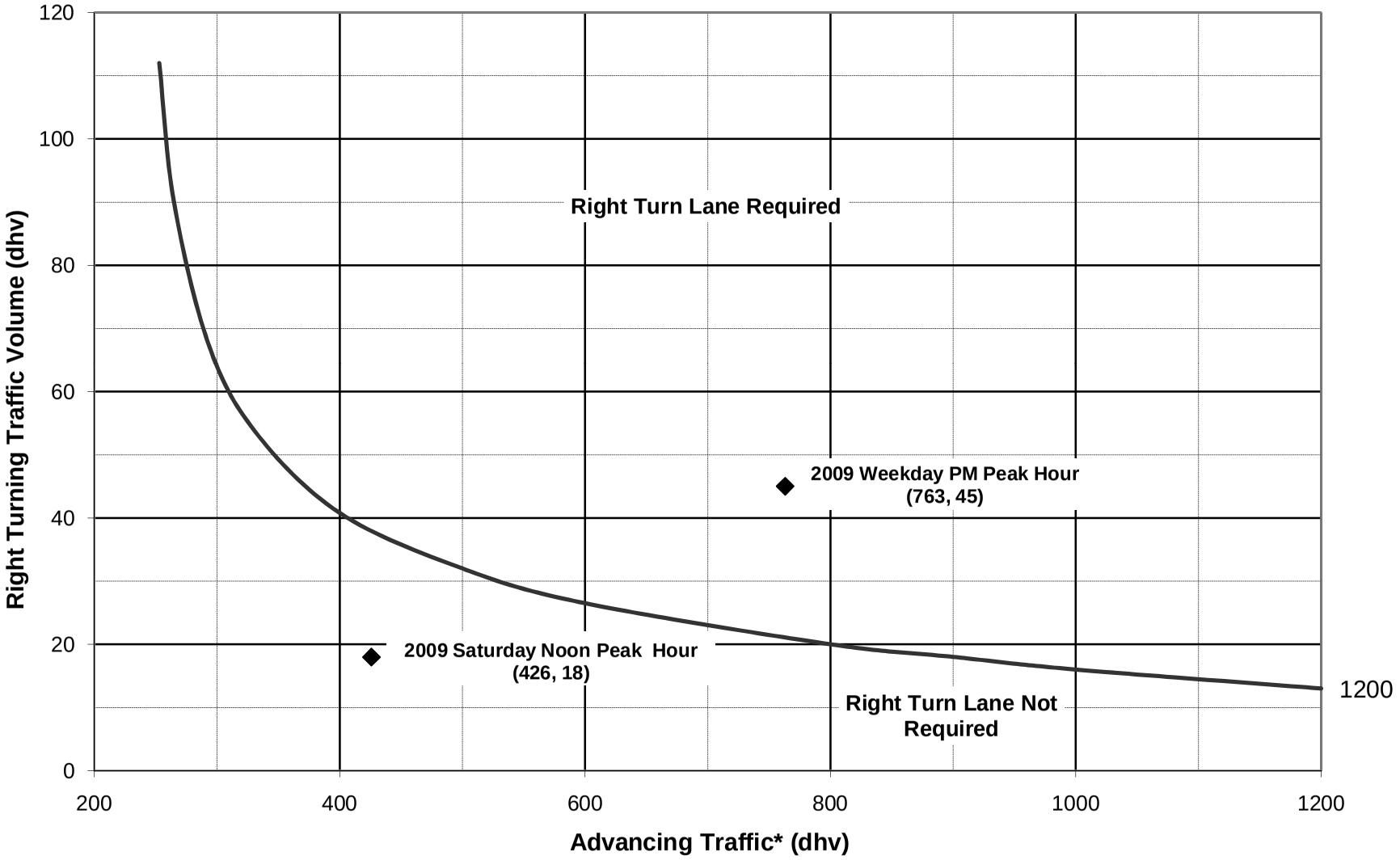
Fitted Curve Equation: T = 35.47(X) - 64.70

$R^2 = 0.96$

$T = (35.47)(24) - 64.70 = 787$

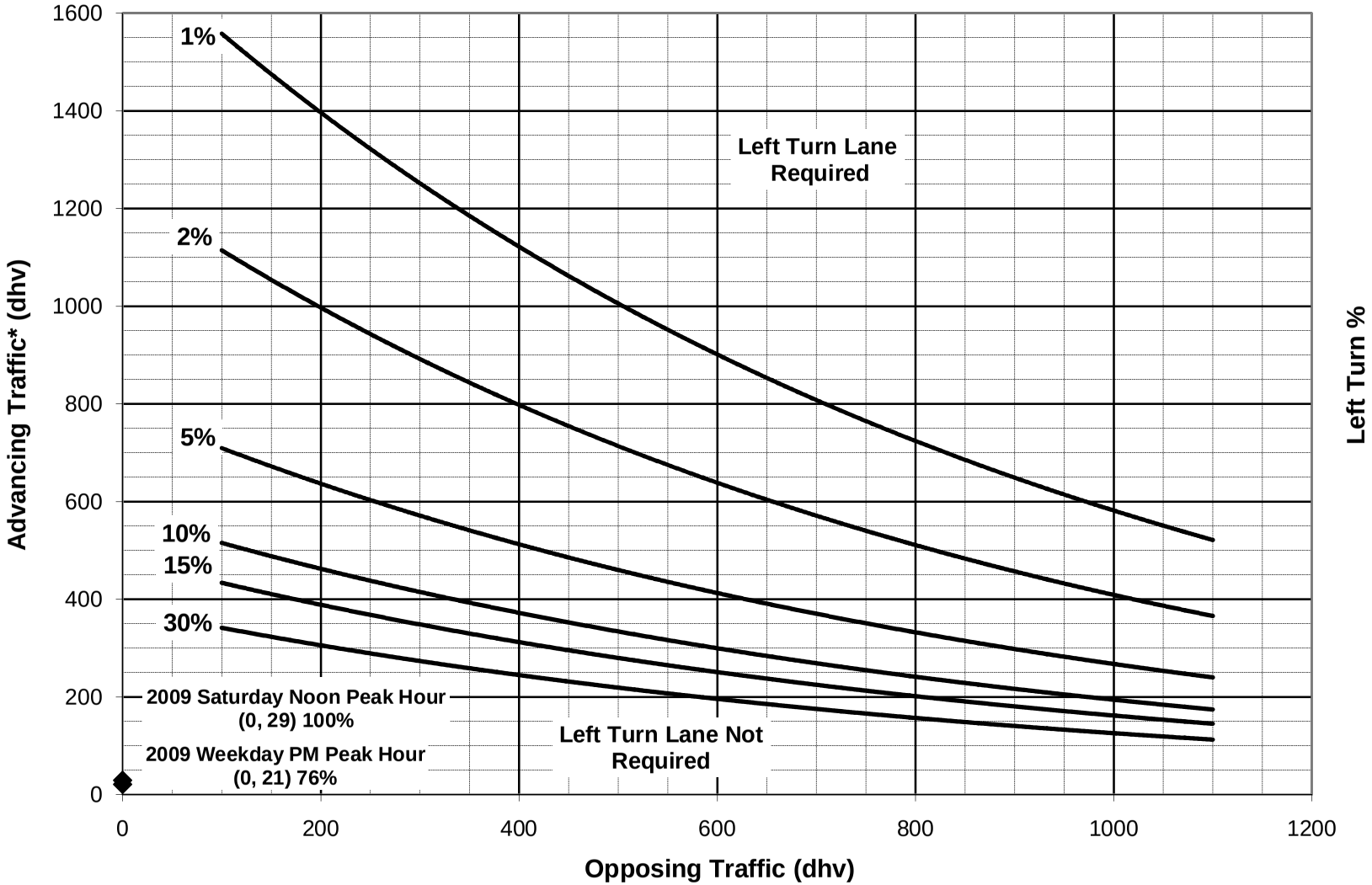
APPENDIX D
TURN LANE WARRANT ANALYSIS

Northbound Butler Warren County Line Road @ Tyler Court
2009 Existing Conditions
2-Lane Highway Right Turn Lane Warrant
(>40 mph or 70 kph Posted Speed)



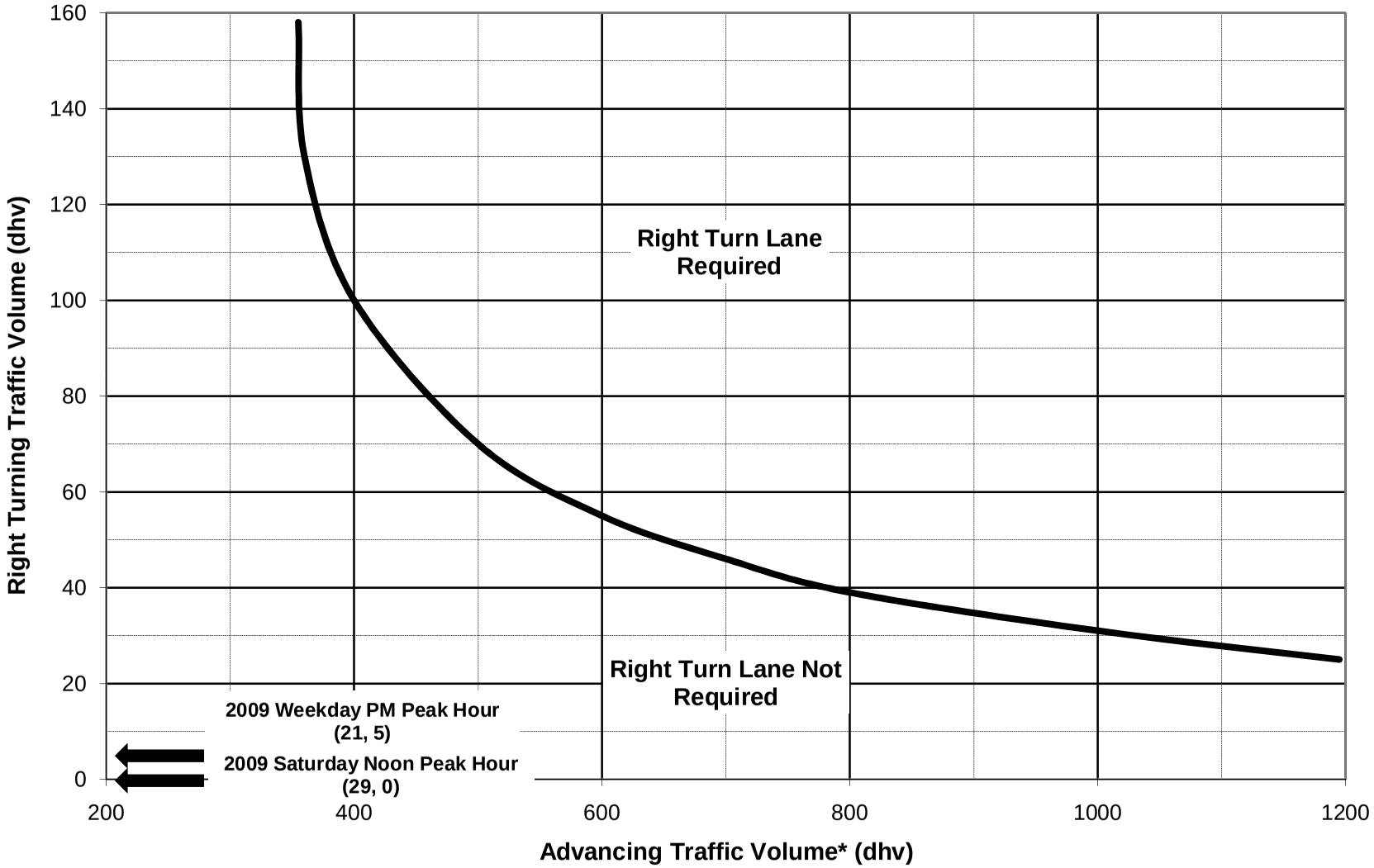
*** Includes Left Turns**

Westbound Tyler Court @ Butler Warren County Line Road
2009 Existing Conditions
2-Lane Highway Left Turn Lane Warrant
(=< 40 mph or 70 kph Posted Speed)



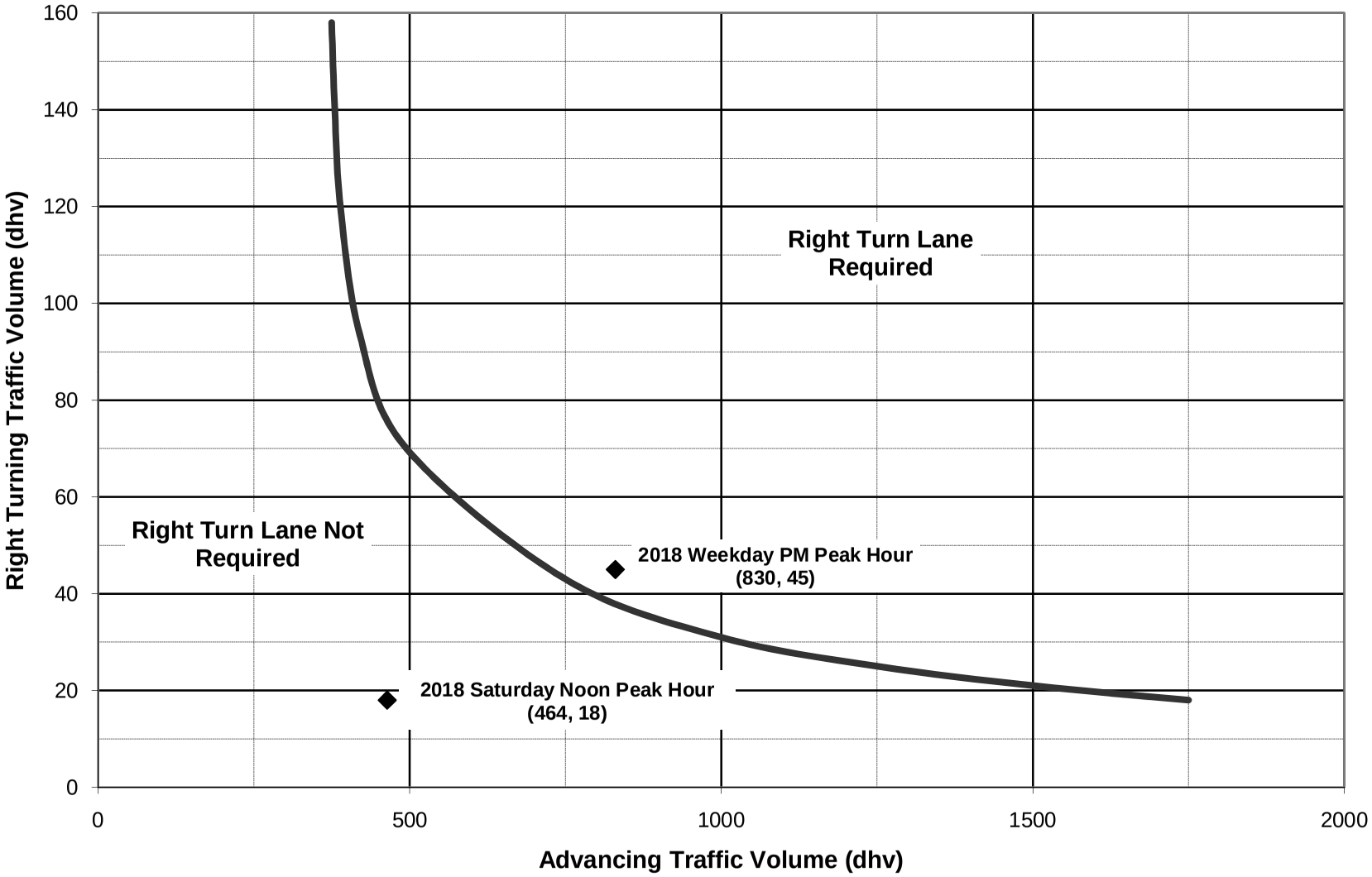
*** Includes Left Turns**

Westbound Tyler Court @ Butler Warren County Line Road
2009 Existing Conditions
2-Lane Highway Right Turn Lane Warrant
(=< 40 mph or 70 kph Posted Speed)

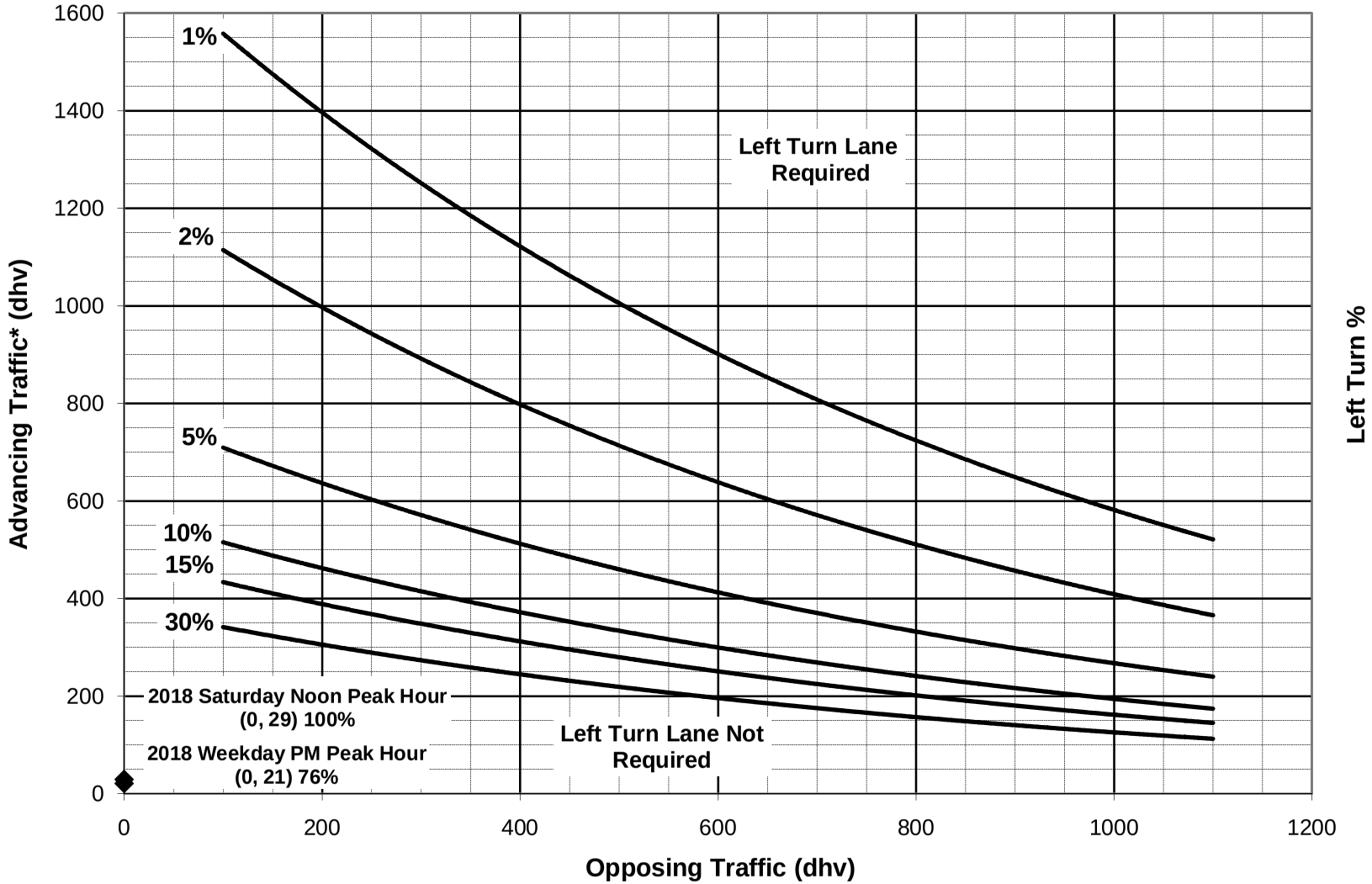


*** Includes Right Turns**

Northbound Butler Warren County Line Road @ Tyler Court
2018 Background Conditions
4-Lane Highway Right Turn Lane Warrant
(>40 mph or 70 kph Posted Speed)

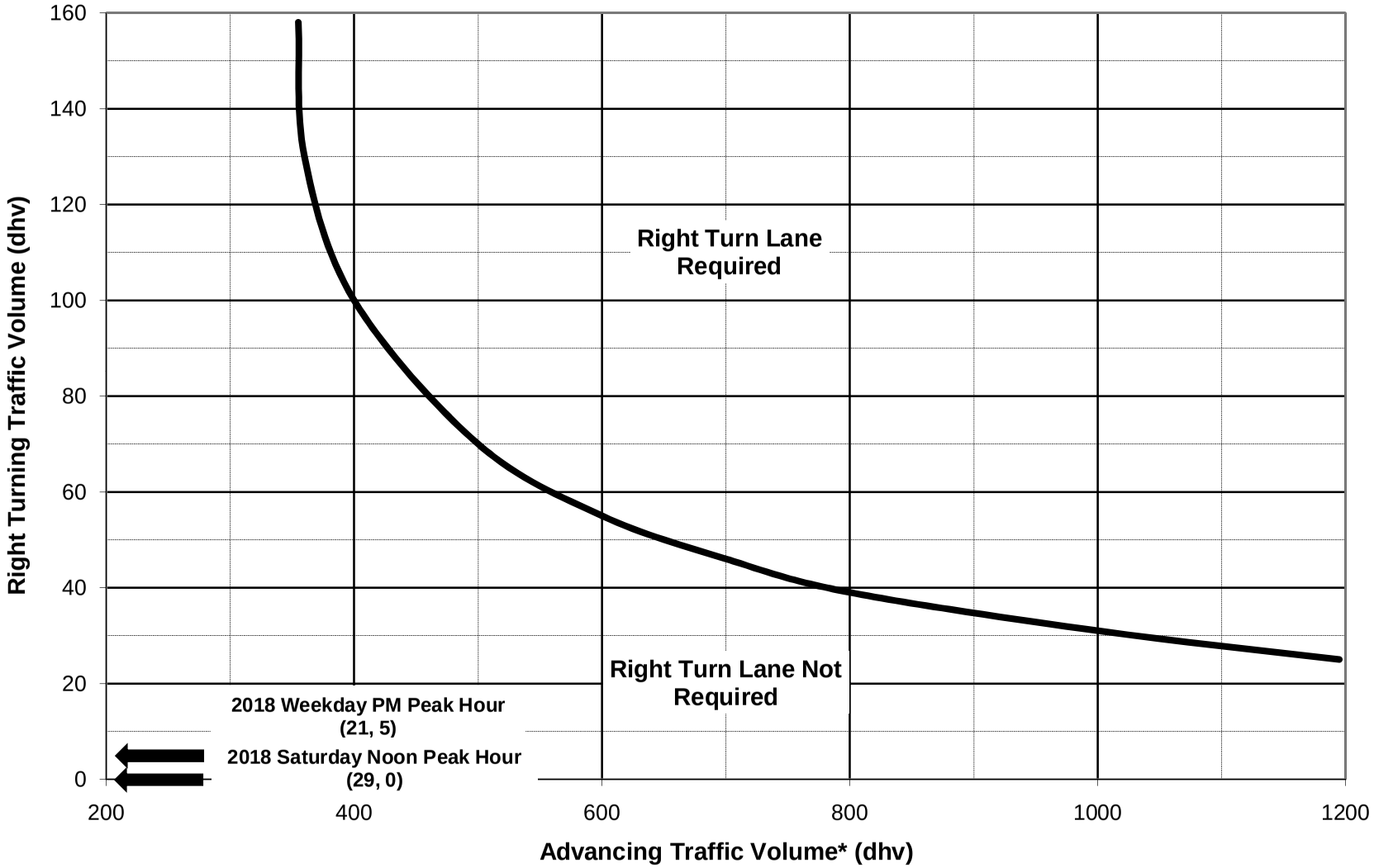


Westbound Tyler Court @ Butler Warren County Line Road
2018 Background Conditions
2-Lane Highway Left Turn Lane Warrant
(=< 40 mph or 70 kph Posted Speed)



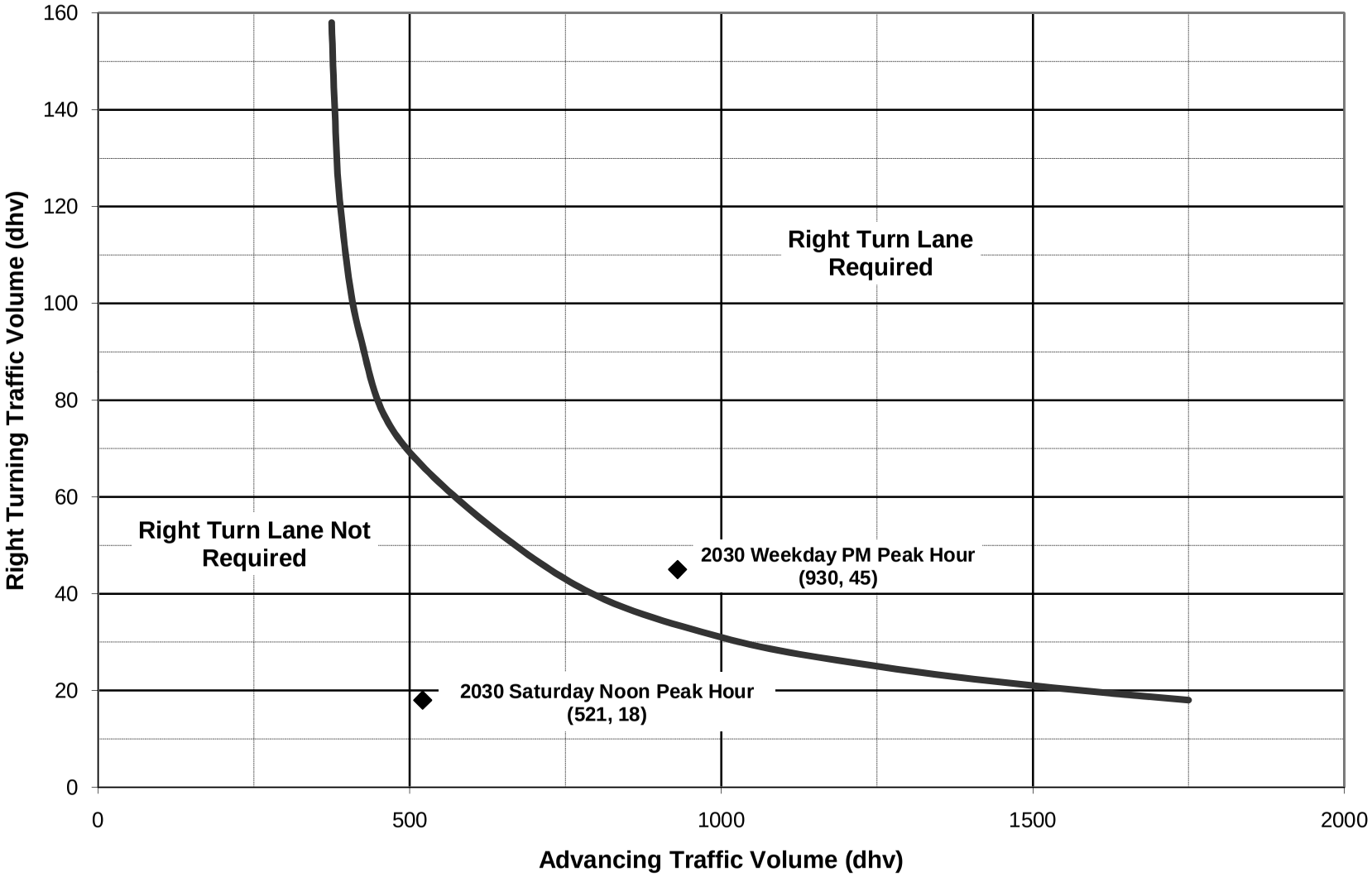
*** Includes Left Turns**

Westbound Tyler Court @ Butler Warren County Line Road
2018 Background Conditions
2-Lane Highway Right Turn Lane Warrant
(=< 40 mph or 70 kph Posted Speed)

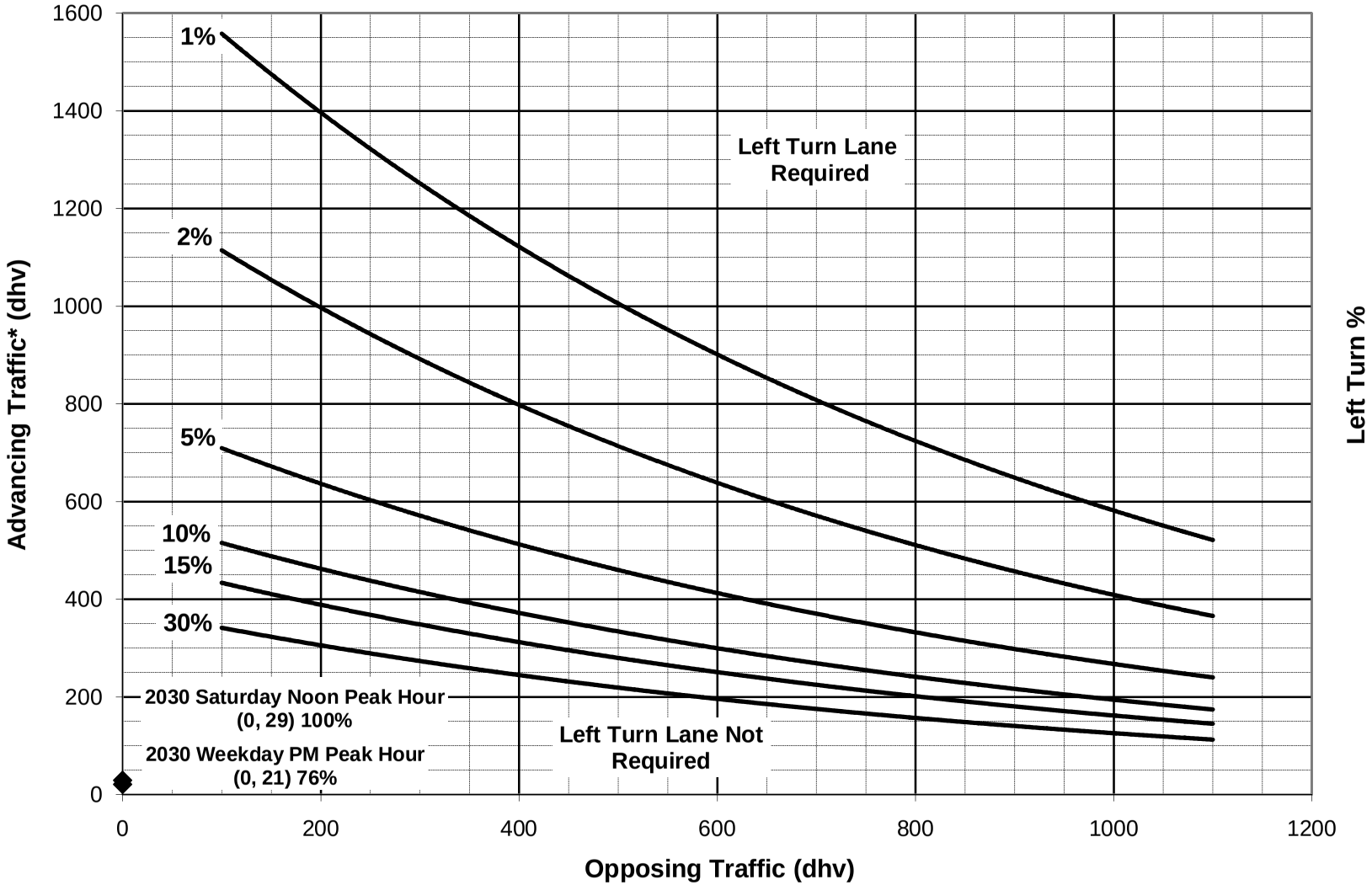


*** Includes Right Turns**

Northbound Butler Warren County Line Road @ Tyler Court
2030 Background Conditions
4-Lane Highway Right Turn Lane Warrant
(>40 mph or 70 kph Posted Speed)

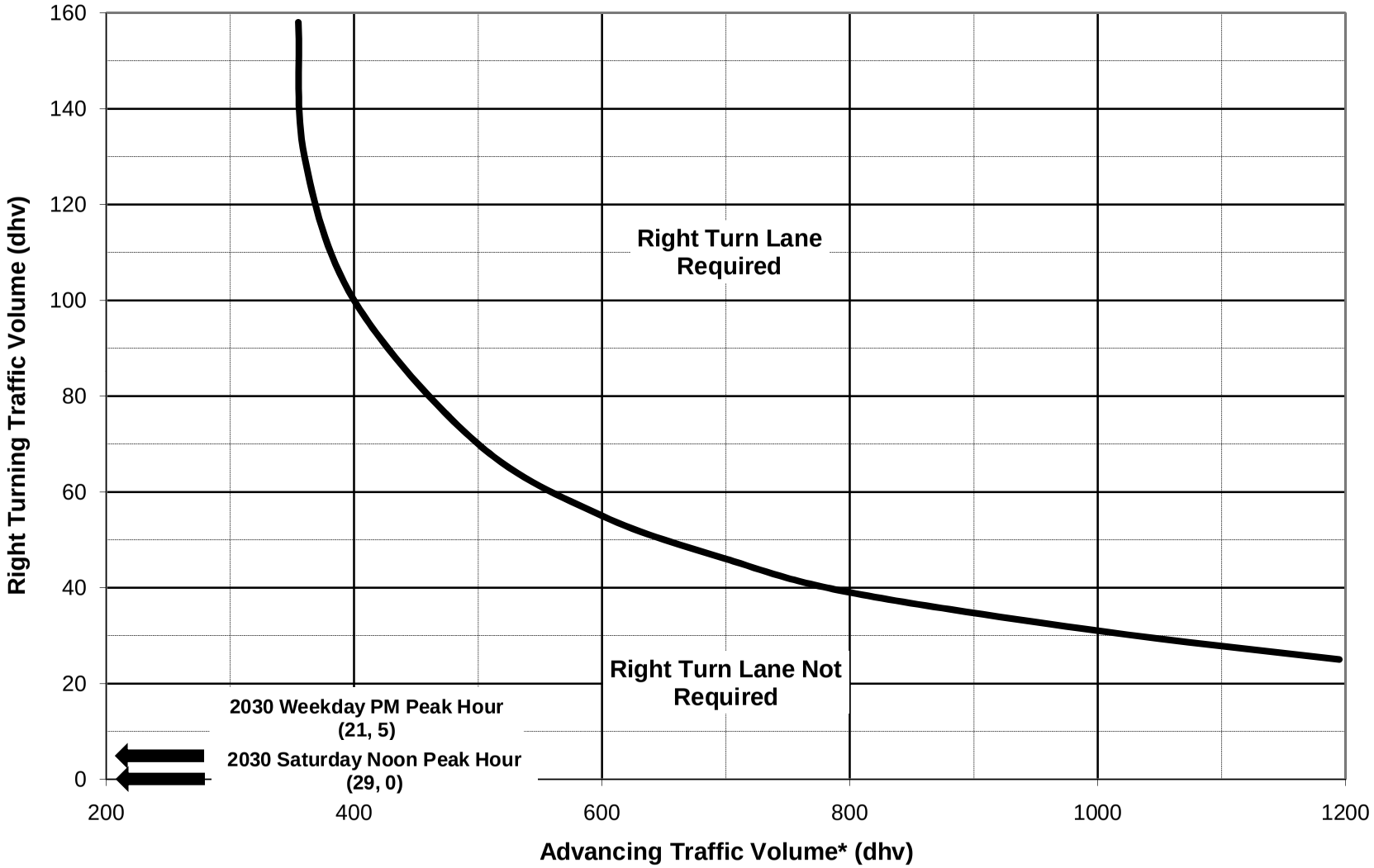


Westbound Tyler Court @ Butler Warren County Line Road
2030 Background Conditions
2-Lane Highway Left Turn Lane Warrant
(=< 40 mph or 70 kph Posted Speed)



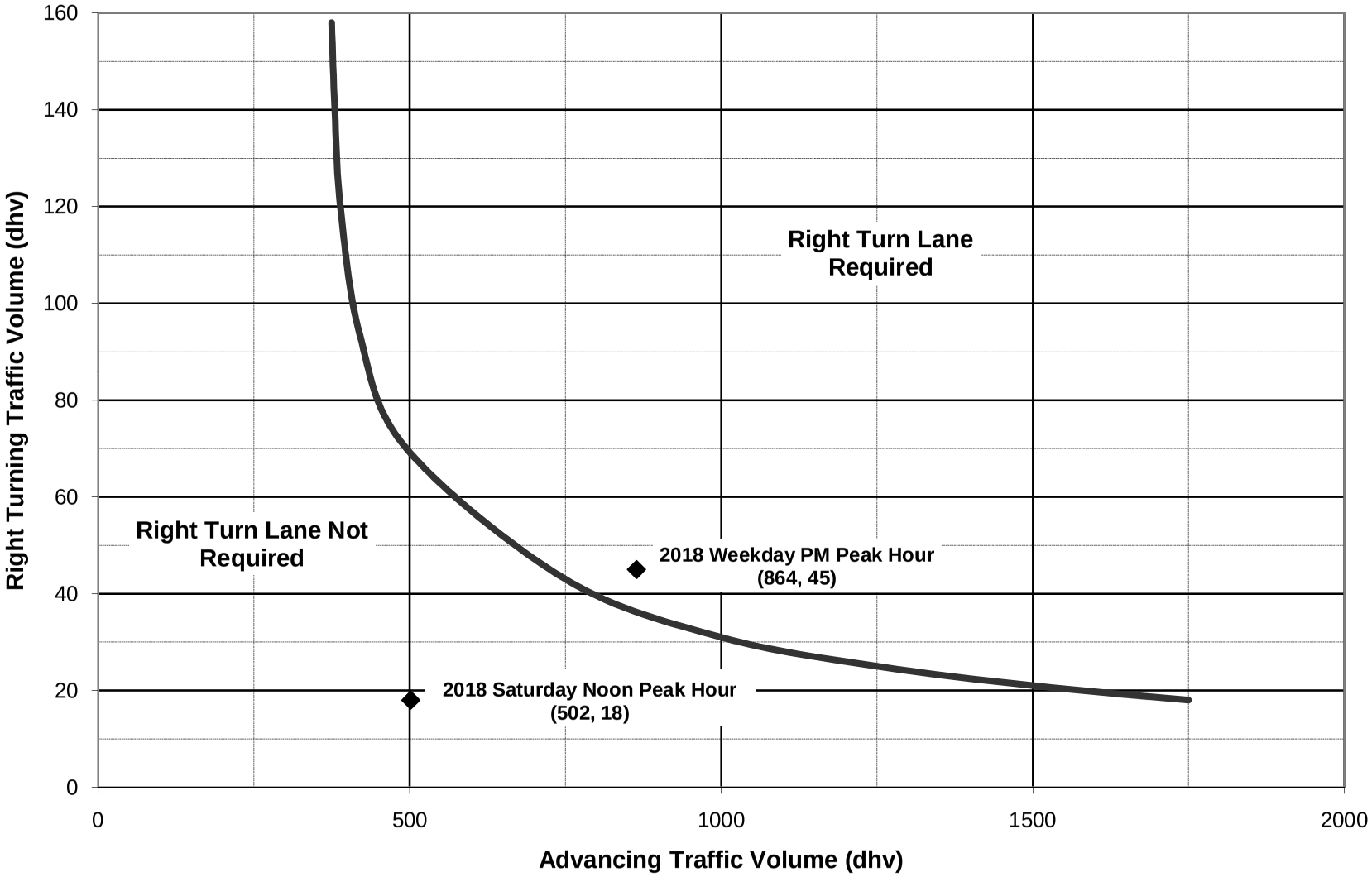
*** Includes Left Turns**

Westbound Tyler Court @ Butler Warren County Line Road
2030 Background Conditions
2-Lane Highway Right Turn Lane Warrant
(=< 40 mph or 70 kph Posted Speed)

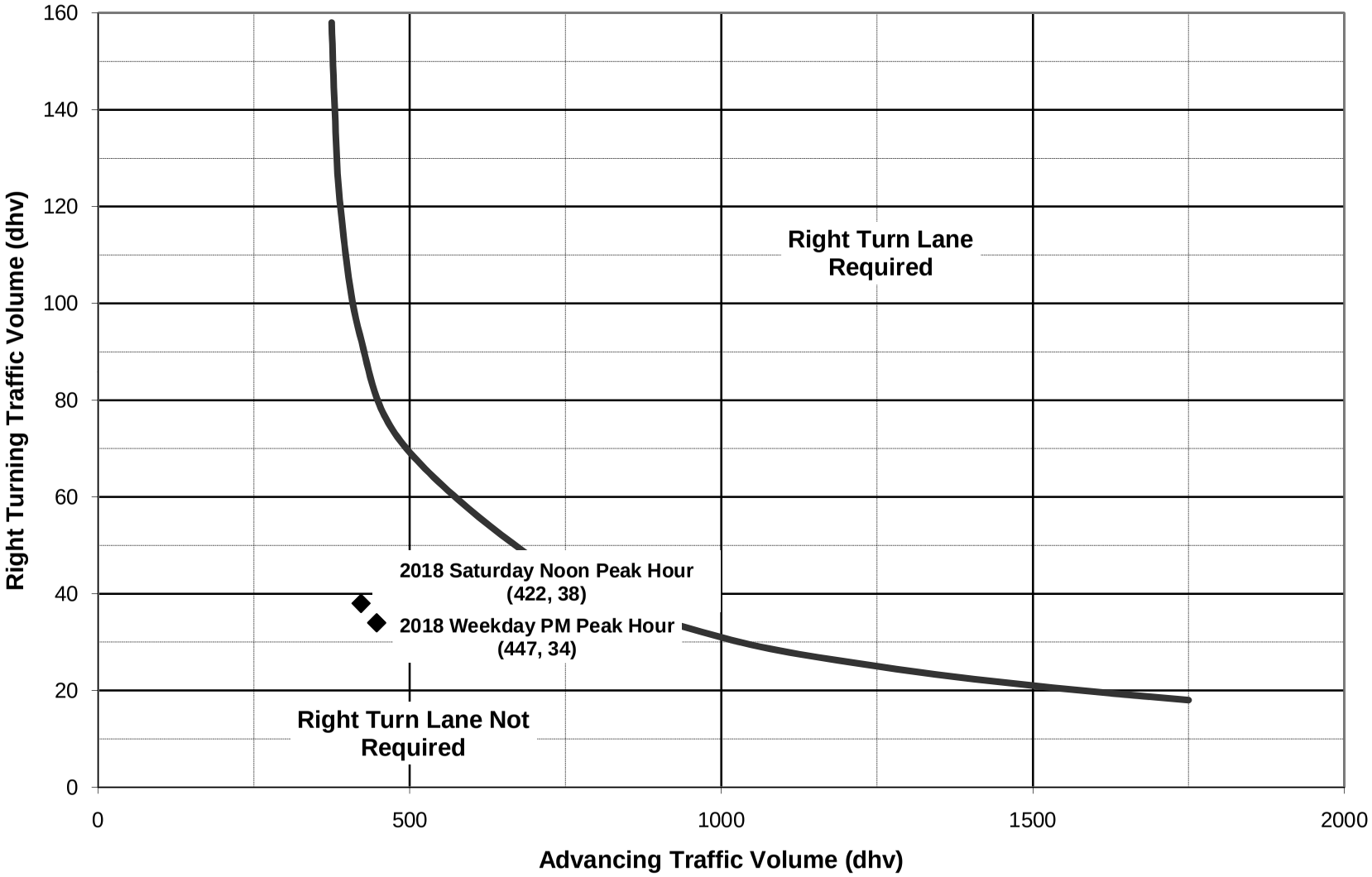


*** Includes Right Turns**

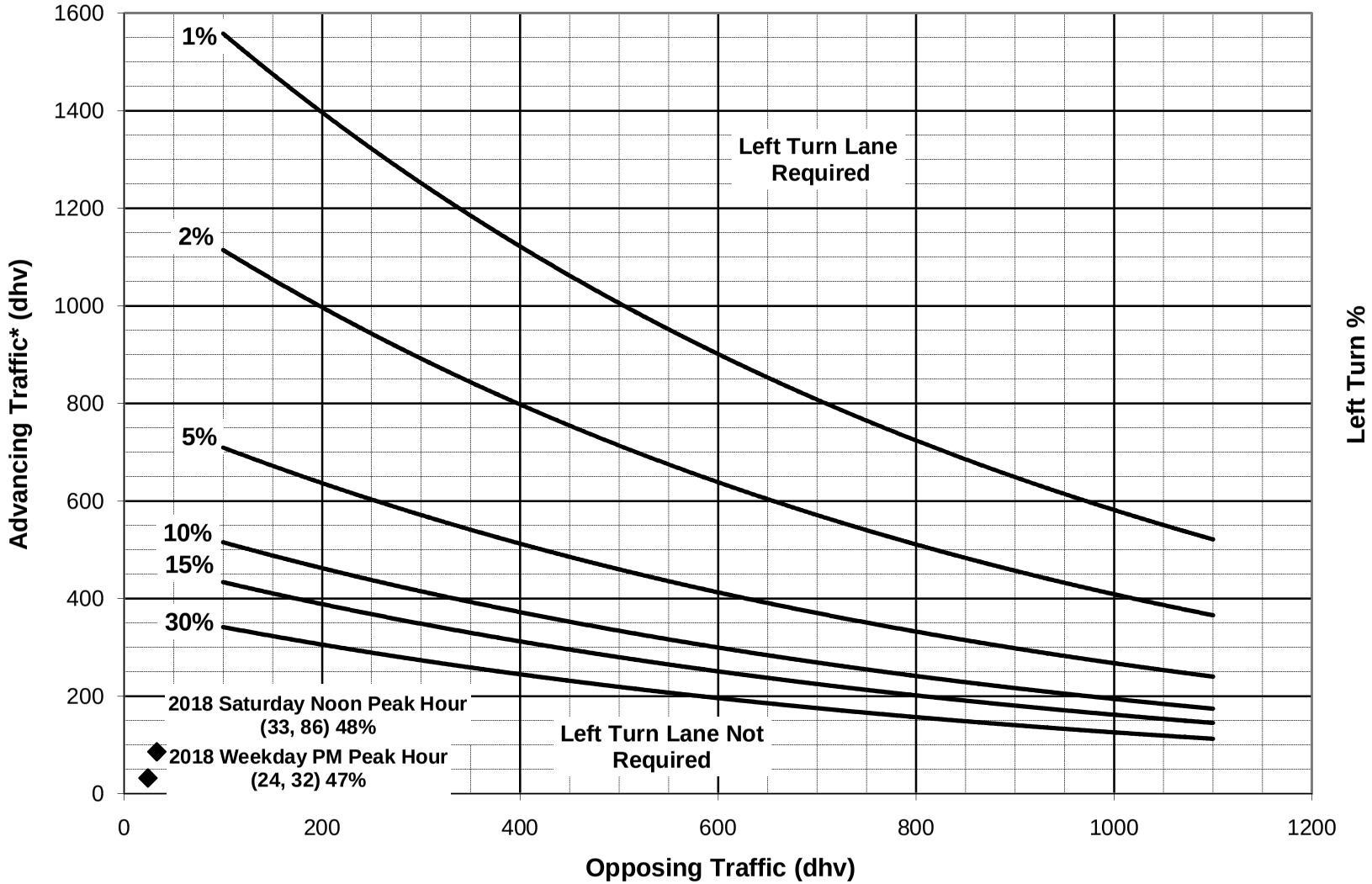
Northbound Butler Warren County Line Road @ Tyler Court/VOA Proposed Access Drive #2
2018 Total Conditions
4-Lane Highway Right Turn Lane Warrant
(>40 mph or 70 kph Posted Speed)



Southbound Butler Warren County Line Road @ VOA Proposed Access Drive #2/Tyler Court
2018 Total Conditions
4-Lane Highway Right Turn Lane Warrant
(>40 mph or 70 kph Posted Speed)

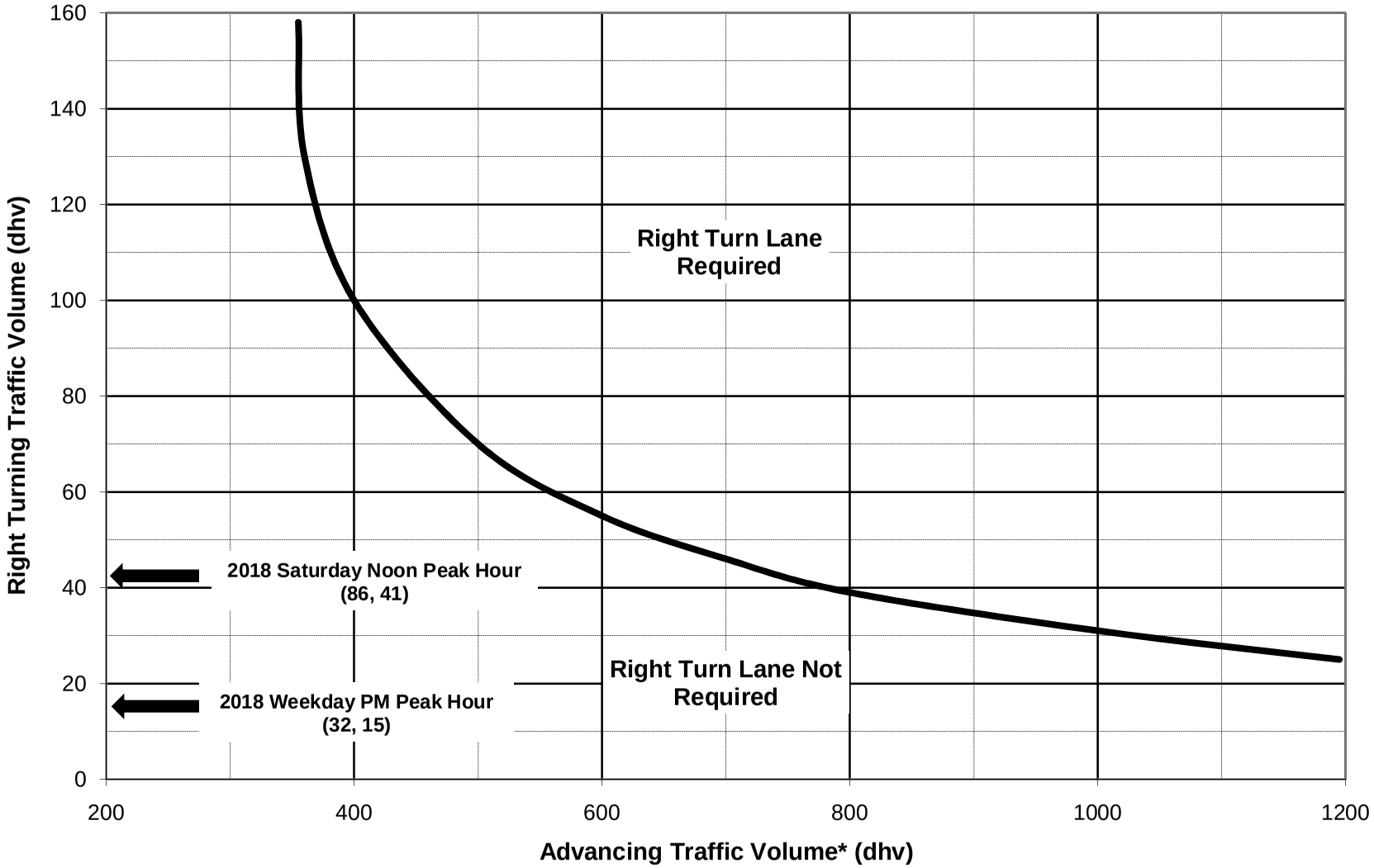


Eastbound VOA Proposed Access Drive #2/Tyler Court @ Butler Warren County Line Road
2018 Total Conditions
2-Lane Highway Left Turn Lane Warrant
(=< 40 mph or 70 kph Posted Speed)



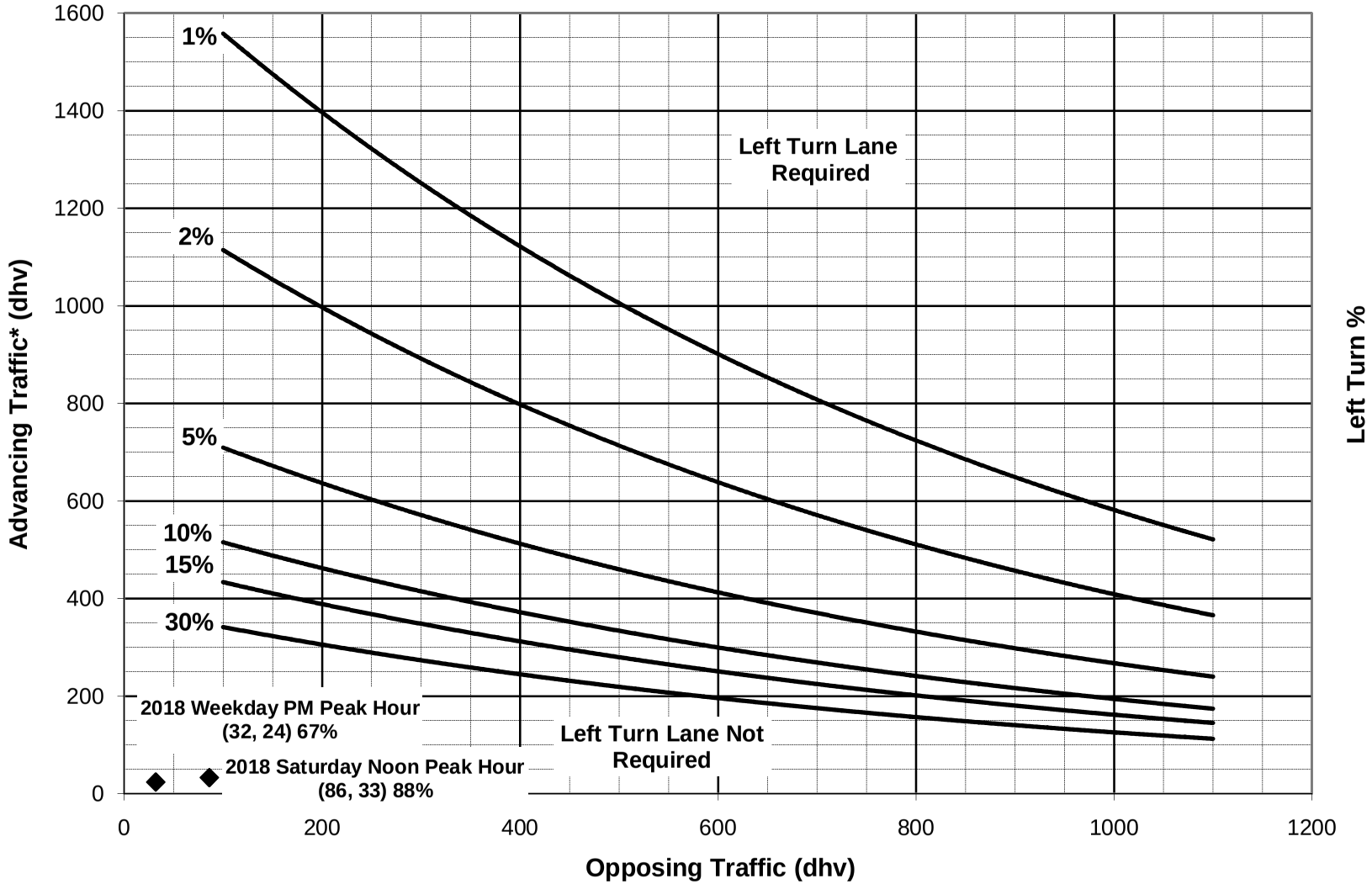
*** Includes Left Turns**

Eastbound VOA Proposed Access Drive #2/Tyler Court @ Butler Warren County Line Road
2018 Total Conditions
2-Lane Highway Right Turn Lane Warrant
(=< 40 mph or 70 kph Posted Speed)



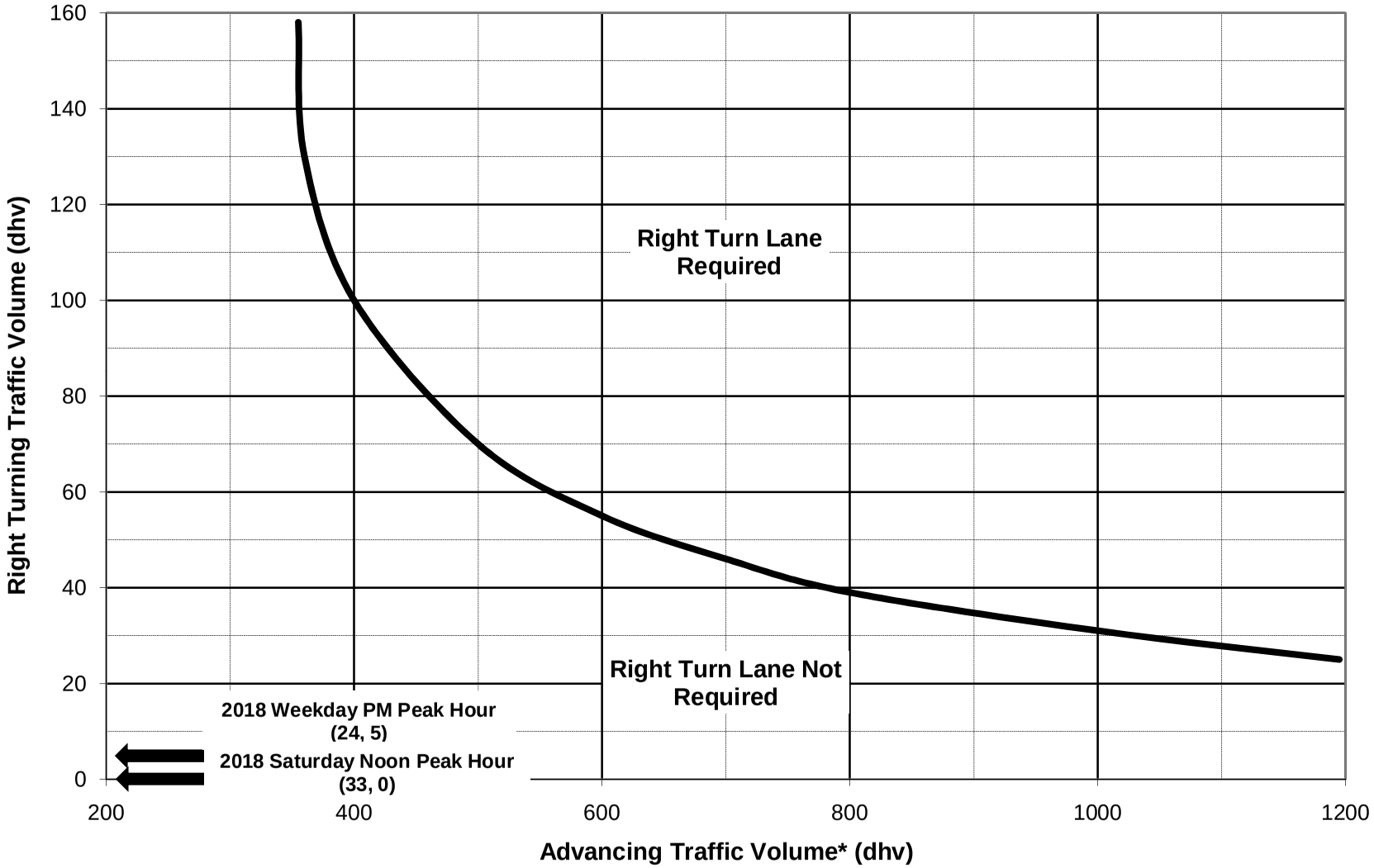
*** Includes Right Turns**

Westbound Tyler Court/VOA Proposed Access Drive #2 @ Butler Warren County Line Road
2018 Total Conditions
2-Lane Highway Left Turn Lane Warrant
(=< 40 mph or 70 kph Posted Speed)



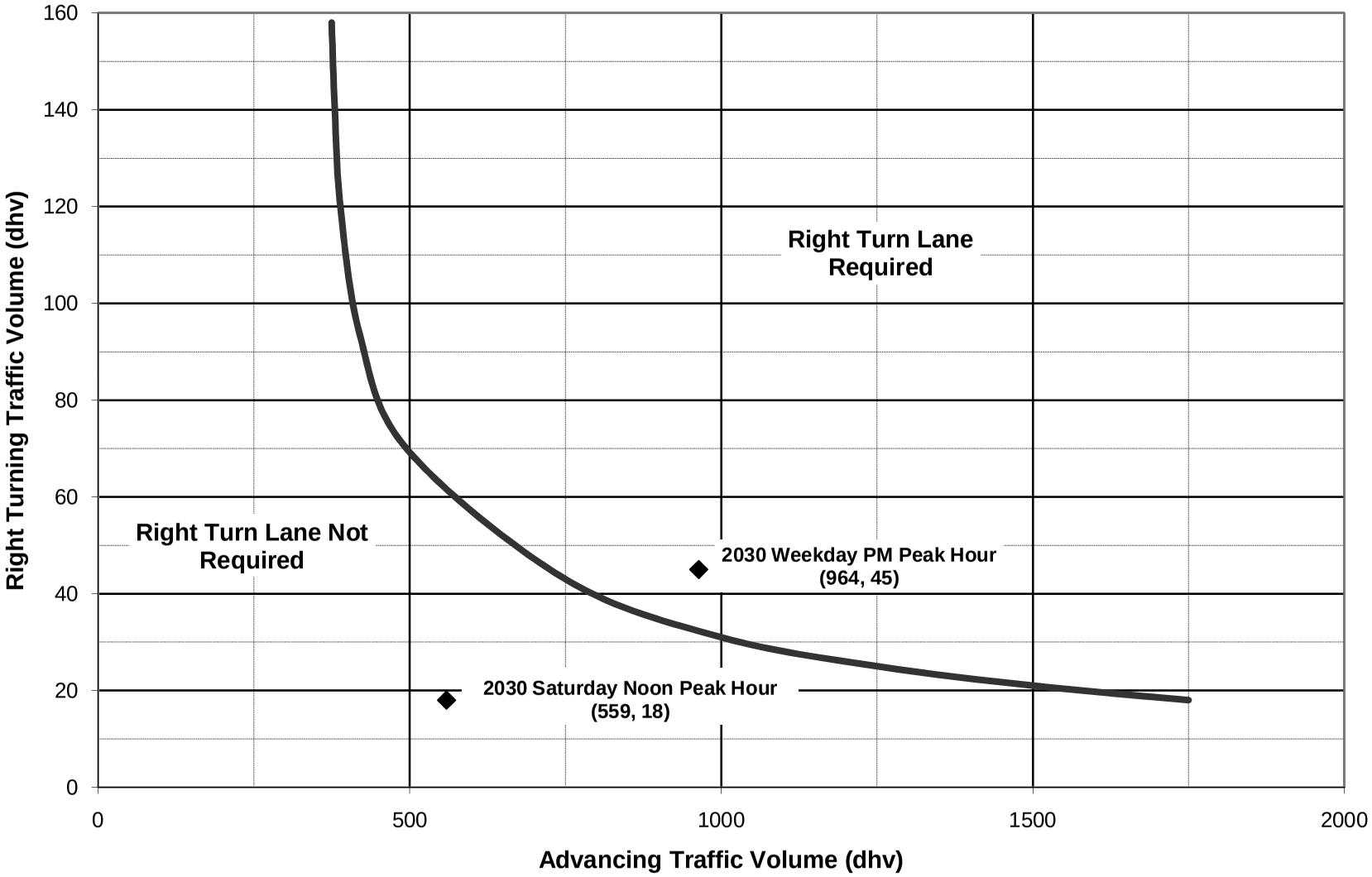
*** Includes Left Turns**

Westbound Tyler Court/VOA Proposed Access Drive #2 @ Butler Warren County Line Road
2018 Total Conditions
2-Lane Highway Right Turn Lane Warrant
(=< 40 mph or 70 kph Posted Speed)

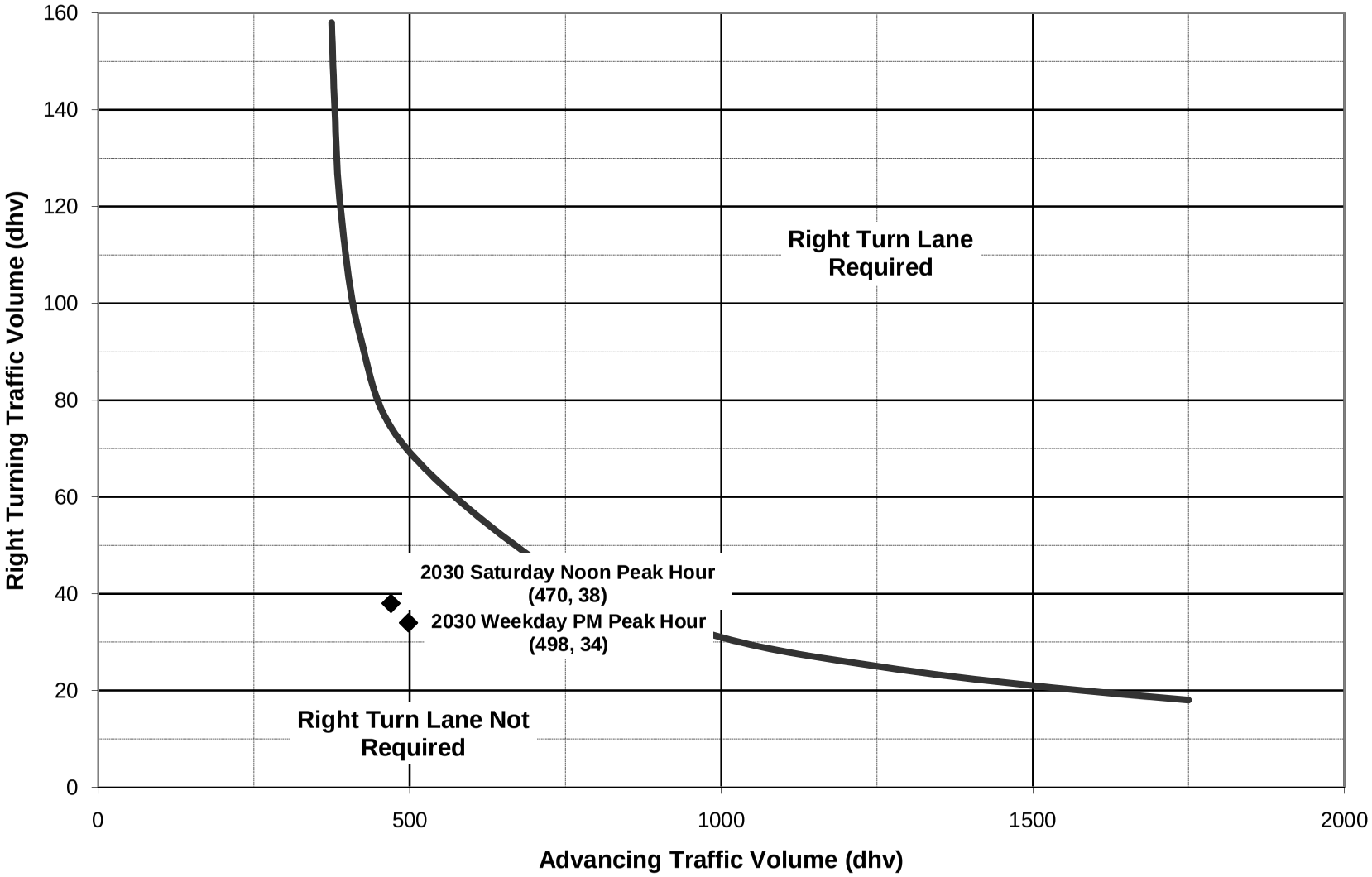


*** Includes Right Turns**

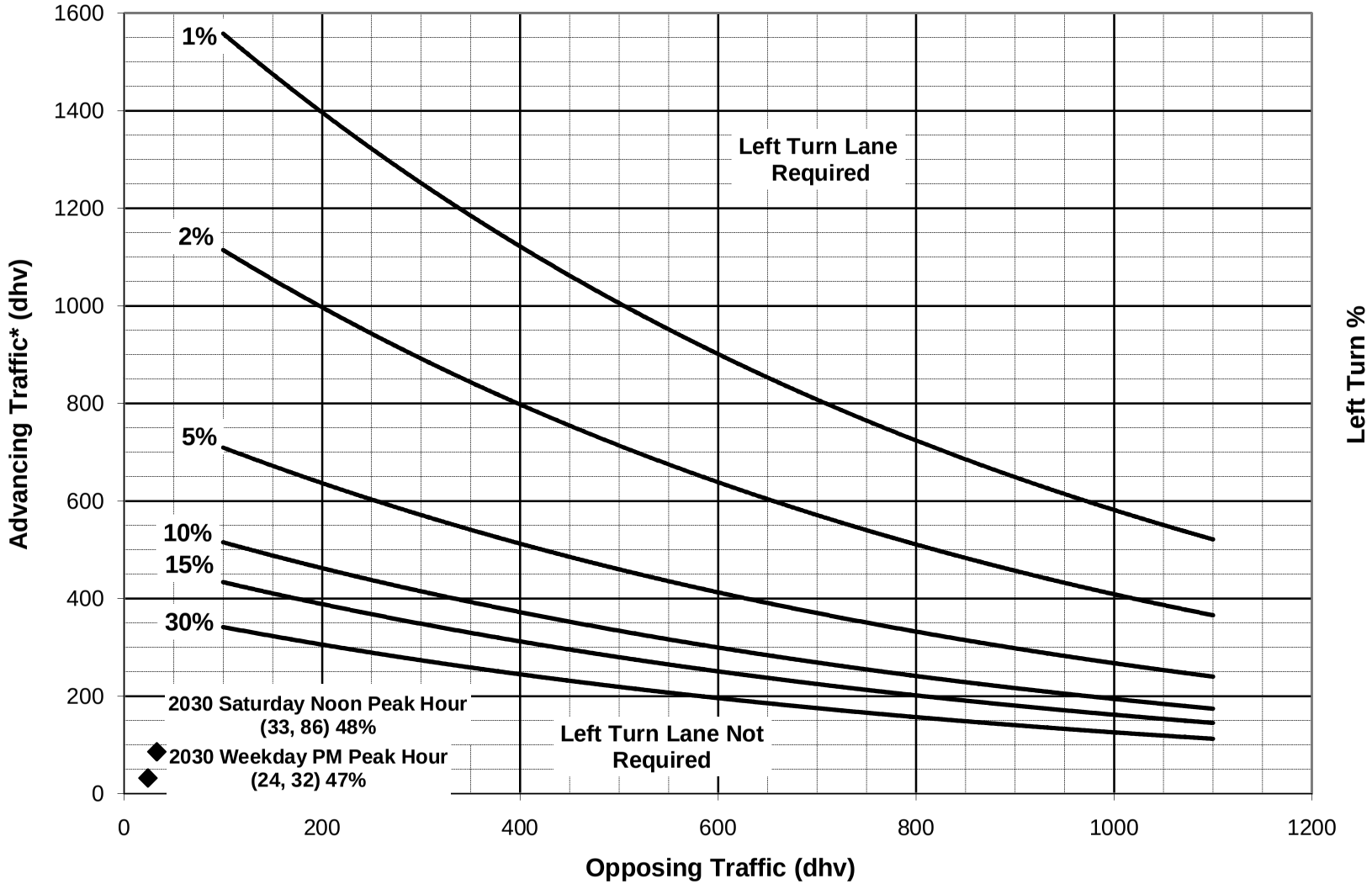
Northbound Butler Warren County Line Road @ Tyler Court/VOA Proposed Access Drive #2
2030 Total Conditions
4-Lane Highway Right Turn Lane Warrant
(>40 mph or 70 kph Posted Speed)



Southbound Butler Warren County Line Road @ VOA Proposed Access Drive #2/Tyler Court
2030 Total Conditions
4-Lane Highway Right Turn Lane Warrant
(>40 mph or 70 kph Posted Speed)

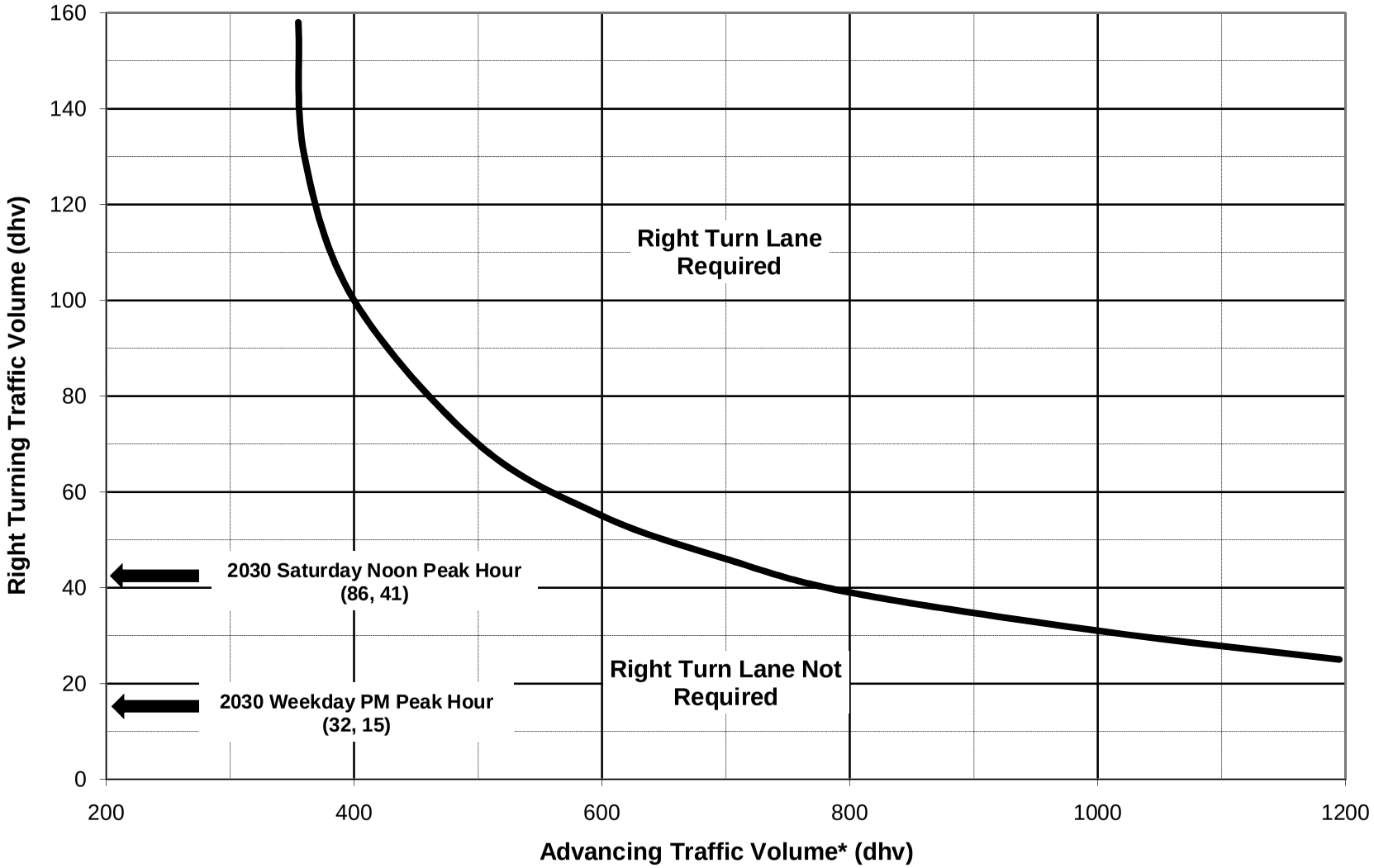


Eastbound VOA Proposed Access Drive #2/Tyler Court @ Butler Warren County Line Road
2030 Total Conditions
2-Lane Highway Left Turn Lane Warrant
(=< 40 mph or 70 kph Posted Speed)



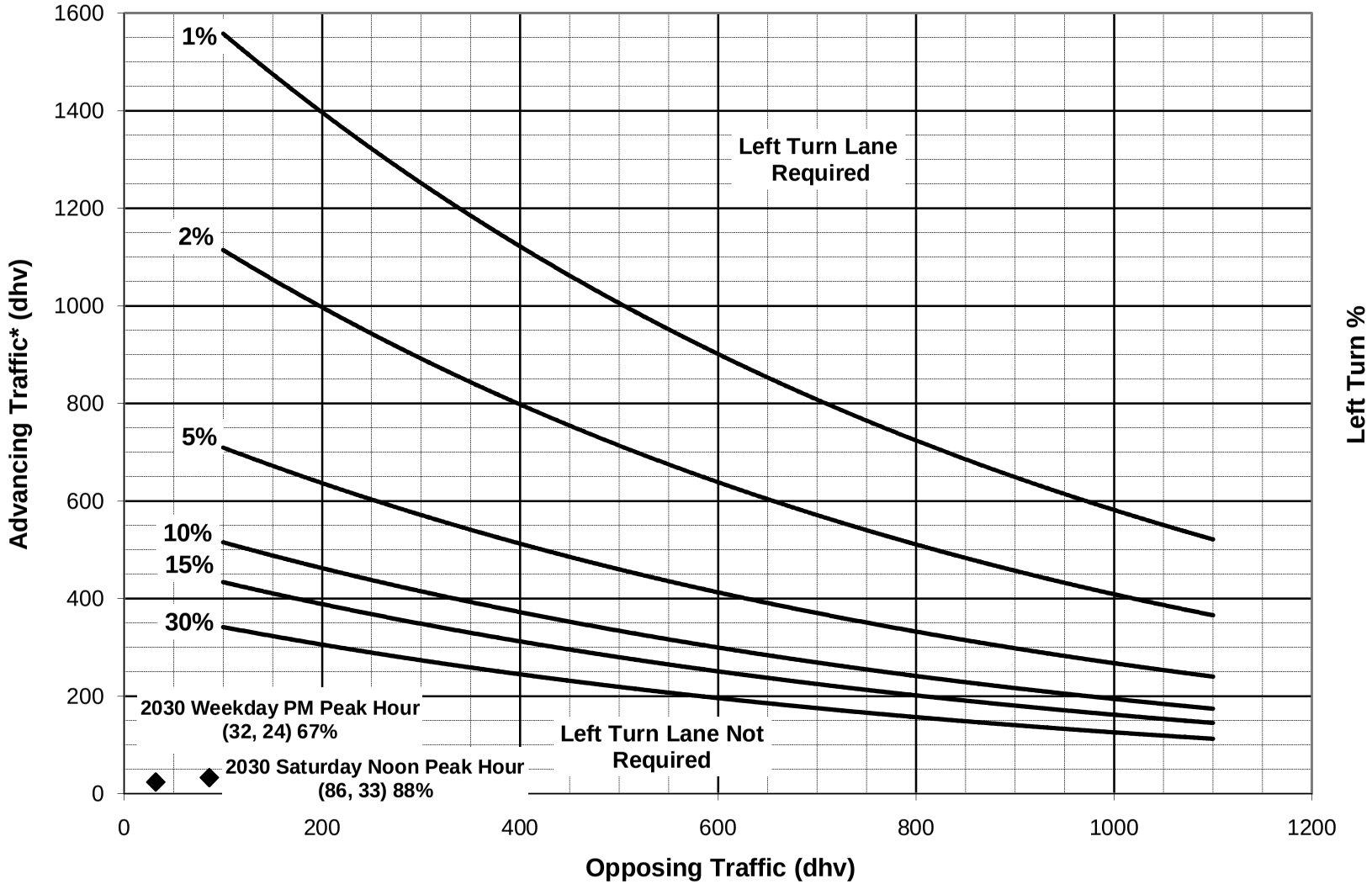
*** Includes Left Turns**

Eastbound VOA Proposed Access Drive #2/Tyler Court @ Butler Warren County Line Road
2030 Total Conditions
2-Lane Highway Right Turn Lane Warrant
(=< 40 mph or 70 kph Posted Speed)



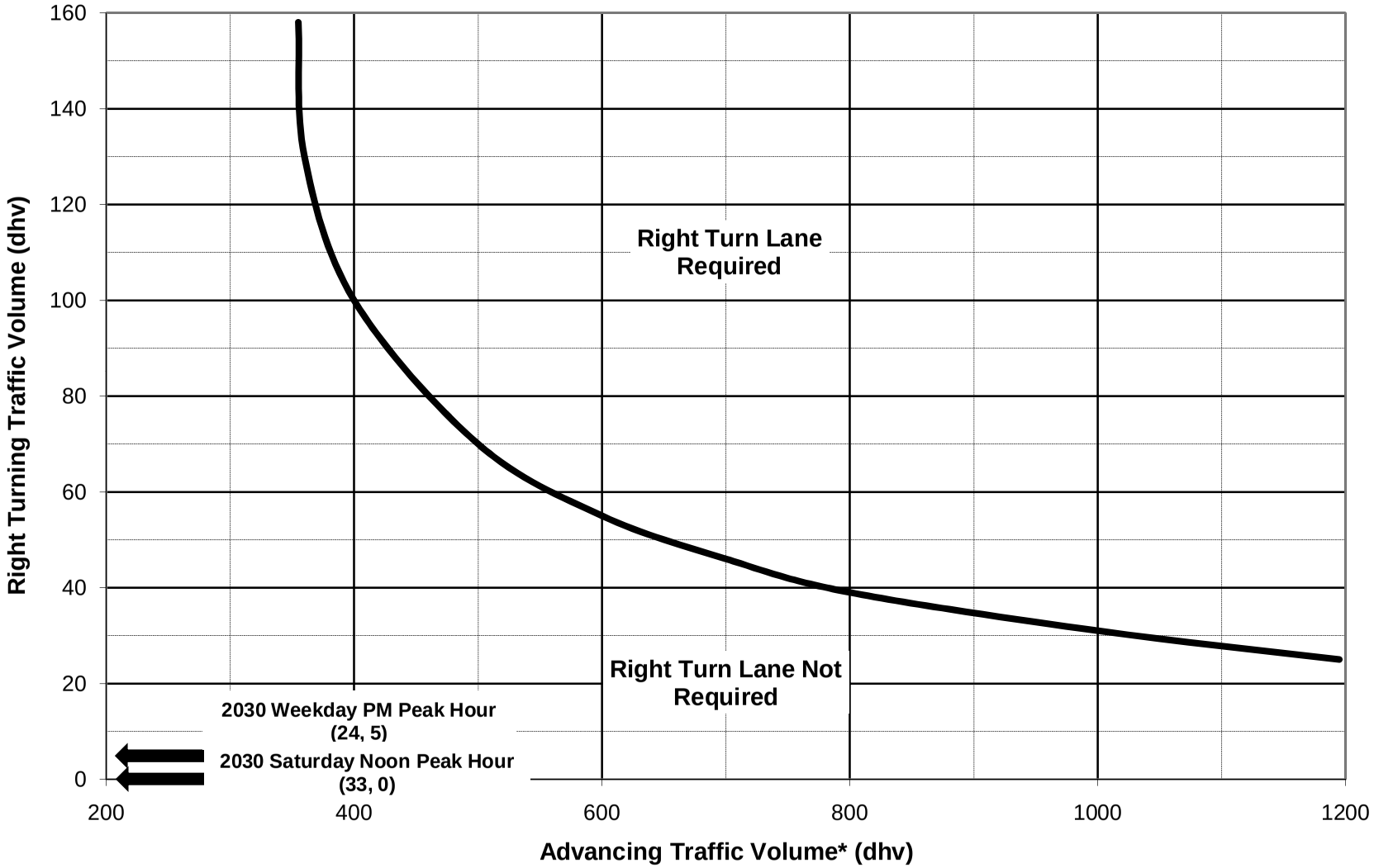
*** Includes Right Turns**

Westbound Tyler Court/VOA Proposed Access Drive #2 @ Butler Warren County Line Road
2030 Total Conditions
2-Lane Highway Left Turn Lane Warrant
(=< 40 mph or 70 kph Posted Speed)



*** Includes Left Turns**

Westbound Tyler Court/VOA Proposed Access Drive #2 @ Butler Warren County Line Road
2030 Total Conditions
2-Lane Highway Right Turn Lane Warrant
(=< 40 mph or 70 kph Posted Speed)



*** Includes Right Turns**

APPENDIX E
STORAGE LENGTH CALCULATIONS

Storage Length Calculations

Using the ODOT *Location and Design Manual*, *Volume 1* Figure 401-9 "Basis for Computing Length of Turn Lanes" and Figure 401-10 "Storage Length at Intersections."

TYLERSVILLE ROAD @ PEPPER PIKE – 2009 EXISTING CONDITIONS

Westbound Left Turn Lane - Storage required:

Data Required:

- Speed Limit = 45 mph
- Unsignalized
- Volume of Turns
  - Weekday PM Peak Hour = 21 Vehicles/Hour
  - Saturday Noon Peak Hour = 10 Vehicles/Hour

1. Determine the cycles per hour.

   Per ODOT's L & D manual, Figure 401-10, we assume 60 Cycles/Hour for an unsignalized intersection.

2. Determine Average Vehicles Per Cycle Requiring Storage.

   $$VPC = \frac{21 \text{ Vehicles/Hour}}{60 \text{ Cycles/Hour}} = 1 \text{ Vehicle/Cycle}$$

3. According to the ODOT's L & D manual, Figure 401-9, for an unsignalized through road, with a 45 mph design speed and low turn volume, Condition B applies.

Condition B:

Design Speed = 45 mph
Storage Length = 175 feet (including 50-foot diverging taper).

Therefore,

- Westbound left turn lane should be 175 feet (including 50-foot diverging taper).

BUTLER WARREN COUNTY LINE ROAD @ TYLER COURT – 2009 EXISTING CONDITIONS

Northbound Right Turn Lane - Storage required:

Data Required:

- Speed Limit = 45 mph
- Unsignalized
- Volume of Turns
  - Weekday PM Peak Hour = 45 Vehicles/Hour
  - Saturday Noon Peak Hour = 18 Vehicles/Hour

1. Determine the cycles per hour.

   Per ODOT's L & D manual, Figure 401-10, we assume 60 Cycles/Hour for an unsignalized intersection.

2. Determine Average Vehicles Per Cycle Requiring Storage.

   $$VPC = \frac{45 \text{ Vehicles/Hour}}{60 \text{ Cycles/Hour}} = 1 \text{ Vehicle/Cycle}$$

3. According to the ODOT's L & D manual, Figure 401-9, for an unsignalized through road, with a 45 mph design speed and low turn volume, Condition B applies.

Condition B:

Design Speed = 45 mph
Storage Length = 175 feet (including 50-foot diverging taper).

Therefore,

- Northbound right turn lane should be 175 feet (including 50-foot diverging taper).

TYLERSVILLE ROAD @ PEPPER PIKE – 2018 BACKGROUND CONDITIONS

Westbound Left Turn Lane - Storage required:

Data Required:

- Speed Limit = 45 mph
- Signalized
- Volume of Turns
  - Weekday PM Peak Hour = 66 Vehicles/Hour
  - Saturday Noon Peak Hour = 34 Vehicles/Hour

1. Determine the cycles per hour.

   Per HCS analysis, we assume 120 second cycle length for the signalized intersection, which is 30 Cycles/Hour.

2. Determine Average Vehicles Per Cycle Requiring Storage.

   $$VPC = \frac{66 \text{ Vehicles/Hour}}{30 \text{ Cycles/Hour}} = 3 \text{ Vehicles/Cycle}$$

3. According to the ODOT's L & D manual, Figure 401-9, for a signalized intersection, with a 45 mph design speed and low turn volume, the greater of Condition B or Condition C applies.

Condition B:

Design Speed = 45 mph
Storage Length = 175 feet (including 50-foot diverging taper).

Condition C:

According to ODOT's L & D manual, Figure 401-10 storage length for 3 vehicles/cycle = 150 feet.

Therefore,

Design Speed = 45 mph
Length = 175 feet + 150 feet storage = 325 feet (including 50-foot diverging taper)

Therefore,

- Westbound left turn lane should be 325 feet (including 50-foot diverging taper).

BUTLER WARREN COUNTY LINE ROAD @ TYLER COURT – 2018 BACKGROUND CONDITIONS

Northbound Right Turn Lane - Storage required:

Data Required:

- Speed Limit = 45 mph
- Unsignalized
- Volume of Turns
  - Weekday PM Peak Hour = 45 Vehicles/Hour
  - Saturday Noon Peak Hour = 18 Vehicles/Hour

1. Determine the cycles per hour.

   Per ODOT's L & D manual, Figure 401-10, we assume 60 Cycles/Hour for an unsignalized intersection.

2. Determine Average Vehicles Per Cycle Requiring Storage.

   $$VPC = \frac{45 \text{ Vehicles/Hour}}{60 \text{ Cycles/Hour}} = 1 \text{ Vehicle/Cycle}$$

3. According to the ODOT's L & D manual, Figure 401-9, for an unsignalized through road, with a 45 mph design speed and low turn volume, Condition B applies.

Condition B:

Design Speed = 45 mph
Storage Length = 175 feet (including 50-foot diverging taper).

Therefore,

- Northbound right turn lane should be 175 feet (including 50-foot diverging taper).

BUTLER WARREN COUNTY LINE ROAD @ TYLER COURT – 2018 BACKGROUND CONDITIONS

Southbound Left Turn Lane - Storage required:

Data Required:

- Speed Limit = 45 mph
- Unsignalized
- Volume of Turns
    - Weekday PM Peak Hour = 8 Vehicles/Hour
    - Saturday Noon Peak Hour = 3 Vehicles/Hour

1. Determine the cycles per hour.

   Per ODOT's L & D manual, Figure 401-10, we assume 60 Cycles/Hour for an unsignalized intersection.

2. Determine Average Vehicles Per Cycle Requiring Storage.

   $$VPC = \frac{8 \text{ Vehicles/Hour}}{60 \text{ Cycles/Hour}} = 1 \text{ Vehicle/Cycle}$$

3. According to the ODOT's L & D manual, Figure 401-9, for an unsignalized through road, with a 45 mph design speed and low turn volume, Condition B applies.

Condition B:

Design Speed = 45 mph
Storage Length = 175 feet (including 50-foot diverging taper).

Therefore,

- Southbound left turn lane should be 175 feet (including 50-foot diverging taper).

TYLERSVILLE ROAD @ PEPPER PIKE – 2030 BACKGROUND CONDITIONS

Westbound Left Turn Lane - Storage required:

Data Required:

- Speed Limit = 45 mph
- Signalized
- Volume of Turns
  - Weekday PM Peak Hour = 66 Vehicles/Hour
  - Saturday Noon Peak Hour = 34 Vehicles/Hour

1. Determine the cycles per hour.

   Per HCS analysis, we assume 120 second cycle length for the signalized intersection, which is 30 Cycles/Hour.

2. Determine Average Vehicles Per Cycle Requiring Storage.

   $$VPC = \frac{66 \text{ Vehicles/Hour}}{30 \text{ Cycles/Hour}} = 3 \text{ Vehicles/Cycle}$$

3. According to the ODOT's L & D manual, Figure 401-9, for a signalized intersection, with a 45 mph design speed and low turn volume, the greater of Condition B or Condition C applies.

Condition B:

Design Speed = 45 mph
Storage Length = 175 feet (including 50-foot diverging taper).

Condition C:

According to ODOT's L & D manual, Figure 401-10 storage length for 3 vehicles/cycle = 150 feet.

Therefore,

Design Speed = 45 mph
Length = 175 feet + 150 feet storage = 325 feet (including 50-foot diverging taper)

Therefore,

- Westbound left turn lane should be 325 feet (including 50-foot diverging taper).

BUTLER WARREN COUNTY LINE ROAD @ TYLER COURT – 2030 BACKGROUND CONDITIONS

Northbound Right Turn Lane - Storage required:

Data Required:

- Speed Limit = 45 mph
- Unsignalized
- Volume of Turns
  - Weekday PM Peak Hour = 45 Vehicles/Hour
  - Saturday Noon Peak Hour =18 Vehicles/Hour

1. Determine the cycles per hour.

   Per ODOT's L & D manual, Figure 401-10, we assume 60 Cycles/Hour for an unsignalized intersection.

2. Determine Average Vehicles Per Cycle Requiring Storage.

   $$VPC = \frac{45 \text{ Vehicles/Hour}}{60 \text{ Cycles/Hour}} = 1 \text{ Vehicle/Cycle}$$

3. According to the ODOT's L & D manual, Figure 401-9, for an unsignalized through road, with a 45 mph design speed and low turn volume, Condition B applies.

Condition B:

Design Speed = 45 mph
Storage Length = 175 feet (including 50-foot diverging taper).

Therefore,

- Northbound right turn lane should be 175 feet (including 50-foot diverging taper).

BUTLER WARREN COUNTY LINE ROAD @ TYLER COURT – 2030 BACKGROUND CONDITIONS

Southbound Left Turn Lane - Storage required:

Data Required:

- Speed Limit = 45 mph
- Unsignalized
- Volume of Turns
    - Weekday PM Peak Hour = 8 Vehicles/Hour
    - Saturday Noon Peak Hour = 3 Vehicles/Hour

1. Determine the cycles per hour.

   Per ODOT's L & D manual, Figure 401-10, we assume 60 Cycles/Hour for an unsignalized intersection.

2. Determine Average Vehicles Per Cycle Requiring Storage.

   $$VPC = \frac{8 \text{ Vehicles/Hour}}{60 \text{ Cycles/Hour}} = 1 \text{ Vehicle/Cycle}$$

3. According to the ODOT's L & D manual, Figure 401-9, for an unsignalized through road, with a 45 mph design speed and low turn volume, Condition B applies.

Condition B:

Design Speed = 45 mph
Storage Length = 175 feet (including 50-foot diverging taper).

Therefore,

- Southbound left turn lane should be 175 feet (including 50-foot diverging taper).

TYLERSVILLE ROAD @ VOA PROPOSED ACCESS DRIVE #1/PEPPER PIKE – 2018 TOTAL CONDITIONS

Eastbound Left Turn Lane - Storage required:

Data Required:

- Speed Limit = 45 mph
- Signalized
- Volume of Turns
  - Weekday PM Peak Hour = 103 Vehicles/Hour
  - Saturday Noon Peak Hour =113 Vehicles/Hour

1. Determine the cycles per hour.

   Per HCS analysis, we assume 120 second cycle length for the signalized intersection, which is 30 Cycles/Hour.

2. Determine Average Vehicles Per Cycle Requiring Storage.

   $$VPC = \frac{113 \text{ Vehicles/Hour}}{30 \text{ Cycles/Hour}} = 4 \text{ Vehicles/Cycle}$$

3. According to the ODOT's L & D manual, Figure 401-9, for a signalized intersection, with a 45 mph design speed and low turn volume, the greater of Condition B or Condition C applies.

Condition B:

Design Speed = 45 mph
Storage Length = 175 feet (including 50-foot diverging taper).

Condition C:

According to ODOT's L & D manual, Figure 401-10 storage length for 4 vehicles/cycle = 175 feet.

Therefore,

Design Speed = 45 mph
Length = 175 feet + 175 feet storage = 350 feet (including 50-foot diverging taper)

Therefore,

- Eastbound left turn lane should be 350 feet (including 50-foot diverging taper).

TYLERSVILLE ROAD @ PEPPER PIKE/VOA PROPOSED ACCESS DRIVE #1 – 2018 TOTAL CONDITIONS

Westbound Left Turn Lane - Storage required:

Data Required:

- Speed Limit = 45 mph
- Signalized
- Volume of Turns
  - Weekday PM Peak Hour = 66 Vehicles/Hour
  - Saturday Noon Peak Hour = 34 Vehicles/Hour

1. Determine the cycles per hour.

   Per HCS analysis, we assume 120 second cycle length for the signalized intersection, which is 30 Cycles/Hour.

2. Determine Average Vehicles Per Cycle Requiring Storage.

   $$VPC = \frac{66 \text{ Vehicles/Hour}}{30 \text{ Cycles/Hour}} = 3 \text{ Vehicles/Cycle}$$

3. According to the ODOT's L & D manual, Figure 401-9, for a signalized intersection, with a 45 mph design speed and low turn volume, the greater of Condition B or Condition C applies.

Condition B:

Design Speed = 45 mph
Storage Length = 175 feet (including 50-foot diverging taper).

Condition C:

According to ODOT's L & D manual, Figure 401-10 storage length for 3 vehicles/cycle = 150 feet.

Therefore,

Design Speed = 45 mph
Length = 175 feet + 150 feet storage = 325 feet (including 50-foot diverging taper)

Therefore,

- Westbound left turn lane should be 325 feet (including 50-foot diverging taper).

PEPPER PIKE/VOA PROPOSED ACCESS DRIVE #1 @ TYLERSVILLE ROAD – 2018 TOTAL CONDITIONS

Northbound Left Turn Lane - Storage required:

Data Required:

- Speed Limit = 25 mph
- Signalized
- Volume of Turns
  - Weekday PM Peak Hour = 90 Vehicles/Hour
  - Saturday Noon Peak Hour = 120 Vehicles/Hour

1. Determine the cycles per hour.

   Per HCS analysis, we assume 120 second cycle length for the signalized intersection, which is 30 Cycles/Hour.

2. Determine Average Vehicles Per Cycle Requiring Storage.

   $$VPC = \frac{120 \text{ Vehicles/Hour}}{30 \text{ Cycles/Hour}} = 4 \text{ Vehicles/Cycle}$$

3. According to the ODOT's L & D manual, Figure 401-9, for a signalized intersection, with a 25 mph design speed and high turn volume, Condition A applies.

Condition C:

According to ODOT's L & D manual, Figure 401-10 storage length for 4 vehicles/cycle = 175 feet.

Therefore,

Length = 50 feet + 175 feet storage = 225 feet (including 50-foot diverging taper)

Therefore,

- Northbound left turn lane should be 225 feet (including 50-foot diverging taper).

VOA PROPOSED ACCESS DRIVE #1/PEPPER PIKE @ TYLERSVILLE ROAD – 2018 TOTAL CONDITIONS

Southbound Left Turn Lane - Storage required:

Data Required:

- Speed Limit = 25 mph
- Signalized
- Volume of Turns
    - Weekday PM Peak Hour = 46 Vehicles/Hour
    - Saturday Noon Peak Hour = 123 Vehicles/Hour

1. Determine the cycles per hour.

   Per HCS analysis, we assume 120 second cycle length for the signalized intersection, which is 30 Cycles/Hour.

2. Determine Average Vehicles Per Cycle Requiring Storage.

   $$VPC = \frac{123 \text{ Vehicles/Hour}}{30 \text{ Cycles/Hour}} = 5 \text{ Vehicles/Cycle}$$

3. According to the ODOT's L & D manual, Figure 401-9, for a signalized intersection, with a 25 mph design speed and high turn volume, Condition A applies.

Condition C:

According to ODOT's L & D manual, Figure 401-10 storage length for 5 vehicles/cycle = 200 feet.

Therefore,

Length = 50 feet + 200 feet storage = 250 feet (including 50-foot diverging taper)

Therefore,

- Southbound left turn lane should be 250 feet (including 50-foot diverging taper).

BUTLER WARREN COUNTY LINE ROAD @ VOA PROPOSED ACCESS DRIVE #2/TYLER COURT – 2018 TOTAL CONDITIONS

Northbound Left Turn Lane - Storage required:

Data Required:

- Speed Limit = 45 mph
- Unsignalized
- Volume of Turns
  - Weekday PM Peak Hour = 34 Vehicles/Hour
  - Saturday Noon Peak Hour = 38 Vehicles/Hour

1. Determine the cycles per hour.

   Per ODOT's L & D manual, Figure 401-10, we assume 60 Cycles/Hour for an unsignalized intersection.

2. Determine Average Vehicles Per Cycle Requiring Storage.

   $$VPC = \frac{38 \text{ Vehicles/Hour}}{60 \text{ Cycles/Hour}} = 1 \text{ Vehicle/Cycle}$$

3. According to the ODOT's L & D manual, Figure 401-9, for an unsignalized through road, with a 45 mph design speed and low turn volume, Condition B applies.

Condition B:

Design Speed = 45 mph
Storage Length = 175 feet (including 50-foot diverging taper).

Therefore,

- Northbound left turn lane should be 175 feet (including 50-foot diverging taper).

BUTLER WARREN COUNTY LINE ROAD @ TYLER COURT/VOA PROPOSED ACCESS DRIVE #2 – 2018 TOTAL CONDITIONS

Northbound Right Turn Lane - Storage required:

Data Required:

- Speed Limit = 45 mph
- Unsignalized
- Volume of Turns
  - Weekday PM Peak Hour = 45 Vehicles/Hour
  - Saturday Noon Peak Hour = 18 Vehicles/Hour

1. Determine the cycles per hour.

   Per ODOT's L & D manual, Figure 401-10, we assume 60 Cycles/Hour for an unsignalized intersection.

2. Determine Average Vehicles Per Cycle Requiring Storage.

   $$VPC = \frac{45 \text{ Vehicles/Hour}}{60 \text{ Cycles/Hour}} = 1 \text{ Vehicle/Cycle}$$

3. According to the ODOT's L & D manual, Figure 401-9, for an unsignalized through road, with a 45 mph design speed and low turn volume, Condition B applies.

Condition B:

Design Speed = 45 mph
Storage Length = 175 feet (including 50-foot diverging taper).

Therefore,

- Northbound right turn lane should be 175 feet (including 50-foot diverging taper).

BUTLER WARREN COUNTY LINE ROAD @ TYLER COURT/VOA PROPOSED ACCESS DRIVE #2 – 2018 TOTAL CONDITIONS

Southbound Left Turn Lane - Storage required:

Data Required:

- Speed Limit = 45 mph
- Unsignalized
- Volume of Turns
    - Weekday PM Peak Hour = 8 Vehicles/Hour
    - Saturday Noon Peak Hour = 3 Vehicles/Hour

1. Determine the cycles per hour.

   Per ODOT's L & D manual, Figure 401-10, we assume 60 Cycles/Hour for an unsignalized intersection.

2. Determine Average Vehicles Per Cycle Requiring Storage.

   $$VPC = \frac{8 \text{ Vehicles/Hour}}{60 \text{ Cycles/Hour}} = 1 \text{ Vehicle/Cycle}$$

3. According to the ODOT's L & D manual, Figure 401-9, for an unsignalized through road, with a 45 mph design speed and low turn volume, Condition B applies.

Condition B:

Design Speed = 45 mph
Storage Length = 175 feet (including 50-foot diverging taper).

Therefore,

- Southbound left turn lane should be 175 feet (including 50-foot diverging taper).

TYLERSVILLE ROAD @ VOA PROPOSED ACCESS DRIVE #1/PEPPER PIKE – 2030 TOTAL CONDITIONS

Eastbound Left Turn Lane - Storage required:

Data Required:

- Speed Limit = 45 mph
- Signalized
- Volume of Turns
  - Weekday PM Peak Hour = 103 Vehicles/Hour
  - Saturday Noon Peak Hour =113 Vehicles/Hour

1. Determine the cycles per hour.

   Per HCS analysis, we assume 120 second cycle length for the signalized intersection, which is 30 Cycles/Hour.

2. Determine Average Vehicles Per Cycle Requiring Storage.

   $$VPC = \frac{113 \text{ Vehicles/Hour}}{30 \text{ Cycles/Hour}} = 4 \text{ Vehicles/Cycle}$$

3. According to the ODOT's L & D manual, Figure 401-9, for a signalized intersection, with a 45 mph design speed and low turn volume, the greater of Condition B or Condition C applies.

Condition B:

Design Speed = 45 mph
Storage Length = 175 feet (including 50-foot diverging taper).

Condition C:

According to ODOT's L & D manual, Figure 401-10 storage length for 4 vehicles/cycle = 175 feet.

Therefore,

Design Speed = 45 mph
Length = 175 feet + 175 feet storage = 350 feet (including 50-foot diverging taper)

Therefore,

- Eastbound left turn lane should be 350 feet (including 50-foot diverging taper).

TYLERSVILLE ROAD @ PEPPER PIKE/VOA PROPOSED ACCESS DRIVE #1 – 2030 TOTAL CONDITIONS

Westbound Left Turn Lane - Storage required:

Data Required:

- Speed Limit = 45 mph
- Signalized
- Volume of Turns
  - Weekday PM Peak Hour = 66 Vehicles/Hour
  - Saturday Noon Peak Hour = 34 Vehicles/Hour

1. Determine the cycles per hour.

   Per HCS analysis, we assume 120 second cycle length for the signalized intersection, which is 30 Cycles/Hour.

2. Determine Average Vehicles Per Cycle Requiring Storage.

   $$VPC = \frac{66 \text{ Vehicles/Hour}}{30 \text{ Cycles/Hour}} = 3 \text{ Vehicles/Cycle}$$

3. According to the ODOT's L & D manual, Figure 401-9, for a signalized intersection, with a 45 mph design speed and low turn volume, the greater of Condition B or Condition C applies.

Condition B:

Design Speed = 45 mph
Storage Length = 175 feet (including 50-foot diverging taper).

Condition C:

According to ODOT's L & D manual, Figure 401-10 storage length for 3 vehicles/cycle = 150 feet.

Therefore,

Design Speed = 45 mph
Length = 175 feet + 150 feet storage = 325 feet (including 50-foot diverging taper)

Therefore,

- Westbound left turn lane should be 325 feet (including 50-foot diverging taper).

PEPPER PIKE/VOA PROPOSED ACCESS DRIVE #1 @ TYLERSVILLE ROAD – 2030 TOTAL CONDITIONS

Northbound Left Turn Lane - Storage required:

Data Required:

- Speed Limit = 25 mph
- Signalized
- Volume of Turns
  - Weekday PM Peak Hour = 90 Vehicles/Hour
  - Saturday Noon Peak Hour = 120 Vehicles/Hour

1. Determine the cycles per hour.

   Per HCS analysis, we assume 120 second cycle length for the signalized intersection, which is 30 Cycles/Hour.

2. Determine Average Vehicles Per Cycle Requiring Storage.

   $$VPC = \frac{120 \text{ Vehicles/Hour}}{30 \text{ Cycles/Hour}} = 4 \text{ Vehicles/Cycle}$$

3. According to the ODOT's L & D manual, Figure 401-9, for a signalized intersection, with a 25 mph design speed and high turn volume, Condition A applies.

Condition C:

According to ODOT's L & D manual, Figure 401-10 storage length for 4 vehicles/cycle = 175 feet.

Therefore,

Length = 50 feet + 175 feet storage = 225 feet (including 50-foot diverging taper)

Therefore,

- Northbound left turn lane should be 225 feet (including 50-foot diverging taper).

VOA PROPOSED ACCESS DRIVE #1/PEPPER PIKE @ TYLERSVILLE ROAD – 2030 TOTAL CONDITIONS

Southbound Left Turn Lane - Storage required:

Data Required:

- Speed Limit = 25 mph
- Signalized
- Volume of Turns
  - Weekday PM Peak Hour = 46 Vehicles/Hour
  - Saturday Noon Peak Hour = 123 Vehicles/Hour

1. Determine the cycles per hour.

   Per HCS analysis, we assume 120 second cycle length for the signalized intersection, which is 30 Cycles/Hour.

2. Determine Average Vehicles Per Cycle Requiring Storage.

   $$VPC = \frac{123 \text{ Vehicles/Hour}}{30 \text{ Cycles/Hour}} = 5 \text{ Vehicles/Cycle}$$

3. According to the ODOT's L & D manual, Figure 401-9, for a signalized intersection, with a 25 mph design speed and high turn volume, Condition A applies.

Condition C:

According to ODOT's L & D manual, Figure 401-10 storage length for 5 vehicles/cycle = 200 feet.

Therefore,

Length = 50 feet + 200 feet storage = 250 feet (including 50-foot diverging taper)

Therefore,

- Southbound left turn lane should be 250 feet (including 50-foot diverging taper).

BUTLER WARREN COUNTY LINE ROAD @ VOA PROPOSED ACCESS DRIVE #2/TYLER COURT – 2030 TOTAL CONDITIONS

Northbound Left Turn Lane - Storage required:

Data Required:

- Speed Limit = 45 mph
- Unsignalized
- Volume of Turns
  - Weekday PM Peak Hour = 34 Vehicles/Hour
  - Saturday Noon Peak Hour = 38 Vehicles/Hour

1. Determine the cycles per hour.

   Per ODOT's L & D manual, Figure 401-10, we assume 60 Cycles/Hour for an unsignalized intersection.

2. Determine Average Vehicles Per Cycle Requiring Storage.

   $$VPC = \frac{38 \text{ Vehicles/Hour}}{60 \text{ Cycles/Hour}} = 1 \text{ Vehicle/Cycle}$$

3. According to the ODOT's L & D manual, Figure 401-9, for an unsignalized through road, with a 45 mph design speed and low turn volume, Condition B applies.

Condition B:

Design Speed = 45 mph
Storage Length = 175 feet (including 50-foot diverging taper).

Therefore,

- Northbound left turn lane should be 175 feet (including 50-foot diverging taper).

BUTLER WARREN COUNTY LINE ROAD @ TYLER COURT/VOA PROPOSED ACCESS DRIVE #2 – 2030 TOTAL CONDITIONS

Northbound Right Turn Lane - Storage required:

Data Required:

- Speed Limit = 45 mph
- Unsignalized
- Volume of Turns
  - Weekday PM Peak Hour = 45 Vehicles/Hour
  - Saturday Noon Peak Hour = 18 Vehicles/Hour

1. Determine the cycles per hour.

   Per ODOT's L & D manual, Figure 401-10, we assume 60 Cycles/Hour for an unsignalized intersection.

2. Determine Average Vehicles Per Cycle Requiring Storage.

   $$VPC = \frac{45 \text{ Vehicles/Hour}}{60 \text{ Cycles/Hour}} = 1 \text{ Vehicle/Cycle}$$

3. According to the ODOT's L & D manual, Figure 401-9, for an unsignalized through road, with a 45 mph design speed and low turn volume, Condition B applies.

Condition B:

Design Speed = 45 mph
Storage Length = 175 feet (including 50-foot diverging taper).

Therefore,

- Northbound right turn lane should be 175 feet (including 50-foot diverging taper).

BUTLER WARREN COUNTY LINE ROAD @ TYLER COURT/VOA PROPOSED ACCESS DRIVE #2 – 2030 TOTAL CONDITIONS

Southbound Left Turn Lane - Storage required:

Data Required:

- Speed Limit = 45 mph
- Unsignalized
- Volume of Turns
    - Weekday PM Peak Hour = 8 Vehicles/Hour
    - Saturday Noon Peak Hour = 3 Vehicles/Hour

1. Determine the cycles per hour.

   Per ODOT's L & D manual, Figure 401-10, we assume 60 Cycles/Hour for an unsignalized intersection.

2. Determine Average Vehicles Per Cycle Requiring Storage.

   $$VPC = \frac{8 \text{ Vehicles/Hour}}{60 \text{ Cycles/Hour}} = 1 \text{ Vehicle/Cycle}$$

3. According to the ODOT's L & D manual, Figure 401-9, for an unsignalized through road, with a 45 mph design speed and low turn volume, Condition B applies.

Condition B:

Design Speed = 45 mph
Storage Length = 175 feet (including 50-foot diverging taper).

Therefore,

- Southbound left turn lane should be 175 feet (including 50-foot diverging taper).

APPENDIX F
INTERSECTION CAPACITY ANALYSIS

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*KMD*
Agency/Co.	*Bayer Becker*
Date Performed	*01/26/09*
Analysis Time Period	*Weekday PM Peak Hour*

Site Information

Intersection	*Tylersville Rd. & Pepper Pk.*
Jurisdiction	*BCEO*
Analysis Year	*2009 Existing Conditions*

Project Description *07M056.000 - Voice of America Park*

East/West Street: *Tylersville Road* | North/South Street: *Pepper Pike*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*1373*	*58*	*21*	*1230*	
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*0*	*1525*	*64*	*23*	*1366*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*0*	*1*	*2*	*0*
Configuration		*T*	*TR*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*11*		*10*			
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*12*	*0*	*11*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (veh/h)		*23*		*23*				
C (m) (veh/h)		*419*		*57*				
v/c		*0.05*		*0.40*				
95% queue length		*0.17*		*1.50*				
Control Delay (s/veh)		*14.1*		*105.6*				
LOS		*B*		*F*				
Approach Delay (s/veh)	--	--	*105.6*					
Approach LOS	--	--	*F*					

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*KMD*
Agency/Co.	*Bayer Becker*
Date Performed	*01/26/09*
Analysis Time Period	*Weekday PM Peak Hour*

Site Information

Intersection	*Butler Warren Rd. & Tyler Ct.*
Jurisdiction	*BCEO*
Analysis Year	*2009 Existing Conditions*

Project Description *07M056.000 - Voice of America Park*

East/West Street: *Tyler Court* | North/South Street: *Butler Warren County Line Road*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*718*	*45*	*8*	*370*	
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*0*	*797*	*50*	*8*	*411*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*16*		*5*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*17*	*0*	*5*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (veh/h)		*8*		*22*				
C (m) (veh/h)		*799*		*215*				
v/c		*0.01*		*0.10*				
95% queue length		*0.03*		*0.34*				
Control Delay (s/veh)		*9.6*		*23.6*				
LOS		*A*		*C*				
Approach Delay (s/veh)	--	--	*23.6*					
Approach LOS	--	--	*C*					

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*KMD*
Agency/Co.	*Bayer Becker*
Date Performed	*01/26/09*
Analysis Time Period	*Saturday Noon Peak Hour*

Site Information

Intersection	*Tylersville Rd. & Pepper Pk.*
Jurisdiction	*BCEO*
Analysis Year	*2009 Existing Conditions*

Project Description *07M056.000 - Voice of America Park*

East/West Street: *Tylersville Road* | North/South Street: *Pepper Pike*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*1344*	*43*	*10*	*1257*	
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*0*	*1493*	*47*	*11*	*1396*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*0*	*1*	*2*	*0*
Configuration		*T*	*TR*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*13*		*15*			
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*14*	*0*	*16*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (veh/h)		*11*		*30*				
C (m) (veh/h)		*437*		*70*				
v/c		*0.03*		*0.43*				
95% queue length		*0.08*		*1.68*				
Control Delay (s/veh)		*13.5*		*90.5*				
LOS		*B*		*F*				
Approach Delay (s/veh)	--	--	*90.5*					
Approach LOS	--	--	*F*					

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*KMD*
Agency/Co.	*Bayer Becker*
Date Performed	*01/26/09*
Analysis Time Period	*Saturday Noon Peak Hour*

Site Information

Intersection	*Butler Warren Rd. & Tyler Ct.*
Jurisdiction	*BCEO*
Analysis Year	*2009 Existing Conditions*

Project Description *07M056.000 - Voice of America Park*

East/West Street: *Tyler Court* | North/South Street: *Butler Warren County Line Road*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*408*	*18*	*3*	*348*	
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*0*	*453*	*20*	*3*	*386*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*29*		*0*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*32*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (veh/h)		*3*		*32*				
C (m) (veh/h)		*1099*		*330*				
v/c		*0.00*		*0.10*				
95% queue length		*0.01*		*0.32*				
Control Delay (s/veh)		*8.3*		*17.1*				
LOS		*A*		*C*				
Approach Delay (s/veh)	--	--	*17.1*					
Approach LOS	--	--	*C*					

SHORT REPORT

General Information		Site Information	
Analyst	*KMD*	Intersection	*Tylersville Rd. & Pepper Pk.*
Agency or Co.	*Bayer Becker*	Area Type	*All other areas*
Date Performed	*01/26/09*	Jurisdiction	*BCEO*
Time Period	*Weekday PM Peak Hour*	Analysis Year	*2018 Background Conditions*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes		*2*	*0*	*1*	*2*		*0*		*0*			
Lane Group		*TR*		*L*	*T*			*LR*				
Volume (vph)		*1502*	*153*	*66*	*1345*		*90*		*38*			
% Heavy Vehicles		*0*	*0*	*0*	*0*		*0*		*0*			
PHF		*0.90*	*0.90*	*0.90*	*0.90*		*0.90*		*0.90*			
Pretimed/Actuated (P/A)		*A*	*A*	*A*	*A*		*A*		*A*			
Startup Lost Time		*2.0*		*2.0*	*2.0*			*2.0*				
Extension of Effective Green		*2.0*		*2.0*	*2.0*			*2.0*				
Arrival Type		*3*		*3*	*3*			*3*				
Unit Extension		*3.0*		*3.0*	*3.0*			*3.0*				
Ped/Bike/RTOR Volume	*0*	*0*	*0*	*0*	*0*		*0*	*0*	*0*			
Lane Width		*12.0*		*12.0*	*12.0*			*12.0*				
Parking/Grade/Parking	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*			
Parking/Hour												
Bus Stops/Hour		*0*		*0*	*0*			*0*				
Minimum Pedestrian Time		*3.2*			*3.2*			*3.2*				

Phasing	WB Only	EW Perm	03	04	NB Only	06	07	08
Timing	G = *9.0*	G = *66.0*	G =	G =	G = *25.0*	G =	G =	G =
	Y = *6*	Y = *7*	Y =	Y =	Y = *7*	Y =	Y =	Y =

Duration of Analysis (hrs) = *0.25* | Cycle Length C = *120.0*

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate		*1839*		*73*	*1494*			*142*				
Lane Group Capacity		*1962*		*198*	*2442*			*367*				
v/c Ratio		*0.94*		*0.37*	*0.61*			*0.39*				
Green Ratio		*0.55*		*0.68*	*0.68*			*0.21*				
Uniform Delay d_1		*25.1*		*24.4*	*10.8*			*40.9*				
Delay Factor k		*0.45*		*0.11*	*0.20*			*0.11*				
Incremental Delay d_2		*9.3*		*1.2*	*0.5*			*0.7*				
PF Factor		*1.000*		*1.000*	*1.000*			*1.000*				
Control Delay		*34.4*		*25.5*	*11.3*			*41.6*				
Lane Group LOS		*C*		*C*	*B*			*D*				
Approach Delay	*34.4*			*11.9*			*41.6*					
Approach LOS	*C*			*B*			*D*					
Intersection Delay	*24.8*			Intersection LOS						*C*		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*KMD*
Agency/Co.	*Bayer Becker*
Date Performed	*01/26/09*
Analysis Time Period	*Weekday PM Peak Hour*

Site Information

Intersection	*Butler Warren Rd. & Tyler Ct.*
Jurisdiction	*BCEO*
Analysis Year	*2018 Background Conditions*

Project Description *07M056.000 - Voice of America Park*

East/West Street: *Tyler Court* | North/South Street: *Butler Warren County Line Road*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*785*	*45*	*8*	*405*	
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*0*	*872*	*50*	*8*	*450*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*1*	*1*	*2*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*16*		*5*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*17*	*0*	*5*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (veh/h)		*8*		*22*				
C (m) (veh/h)		*749*		*241*				
v/c		*0.01*		*0.09*				
95% queue length		*0.03*		*0.30*				
Control Delay (s/veh)		*9.9*		*21.4*				
LOS		*A*		*C*				
Approach Delay (s/veh)	--	--	*21.4*					
Approach LOS	--	--	*C*					

SHORT REPORT

General Information		Site Information	
Analyst	*KMD*	Intersection	*Tylersville Rd. & Pepper Pk.*
Agency or Co.	*Bayer Becker*	Area Type	*All other areas*
Date Performed	*01/26/09*	Jurisdiction	*BCEO*
Time Period	*Saturday Noon Peak Hour*	Analysis Year	*2018 Background Conditions*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes		*2*	*0*	*1*	*2*		*0*		*0*			
Lane Group		*TR*		*L*	*T*			*LR*				
Volume (vph)		*1470*	*136*	*34*	*1375*		*120*		*30*			
% Heavy Vehicles		*0*	*0*	*0*	*0*		*0*		*0*			
PHF		*0.90*	*0.90*	*0.90*	*0.90*		*0.90*		*0.90*			
Pretimed/Actuated (P/A)		*A*	*A*	*A*	*A*		*A*		*A*			
Startup Lost Time		*2.0*		*2.0*	*2.0*			*2.0*				
Extension of Effective Green		*2.0*		*2.0*	*2.0*			*2.0*				
Arrival Type		*3*		*3*	*3*			*3*				
Unit Extension		*3.0*		*3.0*	*3.0*			*3.0*				
Ped/Bike/RTOR Volume	*0*	*0*	*0*	*0*	*0*		*0*	*0*	*0*			
Lane Width		*12.0*		*12.0*	*12.0*			*12.0*				
Parking/Grade/Parking	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*			
Parking/Hour												
Bus Stops/Hour		*0*		*0*	*0*			*0*				
Minimum Pedestrian Time		*3.2*			*3.2*			*3.2*				

Phasing	WB Only	EW Perm	03	04	NB Only	06	07	08
Timing	G = *9.0*	G = *66.0*	G =	G =	G = *25.0*	G =	G =	G =
	Y = *6*	Y = *7*	Y =	Y =	Y = *7*	Y =	Y =	Y =
Duration of Analysis (hrs) = *0.25*						Cycle Length C = *120.0*		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate		*1784*		*38*	*1528*			*166*				
Lane Group Capacity		*1965*		*198*	*2442*			*370*				
v/c Ratio		*0.91*		*0.19*	*0.63*			*0.45*				
Green Ratio		*0.55*		*0.68*	*0.68*			*0.21*				
Uniform Delay d_1		*24.3*		*21.6*	*11.0*			*41.5*				
Delay Factor k		*0.43*		*0.11*	*0.21*			*0.11*				
Incremental Delay d_2		*6.7*		*0.5*	*0.5*			*0.9*				
PF Factor		*1.000*		*1.000*	*1.000*			*1.000*				
Control Delay		*30.9*		*22.1*	*11.5*			*42.3*				
Lane Group LOS		*C*		*C*	*B*			*D*				
Approach Delay		*30.9*			*11.7*			*42.3*				
Approach LOS		*C*			*B*			*D*				
Intersection Delay		*22.9*			Intersection LOS						*C*	

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*KMD*
Agency/Co.	*Bayer Becker*
Date Performed	*01/26/09*
Analysis Time Period	*Saturday Noon Peak Hour*

Site Information

Intersection	*Butler Warren Rd. & Tyler Ct.*
Jurisdiction	*BCEO*
Analysis Year	*2018 Background Conditions*

Project Description *07M056.000 - Voice of America Park*

East/West Street: *Tyler Court* | North/South Street: *Butler Warren County Line Road*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*446*	*18*	*3*	*381*	
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*0*	*495*	*20*	*3*	*423*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*1*	*1*	*2*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*29*		*0*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*32*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (veh/h)		*3*		*32*				
C (m) (veh/h)		*1061*		*370*				
v/c		*0.00*		*0.09*				
95% queue length		*0.01*		*0.28*				
Control Delay (s/veh)		*8.4*		*15.6*				
LOS		*A*		*C*				
Approach Delay (s/veh)	--	--	*15.6*					
Approach LOS	--	--	*C*					

SHORT REPORT

General Information		Site Information	
Analyst	*KMD*	Intersection	*Tylersville Rd. & Pepper Pk.*
Agency or Co.	*Bayer Becker*	Area Type	*All other areas*
Date Performed	*01/26/09*	Jurisdiction	*BCEO*
Time Period	*Weekday PM Peak Hour*	Analysis Year	*2018 Total Conditions*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	*1*	*2*	*0*	*1*	*2*	*0*	*0*	*1*	*0*	*0*	*1*	*0*
Lane Group	*L*	*TR*		*L*	*TR*			*LTR*			*LTR*	
Volume (vph)	*103*	*1502*	*153*	*66*	*1345*	*103*	*90*	*3*	*38*	*46*	*2*	*46*
% Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Pretimed/Actuated (P/A)	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*
Startup Lost Time	*2.0*	*2.0*		*2.0*	*2.0*			*2.0*			*2.0*	
Extension of Effective Green	*2.0*	*2.0*		*2.0*	*2.0*			*2.0*			*2.0*	
Arrival Type	*3*	*3*		*3*	*3*			*3*			*3*	
Unit Extension	*3.0*	*3.0*		*3.0*	*3.0*			*3.0*			*3.0*	
Ped/Bike/RTOR Volume	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Lane Width	*12.0*	*12.0*		*12.0*	*12.0*			*12.0*			*12.0*	
Parking/Grade/Parking	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*
Parking/Hour												
Bus Stops/Hour	*0*	*0*		*0*	*0*			*0*			*0*	
Minimum Pedestrian Time		*3.2*			*3.2*			*3.2*			*3.2*	

Phasing	Excl. Left	EW Perm	03	04	NS Perm	06	07	08
Timing	G = *9.0*	G = *63.0*	G =	G =	G = *28.0*	G =	G =	G =
	Y = *6*	Y = *7*	Y =	Y =	Y = *7*	Y =	Y =	Y =

Duration of Analysis (hrs) = *0.25* | Cycle Length C = *120.0*

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	*114*	*1839*		*73*	*1608*			*145*			*104*	
Lane Group Capacity	*199*	*1873*		*199*	*1879*			*317*			*330*	
v/c Ratio	*0.57*	*0.98*		*0.37*	*0.86*			*0.46*			*0.32*	
Green Ratio	*0.66*	*0.52*		*0.66*	*0.52*			*0.23*			*0.23*	
Uniform Delay d_1	*23.5*	*27.9*		*25.5*	*24.6*			*39.5*			*38.1*	
Delay Factor k	*0.17*	*0.49*		*0.11*	*0.39*			*0.11*			*0.11*	
Incremental Delay d_2	*4.0*	*16.6*		*1.1*	*4.1*			*1.0*			*0.6*	
PF Factor	*1.000*	*1.000*		*1.000*	*1.000*			*1.000*			*1.000*	
Control Delay	*27.5*	*44.6*		*26.6*	*28.7*			*40.5*			*38.6*	
Lane Group LOS	*C*	*D*		*C*	*C*			*D*			*D*	
Approach Delay	*43.6*			*28.6*			*40.5*			*38.6*		
Approach LOS	*D*			*C*			*D*			*D*		
Intersection Delay	*36.9*			Intersection LOS						*D*		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*KMD*
Agency/Co.	*Bayer Becker*
Date Performed	*01/26/09*
Analysis Time Period	*Weekday PM Peak Hour*

Site Information

Intersection	*Butler Warren Rd. & Tyler Ct.*
Jurisdiction	*BCEO*
Analysis Year	*2018 Total Conditions*

Project Description *07M056.000 - Voice of America Park*

East/West Street: *Tyler Court* | North/South Street: *Butler Warren County Line Road*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*34*	*785*	*45*	*8*	*405*	*34*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*37*	*872*	*50*	*8*	*450*	*37*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*2*	*1*	*1*	*2*	*0*
Configuration	*L*	*T*	*R*	*L*	*T*	*TR*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*15*	*2*	*15*	*16*	*3*	*5*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*16*	*2*	*16*	*17*	*3*	*5*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (veh/h)	*37*	*8*		*25*			*34*	
C (m) (veh/h)	*1086*	*749*		*159*			*282*	
v/c	*0.03*	*0.01*		*0.16*			*0.12*	
95% queue length	*0.11*	*0.03*		*0.54*			*0.41*	
Control Delay (s/veh)	*8.4*	*9.9*		*31.8*			*19.5*	
LOS	*A*	*A*		*D*			*C*	
Approach Delay (s/veh)	--	--	*31.8*			*19.5*		
Approach LOS	--	--	*D*			*C*		

SHORT REPORT

General Information		Site Information	
Analyst	*KMD*	Intersection	*Tylersville Rd. & Pepper Pk.*
Agency or Co.	*Bayer Becker*	Area Type	*All other areas*
Date Performed	*01/26/09*	Jurisdiction	*BCEO*
Time Period	*Saturday Noon Peak Hour*	Analysis Year	*2018 Total Conditions*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	*1*	*2*	*0*	*1*	*2*	*0*	*0*	*1*	*0*	*0*	*1*	*0*
Lane Group	*L*	*TR*		*L*	*TR*			*LTR*			*LTR*	
Volume (vph)	*113*	*1470*	*136*	*34*	*1375*	*113*	*120*	*4*	*30*	*123*	*4*	*123*
% Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Pretimed/Actuated (P/A)	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*
Startup Lost Time	*2.0*	*2.0*		*2.0*	*2.0*			*2.0*			*2.0*	
Extension of Effective Green	*2.0*	*2.0*		*2.0*	*2.0*			*2.0*			*2.0*	
Arrival Type	*3*	*3*		*3*	*3*			*3*			*3*	
Unit Extension	*3.0*	*3.0*		*3.0*	*3.0*			*3.0*			*3.0*	
Ped/Bike/RTOR Volume	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Lane Width	*12.0*	*12.0*		*12.0*	*12.0*			*12.0*			*12.0*	
Parking/Grade/Parking	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*
Parking/Hour												
Bus Stops/Hour	*0*	*0*		*0*	*0*			*0*			*0*	
Minimum Pedestrian Time		*3.2*			*3.2*			*3.2*			*3.2*	

Phasing	Excl. Left	EW Perm	03	04	NS Perm	06	07	08
Timing	G = *9.0*	G = *63.0*	G =	G =	G = *28.0*	G =	G =	G =
	Y = *6*	Y = *7*	Y =	Y =	Y = *7*	Y =	Y =	Y =

Duration of Analysis (hrs) = *0.25* | Cycle Length C = *120.0*

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	*126*	*1784*		*38*	*1654*			*170*			*278*	
Lane Group Capacity	*199*	*1875*		*199*	*1877*			*252*			*327*	
v/c Ratio	*0.63*	*0.95*		*0.19*	*0.88*			*0.67*			*0.85*	
Green Ratio	*0.66*	*0.52*		*0.66*	*0.52*			*0.23*			*0.23*	
Uniform Delay d_1	*27.2*	*27.0*		*23.8*	*25.2*			*41.9*			*44.0*	
Delay Factor k	*0.21*	*0.46*		*0.11*	*0.41*			*0.25*			*0.38*	
Incremental Delay d_2	*6.4*	*11.4*		*0.5*	*5.3*			*7.0*			*18.7*	
PF Factor	*1.000*	*1.000*		*1.000*	*1.000*			*1.000*			*1.000*	
Control Delay	*33.6*	*38.5*		*24.3*	*30.5*			*48.8*			*62.7*	
Lane Group LOS	*C*	*D*		*C*	*C*			*D*			*E*	
Approach Delay	*38.2*			*30.3*			*48.8*			*62.7*		
Approach LOS	*D*			*C*			*D*			*E*		
Intersection Delay	*37.0*			Intersection LOS			*D*					

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*KMD*
Agency/Co.	*Bayer Becker*
Date Performed	*01/26/09*
Analysis Time Period	*Saturday Noon Peak Hour*

Site Information

Intersection	*Butler Warren Rd. & Tyler Ct.*
Jurisdiction	*BCEO*
Analysis Year	*2018 Total Conditions*

Project Description *07M056.000 - Voice of America Park*

East/West Street: *Tyler Court* | North/South Street: *Butler Warren County Line Road*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*38*	*446*	*18*	*3*	*381*	*38*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*42*	*495*	*20*	*3*	*423*	*42*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*2*	*1*	*1*	*2*	*0*
Configuration	*L*	*T*	*R*	*L*	*T*	*TR*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*41*	*4*	*41*	*29*	*4*	*0*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*45*	*4*	*45*	*32*	*4*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (veh/h)	*42*	*3*		*36*			*94*	
C (m) (veh/h)	*1107*	*1061*		*249*			*396*	
v/c	*0.04*	*0.00*		*0.14*			*0.24*	
95% queue length	*0.12*	*0.01*		*0.50*			*0.91*	
Control Delay (s/veh)	*8.4*	*8.4*		*21.9*			*16.9*	
LOS	*A*	*A*		*C*			*C*	
Approach Delay (s/veh)	--	--	*21.9*			*16.9*		
Approach LOS	--	--	*C*			*C*		

SHORT REPORT

General Information		Site Information	
Analyst	*KMD*	Intersection	*Tylersville Rd. & Pepper Pk.*
Agency or Co.	*Bayer Becker*	Area Type	*All other areas*
Date Performed	*01/26/09*	Jurisdiction	*BCEO*
Time Period	*Weekday PM Peak Hour*	Analysis Year	*2030 Background Conditions*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes		*2*	*0*	*1*	*2*		*0*		*0*			
Lane Group		*TR*		*L*	*T*			*LR*				
Volume (vph)		*1692*	*153*	*66*	*1516*		*90*		*38*			
% Heavy Vehicles		*0*	*0*	*0*	*0*		*0*		*0*			
PHF		*0.90*	*0.90*	*0.90*	*0.90*		*0.90*		*0.90*			
Pretimed/Actuated (P/A)		*A*	*A*	*A*	*A*		*A*		*A*			
Startup Lost Time		*2.0*		*2.0*	*2.0*			*2.0*				
Extension of Effective Green		*2.0*		*2.0*	*2.0*			*2.0*				
Arrival Type		*3*		*3*	*3*			*3*				
Unit Extension		*3.0*		*3.0*	*3.0*			*3.0*				
Ped/Bike/RTOR Volume	*0*	*0*	*0*	*0*	*0*		*0*	*0*	*0*			
Lane Width		*12.0*		*12.0*	*12.0*			*12.0*				
Parking/Grade/Parking	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*			
Parking/Hour												
Bus Stops/Hour		*0*		*0*	*0*			*0*				
Minimum Pedestrian Time		*3.2*			*3.2*			*3.2*				

Phasing	WB Only	EW Perm	03	04	NB Only	06	07	08
Timing	G = *9.0*	G = *72.0*	G =	G =	G = *19.0*	G =	G =	G =
	Y = *6*	Y = *7*	Y =	Y =	Y = *7*	Y =	Y =	Y =

Duration of Analysis (hrs) = *0.25* | Cycle Length C = *120.0*

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate		*2050*		*73*	*1684*			*142*				
Lane Group Capacity		*2144*		*198*	*2623*			*279*				
v/c Ratio		*0.96*		*0.37*	*0.64*			*0.51*				
Green Ratio		*0.60*		*0.73*	*0.73*			*0.16*				
Uniform Delay d_1		*22.5*		*27.4*	*8.5*			*46.2*				
Delay Factor k		*0.47*		*0.11*	*0.22*			*0.12*				
Incremental Delay d_2		*11.0*		*1.2*	*0.5*			*1.6*				
PF Factor		*1.000*		*1.000*	*1.000*			*1.000*				
Control Delay		*33.5*		*28.5*	*9.0*			*47.8*				
Lane Group LOS		*C*		*C*	*A*			*D*				
Approach Delay	*33.5*			*9.8*			*47.8*					
Approach LOS	*C*			*A*			*D*					
Intersection Delay	*23.5*			Intersection LOS			*C*					

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*KMD*
Agency/Co.	*Bayer Becker*
Date Performed	*01/26/09*
Analysis Time Period	*Weekday PM Peak Hour*

Site Information

Intersection	*Butler Warren Rd. & Tyler Ct.*
Jurisdiction	*BCEO*
Analysis Year	*2030 Background Conditions*

Project Description *07M056.000 - Voice of America Park*

East/West Street: *Tyler Court* | North/South Street: *Butler Warren County Line Road*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*885*	*45*	*8*	*456*	
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*0*	*983*	*50*	*8*	*506*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*1*	*1*	*2*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*16*		*5*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*17*	*0*	*5*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (veh/h)		*8*		*22*				
C (m) (veh/h)		*681*		*197*				
v/c		*0.01*		*0.11*				
95% queue length		*0.04*		*0.37*				
Control Delay (s/veh)		*10.3*		*25.6*				
LOS		*B*		*D*				
Approach Delay (s/veh)	--	--	*25.6*					
Approach LOS	--	--	*D*					

SHORT REPORT

General Information		Site Information	
Analyst	*KMD*	Intersection	*Tylersville Rd. & Pepper Pk.*
Agency or Co.	*Bayer Becker*	Area Type	*All other areas*
Date Performed	*01/26/09*	Jurisdiction	*BCEO*
Time Period	*Saturday Noon Peak Hour*	Analysis Year	*2030 Background Conditions*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes		*2*	*0*	*1*	*2*		*0*		*0*			
Lane Group		*TR*		*L*	*T*			*LR*				
Volume (vph)		*1656*	*136*	*34*	*1549*		*120*		*30*			
% Heavy Vehicles		*0*	*0*	*0*	*0*		*0*		*0*			
PHF		*0.90*	*0.90*	*0.90*	*0.90*		*0.90*		*0.90*			
Pretimed/Actuated (P/A)		*A*	*A*	*A*	*A*		*A*		*A*			
Startup Lost Time		*2.0*		*2.0*	*2.0*			*2.0*				
Extension of Effective Green		*2.0*		*2.0*	*2.0*			*2.0*				
Arrival Type		*3*		*3*	*3*			*3*				
Unit Extension		*3.0*		*3.0*	*3.0*			*3.0*				
Ped/Bike/RTOR Volume	*0*	*0*	*0*	*0*	*0*		*0*	*0*	*0*			
Lane Width		*12.0*		*12.0*	*12.0*			*12.0*				
Parking/Grade/Parking	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*			
Parking/Hour												
Bus Stops/Hour		*0*		*0*	*0*			*0*				
Minimum Pedestrian Time		*3.2*			*3.2*			*3.2*				

Phasing	WB Only	EW Perm	03	04	NB Only	06	07	08
Timing	G = *9.0*	G = *70.0*	G =	G =	G = *21.0*	G =	G =	G =
	Y = *6*	Y = *7*	Y =	Y =	Y = *7*	Y =	Y =	Y =
Duration of Analysis (hrs) = *0.25*						Cycle Length C = *120.0*		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate		*1991*		*38*	*1721*			*166*				
Lane Group Capacity		*2086*		*199*	*2563*			*311*				
v/c Ratio		*0.95*		*0.19*	*0.67*			*0.53*				
Green Ratio		*0.58*		*0.72*	*0.71*			*0.17*				
Uniform Delay d_1		*23.5*		*25.7*	*9.7*			*45.0*				
Delay Factor k		*0.46*		*0.11*	*0.24*			*0.14*				
Incremental Delay d_2		*10.9*		*0.5*	*0.7*			*1.8*				
PF Factor		*1.000*		*1.000*	*1.000*			*1.000*				
Control Delay		*34.5*		*26.2*	*10.4*			*46.8*				
Lane Group LOS		*C*		*C*	*B*			*D*				
Approach Delay	*34.5*			*10.8*			*46.8*					
Approach LOS	*C*			*B*			*D*					
Intersection Delay	*24.3*			Intersection LOS						*C*		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*KMD*
Agency/Co.	*Bayer Becker*
Date Performed	*01/26/09*
Analysis Time Period	*Saturday Noon Peak Hour*

Site Information

Intersection	*Butler Warren Rd. & Tyler Ct.*
Jurisdiction	*BCEO*
Analysis Year	*2030 Background Conditions*

Project Description *07M056.000 - Voice of America Park*

East/West Street: *Tyler Court* | North/South Street: *Butler Warren County Line Road*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*503*	*18*	*3*	*429*	
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*0*	*558*	*20*	*3*	*476*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*1*	*1*	*2*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*29*		*0*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*32*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (veh/h)		*3*		*32*				
C (m) (veh/h)		*1006*		*325*				
v/c		*0.00*		*0.10*				
95% queue length		*0.01*		*0.32*				
Control Delay (s/veh)		*8.6*		*17.3*				
LOS		*A*		*C*				
Approach Delay (s/veh)	--	--	*17.3*					
Approach LOS	--	--	*C*					

SHORT REPORT

General Information		Site Information	
Analyst	*KMD*	Intersection	*Tylersville Rd. & Pepper Pk.*
Agency or Co.	*Bayer Becker*	Area Type	*All other areas*
Date Performed	*01/26/09*	Jurisdiction	*BCEO*
Time Period	*Weekday PM Peak Hour*	Analysis Year	*2030 Total Conditions*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	*1*	*2*	*0*	*1*	*2*	*0*	*0*	*1*	*0*	*0*	*1*	*0*
Lane Group	*L*	*TR*		*L*	*TR*			*LTR*			*LTR*	
Volume (vph)	*103*	*1692*	*153*	*66*	*1516*	*103*	*90*	*3*	*38*	*46*	*2*	*46*
% Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Pretimed/Actuated (P/A)	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*
Startup Lost Time	*2.0*	*2.0*		*2.0*	*2.0*			*2.0*			*2.0*	
Extension of Effective Green	*2.0*	*2.0*		*2.0*	*2.0*			*2.0*			*2.0*	
Arrival Type	*3*	*3*		*3*	*3*			*3*			*3*	
Unit Extension	*3.0*	*3.0*		*3.0*	*3.0*			*3.0*			*3.0*	
Ped/Bike/RTOR Volume	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Lane Width	*12.0*	*12.0*		*12.0*	*12.0*			*12.0*			*12.0*	
Parking/Grade/Parking	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*
Parking/Hour												
Bus Stops/Hour	*0*	*0*		*0*	*0*			*0*			*0*	
Minimum Pedestrian Time		*3.2*			*3.2*			*3.2*			*3.2*	

Phasing	Excl. Left	EW Perm	03	04	NS Perm	06	07	08
Timing	G = *11.0*	G = *67.0*	G =	G =	G = *22.0*	G =	G =	G =
	Y = *6*	Y = *7*	Y =	Y =	Y = *7*	Y =	Y =	Y =

Duration of Analysis (hrs) = *0.25* | Cycle Length C = *120.0*

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	*114*	*2050*		*73*	*1798*			*145*			*104*	
Lane Group Capacity	*229*	*1995*		*229*	*2001*			*248*			*256*	
v/c Ratio	*0.50*	*1.03*		*0.32*	*0.90*			*0.58*			*0.41*	
Green Ratio	*0.71*	*0.56*		*0.71*	*0.56*			*0.18*			*0.18*	
Uniform Delay d_1	*26.2*	*26.5*		*26.5*	*23.5*			*44.8*			*43.2*	
Delay Factor k	*0.11*	*0.50*		*0.11*	*0.42*			*0.18*			*0.11*	
Incremental Delay d_2	*1.7*	*27.5*		*0.8*	*5.9*			*3.5*			*1.1*	
PF Factor	*1.000*	*1.000*		*1.000*	*1.000*			*1.000*			*1.000*	
Control Delay	*27.9*	*54.0*		*27.4*	*29.4*			*48.4*			*44.3*	
Lane Group LOS	*C*	*D*		*C*	*C*			*D*			*D*	
Approach Delay	*52.7*			*29.3*			*48.4*			*44.3*		
Approach LOS	*D*			*C*			*D*			*D*		
Intersection Delay	*42.1*			Intersection LOS						*D*		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*KMD*
Agency/Co.	*Bayer Becker*
Date Performed	*01/26/09*
Analysis Time Period	*Weekday PM Peak Hour*

Site Information

Intersection	*Butler Warren Rd. & Tyler Ct.*
Jurisdiction	*BCEO*
Analysis Year	*2030 Total Conditions*

Project Description *07M056.000 - Voice of America Park*

East/West Street: *Tyler Court* | North/South Street: *Butler Warren County Line Road*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*34*	*885*	*45*	*8*	*456*	*34*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*37*	*983*	*50*	*8*	*506*	*37*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*2*	*1*	*1*	*2*	*0*
Configuration	*L*	*T*	*R*	*L*	*T*	*TR*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*15*	*2*	*15*	*16*	*3*	*5*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*16*	*2*	*16*	*17*	*3*	*5*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (veh/h)	*37*	*8*		*25*			*34*	
C (m) (veh/h)	*1036*	*681*		*127*			*237*	
v/c	*0.04*	*0.01*		*0.20*			*0.14*	
95% queue length	*0.11*	*0.04*		*0.70*			*0.49*	
Control Delay (s/veh)	*8.6*	*10.3*		*40.2*			*22.7*	
LOS	*A*	*B*		*E*			*C*	
Approach Delay (s/veh)	--	--	*40.2*			*22.7*		
Approach LOS	--	--	*E*			*C*		

SHORT REPORT

General Information		Site Information	
Analyst	*KMD*	Intersection	*Tylersville Rd. & Pepper Pk.*
Agency or Co.	*Bayer Becker*	Area Type	*All other areas*
Date Performed	*01/26/09*	Jurisdiction	*BCEO*
Time Period	*Saturday Noon Peak Hour*	Analysis Year	*2030 Total Conditions*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	*1*	*2*	*0*	*1*	*2*	*0*	*0*	*1*	*0*	*0*	*1*	*0*
Lane Group	*L*	*TR*		*L*	*TR*			*LTR*			*LTR*	
Volume (vph)	*113*	*1656*	*136*	*34*	*1549*	*113*	*120*	*4*	*30*	*123*	*4*	*123*
% Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Pretimed/Actuated (P/A)	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*
Startup Lost Time	*2.0*	*2.0*		*2.0*	*2.0*			*2.0*			*2.0*	
Extension of Effective Green	*2.0*	*2.0*		*2.0*	*2.0*			*2.0*			*2.0*	
Arrival Type	*3*	*3*		*3*	*3*			*3*			*3*	
Unit Extension	*3.0*	*3.0*		*3.0*	*3.0*			*3.0*			*3.0*	
Ped/Bike/RTOR Volume	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Lane Width	*12.0*	*12.0*		*12.0*	*12.0*			*12.0*			*12.0*	
Parking/Grade/Parking	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*
Parking/Hour												
Bus Stops/Hour	*0*	*0*		*0*	*0*			*0*			*0*	
Minimum Pedestrian Time		*3.2*			*3.2*			*3.2*			*3.2*	

Phasing	Excl. Left	EW Perm	03	04	NS Perm	06	07	08
Timing	G = *11.0*	G = *67.0*	G =	G =	G = *22.0*	G =	G =	G =
	Y = *6*	Y = *7*	Y =	Y =	Y = *7*	Y =	Y =	Y =

Duration of Analysis (hrs) = *0.25* | Cycle Length C = *120.0*

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	*126*	*1991*		*38*	*1847*			*170*			*278*	
Lane Group Capacity	*229*	*1997*		*229*	*1999*			*194*			*261*	
v/c Ratio	*0.55*	*1.00*		*0.17*	*0.92*			*0.88*			*1.07*	
Green Ratio	*0.71*	*0.56*		*0.71*	*0.56*			*0.18*			*0.18*	
Uniform Delay d_1	*29.6*	*26.4*		*25.5*	*24.2*			*47.7*			*49.0*	
Delay Factor k	*0.15*	*0.50*		*0.11*	*0.44*			*0.40*			*0.50*	
Incremental Delay d_2	*2.8*	*19.4*		*0.3*	*7.8*			*33.2*			*74.0*	
PF Factor	*1.000*	*1.000*		*1.000*	*1.000*			*1.000*			*1.000*	
Control Delay	*32.4*	*45.8*		*25.9*	*32.0*			*80.9*			*123.0*	
Lane Group LOS	*C*	*D*		*C*	*C*			*F*			*F*	
Approach Delay	*45.0*			*31.9*			*80.9*			*123.0*		
Approach LOS	*D*			*C*			*F*			*F*		
Intersection Delay	*45.7*			Intersection LOS				*D*				

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*KMD*
Agency/Co.	*Bayer Becker*
Date Performed	*01/26/09*
Analysis Time Period	*Saturday Noon Peak Hour*

Site Information

Intersection	*Butler Warren Rd. & Tyler Ct.*
Jurisdiction	*BCEO*
Analysis Year	*2030 Total Conditions*

Project Description *07M056.000 - Voice of America Park*

East/West Street: *Tyler Court* | North/South Street: *Butler Warren County Line Road*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*38*	*503*	*18*	*3*	*429*	*38*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*42*	*558*	*20*	*3*	*476*	*42*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*2*	*1*	*1*	*2*	*0*
Configuration	*L*	*T*	*R*	*L*	*T*	*TR*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*41*	*4*	*41*	*29*	*4*	*0*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*45*	*4*	*45*	*32*	*4*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (veh/h)	*42*	*3*		*36*			*94*	
C (m) (veh/h)	*1058*	*1006*		*212*			*351*	
v/c	*0.04*	*0.00*		*0.17*			*0.27*	
95% queue length	*0.12*	*0.01*		*0.60*			*1.06*	
Control Delay (s/veh)	*8.5*	*8.6*		*25.4*			*19.0*	
LOS	*A*	*A*		*D*			*C*	
Approach Delay (s/veh)	--	--	*25.4*			*19.0*		
Approach LOS	--	--	*D*			*C*		

APPENDIX G
ADDITIONAL INTERSECTION CAPACITY ANALYSIS

SHORT REPORT

General Information		Site Information	
Analyst	*KMD*	Intersection	*Tylersville Rd. & Pepper Pk.*
Agency or Co.	*Bayer Becker*	Area Type	*All other areas*
Date Performed	*01/26/09*	Jurisdiction	*BCEO*
Time Period	*Weekday PM Peak Hour*	Analysis Year	*2018 Background Cond. (NB LTL)*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes		*2*	*0*	*1*	*2*		*1*		*1*			
Lane Group		*TR*		*L*	*T*		*L*		*R*			
Volume (vph)		*1502*	*153*	*66*	*1345*		*90*		*38*			
% Heavy Vehicles		*0*	*0*	*0*	*0*		*0*		*0*			
PHF		*0.90*	*0.90*	*0.90*	*0.90*		*0.90*		*0.90*			
Pretimed/Actuated (P/A)		*A*	*A*	*A*	*A*		*A*		*A*			
Startup Lost Time		*2.0*		*2.0*	*2.0*		*2.0*		*2.0*			
Extension of Effective Green		*2.0*		*2.0*	*2.0*		*2.0*		*2.0*			
Arrival Type		*3*		*3*	*3*		*3*		*3*			
Unit Extension		*3.0*		*3.0*	*3.0*		*3.0*		*3.0*			
Ped/Bike/RTOR Volume	*0*	*0*	*0*	*0*	*0*		*0*	*0*	*0*			
Lane Width		*12.0*		*12.0*	*12.0*		*12.0*		*12.0*			
Parking/Grade/Parking	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*			
Parking/Hour												
Bus Stops/Hour		*0*		*0*	*0*		*0*		*0*			
Minimum Pedestrian Time		*3.2*			*3.2*			*3.2*				

Phasing	WB Only	EW Perm	03	04	NB Only	06	07	08
Timing	G = *9.0*	G = *66.0*	G =	G =	G = *25.0*	G =	G =	G =
	Y = *6*	Y = *7*	Y =	Y =	Y = *7*	Y =	Y =	Y =
Duration of Analysis (hrs) = *0.25*						Cycle Length C = *120.0*		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate		*1839*		*73*	*1494*		*100*		*42*			
Lane Group Capacity		*1962*		*198*	*2442*		*376*		*336*			
v/c Ratio		*0.94*		*0.37*	*0.61*		*0.27*		*0.13*			
Green Ratio		*0.55*		*0.68*	*0.68*		*0.21*		*0.21*			
Uniform Delay d_1		*25.1*		*24.4*	*10.8*		*39.8*		*38.6*			
Delay Factor k		*0.45*		*0.11*	*0.20*		*0.11*		*0.11*			
Incremental Delay d_2		*9.3*		*1.2*	*0.5*		*0.4*		*0.2*			
PF Factor		*1.000*		*1.000*	*1.000*		*1.000*		*1.000*			
Control Delay		*34.4*		*25.5*	*11.3*		*40.2*		*38.8*			
Lane Group LOS		*C*		*C*	*B*		*D*		*D*			
Approach Delay	*34.4*			*11.9*			*39.8*					
Approach LOS	*C*			*B*			*D*					
Intersection Delay	*24.7*			Intersection LOS						*C*		

SHORT REPORT

General Information		Site Information	
Analyst	*KMD*	Intersection	*Tylersville Rd. & Pepper Pk.*
Agency or Co.	*Bayer Becker*	Area Type	*All other areas*
Date Performed	*01/26/09*	Jurisdiction	*BCEO*
Time Period	*Saturday Noon Peak Hour*	Analysis Year	*2018 Background Cond. (NB LTL)*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes		*2*	*0*	*1*	*2*		*1*		*1*			
Lane Group		*TR*		*L*	*T*		*L*		*R*			
Volume (vph)		*1470*	*136*	*34*	*1375*		*120*		*30*			
% Heavy Vehicles		*0*	*0*	*0*	*0*		*0*		*0*			
PHF		*0.90*	*0.90*	*0.90*	*0.90*		*0.90*		*0.90*			
Pretimed/Actuated (P/A)		*A*	*A*	*A*	*A*		*A*		*A*			
Startup Lost Time		*2.0*		*2.0*	*2.0*		*2.0*		*2.0*			
Extension of Effective Green		*2.0*		*2.0*	*2.0*		*2.0*		*2.0*			
Arrival Type		*3*		*3*	*3*		*3*		*3*			
Unit Extension		*3.0*		*3.0*	*3.0*		*3.0*		*3.0*			
Ped/Bike/RTOR Volume	*0*	*0*	*0*	*0*	*0*		*0*	*0*	*0*			
Lane Width		*12.0*		*12.0*	*12.0*		*12.0*		*12.0*			
Parking/Grade/Parking	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*			
Parking/Hour												
Bus Stops/Hour		*0*		*0*	*0*		*0*		*0*			
Minimum Pedestrian Time		*3.2*			*3.2*			*3.2*				

Phasing	WB Only	EW Perm	03	04	NB Only	06	07	08
Timing	G = *9.0*	G = *66.0*	G =	G =	G = *25.0*	G =	G =	G =
	Y = *6*	Y = *7*	Y =	Y =	Y = *7*	Y =	Y =	Y =
Duration of Analysis (hrs) = *0.25*						Cycle Length C = *120.0*		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate		*1784*		*38*	*1528*		*133*		*33*			
Lane Group Capacity		*1965*		*198*	*2442*		*376*		*336*			
v/c Ratio		*0.91*		*0.19*	*0.63*		*0.35*		*0.10*			
Green Ratio		*0.55*		*0.68*	*0.68*		*0.21*		*0.21*			
Uniform Delay d_1		*24.3*		*21.6*	*11.0*		*40.6*		*38.4*			
Delay Factor k		*0.43*		*0.11*	*0.21*		*0.11*		*0.11*			
Incremental Delay d_2		*6.7*		*0.5*	*0.5*		*0.6*		*0.1*			
PF Factor		*1.000*		*1.000*	*1.000*		*1.000*		*1.000*			
Control Delay		*30.9*		*22.1*	*11.5*		*41.2*		*38.5*			
Lane Group LOS		*C*		*C*	*B*		*D*		*D*			
Approach Delay		*30.9*			*11.7*			*40.6*				
Approach LOS		*C*			*B*			*D*				
Intersection Delay		*22.8*			Intersection LOS						*C*	

SHORT REPORT

General Information		Site Information	
Analyst	*KMD*	Intersection	*Tylersville Rd. & Pepper Pk.*
Agency or Co.	*Bayer Becker*	Area Type	*All other areas*
Date Performed	*01/26/09*	Jurisdiction	*BCEO*
Time Period	*Weekday PM Peak Hour*	Analysis Year	*2018 Total Cond. (NB&SB LTLs)*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	*1*	*2*	*0*	*1*	*2*	*0*	*1*	*1*	*0*	*1*	*1*	*0*
Lane Group	*L*	*TR*		*L*	*TR*		*L*	*TR*		*L*	*TR*	
Volume (vph)	*103*	*1502*	*153*	*66*	*1345*	*103*	*90*	*3*	*38*	*46*	*2*	*46*
% Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Pretimed/Actuated (P/A)	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*
Startup Lost Time	*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	
Extension of Effective Green	*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	
Arrival Type	*3*	*3*		*3*	*3*		*3*	*3*		*3*	*3*	
Unit Extension	*3.0*	*3.0*		*3.0*	*3.0*		*3.0*	*3.0*		*3.0*	*3.0*	
Ped/Bike/RTOR Volume	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Lane Width	*12.0*	*12.0*		*12.0*	*12.0*		*12.0*	*12.0*		*12.0*	*12.0*	
Parking/Grade/Parking	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*
Parking/Hour												
Bus Stops/Hour	*0*	*0*		*0*	*0*		*0*	*0*		*0*	*0*	
Minimum Pedestrian Time		*3.2*			*3.2*			*3.2*			*3.2*	

Phasing	Excl. Left	EW Perm	03	04	NS Perm	06	07	08
Timing	G = *9.0*	G = *66.0*	G =	G =	G = *25.0*	G =	G =	G =
	Y = *6*	Y = *7*	Y =	Y =	Y = *7*	Y =	Y =	Y =

Duration of Analysis (hrs) = *0.25* | Cycle Length C = *120.0*

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	*114*	*1839*		*73*	*1608*		*100*	*45*		*51*	*53*	
Lane Group Capacity	*198*	*1962*		*198*	*1968*		*286*	*340*		*288*	*339*	
v/c Ratio	*0.58*	*0.94*		*0.37*	*0.82*		*0.35*	*0.13*		*0.18*	*0.16*	
Green Ratio	*0.68*	*0.55*		*0.68*	*0.55*		*0.21*	*0.21*		*0.21*	*0.21*	
Uniform Delay d_1	*23.8*	*25.1*		*24.4*	*22.1*		*40.6*	*38.7*		*39.0*	*38.9*	
Delay Factor k	*0.17*	*0.45*		*0.11*	*0.36*		*0.11*	*0.11*		*0.11*	*0.11*	
Incremental Delay d_2	*4.1*	*9.3*		*1.2*	*2.8*		*0.7*	*0.2*		*0.3*	*0.2*	
PF Factor	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
Control Delay	*27.9*	*34.4*		*25.5*	*24.9*		*41.3*	*38.8*		*39.3*	*39.1*	
Lane Group LOS	*C*	*C*		*C*	*C*		*D*	*D*		*D*	*D*	
Approach Delay	*34.0*			*24.9*			*40.5*			*39.2*		
Approach LOS	*C*			*C*			*D*			*D*		
Intersection Delay	*30.5*			Intersection LOS						*C*		

SHORT REPORT

General Information		Site Information	
Analyst	*KMD*	Intersection	*Tylersville Rd. & Pepper Pk.*
Agency or Co.	*Bayer Becker*	Area Type	*All other areas*
Date Performed	*01/26/09*	Jurisdiction	*BCEO*
Time Period	*Saturday Noon Peak Hour*	Analysis Year	*2018 Total Cond. (NB&SB LTLs)*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	*1*	*2*	*0*	*1*	*2*	*0*	*1*	*1*	*0*	*1*	*1*	*0*
Lane Group	*L*	*TR*		*L*	*TR*		*L*	*TR*		*L*	*TR*	
Volume (vph)	*113*	*1470*	*136*	*34*	*1375*	*113*	*120*	*4*	*30*	*123*	*4*	*123*
% Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Pretimed/Actuated (P/A)	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*
Startup Lost Time	*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	
Extension of Effective Green	*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	
Arrival Type	*3*	*3*		*3*	*3*		*3*	*3*		*3*	*3*	
Unit Extension	*3.0*	*3.0*		*3.0*	*3.0*		*3.0*	*3.0*		*3.0*	*3.0*	
Ped/Bike/RTOR Volume	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Lane Width	*12.0*	*12.0*		*12.0*	*12.0*		*12.0*	*12.0*		*12.0*	*12.0*	
Parking/Grade/Parking	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*
Parking/Hour												
Bus Stops/Hour	*0*	*0*		*0*	*0*		*0*	*0*		*0*	*0*	
Minimum Pedestrian Time		*3.2*			*3.2*			*3.2*			*3.2*	

Phasing	Excl. Left	EW Perm	03	04	NS Perm	06	07	08
Timing	G = *9.0*	G = *65.0*	G =	G =	G = *26.0*	G =	G =	G =
	Y = *6*	Y = *7*	Y =	Y =	Y = *7*	Y =	Y =	Y =

Duration of Analysis (hrs) = *0.25* | Cycle Length C = *120.0*

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	*126*	*1784*		*38*	*1654*		*133*	*37*		*137*	*141*	
Lane Group Capacity	*199*	*1935*		*199*	*1937*		*264*	*357*		*302*	*352*	
v/c Ratio	*0.63*	*0.92*		*0.19*	*0.85*		*0.50*	*0.10*		*0.45*	*0.40*	
Green Ratio	*0.68*	*0.54*		*0.68*	*0.54*		*0.22*	*0.22*		*0.22*	*0.22*	
Uniform Delay d_1	*27.2*	*25.2*		*22.3*	*23.5*		*41.3*	*37.7*		*40.8*	*40.3*	
Delay Factor k	*0.21*	*0.44*		*0.11*	*0.39*		*0.11*	*0.11*		*0.11*	*0.11*	
Incremental Delay d_2	*6.4*	*7.9*		*0.5*	*4.0*		*1.6*	*0.1*		*1.1*	*0.7*	
PF Factor	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
Control Delay	*33.7*	*33.1*		*22.8*	*27.4*		*42.9*	*37.8*		*41.9*	*41.1*	
Lane Group LOS	*C*	*C*		*C*	*C*		*D*	*D*		*D*	*D*	
Approach Delay	*33.1*			*27.3*			*41.8*			*41.5*		
Approach LOS	*C*			*C*			*D*			*D*		
Intersection Delay	*31.6*			Intersection LOS			*C*					

SHORT REPORT

General Information		Site Information	
Analyst	*KMD*	Intersection	*Tylersville Rd. & Pepper Pk.*
Agency or Co.	*Bayer Becker*	Area Type	*All other areas*
Date Performed	*01/26/09*	Jurisdiction	*BCEO*
Time Period	*Weekday PM Peak Hour*	Analysis Year	*2030 Background Cond. (NB LTL)*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes		*2*	*0*	*1*	*2*		*1*		*1*			
Lane Group		*TR*		*L*	*T*		*L*		*R*			
Volume (vph)		*1692*	*153*	*66*	*1516*		*90*		*38*			
% Heavy Vehicles		*0*	*0*	*0*	*0*		*0*		*0*			
PHF		*0.90*	*0.90*	*0.90*	*0.90*		*0.90*		*0.90*			
Pretimed/Actuated (P/A)		*A*	*A*	*A*	*A*		*A*		*A*			
Startup Lost Time		*2.0*		*2.0*	*2.0*		*2.0*		*2.0*			
Extension of Effective Green		*2.0*		*2.0*	*2.0*		*2.0*		*2.0*			
Arrival Type		*3*		*3*	*3*		*3*		*3*			
Unit Extension		*3.0*		*3.0*	*3.0*		*3.0*		*3.0*			
Ped/Bike/RTOR Volume	*0*	*0*	*0*	*0*	*0*		*0*	*0*	*0*			
Lane Width		*12.0*		*12.0*	*12.0*		*12.0*		*12.0*			
Parking/Grade/Parking	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*			
Parking/Hour												
Bus Stops/Hour		*0*		*0*	*0*		*0*		*0*			
Minimum Pedestrian Time		*3.2*			*3.2*			*3.2*				

Phasing	WB Only	EW Perm	03	04	NB Only	06	07	08
Timing	G = *9.0*	G = *72.0*	G =	G =	G = *19.0*	G =	G =	G =
	Y = *6*	Y = *7*	Y =	Y =	Y = *7*	Y =	Y =	Y =
Duration of Analysis (hrs) = *0.25*						Cycle Length C = *120.0*		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate		*2050*		*73*	*1684*		*100*		*42*			
Lane Group Capacity		*2144*		*198*	*2623*		*286*		*256*			
v/c Ratio		*0.96*		*0.37*	*0.64*		*0.35*		*0.16*			
Green Ratio		*0.60*		*0.73*	*0.73*		*0.16*		*0.16*			
Uniform Delay d_1		*22.5*		*27.4*	*8.5*		*45.0*		*43.6*			
Delay Factor k		*0.47*		*0.11*	*0.22*		*0.11*		*0.11*			
Incremental Delay d_2		*11.0*		*1.2*	*0.5*		*0.7*		*0.3*			
PF Factor		*1.000*		*1.000*	*1.000*		*1.000*		*1.000*			
Control Delay		*33.5*		*28.5*	*9.0*		*45.7*		*43.9*			
Lane Group LOS		*C*		*C*	*A*		*D*		*D*			
Approach Delay	*33.5*			*9.8*			*45.2*					
Approach LOS	*C*			*A*			*D*					
Intersection Delay	*23.4*			Intersection LOS						*C*		

SHORT REPORT

General Information		Site Information	
Analyst	*KMD*	Intersection	*Tylersville Rd. & Pepper Pk.*
Agency or Co.	*Bayer Becker*	Area Type	*All other areas*
Date Performed	*01/26/09*	Jurisdiction	*BCEO*
Time Period	*Saturday Noon Peak Hour*	Analysis Year	*2030 Background Cond. (NB LTL)*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes		*2*	*0*	*1*	*2*		*1*		*1*			
Lane Group		*TR*		*L*	*T*		*L*		*R*			
Volume (vph)		*1656*	*136*	*34*	*1549*		*120*		*30*			
% Heavy Vehicles		*0*	*0*	*0*	*0*		*0*		*0*			
PHF		*0.90*	*0.90*	*0.90*	*0.90*		*0.90*		*0.90*			
Pretimed/Actuated (P/A)		*A*	*A*	*A*	*A*		*A*		*A*			
Startup Lost Time		*2.0*		*2.0*	*2.0*		*2.0*		*2.0*			
Extension of Effective Green		*2.0*		*2.0*	*2.0*		*2.0*		*2.0*			
Arrival Type		*3*		*3*	*3*		*3*		*3*			
Unit Extension		*3.0*		*3.0*	*3.0*		*3.0*		*3.0*			
Ped/Bike/RTOR Volume	*0*	*0*	*0*	*0*	*0*		*0*	*0*	*0*			
Lane Width		*12.0*		*12.0*	*12.0*		*12.0*		*12.0*			
Parking/Grade/Parking	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*			
Parking/Hour												
Bus Stops/Hour		*0*		*0*	*0*		*0*		*0*			
Minimum Pedestrian Time		*3.2*			*3.2*			*3.2*				

Phasing	WB Only	EW Perm	03	04	NB Only	06	07	08
Timing	G = *9.0*	G = *70.0*	G =	G =	G = *21.0*	G =	G =	G =
	Y = *6*	Y = *7*	Y =	Y =	Y = *7*	Y =	Y =	Y =
Duration of Analysis (hrs) = *0.25*						Cycle Length C = *120.0*		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate		*1991*		*38*	*1721*		*133*		*33*			
Lane Group Capacity		*2086*		*199*	*2563*		*316*		*283*			
v/c Ratio		*0.95*		*0.19*	*0.67*		*0.42*		*0.12*			
Green Ratio		*0.58*		*0.72*	*0.71*		*0.17*		*0.17*			
Uniform Delay d_1		*23.5*		*25.7*	*9.7*		*44.1*		*41.7*			
Delay Factor k		*0.46*		*0.11*	*0.24*		*0.11*		*0.11*			
Incremental Delay d_2		*10.9*		*0.5*	*0.7*		*0.9*		*0.2*			
PF Factor		*1.000*		*1.000*	*1.000*		*1.000*		*1.000*			
Control Delay		*34.5*		*26.2*	*10.4*		*45.0*		*41.9*			
Lane Group LOS		*C*		*C*	*B*		*D*		*D*			
Approach Delay	*34.5*			*10.8*			*44.4*					
Approach LOS	*C*			*B*			*D*					
Intersection Delay	*24.2*			Intersection LOS						*C*		

SHORT REPORT

General Information		Site Information	
Analyst	*KMD*	Intersection	*Tylersville Rd. & Pepper Pk.*
Agency or Co.	*Bayer Becker*	Area Type	*All other areas*
Date Performed	*01/26/09*	Jurisdiction	*BCEO*
Time Period	*Weekday PM Peak Hour*	Analysis Year	*2030 Total Cond. (NB&SB LTLs)*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	*1*	*2*	*0*	*1*	*2*	*0*	*1*	*1*	*0*	*1*	*1*	*0*
Lane Group	*L*	*TR*		*L*	*TR*		*L*	*TR*		*L*	*TR*	
Volume (vph)	*103*	*1692*	*153*	*66*	*1516*	*103*	*90*	*3*	*38*	*46*	*2*	*46*
% Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Pretimed/Actuated (P/A)	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*
Startup Lost Time	*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	
Extension of Effective Green	*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	
Arrival Type	*3*	*3*		*3*	*3*		*3*	*3*		*3*	*3*	
Unit Extension	*3.0*	*3.0*		*3.0*	*3.0*		*3.0*	*3.0*		*3.0*	*3.0*	
Ped/Bike/RTOR Volume	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Lane Width	*12.0*	*12.0*		*12.0*	*12.0*		*12.0*	*12.0*		*12.0*	*12.0*	
Parking/Grade/Parking	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*
Parking/Hour												
Bus Stops/Hour	*0*	*0*		*0*	*0*		*0*	*0*		*0*	*0*	
Minimum Pedestrian Time		*3.2*			*3.2*			*3.2*			*3.2*	

Phasing	Excl. Left	EW Perm	03	04	NS Perm	06	07	08
Timing	G = *11.0*	G = *72.0*	G =	G =	G = *17.0*	G =	G =	G =
	Y = *6*	Y = *7*	Y =	Y =	Y = *7*	Y =	Y =	Y =

Duration of Analysis (hrs) = *0.25* | Cycle Length C = *120.0*

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	*114*	*2050*		*73*	*1798*		*100*	*45*		*51*	*53*	
Lane Group Capacity	*228*	*2144*		*228*	*2150*		*195*	*231*		*196*	*230*	
v/c Ratio	*0.50*	*0.96*		*0.32*	*0.84*		*0.51*	*0.19*		*0.26*	*0.23*	
Green Ratio	*0.75*	*0.60*		*0.75*	*0.60*		*0.14*	*0.14*		*0.14*	*0.14*	
Uniform Delay d_1	*26.2*	*22.5*		*26.8*	*19.3*		*47.7*	*45.5*		*45.9*	*45.7*	
Delay Factor k	*0.11*	*0.47*		*0.11*	*0.37*		*0.12*	*0.11*		*0.11*	*0.11*	
Incremental Delay d_2	*1.7*	*11.0*		*0.8*	*3.1*		*2.3*	*0.4*		*0.7*	*0.5*	
PF Factor	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
Control Delay	*27.9*	*33.5*		*27.7*	*22.3*		*50.0*	*45.9*		*46.6*	*46.2*	
Lane Group LOS	*C*	*C*		*C*	*C*		*D*	*D*		*D*	*D*	
Approach Delay	*33.2*			*22.5*			*48.7*			*46.4*		
Approach LOS	*C*			*C*			*D*			*D*		
Intersection Delay	*29.4*			Intersection LOS			*C*					

SHORT REPORT

General Information		Site Information	
Analyst	*KMD*	Intersection	*Tylersville Rd. & Pepper Pk.*
Agency or Co.	*Bayer Becker*	Area Type	*All other areas*
Date Performed	*01/26/09*	Jurisdiction	*BCEO*
Time Period	*Saturday Noon Peak Hour*	Analysis Year	*2030 Total Cond. (NB&SB LTLs)*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	*1*	*2*	*0*	*1*	*2*	*0*	*1*	*1*	*0*	*1*	*1*	*0*
Lane Group	*L*	*TR*		*L*	*TR*		*L*	*TR*		*L*	*TR*	
Volume (vph)	*113*	*1656*	*136*	*34*	*1549*	*113*	*120*	*4*	*30*	*123*	*4*	*123*
% Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Pretimed/Actuated (P/A)	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*
Startup Lost Time	*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	
Extension of Effective Green	*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	
Arrival Type	*3*	*3*		*3*	*3*		*3*	*3*		*3*	*3*	
Unit Extension	*3.0*	*3.0*		*3.0*	*3.0*		*3.0*	*3.0*		*3.0*	*3.0*	
Ped/Bike/RTOR Volume	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Lane Width	*12.0*	*12.0*		*12.0*	*12.0*		*12.0*	*12.0*		*12.0*	*12.0*	
Parking/Grade/Parking	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*
Parking/Hour												
Bus Stops/Hour	*0*	*0*		*0*	*0*		*0*	*0*		*0*	*0*	
Minimum Pedestrian Time		*3.2*			*3.2*			*3.2*			*3.2*	

Phasing	Excl. Left	EW Perm	03	04	NS Perm	06	07	08
Timing	G = *9.7*	G = *69.9*	G =	G =	G = *20.4*	G =	G =	G =
	Y = *6*	Y = *7*	Y =	Y =	Y = *7*	Y =	Y =	Y =

Duration of Analysis (hrs) = *0.25* | Cycle Length C = *120.0*

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	*126*	*1991*		*38*	*1847*		*133*	*37*		*137*	*141*	
Lane Group Capacity	*209*	*2083*		*209*	*2086*		*200*	*280*		*237*	*276*	
v/c Ratio	*0.60*	*0.96*		*0.18*	*0.89*		*0.67*	*0.13*		*0.58*	*0.51*	
Green Ratio	*0.72*	*0.58*		*0.72*	*0.58*		*0.17*	*0.17*		*0.17*	*0.17*	
Uniform Delay d_1	*30.0*	*23.6*		*25.6*	*21.6*		*46.6*	*42.3*		*45.8*	*45.3*	
Delay Factor k	*0.19*	*0.47*		*0.11*	*0.41*		*0.24*	*0.11*		*0.17*	*0.12*	
Incremental Delay d_2	*4.8*	*11.2*		*0.4*	*5.0*		*8.1*	*0.2*		*3.5*	*1.6*	
PF Factor	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
Control Delay	*34.9*	*34.7*		*26.0*	*26.6*		*54.7*	*42.5*		*49.3*	*46.9*	
Lane Group LOS	*C*	*C*		*C*	*C*		*D*	*D*		*D*	*D*	
Approach Delay	*34.8*			*26.6*			*52.0*			*48.1*		
Approach LOS	*C*			*C*			*D*			*D*		
Intersection Delay	*32.8*			Intersection LOS						*C*		

APPENDIX H
QUEUE ANALYSIS

BACK-OF-QUEUE WORKSHEET

General Information

Project Description *2018 Total Conditions - Weekday PM Peak Hour*

Average Back of Queue

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Lane Group	*L*	*TR*		*L*	*TR*		*L*	*TR*		*L*	*TR*	
Initial Queue/Lane	*0.0*	*0.0*		*0.0*	*0.0*		*0.0*	*0.0*		*0.0*	*0.0*	
Flow Rate/Lane Group	*114*	*1839*		*73*	*1608*		*100*	*45*		*51*	*53*	
Satflow/Lane	*291*	*1873*		*291*	*1879*		*1373*	*1634*		*1383*	*1626*	
Capacity/Lane Group	*198*	*1962*		*198*	*1968*		*286*	*340*		*288*	*339*	
Flow Ratio	*0.4*	*0.5*		*0.3*	*0.4*		*0.1*	*0.0*		*0.0*	0.0	
v/c Ratio	*0.58*	*0.94*		*0.37*	*0.82*		*0.35*	*0.13*		*0.18*	*0.16*	
I Factor	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
Arrival Type	*3*	*3*		*3*	*3*		*3*	*3*		*3*	*3*	
Platoon Ratio	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
PF Factor	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
Q_1	*1.3*	*29.9*		*0.8*	*23.0*		*2.8*	*1.2*		*1.4*	*1.4*	
k_B	*0.3*	*0.8*		*0.3*	*0.8*		*0.4*	*0.4*		*0.4*	*0.4*	
Q_2	*0.4*	*6.8*		*0.2*	*3.3*		*0.2*	*0.1*		*0.1*	*0.1*	
Q Average	*1.7*	*36.6*		*1.0*	*26.3*		*3.1*	*1.3*		*1.5*	*1.5*	

Percentile Back of Queue (95th percentile)

$f_{B\%}$	*2.0*	*1.6*		*2.1*	*1.6*		*2.0*	*2.1*		*2.1*	*2.1*	
Back of Queue	*3.4*	*57.8*		*2.0*	*43.1*		*6.1*	*2.6*		*3.0*	*3.1*	

Queue Storage Ratio

Queue Spacing	*25.0*	*25.0*		*25.0*	*25.0*		*25.0*	*25.0*		*25.0*	*25.0*	
Queue Storage	*0*	*0*		*0*	*0*		*0*	*0*		*0*	*0*	
Average Queue Storage Ratio												
95% Queue Storage Ratio												

BACK-OF-QUEUE WORKSHEET

General Information

Project Description *2018 Total Conditions - Saturday Noon Peak Hour*

Average Back of Queue

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Lane Group	*L*	*TR*		*L*	*TR*		*L*	*TR*		*L*	*TR*	
Initial Queue/Lane	*0.0*	*0.0*		*0.0*	*0.0*		*0.0*	*0.0*		*0.0*	*0.0*	
Flow Rate/Lane Group	*126*	*1784*		*38*	*1654*		*133*	*37*		*137*	*141*	
Satflow/Lane	*295*	*1876*		*295*	*1878*		*1219*	*1646*		*1393*	*1623*	
Capacity/Lane Group	*199*	*1935*		*199*	*1937*		*264*	*357*		*302*	*352*	
Flow Ratio	*0.4*	*0.5*		*0.1*	*0.5*		*0.1*	*0.0*		*0.1*	0.1	
v/c Ratio	*0.63*	*0.92*		*0.19*	*0.85*		*0.50*	*0.10*		*0.45*	*0.40*	
I Factor	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
Arrival Type	*3*	*3*		*3*	*3*		*3*	*3*		*3*	*3*	
Platoon Ratio	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
PF Factor	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
Q_1	*1.4*	*28.5*		*0.4*	*24.7*		*3.9*	*1.0*		*4.0*	*4.0*	
k_B	*0.3*	*0.8*		*0.3*	*0.8*		*0.4*	*0.4*		*0.4*	*0.4*	
Q_2	*0.5*	*6.0*		*0.1*	*4.0*		*0.4*	*0.1*		*0.3*	*0.3*	
Q Average	*1.9*	*34.6*		*0.5*	*28.6*		*4.3*	*1.0*		*4.3*	*4.3*	

Percentile Back of Queue (95th percentile)

$f_{B\%}$	*2.0*	*1.6*		*2.1*	*1.6*		*2.0*	*2.1*		*2.0*	*2.0*	
Back of Queue	*4.0*	*54.9*		*1.0*	*46.5*		*8.4*	*2.1*		*8.5*	*8.5*	

Queue Storage Ratio

Queue Spacing	*25.0*	*25.0*		*25.0*	*25.0*		*25.0*	*25.0*		*25.0*	*25.0*	
Queue Storage	*0*	*0*		*0*	*0*		*0*	*0*		*0*	*0*	
Average Queue Storage Ratio												
95% Queue Storage Ratio												

BACK-OF-QUEUE WORKSHEET

General Information

Project Description *2030 Total Conditions - Weekday PM Peak Hour*

Average Back of Queue

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Lane Group	*L*	*TR*		*L*	*TR*		*L*	*TR*		*L*	*TR*	
Initial Queue/Lane	*0.0*	*0.0*		*0.0*	*0.0*		*0.0*	*0.0*		*0.0*	*0.0*	
Flow Rate/Lane Group	*114*	*2050*		*73*	*1798*		*100*	*45*		*51*	*53*	
Satflow/Lane	*305*	*1876*		*305*	*1881*		*1373*	*1634*		*1383*	*1626*	
Capacity/Lane Group	*228*	*2144*		*228*	*2150*		*195*	*231*		*196*	*230*	
Flow Ratio	*0.4*	*0.6*		*0.2*	*0.5*		*0.1*	*0.0*		*0.0*	0.0	
v/c Ratio	*0.50*	*0.96*		*0.32*	*0.84*		*0.51*	*0.19*		*0.26*	*0.23*	
I Factor	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
Arrival Type	*3*	*3*		*3*	*3*		*3*	*3*		*3*	*3*	
Platoon Ratio	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
PF Factor	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
Q_1	*1.0*	*33.6*		*0.6*	*25.3*		*3.1*	*1.3*		*1.5*	*1.6*	
k_B	*0.3*	*0.9*		*0.3*	*0.9*		*0.3*	*0.3*		*0.3*	*0.3*	
Q_2	*0.3*	*8.2*		*0.2*	*3.9*		*0.3*	*0.1*		*0.1*	*0.1*	
Q Average	*1.3*	*41.8*		*0.8*	*29.1*		*3.4*	*1.4*		*1.6*	*1.7*	

Percentile Back of Queue (95th percentile)

$f_{B\%}$	*2.1*	*1.6*		*2.1*	*1.6*		*2.0*	*2.1*		*2.0*	*2.0*	
Back of Queue	*2.7*	*65.2*		*1.6*	*47.1*		*6.8*	*2.9*		*3.3*	*3.4*	

Queue Storage Ratio

Queue Spacing	*25.0*	*25.0*		*25.0*	*25.0*		*25.0*	*25.0*		*25.0*	*25.0*	
Queue Storage	*0*	*0*		*0*	*0*		*0*	*0*		*0*	*0*	
Average Queue Storage Ratio												
95% Queue Storage Ratio												

BACK-OF-QUEUE WORKSHEET

General Information

Project Description *2030 Total Conditions - Saturday Noon Peak Hour*

Average Back of Queue

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Lane Group	*L*	*TR*		*L*	*TR*		*L*	*TR*		*L*	*TR*	
Initial Queue/Lane	*0.0*	*0.0*		*0.0*	*0.0*		*0.0*	*0.0*		*0.0*	*0.0*	
Flow Rate/Lane Group	*126*	*1991*		*38*	*1847*		*133*	*37*		*137*	*141*	
Satflow/Lane	*290*	*1878*		*290*	*1880*		*1176*	*1646*		*1393*	*1623*	
Capacity/Lane Group	*209*	*2083*		*209*	*2086*		*200*	*280*		*237*	*276*	
Flow Ratio	*0.4*	*0.6*		*0.1*	*0.5*		*0.1*	*0.0*		*0.1*	0.1	
v/c Ratio	*0.60*	*0.96*		*0.18*	*0.89*		*0.67*	*0.13*		*0.58*	*0.51*	
I Factor	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
Arrival Type	*3*	*3*		*3*	*3*		*3*	*3*		*3*	*3*	
Platoon Ratio	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
PF Factor	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
Q_1	*1.2*	*32.8*		*0.4*	*27.9*		*4.1*	*1.0*		*4.2*	*4.3*	
k_B	*0.3*	*0.9*		*0.3*	*0.9*		*0.3*	*0.4*		*0.3*	*0.4*	
Q_2	*0.5*	*8.0*		*0.1*	*5.1*		*0.6*	*0.1*		*0.5*	*0.4*	
Q Average	*1.7*	*40.8*		*0.4*	*33.0*		*4.7*	*1.1*		*4.7*	*4.7*	

Percentile Back of Queue (95th percentile)

$f_{B\%}$	*2.0*	*1.6*		*2.1*	*1.6*		*2.0*	*2.1*		*2.0*	*2.0*	
Back of Queue	*3.5*	*63.7*		*0.9*	*52.6*		*9.3*	*2.3*		*9.1*	*9.1*	

Queue Storage Ratio

Queue Spacing	*25.0*	*25.0*		*25.0*	*25.0*		*25.0*	*25.0*		*25.0*	*25.0*	
Queue Storage	*0*	*0*		*0*	*0*		*0*	*0*		*0*	*0*	
Average Queue Storage Ratio												
95% Queue Storage Ratio												