

Cosgray Road & Shier Rings Road Single-Family Development Traffic Impact Study

MC Shier Rings LLC
April 30, 2020



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I. Purpose of Report & Study Objectives

The purpose of this traffic analysis and report is to document the potential traffic impacts of the proposed MC Shier Rings single-family development on Shier Rings Road in Dublin, Ohio. This analysis and report are being required by the City of Dublin as part of the development approval process. A Memorandum of Understanding (MOU) was provided to the City of Dublin via email. This MOU and comments on said MOU can be seen in **Appendix A**.

II. Proposed Development

A. Off-Site Developments

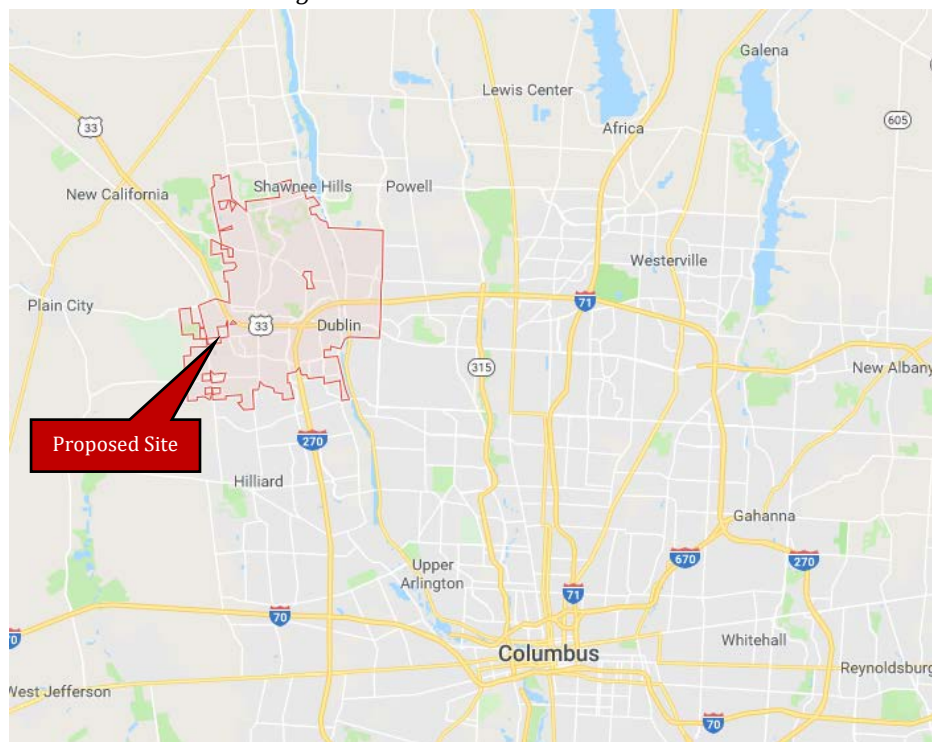
The study area is located in the southeast corner of the intersection of Shier Rings Road & Cosgray Road. The surrounding area includes residential developments, agricultural fields, and undeveloped green space.

B. On-Site Development

Location

The site is located southwest of US-33 in Dublin, Ohio. **Figure 1** shows the location of the proposed site in central Ohio and **Figure 2** shows the study area.

Figure 1 – Location in Central Ohio¹



¹ Note that **Figure 1** shows the current City of Dublin limits.

Figure 2 – Location of the Proposed Development (Yellow), Site Drive, and Study Intersections



Land Use & Intensity

The site is currently not developed and is proposed to develop with 34 single-family homes.

Site Plan

The full site plan can be found in **Appendix A**.

Phasing & Timing

For analysis, the Opening Year for the development is 2021 and the Design or Horizon Year is 2031.

III. Area Conditions

A. Area of Influence

The intersections under study are listed below (numbers correspond to **Figure 2**).

1. Shier Rings Road & Cosgray Road
2. Shier Rings Road & Eiterman Road
3. Shier Rings Road & Site Access Point

The classification and design speeds used for each roadway are listed in **Table 1**. The design speeds used are 5 MPH higher than the posted speed limits. Roadway classifications were obtained from the City of Dublin Thoroughfare Plan. The intersection of Shier Rings Road & Cosgray Road is currently a roundabout with one circulating lane and single lane approaches for all but the eastbound approach, which has a shared left-through lane and a dedicated right turn lane. The intersection of Shier Rings Road & Eiterman Road is currently four-way stop-controlled with single lane approaches. Improvements to this intersection, whether it be a signal or a roundabout, are to be constructed in the near future.

Table 1 – Road Classifications and Design Speeds

Road	Classification	Posted Speed (mph)	Design Speed (mph)
Eiterman Rd.	Minor Collector	35	40
Shier Rings Rd. (between Eiterman Rd. & Cosgray Rd.)	Minor Collector	35	40
Cosgray Rd. (north of Shier Rings Rd.)	Minor Collector	50	55
Cosgray Rd. (south of Shier Rings Rd.)	Minor Collector	45	50

A City of Dublin proposed roadway improvement project that includes realigning Shier Rings Road is planned to be implemented prior to the Horizon Year of this study. Details of this roadway realignment, and the proposed development associated with it, are provided later in this report. *aka University Boulevard*

B. Jurisdictions

The proposed site and all the study intersections are under City of Dublin jurisdiction.

C. Traffic Volumes & Conditions

AM (7:00-9:00) and PM (4:00-6:00) peak turning movement counts were obtained from the City of Dublin for the intersections of Shier Rings Road & Eiterman Road (collected on 10/4/17) and Shier Rings Road & Cosgray Road (collected on 2/15/17). All count data can be found in **Appendix B**.

IV. Projected Traffic

A. Background Traffic

Linear, annual growth rates from the Mid-Ohio Regional Planning Commission (MORPC) for a nearby study titled *City of Dublin Ambulatory & Hospital Development Traffic Impact Study* were utilized. These growth rates as seen in **Table 2**.

Table 2 – MORPC Growth Rates

Location	Linear Annual Growth Rate
Shier Rings Rd. e/o Cosgray Rd.	1.00%
Cosgray Rd. n/o Shier Rings Rd.	2.00%
Shier Rings Rd. w/o Cosgray Rd.	1.00%
Cosgray Rd. s/o Shier Rings Rd.	2.00%
Shier Rings Rd. e/o Eiterman Rd.	1.00%
Eiterman Rd. n/o Shier Rings Rd.	4.00%
Shier Rings Rd. w/o Eiterman Rd.	1.00%
Eiterman Rd. s/o Shier Rings Rd.	2.00%

Growth rates were applied to the count data to produce Background traffic for the Opening (2021) and Horizon (2031) Years. MORPC correspondence can be seen in **Appendix B**.

B. Site Traffic

Trip Generation

Trips for the proposed site development were generated using standard Institute of Transportation Engineers (ITE) practices and the *Trip Generation Manual*, 10th edition, data via the OTISS program². Land Use Code (LUC) 210 – *Single-Family Detached Housing* was used to generate trips for the proposed development. Pass-by and internal capture rates do not apply to this proposed development. **Table 3** shows the trip generation of the proposed development. The full trip generation details can be found in **Appendix C**.

Table 3 – Proposed Site Trip Generation Summary

Land Use	Size	AM Peak			PM Peak		
		Entry	Exit	Total	Entry	Exit	Total
210 – Single-Family Detached Housing	34 Dwelling Units	7	22	29	23	13	36

In addition to the proposed site traffic, traffic generated by several background developments was included in the traffic study as background traffic. The included background developments are detailed below.

- Proposed Noah’s Event Venue
 - This proposed development is located on the northeast corner of Old Shier Rings Road & Eiterman Road. Trips were generated according to a study titled *Noah’s Event Venue Dublin Traffic Access Study* completed by Carpenter Marty Transportation in October 2018. The trips were distributed based on a study titled *City of Dublin Ambulatory & Hospital Development Traffic Impact Study* completed by Carpenter Marty Transportation in October of 2019.
- Proposed OSU Dublin Ambulatory Care Facility
 - This proposed development is located on the north side of Realigned Shier Rings Road, northeast of Eiterman Road. Trips were generated and distributed according to the *City of Dublin Ambulatory & Hospital Development Traffic Impact Study* completed by Carpenter Marty Transportation in October of 2019.
- Proposed OSU Dublin Ambulatory Care Facility Outlots
 - These proposed developments will be located around the above proposed OSU Dublin Ambulatory Care Facility on the north and south sides of Realigned Shier Rings Road, northeast of Eiterman Road. Trips were generated and distributed according to said TIS completed by Carpenter Marty Transportation in October of 2019.

² Online Traffic Impact Study Software developed by ITE and Transoft Solutions.

Table 4 shows the trip generation summary of the above noted background developments. It should be noted that pass-by and internal capture rates do not apply to the trips generated for the OSU Dublin Ambulatory Care Facility or Outlots. It should also be noted that the trip generation for the Noah’s Event Venue was not developed using standard ITE practices. Full trip generation for all background developments can be seen in **Appendix C**.

Table 4 – Background Developments Trip Generation Summary

Background Development	Land Use	Approx. Acreage	AM Peak			PM Peak		
			Entry	Exit	Total	Entry	Exit	Total
Noah’s Event Venue	ENTERING Event Center (Non-ITE Source)	250 People	110	15	125	---	---	---
	EXITING Event Center (Non-ITE Source)		---	---	---	15	110	125
	Total		110	15	125	15	110	125
OSU Dublin Ambulatory Care Facility	720 – Medical-Dental Office Building (Phase 1)	243,000 SF Gross Floor Area	527	149	676	235	605	840
	610 – Hospital (Phase 2)	274,000 SF Gross Floor Area	224	105	329	85	181	266
	Total		751	254	1005	320	786	1106
OSU Dublin Ambulatory Care Facility Outlots	310 – Hotel	200 Rooms	56	39	95	63	61	124
	310 – Hotel	200 Rooms	56	39	95	63	61	124
	411 – Public Park	5 Acres	0	0	0	13	10	23
	720 – Medical-Dental Office Building	272,250 SF Gross Floor Area	590	167	757	264	678	942
	710 – General Office Building	272,250 SF Gross Floor Area	243	40	283	47	248	295
	760 – Research and Development Center	99,000 SF Gross Floor Area	31	10	41	8	45	53
	760 – Research and Development Center	99,000 SF Gross Floor Area	31	10	41	8	45	53
	Total		1007	305	1312	466	1148	1614
TOTAL		1868	574	2442	801	2044	2845	

Trip Distribution & Assignment

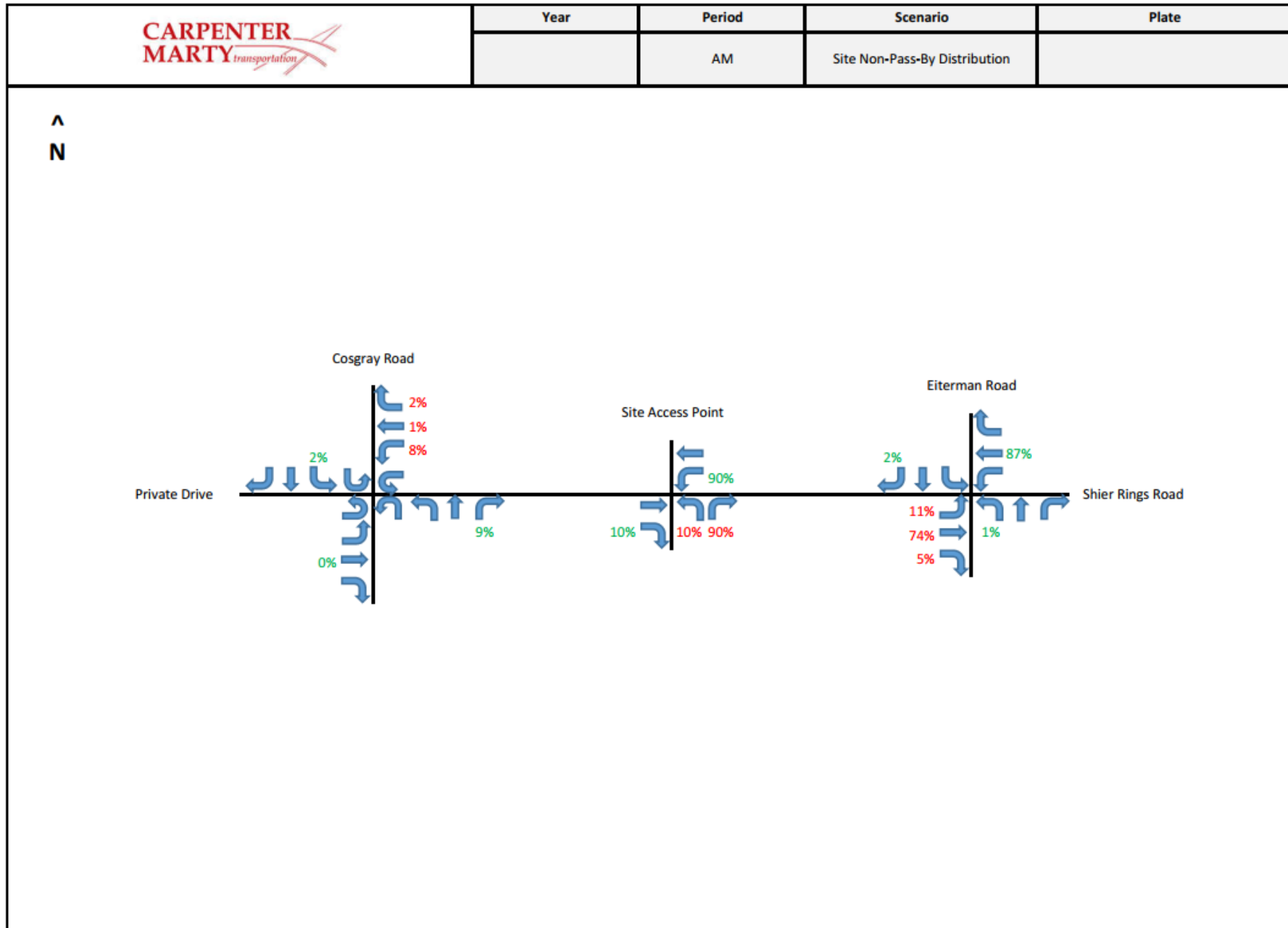
All background traffic was distributed based on the *City of Dublin Ambulatory & Hospital Development Traffic Impact Study*. Traffic distributions for the proposed site were developed based on the count data, knowledge of the surrounding area, engineering judgment, and input from the City of Dublin.

Traffic Volumes

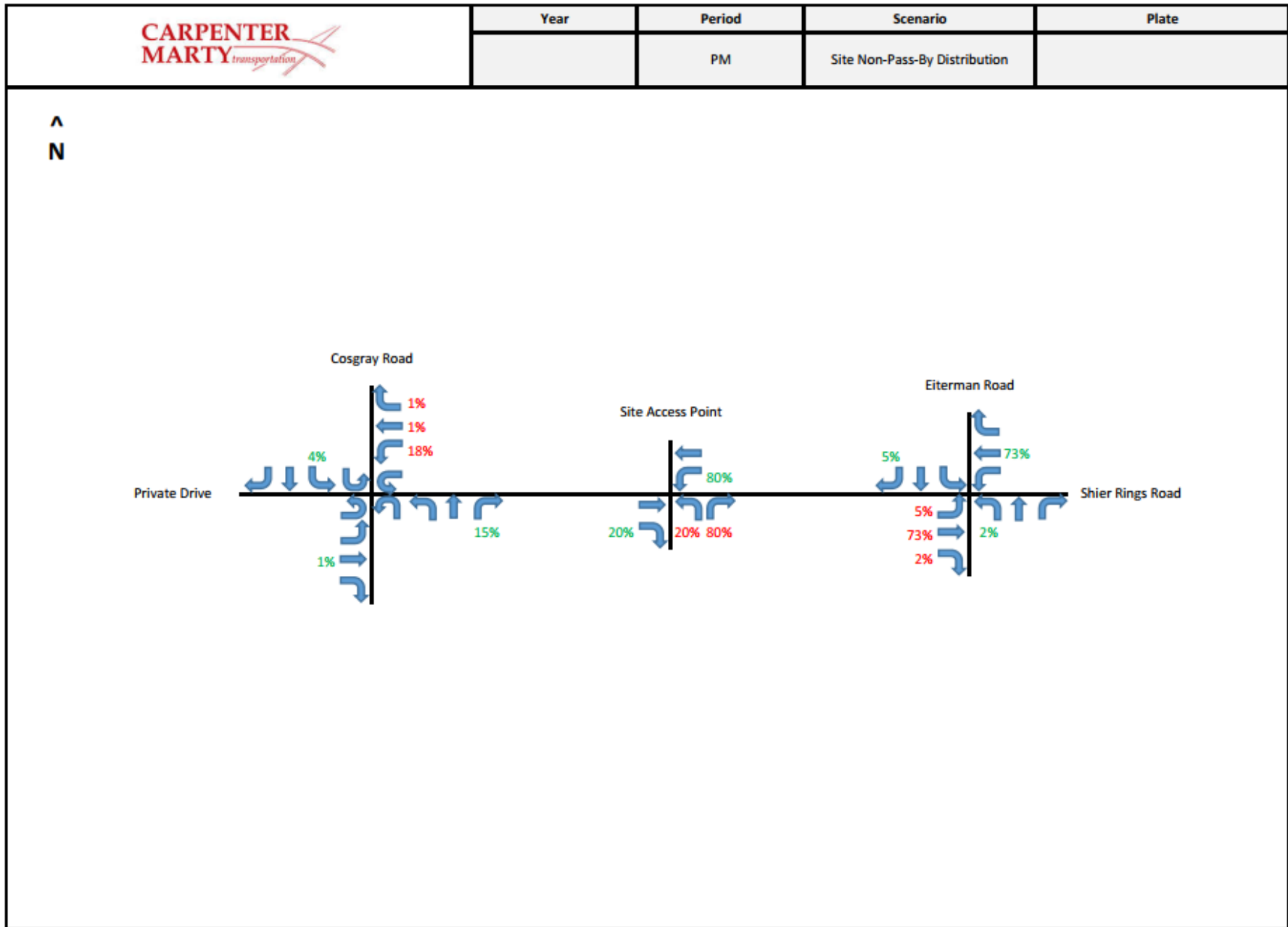
The background development traffic was added to the grown Background traffic to produce No Build traffic volumes. Noah’s Event Venue traffic was added as background traffic for the Opening Year and all OSU traffic (Ambulatory Phase 1 & Phase 2 and Outlots) was added as background for the Horizon Year. Site traffic was added to the No Build traffic to produce Build traffic for the Opening and Horizon Years. Count data at the intersection of Shier Rings Road & Eiterman Road was adjusted based on the realignment of Shier Rings Road as a part of the OSU Dublin Ambulatory project. It should be noted that adjustments to this

intersection do not match the same adjustments made in the *City of Dublin Ambulatory & Hospital Development Traffic Impact Study*. A connection from Old Shier Rings Road to Realigned Shier Rings Road is now proposed to be constructed. This connection was not included in the *City of Dublin Ambulatory & Hospital Development Traffic Impact Study*. The count data adjustments noted, distributions and assignments, as well as the volume development and calculations can be found in **Appendix D**. Site traffic distributions, No Build volumes, and Build volumes utilized for the analysis can be seen below.


Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations



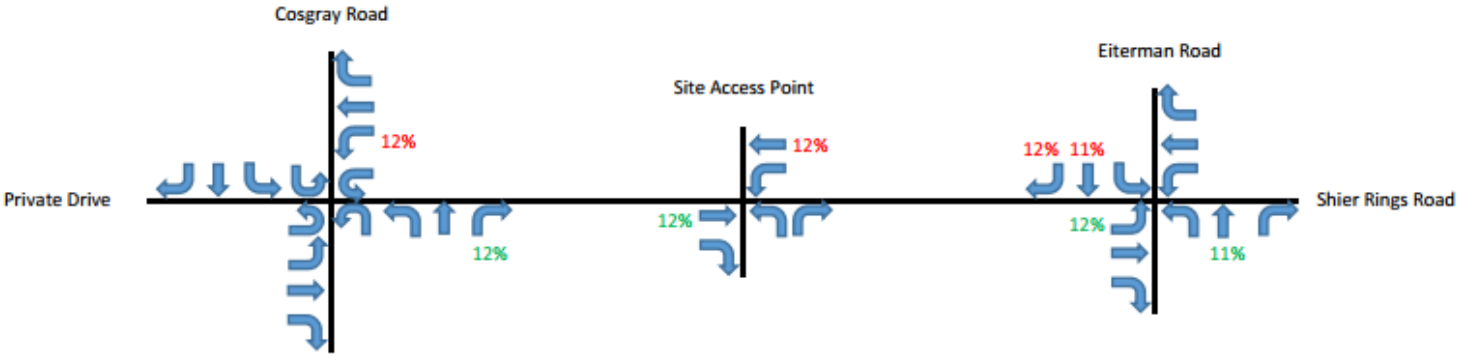
Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations



Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations

	Year	Period	Scenario	Plate
				Noah's Non-Pass-By Distribution*


^
N



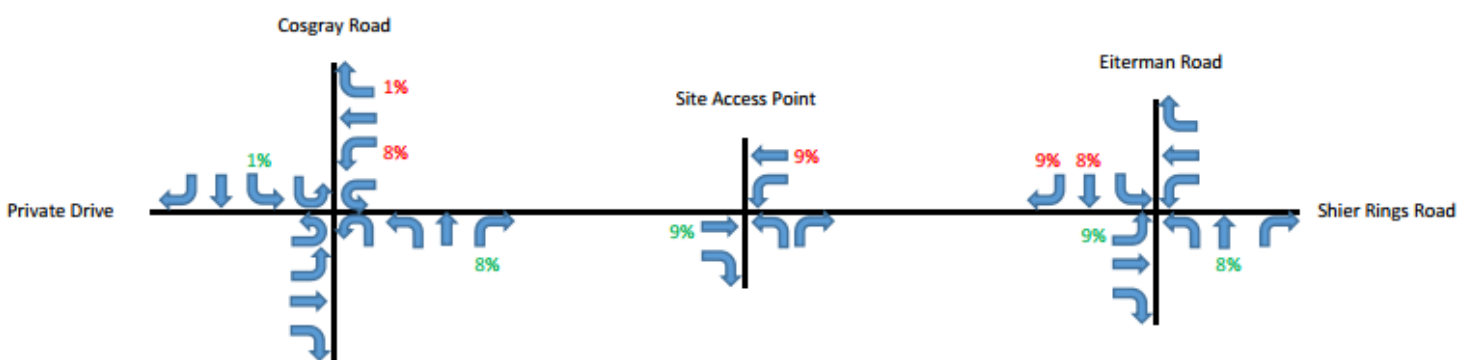
The diagram illustrates traffic flow at five locations along a horizontal road. From left to right: Private Drive, Cosgray Road, Site Access Point, Eiterman Road, and Shier Rings Road. Blue arrows indicate traffic direction. Percentages are shown in red and green. At Cosgray Road, 12% (red) flows north and 12% (green) flows south. At Site Access Point, 12% (red) flows west and 12% (green) flows east. At Eiterman Road, 12% (red) flows west and 11% (red) flows east. At Shier Rings Road, 12% (green) flows west and 11% (green) flows east.

* Distribution obtained from the Noah's Event Venue Dublin Traffic Access Study and The Ohio State University City of Dublin Ambulatory & Hospital Development Traffic Impact Study.

**Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations**

	Year	Period	Scenario	Plate
				Hospital/Ambulatory and Medical Office Non-Pass-By Distribution*

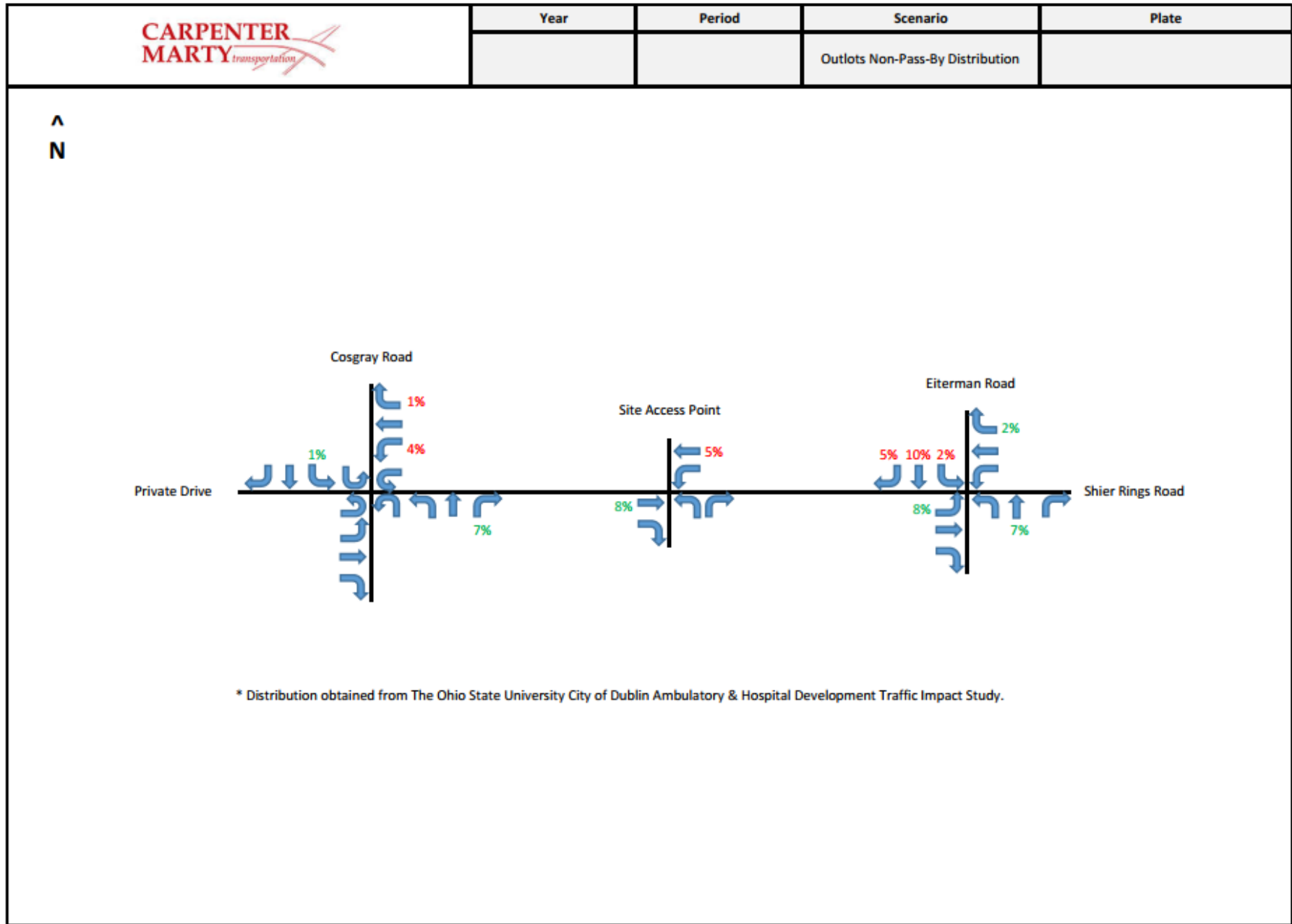
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The diagram illustrates traffic distribution percentages at various points along a road. From left to right, the points are: Private Drive, Cosgray Road, Site Access Point, Eiterman Road, and Shier Rings Road. Percentages are shown in red for northbound and southbound through traffic, and in green for eastbound and westbound through traffic. At Cosgray Road, northbound traffic is 1% and southbound is 8%. At Site Access Point, northbound traffic is 9% and southbound is 9%. At Eiterman Road, northbound traffic is 9% and southbound is 8%. At Shier Rings Road, northbound traffic is 9% and southbound is 8%. Private Drive has a 1% distribution for westbound traffic.

* Distribution obtained from The Ohio State University City of Dublin Ambulatory & Hospital Development Traffic Impact Study.

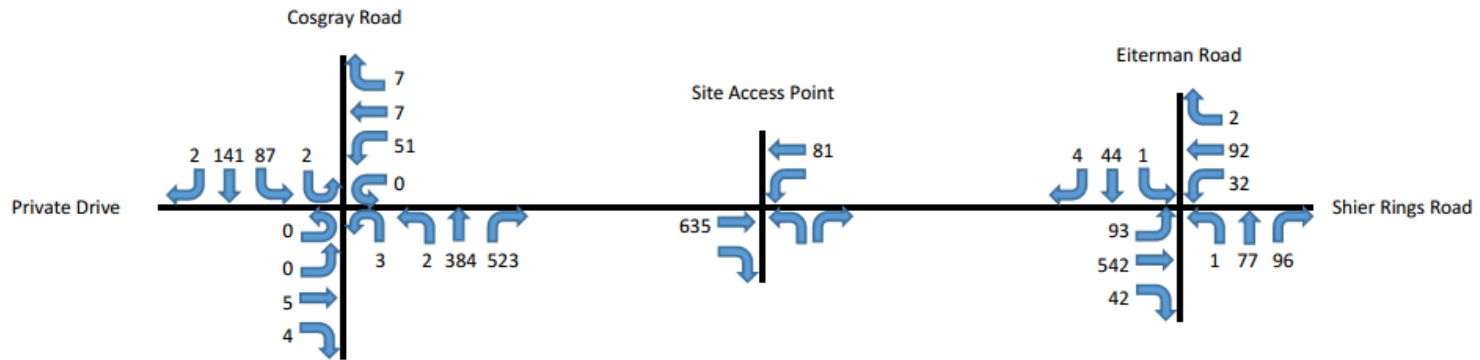
Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations



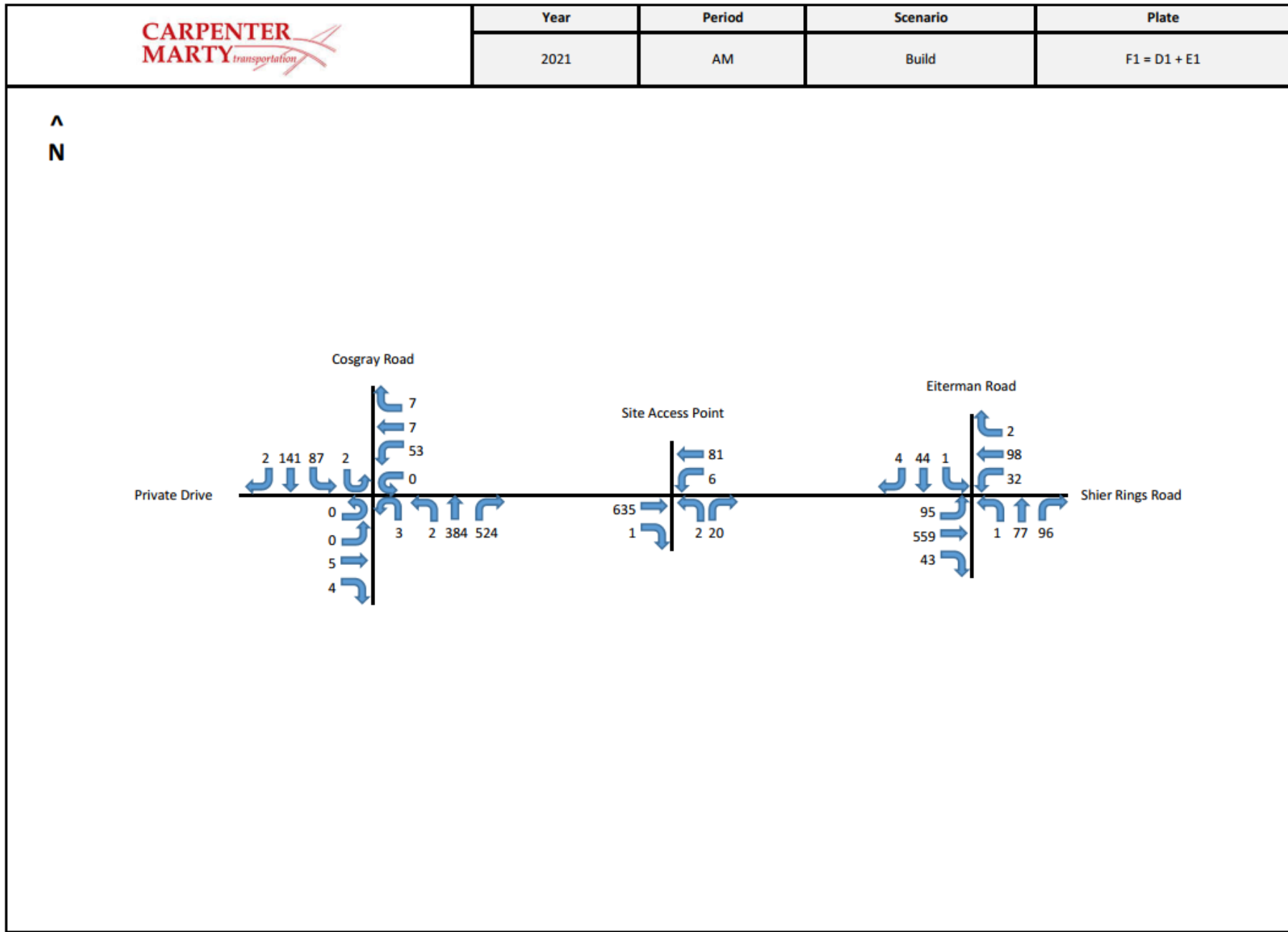
Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations

	Year	Period	Scenario	Plate
	2021	AM	No Build	D1 = B1 + C1

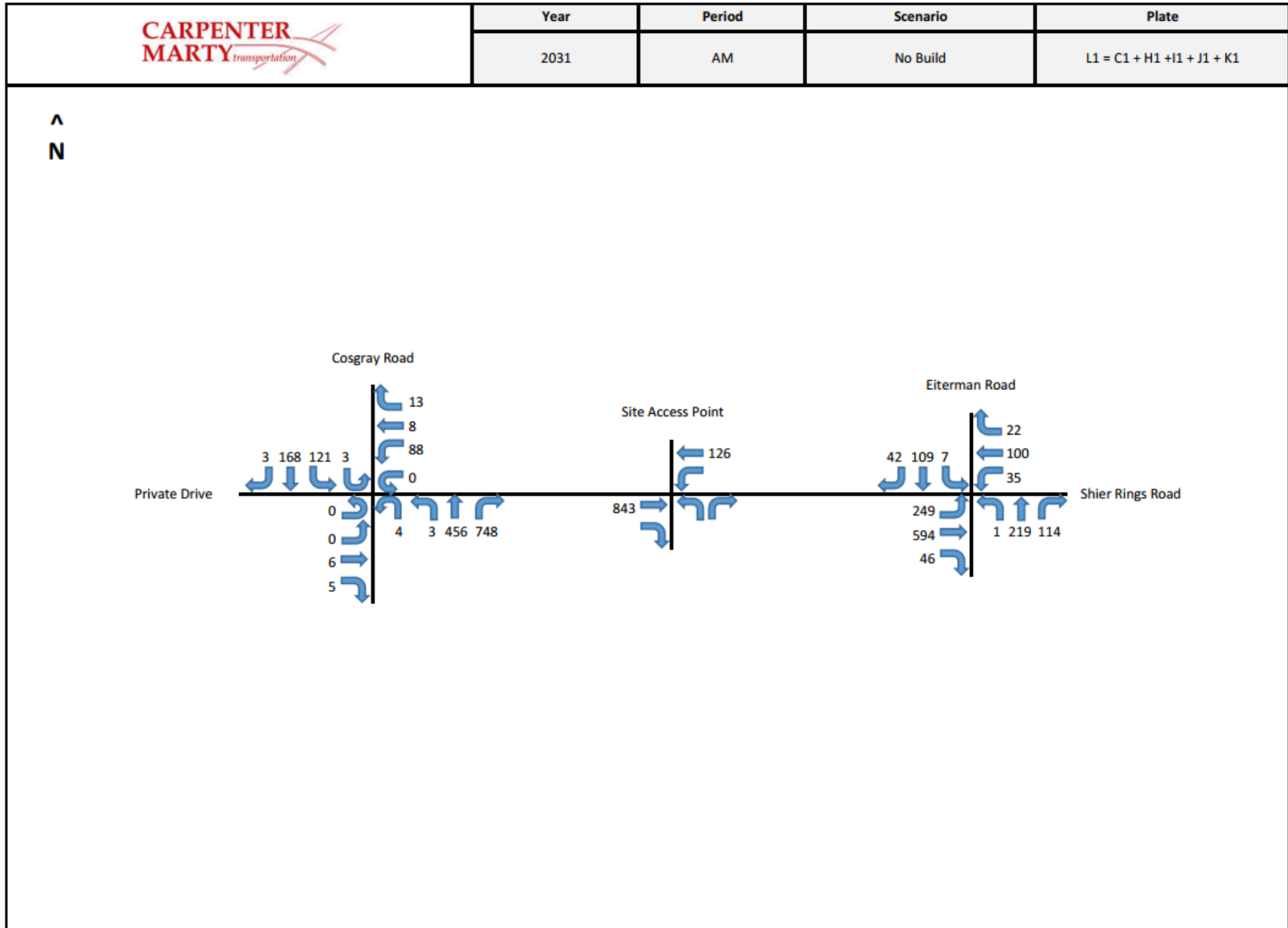
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Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations



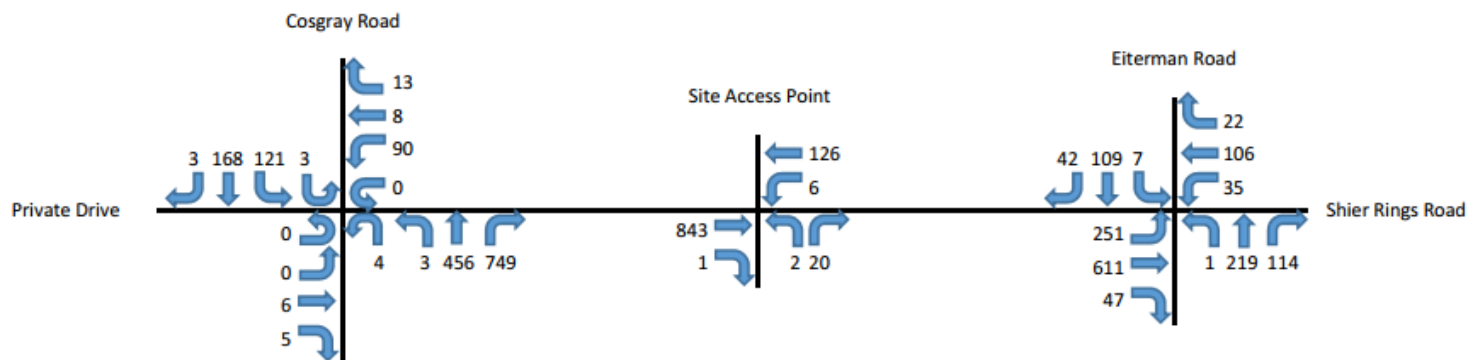
Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations




Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations

	Year	Period	Scenario	Plate
	2031	AM	Build	M1 = E1 + L1

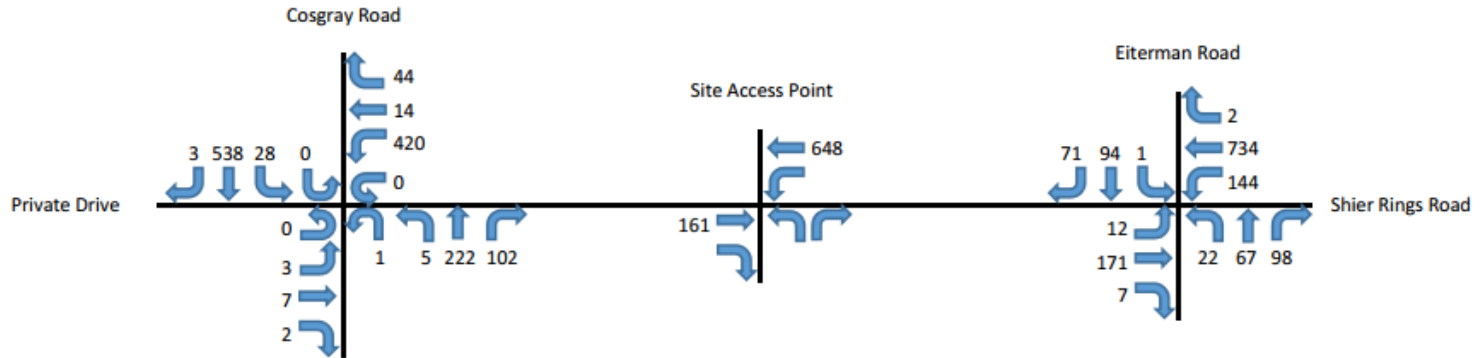
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Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations

	Year	Period	Scenario	Plate
	2021	PM	No Build	D2 = B2 + C2

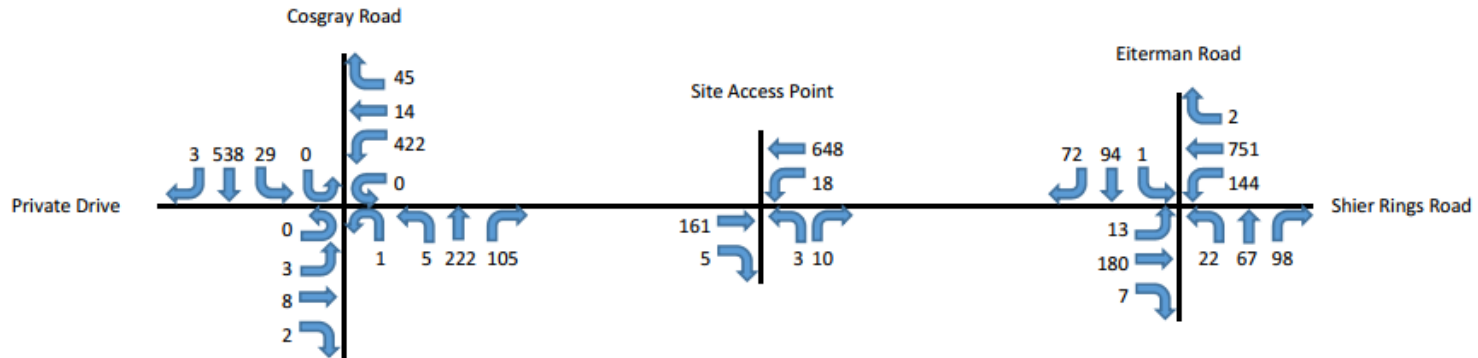
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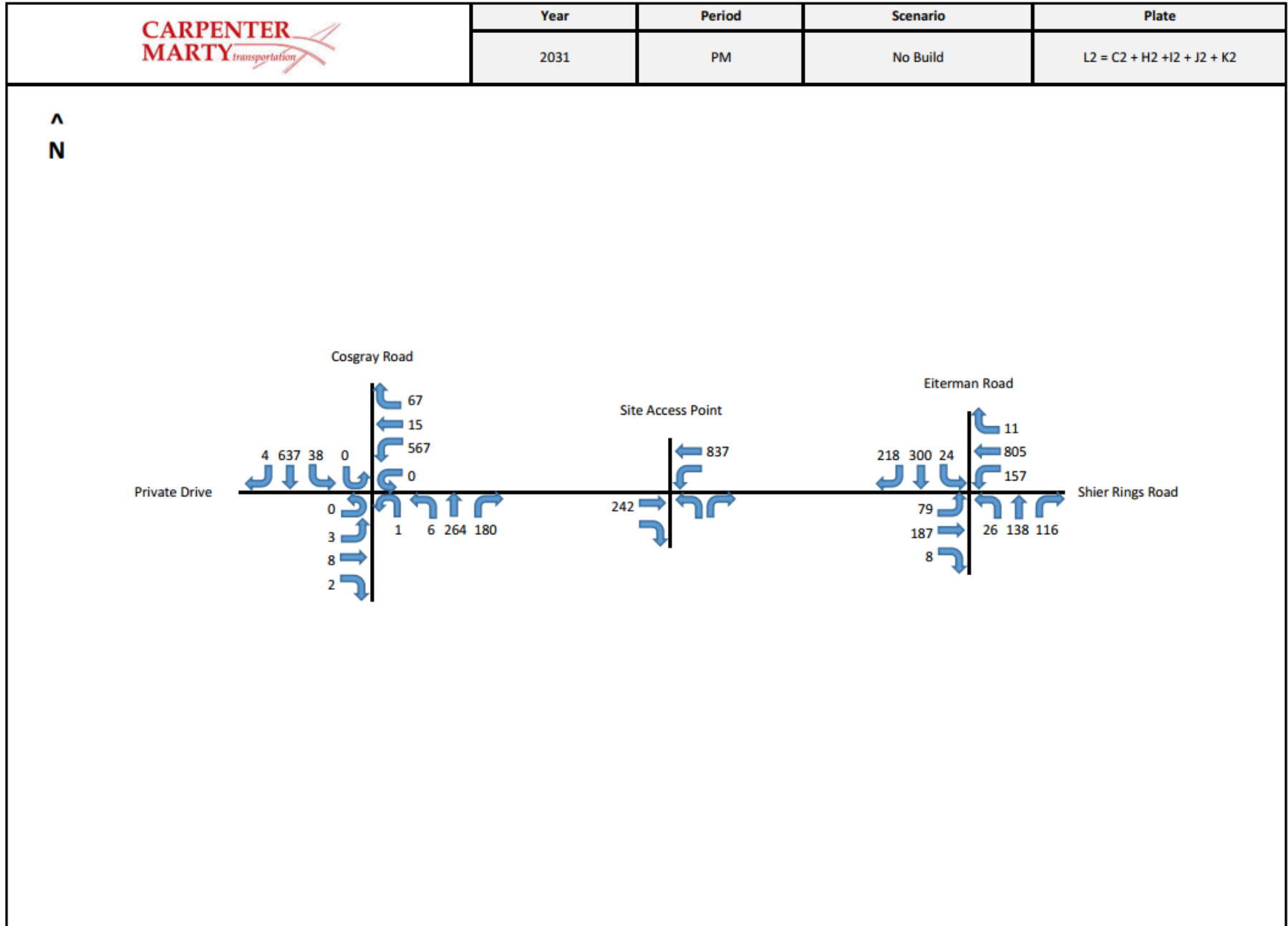
Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations

	Year	Period	Scenario	Plate
	2021	PM	Build	F2 = D2 + E2

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N



Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations

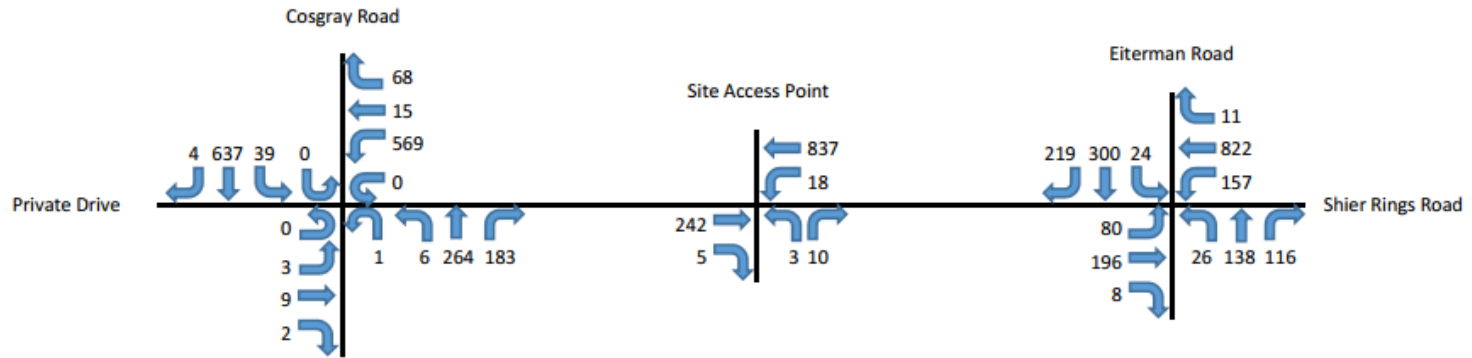


Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations



Year	Period	Scenario	Plate
2031	PM	Build	M2 = E2 + L2

^
N



V. Traffic Analysis

A. Turn Lane Warrant Analysis

Turn lane warrant analyses were conducted at the proposed Site Access Point using standard ODOT turn lane warrant graphs. If a turn lane was warranted in any particular scenario, the length was calculated using methodologies in the ODOT Location and Design (L&D) Manual and it was represented as such in the capacity analysis. Turn lane warrants were conducted for both the 85th percentile speed³ as well as the design speeds outlined in **Table 1**. Per the City of Dublin, a left turn lane was required at the full access point regardless of meeting warrants for safety. All turn lane lengths were calculated based on Horizon Year volumes.

B. Capacity Analysis

HCS 7 was used to analyze capacity at stop-controlled study intersections. Sidra 7 software was used to analyze capacity at roundabouts. The HCM module of Synchro 10 software was used to evaluate the intersection of Shier Rings Road & Eiterman Road as a signalized intersection. The roundabout LOS was calculated using the Sidra Standard method with the same delay criteria as for signalized intersections. Environmental factors of 1.00 and 1.10 were applied for each analysis scenario. A minimum LOS of D for the overall intersection and for each individual movement during peak traffic hours was considered acceptable at each intersection. If an intersection fell below these criteria, mitigation strategies were developed to bring each movement back to an acceptable LOS.

C. Sight Distance Analysis

A sight distance exhibit was developed for the proposed Site Access Point based on City of Dublin sight distance criteria. The design speed used can be seen in **Table 1**.

VI. Results

A. Turn Lane Warrant Analysis

✓ The results of the turn lane warrant analysis show that, when utilizing the design speed for the roadway speed limit, no turn lanes are warranted. When the 85th percentile design speed of 45 MPH is used, a 175' westbound left turn lane is warranted in both the Opening and Horizon Year Build scenarios. This left turn lane was assumed to be included based on safety, per the City of Dublin, regardless of the turn lane warrant results. A right turn lane does not meet warrants in any scenario. The full turn lane warrant analysis can be found in **Appendix F**.

B. Capacity Analysis

Results of the capacity analysis for the study intersections can be seen in **Table 5**. The total delay for stop-controlled intersections and roundabouts is represented by the worst approach LOS. The full baseline capacity analysis can be found in **Appendix G**. Baseline capacity analysis assumes the existing roadway conditions, including intersection control and lane configurations, are in place.

³ As determined in the speed study documents provided by the City of Dublin in **Appendix E**

Table 5 – Baseline Capacity Analysis Summary

Intersection	Approach	Opening Year				Horizon Year			
		AM No Build	AM Build	PM No Build	PM Build	AM No Build	AM Build	PM No Build	PM Build
Shier Rings Road & Cosgray Road (E.F. = 1.0)	Eastbound	A/6.2	A/6.2	B/13.3	B/13.2	A/6.5	A/6.5	C/22.0	C/21.9
	Westbound	B/10.6	B/10.6	B/10.8	B/10.8	B/11.1	B/11.1	B/12.7	B/12.8
	Northbound	A/5.4	A/5.4	A/4.1	A/4.1	D/49.2	D/49.6	A/4.2	A/4.2
	Southbound	A/6.3	A/6.4	B/11.0	B/11.1	A/6.8	A/6.9	D/44.8	D/46.1
	Total	A/5.9	A/5.9	A/9.3	A/9.4	D/38.6	D/38.9	C/22.8	C/23.3
Shier Rings Road & Cosgray Road (E.F. = 1.1)	Eastbound	A/6.4	A/6.4	B/14.4	B/14.3	A/6.7	A/6.7	B/18.6	B/18.4
	Westbound	B/11.0	B/11.0	B/11.4	B/11.4	B/11.2	B/11.2	B/15.4	B/15.5
	Northbound	A/6.7	A/6.7	A/4.1	A/4.1	F/104.6	F/105.1	A/4.2	A/4.2
	Southbound	A/6.4	A/6.4	B/15.9	B/16.1	A/7.0	A/7.0	F/112.8	F/115.5
	Total	A/6.9	A/6.9	B/11.5	B/11.6	E/79.8	F/80.2	D/49.5	D/50.5
Shier Rings Road & Eiterman Road	Eastbound	F/63.3	F/71.5	B/13.2	B/13.5	F/341.1	F/361.1	D/34.1	E/36.8
	Westbound	A/9.9	A/10.0	F/168.6	F/183.3	B/12.5	B/12.7	F/452.4	F/476.7
	Northbound	B/11.5	B/11.5	B/13.2	B/13.3	C/21.3	C/21.5	D/32.0	D/32.7
	Southbound	B/10.2	B/10.2	B/12.8	B/12.9	B/13.7	B/13.8	F/183.6	F/190.0
	Total	E/45.4	F/51.0	F/109.3	F/118.4	F/204.5	F/217.2	F/269.7	F/283.6
Shier Rings Road & Site Access Point	Eastbound		A/0.0		A/0.0		A/0.0		A/0.0
	Westbound		A/0.6		A/0.2		A/0.4		A/0.2
	Northbound		B/13.8		B/11.2		C/17.2		B/13.0
	Total		B/13.8		B/11.2		C/17.2		B/13.0

LOS D is considered acceptable.

Add legend for results in red

This is not apparent from Table 5 with E.F. = 1.0.

As seen above, the intersection of Shier Rings Road & Cosgray Road has failing LOS in all scenarios in the Horizon Year. In addition, the intersection of Shier Rings Road & Eiterman Road fails as stop-controlled in all analysis scenarios. Mitigation in order to achieve acceptable LOS standards was explored and it was determined that signalization or a roundabout is necessary at Shier Rings Road & Eiterman Road and additional lanes will be needed at Shier Rings Road & Cosgray Road. **Table 6** includes the lane configurations required for the intersections in order to achieve acceptable LOS. Full capacity analysis with improvements can be found in **Appendix G**.

Table 6 – Road Improvements Summary

Intersection	Intersection Control	Opening Year		Horizon Year	
		No Build	Build	No Build	Build
Shier Rings Road & Cosgray Road	Roundabout (E.F = 1.0)	None	None	EB/NB/SB: L/Th and R WB: single lane	EB/NB/SB: L/Th and R WB: single lane
	Roundabout (E.F = 1.1)	None	None	EB/NB/SB: L/Th and R WB: single lane	EB/NB/SB: L/Th and R WB: single lane
Shier Rings Road & Eiterman Road	Signalized	All Approaches: L and Th/R	All Approaches: L and Th/R	All Approaches: L and Th/R	All Approaches: L and Th/R
	Roundabout (E.F = 1.0)	All Approaches: single lane	All Approaches: single lane	EB/WB/NB: single lane SB: L/Th and R	EB/WB/NB: single lane SB: L/Th and R
	Roundabout (E.F = 1.1)	All Approaches: single lane	All Approaches: single lane	EB/NB: single lane WB: L and Th/R SB: L/Th and R	EB: single lane NB/SB: L/Th and R WB: L and Th/R

Possible site impact

Note the differences between the Environmental Factor of 1.0 and 1.1 for the roundabout analysis in the report. Mitigation can be based on EF of 1.0 in this study, given the future plans for University Blvd to carry more through volumes as the alignment builds out. If delays are incurred at the Shier Rings Road roundabouts, traffic will likely reroute to University Blvd.

Table 7 – Capacity Analysis with Improvements Summary

	Intersection Control	Approach	Opening Year				Horizon Year			
			AM No Build	AM Build	PM No Build	PM Build	AM No Build	AM Build	PM No Build	PM Build
Shier Rings Road & Cosgray Road	Roundabout (E.F. = 1.0)	Eastbound					A/6.5	A/6.5	C/22.1	C/22.1
		Westbound					B/11.3	B/11.4	B/12.7	B/12.7
		Northbound					A/4.9	A/4.9	A/4.1	A/4.1
		Southbound					A/6.7	A/6.7	B/14.9	B/15.2
		Total					A/5.7	A/5.7	B/11.5	B/11.6
	Roundabout (E.F. = 1.1)	Eastbound					A/6.7	A/6.7	C/24.2	C/24.2
		Westbound					B/11.9	B/11.9	B/15.3	B/15.4
		Northbound					A/5.2	A/5.2	A/4.2	A/4.2
		Southbound					A/6.8	A/6.8	C/28.4	C/29.2
		Total					A/5.9	A/5.9	B/17.5	B/17.9
Shier Rings Road & Eiterman Road ⁴	Signalized	Eastbound	B/16.6	B/16.1	A/9.0	A/8.9	C/20.3	C/20.7	B/19.2	B/19.9
		Westbound	B/14.2	B/13.5	B/13.7	B/13.7	B/16.4	B/16.3	C/23.3	C/24.8
		Northbound	B/11.9	B/12.4	B/16.6	B/17.3	B/17.0	B/17.7	C/27.2	C/27.2
		Southbound	B/10.3	B/10.7	B/16.4	B/17.0	B/13.9	B/14.5	D/49.2	D/49.5
		Total	B/15.2	B/14.9	B/13.8	B/13.9	B/18.5	B/18.9	C/30.1	C/30.8
	Roundabout (E.F. = 1.0)	Eastbound	A/5.3	A/5.3	A/5.4	A/5.4	A/8.7	A/9.1	A/8.7	A/8.7
		Westbound	A/6.1	A/6.0	A/6.2	A/6.2	A/7.9	A/7.9	C/22.1	C/25.4
		Northbound	A/8.3	A/8.5	A/5.5	A/5.5	C/24.2	C/27.9	A/6.1	A/6.2
		Southbound	A/4.3	A/4.4	B/12.3	B/13.1	A/4.6	A/4.6	C/33.7	D/37.9
		Total	A/5.8	A/5.9	A/6.7	A/6.8	B/11.6	B/12.5	C/21.2	C/23.8
	Roundabout (E.F. = 1.1)	Eastbound		A/5.6		A/5.7	B/13.7	B/15.2	B/13.7	A/9.5
		Westbound		A/6.2		A/7.8	A/7.8	A/7.8	A/7.8	A/8.7
		Northbound		A/9.4		A/5.8	D/54.7	B/14.0	D/54.7	A/6.0
Southbound			A/4.5		B/19.1	A/4.7	A/4.7	A/4.7	B/13.6	
Total			A/6.2		A/8.5	C/21.1	B/13.1	C/21.1	A/9.7	

C. Sight Distance Analysis

The sight triangle exhibit developed for the Site Access Point can be found in **Appendix H**. Per the City, single tree trunks are allowed within the sight distance areas. Other objects, such as ground vegetation and signs, should follow the City’s policy⁵. It is recommended that this be used as a planning and design tool to ensure minimum sight distance requirements are obtained for the access point. Elevation changes along this stretch of Shier Rings Road are minimal and not expected to impact sight distance.

ISD policy requires 445-ft. Explain why 425-ft was applied looking left.

VII. Recommendations and Conclusions

Based on the results of this traffic impact study, it is recommended that a 175’ left turn lane, inclusive of a 50’ diverging taper, be installed along Shier Rings Road at the site full access point. This is a Build improvement that is the responsibility of the developer. No additional Build improvements are required or recommended.

No Build improvements include the expansion of the existing roundabout at the intersection of Shier Rings Road & Cosgray Road to include right turn lanes on all approaches except the

⁴ Based on a comment from the City of Dublin, the roundabout was analyzed with an Environmental Factor of 1.1 working backwards from the Horizon Year Build scenario until improvements matched the analysis using an Environmental Factor of 1.0.

⁵ Visual obstructions within intersection sight triangle shall be limited to a height of no more than two and a half (2.5) feet. Overhanging branches or other elevated obstructions may not be any lower than ten (10) feet within the intersection sight triangle.

westbound approach. Consideration should also be given to converting the stop-controlled intersection of Shier Rings Road & Eiterman Road into either a signalized intersection or a roundabout. These are No Build improvements required with and without the proposed development. A diagram of the necessary improvements for each intersection can be found in **Appendix I**. *Also include this graphic in the body of the report.*

VIII. Appendices

- Appendix A – MOU & Site Plan
- Appendix B – Count Data & MORPC Correspondence
- Appendix C – Trip Generation
- Appendix D – Volume Calculations
- Appendix E – Speed Study Documentation
- Appendix F – Turn Lane Warrant Analysis
- Appendix G – Capacity Analysis
- Appendix H – Sight Triangle Exhibit
- Appendix I – Improvements Exhibit

Note the differences between the Environmental Factor of 1.0 and 1.1 for the roundabout analysis in the report. Mitigation can be based on EF of 1.0 in this study, given the future plans for University Blvd to carry more through volumes as the alignment builds out. If delays are incurred at the Shier Rings Road roundabouts, traffic will likely reroute to University Blvd.

Appendix A

MOU and Site Plan



MEMORANDUM OF UNDERSTANDING

BETWEEN:

The City of Dublin & Carpenter Marty Transportation

REGARDING:

Scope for a Traffic Impact Study pertaining to the proposed Single-Family Development at Shier Rings Road & Cosgray Road

I. Purpose

The purpose of this Memorandum of Understanding (MOU) is to establish a mutually agreeable scope for a Traffic Impact Study (TIS) covering the proposed Single-Family Development on Shier Rings Road in Dublin, Ohio. **Figure 1** shows the location of the proposed development, site access drive, and study intersections.

Figure 1 – Location of the Proposed Development (Yellow), Site Drive, and Study Intersections



II. Study Area

The intersections under study include the following (numbers correspond to **Figure 1**):

1. Shier Rings Road & Cosgray Road
2. Shier Rings Road & Site Access Point
3. Shier Rings Road & Eiterman Road

III. Proposed Development

The site is proposed to be developed with 34 single-family homes marketed toward empty-nesters. One full-movement access is proposed on Shier Rings Road. A preliminary site plan can be found in **Attachment A**.

Fire access requirements for this access point need to be implemented by the developer

IV. Data Collection

Peak hour turning movement count data will be utilized for the analysis. All counts will be a maximum of three years old from the time of this MOU submittal. AM (7-9) and PM (4-6) peak turning movement counts were obtained at the intersections of Shier Rings Road & Eiterman Road and Shier Rings Road & Cosgray Road. Count data to be utilized in the traffic study can be found in **Attachment B**.

V. Volume Development

For analysis, the Opening Year is 2021 and the Design, or Horizon Year, is 2031. Growth rates, provided by the Mid-Ohio Regional Planning Commission (MORPC), will be applied to the count data to project Opening and Horizon Year Background traffic volumes. Growth rates were previously obtained in the general vicinity for another traffic study titled *City of Dublin Ambulatory & Hospital Development Traffic Impact Study*. A summary of the relevant growth rates can be seen in **Table 1**. MORPC correspondence can be seen in **Attachment B**.

Table 1 – MORPC Growth Rates

Location	Size
Shier Rings Rd e/o Cosgray Rd	1.00%
Cosgray Rd n/o Shier Rings Rd	2.00%
Shier Rings Rd w/o Cosgray Rd	1.00%
Cosgray Rd s/o Shier Rings Rd	2.00%
Shier Rings Rd e/o Eiterman Rd	1.00%
Eiterman Rd n/o Shier Rings Rd	4.00%
Shier Rings Rd w/o Eiterman Rd	1.00%
Eiterman Rd s/o Shier Rings Rd	2.00%

Trips for the proposed site development were generated using standard Institute of Transportation Engineers (ITE) practices and the *Trip Generation Manual*, 10th edition, data via the OTISS program¹. Land Use Code (LUC) 210 – *Single-Family Detached Housing* was used to generate trips for the proposed development. Pass-by and internal capture rates do not apply to this proposed development. **Table 2** shows the trip generation summary of the proposed development. The full trip generation details can be found in **Attachment C**.

¹ Online Traffic Impact Study Software developed by ITE and Transoft Solutions.

Table 2 – Proposed Site Trip Generation Summary

Land Use	Size	AM Peak		PM Peak	
		Entry	Exit	Entry	Exit
210 – Single-Family Detached Housing	34 Dwelling Units	7	22	23	13

In the TIS, please include peak hour totals

In addition to the proposed site traffic, traffic generated by several background developments was included in the traffic study as background traffic. The included background developments are detailed below.

- Proposed Noah’s Event Venue
 - This proposed development is located on the northeast corner of Old Shier Rings Road & Eiterman Road. Trips were generated according to a TIS titled *City of Dublin Ambulatory & Hospital Development Traffic Impact Study* completed by Carpenter Marty Transportation in October of 2019 which references the *Noah’s Event Venue Dublin Traffic Access Study* also completed by Carpenter Marty Transportation.
- Proposed OSU Dublin Ambulatory Care Facility
 - This proposed development is located on the north side of Realigned Shier Rings Road, northeast of Eiterman Road. Trips were generated and distributed according to said TIS completed by Carpenter Marty Transportation in October of 2019. Details of said Shier Rings Road realignment are described further in this MOU.
- Proposed OSU Dublin Ambulatory Care Facility Outlots
 - These proposed developments will be located around the above proposed OSU Dublin Ambulatory Care Facility on the north and south sides of Realigned Shier Rings Road, northeast of Eiterman Road. Trips were generated and distributed according to said TIS completed by Carpenter Marty Transportation in October of 2019.

Table 3 shows the trip generation summary of the above noted background developments. It should be noted that pass-by and internal capture rates do not apply to the trips generated for the OSU Dublin Ambulatory Care Facility or Outlots. It should also be noted that the trip generation for the Noah’s Event Venue was not developed using standard ITE practices. Full trip generation for all background developments can be seen in **Attachment C**.

Table 3 – Background Developments Trip Generation Summary

Background Development	Land Use	Approx. Acreage	AM Peak		PM Peak	
			Entry	Exit	Entry	Exit
Noah’s Event Venue	ENTERING Event Center (Non-ITE Source)	250 People	110	15	---	---
	EXITING Event Center (Non-ITE Source)		---	---	15	110
	Total		110	15	15	110
OSU Dublin Ambulatory Care Facility	720 – Medical-Dental Office Building (Phase 1)	243,000 SF Gross Floor Area	527	149	235	605
	610 – Hospital (Phase 2)	274,000 SF Gross Floor Area	224	105	85	181
	Total		751	254	320	786
OSU Dublin Ambulatory Care Facility Outlots	310 – Hotel	200 Rooms	56	39	63	61
	310 – Hotel	200 Rooms	56	39	63	61
	411 – Public Park	5 Acres	0	0	13	10
	720 – Medical-Dental Office Building	272,250 SF Gross Floor Area	590	167	264	678
	710 – General Office Building	272,250 SF Gross Floor Area	243	40	47	248
	760 – Research and Development Center	99,000 SF Gross Floor Area	31	10	8	45
	760 – Research and Development Center	99,000 SF Gross Floor Area	31	10	8	45
	Total		1007	305	466	1148
TOTAL			1868	574	801	2044

In the TIS, please include peak hour totals

All background development traffic described above was added to the Background traffic volumes to produce No Build traffic volumes. The Noah’s Event Venue trips and OSU Dublin Ambulatory Care Facility Phase 1 trips were added to the Opening Year Background Traffic. The Noah’s Event Venue trips, OSU Dublin Ambulatory Care Facility Phases 1 and 2 trips, and the OSU Dublin Outlot trips were added to the Horizon Year Background traffic. All background traffic trips were distributed based on the *City of Dublin Ambulatory & Hospital Development Traffic Impact Study*. The proposed site development trips were distributed based on the site plan, count data, knowledge of the surrounding area, and engineering judgment. Site traffic was added to the No Build traffic to produce Build traffic for the Opening and Horizon Years. *The proposed distribution does not match the existing counts of 90/10 and 80/20 splits. Please revise or provide a more detailed explanation.*

Lastly, count data at the intersection of Shier Rings Road and Eiterman Road was adjusted based on the realignment of Shier Rings Road as a part of the OSU Dublin Ambulatory project. It should be noted that adjustments to this intersection do not match the same adjustments made in the *City of Dublin Ambulatory & Hospital Development Traffic Impact Study*. A connection from Old Shier Rings Road to Realigned Shier Rings Road is now proposed to be constructed. This connection was not included in the *City of Dublin Ambulatory & Hospital Development Traffic Impact Study*. Traffic volume calculations, provided in **Attachment D**, show the count data adjustments noted. Traffic volumes are being provided with this MOU

Please include a graphic or list the site distribution percents in a table in the body of the report for the TIS.

for preliminary review prior to the completion of any analysis in an effort to expedite the review process and prevent future rework. *See Appendix D for text modifications*

VI. Analysis

Turn lane warrant analyses will be conducted at the proposed Site Access Point using ODOT L&D turn lane warrant graphs. If a turn lane is warranted in any particular scenario, the turn lane length will be calculated and represented as such in the capacity analysis. Turn lane warrants will be conducted for both the 85th percentile speed as determined in speed study documents provided by the City of Dublin, which can be found in **Attachment E**. Turn lane lengths will also be calculated for a design speed of 5 MPH over the posted speed limit. The City of Dublin advises that left turn lanes will be required at all full access points, regardless of meeting warrants. Turn lane lengths will be calculated based on Horizon Year volumes.

For the TIS, the cover sheet and map for the Shier Rings Rd speed study are the only needed references for App E

HCS 7 will be used to analyze the capacity at stop-controlled intersections. Sidra 7 will be used to analyze capacity at the Shier Rings Road & Cosgray Road roundabout. The roundabout LOS will be calculated using the Sidra Standard method with the same delay criteria as for signalized intersections. Environmental factors of 1.00 and 1.10 will be applied for each analysis scenario. A minimum LOS of D for the overall intersection and for each individual movement during peak traffic hours will be considered acceptable at each intersection. If ~~an intersection~~ ^{a movement} does not meet the LOS criteria, mitigation strategies will be developed to bring each movement or intersection back to acceptable LOS. Should mitigation strategies include signalization of an intersection, the HCM 6th Edition module of Synchro Version 10 software will be used to analyze capacity at that intersection.

A sight distance triangle schematic will be developed and provided for the proposed site access point per City of Dublin sight distance policy and the 85th percentile speeds described above.

Please include a summary graphic of the recommended improvements in the TIS

VII. Report

A report will be produced that includes tables, figures, appendices, etc. LOS summary tables and a summary of AM and PM peak hour volume graphics will be included in the body of the report. This report will document the analysis, results, and recommendations for the public roadway system surrounding the development. These recommendations will be divided into both Build and No Build improvements required to mitigate the anticipated traffic volumes. This MOU includes a preliminary submission of trip generation, volume calculations, distributions, and growth rates to be approved by the City of Dublin prior to any analysis being competed.

Please signify your concurrence with this Memorandum of Understanding by signing below. If you have any questions or comments, please contact Drew Laurent at 614-656-2421 or dlaurent@cmtran.com.

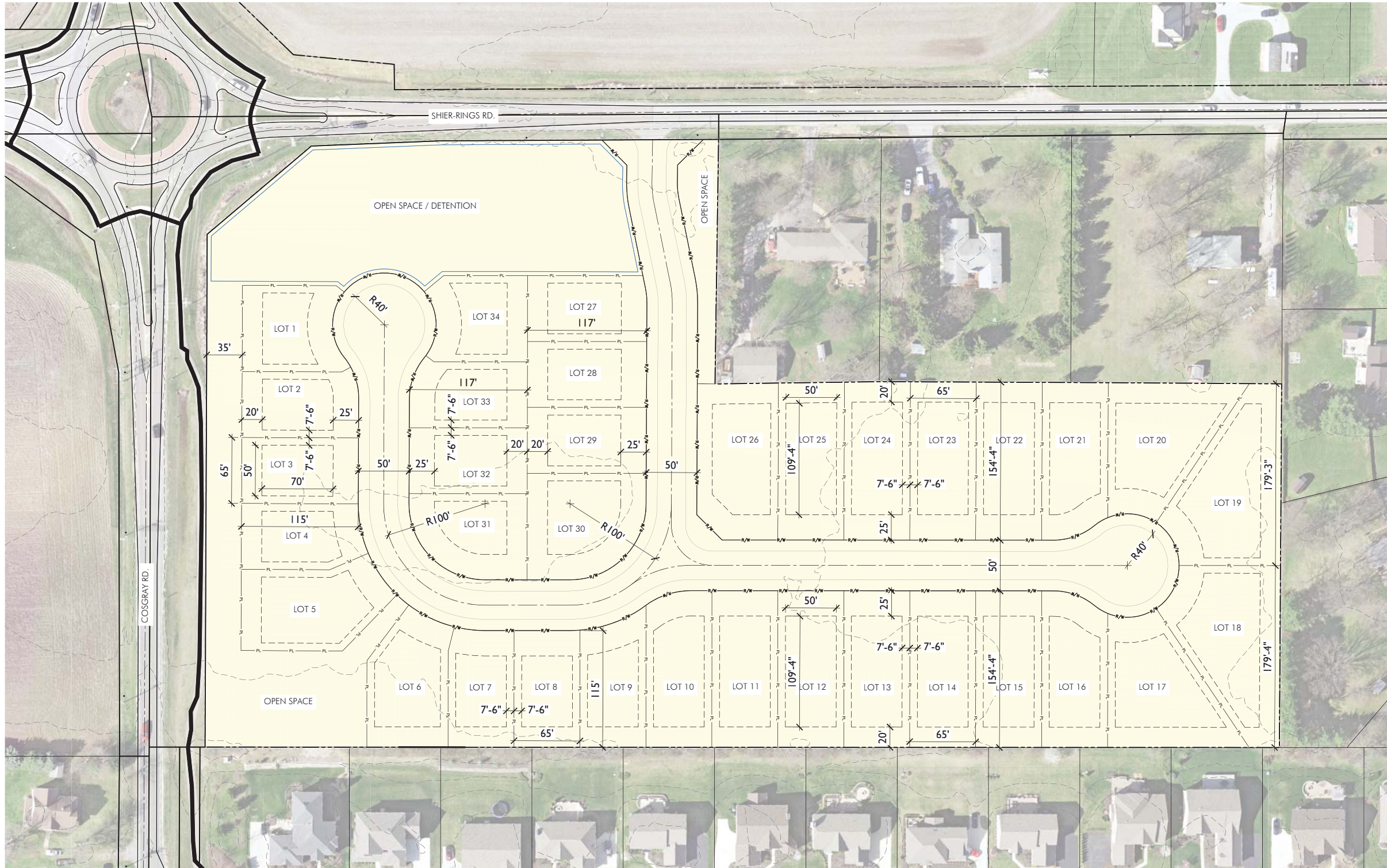
Sincerely,



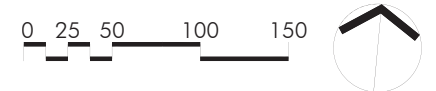
Gina Balsamo, PE
Project Manager
Carpenter Marty Transportation

City of Dublin (or their Representative)

Signature: *Accepted with comments as noted,
Tina Wawszkiewicz, PE* **Date:** 11/19/2019



SITE DATA	
TOTAL SITE AREA	= ±11.37 AC
RESIDENTIAL UNITS	= 34 UNITS
RESIDENTIAL DENSITY	= ±3.0 UNITS/AC
SITE AREA (EXCLUDING STREETS)	= ±10.28 AC
PROPOSED OPEN SPACE	= ±2.11 AC
PROPOSED PERCENTAGE OF OPEN SPACE (2.11/10.28)	= ±20%
PROPOSED PERCENTAGE OF STORM ASSUMED 10% TOTAL SITE AREA	= ±1.14 AC



Concept Site Plan | 07.26.2019

Appendix B

Count Data and MORPC Correspondence



Smart Services, Inc.

88 W. Church Street
Newark, OH 43055
(740) 345-4700

AM Count was taken on 2/16/2017.

File Name : Cosgray_Rd_ & Shier_Rings_Road_384196_02-15-2017
Site Code : 695001
Start Date : 2/15/2017
Page No : 1

Start Time	Cosgray Rd										Shier Rings Rd										Cosgray Rd										Private Dr									
	Southbound					Westbound					Westbound					Northbound					Northbound					Eastbound					Eastbound									
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total					
07:00 AM	8	23	0	0	31	8	0	1	0	9	1	81	56	2	140	0	0	0	0	0	0	140	0	0	140	0	0	0	0	0	0	0	0	0	0					
07:15 AM	21	24	0	1	46	6	0	3	0	9	0	91	100	0	191	1	0	1	0	2	1	191	1	0	192	0	0	0	0	0	0	0	0	0	0					
07:30 AM	28	33	0	0	61	5	0	2	0	7	0	110	127	2	239	0	0	0	0	0	0	239	0	0	239	0	0	0	0	0	0	0	0	0	0					
07:45 AM	25	39	2	2	68	20	3	1	0	24	0	99	153	0	252	0	0	0	0	0	0	252	0	0	252	0	0	0	0	0	0	0	0	0	0					
Total	82	119	2	3	206	39	7	7	0	49	1	381	436	4	822	1	4	2	0	7	1	822	1	4	827	0	0	0	0	0	0	0	0	0	0					
08:00 AM	81	131	2	2	47	15	2	2	0	19	2	74	99	3	176	0	0	5	0	5	0	176	0	0	176	0	0	0	0	0	0	0	0	0	0					
08:15 AM	16	30	0	0	41	7	2	2	0	11	0	73	93	0	166	0	0	2	0	2	0	166	0	0	166	0	0	0	0	0	0	0	0	0	0					
08:30 AM	13	28	1	0	42	12	0	1	0	13	2	64	71	1	138	0	0	3	0	3	0	138	0	0	138	0	0	0	0	0	0	0	0	0	0					
08:45 AM	9	24	0	0	33	11	1	4	0	16	0	49	81	0	130	0	0	1	0	1	0	130	0	0	130	0	0	0	0	0	0	0	0	0	0					
Total	50	111	1	0	162	45	5	9	0	59	4	260	344	2	610	0	0	7	0	7	0	610	0	0	610	0	0	0	0	0	0	0	0	0	0					
04:00 PM	8	119	0	0	127	53	0	6	0	59	2	39	18	1	60	0	0	0	0	0	0	60	0	0	60	0	0	0	0	0	0	0	0	0	0					
04:15 PM	3	97	1	1	102	59	0	10	0	69	1	50	27	0	78	0	0	0	0	0	0	78	0	0	78	0	0	0	0	0	0	0	0	0	0					
04:30 PM	5	133	0	0	138	82	0	11	0	93	2	55	19	1	77	0	0	3	1	4	0	77	0	3	80	0	0	0	0	0	0	0	0	0	0					
04:45 PM	2	103	0	0	105	89	4	7	0	100	0	47	22	0	69	2	1	1	0	4	0	69	2	1	71	0	0	0	0	0	0	0	0	0	0					
Total	18	452	1	1	472	283	4	34	0	321	5	191	86	2	284	2	4	4	0	10	2	284	2	4	290	0	0	0	0	0	0	0	0	0	0					
05:00 PM	6	133	1	0	140	116	5	16	0	137	2	53	28	0	83	1	2	0	0	3	0	83	1	2	85	0	0	0	0	0	0	0	0	0	0					
05:15 PM	11	129	2	0	142	104	4	8	0	116	1	51	24	0	76	0	0	1	0	1	0	76	0	1	77	0	0	0	0	0	0	0	0	0	0					
05:30 PM	9	108	1	0	118	76	1	14	0	91	1	45	14	0	60	0	0	1	1	2	0	60	0	1	61	0	0	0	0	0	0	0	0	0	0					
05:45 PM	7	80	1	0	88	61	2	11	0	74	0	77	24	0	101	1	3	0	0	4	0	101	1	3	104	0	0	0	0	0	0	0	0	0	0					
Total	33	450	5	0	488	357	12	49	0	418	4	226	90	0	320	2	7	1	0	10	2	320	2	7	329	0	0	0	0	0	0	0	0	0	0					
Grand Total	183	1132	9	4	1328	724	24	99	0	847	14	1058	956	8	2036	5	22	10	0	37	5	2036	5	22	2063	0	0	0	0	0	0	0	0	0	0					
Approch %	13.8	85.2	0.7	0.3	85.2	85.5	2.8	11.7	0	85.5	0.7	52	47	0.4	52.4	13.5	59.5	27	0	59.5	13.5	59.5	13.5	59.5	59.5	0	0	0	0	0	0	0	0	0	0					
Total %	4.3	26.6	0.2	0.1	31.3	17	0.6	2.3	0	19.9	0.3	24.9	22.5	0.2	47.9	0.1	0.5	0.2	0	0.9	0.1	0.5	0.1	0.5	0.6	0	0	0	0	0	0	0	0	0	0					
% Cars	176	1108	9	4	1297	717	22	96	0	835	13	1042	946	8	2009	5	20	9	0	34	5	2009	5	20	2029	0	0	0	0	0	0	0	0	0	0					
% Trucks	96.2	97.9	100	100	97.7	99	91.7	97	0	98.6	92.9	98.5	99	100	98.7	100	90.9	90	0	91.9	100	90.9	100	90.9	90.9	0	0	0	0	0	0	0	0	0	0					
% Trucks	3.8	2.1	0	0	2.3	1	8.3	3	0	1.4	7.1	1.5	1	0	1.3	0	9.1	10	0	8.1	0	9.1	0	9.1	9.1	0	0	0	0	0	0	0	0	0	0					

Carpenter/Marty (CM) Transportation Inc.
6612 Singletree Drive

Count Name: Noah's Dublin
Site Code:
Start Date: 10/04/2017
Page No: 1

Columbus, Ohio, United States 43229
614 656 2419 dlaurent@cmtran.com

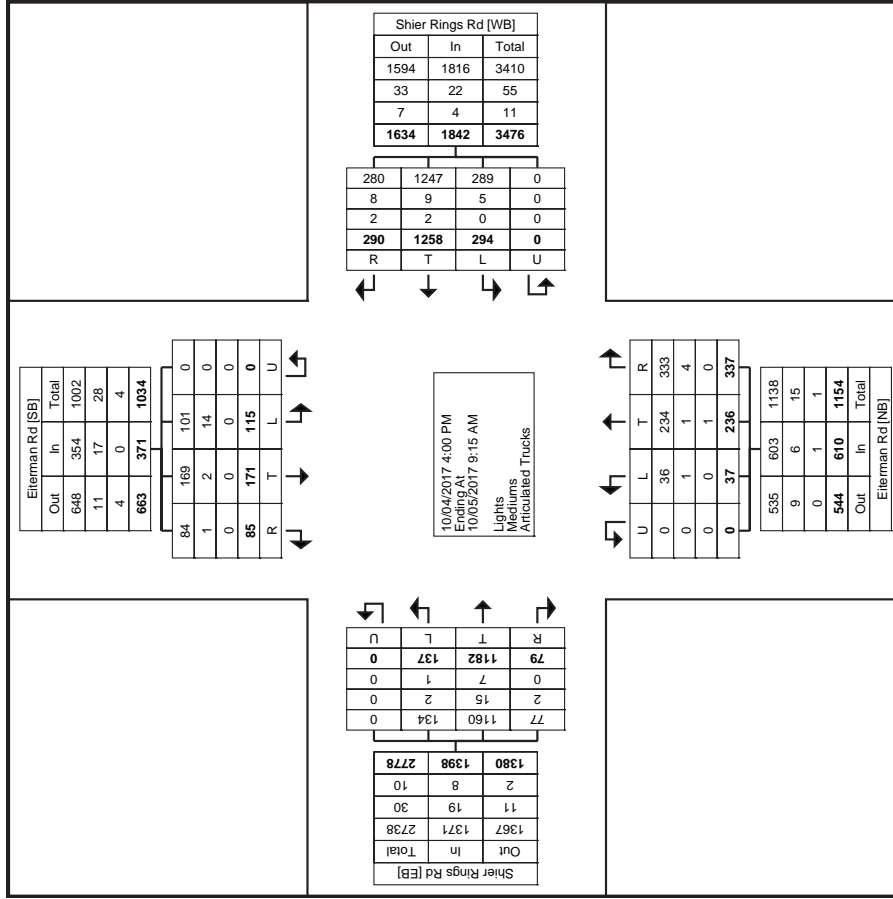
Turning Movement Data

Start Time	Eiterman Rd Southbound				Shier Rings Rd Westbound				Eiterman Rd Northbound				Shier Rings Rd Eastbound								
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
4:00 PM	8	6	12	0	26	14	75	11	0	100	18	13	3	0	34	3	24	0	0	27	187
4:15 PM	9	10	11	0	30	22	90	29	0	141	10	19	2	0	31	1	39	0	0	40	242
4:30 PM	5	13	4	0	22	30	114	21	0	165	10	21	8	0	39	2	37	2	0	41	267
4:45 PM	7	11	4	0	22	18	123	17	0	158	21	13	3	0	37	3	47	2	0	52	269
Hourly Total	29	40	31	0	100	84	402	78	0	564	59	66	16	0	141	9	147	4	0	160	965
5:00 PM	15	23	5	0	43	27	193	28	0	248	15	13	2	0	30	3	29	3	0	35	356
5:15 PM	12	20	7	0	39	18	194	41	0	253	15	17	6	0	38	2	48	1	0	51	381
5:30 PM	15	16	11	0	42	10	164	35	0	209	32	20	6	0	58	2	46	4	0	52	361
5:45 PM	8	12	5	0	25	23	155	34	0	212	29	10	6	0	45	0	41	2	0	43	325
Hourly Total	50	71	28	0	149	78	706	138	0	922	91	60	20	0	171	7	164	10	0	181	1423
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BREAK	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 AM	1	6	6	0	13	6	10	9	0	25	16	10	0	0	26	8	77	9	0	94	158
7:15 AM	1	6	4	0	11	13	17	9	0	39	26	13	0	0	39	9	111	17	0	137	226
7:30 AM	0	15	7	0	22	15	17	2	0	34	21	15	0	0	36	12	130	13	0	155	247
7:45 AM	1	7	9	0	17	24	20	8	0	52	27	14	0	0	41	12	149	32	0	193	303
Hourly Total	3	34	26	0	63	58	64	28	0	150	90	52	0	0	142	41	467	71	0	579	934
8:00 AM	0	8	6	0	14	20	34	12	0	66	15	18	1	0	34	7	131	15	0	153	267
8:15 AM	1	7	6	0	14	19	23	16	0	58	26	10	0	0	36	8	96	9	0	113	221
8:30 AM	1	6	8	0	15	18	13	15	0	46	24	11	0	0	35	4	96	15	0	115	211
8:45 AM	1	5	10	0	16	13	16	7	0	36	32	19	0	0	51	3	81	13	0	97	200
Hourly Total	3	26	30	0	59	70	86	50	0	206	97	58	1	0	156	22	404	52	0	478	899
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	85	171	115	0	371	290	1258	294	0	1842	337	236	37	0	610	79	1182	137	0	1398	4221
Approach %	22.9	46.1	31.0	0.0	-	15.7	68.3	16.0	0.0	-	55.2	38.7	6.1	0.0	-	5.7	84.5	9.8	0.0	-	-
Total %	2.0	4.1	2.7	0.0	8.8	6.9	29.8	7.0	0.0	43.6	8.0	5.6	0.9	0.0	14.5	1.9	28.0	3.2	0.0	33.1	-
Lights	84	169	101	0	354	280	1247	289	0	1816	333	234	36	0	603	77	1160	134	0	1371	4144
% Lights	98.8	98.8	87.8	-	95.4	96.6	99.1	98.3	-	96.6	98.8	99.2	97.3	-	98.9	97.5	98.1	97.8	-	98.1	98.2
Mediums	1	2	14	0	17	8	9	5	0	22	4	1	1	0	6	2	15	2	0	19	64
% Mediums	1.2	1.2	12.2	-	4.6	2.8	0.7	1.7	-	1.2	1.2	0.4	2.7	-	1.0	2.5	1.3	1.5	-	1.4	1.5
Articulated Trucks	0	0	0	0	0	2	2	0	0	4	0	1	0	0	1	0	7	1	0	8	13
% Articulated Trucks	0.0	0.0	0.0	-	0.0	0.7	0.2	0.0	-	0.2	0.0	0.4	0.0	-	0.2	0.0	0.6	0.7	-	0.6	0.3

Carpenter Mairy (CM) Transportation Inc.
6612 Singletree Drive

Columbus, Ohio, United States 43229
614 656 2419 dlaurent@cmtran.com

Count Name: Noah's Dublin
Site Code:
Start Date: 10/04/2017
Page No: 2



Turning Movement Data Plot

Carpenter Marty (CM) Transportation Inc.
6612 Singletree Drive

Count Name: Noah's Dublin
Site Code:
Start Date: 10/04/2017
Page No: 5

Columbus, Ohio, United States 43229
614 656 2419 dlaurent@cmtran.com

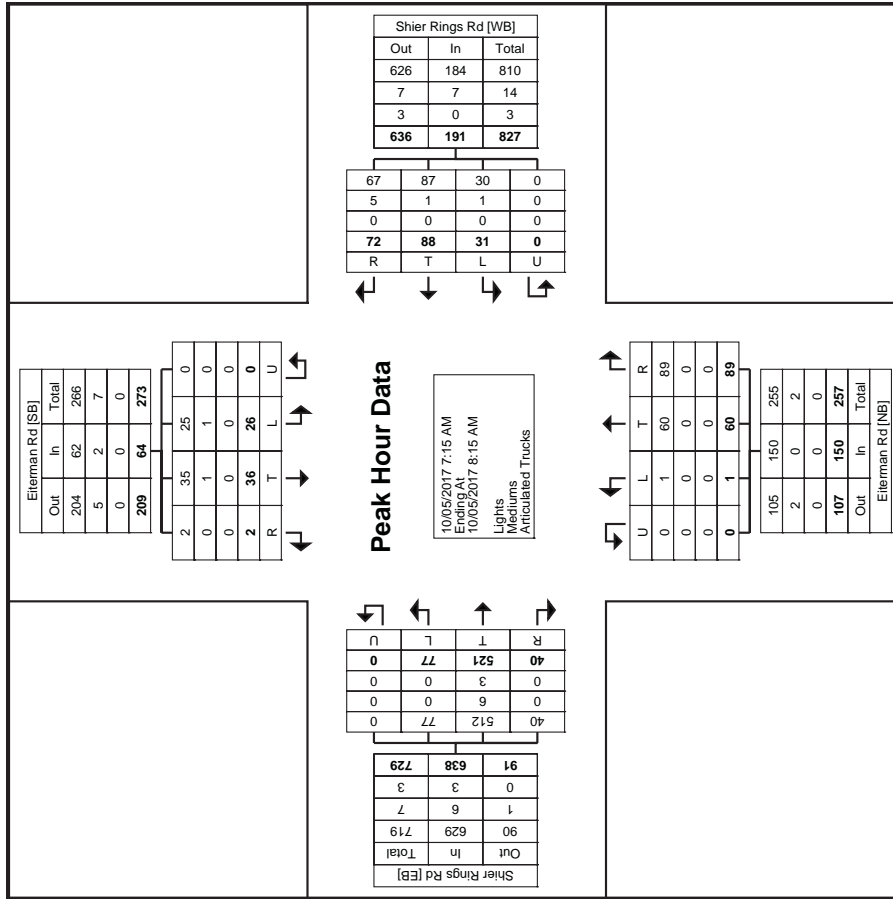
Turning Movement Peak Hour Data (7:15 AM)

Start Time	Eiterman Rd Southbound				Shier Rings Rd Westbound				Eiterman Rd Northbound				Shier Rings Rd Eastbound				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
7:15 AM	1	6	4	0	13	17	9	0	26	13	0	0	9	111	17	0	226
7:30 AM	0	15	7	0	15	17	2	0	21	15	0	0	12	130	13	0	247
7:45 AM	1	7	9	0	24	20	8	0	27	14	0	0	12	149	32	0	303
8:00 AM	0	8	6	0	20	34	12	0	15	18	1	0	7	131	15	0	267
Total	2	36	26	0	72	88	31	0	89	60	1	0	40	521	77	0	1043
Approach %	3.1	56.3	40.6	0.0	37.7	46.1	16.2	0.0	59.3	40.0	0.7	0.0	6.3	81.7	12.1	0.0	-
Total %	0.2	3.5	2.5	0.0	6.1	8.4	3.0	0.0	8.5	5.8	0.1	0.0	3.8	50.0	7.4	0.0	61.2
PHF	0.500	0.600	0.722	0.000	0.750	0.647	0.646	0.000	0.824	0.833	0.250	0.000	0.833	0.874	0.602	0.000	0.826
Lights	2	35	25	0	67	87	30	0	89	60	1	0	40	512	77	0	629
% Lights	100.0	97.2	96.2	-	93.1	98.9	96.8	-	100.0	100.0	100.0	-	100.0	98.3	100.0	-	98.6
Mediums	0	1	1	0	5	1	1	0	0	0	0	0	0	6	0	0	15
% Mediums	0.0	2.8	3.8	-	6.9	1.1	3.2	-	0.0	0.0	0.0	-	0.0	1.2	0.0	-	0.9
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3
% Articulated Trucks	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.6	0.0	-	0.5

Carpenter Mairy (CM) Transportation Inc.
6612 Singletree Drive

Columbus, Ohio, United States 43229
614 656 2419 dlaurent@cmtran.com

Count Name: Noah's Dublin
Site Code:
Start Date: 10/04/2017
Page No: 6



Turning Movement Peak Hour Data Plot (7:15 AM)

Carpenter/Marty (CM) Transportation Inc.
6612 Singletree Drive

Count Name: Noah's Dublin
Site Code:
Start Date: 10/04/2017
Page No: 3

Columbus, Ohio, United States 43229
614 656 2419 dlaurent@cmtran.com

Turning Movement Peak Hour Data (5:00 PM)

Start Time	Eiterman Rd Southbound				Shier Rings Rd Westbound				Eiterman Rd Northbound				Shier Rings Rd Eastbound			
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn
5:00 PM	15	23	5	0	27	193	28	0	15	13	2	0	3	29	3	0
5:15 PM	12	20	7	0	18	194	41	0	15	17	6	0	2	48	1	0
5:30 PM	15	16	11	0	10	164	35	0	32	20	6	0	2	46	4	0
5:45 PM	8	12	5	0	23	155	34	0	29	10	6	0	0	41	2	0
Total	50	71	28	0	78	706	138	0	91	60	20	0	7	164	10	0
Approach %	33.6	47.7	18.8	0.0	8.5	76.6	15.0	0.0	53.2	35.1	11.7	0.0	3.9	90.6	5.5	0.0
Total %	3.5	5.0	2.0	0.0	5.5	49.6	9.7	0.0	6.4	4.2	1.4	0.0	0.5	11.5	0.7	0.0
PHF	0.833	0.772	0.636	0.000	0.722	0.910	0.841	0.000	0.711	0.750	0.833	0.000	0.583	0.854	0.625	0.000
Lights	50	71	27	0	77	702	138	0	91	60	20	0	7	162	10	0
% Lights	100.0	100.0	96.4	-	98.7	99.4	100.0	-	100.0	100.0	100.0	-	100.0	98.8	100.0	-
Mediums	0	0	1	0	0	4	0	0	0	0	0	0	0	1	0	0
% Mediums	0.0	0.0	3.6	-	0.0	0.6	0.0	-	0.0	0.0	0.0	-	0.0	0.6	0.0	-
Articulated Trucks	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0
% Articulated Trucks	0.0	0.0	0.0	-	1.3	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.6	0.0	-
Int. Total	356	381	361	43	181	1423	934	1415	99.4	6	0.4	2	0.1			

Chelsea Cousins

From: Zhuojun Jiang <zjiang@morpc.org>
Sent: Wednesday, February 13, 2019 4:51 PM
To: Chelsea Cousins; Hwashik Jang; Nick Gill
Cc: Drew Laurent; Gina Balsamo; Ying Su
Subject: RE: Growth Rate Request for OSU Dublin Ambulatory

Follow Up Flag: Follow up
Flag Status: Completed

Hello Chelsea,

Please use the following linear annual growth rates for the intersections in your study.

SR161 e/o Eiterman Rd	1.50%
SR161 w/o Eiterman Rd	1.50%
Eiterman Rd s/o SR161	4.00%
Shier Rings Rd e/o Cosgray Rd	1.00%
Cosgray Rd n/o Shier Rings Rd	2.00%
Shier Rings Rd w/o Cosgray Rd	1.00%
Cosgray Rd s/o Shier Rings Rd	2.00%
Shier Rings Rd e/o Eiterman Rd	1.00%
Eiterman Rd n/o Shier Rings Rd	4.00%
Shier Rings Rd w/o Eiterman Rd	1.00%
Eiterman Rd s/o Shier Rings Rd	2.00%
Shier Rings Rd e/o City of Dublin West Access	1.00%
Shier Rings Rd w/o City of Dublin West Access	1.50%
Shier Rings Rd e/o City of Dublin Center Access	1.50%
Shier Rings Rd w/o City of Dublin Center Access	1.50%
Shier Rings Rd e/o City of Dublin East Access	1.50%
Shier Rings Rd w/o City of Dublin East Access	1.50%
Shier Rings Rd e/o Old Avery Rd	1.50%
Old Avery Rd n/o Shier Rings Rd	0.50%
Shier Rings Rd w/o Old Avery Rd	1.50%
Shier Rings Rd e/o Avery Rd	0.50%
Avery Rd n/o Shier Rings Rd	1.00%
Shier Rings Rd w/o Avery Rd	1.50%

Avery Rd s/o Shier Rings Rd	1.00%
US 33EB Ramp e/o Avery Rd	1.50%
Avery-Muirfield Dr n/o US 33EB Ramp	1.00%
Avery Rd s/o US 33EB Ramp	1.00%
US 33WB Ramp e/o Avery-Muirfield Dr	1.50%
Avery-Muirfield Dr n/o US 33WB Ramp	1.00%
Hospital Dr w/o Avery-Muirfield Dr	1.00%
Avery-Muirfield Dr s/o US 33WB Ramp	1.00%

Note: The above rates were derived based on planning level analysis by using MORPC's regional travel demand model.

If you have any questions regarding the rates, please let us know. Thanks!

Zhuojun

Zhuojun Jiang, Ph.D., P.E.

Manager, Travel Forecasting | Mid-Ohio Regional Planning Commission

T: 614.233.4147

111 Liberty Street, Suite 100 | Columbus, OH 43215



From: Chelsea Cousins [mailto:ccousins@cmtran.com]

Sent: Tuesday, January 29, 2019 9:56 AM

To: Hwashik Jang <hjang@morpc.org>; Nick Gill <ngill@morpc.org>; Zhuojun Jiang <zjiang@morpc.org>

Cc: Drew Laurent <dlaurent@cmtran.com>; Gina Balsamo <gbalsamo@cmtran.com>

Subject: Growth Rate Request for OSU Dublin Ambulatory

All,

We would like to request growth rates for the study network including the following list of intersections for a traffic impact study:

- 1) SR-161/Post Road & Eiterman Road
- 2) Existing Shier Rings Road & Eiterman Road
- 3) Shier Rings Road & City of Dublin Building Westerly Access Points
 - a. Shier Rings Road & City of Dublin Building West Access
 - b. Shier Rings Road & City of Dublin Building Center Access
- 4) Shier Rings Road & City of Dublin Building East Access Point
- 5) Shier Rings Road & Avery Road
- 6) Avery-Muirfield Drive/Avery Road & US-33 Eastbound Ramps
- 7) Avery-Muirfield Drive & US-33 Westbound Ramps
- 8) Shier Rings Road & Old Avery Road
- 9) Shier Rings Road & Cosgray Road

The site is proposed to develop as a hospital and ambulatory medical office building. The medical office/ambulatory space will be approximately 243,000 SF while the hospital space will be approximately 274,000 SF. The site will be located north of Shier Ring Road between Avery-Muirfield Drive, Avery Road and Eiterman Road in Dublin, Ohio. The Opening year will be 2022 with a 10-year Horizon. The study will be reviewed by the City of Dublin. See the attached counts and site plan for your use. Three of the intersections counted are located at the site drive intersections of the City of Dublin buildings with Shier Rings Road (intersections 3a, 3b, and 4). We do NOT need growth rates for the City of Dublin site drives, just Shier Rings Road.

Additionally, you will see on the site plan that this development includes the realignment of Shier Rings Road. Please do NOT account for this realignment when calculating growth rates. Carpenter Marty and the City of Dublin will work together to adjust traffic volumes for the analysis based on the Shier Rings Road realignment.

This project is on a very aggressive schedule. We appreciate any efforts to expedite this process as much as possible. Please let me know if you need additional assistance or information.

Thank you,

Chelsea Cousins, EIT

Project Engineer



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Appendix C

Trip Generation

Scenario - 1

Scenario Name: AM Peak

User Group:

Dev. phase: 1

No. of Years to Project 0
Traffic :

Analyst Note:

Warning:

VEHICLE TRIPS BEFORE REDUCTION

Land Use & Data Source	Location	IV	Size	Time Period Weekday, Peak Hour of Adjacent Street Traffic,	Method Rate/Equation Best Fit (LIN) T = 0.71(X) + 4.80	Entry Split%		Exit Split%		Total
						Entry	Exit	Entry	Exit	
210 - Single-Family Detached Housing Data Source: Trip Generation Manual, 10th Ed	General Urban/Suburban	Dwelling Units	34			7	25%	22	75%	29

VEHICLE TO PERSON TRIP CONVERSION

BASELINE SITE VEHICLE CHARACTERISTICS:

Land Use	Baseline Site Vehicle Mode Share		Baseline Site Vehicle Occupancy		Baseline Site Vehicle Directional Split	
	Entry (%)	Exit (%)	Entry	Exit	Entry (%)	Exit (%)
210 - Single-Family Detached Housing	100	100	1	1	25	75

ESTIMATED BASELINE SITE PERSON TRIPS:

Land Use	Person Trips by Vehicle		Person Trips by Other Modes		Total Baseline Site Person Trips	
	Entry	Exit	Entry	Exit	Entry	Exit
210 - Single-Family Detached Housing	7	22	0	0	7	22
		29				29

NEW VEHICLE TRIPS

Land Use	New Vehicle Trips	
	Entry	Exit
210 - Single-Family Detached Housing	7	22
		29

RESULTS

Site Totals	Entry	Exit	Total
Vehicle Trips Before Reduction	7	22	29
External Vehicle Trips	7	22	29
New Vehicle Trips	7	22	29

Scenario - 2

Scenario Name: PM Peak

User Group:

Dev. phase: 1

No. of Years to Project 0

Analyst Note:

Traffic :

Warning:

VEHICLE TRIPS BEFORE REDUCTION

Land Use & Data Source	Location	IV	Size	Time Period Weekday, Peak Hour of Adjacent Street Traffic,	Method Rate/Equation Best fit (LOG) $\ln(T) = 0.96 \ln(X) + 0.20$	Entry Split%		Exit Split%		Total
						Entry	Exit	Entry	Exit	
210 - Single-Family Detached Housing Data Source: Trip Generation Manual, 10th Ed	General Urban/Suburban	Dwelling Units	34			23	63%	13	37%	36

VEHICLE TO PERSON TRIP CONVERSION

BASELINE SITE VEHICLE CHARACTERISTICS:

Land Use	Baseline Site Vehicle Mode Share		Baseline Site Vehicle Occupancy		Baseline Site Vehicle Directional Split	
	Entry (%)	Exit (%)	Entry	Exit	Entry (%)	Exit (%)
210 - Single-Family Detached Housing	100	100	1	1	63	37

ESTIMATED BASELINE SITE PERSON TRIPS:

Land Use	Person Trips by Vehicle		Person Trips by Other Modes		Total Baseline Site Person Trips	
	Entry	Exit	Entry	Exit	Entry	Exit
210 - Single-Family Detached Housing	23	13	0	0	23	13
	36		0		36	

NEW VEHICLE TRIPS

Land Use	New Vehicle Trips		Total
	Entry	Exit	
210 - Single-Family Detached Housing	23	13	36

RESULTS

Site Totals	Entry	Exit	Total
Vehicle Trips Before Reduction	23	13	36
External Vehicle Trips	23	13	36
New Vehicle Trips	23	13	36



The site will consist of an 8,181 SF event center with a maximum capacity of 250 people. There is one proposed access point along Eiterman Road that will be full access. A draft of the proposed site plan can be found in **Attachment A**.

Traffic Volume Development

To conduct the required analyses for the proposed site, Opening Year (2019) and Horizon Year (2029) traffic volumes were developed. AM and PM Peak Hour turning movement counts were taken in October of 2017 at the intersection of Eiterman Road and Shier Rings Road. A linear growth rate of 3.3% for both study roadways was taken from the draft of the *Kaufman Site TIS* provided to Carpenter Marty Transportation by the City of Dublin. The supplied growth rate was used for this project to create Opening Year and Horizon Year Background data. The count data can be found in **Attachment B**. The *Kaufman Site TIS* draft study can be found in **Attachment C**.

Trips for the proposed Noah’s Event Center site were taken from the *Noah’s Reception Center TIS MOU* completed by Traffic Engineering Services, INC. in December of 2013 for the City of Dublin. This MOU outlines trip generation assumptions as well as comments from the City of Dublin for a similar Noah’s development. The proposed Noah’s Event Center has a capacity of 250 people. It is assumed that there are two people per vehicle and that 88% of this traffic is inbound and 12% is outbound for both the AM and PM Peaks¹. Additionally, separate volume calculations were created that represent an event exiting the proposed site. In this scenario, 88% of the traffic is outbound and 12% is inbound. Table 1 shows the trip generation for the proposed site. The *Noah’s Reception Center TIS MOU* and supporting Dublin comments can be seen in **Attachment C**.

Table 1 - Event Center Trip Generation

Land Use	Size	AM Peak		PM Peak	
		Entry	Exit	Entry	Exit
ENTERING Event Center (Non -ITE Source)	250 people	110	15	110	15
EXITING Event Center (Non-ITE Source)	250 people	15	110	15	110

Per the request of the City of Dublin, Sunday peak hour trips for the existing Fellowship Baptist Church were generated and added to the Background traffic in both the AM and PM Peaks. The trips generated for the church can be seen in Table 2 below.

¹ It is noted that Noah’s has calculated an average of 2.6 persons per vehicle at other Noah’s Event Center locations. Therefore, the trip generation for this analysis is conservative.

Scenario - 1

Scenario Name: AM Peak

User Group:

Dev. phase: 1

Horizon Year: 2032

Analyst Note:

Warning:

VEHICLE TRIPS BEFORE REDUCTION

Land Use & Data Source	Location	IV	Size	Time Period	Method Rate/Equation	Entry		Exit		Total
						Split%	Split%	Split%	Split%	
720 - Medical-Dental Office Building	General Urban/Suburban	1000 Sq. Ft. GFA	273	Weekday, Peak Hour of Adjacent Street Traffic,	Average	592	167			759
Data Source: Trip Generation Manual, 10th Ed					2.78	78%	22%			
610 - Hospital	General Urban/Suburban	1000 Sq. Ft. GFA	223	Weekday, Peak Hour of Adjacent Street Traffic,	Best Fit (LIN)	198	93			291
Data Source: Trip Generation Manual, 10th Ed					T = 0.74(X) + 126.36	68%	32%			

Scenario - 2

Scenario Name: PM Peak

User Group:

Dev. phase: 1

Horizon Year: 2032

Analyst Note:

Warning:

VEHICLE TRIPS BEFORE REDUCTION

Land Use & Data Source	Location	IV	Size	Time Period	Method Rate/Equation	Entry		Exit		Total
						Split%	Split%	Split%	Split%	
720 - Medical-Dental Office Building	General Urban/Suburban	1000 Sq. Ft. GFA	273	Weekday, Peak Hour of Adjacent Street Traffic,	Average	264	680			944
Data Source: Trip Generation Manual, 10th Ed					3.46	28%	72%			
610 - Hospital	General Urban/Suburban	1000 Sq. Ft. GFA	223	Weekday, Peak Hour of Adjacent Street Traffic,	Best Fit (LIN)	92	196			288
Data Source: Trip Generation Manual, 10th Ed					T = 0.84(X) + 100.56	32%	68%			

Scenario - 1

Scenario Name: AM Peak

User Group:

Dev. phase: 1

Horizon Year: 2019

Analyst Note:

Warning:

VEHICLE TRIPS BEFORE REDUCTION

Land Use & Data Source	Location	IV	Size	Time Period		Method Rate/Equation	Entry		Exit	Total
				Weekday, Peak Hour of Adjacent Street Traffic,	Adjacent Street Traffic,		Split%	Split%		
310 - Hotel Data Source: Trip Generation Manual, 10th Ed	General Urban/Suburban	Rooms	200	Weekday, Peak Hour of Adjacent Street Traffic,	Adjacent Street Traffic,	Best Fit (LIN) T = 0.50(X) + -5.34	56	39	95	
310(1) - Hotel	General Urban/Suburban	Rooms	200	Weekday, Peak Hour of Adjacent Street Traffic,	Adjacent Street Traffic,	Best Fit (LIN) T = 0.50(X) + -5.34	56	39	95	
411 - Public Park Data Source: Trip Generation Manual, 10th Ed	General Urban/Suburban	Acres	5	Weekday, Peak Hour of Adjacent Street Traffic,	Adjacent Street Traffic,	Average 0.02	0	0	0	
720 - Medical-Dental Office Building Data Source: Trip Generation Manual, 10th Ed	General Urban/Suburban	1000 Sq. Ft. GFA	272.25	Weekday, Peak Hour of Adjacent Street Traffic,	Adjacent Street Traffic,	Average 2.78	590	167	757	
710 - General Office Building Data Source: Trip Generation Manual, 10th Ed	General Urban/Suburban	1000 Sq. Ft. GFA	272.25	Weekday, Peak Hour of Adjacent Street	Adjacent Street	Best Fit (LIN) T = 0.94(X) + 26.49	243	40	283	
760 - Research and Development Center Data Source: Trip Generation Manual, 10th Ed	General Urban/Suburban	1000 Sq. Ft. GFA	99	Weekday, Peak Hour of Adjacent Street Traffic,	Adjacent Street Traffic,	Average 0.42	31	10	41	
760(1) - Research and Development Center Data Source: Trip Generation Manual, 10th Ed	General Urban/Suburban	1000 Sq. Ft. GFA	99	Weekday, Peak Hour of Adjacent Street Traffic,	Adjacent Street Traffic,	Average 0.42	31	10	41	

VEHICLE TO PERSON TRIP CONVERSION

BASELINE SITE VEHICLE CHARACTERISTICS:

Land Use	Baseline Site Vehicle Mode Share		Baseline Site Vehicle Occupancy		Baseline Site Vehicle Directional Split	
	Entry (%)	Exit (%)	Entry	Exit	Entry (%)	Exit (%)
310 - Hotel	100	100	1	1	59	41
310(1) - Hotel	100	100	1	1	59	41
411 - Public Park	100	100	1	1	59	41
720 - Medical-Dental Office Building	100	100	1.4	1.4	78	22
710 - General Office Building	100	100	1	1	86	14
760 - Research and Development Center	100	100	1	1	75	25
760(1) - Research and Development Center	100	100	1	1	75	25

ESTIMATED BASELINE SITE PERSON TRIPS:

Land Use	Person Trips by Vehicle		Person Trips by Other Modes		Total Baseline Site Person Trips	
	Entry	Exit	Entry	Exit	Entry	Exit
310 - Hotel	56	39	0	0	56	39
310(1) - Hotel	56	39	0	0	56	39
411 - Public Park	0	0	0	0	0	0
720 - Medical-Dental Office Building	826	233	0	0	826	233
710 - General Office Building	243	40	0	0	243	40
760 - Research and Development Center	31	10	0	0	31	10

760(1) - Research and Development Center	31	41	10	0	0	0	31	10
							41	41

INTERNAL VEHICLE TRIP REDUCTION

LAND USE GROUP ASSIGNMENT:

Land Use	Land Use Group	
310 - Hotel	Hotel	
310(1) - Hotel	Hotel	
411 - Public Park	Cinema	
720 - Medical-Dental Office Building	Office	
710 - General Office Building	Office	
760 - Research and Development Center	Office	
760(1) - Research and Development Center	Office	

BALANCED PERSON TRIPS:

310 - Hotel	PAF	UIPTC	Unconstrained Demand	====>> BALANCED ==>>>	Unconstrained Demand	UIPTC	PAF	310(1) - Hotel
Persons Exit	0	0	0	0	0	0	0	Persons Entry
39	0	0	0	0	0	0	0	56
Persons Entry	0	0	0	<<<== BALANCED <<<==	0	0	0	Persons Exit
56	0	0	0	0	0	0	0	39
411 - Public Park								
Persons Exit	0	0	0	====>> BALANCED ==>>>	0	0	0	Persons Entry
39	0	0	0	0	0	0	0	0
Persons Entry	0	0	0	<<<== BALANCED <<<==	0	0	0	Persons Exit
56	0	0	0	0	0	0	0	0
720 - Medical-Dental Office Building								
Persons Exit	0	0	0	====>> BALANCED ==>>>	0	0	0	Persons Entry
39	0	0	0	0	0	0	0	826
Persons Entry	0	0	0	<<<== BALANCED <<<==	0	0	0	Persons Exit
56	0	0	0	0	0	0	0	233
710 - General Office Building								
Persons Exit	0	0	0	====>> BALANCED ==>>>	0	0	0	Persons Entry
39	0	0	0	0	0	0	0	243
Persons Entry	0	0	0	<<<== BALANCED <<<==	0	0	0	Persons Exit
56	0	0	0	0	0	0	0	40
760 - Research and Development Center								
Persons Exit	0	0	0	====>> BALANCED ==>>>	0	0	0	Persons Entry
39	0	0	0	0	0	0	0	31
Persons Entry	0	0	0	<<<== BALANCED <<<==	0	0	0	Persons Exit
56	0	0	0	0	0	0	0	31

56	0	0	0	0	0	0	0	10
310(1) - Hotel								
Persons Exit	PAF	UIPTC	Unconstrained Demand	====>>> BALANCED ==>>>	UIPTC	PAF	760(1) - Research and Development Center	Persons Entry
39	0	0	0	0	0	0		31
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<<== BALANCED <<<<==	UIPTC	PAF		Persons Exit
56	0	0	0	0	0	0		10
310(1) - Hotel								
Persons Exit	PAF	UIPTC	Unconstrained Demand	====>>> BALANCED ==>>>	UIPTC	PAF	411 - Public Park	Persons Entry
39	0	0	0	0	0	0		0
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<<== BALANCED <<<<==	UIPTC	PAF		Persons Exit
56	0	0	0	0	0	0		0
310(1) - Hotel								
Persons Exit	PAF	UIPTC	Unconstrained Demand	====>>> BALANCED ==>>>	UIPTC	PAF	720 - Medical-Dental Office Building	Persons Entry
39	0	0	0	0	0	0		826
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<<== BALANCED <<<<==	UIPTC	PAF		Persons Exit
56	0	0	0	0	0	0		233
310(1) - Hotel								
Persons Exit	PAF	UIPTC	Unconstrained Demand	====>>> BALANCED ==>>>	UIPTC	PAF	710 - General Office Building	Persons Entry
39	0	0	0	0	0	0		243
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<<== BALANCED <<<<==	UIPTC	PAF		Persons Exit
56	0	0	0	0	0	0		40
310(1) - Hotel								
Persons Exit	PAF	UIPTC	Unconstrained Demand	====>>> BALANCED ==>>>	UIPTC	PAF	760 - Research and Development Center	Persons Entry
39	0	0	0	0	0	0		31
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<<== BALANCED <<<<==	UIPTC	PAF		Persons Exit
56	0	0	0	0	0	0		10
310(1) - Hotel								
Persons Exit	PAF	UIPTC	Unconstrained Demand	====>>> BALANCED ==>>>	UIPTC	PAF	760(1) - Research and Development Center	Persons Entry
39	0	0	0	0	0	0		31
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<<== BALANCED <<<<==	UIPTC	PAF		Persons Exit
56	0	0	0	0	0	0		10
411 - Public Park								
Persons Exit	PAF	UIPTC	Unconstrained Demand	====>>> BALANCED ==>>>	UIPTC	PAF	720 - Medical-Dental Office Building	Persons Entry
0	0	0	0	0	0	0		826
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<<== BALANCED <<<<==	UIPTC	PAF		Persons Exit

0	0	0	0	0	0	0	0	0	233
411 - Public Park									
Persons Exit	PAF	UIPTC	Unconstrained Demand	====>> BALANCED ==>>>>	Unconstrained Demand	PAF	UIPTC	Persons Entry	710 - General Office Building
0	0	0	0	0	0	0	0	243	
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<<== BALANCED <<<<==	Unconstrained Demand	PAF	UIPTC	Persons Exit	
0	0	0	0	0	0	0	0	40	
411 - Public Park									
Persons Exit	PAF	UIPTC	Unconstrained Demand	====>> BALANCED ==>>>>	Unconstrained Demand	PAF	UIPTC	Persons Entry	760 - Research and Development Center
0	0	0	0	0	0	0	0	31	
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<<== BALANCED <<<<==	Unconstrained Demand	PAF	UIPTC	Persons Exit	
0	0	0	0	0	0	0	0	10	
411 - Public Park									
Persons Exit	PAF	UIPTC	Unconstrained Demand	====>> BALANCED ==>>>>	Unconstrained Demand	PAF	UIPTC	Persons Entry	760(1) - Research and Development Center
0	0	0	0	0	0	0	0	31	
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<<== BALANCED <<<<==	Unconstrained Demand	PAF	UIPTC	Persons Exit	
0	0	0	0	0	0	0	0	10	
720 - Medical-Dental Office Building									
Persons Exit	PAF	UIPTC	Unconstrained Demand	====>> BALANCED ==>>>>	Unconstrained Demand	PAF	UIPTC	Persons Entry	710 - General Office Building
233	0	0	0	0	0	0	0	243	
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<<== BALANCED <<<<==	Unconstrained Demand	PAF	UIPTC	Persons Exit	
826	0	0	0	0	0	0	0	40	
720 - Medical-Dental Office Building									
Persons Exit	PAF	UIPTC	Unconstrained Demand	====>> BALANCED ==>>>>	Unconstrained Demand	PAF	UIPTC	Persons Entry	760 - Research and Development Center
233	0	0	0	0	0	0	0	31	
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<<== BALANCED <<<<==	Unconstrained Demand	PAF	UIPTC	Persons Exit	
826	0	0	0	0	0	0	0	10	
720 - Medical-Dental Office Building									
Persons Exit	PAF	UIPTC	Unconstrained Demand	====>> BALANCED ==>>>>	Unconstrained Demand	PAF	UIPTC	Persons Entry	760(1) - Research and Development Center
233	0	0	0	0	0	0	0	31	
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<<== BALANCED <<<<==	Unconstrained Demand	PAF	UIPTC	Persons Exit	
826	0	0	0	0	0	0	0	10	
710 - General Office Building									
Persons Exit	PAF	UIPTC	Unconstrained Demand	====>> BALANCED ==>>>>	Unconstrained Demand	PAF	UIPTC	Persons Entry	760 - Research and Development Center
40	0	0	0	0	0	0	0	31	
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<<== BALANCED <<<<==	Unconstrained Demand	PAF	UIPTC	Persons Exit	
243	0	0	0	0	0	0	0	10	

710 - General Office Building		760(1) - Research and Development Center	
Persons Exit	PAF	UIPTC	PAF
40	0	0	0
Persons Entry	PAF	UIPTC	PAF
243	0	0	0
Unconstrained Demand		Unconstrained Demand	
0		0	
Unconstrained Demand		Unconstrained Demand	
0		0	
====>>> BALANCED =====		====>>> BALANCED =====	
0		0	
<<<<== BALANCED <<<<==		<<<<== BALANCED <<<<==	
0		0	
Persons Exit		Persons Exit	
31	0	10	

INTERNAL PERSON TRIPS:

310 - Hotel

Internal Person Trips From	Entry	Exit	Total
Total Internal Person Trips	0	0	0

310(1) - Hotel

Internal Person Trips From	Entry	Exit	Total
Total Internal Person Trips	0	0	0

411 - Public Park

Internal Person Trips From	Entry	Exit	Total
Total Internal Person Trips	0	0	0

720 - Medical-Dental Office Building

Internal Person Trips From	Entry	Exit	Total
Total Internal Person Trips	0	0	0

710 - General Office Building

Internal Person Trips From	Entry	Exit	Total
Total Internal Person Trips	0	0	0

760 - Research and Development Center

Internal Person Trips From	Entry	Exit	Total
Total Internal Person Trips	0	0	0

760(1) - Research and Development Center

Internal Person Trips From	Entry	Exit	Total
Total Internal Person Trips	0	0	0

INTERNAL VEHICLE TRIPS AND CAPTURE:

310 - Hotel

Total Internal Person Trips	0	0	0
Vehicle Mode Share	100%	100%	-
Vehicle Occupancy	1.00	1.00	-
Total Vehicle Internal Trips	0	0	0
Total External Vehicle Trips	56	39	95
Internal Vehicle Trip Capture	0%	0%	0%

Total Internal Person Trips	0	0	0
Vehicle Mode Share	100%	100%	-
Vehicle Occupancy	1.00	1.00	-
Total Vehicle Internal Trips	0	0	0
Total External Vehicle Trips	56	39	95
Internal Vehicle Trip Capture	0%	0%	0%

411 - Public Park

Total Internal Person Trips	0	0	0
Vehicle Mode Share	100%	100%	-
Vehicle Occupancy	1.00	1.00	-
Total Vehicle Internal Trips	0	0	0
Total External Vehicle Trips	0	0	0
Internal Vehicle Trip Capture	0%	0%	0%

720 - Medical-Dental Office Building

Total Internal Person Trips	0	0	0
Vehicle Mode Share	100%	100%	-
Vehicle Occupancy	1.00	1.00	-
Total Vehicle Internal Trips	0	0	0
Total External Vehicle Trips	590	167	757
Internal Vehicle Trip Capture	0%	0%	0%

710 - General Office Building

Total Internal Person Trips	0	0	0
Vehicle Mode Share	100%	100%	-
Vehicle Occupancy	1.00	1.00	-
Total Vehicle Internal Trips	0	0	0
Total External Vehicle Trips	243	40	283
Internal Vehicle Trip Capture	0%	0%	0%

760 - Research and Development Center

Total Internal Person Trips	0	0	0
Vehicle Mode Share	100%	100%	-
Vehicle Occupancy	1.00	1.00	-
Total Vehicle Internal Trips	0	0	0
Total External Vehicle Trips	31	10	41
Internal Vehicle Trip Capture	0%	0%	0%

760(1) - Research and Development Center

Total Internal Person Trips	0	0	0
Vehicle Mode Share	100%	100%	-
Vehicle Occupancy	1.00	1.00	-
Total Vehicle Internal Trips	0	0	0
Total External Vehicle Trips	31	10	41
Internal Vehicle Trip Capture	0%	0%	0%

PASS-BY VEHICLE TRIP REDUCTION

Total Internal Person Trips	0	0	0
Vehicle Mode Share	100%	100%	-
Vehicle Occupancy	1.00	1.00	-
Total Vehicle Internal Trips	0	0	0
Total External Vehicle Trips	31	10	41
Internal Vehicle Trip Capture	0%	0%	0%

1.0004.1160

External Vehicle Trips

Pass-by Vehicle Trip %

Pass-by Vehicle Trips

Land Use	Entry	Exit	Entry (%)	Exit (%)	Entry	Exit
310 - Hotel	56	39	0.00%	0.00%	0	0
310(1) - Hotel	56	39	0.00%	0.00%	0	0
411 - Public Park	0	0	0.00%	0.00%	0	0
720 - Medical-Dental Office Building	590	167	0.00%	0.00%	0	0
710 - General Office Building	243	40	0.00%	0.00%	0	0
760 - Research and Development Center	31	10	0.00%	0.00%	0	0
760(1) - Research and Development Center	31	10	0.00%	0.00%	0	0

DIVERTED VEHICLE TRIP REDUCTION

Land Use	External Vehicle Trips		Diverted Vehicle Trip %		Diverted Vehicle Trips	
	Entry	Exit	Entry (%)	Exit (%)	Entry	Exit
310 - Hotel	56	39	0.00%	0.00%	0	0
310(1) - Hotel	56	39	0.00%	0.00%	0	0
411 - Public Park	0	0	0.00%	0.00%	0	0
720 - Medical-Dental Office Building	590	167	0.00%	0.00%	0	0
710 - General Office Building	243	40	0.00%	0.00%	0	0
760 - Research and Development Center	31	10	0.00%	0.00%	0	0
760(1) - Research and Development Center	31	10	0.00%	0.00%	0	0

EXTRA VEHICLE TRIP REDUCTION

Land Use	(External - (Pass-by + Diverted)) Vehicle Trips		Extra Vehicle Trip Reduction %		Extra Reduced Vehicle Trips	
	Entry	Exit	Entry (%)	Exit (%)	Entry	Exit
310 - Hotel	56	39	0.00%	0.00%	0	0
310(1) - Hotel	56	39	0.00%	0.00%	0	0
411 - Public Park	0	0	0.00%	0.00%	0	0
720 - Medical-Dental Office Building	590	167	0.00%	0.00%	0	0
710 - General Office Building	243	40	0.00%	0.00%	0	0
760 - Research and Development Center	31	10	0.00%	0.00%	0	0
760(1) - Research and Development Center	31	10	0.00%	0.00%	0	0

NEW VEHICLE TRIPS

Land Use	New Vehicle Trips		Total
	Entry	Exit	
310 - Hotel	56	39	95
310(1) - Hotel	56	39	95
411 - Public Park	0	0	0
720 - Medical-Dental Office Building	590	167	757
710 - General Office Building	243	40	283
760 - Research and Development Center	31	10	41
760(1) - Research and Development Center	31	10	41

RESULTS

Site Totals	Entry	Exit	Total
Vehicle Trips Before Reduction	1007	305	1312
Internal Vehicle Trips	0	0	0
External Vehicle Trips	1007	305	1312
Internal Vehicle Trip Capture	0%	0%	0%
Pass-by Vehicle Trips	0	0	0
Diverted Vehicle Trips	0	0	0
Extra Reduced Vehicle Trips	0	0	0
New Vehicle Trips	1007	305	1312

Scenario - 2

Scenario Name: PM Peak

Dev. phase: 1

Analyst Note:

User Group:

Horizon Year: 2019

Warning:

VEHICLE TRIPS BEFORE REDUCTION

Land Use & Data Source	Location	IV	Size	Time Period	Method Rate/Equation	Entry		Exit		Total
						Split%	Split%	Split%	Split%	
310 - Hotel	General Urban/Suburban	Rooms	200	Weekday, Peak Hour of Adjacent Street Traffic,	Best Fit (LIN) $T = 0.75(X) + -26.02$	63	61	63	61	124
Data Source: Trip Generation Manual, 10th Ed						51%	49%	51%	49%	
310(1) - Hotel	General Urban/Suburban	Rooms	200	Weekday, Peak Hour of Adjacent Street Traffic,	Best Fit (LIN) $T = 0.75(X) + -26.02$	63	61	63	61	124
Data Source: Trip Generation Manual, 10th Ed						51%	49%	51%	49%	
411 - Public Park	General Urban/Suburban	Acres	5	Weekday, Peak Hour of Adjacent Street Traffic,	Best Fit (LIN) $T = 0.06(X) + 22.60$	13	10	13	10	23
Data Source: Trip Generation Manual, 10th Ed						55%	45%	55%	45%	
720 - Medical-Dental Office Building	General Urban/Suburban	1000 Sq. Ft. GFA	272.25	Weekday, Peak Hour of Adjacent Street Traffic,	Average 3.46	264	678	264	678	942
Data Source: Trip Generation Manual, 10th Ed						28%	72%	28%	72%	
710 - General Office Building	General Urban/Suburban	1000 Sq. Ft. GFA	272.25	Weekday, Peak Hour of Adjacent Street	Best Fit (LOG) $\ln(T) = 0.95\ln(X) + 0.36$	47	248	47	248	295
Data Source: Trip Generation Manual, 10th Ed						16%	84%	16%	84%	
760 - Research and Development Center	General Urban/Suburban	1000 Sq. Ft. GFA	99	Weekday, Peak Hour of Adjacent Street Traffic,	Best Fit (LOG) $\ln(T) = 0.35\ln(X) + 2.36$	8	45	8	45	53
Data Source: Trip Generation Manual, 10th Ed						15%	85%	15%	85%	
760(1) - Research and Development Center	General Urban/Suburban	1000 Sq. Ft. GFA	99	Weekday, Peak Hour of Adjacent Street Traffic,	Best Fit (LOG) $\ln(T) = 0.35\ln(X) + 2.36$	8	45	8	45	53
Data Source: Trip Generation Manual, 10th Ed						15%	85%	15%	85%	

VEHICLE TO PERSON TRIP CONVERSION

BASELINE SITE VEHICLE CHARACTERISTICS:

Land Use	Baseline Site Vehicle Mode Share		Baseline Site Vehicle Occupancy		Baseline Site Vehicle Directional Split	
	Entry (%)	Exit (%)	Entry	Exit	Entry (%)	Exit (%)
310 - Hotel	100	100	1	1	51	49
310(1) - Hotel	100	100	1	1	51	49
411 - Public Park	100	100	1	1	55	45
720 - Medical-Dental Office Building	100	100	1.4	1.4	28	72
710 - General Office Building	100	100	1	1	16	84
760 - Research and Development Center	100	100	1	1	15	85
760(1) - Research and Development Center	100	100	1	1	15	85

ESTIMATED BASELINE SITE PERSON TRIPS:

Land Use	Person Trips by Vehicle		Person Trips by Other Modes		Total Baseline Site Person Trips	
	Entry	Exit	Entry	Exit	Entry	Exit
310 - Hotel	63	61	0	0	63	61
310(1) - Hotel	63	61	0	0	63	61
411 - Public Park	13	10	0	0	13	10
720 - Medical-Dental Office Building	369	950	0	0	369	950
710 - General Office Building	47	248	0	0	47	248
760 - Research and Development Center	8	45	0	0	8	45

760(1) - Research and Development Center	8	45	0	0	8	45
	53					53

INTERNAL VEHICLE TRIP REDUCTION

LAND USE GROUP ASSIGNMENT:

Land Use	Land Use Group	
310 - Hotel	Hotel	
310(1) - Hotel	Hotel	
411 - Public Park	Cinema	
720 - Medical-Dental Office Building	Office	
710 - General Office Building	Office	
760 - Research and Development Center	Office	
760(1) - Research and Development Center	Office	

BALANCED PERSON TRIPS:

310 - Hotel	PAF	UIPTC	Unconstrained Demand	====>> BALANCED =====>>	Unconstrained Demand	UIPTC	PAF	310(1) - Hotel
Persons Exit	0	0	0	0	0	0	0	Persons Entry
61	0	0	0	0	0	0	0	63
Persons Entry	0	0	0	<<<== BALANCED <<<==	0	0	0	Persons Exit
63	0	0	0	0	0	0	0	61
411 - Public Park								
Persons Exit	0	0	0	====>> BALANCED =====>>	0	0	0	Persons Entry
61	0	0	0	0	0	0	0	13
Persons Entry	0	0	0	<<<== BALANCED <<<==	0	0	0	Persons Exit
63	0	0	0	0	0	0	0	10
720 - Medical-Dental Office Building								
Persons Exit	0	0	0	====>> BALANCED =====>>	0	0	0	Persons Entry
61	0	0	0	0	0	0	0	369
Persons Entry	0	0	0	<<<== BALANCED <<<==	0	0	0	Persons Exit
63	0	0	0	0	0	0	0	950
710 - General Office Building								
Persons Exit	0	0	0	====>> BALANCED =====>>	0	0	0	Persons Entry
61	0	0	0	0	0	0	0	47
Persons Entry	0	0	0	<<<== BALANCED <<<==	0	0	0	Persons Exit
63	0	0	0	0	0	0	0	248
760 - Research and Development Center								
Persons Exit	0	0	0	====>> BALANCED =====>>	0	0	0	Persons Entry
61	0	0	0	0	0	0	0	8
Persons Entry	0	0	0	<<<== BALANCED <<<==	0	0	0	Persons Exit

63	0	0	0	0	0	0	0	45
310(1) - Hotel								
Persons Exit	PAF	UIPTC	Unconstrained Demand	====>>> BALANCED ==>>>>	UIPTC	PAF	Unconstrained Demand	Persons Entry
61	0	0	0	0	0	0	0	8
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<<== BALANCED <<<<==	UIPTC	PAF	Unconstrained Demand	Persons Exit
63	0	0	0	0	0	0	0	45
310(1) - Hotel								
Persons Exit	PAF	UIPTC	Unconstrained Demand	====>>> BALANCED ==>>>>	UIPTC	PAF	Unconstrained Demand	Persons Entry
61	0	0	0	0	0	0	0	13
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<<== BALANCED <<<<==	UIPTC	PAF	Unconstrained Demand	Persons Exit
63	0	0	0	0	0	0	0	10
310(1) - Hotel								
Persons Exit	PAF	UIPTC	Unconstrained Demand	====>>> BALANCED ==>>>>	UIPTC	PAF	Unconstrained Demand	Persons Entry
61	0	0	0	0	0	0	0	369
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<<== BALANCED <<<<==	UIPTC	PAF	Unconstrained Demand	Persons Exit
63	0	0	0	0	0	0	0	950
310(1) - Hotel								
Persons Exit	PAF	UIPTC	Unconstrained Demand	====>>> BALANCED ==>>>>	UIPTC	PAF	Unconstrained Demand	Persons Entry
61	0	0	0	0	0	0	0	47
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<<== BALANCED <<<<==	UIPTC	PAF	Unconstrained Demand	Persons Exit
63	0	0	0	0	0	0	0	248
310(1) - Hotel								
Persons Exit	PAF	UIPTC	Unconstrained Demand	====>>> BALANCED ==>>>>	UIPTC	PAF	Unconstrained Demand	Persons Entry
61	0	0	0	0	0	0	0	8
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<<== BALANCED <<<<==	UIPTC	PAF	Unconstrained Demand	Persons Exit
63	0	0	0	0	0	0	0	45
310(1) - Hotel								
Persons Exit	PAF	UIPTC	Unconstrained Demand	====>>> BALANCED ==>>>>	UIPTC	PAF	Unconstrained Demand	Persons Entry
61	0	0	0	0	0	0	0	8
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<<== BALANCED <<<<==	UIPTC	PAF	Unconstrained Demand	Persons Exit
63	0	0	0	0	0	0	0	45
411 - Public Park								
Persons Exit	PAF	UIPTC	Unconstrained Demand	====>>> BALANCED ==>>>>	UIPTC	PAF	Unconstrained Demand	Persons Entry
10	0	0	0	0	0	0	0	369
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<<== BALANCED <<<<==	UIPTC	PAF	Unconstrained Demand	Persons Exit

13	0	0	0	0	0	0	0	950
411 - Public Park								
Persons Exit	PAF	UIPTC	Unconstrained Demand	====>> BALANCED ==>>>>	Unconstrained Demand	UIPTC	PAF	Persons Entry
10	0	0	0	0	0	0	0	47
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<<== BALANCED <<<<==	Unconstrained Demand	UIPTC	PAF	Persons Exit
13	0	0	0	0	0	0	0	248
411 - Public Park								
Persons Exit	PAF	UIPTC	Unconstrained Demand	====>> BALANCED ==>>>>	Unconstrained Demand	UIPTC	PAF	Persons Entry
10	0	0	0	0	0	0	0	8
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<<== BALANCED <<<<==	Unconstrained Demand	UIPTC	PAF	Persons Exit
13	0	0	0	0	0	0	0	45
411 - Public Park								
Persons Exit	PAF	UIPTC	Unconstrained Demand	====>> BALANCED ==>>>>	Unconstrained Demand	UIPTC	PAF	Persons Entry
10	0	0	0	0	0	0	0	8
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<<== BALANCED <<<<==	Unconstrained Demand	UIPTC	PAF	Persons Exit
13	0	0	0	0	0	0	0	45
720 - Medical-Dental Office Building								
Persons Exit	PAF	UIPTC	Unconstrained Demand	====>> BALANCED ==>>>>	Unconstrained Demand	UIPTC	PAF	Persons Entry
950	0	0	0	0	0	0	0	47
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<<== BALANCED <<<<==	Unconstrained Demand	UIPTC	PAF	Persons Exit
369	0	0	0	0	0	0	0	248
720 - Medical-Dental Office Building								
Persons Exit	PAF	UIPTC	Unconstrained Demand	====>> BALANCED ==>>>>	Unconstrained Demand	UIPTC	PAF	Persons Entry
950	0	0	0	0	0	0	0	8
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<<== BALANCED <<<<==	Unconstrained Demand	UIPTC	PAF	Persons Exit
369	0	0	0	0	0	0	0	45
720 - Medical-Dental Office Building								
Persons Exit	PAF	UIPTC	Unconstrained Demand	====>> BALANCED ==>>>>	Unconstrained Demand	UIPTC	PAF	Persons Entry
950	0	0	0	0	0	0	0	8
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<<== BALANCED <<<<==	Unconstrained Demand	UIPTC	PAF	Persons Exit
369	0	0	0	0	0	0	0	45
710 - General Office Building								
Persons Exit	PAF	UIPTC	Unconstrained Demand	====>> BALANCED ==>>>>	Unconstrained Demand	UIPTC	PAF	Persons Entry
248	0	0	0	0	0	0	0	8
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<<== BALANCED <<<<==	Unconstrained Demand	UIPTC	PAF	Persons Exit
47	0	0	0	0	0	0	0	45

710 - General Office Building		760(1) - Research and Development Center	
Persons Exit	PAF	UIPTC	PAF
248	0	0	0
Persons Entry	PAF	UIPTC	PAF
47	0	0	0
Unconstrained Demand		Unconstrained Demand	
0		0	
Unconstrained Demand		Unconstrained Demand	
0		0	
====> BALANCED =====		====> BALANCED =====	
0		0	
<<<==== BALANCED <<<<====		<<<==== BALANCED <<<<====	
0		0	
Persons Exit		Persons Exit	
8		45	

760 - Research and Development Center		760(1) - Research and Development Center	
Persons Exit	PAF	UIPTC	PAF
45	0	0	0
Persons Entry	PAF	UIPTC	PAF
8	0	0	0
Unconstrained Demand		Unconstrained Demand	
0		0	
Unconstrained Demand		Unconstrained Demand	
0		0	
====> BALANCED =====		====> BALANCED =====	
0		0	
<<<==== BALANCED <<<<====		<<<==== BALANCED <<<<====	
0		0	
Persons Exit		Persons Exit	
8		45	

INTERNAL PERSON TRIPS:

310 - Hotel		760(1) - Research and Development Center	
Internal Person Trips From	Entry	Exit	Total
Total Internal Person Trips	0	0	0

310(1) - Hotel		760(1) - Research and Development Center	
Internal Person Trips From	Entry	Exit	Total
Total Internal Person Trips	0	0	0

411 - Public Park		760(1) - Research and Development Center	
Internal Person Trips From	Entry	Exit	Total
Total Internal Person Trips	0	0	0

720 - Medical-Dental Office Building		760(1) - Research and Development Center	
Internal Person Trips From	Entry	Exit	Total
Total Internal Person Trips	0	0	0

710 - General Office Building		760(1) - Research and Development Center	
Internal Person Trips From	Entry	Exit	Total
Total Internal Person Trips	0	0	0

760 - Research and Development Center		760(1) - Research and Development Center	
Internal Person Trips From	Entry	Exit	Total
Total Internal Person Trips	0	0	0

760(1) - Research and Development Center		760(1) - Research and Development Center	
Internal Person Trips From	Entry	Exit	Total
Total Internal Person Trips	0	0	0

INTERNAL VEHICLE TRIPS AND CAPTURE:

310 - Hotel		760(1) - Research and Development Center	
Total Internal Person Trips	0	0	0
Vehicle Mode Share	100%	100%	-
Vehicle Occupancy	1.00	1.00	-
Total Vehicle Internal Trips	0	0	0
Total External Vehicle Trips	63	61	124
Internal Vehicle Trip Capture	0%	0%	0%

310(1) - Hotel		760(1) - Research and Development Center	
Internal Person Trips From	Entry	Exit	Total
Total Internal Person Trips	0	0	0

Total Internal Person Trips	0	0	0
Vehicle Mode Share	100%	100%	-
Vehicle Occupancy	1.00	1.00	-
Total Vehicle Internal Trips	0	0	0
Total External Vehicle Trips	63	61	124
Internal Vehicle Trip Capture	0%	0%	0%

411 - Public Park

Total Internal Person Trips	0	0	0
Vehicle Mode Share	100%	100%	-
Vehicle Occupancy	1.00	1.00	-
Total Vehicle Internal Trips	0	0	0
Total External Vehicle Trips	13	10	23
Internal Vehicle Trip Capture	0%	0%	0%

720 - Medical-Dental Office Building

Total Internal Person Trips	0	0	0
Vehicle Mode Share	100%	100%	-
Vehicle Occupancy	1.00	1.00	-
Total Vehicle Internal Trips	0	0	0
Total External Vehicle Trips	264	678	942
Internal Vehicle Trip Capture	0%	0%	0%

710 - General Office Building

Total Internal Person Trips	0	0	0
Vehicle Mode Share	100%	100%	-
Vehicle Occupancy	1.00	1.00	-
Total Vehicle Internal Trips	0	0	0
Total External Vehicle Trips	47	248	295
Internal Vehicle Trip Capture	0%	0%	0%

760 - Research and Development Center

Total Internal Person Trips	0	0	0
Vehicle Mode Share	100%	100%	-
Vehicle Occupancy	1.00	1.00	-
Total Vehicle Internal Trips	0	0	0
Total External Vehicle Trips	8	45	53
Internal Vehicle Trip Capture	0%	0%	0%

760(1) - Research and Development Center

Total Internal Person Trips	0	0	0
Vehicle Mode Share	100%	100%	-
Vehicle Occupancy	1.00	1.00	-
Total Vehicle Internal Trips	0	0	0
Total External Vehicle Trips	8	45	53
Internal Vehicle Trip Capture	0%	0%	0%

PASS-BY VEHICLE TRIP REDUCTION

Internal Vehicle Trips	0	0	0
External Vehicle Trips	100%	100%	-
Pass-by Vehicle Trip %	1.00	1.00	-
Internal Vehicle Trips	0	0	0
External Vehicle Trips	8	45	53
Pass-by Vehicle Trips	0%	0%	0%

Land Use	Entry	Exit	Entry (%)	Exit (%)	Entry	Exit
310 - Hotel	63	61	0.00%	0.00%	0	0
310(1) - Hotel	63	61	0.00%	0.00%	0	0
411 - Public Park	13	10	0.00%	0.00%	0	0
720 - Medical-Dental Office Building	264	678	0.00%	0.00%	0	0
710 - General Office Building	47	248	0.00%	0.00%	0	0
760 - Research and Development Center	8	45	0.00%	0.00%	0	0
760(1) - Research and Development Center	8	45	0.00%	0.00%	0	0

DIVERTED VEHICLE TRIP REDUCTION

Land Use	External Vehicle Trips		Diverted Vehicle Trip %		Diverted Vehicle Trips	
	Entry	Exit	Entry (%)	Exit (%)	Entry	Exit
310 - Hotel	63	61	0.00%	0.00%	0	0
310(1) - Hotel	63	61	0.00%	0.00%	0	0
411 - Public Park	13	10	0.00%	0.00%	0	0
720 - Medical-Dental Office Building	264	678	0.00%	0.00%	0	0
710 - General Office Building	47	248	0.00%	0.00%	0	0
760 - Research and Development Center	8	45	0.00%	0.00%	0	0
760(1) - Research and Development Center	8	45	0.00%	0.00%	0	0

EXTRA VEHICLE TRIP REDUCTION

Land Use	(External - (Pass-by + Diverted)) Vehicle Trips		Extra Vehicle Trip Reduction %		Extra Reduced Vehicle Trips	
	Entry	Exit	Entry (%)	Exit (%)	Entry	Exit
310 - Hotel	63	61	0.00%	0.00%	0	0
310(1) - Hotel	63	61	0.00%	0.00%	0	0
411 - Public Park	13	10	0.00%	0.00%	0	0
720 - Medical-Dental Office Building	264	678	0.00%	0.00%	0	0
710 - General Office Building	47	248	0.00%	0.00%	0	0
760 - Research and Development Center	8	45	0.00%	0.00%	0	0
760(1) - Research and Development Center	8	45	0.00%	0.00%	0	0

NEW VEHICLE TRIPS

Land Use	New Vehicle Trips		Total
	Entry	Exit	
310 - Hotel	63	61	124
310(1) - Hotel	63	61	124
411 - Public Park	13	10	23
720 - Medical-Dental Office Building	264	678	942
710 - General Office Building	47	248	295
760 - Research and Development Center	8	45	53
760(1) - Research and Development Center	8	45	53


RESULTS

Site Totals	Entry	Exit	Total
Vehicle Trips Before Reduction	466	1148	1614
Internal Vehicle Trips	0	0	0
External Vehicle Trips	466	1148	1614
Internal Vehicle Trip Capture	0%	0%	0%
Pass-by Vehicle Trips	0	0	0
Diverted Vehicle Trips	0	0	0
Extra Reduced Vehicle Trips	0	0	0
New Vehicle Trips	466	1148	1614

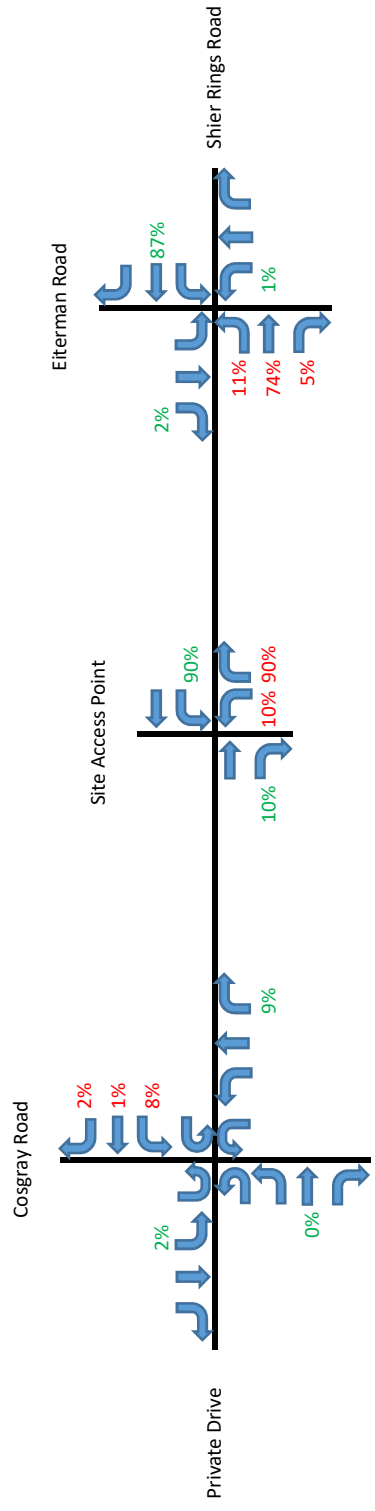
Appendix D

Volume Calculations


Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations

	Year	Period	Scenario	Plate
		AM	Site Non-Pass-By Distribution	

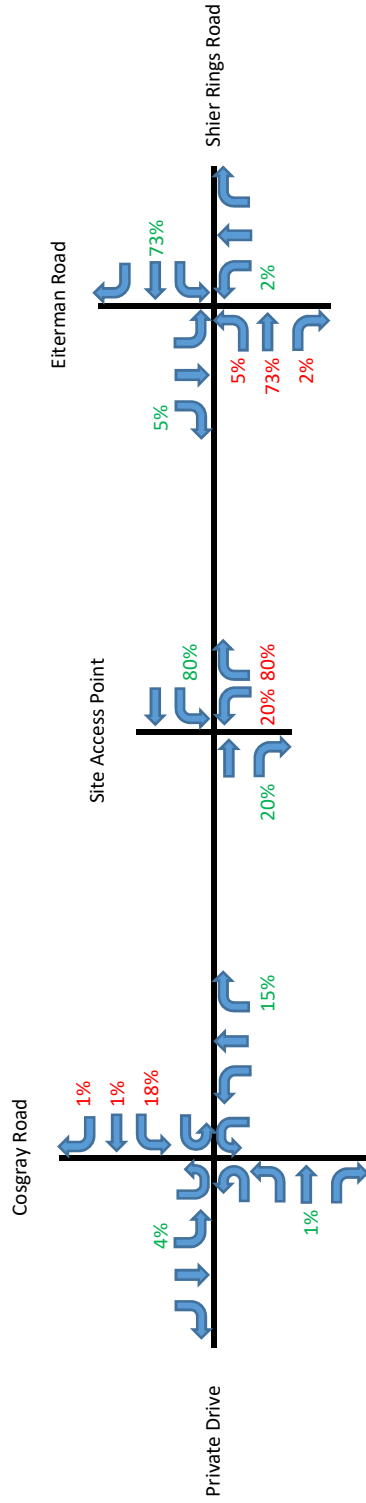
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N




Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations

	Year	Period	Scenario	Plate
		PM	Site Non-Pass-By Distribution	

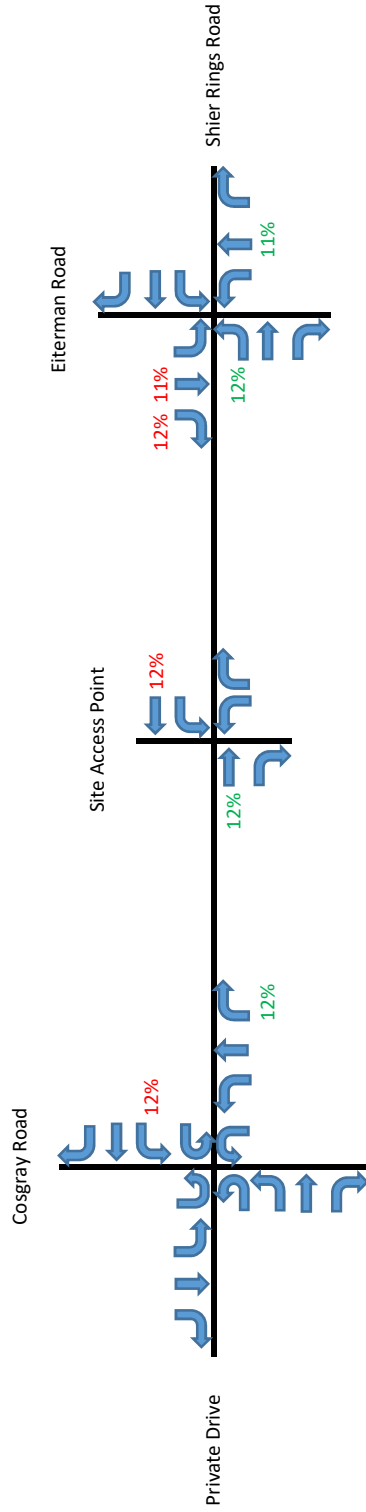
^
N



Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations

	Year	Period	Scenario	Plate
			Noah's Non-Pass-By Distribution*	

^
N



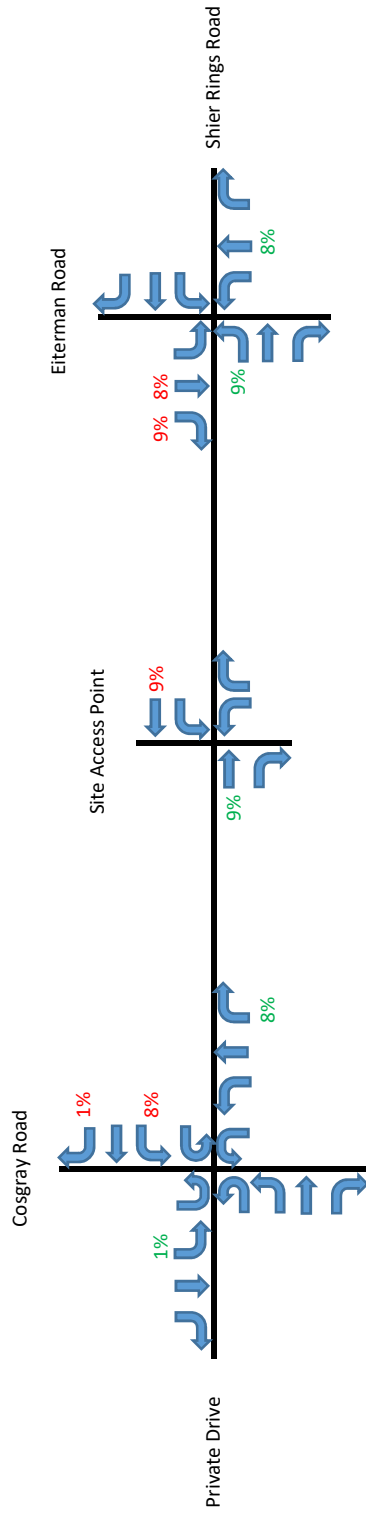
* Distribution obtained from the Noah's Event Venue Dublin Traffic Access Study and The Ohio State University City of Dublin Ambulatory & Hospital Development Traffic Impact Study.

Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations

Year	Period	Scenario	Plate
		Hospital/Ambulatory and Medical Office Non-Pass-By Distribution*	




^
N

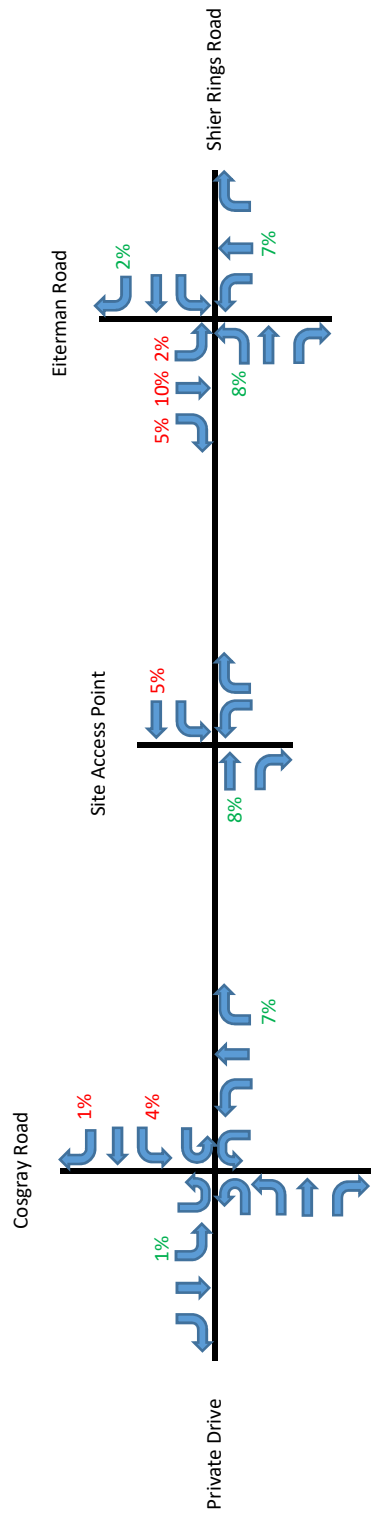


* Distribution obtained from The Ohio State University City of Dublin Ambulatory & Hospital Development Traffic Impact Study.

Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations

	Year	Period	Scenario	Plate
			Outlots Non-Pass-By Distribution	

^
N



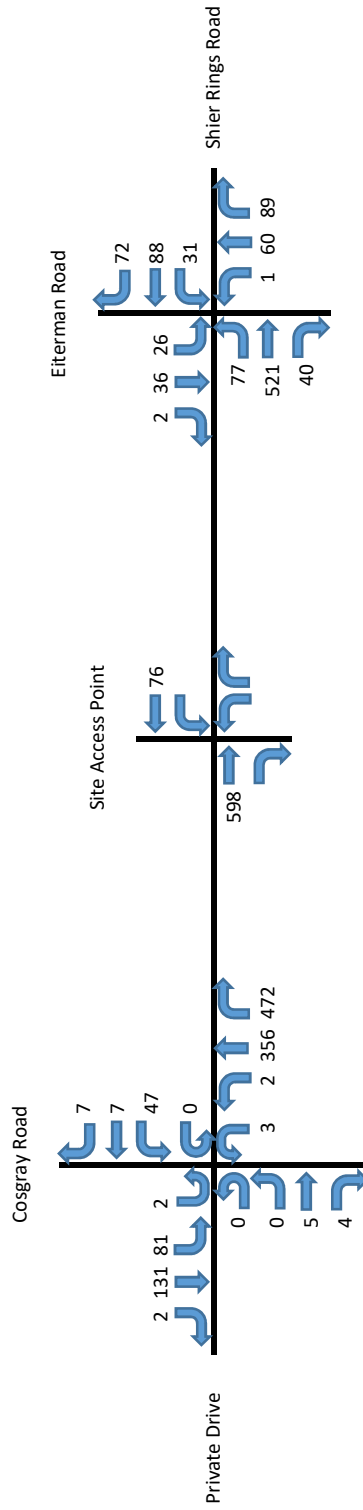
* Distribution obtained from The Ohio State University City of Dublin Ambulatory & Hospital Development Traffic Impact Study.

Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations



Year	Period	Scenario	Plate
2017	AM	Count	

^
N

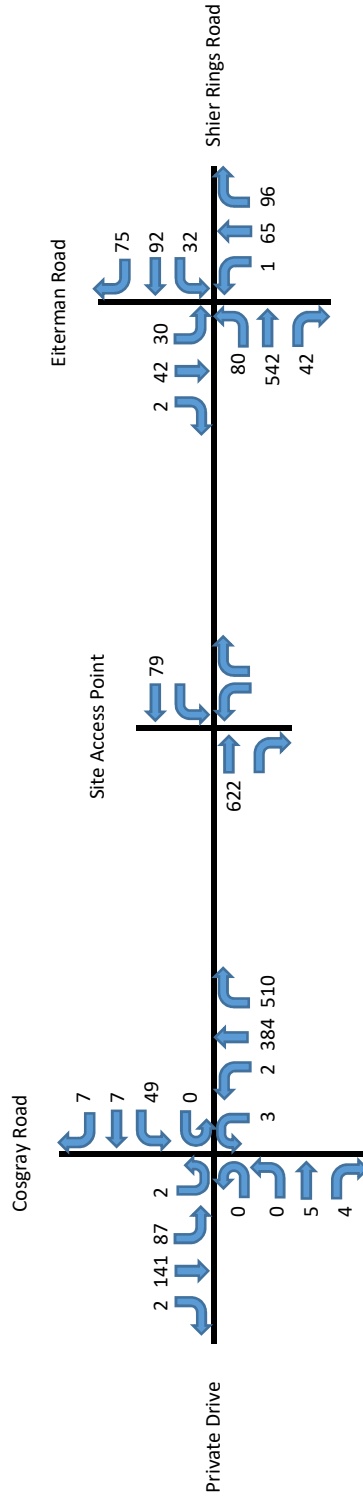


Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations



Year	Period	Scenario	Plate
2021	AM	Background - Pre-Adjustment	A1


^
N



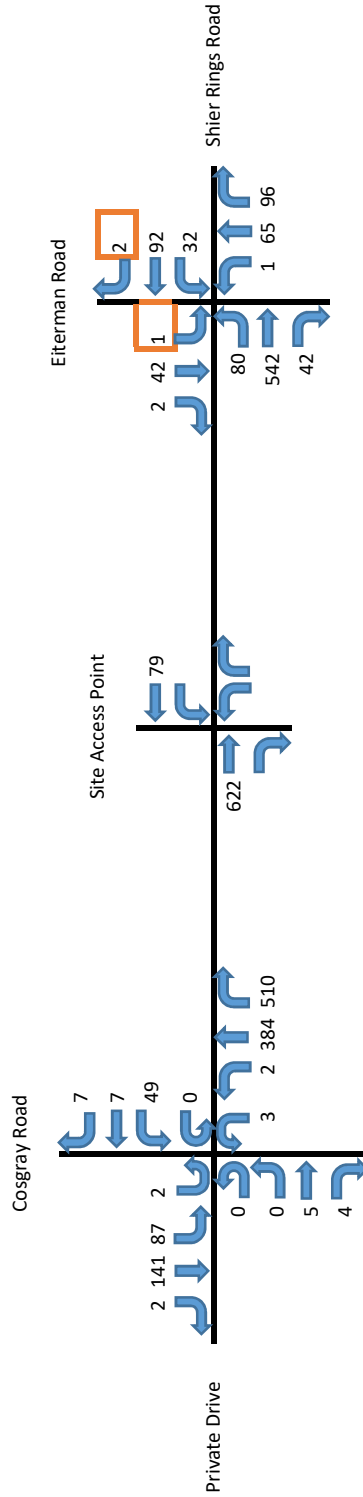
Growth Rates

Shier Rings Rd e/o Cosgray Rd	1.00%
Cosgray Rd n/o Shier Rings Rd	2.00%
Shier Rings Rd w/o Cosgray Rd	1.00%
Cosgray Rd s/o Shier Rings Rd	2.00%
Shier Rings Rd e/o Eiterman Rd	1.00%
Eiterman Rd n/o Shier Rings Rd	4.00%
Shier Rings Rd w/o Eiterman Rd	1.00%
Eiterman Rd s/o Shier Rings Rd	2.00%

Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations

	Year	Period	Scenario	Plate
	2021	AM	Background - Adjusted	B1

^
N



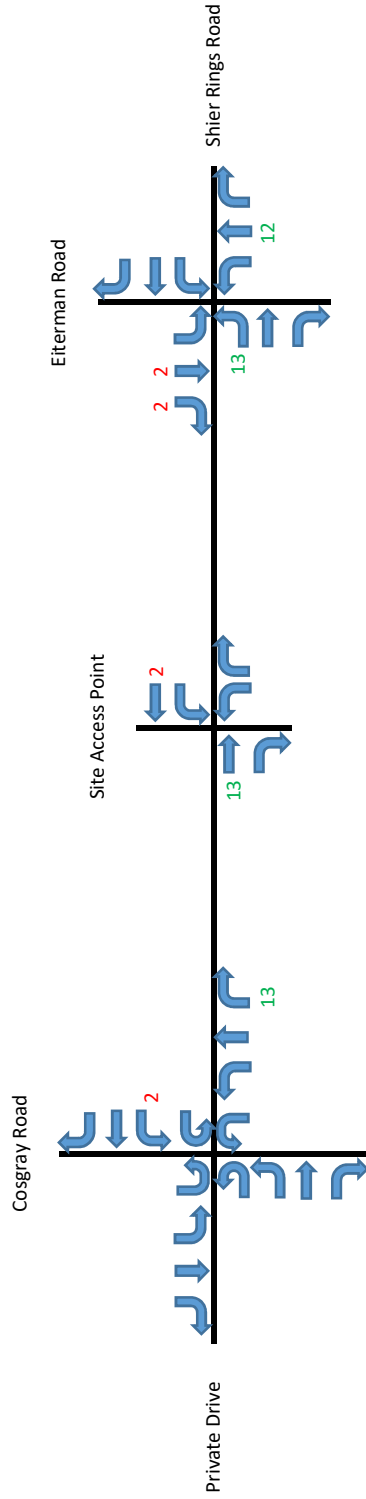
Southbound left and westbound right turning movements were adjusted to match the turning movements assumed in The Ohio State University City of Dublin Ambulatory & Hospital Development Traffic Impact Study. This study assumed with the realignment of Shier Rings Road, the east leg of the Shier Rings Road & Eiterman Road intersection would terminate in a cul-de-sac east of Eiterman Road and would therefore only support residential traffic from developments to the south of Shier Rings Road. The site plan for this realignment has since been updated to include an option to continue east on Shier Ring Road. Due to this change, the only movements that are expected to change are the southbound left turning movement from Eiterman Road onto Shier Rings and the westbound right turning movement from Shier Rings Road onto Eiterman Road. These movements are currently supporting those that are traveling to/from SR-161 who will be able to utilize the realigned Shier Rings Road. Due to this, the only traffic expected to make these two movements is the residential traffic, which would match the volumes assumed for the previous study where residential traffic was the only traffic utilizing the westbound approach to the intersection of Shier Rings Road & Eiterman Road.

Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations




Year	Period	Scenario	Plate
	AM	Noah's Event Venue Non-Pass-By	C1

^
N

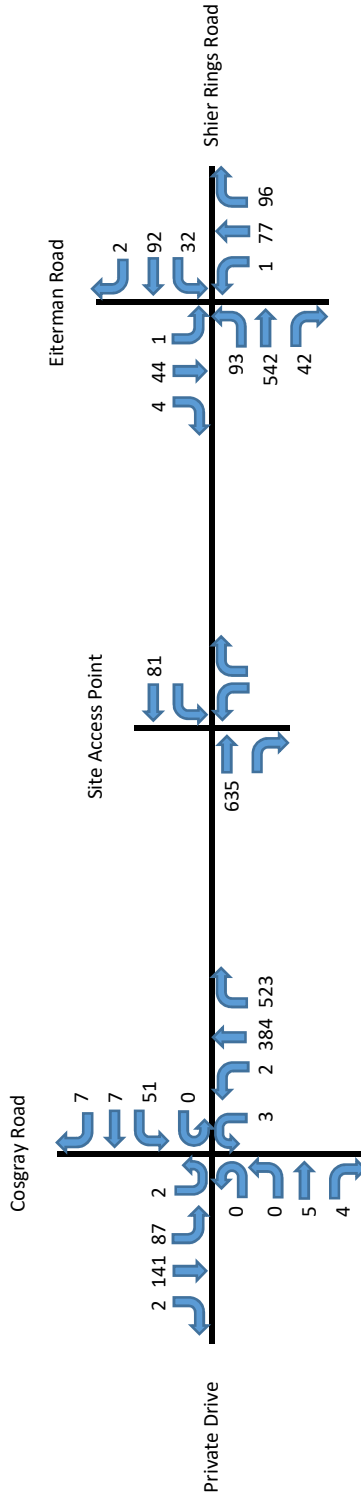


Entry 110
Exit 15

Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations

	Year	Period	Scenario	Plate
	2021	AM	No Build	D1 = B1 + C1

^
N

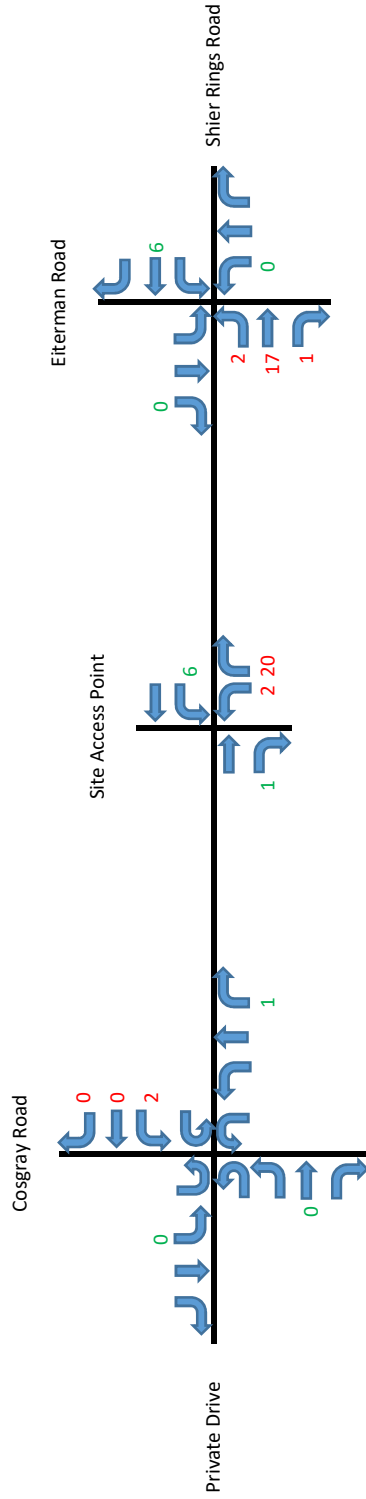


Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations



Year	Period	Scenario	Plate
	AM	Site Non-Pass-By	E1

^
N



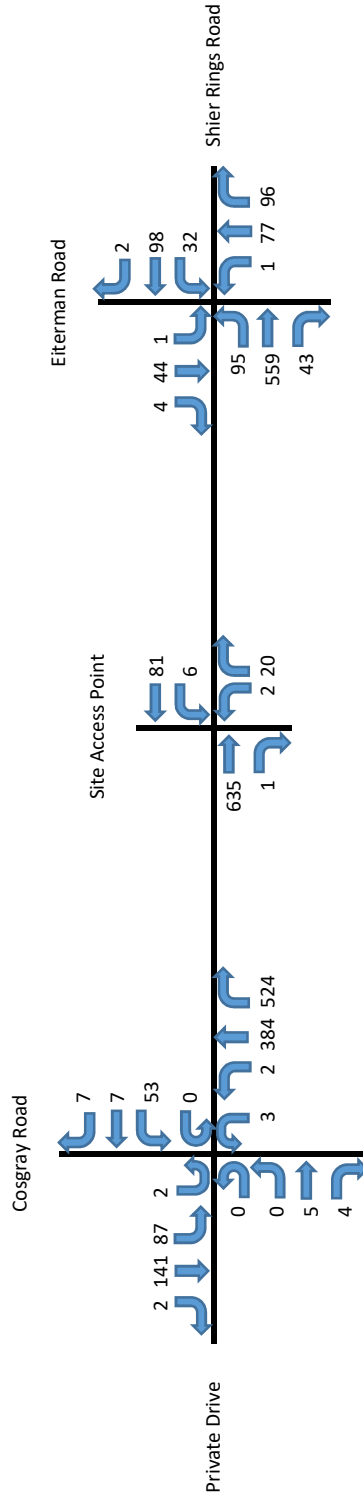
Entry 7
Exit 22

Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations




Year	Period	Scenario	Plate
2021	AM	Build	F1 = D1 + E1

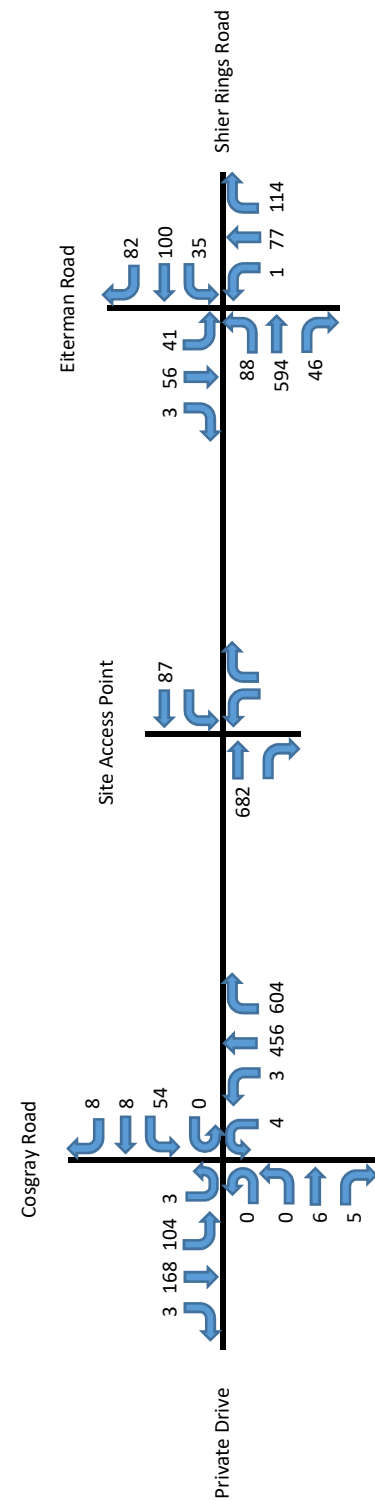
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Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations

	Year	Period	Scenario	Plate
	2031	AM	Background - Pre-Adjustment	G1


^
N



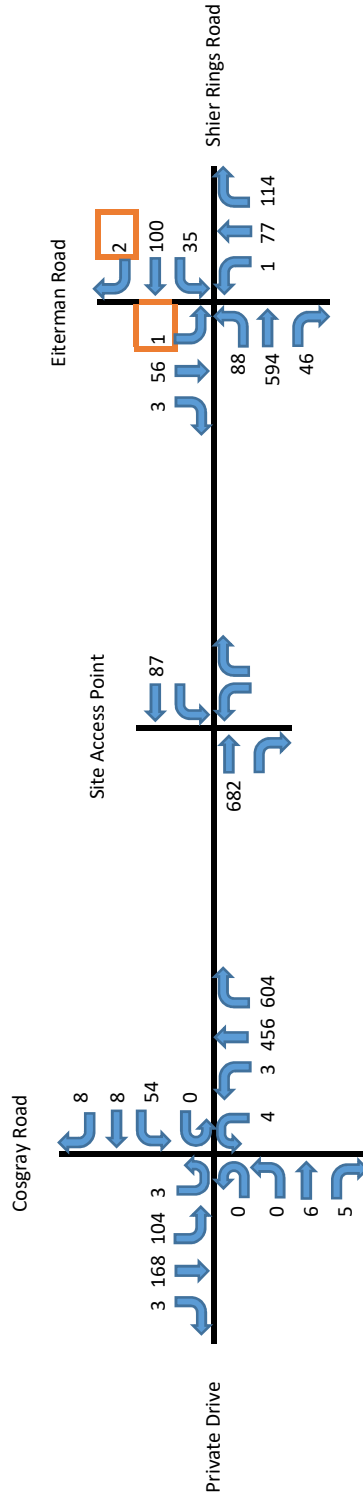
Growth Rates

Shier Rings Rd e/o Cosgray Rd	1.00%
Cosgray Rd n/o Shier Rings Rd	2.00%
Shier Rings Rd w/o Cosgray Rd	1.00%
Cosgray Rd s/o Shier Rings Rd	2.00%
Shier Rings Rd e/o Eiterman Rd	1.00%
Eiterman Rd n/o Shier Rings Rd	4.00%
Shier Rings Rd w/o Eiterman Rd	1.00%
Eiterman Rd s/o Shier Rings Rd	2.00%

Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations

	Year	Period	Scenario	Plate
	2031	AM	Background - Adjusted	H1

^
N



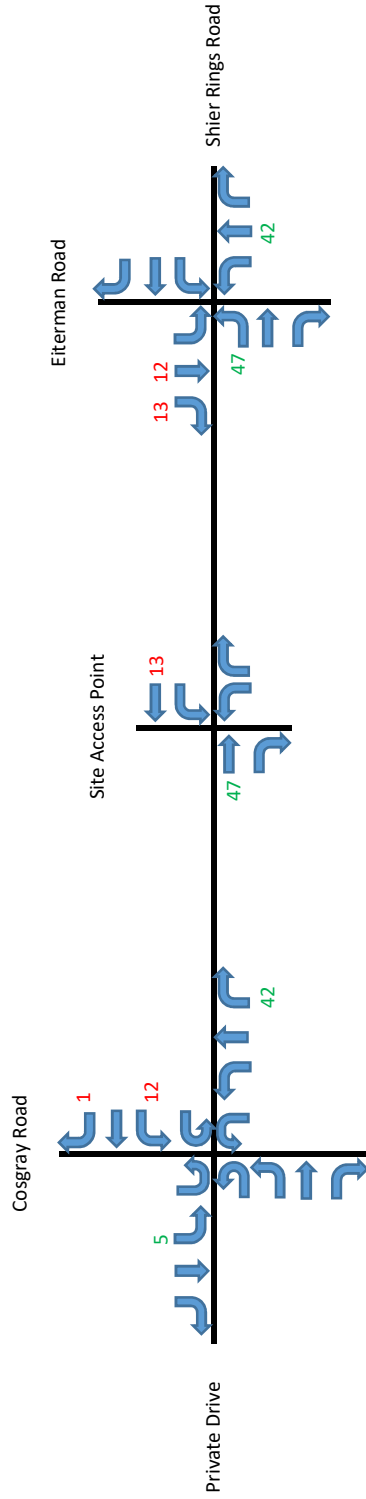
Southbound left and westbound right turning movements were adjusted to match the turning movements assumed in The Ohio State University City of Dublin Ambulatory & Hospital Development Traffic Impact Study. This study assumed with the realignment of Shier Rings Road, the east leg of the Shier Rings Road & Eiterman Road intersection would terminate in a cul-de-sac east of Eiterman Road and would therefore only support residential traffic from developments to the south of Shier Rings Road. The site plan for this realignment has since been updated to include an option to continue east on Shier Ring Road. Due to this change, the only movements that are expected to change are the southbound left turning movement from Eiterman Road onto Shier Rings and the westbound right tuning movement from Shier Rings Road onto Eiterman Road. These movements are currently supporting those that are traveling to/from SR-161 who will be able to utilize the realigned Shier Rings Road. Due to this, the only traffic expected to make these two movements is the residential traffic, which would match the volumes assumed for the previous study where residential traffic was the only traffic utilizing the westbound approach to the intersection of Shier Rings Road & Eiterman Road.

Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations



Year	Period	Scenario	Plate
	AM	OSU Ambulatory Care Facility Phase 1 Non-Pass-By	I1

^
N



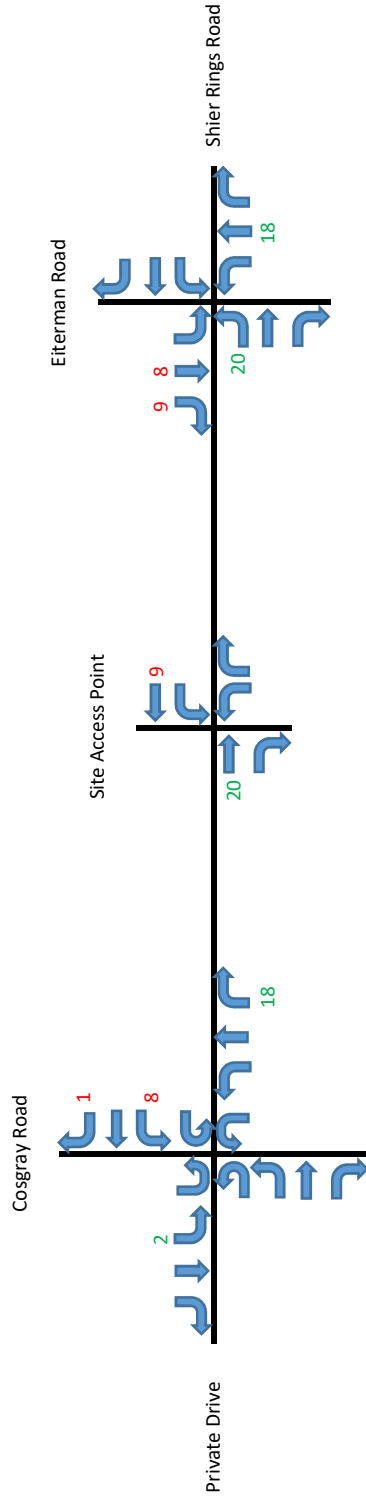
Entry 527
Exit 149

Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations




Year	Period	Scenario	Plate
	AM	OSU Ambulatory Care Facility Phase 2 Non-Pass-By	J1

^
N

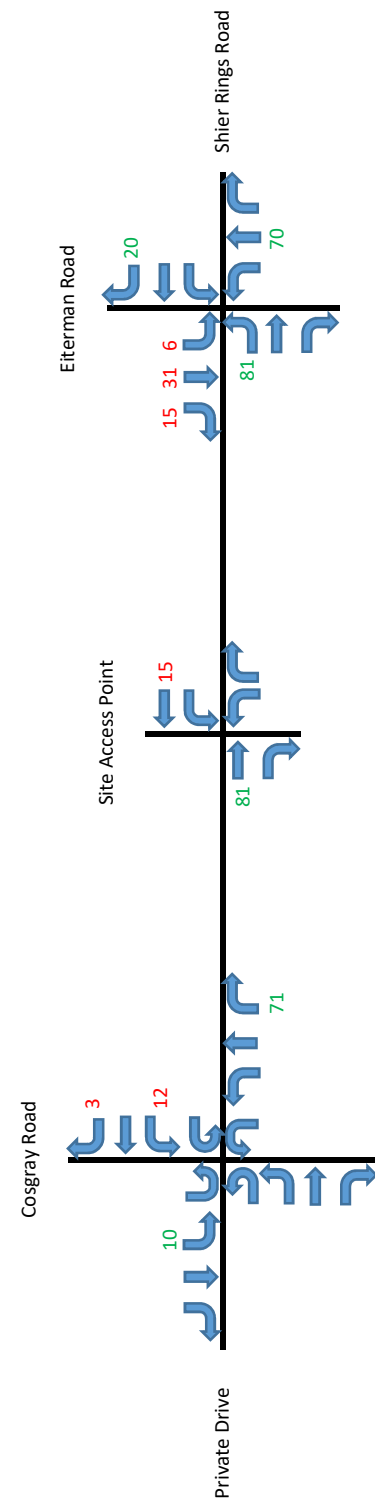


Entry 224
Exit 105

Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations


	Year	Period	Scenario	Plate
		AM	Outlots Non-Pass-By	K1

^
N

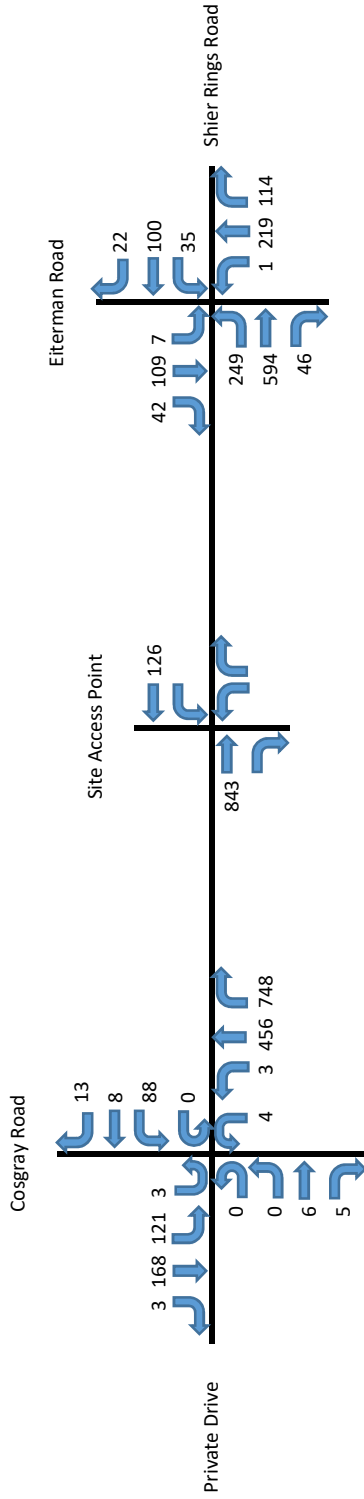


Entry 1007
Exit 305


Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations

	Year	Period	Scenario	Plate
	2031	AM	No Build	$L1 = C1 + H1 + I1 + J1 + K1$

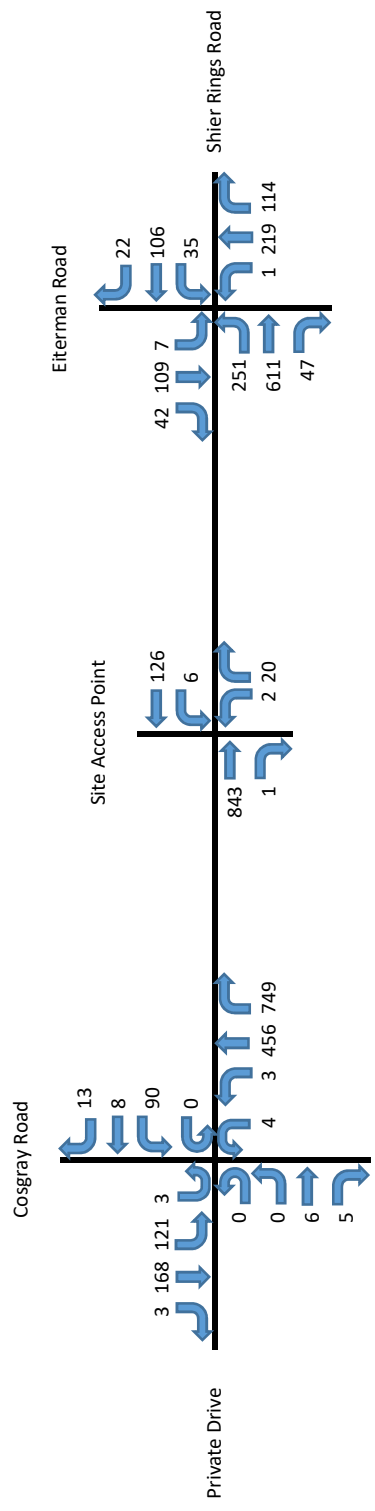
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N




Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations

	Year	Period	Scenario	Plate
	2031	AM	Build	M1 = E1 + L1

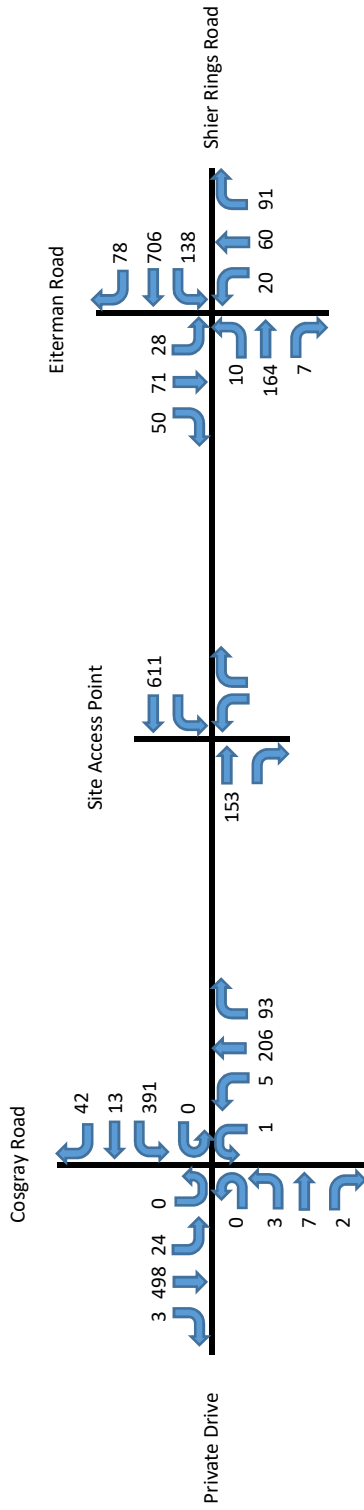
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N




Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations

	Year	Period	Scenario	Plate
	2017	PM	Count	

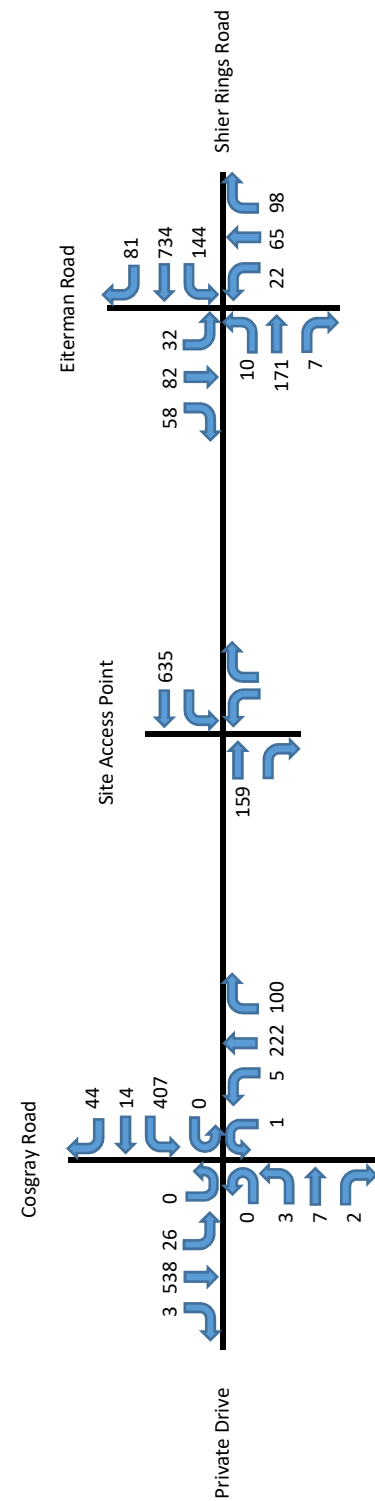
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Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations

	Year	Period	Scenario	Plate
	2021	PM	Background - Pre-Adjustment	A2


^
N



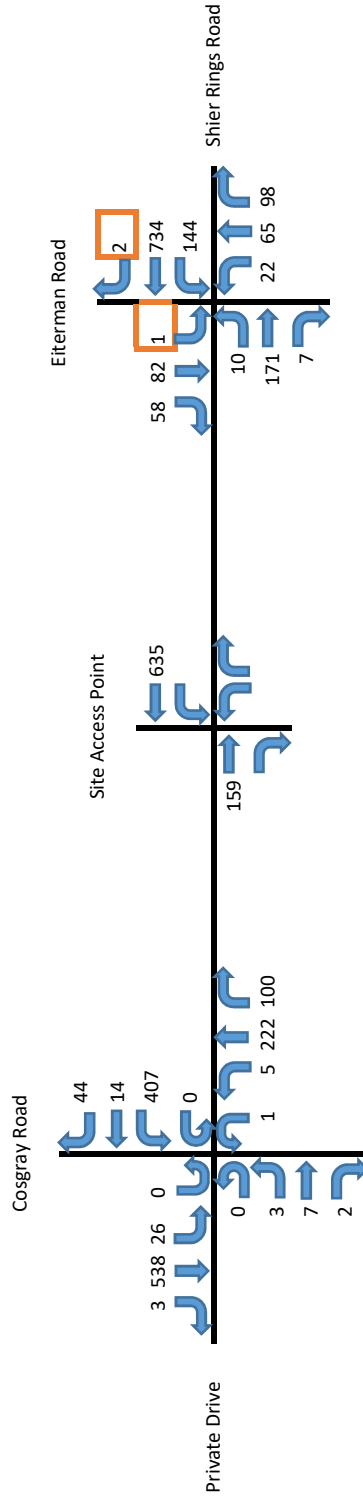
Growth Rates

Shier Rings Rd e/o Cosgray Rd	1.00%
Cosgray Rd n/o Shier Rings Rd	2.00%
Shier Rings Rd w/o Cosgray Rd	1.00%
Cosgray Rd s/o Shier Rings Rd	2.00%
Shier Rings Rd e/o Eiterman Rd	1.00%
Eiterman Rd n/o Shier Rings Rd	4.00%
Shier Rings Rd w/o Eiterman Rd	1.00%
Eiterman Rd s/o Shier Rings Rd	2.00%

Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations

	Year	Period	Scenario	Plate
	2021	PM	Background - Adjusted	B2

^
N



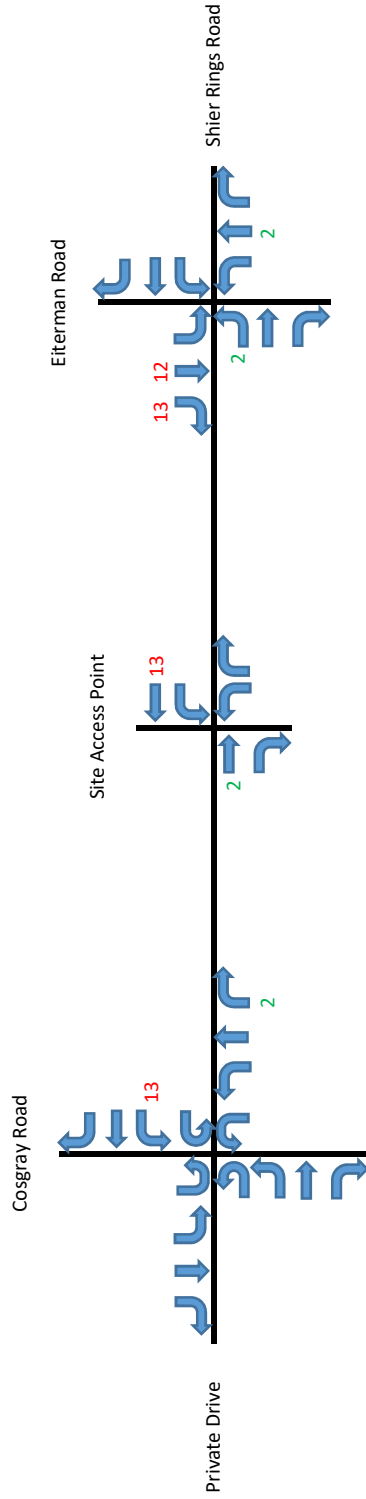
Southbound left and westbound right turning movements were adjusted to match the turning movements assumed in The Ohio State University City of Dublin Ambulatory & Hospital Development Traffic Impact Study. This study assumed with the realignment of Shier Rings Road, the east leg of the Shier Rings Road & Eiterman Road intersection would terminate in a cul-de-sac east of Eiterman Road and would therefore only support residential traffic from developments to the south of Shier Rings Road. The site plan for this realignment has since been updated to include an option to continue east on Shier Ring Road. Due to this change, the only movements that are expected to change are the southbound left turning movement from Eiterman Road onto Shier Rings and the westbound right turning movement from Shier Rings Road onto Eiterman Road. These movements are currently supporting those that are traveling to/from SR-161 who will be able to utilize the realigned Shier Rings Road. Due to this, the only traffic expected to make these two movements is the residential traffic, which would match the volumes assumed for the previous study where residential traffic was the only traffic utilizing the westbound approach to the intersection of Shier Rings Road & Eiterman Road.

Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations




Year	Period	Scenario	Plate
	PM	Noah's Event Venue Non-Pass-By	C2

^
N

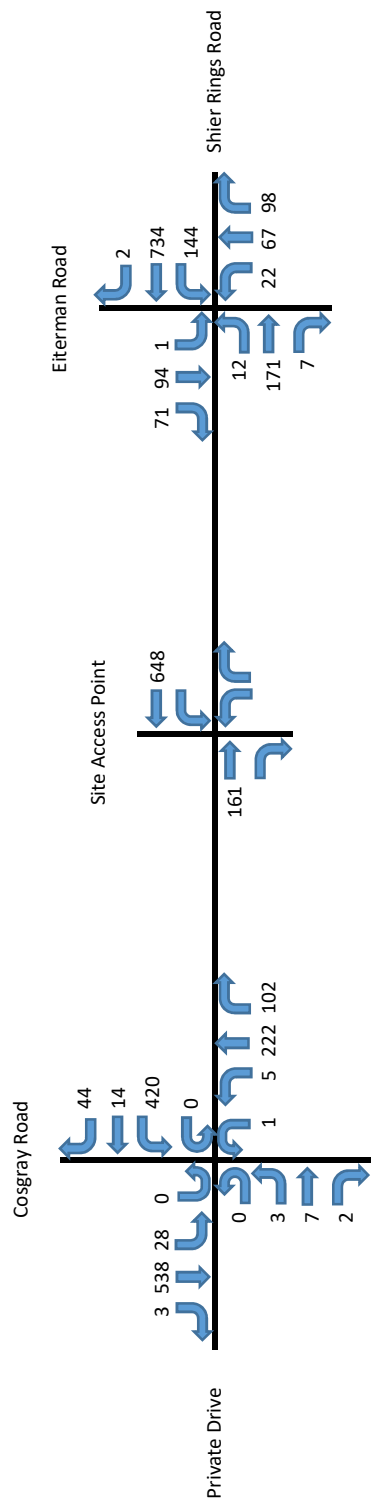


Entry 15
Exit 110

Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations

	Year	Period	Scenario	Plate
	2021	PM	No Build	D2 = B2 + C2

^
N

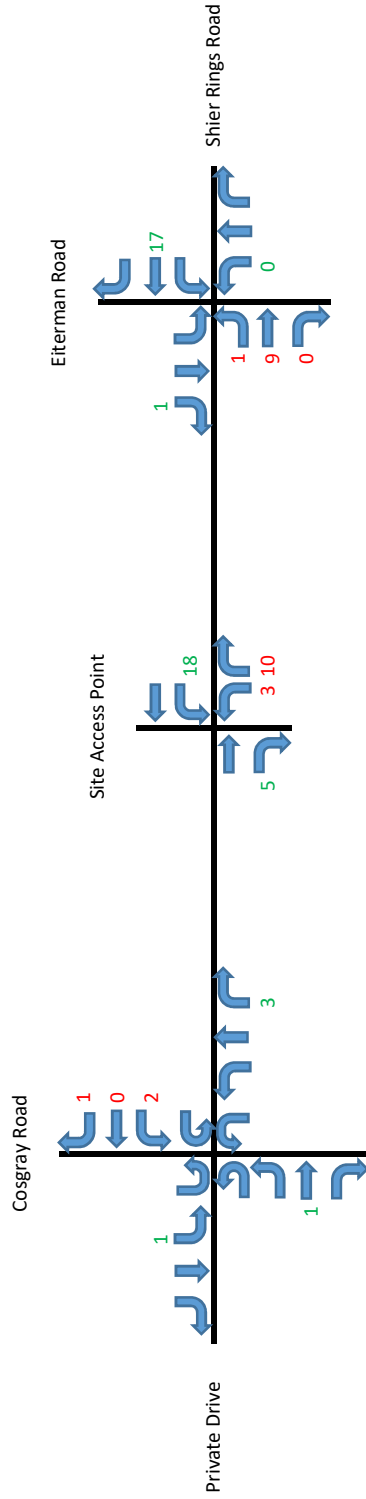


Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations




Year	Period	Scenario	Plate
	PM	Site Non-Pass-By	E2

^
N

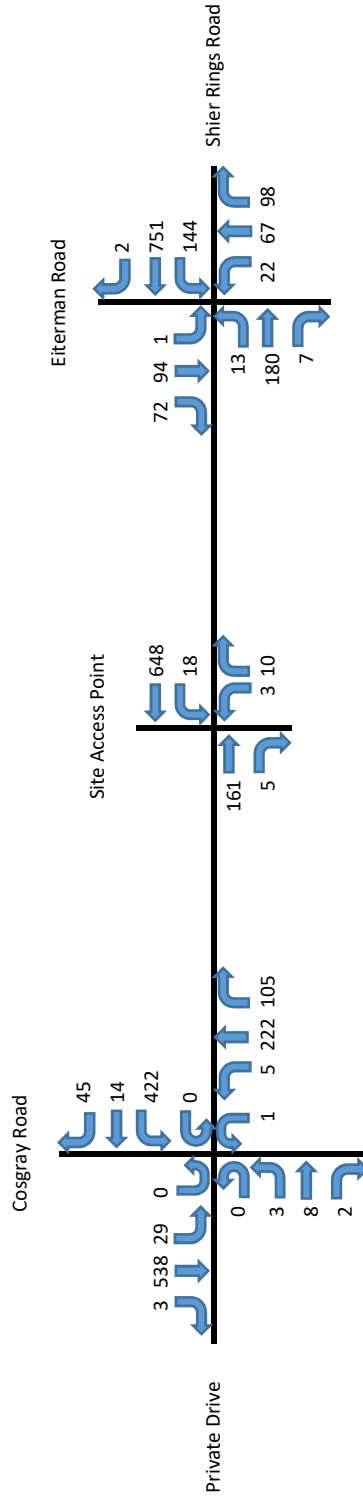


Entry 23
Exit 13


Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations

	Year	Period	Scenario	Plate
	2021	PM	Build	F2 = D2 + E2

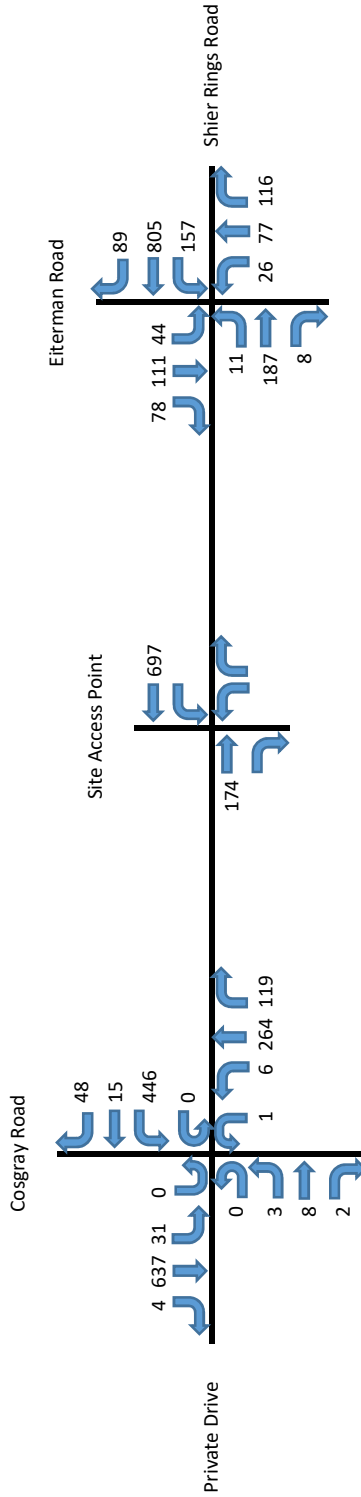
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Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations

	Year	Period	Scenario	Plate
	2031	PM	Background - Pre-Adjustment	G2


^
N



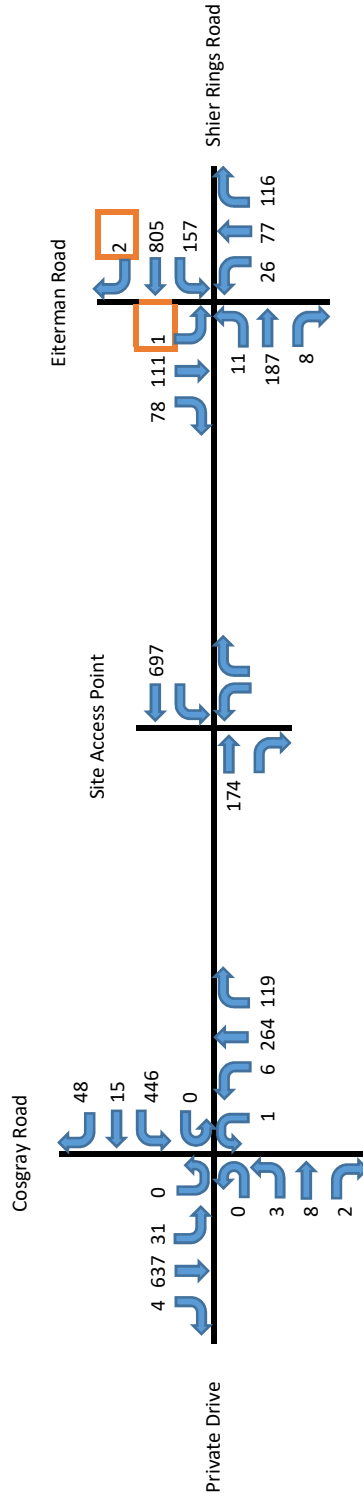
Growth Rates

Shier Rings Rd e/o Cosgray Rd	1.00%
Cosgray Rd n/o Shier Rings Rd	2.00%
Shier Rings Rd w/o Cosgray Rd	1.00%
Cosgray Rd s/o Shier Rings Rd	2.00%
Shier Rings Rd e/o Eiterman Rd	1.00%
Eiterman Rd n/o Shier Rings Rd	4.00%
Shier Rings Rd w/o Eiterman Rd	1.00%
Eiterman Rd s/o Shier Rings Rd	2.00%

Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations


	Year	Period	Scenario	Plate
	2031	PM	Background - Adjusted	H2

^
N

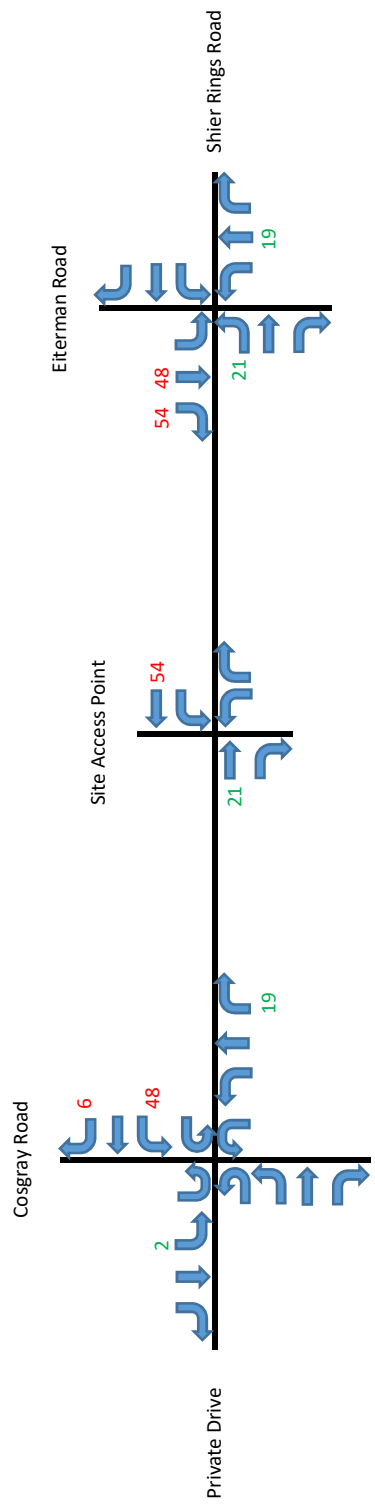


Southbound left and westbound right turning movements were adjusted to match the turning movements assumed in The Ohio State University City of Dublin Ambulatory & Hospital Development Traffic Impact Study. This study assumed with the realignment of Shier Rings Road, the east leg of the Shier Rings Road & Eiterman Road intersection would terminate in a cul-de-sac east of Eiterman Road and would therefore only support residential traffic from developments to the south of Shier Rings Road. The site plan for this realignment has since been updated to include an option to continue east on Shier Ring Road. Due to this change, the only movements that are expected to change are the southbound left turning movement from Eiterman Road onto Shier Rings and the westbound right turning movement from Shier Rings Road onto Eiterman Road. These movements are currently supporting those that are traveling to/from SR-161 who will be able to utilize the realigned Shier Rings Road. Due to this, the only traffic expected to make these two movements is the residential traffic, which would match the volumes assumed for the previous study where residential traffic was the only traffic utilizing the westbound approach to the intersection of Shier Rings Road & Eiterman Road.

Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations


	Year	Period	Scenario	Plate
		PM	OSU Ambulatory Care Facility Phase 1 Non-Pass-By	I2

^
N

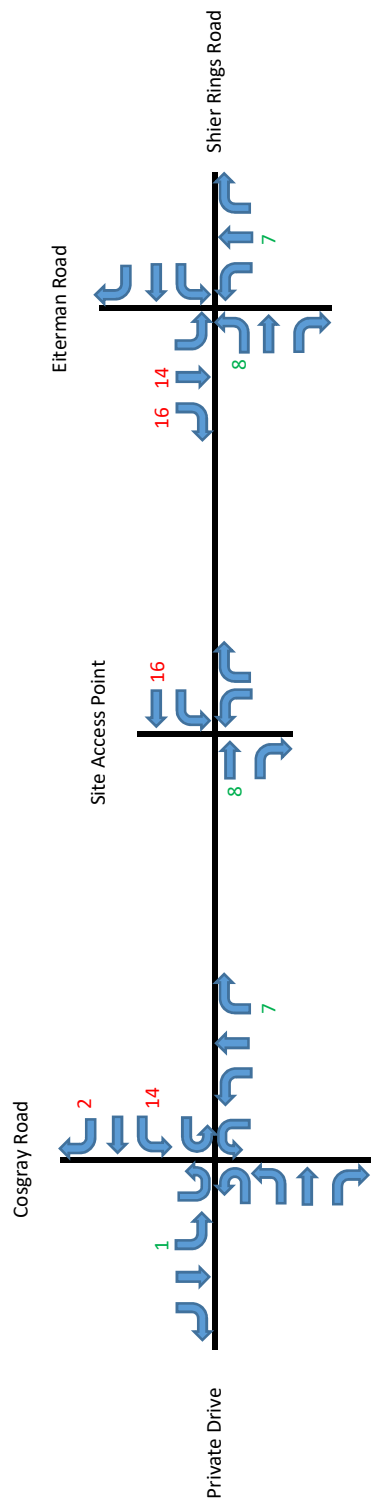


Entry 235
Exit 605

Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations


	Year	Period	Scenario	Plate
		PM	OSU Ambulatory Care Facility Phase 2 Non-Pass-By	J2

^
N

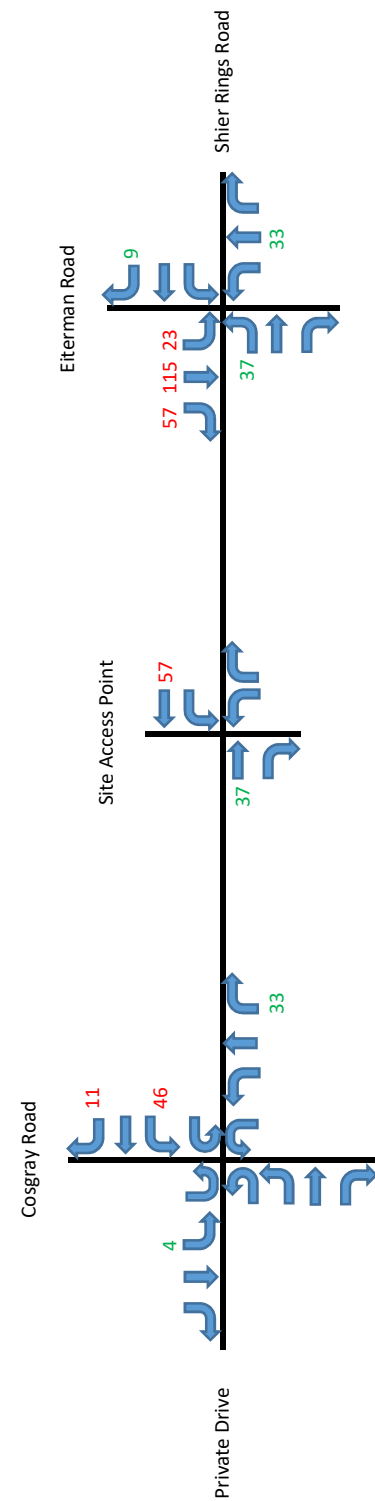


Entry 85
Exit 181

Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations


	Year	Period	Scenario	Plate
		PM	Outlots Non-Pass-By	K2

^
N

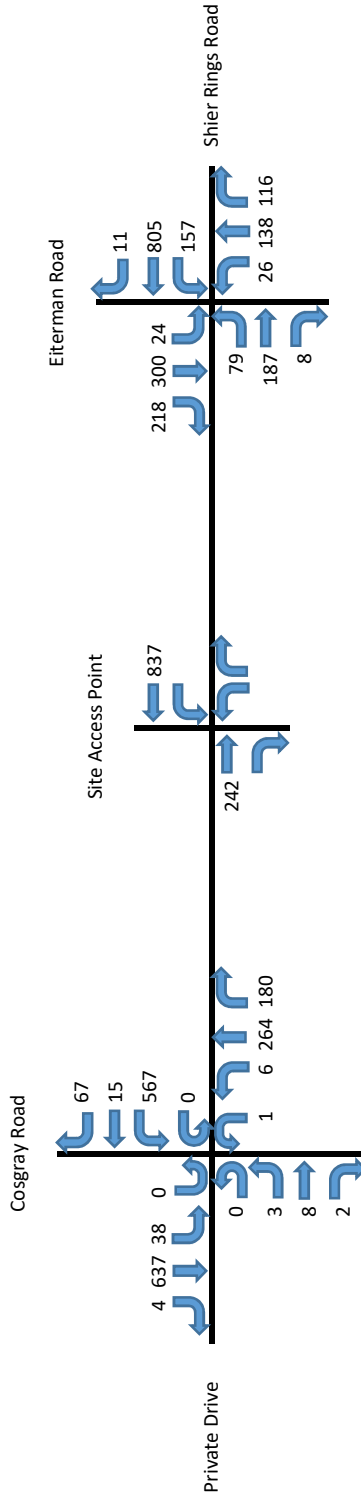


Entry 466
Exit 1148


Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations

	Year	Period	Scenario	Plate
	2031	PM	No Build	L2 = C2 + H2 + I2 + J2 + K2

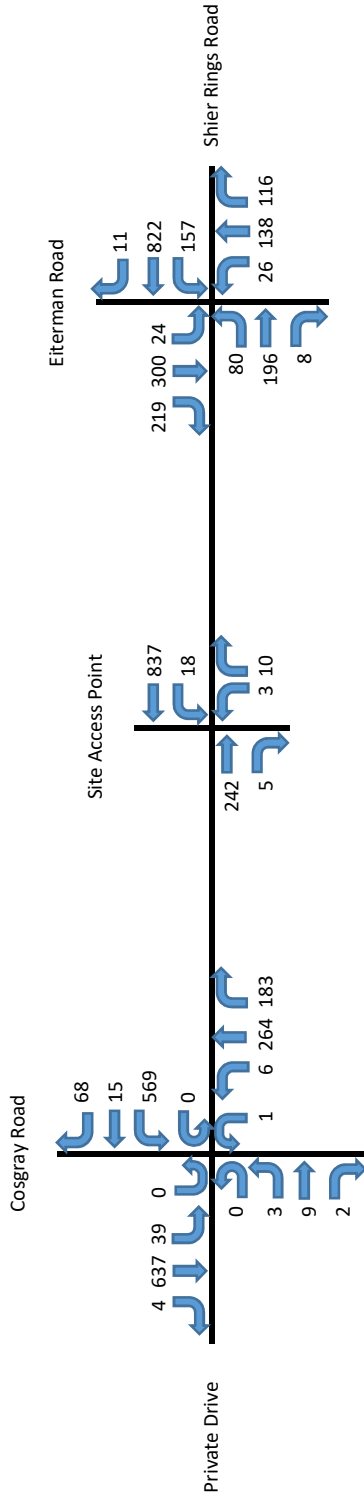
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Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations

	Year	Period	Scenario	Plate
	2031	PM	Build	M2 = E2 + L2

^
N



Appendix E

Speed Study Document



Stealth Stat Analysis Summary

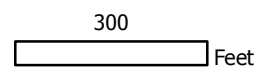
Location	Shier Rings		
Reference	East of Baronscourt Way		
Conditions	WB	Approach,	EB Recede
Posted Speed Limit	35	mph	
Survey Dates	7/18/2017 through 7/20/2017		
Survey Times	24-hours each day		Unit D

Date	Direction of Travel	Number of Vehicles	Average Speed (mph)	85th Percentile (mph)	Percent of Vehicles At or Below 40 mph	Number of Vehicles 51 mph and Over	Comments
7/18/2017	WB	5,044	40.94	46	43%	118	Highest speed at 3:30 p.m.
7/18/2017	EB	4,440	39.66	45	53%	125	Highest speed at 10:30 a.m.
7/19/2017	WB	5,128	41.19	47	42%	199	Highest speed at 12:30 p.m.
7/19/2017	EB	4,581	39.75	46	50%	144	Highest speed at 9:45 a.m.
7/20/2017	WB	4,999	40.84	46	45%	169	Highest speed at 9:00 p.m.
7/20/2017	EB	4,482	39.81	46	51%	130	Highest speed at 4:30 p.m.
Summary							
Direction of Travel	Total # of Vehicles in Survey	Average Speed	85th Percentile	At or Below 40 mph	Percent of Excessive Speeds	Comments	
WB	15,171	40.99	46.33	43%	3.2%		
EB	13,503	39.74	45.67	51%	3.0%		
Both Directions	28,674	40.40	46.00	47%	3.1%		

Invalid data points removed from dataset: 0



Stealth Stat Request - "Two Dimensional"
Shier Rings Rd

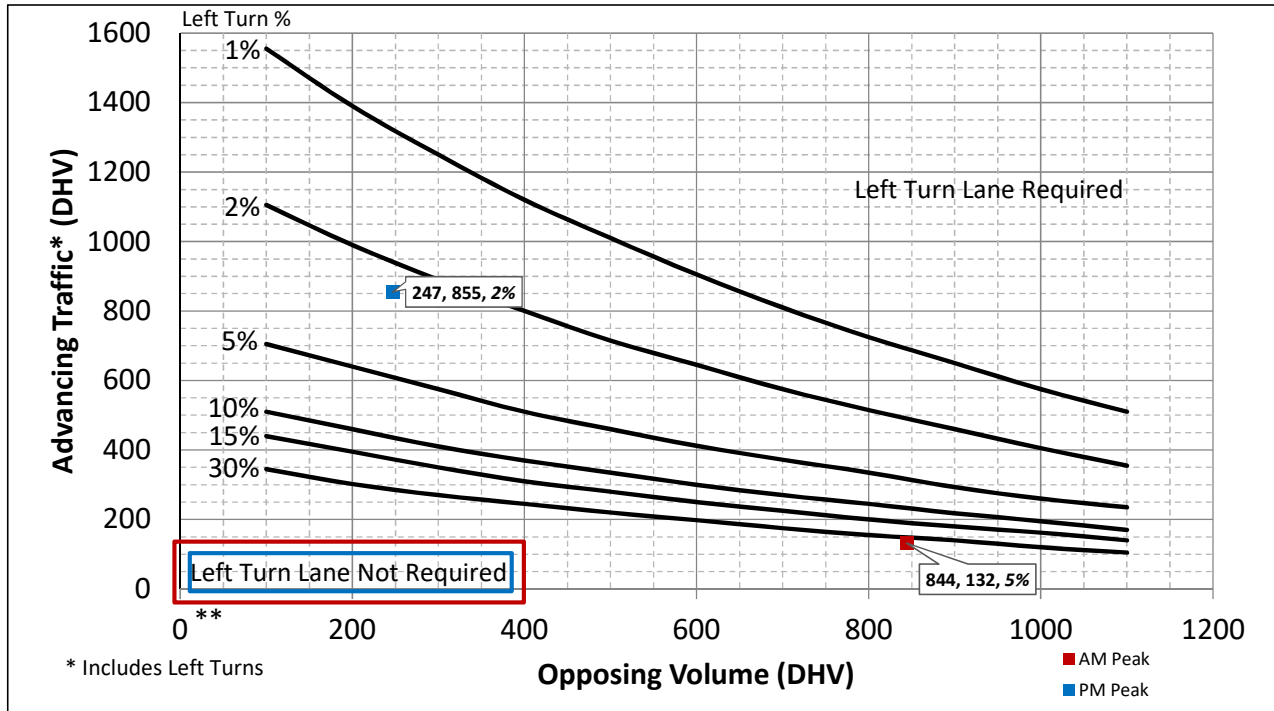


Appendix F

Turn Lane Warrant Analysis



2-Lane Highway Left Turn Lane Warrant
(= < 40 mph or 70 kph Posted Speed)



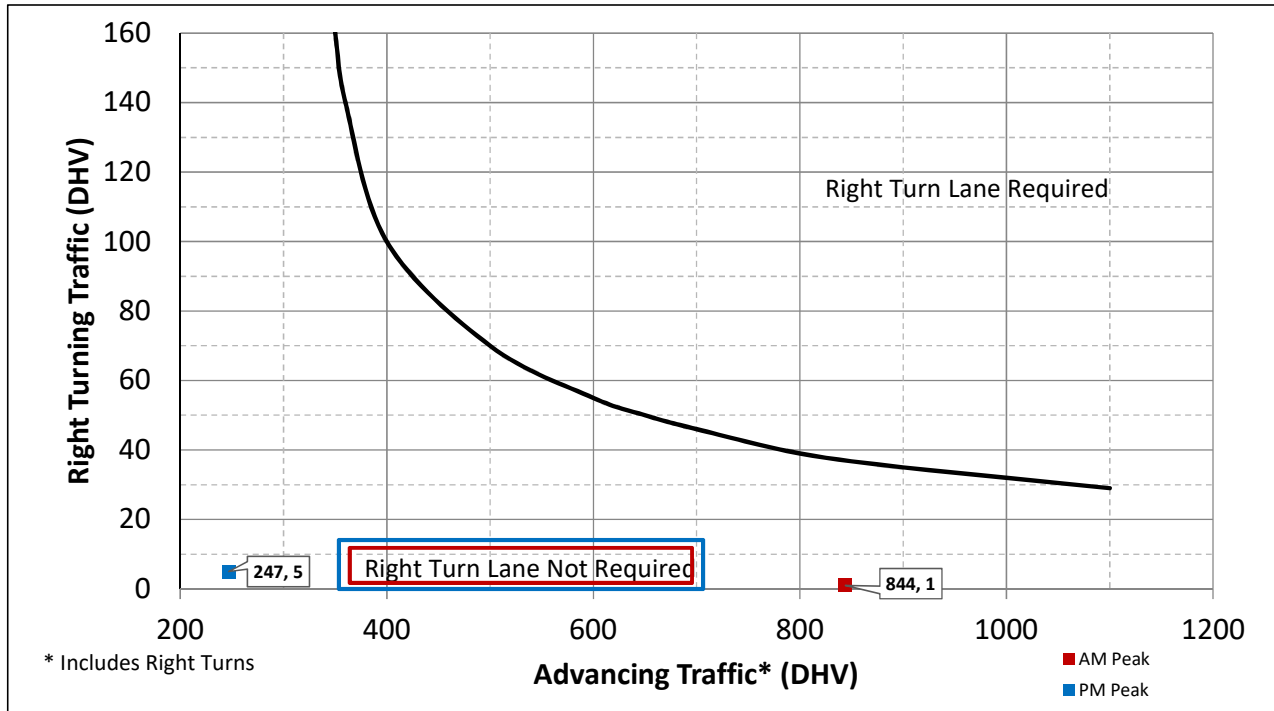
Turn Lane Length Calculations

AM Peak	Design Speed	35	mph
	Traffic Control	Unsignalized	
	Cycle Length	Unsignalized	
	Cycles Per Hour	60	Assume 60
	Turn Lane Volume	6	VPH
	Advancing Traffic	132	VPH
	Opposing Volume	844	VPH
	Left Turn Percentage	5%	
	Location Type	Through Road	
	Condition	A	
	Vehicles/Cycle	1	
	Turn Lane Length	100	
	Offset Width	12	
Approach Taper	245		
PM Peak	Design Speed	35	mph
	Traffic Control	Unsignalized	
	Cycle Length	Unsignalized	
	Cycles Per Hour	60	Assume 60
	Turn Lane Volume	18	VPH
	Advancing Traffic	855	VPH
	Opposing Volume	247	VPH
	Left Turn Percentage	2%	
	Location Type	Through Road	
	Condition	A	
	Vehicles/Cycle	1	
	Turn Lane Length	100	
	Offset Width	12	
Approach Taper	245		
Is Left Turn Warrant Met		No	No Left Turn Lane Required

* Turn Lane Length includes 50 ft diverging taper

* Turn Lane Length includes 50 ft diverging taper

2-Lane Highway Right Turn Lane Warrant
(= < 40 mph or 70 kph Posted Speed)



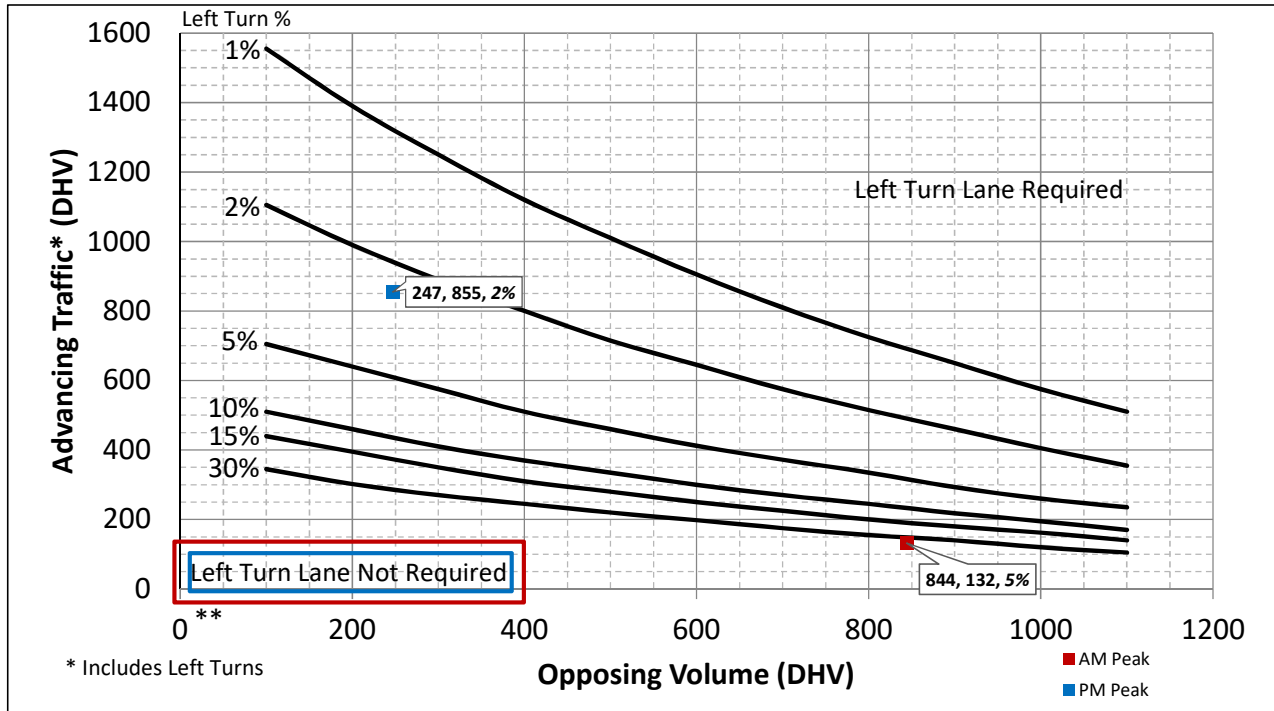
Turn Lane Length Calculations

AM Peak	Design Speed	40	mph	
	Traffic Control	Unsignalized		
	Cycle Length	Unsignalized		
	Cycles Per Hour	60	Assume 60	
	Turn Lane Volume	1	VPH	
	Advancing Traffic	844	VPH	
	Right Turn Percentage	0%		
	Location Type	Through Road		
	Condition	B		
	Vehicles/Cycle	1		
	Turn Lane Length	125		
PM Peak	Design Speed	40	mph	
	Traffic Control	Unsignalized		
	Cycle Length	Unsignalized		
	Cycles Per Hour	60	Assume 60	
	Turn Lane Volume	5	VPH	
	Advancing Traffic	247	VPH	
	Right Turn Percentage	2%		
	Location Type	Through Road		
	Condition	B		
	Vehicles/Cycle	1		
	Turn Lane Length	125		
Is Right Turn Warrant Met		No	No Right Turn Lane Required	

* Turn Lane Length includes 50 ft diverging taper

* Turn Lane Length includes 50 ft diverging taper

2-Lane Highway Left Turn Lane Warrant
(= < 40 mph or 70 kph Posted Speed)



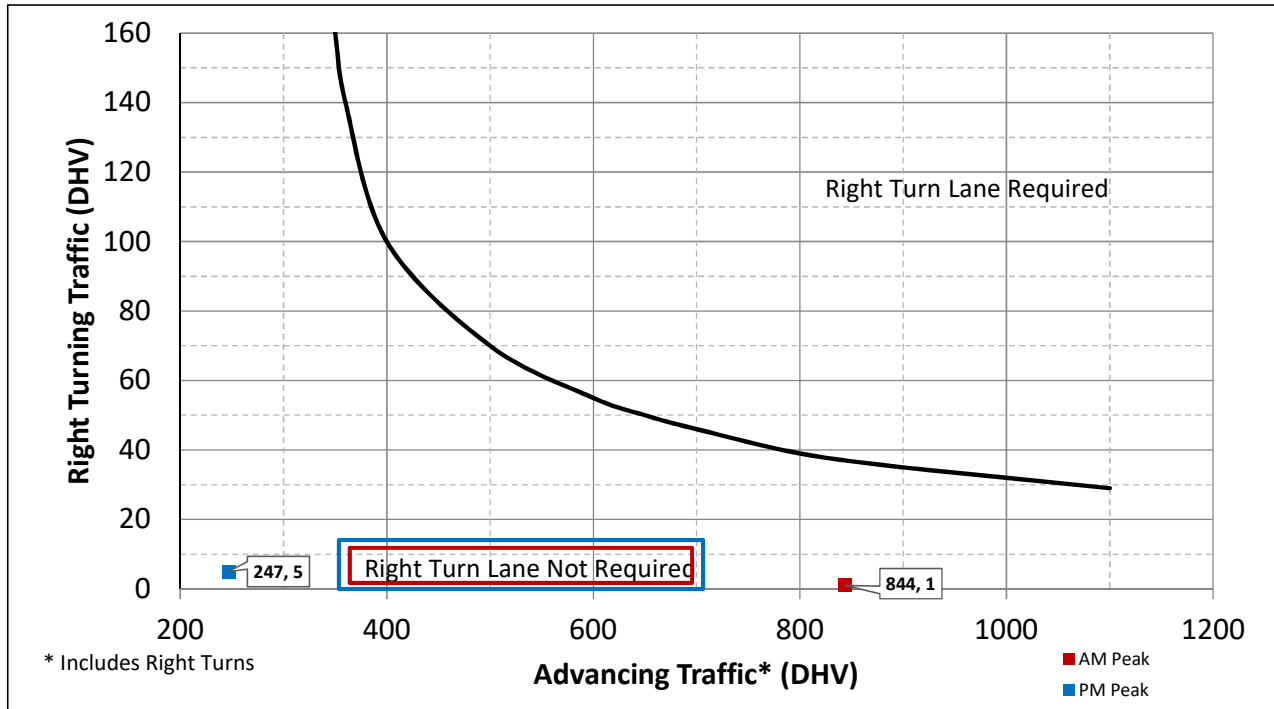
Turn Lane Length Calculations

AM Peak	Design Speed	40	mph
	Traffic Control	Unsignalized	
	Cycle Length	Unsignalized	
	Cycles Per Hour	60	Assume 60
	Turn Lane Volume	6	VPH
	Advancing Traffic	132	VPH
	Opposing Volume	844	VPH
	Left Turn Percentage	5%	
	Location Type	Through Road	
	Condition	B	
	Vehicles/Cycle	1	
	Turn Lane Length	125	
	Offset Width	12	
Approach Taper	320		
PM Peak	Design Speed	40	mph
	Traffic Control	Unsignalized	
	Cycle Length	Unsignalized	
	Cycles Per Hour	60	Assume 60
	Turn Lane Volume	18	VPH
	Advancing Traffic	855	VPH
	Opposing Volume	247	VPH
	Left Turn Percentage	2%	
	Location Type	Through Road	
	Condition	B	
	Vehicles/Cycle	1	
	Turn Lane Length	125	
	Offset Width	12	
Approach Taper	320		
Is Left Turn Warrant Met		No	No Left Turn Lane Required

* Turn Lane Length includes 50 ft diverging taper

* Turn Lane Length includes 50 ft diverging taper

2-Lane Highway Right Turn Lane Warrant
(= < 40 mph or 70 kph Posted Speed)



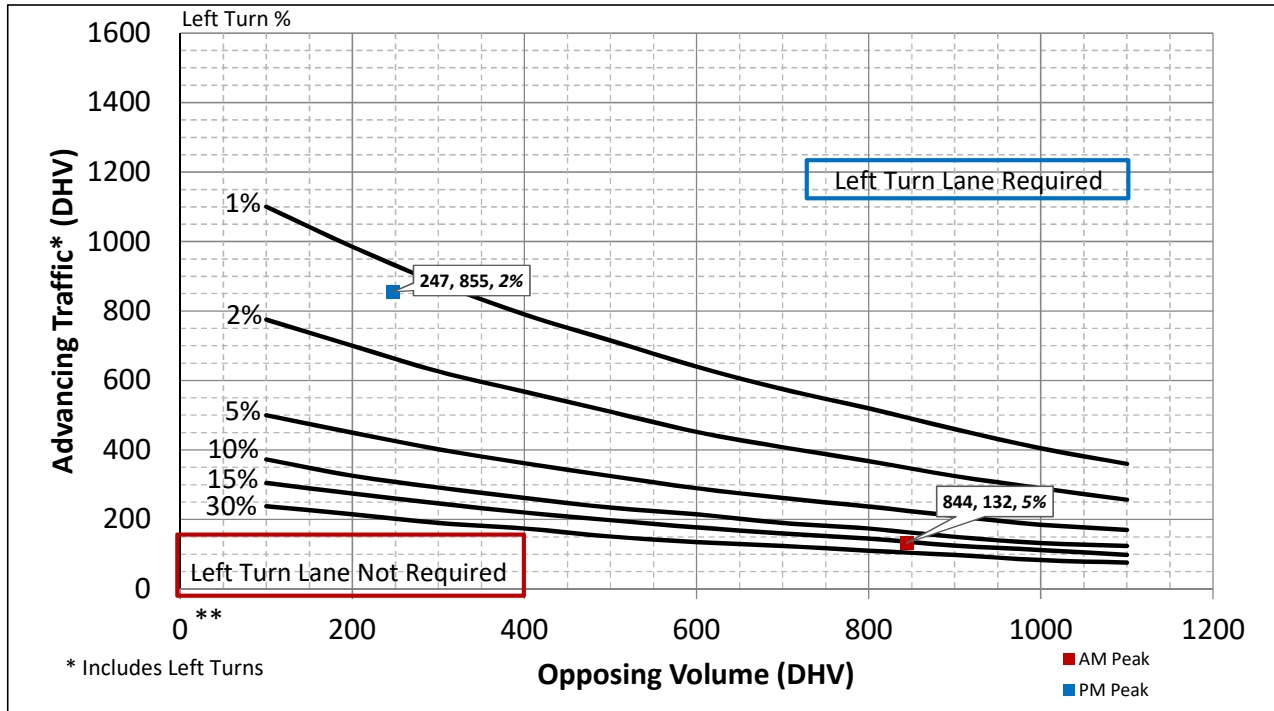
Turn Lane Length Calculations

AM Peak	Design Speed	40	mph	
	Traffic Control	Unsignalized		
	Cycle Length	Unsignalized		
	Cycles Per Hour	60	Assume 60	
	Turn Lane Volume	1	VPH	
	Advancing Traffic	844	VPH	
	Right Turn Percentage	0%		
	Location Type	Through Road		
	Condition	B		
	Vehicles/Cycle	1		
	Turn Lane Length	125		
PM Peak	Design Speed	40	mph	
	Traffic Control	Unsignalized		
	Cycle Length	Unsignalized		
	Cycles Per Hour	60	Assume 60	
	Turn Lane Volume	5	VPH	
	Advancing Traffic	247	VPH	
	Right Turn Percentage	2%		
	Location Type	Through Road		
	Condition	B		
	Vehicles/Cycle	1		
	Turn Lane Length	125		
Is Right Turn Warrant Met		No	No Right Turn Lane Required	

* Turn Lane Length includes 50 ft diverging taper

* Turn Lane Length includes 50 ft diverging taper

2-Lane Highway Left Turn Lane Warrant
(> 40 mph or 70 kph Posted Speed)



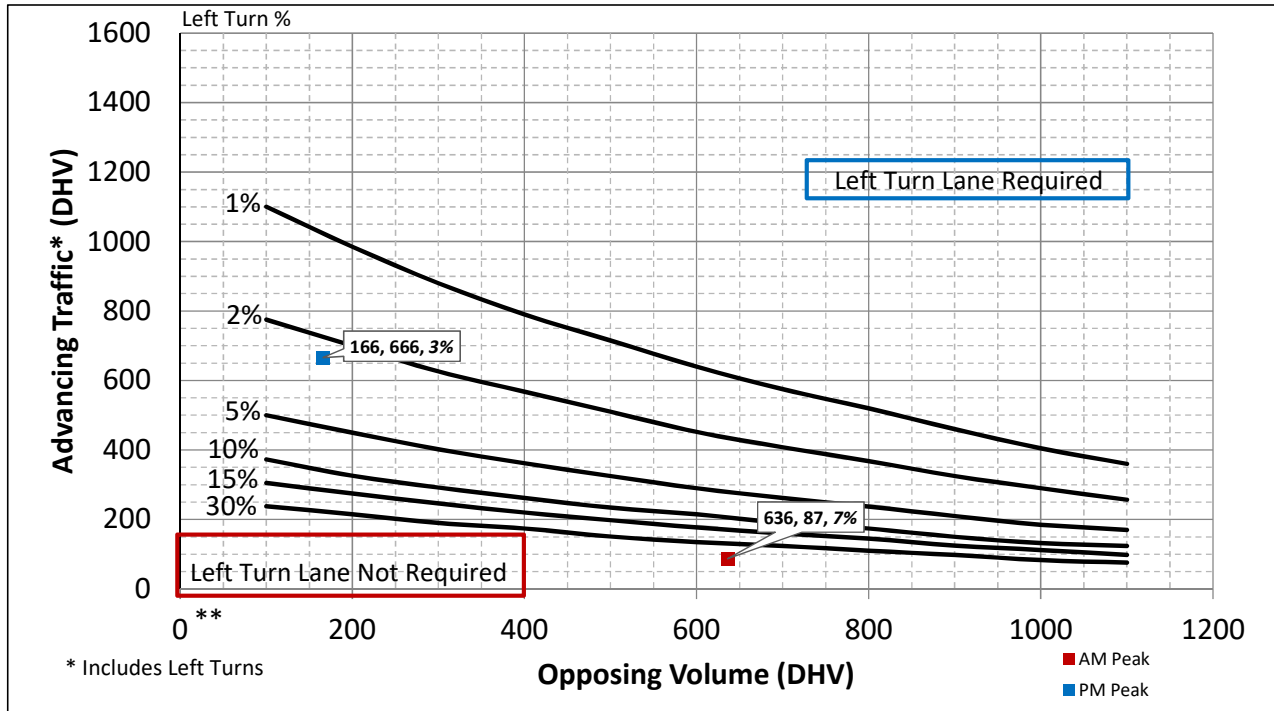
Turn Lane Length Calculations

AM Peak	Design Speed	45	mph
	Traffic Control	Unsignalized	
	Cycle Length	Unsignalized	
	Cycles Per Hour	60	Assume 60
	Turn Lane Volume	6	VPH
	Advancing Traffic	132	VPH
	Opposing Volume	844	VPH
	Left Turn Percentage	5%	
	Location Type	Through Road	
	Condition	B	
	Vehicles/Cycle	1	
	Turn Lane Length	175	
Offset Width	12		
Approach Taper	405		
PM Peak	Design Speed	45	mph
	Traffic Control	Unsignalized	
	Cycle Length	Unsignalized	
	Cycles Per Hour	60	Assume 60
	Turn Lane Volume	18	VPH
	Advancing Traffic	855	VPH
	Opposing Volume	247	VPH
	Left Turn Percentage	2%	
	Location Type	Through Road	
	Condition	B	
	Vehicles/Cycle	1	
	Turn Lane Length	175	
Offset Width	12		
Approach Taper	405		
Is Left Turn Warrant Met		Yes	See Above

* Turn Lane Length includes 50 ft diverging taper

* Turn Lane Length includes 50 ft diverging taper

2-Lane Highway Left Turn Lane Warrant
(> 40 mph or 70 kph Posted Speed)



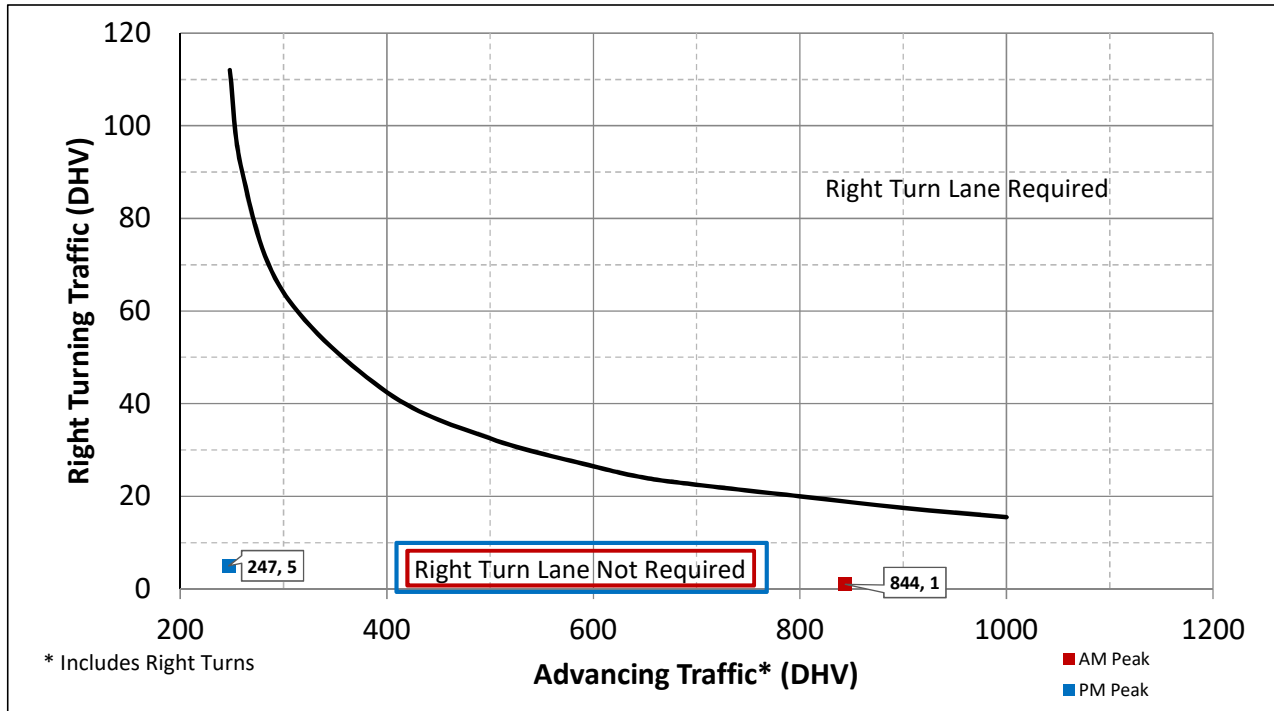
Turn Lane Length Calculations

		Design Speed	45	mph
AM Peak	Traffic Control	Unsignalized		
	Cycle Length	Unsignalized		
	Cycles Per Hour	60	Assume 60	
	Turn Lane Volume	6	VPH	
	Advancing Traffic	87	VPH	
	Opposing Volume	636	VPH	
	Left Turn Percentage	7%		
	Location Type	Through Road		
	Condition	B		
	Vehicles/Cycle	1		
	Turn Lane Length	175		
	Offset Width	12		
	Approach Taper	405		
PM Peak	Design Speed	45	mph	
	Traffic Control	Unsignalized		
	Cycle Length	Unsignalized		
	Cycles Per Hour	60	Assume 60	
	Turn Lane Volume	18	VPH	
	Advancing Traffic	666	VPH	
	Opposing Volume	166	VPH	
	Left Turn Percentage	3%		
	Location Type	Through Road		
	Condition	B		
	Vehicles/Cycle	1		
	Turn Lane Length	175		
	Offset Width	12		
Approach Taper	405			
Is Left Turn Warrant Met		Yes	See Above	

* Turn Lane Length includes 50 ft diverging taper

* Turn Lane Length includes 50 ft diverging taper

2-Lane Highway Right Turn Lane Warrant
(> 40 mph or 70 kph Posted Speed)



Turn Lane Length Calculations

AM Peak	Design Speed	45	mph	
	Traffic Control	Unsignalized		
	Cycle Length	Unsignalized		
	Cycles Per Hour	60	Assume 60	
	Turn Lane Volume	1	VPH	
	Advancing Traffic	844	VPH	
	Right Turn Percentage	0%		
	Location Type	Through Road		
	Condition	B		
	Vehicles/Cycle	1		
	Turn Lane Length	175		
PM Peak	Design Speed	45	mph	
	Traffic Control	Unsignalized		
	Cycle Length	Unsignalized		
	Cycles Per Hour	60	Assume 60	
	Turn Lane Volume	5	VPH	
	Advancing Traffic	247	VPH	
	Right Turn Percentage	2%		
	Location Type	Through Road		
	Condition	B		
	Vehicles/Cycle	1		
	Turn Lane Length	175		
Is Right Turn Warrant Met		No	No Right Turn Lane Required	

* Turn Lane Length includes 50 ft diverging taper

* Turn Lane Length includes 50 ft diverging taper

Appendix G

Capacity Analysis

Baseline Capacity Analysis

LANE LEVEL OF SERVICE

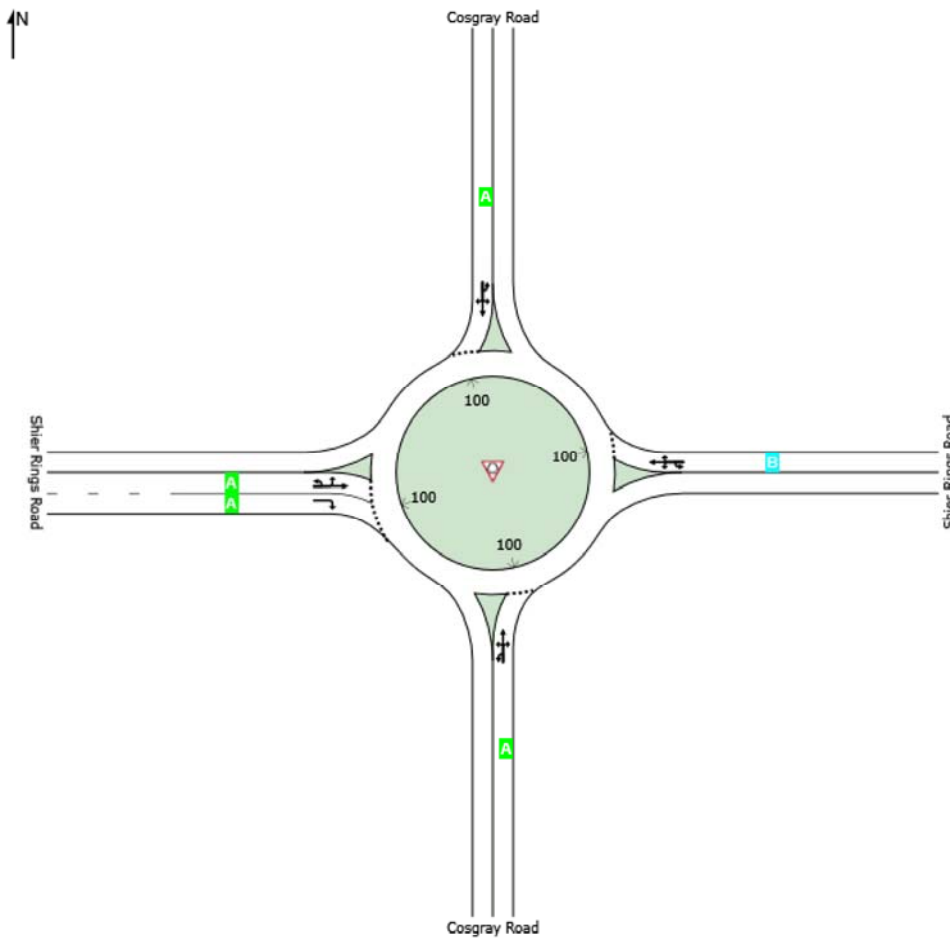
Lane Level of Service

 **Site: 101 [OY AM No Build 1.0]**

Shier Rings Road & Cosgray Road
 2021 AM Peak No Build
 Environmental Factor 1.0
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	B	A	A	A



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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Project: P:\TRA\StructurePoint\Cosgray & Shier Rings Single-Family\Analysis\Capacity\Cosgray\EF=1.0\Shier Rings Rd & Cosgray Rd 1.0.sip7

LANE SUMMARY

 Site: 101 [OY AM No Build 1.0]

Shier Rings Road & Cosgray Road
 2021 AM Peak No Build
 Environmental Factor 1.0
 Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist ft				
South: Cosgray Road													
Lane 1 ^d	991	2.0	1268	0.781	100	5.4	LOS A	10.6	269.7	Full	1600	0.0	0.0
Approach	991	2.0		0.781		5.4	LOS A	10.6	269.7				
East: Shier Rings Road													
Lane 1 ^d	72	2.0	932	0.077	100	10.6	LOS B	0.4	11.4	Full	1600	0.0	0.0
Approach	72	2.0		0.077		10.6	LOS B	0.4	11.4				
North: Cosgray Road													
Lane 1 ^d	252	2.0	1300	0.194	100	6.3	LOS A	1.2	30.2	Full	1600	0.0	0.0
Approach	252	2.0		0.194		6.3	LOS A	1.2	30.2				
West: Shier Rings Road													
Lane 1 ^d	8	2.0	1324	0.006	100	6.7	LOS A	0.0	0.7	Full	1600	0.0	0.0
Lane 2	4	2.0	1053	0.004	100	5.4	LOS A	0.0	0.5	Full	1600	0.0	0.0
Approach	12	2.0		0.006		6.2	LOS A	0.0	0.7				
Intersection	1327	2.0		0.781		5.9	LOS A	10.6	269.7				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE LEVEL OF SERVICE

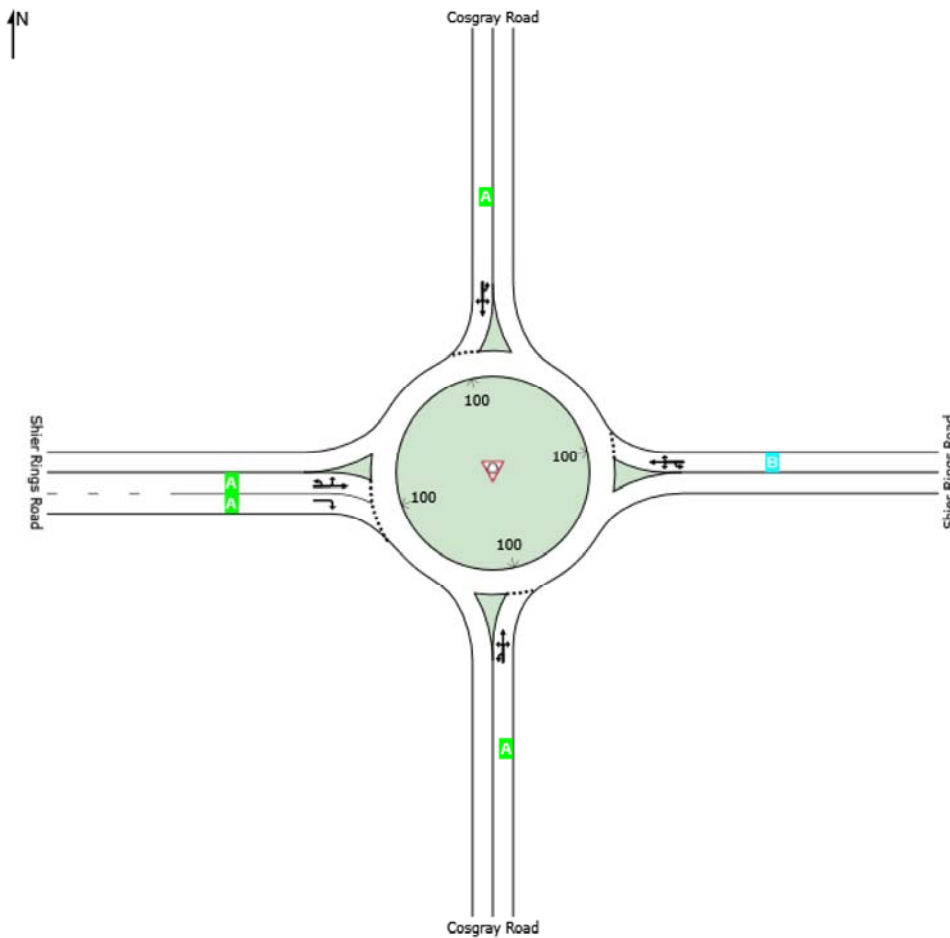
Lane Level of Service

 **Site: 101 [OY AM No Build 1.1]**

Shier Rings Road & Cosgray Road
 2021 AM Peak No Build
 Environmental Factor 1.1
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	B	A	A	A



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 Site: 101 [OY AM No Build 1.1]

Shier Rings Road & Cosgray Road
 2021 AM Peak No Build
 Environmental Factor 1.1
 Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist ft				
South: Cosgray Road													
Lane 1 ^d	991	2.0	1139	0.870	100	6.7	LOS A	15.9	402.7	Full	1600	0.0	0.0
Approach	991	2.0		0.870		6.7	LOS A	15.9	402.7				
East: Shier Rings Road													
Lane 1 ^d	72	2.0	790	0.091	100	11.0	LOS B	0.5	13.6	Full	1600	0.0	0.0
Approach	72	2.0		0.091		11.0	LOS B	0.5	13.6				
North: Cosgray Road													
Lane 1 ^d	252	2.0	1171	0.215	100	6.4	LOS A	1.3	33.9	Full	1600	0.0	0.0
Approach	252	2.0		0.215		6.4	LOS A	1.3	33.9				
West: Shier Rings Road													
Lane 1 ^d	8	2.0	1169	0.007	100	6.9	LOS A	0.0	0.8	Full	1600	0.0	0.0
Lane 2	4	2.0	956	0.005	100	5.6	LOS A	0.0	0.6	Full	1600	0.0	0.0
Approach	12	2.0		0.007		6.4	LOS A	0.0	0.8				
Intersection	1327	2.0		0.870		6.9	LOS A	15.9	402.7				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

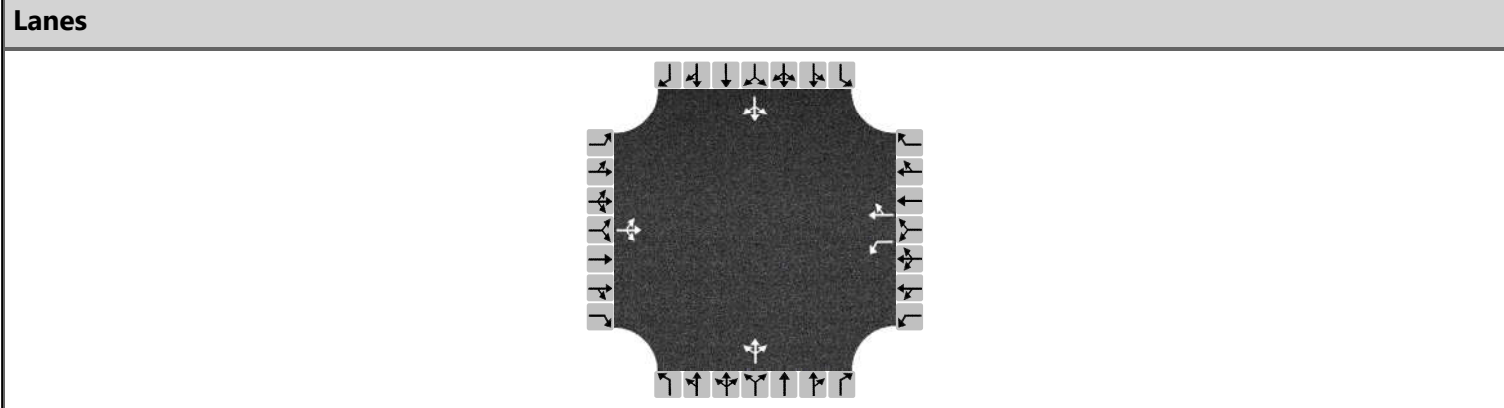
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HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst	CMC	Intersection	Shier Rings & Eiterman
Agency/Co.	CMTran	Jurisdiction	City of Dublin
Date Performed		East/West Street	Shier Rings Road
Analysis Year	2021	North/South Street	Eiterman Road
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.92
Time Analyzed	AM No Build		
Project Description	Cosgray and Shier Rings Single-Family TIS		



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Movement												
Volume	93	542	42	32	92	2	1	77	96	1	44	4
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			L	TR		LTR			LTR		
Flow Rate, v (veh/h)	736			35	102		189			53		
Percent Heavy Vehicles	2			2	2		2			2		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20	3.20		3.20			3.20		
Initial Degree of Utilization, x	0.654			0.031	0.091		0.168			0.047		
Final Departure Headway, hd (s)	5.03			6.57	6.05		5.89			6.49		
Final Degree of Utilization, x	1.029			0.063	0.172		0.309			0.096		
Move-Up Time, m (s)	2.0			2.3	2.3		2.0			2.0		
Service Time, ts (s)	3.03			4.27	3.75		3.89			4.49		

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	736			35	102		189			53		
Capacity	715			548	595		611			555		
95% Queue Length, Q ₉₅ (veh)	18.0			0.2	0.6		1.3			0.3		
Control Delay (s/veh)	63.3			9.7	10.0		11.5			10.2		
Level of Service, LOS	F			A	B		B			B		
Approach Delay (s/veh)	63.3			9.9			11.5			10.2		
Approach LOS	F			A			B			B		
Intersection Delay, s/veh LOS	45.4						E					

LANE LEVEL OF SERVICE

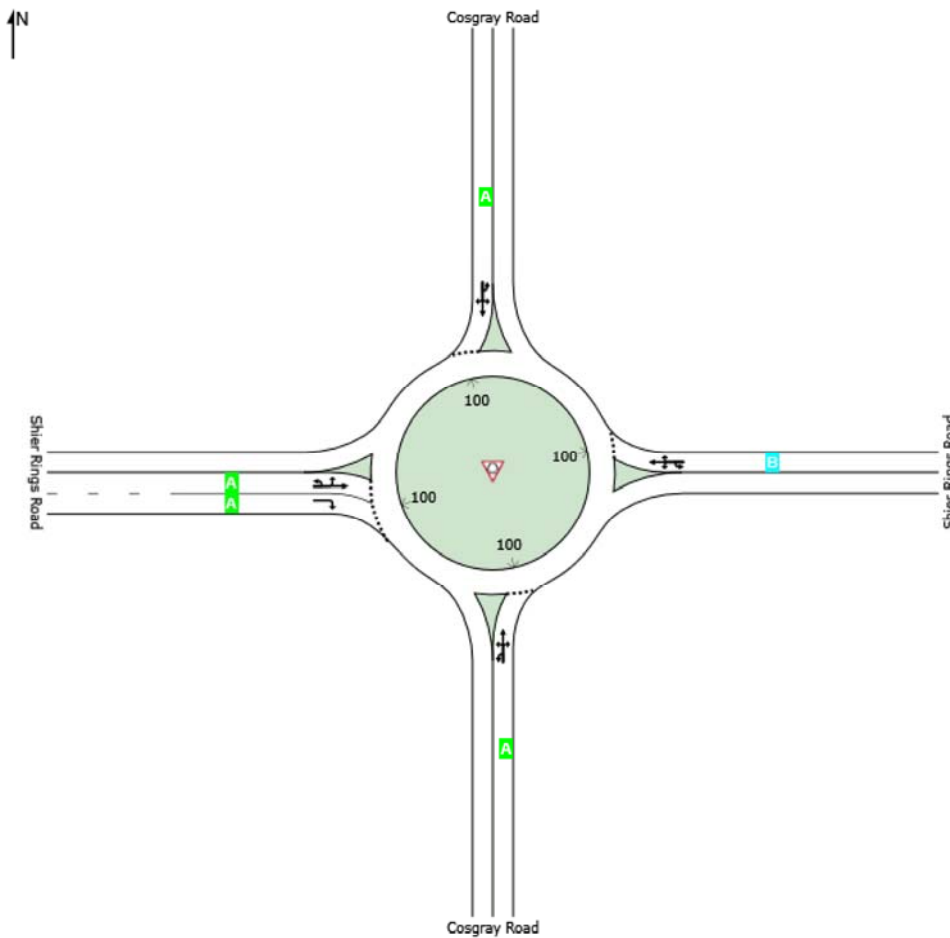
Lane Level of Service

 Site: 101 [OY AM Build 1.0]

Shier Rings Road & Cosgray Road
 2021 AM Peak Build
 Environmental Factor 1.0
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	B	A	A	A



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 Site: 101 [OY AM Build 1.0]

Shier Rings Road & Cosgray Road
 2021 AM Peak Build
 Environmental Factor 1.0
 Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist ft				
South: Cosgray Road													
Lane 1 ^d	992	2.0	1268	0.782	100	5.4	LOS A	10.7	270.9	Full	1600	0.0	0.0
Approach	992	2.0		0.782		5.4	LOS A	10.7	270.9				
East: Shier Rings Road													
Lane 1 ^d	74	2.0	932	0.079	100	10.6	LOS B	0.5	11.7	Full	1600	0.0	0.0
Approach	74	2.0		0.079		10.6	LOS B	0.5	11.7				
North: Cosgray Road													
Lane 1 ^d	252	2.0	1297	0.194	100	6.4	LOS A	1.2	30.2	Full	1600	0.0	0.0
Approach	252	2.0		0.194		6.4	LOS A	1.2	30.2				
West: Shier Rings Road													
Lane 1 ^d	8	2.0	1321	0.006	100	6.7	LOS A	0.0	0.7	Full	1600	0.0	0.0
Lane 2	4	2.0	1051	0.004	100	5.4	LOS A	0.0	0.5	Full	1600	0.0	0.0
Approach	12	2.0		0.006		6.2	LOS A	0.0	0.7				
Intersection	1330	2.0		0.782		5.9	LOS A	10.7	270.9				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE LEVEL OF SERVICE

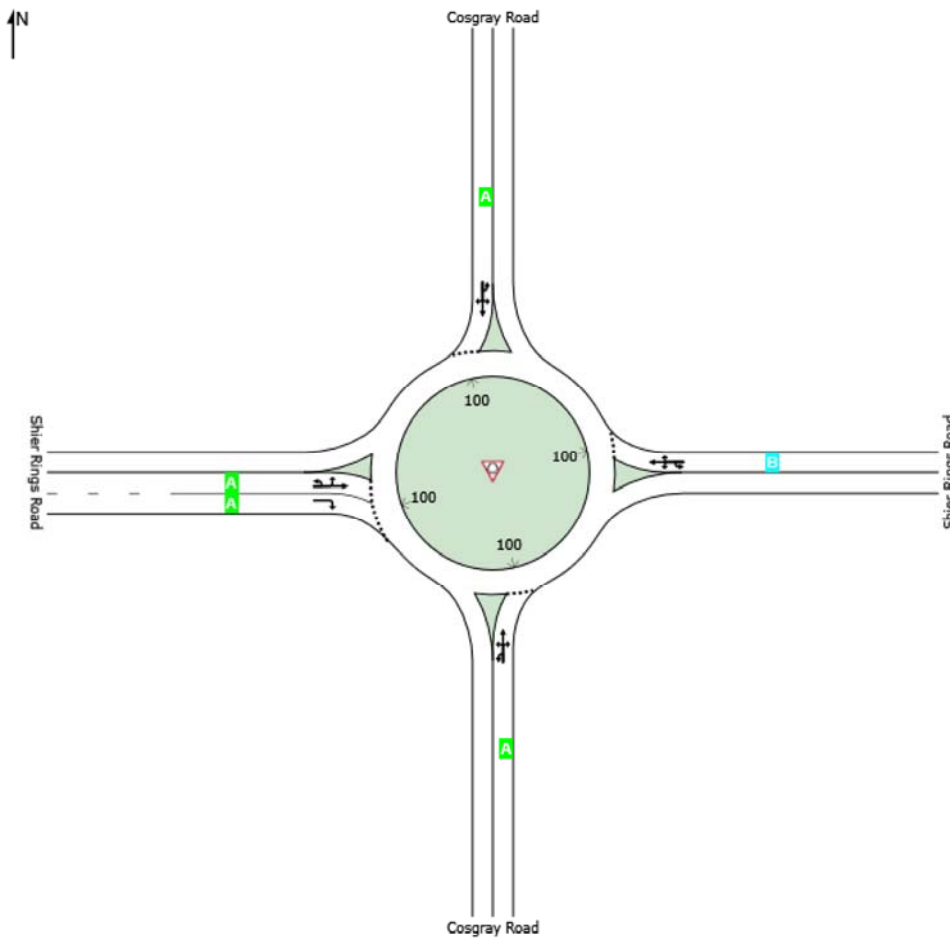
Lane Level of Service

 **Site: 101 [OY AM Build 1.1]**

Shier Rings Road & Cosgray Road
 2021 AM Peak Build
 Environmental Factor 1.1
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	B	A	A	A



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 Site: 101 [OY AM Build 1.1]

Shier Rings Road & Cosgray Road
 2021 AM Peak Build
 Environmental Factor 1.1
 Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist ft				
South: Cosgray Road													
Lane 1 ^d	992	2.0	1139	0.871	100	6.7	LOS A	16.0	405.9	Full	1600	0.0	0.0
Approach	992	2.0		0.871		6.7	LOS A	16.0	405.9				
East: Shier Rings Road													
Lane 1 ^d	74	2.0	789	0.094	100	11.0	LOS B	0.6	14.0	Full	1600	0.0	0.0
Approach	74	2.0		0.094		11.0	LOS B	0.6	14.0				
North: Cosgray Road													
Lane 1 ^d	252	2.0	1168	0.216	100	6.4	LOS A	1.3	34.0	Full	1600	0.0	0.0
Approach	252	2.0		0.216		6.4	LOS A	1.3	34.0				
West: Shier Rings Road													
Lane 1 ^d	8	2.0	1167	0.007	100	6.9	LOS A	0.0	0.8	Full	1600	0.0	0.0
Lane 2	4	2.0	954	0.005	100	5.6	LOS A	0.0	0.6	Full	1600	0.0	0.0
Approach	12	2.0		0.007		6.4	LOS A	0.0	0.8				
Intersection	1330	2.0		0.871		6.9	LOS A	16.0	405.9				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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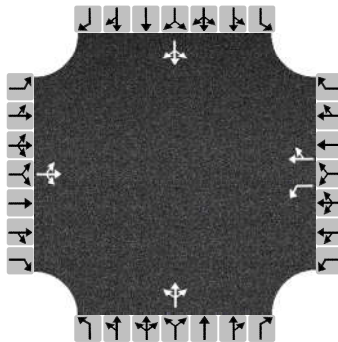
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HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst	CMC	Intersection	Shier Rings & Eiterman
Agency/Co.	CMTran	Jurisdiction	City of Dublin
Date Performed		East/West Street	Shier Rings Road
Analysis Year	2021	North/South Street	Eiterman Road
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.92
Time Analyzed	AM Build		
Project Description	Cosgray and Shier Rings Single-Family TIS		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Movement												
Volume	95	559	43	32	98	2	1	77	96	1	44	4
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			L	TR		LTR			LTR		
Flow Rate, v (veh/h)	758			35	109		189			53		
Percent Heavy Vehicles	2			2	2		2			2		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20	3.20		3.20			3.20		
Initial Degree of Utilization, x	0.673			0.031	0.097		0.168			0.047		
Final Departure Headway, hd (s)	5.02			6.55	6.03		5.89			6.49		
Final Degree of Utilization, x	1.057			0.063	0.182		0.309			0.096		
Move-Up Time, m (s)	2.0			2.3	2.3		2.0			2.0		
Service Time, ts (s)	3.02			4.25	3.73		3.89			4.49		

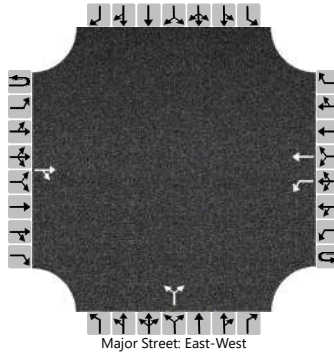
Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	758			35	109		189			53		
Capacity	717			550	597		611			555		
95% Queue Length, Q ₉₅ (veh)	19.6			0.2	0.7		1.3			0.3		
Control Delay (s/veh)	71.5			9.7	10.1		11.5			10.2		
Level of Service, LOS	F			A	B		B			B		
Approach Delay (s/veh)	71.5			10.0			11.5			10.2		
Approach LOS	F			A			B			B		
Intersection Delay, s/veh LOS	51.0						F					

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	CMC			Intersection	Shier Rings & Site Access		
Agency/Co.	CMTran			Jurisdiction	City of Dublin		
Date Performed				East/West Street	Shier Rings Road		
Analysis Year	2021			North/South Street	Site Access Point		
Time Analyzed	AM Build			Peak Hour Factor	0.92		
Intersection Orientation	East-West			Analysis Time Period (hrs)	0.25		
Project Description	Cosgray and Shier Rings Single-Family TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0
Configuration				TR		L	T				LR					
Volume (veh/h)			635	1		6	81			2		20				
Percent Heavy Vehicles (%)						2				2		2				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1					7.1		6.2			
Critical Headway (sec)						4.12					6.42		6.22			
Base Follow-Up Headway (sec)						2.2					3.5		3.3			
Follow-Up Headway (sec)						2.22					3.52		3.32			

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						7						24				
Capacity, c (veh/h)						904						435				
v/c Ratio						0.01						0.06				
95% Queue Length, Q ₉₅ (veh)						0.0						0.2				
Control Delay (s/veh)						9.0						13.8				
Level of Service (LOS)						A						B				
Approach Delay (s/veh)					0.6				13.8							
Approach LOS									B							

LANE LEVEL OF SERVICE

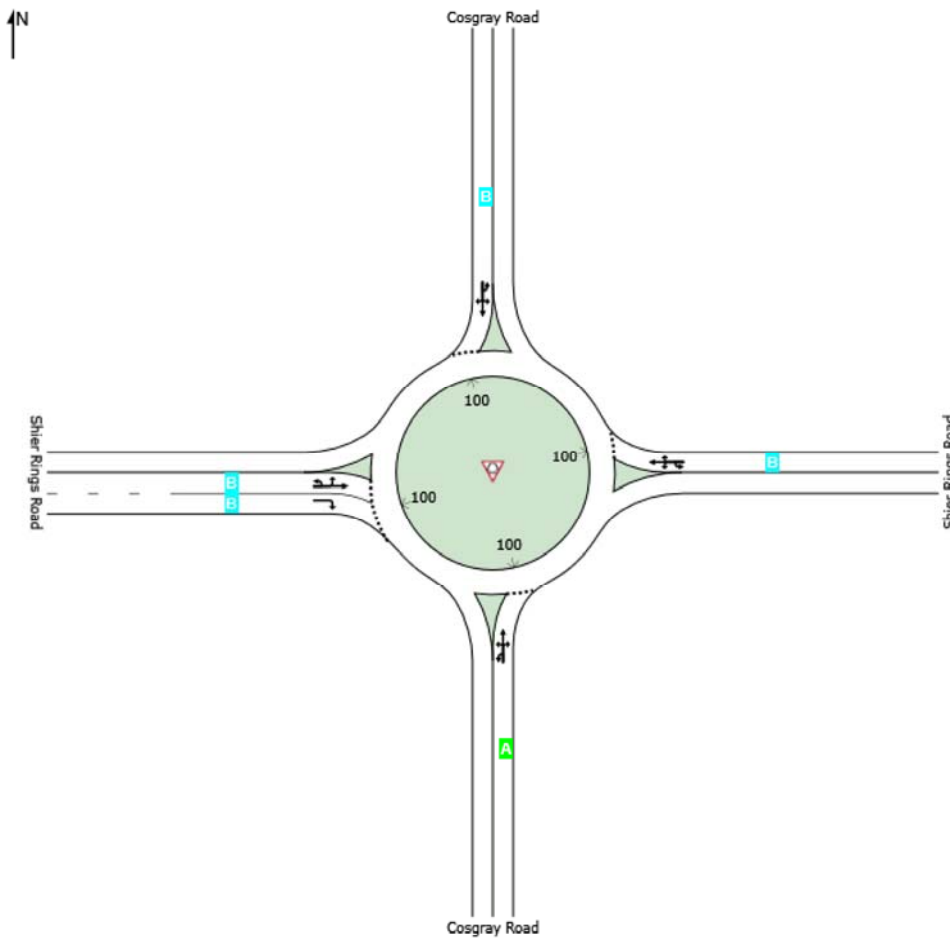
Lane Level of Service

 **Site: 101 [OY PM No Build 1.0]**

Shier Rings Road & Cosgray Road
 2021 PM Peak No Build
 Environmental Factor 1.0
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	B	B	B	A



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 Site: 101 [OY PM No Build 1.0]

Shier Rings Road & Cosgray Road
 2021 PM Peak No Build
 Environmental Factor 1.0
 Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist ft				
South: Cosgray Road													
Lane 1 ^d	359	2.0	1332	0.269	100	4.1	LOS A	1.9	47.2	Full	1600	0.0	0.0
Approach	359	2.0		0.269		4.1	LOS A	1.9	47.2				
East: Shier Rings Road													
Lane 1 ^d	521	2.0	1124	0.463	100	10.8	LOS B	3.3	83.7	Full	1600	0.0	0.0
Approach	521	2.0		0.463		10.8	LOS B	3.3	83.7				
North: Cosgray Road													
Lane 1 ^d	620	2.0	901	0.688	100	11.0	LOS B	8.0	204.0	Full	1600	0.0	0.0
Approach	620	2.0		0.688		11.0	LOS B	8.0	204.0				
West: Shier Rings Road													
Lane 1 ^d	12	2.0	604	0.020	100	13.3	LOS B	0.2	3.9	Full	1600	0.0	0.0
Lane 2	2	2.0	422	0.005	100	13.2	LOS B	0.0	0.9	Full	1600	0.0	0.0
Approach	14	2.0		0.020		13.3	LOS B	0.2	3.9				
Intersection	1513	2.0		0.688		9.3	LOS A	8.0	204.0				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE LEVEL OF SERVICE

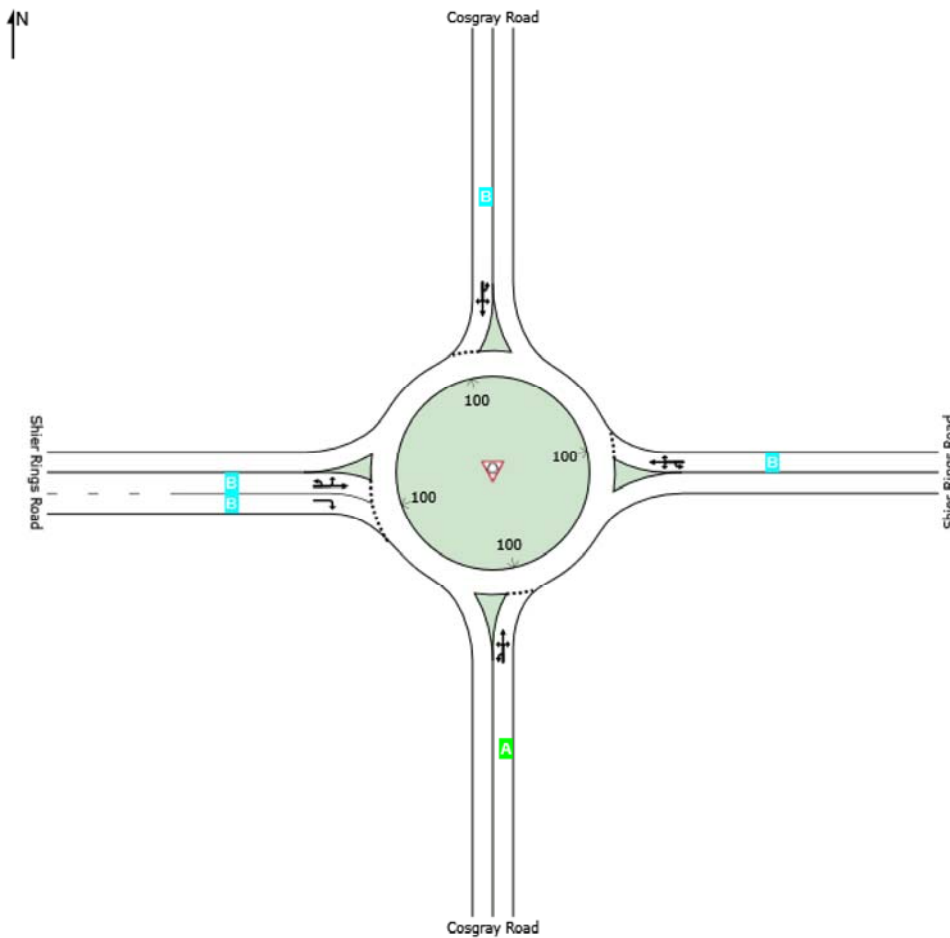
Lane Level of Service

 **Site: 101 [OY PM No Build 1.1]**

Shier Rings Road & Cosgray Road
 2021 PM Peak No Build
 Environmental Factor 1.1
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	B	B	B	B



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 Site: 101 [OY PM No Build 1.1]

Shier Rings Road & Cosgray Road
 2021 PM Peak No Build
 Environmental Factor 1.1
 Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist ft				
South: Cosgray Road													
Lane 1 ^d	359	2.0	1203	0.298	100	4.1	LOS A	2.1	54.0	Full	1600	0.0	0.0
Approach	359	2.0		0.298		4.1	LOS A	2.1	54.0				
East: Shier Rings Road													
Lane 1 ^d	521	2.0	995	0.524	100	11.4	LOS B	3.9	99.0	Full	1600	0.0	0.0
Approach	521	2.0		0.524		11.4	LOS B	3.9	99.0				
North: Cosgray Road													
Lane 1 ^d	620	2.0	778	0.797	100	15.9	LOS B	11.6	293.8	Full	1600	0.0	0.0
Approach	620	2.0		0.797		15.9	LOS B	11.6	293.8				
West: Shier Rings Road													
Lane 1 ^d	12	2.0	497	0.024	100	14.2	LOS B	0.2	4.5	Full	1600	0.0	0.0
Lane 2	2	2.0	309	0.007	100	15.4	LOS B	0.0	1.1	Full	1600	0.0	0.0
Approach	14	2.0		0.024		14.4	LOS B	0.2	4.5				
Intersection	1513	2.0		0.797		11.5	LOS B	11.6	293.8				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

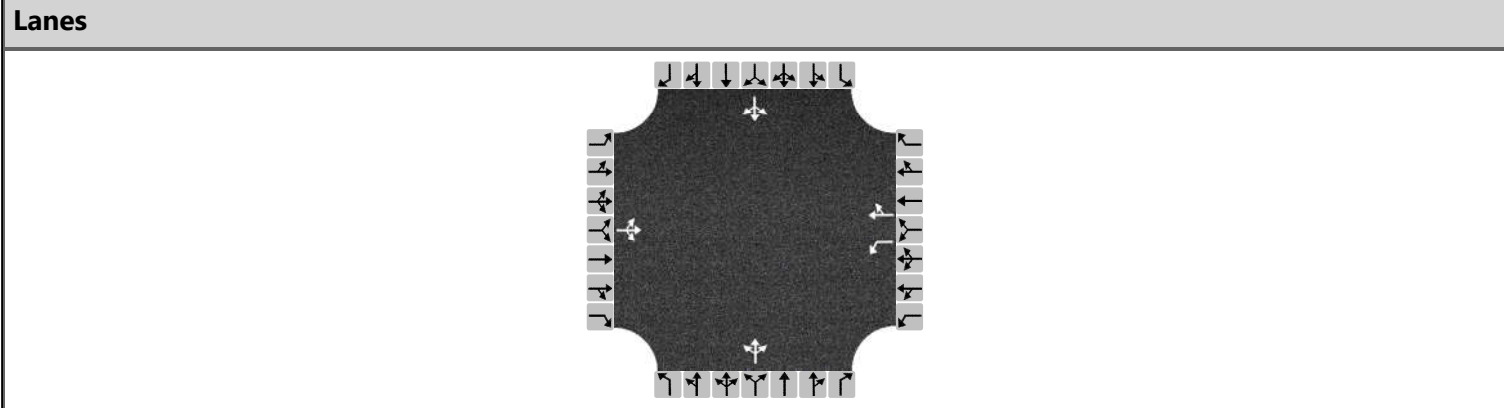
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HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst	CMC	Intersection	Shier Rings & Eiterman
Agency/Co.	CMTran	Jurisdiction	City of Dublin
Date Performed		East/West Street	Shier Rings Road
Analysis Year	2021	North/South Street	Eiterman Road
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.92
Time Analyzed	PM No Build		
Project Description	Cosgray and Shier Rings Single-Family TIS		



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Movement												
Volume	12	171	7	144	734	2	22	67	98	1	94	71
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			L	TR		LTR			LTR		
Flow Rate, v (veh/h)	207			157	800		203			180		
Percent Heavy Vehicles	2			2	2		2			2		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20	3.20		3.20			3.20		
Initial Degree of Utilization, x	0.184			0.139	0.711		0.181			0.160		
Final Departure Headway, hd (s)	6.45			6.71	6.20		6.50			6.60		
Final Degree of Utilization, x	0.370			0.292	1.378		0.367			0.331		
Move-Up Time, m (s)	2.0			2.3	2.3		2.0			2.0		
Service Time, ts (s)	4.45			4.41	3.90		4.50			4.60		

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	207			157	800		203			180		
Capacity	558			536	581		554			545		
95% Queue Length, Q ₉₅ (veh)	1.7			1.2	35.8		1.7			1.4		
Control Delay (s/veh)	13.2			12.2	199.2		13.2			12.8		
Level of Service, LOS	B			B	F		B			B		
Approach Delay (s/veh)	13.2			168.6			13.2			12.8		
Approach LOS	B			F			B			B		
Intersection Delay, s/veh LOS	109.3						F					

LANE LEVEL OF SERVICE

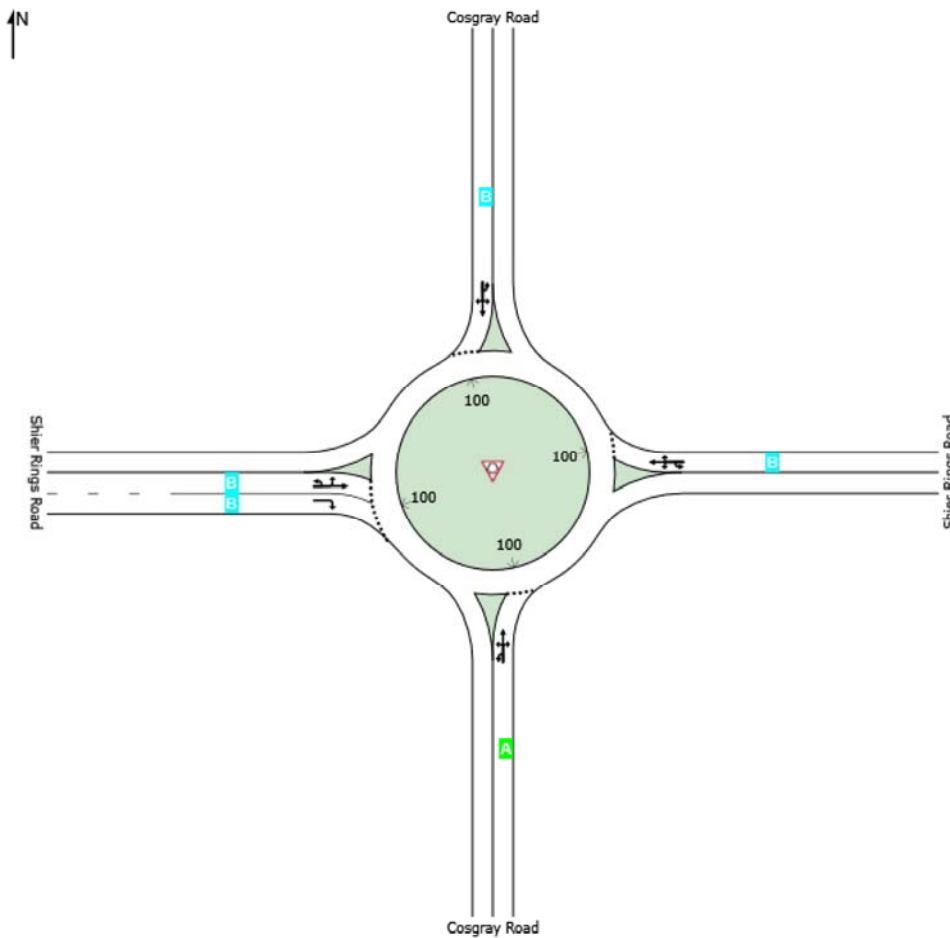
Lane Level of Service

 **Site: 101 [OY PM Build 1.0]**

Shier Rings Road & Cosgray Road
 2021 PM Peak Build
 Environmental Factor 1.0
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	B	B	B	A



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 Site: 101 [OY PM Build 1.0]

Shier Rings Road & Cosgray Road
 2021 PM Peak Build
 Environmental Factor 1.0
 Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist ft				
South: Cosgray Road													
Lane 1 ^d	362	2.0	1329	0.272	100	4.1	LOS A	1.9	47.7	Full	1600	0.0	0.0
Approach	362	2.0		0.272		4.1	LOS A	1.9	47.7				
East: Shier Rings Road													
Lane 1 ^d	524	2.0	1124	0.466	100	10.8	LOS B	3.3	84.7	Full	1600	0.0	0.0
Approach	524	2.0		0.466		10.8	LOS B	3.3	84.7				
North: Cosgray Road													
Lane 1 ^d	621	2.0	898	0.691	100	11.1	LOS B	8.1	206.1	Full	1600	0.0	0.0
Approach	621	2.0		0.691		11.1	LOS B	8.1	206.1				
West: Shier Rings Road													
Lane 1 ^d	13	2.0	601	0.022	100	13.2	LOS B	0.2	4.3	Full	1600	0.0	0.0
Lane 2	2	2.0	420	0.005	100	13.2	LOS B	0.0	0.9	Full	1600	0.0	0.0
Approach	15	2.0		0.022		13.2	LOS B	0.2	4.3				
Intersection	1522	2.0		0.691		9.4	LOS A	8.1	206.1				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE LEVEL OF SERVICE

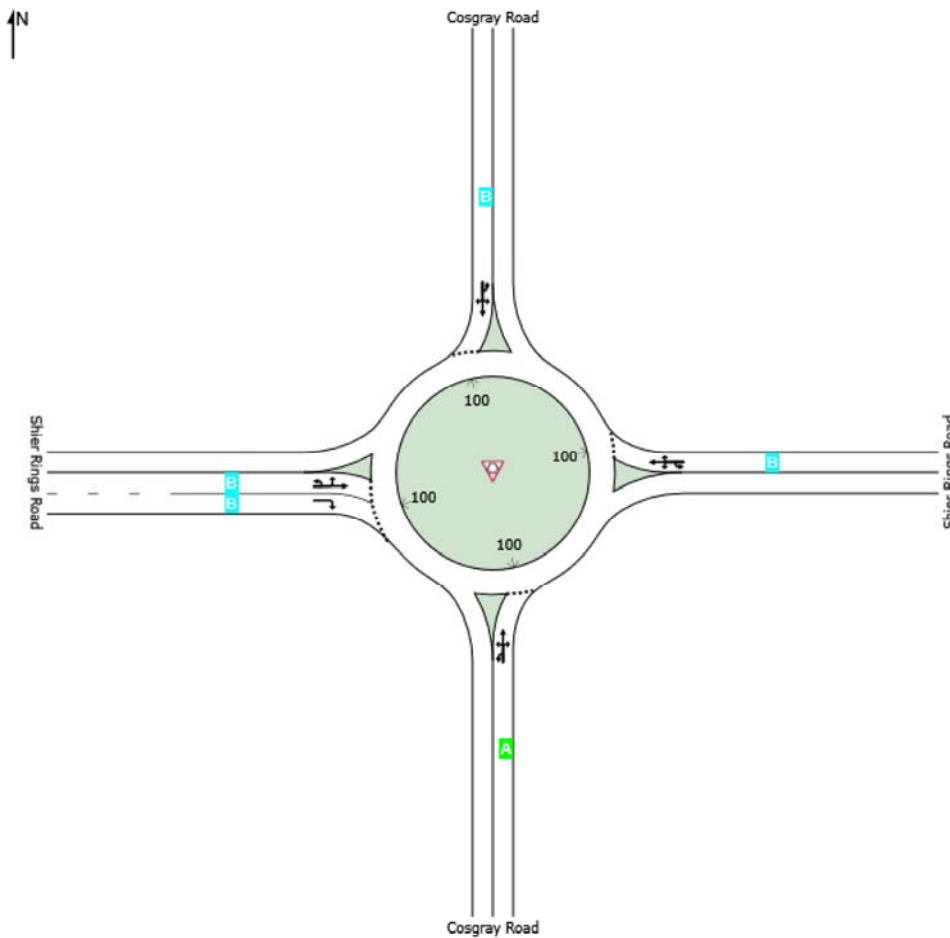
Lane Level of Service

 **Site: 101 [OY PM Build 1.1]**

Shier Rings Road & Cosgray Road
 2021 PM Peak Build
 Environmental Factor 1.1
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	B	B	B	B



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 Site: 101 [OY PM Build 1.1]

Shier Rings Road & Cosgray Road
2021 PM Peak Build
Environmental Factor 1.1
Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist ft				
South: Cosgray Road													
Lane 1 ^d	362	2.0	1201	0.302	100	4.1	LOS A	2.2	54.6	Full	1600	0.0	0.0
Approach	362	2.0		0.302		4.1	LOS A	2.2	54.6				
East: Shier Rings Road													
Lane 1 ^d	524	2.0	994	0.527	100	11.4	LOS B	3.9	100.1	Full	1600	0.0	0.0
Approach	524	2.0		0.527		11.4	LOS B	3.9	100.1				
North: Cosgray Road													
Lane 1 ^d	621	2.0	776	0.800	100	16.1	LOS B	11.7	297.7	Full	1600	0.0	0.0
Approach	621	2.0		0.800		16.1	LOS B	11.7	297.7				
West: Shier Rings Road													
Lane 1 ^d	13	2.0	494	0.026	100	14.1	LOS B	0.2	4.9	Full	1600	0.0	0.0
Lane 2	2	2.0	308	0.007	100	15.5	LOS B	0.0	1.1	Full	1600	0.0	0.0
Approach	15	2.0		0.026		14.3	LOS B	0.2	4.9				
Intersection	1522	2.0		0.800		11.6	LOS B	11.7	297.7				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

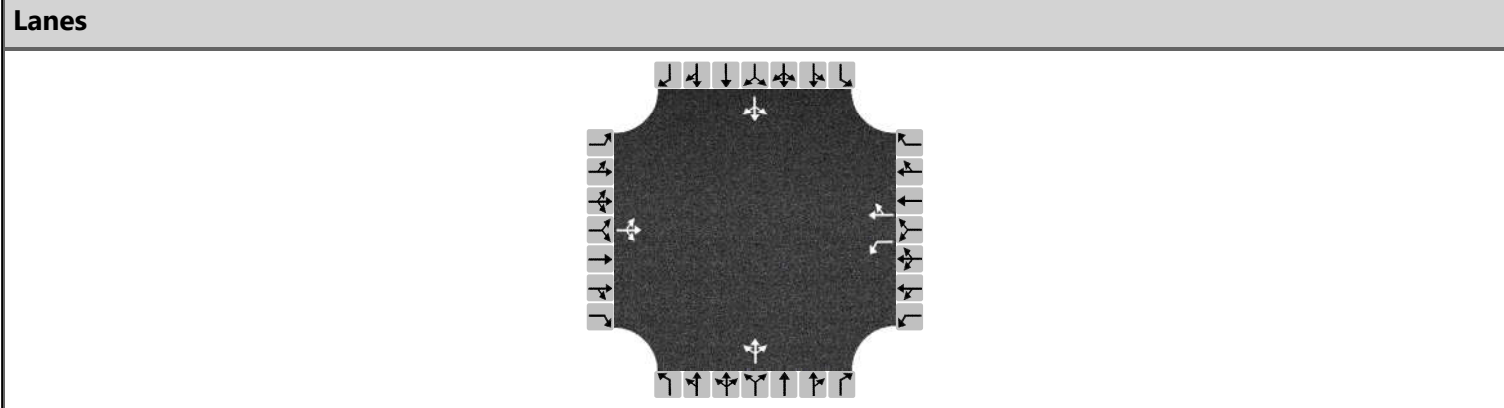
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HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst	CMC	Intersection	Shier Rings & Eiterman
Agency/Co.	CMTran	Jurisdiction	City of Dublin
Date Performed		East/West Street	Shier Rings Road
Analysis Year	2021	North/South Street	Eiterman Road
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.92
Time Analyzed	PM Build		
Project Description	Cosgray and Shier Rings Single-Family TIS		



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Movement												
Volume	13	180	7	144	751	2	22	67	98	1	94	72
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			L	TR		LTR			LTR		
Flow Rate, v (veh/h)	217			157	818		203			182		
Percent Heavy Vehicles	2			2	2		2			2		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20	3.20		3.20			3.20		
Initial Degree of Utilization, x	0.193			0.139	0.728		0.181			0.161		
Final Departure Headway, hd (s)	6.46			6.74	6.23		6.54			6.64		
Final Degree of Utilization, x	0.390			0.293	1.418		0.370			0.335		
Move-Up Time, m (s)	2.0			2.3	2.3		2.0			2.0		
Service Time, ts (s)	4.46			4.44	3.93		4.54			4.64		

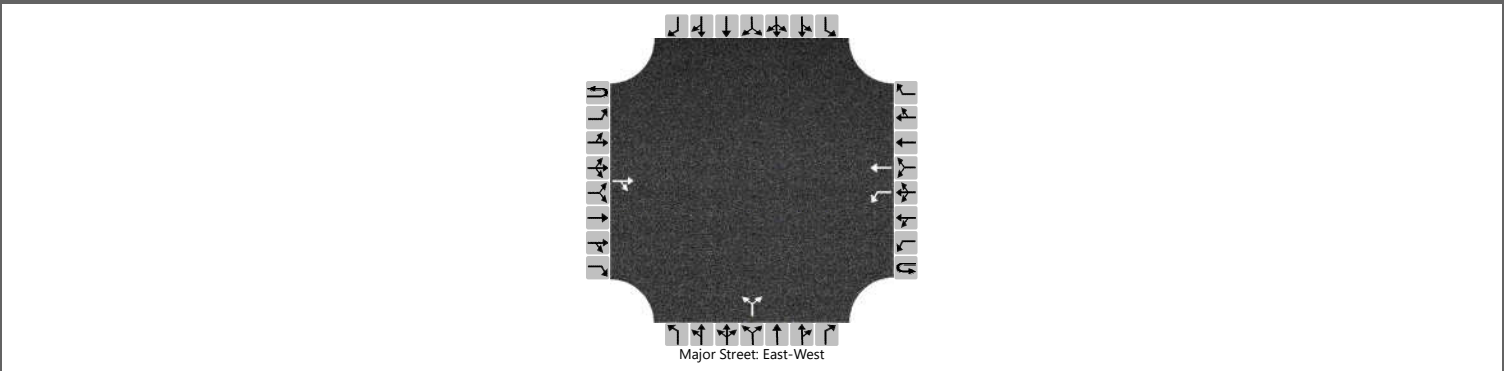
Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	217			157	818		203			182		
Capacity	557			534	577		550			542		
95% Queue Length, Q ₉₅ (veh)	1.8			1.2	38.2		1.7			1.5		
Control Delay (s/veh)	13.5			12.2	216.0		13.3			12.9		
Level of Service, LOS	B			B	F		B			B		
Approach Delay (s/veh)	13.5			183.3			13.3			12.9		
Approach LOS	B			F			B			B		
Intersection Delay, s/veh LOS	118.4						F					

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	CMC			Intersection	Shier Rings & Site Access		
Agency/Co.	CMTran			Jurisdiction	City of Dublin		
Date Performed				East/West Street	Shier Rings Road		
Analysis Year	2021			North/South Street	Site Access Point		
Time Analyzed	PM Build			Peak Hour Factor	0.92		
Intersection Orientation	East-West			Analysis Time Period (hrs)	0.25		
Project Description	Cosgray and Shier Rings Single-Family TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0
Configuration				TR		L	T				LR					
Volume (veh/h)			161	5		18	648			3		10				
Percent Heavy Vehicles (%)						2				2		2				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1					7.1		6.2			
Critical Headway (sec)						4.12					6.42		6.22			
Base Follow-Up Headway (sec)						2.2					3.5		3.3			
Follow-Up Headway (sec)						2.22					3.52		3.32			

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)					20						14					
Capacity, c (veh/h)					1395						599					
v/c Ratio					0.01						0.02					
95% Queue Length, Q ₉₅ (veh)					0.0						0.1					
Control Delay (s/veh)					7.6						11.2					
Level of Service (LOS)					A						B					
Approach Delay (s/veh)					0.2				11.2							
Approach LOS									B							

LANE LEVEL OF SERVICE

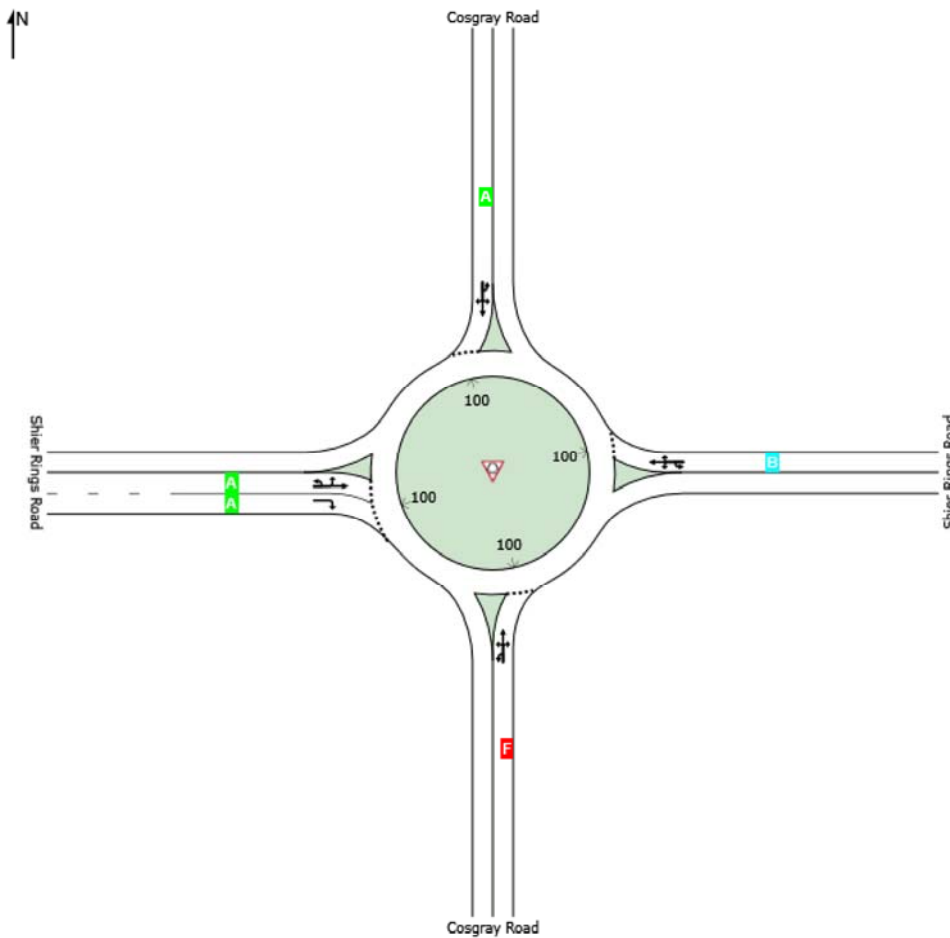
Lane Level of Service

 **Site: 101 [HY AM No Build 1.0]**

Shier Rings Road & Cosgray Road
 2031 AM Peak No Build
 Environmental Factor 1.0
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	D	B	A	A	D



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 Site: 101 [HY AM No Build 1.0]

Shier Rings Road & Cosgray Road
 2031 AM Peak No Build
 Environmental Factor 1.0
 Roundabout

*Approach LOS is only based on delay, results in LOS D.
 Make the same assumption for the lane, Delay = 49.2, LOS = D*

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist ft				
South: Cosgray Road													
Lane 1 ^d	1316	2.0	1222	1.077	100	49.2	LOS F	70.1	1779.9	Full	1600	0.0	8.2
Approach	1316	2.0		1.077		49.2	LOS D	70.1	1779.9				
East: Shier Rings Road													
Lane 1 ^d	120	2.0	852	0.140	100	11.1	LOS B	0.9	23.0	Full	1600	0.0	0.0
Approach	120	2.0		0.140		11.1	LOS B	0.9	23.0				
North: Cosgray Road													
Lane 1 ^d	321	2.0	1242	0.258	100	6.8	LOS A	1.7	43.0	Full	1600	0.0	0.0
Approach	321	2.0		0.258		6.8	LOS A	1.7	43.0				
West: Shier Rings Road													
Lane 1 ^d	9	2.0	1226	0.007	100	6.8	LOS A	0.0	1.0	Full	1600	0.0	0.0
Lane 2	5	2.0	972	0.006	100	5.9	LOS A	0.0	0.7	Full	1600	0.0	0.0
Approach	14	2.0		0.007		6.5	LOS A	0.0	1.0				
Intersection	1771	2.0		1.077		38.6	LOS D	70.1	1779.9				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Assume the delay defines the LOS for movements, approaches and intersections.

^d Dominant lane on roundabout approach

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LANE LEVEL OF SERVICE

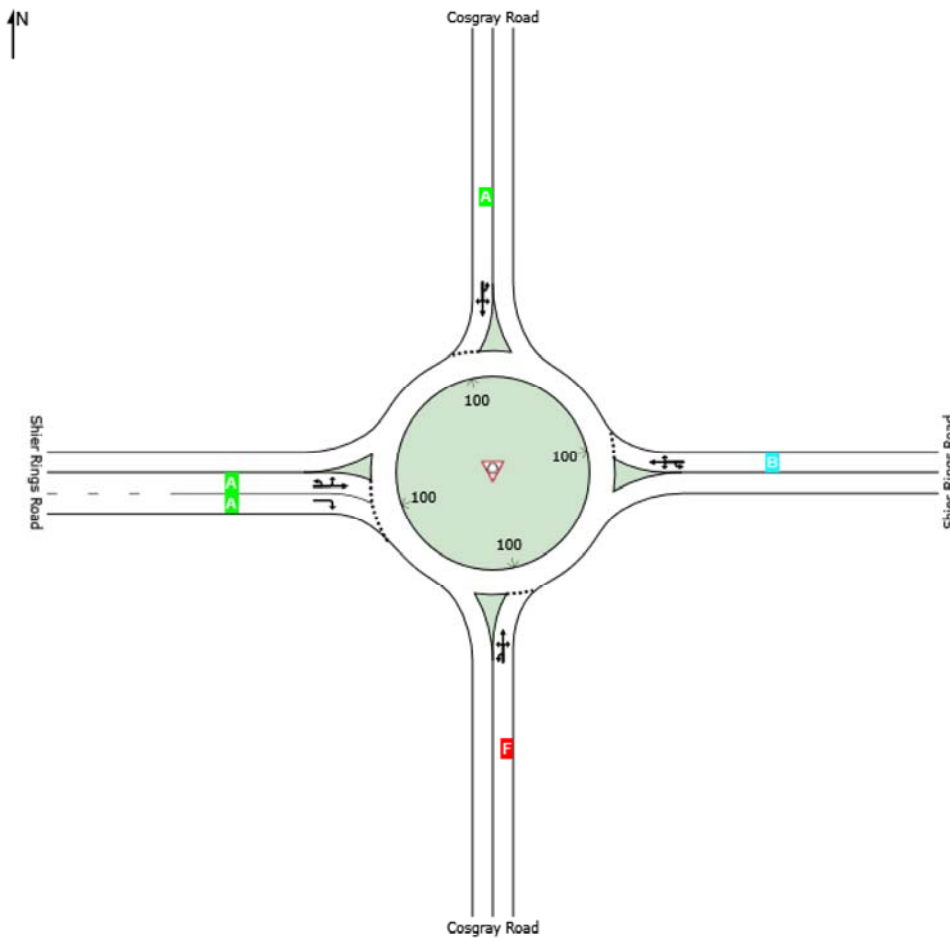
Lane Level of Service

 **Site: 101 [HY AM No Build 1.1]**

Shier Rings Road & Cosgray Road
 2031 AM Peak No Build
 Environmental Factor 1.1
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	F	B	A	A	E



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 **Site: 101 [HY AM No Build 1.1]**

Shier Rings Road & Cosgray Road
 2031 AM Peak No Build
 Environmental Factor 1.1
 Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist ft				
South: Cosgray Road													
Lane 1 ^d	1316	2.0	1092	1.205	100	104.6	LOS F	108.0	2743.7	Full	1600	0.0	24.3
Approach	1316	2.0		1.205		104.6	LOS F	108.0	2743.7				
East: Shier Rings Road													
Lane 1 ^d	120	2.0	786	0.152	100	11.2	LOS B	0.9	23.7	Full	1600	0.0	0.0
Approach	120	2.0		0.152		11.2	LOS B	0.9	23.7				
North: Cosgray Road													
Lane 1 ^d	321	2.0	1117	0.287	100	7.0	LOS A	1.9	48.1	Full	1600	0.0	0.0
Approach	321	2.0		0.287		7.0	LOS A	1.9	48.1				
West: Shier Rings Road													
Lane 1 ^d	9	2.0	1074	0.008	100	7.1	LOS A	0.0	1.1	Full	1600	0.0	0.0
Lane 2	5	2.0	883	0.006	100	6.2	LOS A	0.0	0.8	Full	1600	0.0	0.0
Approach	14	2.0		0.008		6.7	LOS A	0.0	1.1				
Intersection	1771	2.0		1.205		79.8	LOS E	108.0	2743.7				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

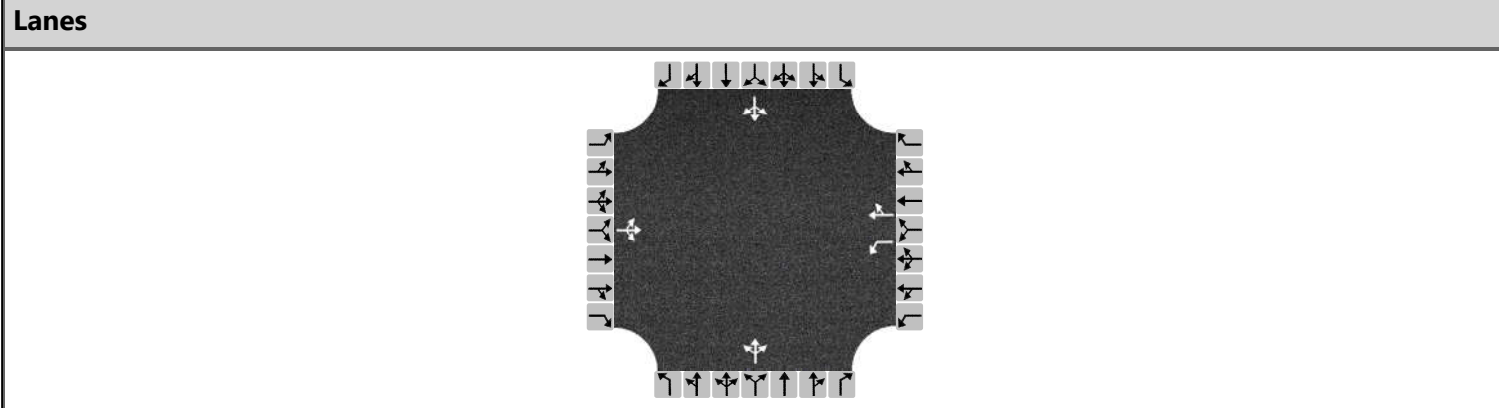
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HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst	CMC	Intersection	Shier Rings & Eiterman
Agency/Co.	CMTran	Jurisdiction	City of Dublin
Date Performed		East/West Street	Shier Rings Road
Analysis Year	2031	North/South Street	Eiterman Road
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.92
Time Analyzed	AM No Build		
Project Description	Cosgray and Shier Rings Single-Family TIS		



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Movement												
Volume	249	594	46	35	100	22	1	219	114	7	109	42
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			L	TR		LTR			LTR		
Flow Rate, v (veh/h)	966			38	133		363			172		
Percent Heavy Vehicles	2			2	2		2			2		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20	3.20		3.20			3.20		
Initial Degree of Utilization, x	0.859			0.034	0.118		0.323			0.153		
Final Departure Headway, hd (s)	6.35			8.01	7.38		6.55			7.12		
Final Degree of Utilization, x	1.705			0.085	0.272		0.660			0.340		
Move-Up Time, m (s)	2.0			2.3	2.3		2.0			2.0		
Service Time, ts (s)	4.35			5.71	5.08		4.55			5.12		

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	966			38	133		363			172		
Capacity	567			449	488		550			505		
95% Queue Length, Q ₉₅ (veh)	56.4			0.3	1.1		4.8			1.5		
Control Delay (s/veh)	341.1			11.5	12.8		21.3			13.7		
Level of Service, LOS	F			B	B		C			B		
Approach Delay (s/veh)	341.1			12.5			21.3			13.7		
Approach LOS	F			B			C			B		
Intersection Delay, s/veh LOS	204.5						F					

LANE LEVEL OF SERVICE

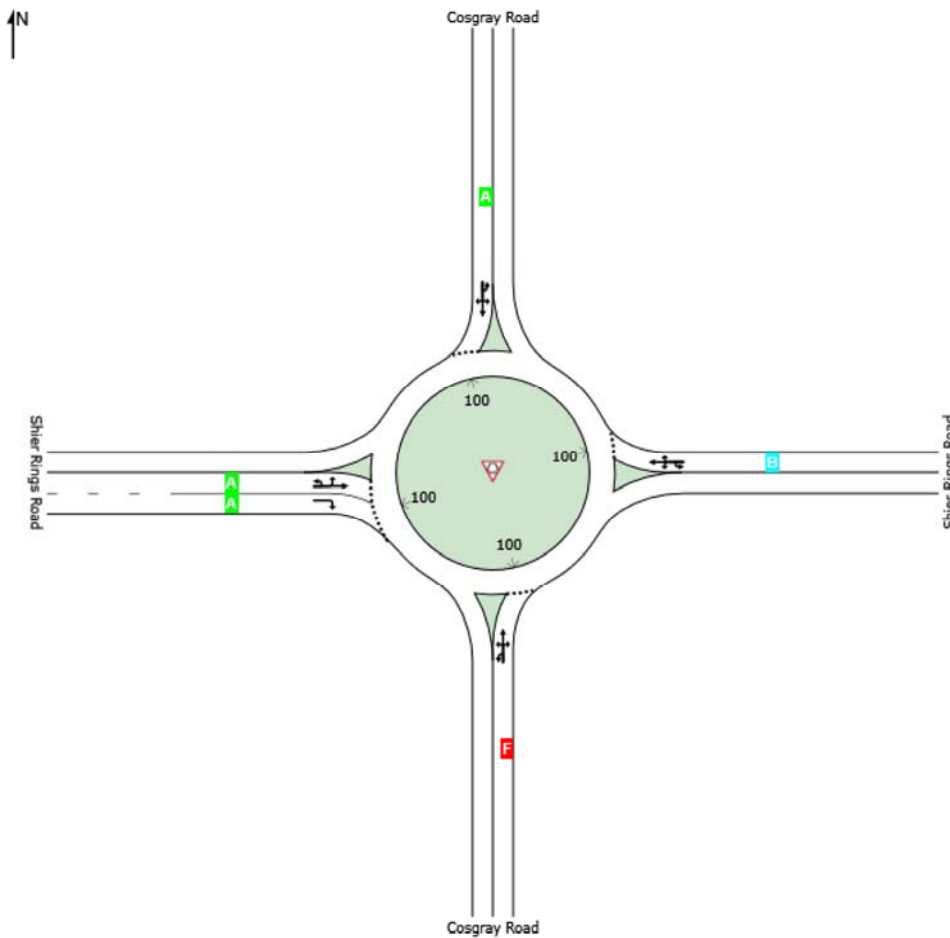
Lane Level of Service

 **Site: 101 [HY AM Build 1.0]**

Shier Rings Road & Cosgray Road
 2031 AM Peak Build
 Environmental Factor 1.0
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	D	B	A	A	D



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 Site: 101 [HY AM Build 1.0]

Shier Rings Road & Cosgray Road
 2031 AM Peak Build
 Environmental Factor 1.0
 Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist ft				
South: Cosgray Road													
Lane 1 ^d	1317	2.0	1222	1.078	100	49.6	LOS F	70.4	1789.0	Full	1600	0.0	8.4
Approach	1317	2.0		1.078		49.6	LOS D	70.4	1789.0				
East: Shier Rings Road													
Lane 1 ^d	122	2.0	852	0.143	100	11.1	LOS B	0.9	23.5	Full	1600	0.0	0.0
Approach	122	2.0		0.143		11.1	LOS B	0.9	23.5				
North: Cosgray Road													
Lane 1 ^d	321	2.0	1240	0.259	100	6.9	LOS A	1.7	43.1	Full	1600	0.0	0.0
Approach	321	2.0		0.259		6.9	LOS A	1.7	43.1				
West: Shier Rings Road													
Lane 1 ^d	9	2.0	1224	0.007	100	6.8	LOS A	0.0	1.0	Full	1600	0.0	0.0
Lane 2	5	2.0	970	0.006	100	5.9	LOS A	0.0	0.7	Full	1600	0.0	0.0
Approach	14	2.0		0.007		6.5	LOS A	0.0	1.0				
Intersection	1774	2.0		1.078		38.9	LOS D	70.4	1789.0				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE LEVEL OF SERVICE

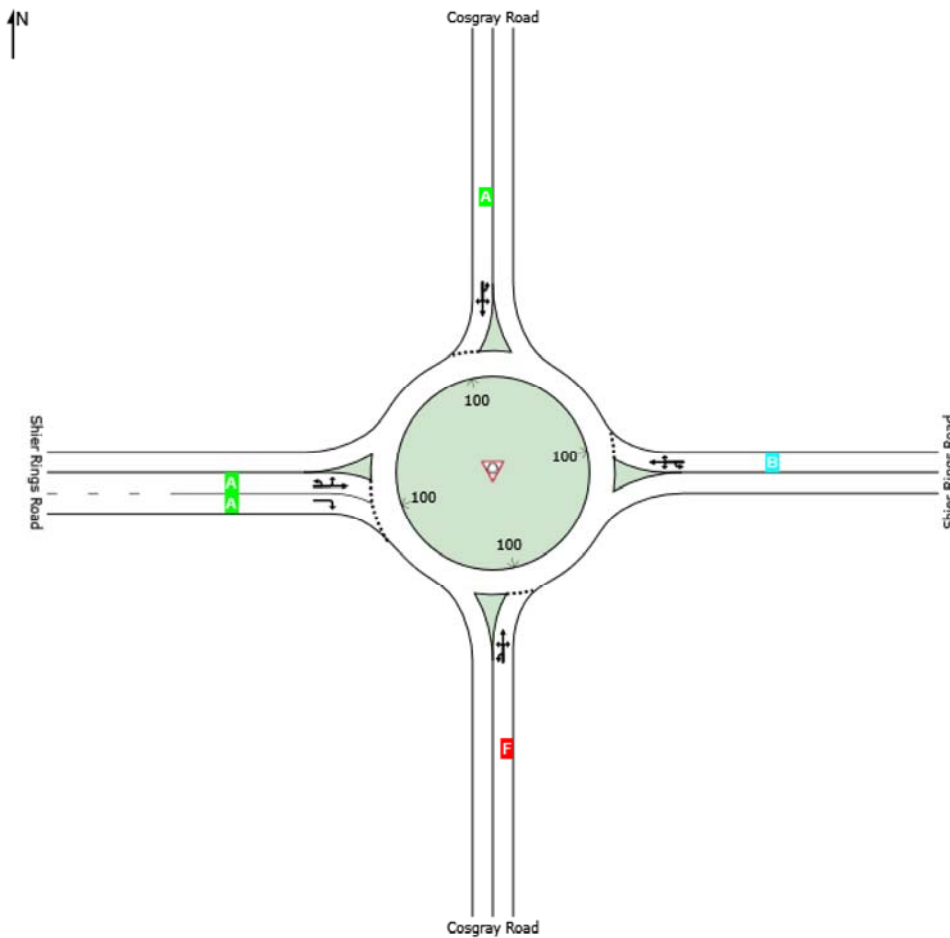
Lane Level of Service

 **Site: 101 [HY AM Build 1.1]**

Shier Rings Road & Cosgray Road
 2031 AM Peak Build
 Environmental Factor 1.1
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	F	B	A	A	F



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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Project: P:\TRA\StructurePoint\Cosgray & Shier Rings Single-Family\Analysis\Capacity\Cosgray\EF=1.1\Shier Rings Rd & Cosgray Rd 1.1.sip7

LANE SUMMARY

 Site: 101 [HY AM Build 1.1]

Shier Rings Road & Cosgray Road
 2031 AM Peak Build
 Environmental Factor 1.1
 Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist ft				
South: Cosgray Road													
Lane 1 ^d	1317	2.0	1092	1.206	100	105.1	LOS F	108.4	2753.7	Full	1600	0.0	24.5
Approach	1317	2.0		1.206		105.1	LOS F	108.4	2753.7				
East: Shier Rings Road													
Lane 1 ^d	122	2.0	786	0.155	100	11.2	LOS B	1.0	24.2	Full	1600	0.0	0.0
Approach	122	2.0		0.155		11.2	LOS B	1.0	24.2				
North: Cosgray Road													
Lane 1 ^d	321	2.0	1114	0.288	100	7.0	LOS A	1.9	48.2	Full	1600	0.0	0.0
Approach	321	2.0		0.288		7.0	LOS A	1.9	48.2				
West: Shier Rings Road													
Lane 1 ^d	9	2.0	1073	0.008	100	7.1	LOS A	0.0	1.1	Full	1600	0.0	0.0
Lane 2	5	2.0	881	0.006	100	6.2	LOS A	0.0	0.8	Full	1600	0.0	0.0
Approach	14	2.0		0.008		6.7	LOS A	0.0	1.1				
Intersection	1774	2.0		1.206		80.2	LOS F	108.4	2753.7				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

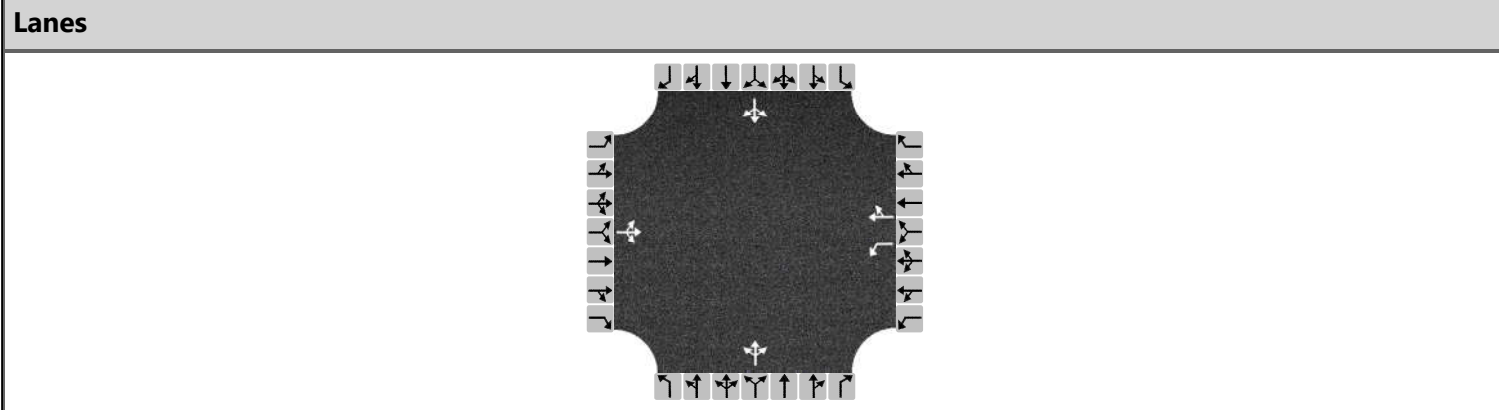
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HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst	CMC	Intersection	Shier Rings & Eiterman
Agency/Co.	CMTran	Jurisdiction	City of Dublin
Date Performed		East/West Street	Shier Rings Road
Analysis Year	2031	North/South Street	Eiterman Road
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.92
Time Analyzed	AM Build		
Project Description	Cosgray and Shier Rings Single-Family TIS		



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Movement												
Volume	251	611	47	35	106	22	1	219	114	7	109	42
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			L	TR		LTR			LTR		
Flow Rate, v (veh/h)	988			38	139		363			172		
Percent Heavy Vehicles	2			2	2		2			2		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20	3.20		3.20			3.20		
Initial Degree of Utilization, x	0.878			0.034	0.124		0.323			0.153		
Final Departure Headway, hd (s)	6.38			8.02	7.40		6.57			7.15		
Final Degree of Utilization, x	1.750			0.085	0.286		0.662			0.341		
Move-Up Time, m (s)	2.0			2.3	2.3		2.0			2.0		
Service Time, ts (s)	4.38			5.72	5.10		4.57			5.15		

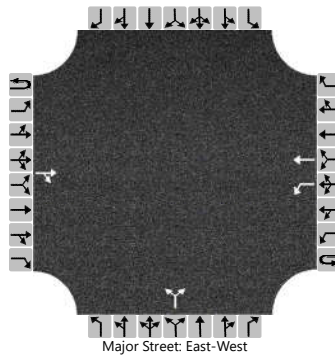
Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	988			38	139		363			172		
Capacity	565			449	487		548			503		
95% Queue Length, Q ₉₅ (veh)	59.2			0.3	1.2		4.9			1.5		
Control Delay (s/veh)	361.1			11.5	13.0		21.5			13.8		
Level of Service, LOS	F			B	B		C			B		
Approach Delay (s/veh)	361.1			12.7			21.5			13.8		
Approach LOS	F			B			C			B		
Intersection Delay, s/veh LOS	217.2						F					

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	CMC			Intersection	Shier Rings & Site Access		
Agency/Co.	CMTran			Jurisdiction	City of Dublin		
Date Performed				East/West Street	Shier Rings Road		
Analysis Year	2031			North/South Street	Site Access Point		
Time Analyzed	AM Build			Peak Hour Factor	0.92		
Intersection Orientation	East-West			Analysis Time Period (hrs)	0.25		
Project Description	Cosgray and Shier Rings Single-Family TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0
Configuration				TR		L	T				LR					
Volume (veh/h)			843	1		6	126			2		20				
Percent Heavy Vehicles (%)						2				2		2				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1					7.1		6.2			
Critical Headway (sec)						4.12					6.42		6.22			
Base Follow-Up Headway (sec)						2.2					3.5		3.3			
Follow-Up Headway (sec)						2.22					3.52		3.32			

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						7						24				
Capacity, c (veh/h)						744						319				
v/c Ratio						0.01						0.07				
95% Queue Length, Q ₉₅ (veh)						0.0						0.2				
Control Delay (s/veh)						9.9						17.2				
Level of Service (LOS)						A						C				
Approach Delay (s/veh)					0.4				17.2							
Approach LOS									C							

LANE LEVEL OF SERVICE

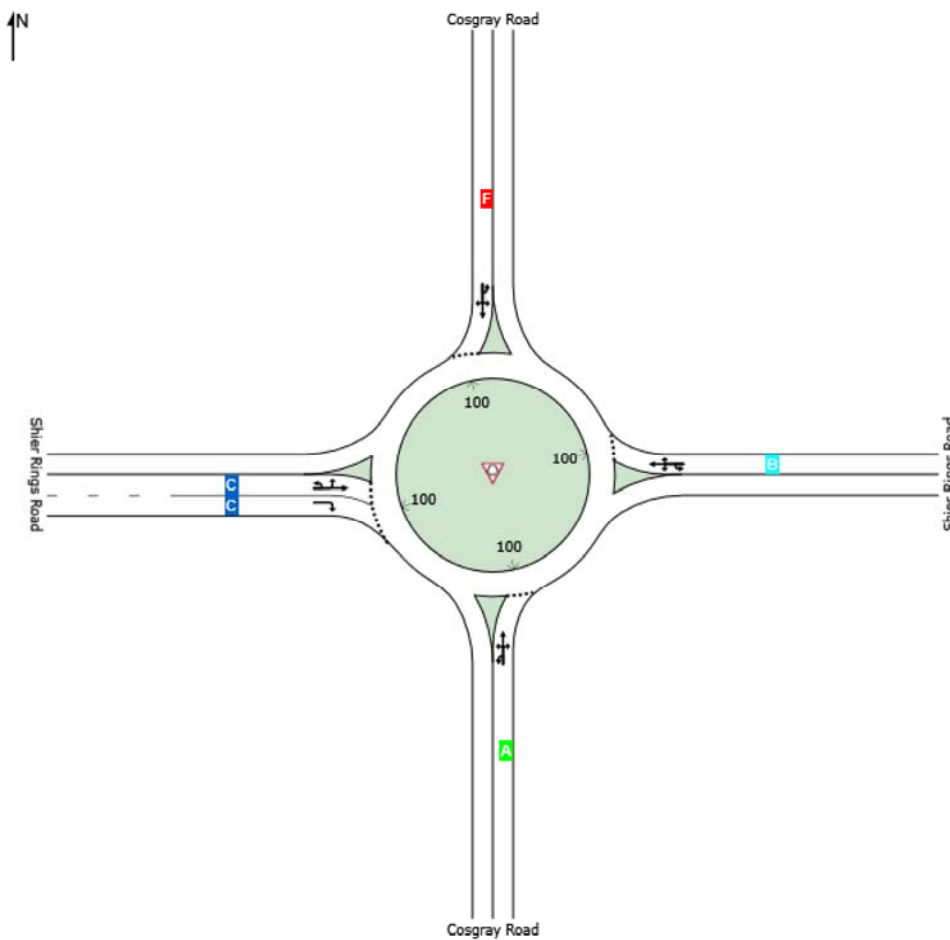
Lane Level of Service

 **Site: 101 [HY PM No Build 1.0]**

Shier Rings Road & Cosgray Road
 2031 PM Peak No Build
 Environmental Factor 1.0
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	B	D	C	C



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 Site: 101 [HY PM No Build 1.0]

Shier Rings Road & Cosgray Road
 2031 PM Peak No Build
 Environmental Factor 1.0
 Roundabout

Lane Use and Performance													
	Demand Flows		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %						Veh	Dist ft				
South: Cosgray Road													
Lane 1 ^d	490	2.0	1313	0.373	100	4.2	LOS A	3.0	75.4	Full	1600	0.0	0.0
Approach	490	2.0		0.373		4.2	LOS A	3.0	75.4				
East: Shier Rings Road													
Lane 1 ^d	707	2.0	1078	0.655	100	12.7	LOS B	6.7	171.3	Full	1600	0.0	0.0
Approach	707	2.0		0.655		12.7	LOS B	6.7	171.3				
North: Cosgray Road													
Lane 1 ^d	739	2.0	738	1.001	100	44.8	LOS F	30.0	762.5	Full	1600	0.0	0.0
Approach	739	2.0		1.001		44.8	LOS D	30.0	762.5				
West: Shier Rings Road													
Lane 1 ^d	13	2.0	370	0.035	100	22.0	LOS C	0.3	7.8	Full	1600	0.0	0.0
Lane 2	2	2.0	273	0.008	100	22.6	LOS C	0.1	1.5	Full	1600	0.0	0.0
Approach	15	2.0		0.035		22.0	LOS C	0.3	7.8				
Intersection	1951	2.0		1.001		22.8	LOS C	30.0	762.5				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE LEVEL OF SERVICE

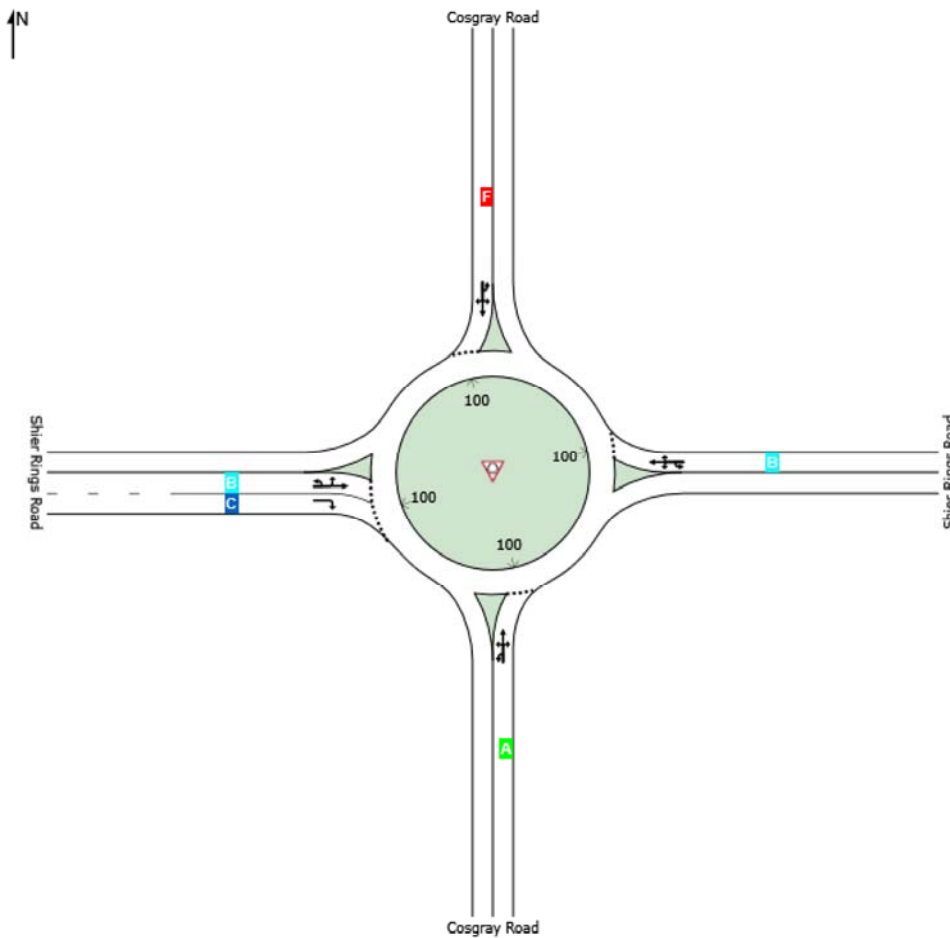
Lane Level of Service

 **Site: 101 [HY PM No Build 1.1]**

Shier Rings Road & Cosgray Road
 2031 PM Peak No Build
 Environmental Factor 1.1
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	B	F	B	D



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 Site: 101 [HY PM No Build 1.1]

Shier Rings Road & Cosgray Road
 2031 PM Peak No Build
 Environmental Factor 1.1
 Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist ft				
South: Cosgray Road													
Lane 1 ^d	490	2.0	1196	0.410	100	4.2	LOS A	3.4	85.2	Full	1600	0.0	0.0
Approach	490	2.0		0.410		4.2	LOS A	3.4	85.2				
East: Shier Rings Road													
Lane 1 ^d	707	2.0	951	0.743	100	15.4	LOS B	9.6	243.6	Full	1600	0.0	0.0
Approach	707	2.0		0.743		15.4	LOS B	9.6	243.6				
North: Cosgray Road													
Lane 1 ^d	739	2.0	619	1.194	100	112.8	LOS F	57.5	1460.6	Full	1600	0.0	2.4
Approach	739	2.0		1.194		112.8	LOS F	57.5	1460.6				
West: Shier Rings Road													
Lane 1 ^d	13	2.0	404	0.032	100	18.3	LOS B	0.2	6.2	Full	1600	0.0	0.0
Lane 2	2	2.0	257	0.008	100	20.4	LOS C	0.1	1.3	Full	1600	0.0	0.0
Approach	15	2.0		0.032		18.6	LOS B	0.2	6.2				
Intersection	1951	2.0		1.194		49.5	LOS D	57.5	1460.6				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

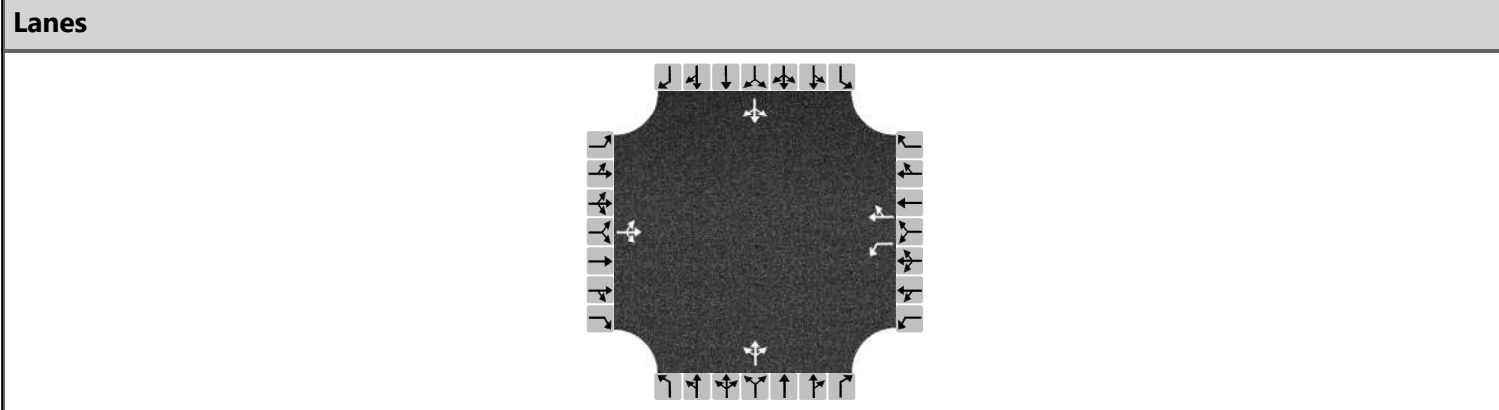
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HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst	CMC	Intersection	Shier Rings & Eiterman
Agency/Co.	CMTran	Jurisdiction	City of Dublin
Date Performed		East/West Street	Shier Rings Road
Analysis Year	2031	North/South Street	Eiterman Road
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.92
Time Analyzed	PM No Build		
Project Description	Cosgray and Shier Rings Single-Family TIS		



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Movement												
Volume	79	187	8	157	805	11	26	138	116	24	300	218
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			L	TR		LTR			LTR		
Flow Rate, v (veh/h)	298			171	887		304			589		
Percent Heavy Vehicles	2			2	2		2			2		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20	3.20		3.20			3.20		
Initial Degree of Utilization, x	0.265			0.152	0.788		0.271			0.524		
Final Departure Headway, hd (s)	9.01			9.16	8.65		8.67			8.08		
Final Degree of Utilization, x	0.745			0.434	2.130		0.733			1.322		
Move-Up Time, m (s)	2.0			2.3	2.3		2.0			2.0		
Service Time, ts (s)	7.01			6.86	6.35		6.67			6.08		

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	298			171	887		304			589		
Capacity	400			393	416		415			446		
95% Queue Length, Q ₉₅ (veh)	6.0			2.1	64.0		5.8			26.3		
Control Delay (s/veh)	34.1			18.7	535.9		32.0			183.6		
Level of Service, LOS	D			C	F		D			F		
Approach Delay (s/veh)	34.1			452.4			32.0			183.6		
Approach LOS	D			F			D			F		
Intersection Delay, s/veh LOS	269.7						F					

LANE LEVEL OF SERVICE

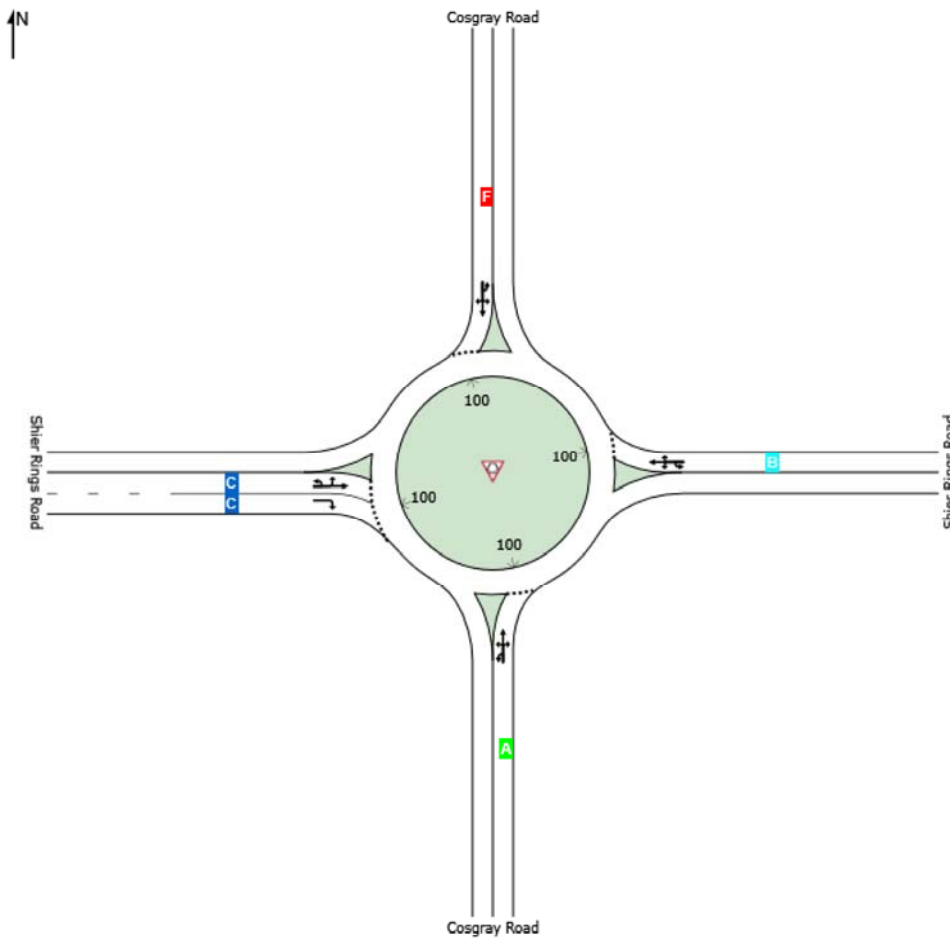
Lane Level of Service

 Site: 101 [HY PM Build 1.0]

Shier Rings Road & Cosgray Road
 2031 PM Peak Build
 Environmental Factor 1.0
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	B	D	C	C



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 Site: 101 [HY PM Build 1.0]

Shier Rings Road & Cosgray Road
 2031 PM Peak Build
 Environmental Factor 1.0
 Roundabout

Apply the same assumptions as PDF page 136

Lane Use and Performance													
	Demand Flows		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %						Veh	Dist ft				
South: Cosgray Road													
Lane 1 ^d	493	2.0	1310	0.377	100	4.2	LOS A	3.0	76.1	Full	1600	0.0	0.0
Approach	493	2.0		0.377		4.2	LOS A	3.0	76.1				
East: Shier Rings Road													
Lane 1 ^d	710	2.0	1078	0.658	100	12.8	LOS B	6.8	173.8	Full	1600	0.0	0.0
Approach	710	2.0		0.658		12.8	LOS B	6.8	173.8				
North: Cosgray Road													
Lane 1 ^d	740	2.0	736	1.006	100	46.1	LOS F	30.7	779.1	Full	1600	0.0	0.0
Approach	740	2.0		1.006		46.1	LOS D	30.7	779.1				
West: Shier Rings Road													
Lane 1 ^d	14	2.0	367	0.039	100	21.8	LOS C	0.3	8.4	Full	1600	0.0	0.0
Lane 2	2	2.0	272	0.008	100	22.6	LOS C	0.1	1.5	Full	1600	0.0	0.0
Approach	16	2.0		0.039		21.9	LOS C	0.3	8.4				
Intersection	1960	2.0		1.006		23.3	LOS C	30.7	779.1				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE LEVEL OF SERVICE

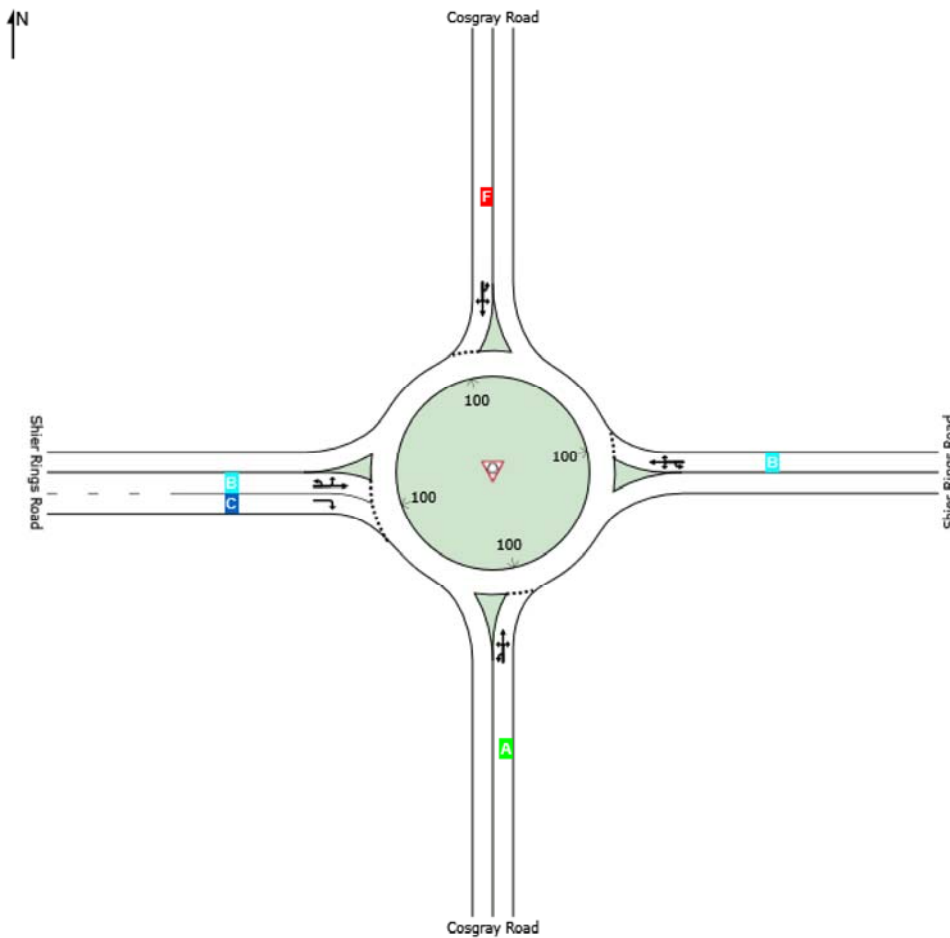
Lane Level of Service

 **Site: 101 [HY PM Build 1.1]**

Shier Rings Road & Cosgray Road
 2031 PM Peak Build
 Environmental Factor 1.1
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	B	F	B	D



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 Site: 101 [HY PM Build 1.1]

Shier Rings Road & Cosgray Road
 2031 PM Peak Build
 Environmental Factor 1.1
 Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist ft				
South: Cosgray Road													
Lane 1 ^d	493	2.0	1194	0.413	100	4.2	LOS A	3.4	86.0	Full	1600	0.0	0.0
Approach	493	2.0		0.413		4.2	LOS A	3.4	86.0				
East: Shier Rings Road													
Lane 1 ^d	710	2.0	951	0.746	100	15.5	LOS B	9.7	247.5	Full	1600	0.0	0.0
Approach	710	2.0		0.746		15.5	LOS B	9.7	247.5				
North: Cosgray Road													
Lane 1 ^d	740	2.0	616	1.201	100	115.5	LOS F	58.5	1486.4	Full	1600	0.0	2.9
Approach	740	2.0		1.201		115.5	LOS F	58.5	1486.4				
West: Shier Rings Road													
Lane 1 ^d	14	2.0	405	0.035	100	18.1	LOS B	0.3	6.7	Full	1600	0.0	0.0
Lane 2	2	2.0	257	0.008	100	20.4	LOS C	0.1	1.3	Full	1600	0.0	0.0
Approach	16	2.0		0.035		18.4	LOS B	0.3	6.7				
Intersection	1960	2.0		1.201		50.5	LOS D	58.5	1486.4				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

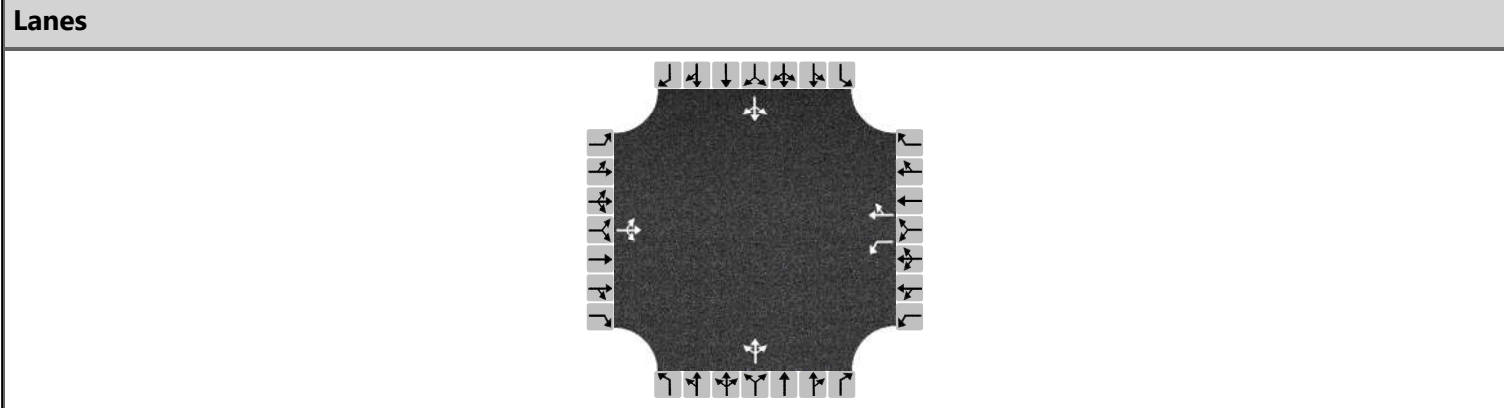
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Project: P:\TRA\StructurePoint\Cosgray & Shier Rings Single-Family\Analysis\Capacity\Cosgray\EF=1.1\Shier Rings Rd & Cosgray Rd 1.1.sip7

HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst	CMC	Intersection	Shier Rings & Eiterman
Agency/Co.	CMTran	Jurisdiction	City of Dublin
Date Performed		East/West Street	Shier Rings Road
Analysis Year	2031	North/South Street	Eiterman Road
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.92
Time Analyzed	PM Build		
Project Description	Cosgray and Shier Rings Single-Family TIS		



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Movement												
Volume	80	196	8	157	822	11	26	138	116	24	300	219
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			L	TR		LTR			LTR		
Flow Rate, v (veh/h)	309			171	905		304			590		
Percent Heavy Vehicles	2			2	2		2			2		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20	3.20		3.20			3.20		
Initial Degree of Utilization, x	0.274			0.152	0.805		0.271			0.525		
Final Departure Headway, hd (s)	9.02			9.22	8.71		8.74			8.15		
Final Degree of Utilization, x	0.774			0.437	2.191		0.739			1.337		
Move-Up Time, m (s)	2.0			2.3	2.3		2.0			2.0		
Service Time, ts (s)	7.02			6.92	6.41		6.74			6.15		

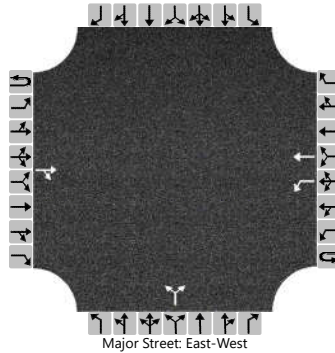
Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	309			171	905		304			590		
Capacity	399			390	413		412			442		
95% Queue Length, Q ₉₅ (veh)	6.5			2.2	66.6		5.9			26.8		
Control Delay (s/veh)	36.8			18.9	563.0		32.7			190.0		
Level of Service, LOS	E			C	F		D			F		
Approach Delay (s/veh)	36.8			476.7			32.7			190.0		
Approach LOS	E			F			D			F		
Intersection Delay, s/veh LOS	283.6						F					

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	CMC			Intersection	Shier Rings & Site Access		
Agency/Co.	CMTran			Jurisdiction	City of Dublin		
Date Performed				East/West Street	Shier Rings Road		
Analysis Year	2031			North/South Street	Site Access Point		
Time Analyzed	PM Build			Peak Hour Factor	0.92		
Intersection Orientation	East-West			Analysis Time Period (hrs)	0.25		
Project Description	Cosgray and Shier Rings Single-Family TIS						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0
Configuration				TR		L	T				LR					
Volume (veh/h)			242	5		18	837			3		10				
Percent Heavy Vehicles (%)						2				2		2				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1					7.1		6.2			
Critical Headway (sec)						4.12					6.42		6.22			
Base Follow-Up Headway (sec)						2.2					3.5		3.3			
Follow-Up Headway (sec)						2.22					3.52		3.32			

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)					20						14					
Capacity, c (veh/h)					1295						462					
v/c Ratio					0.02						0.03					
95% Queue Length, Q ₉₅ (veh)					0.0						0.1					
Control Delay (s/veh)					7.8						13.0					
Level of Service (LOS)					A						B					
Approach Delay (s/veh)					0.2				13.0							
Approach LOS									B							

Capacity Analysis with Improvements

Timing Report, Sorted By Phase

3: Eiterman Road & Shier Rings Road

04/23/2020

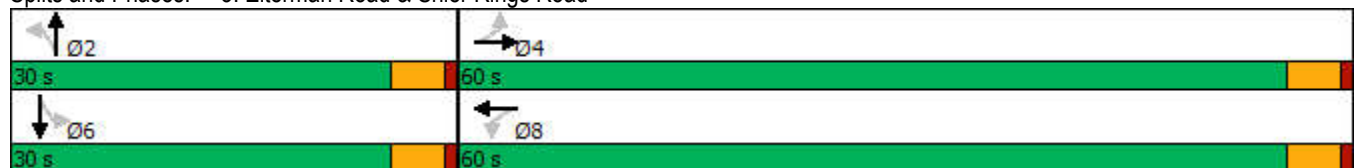


Phase Number	2	4	6	8
Movement	NBTL	EBTL	SBTL	WBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	Max	None	Max	None
Maximum Split (s)	30	60	30	60
Maximum Split (%)	33.3%	66.7%	33.3%	66.7%
Minimum Split (s)	22.5	22.5	22.5	22.5
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	7	7	7	7
Flash Dont Walk (s)	11	11	11	11
Dual Entry	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	30	0	30
End Time (s)	30	0	30	0
Yield/Force Off (s)	25.5	85.5	25.5	85.5
Yield/Force Off 170(s)	14.5	74.5	14.5	74.5
Local Start Time (s)	0	30	0	30
Local Yield (s)	25.5	85.5	25.5	85.5
Local Yield 170(s)	14.5	74.5	14.5	74.5

Intersection Summary

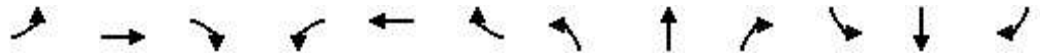
Cycle Length	90
Control Type	Semi Act-Uncoord
Natural Cycle	55

Splits and Phases: 3: Eiterman Road & Shier Rings Road



HCM 6th Signalized Intersection Summary
 3: Eiterman Road & Shier Rings Road

04/23/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	93	542	42	32	92	2	1	77	96	1	44	4
Future Volume (veh/h)	93	542	42	32	92	2	1	77	96	1	44	4
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	101	589	46	35	100	2	1	84	104	1	48	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	623	723	56	215	771	15	676	325	402	546	727	61
Arrive On Green	0.42	0.42	0.42	0.42	0.42	0.42	0.43	0.43	0.43	0.43	0.43	0.43
Sat Flow, veh/h	1293	1713	134	793	1827	37	1352	760	941	1195	1703	142
Grp Volume(v), veh/h	101	0	635	35	0	102	1	0	188	1	0	52
Grp Sat Flow(s),veh/h/ln	1293	0	1846	793	0	1864	1352	0	1701	1195	0	1845
Q Serve(g_s), s	3.1	0.0	18.1	2.4	0.0	2.0	0.0	0.0	4.2	0.0	0.0	1.0
Cycle Q Clear(g_c), s	5.1	0.0	18.1	20.5	0.0	2.0	1.0	0.0	4.2	4.3	0.0	1.0
Prop In Lane	1.00		0.07	1.00		0.02	1.00		0.55	1.00		0.08
Lane Grp Cap(c), veh/h	623	0	779	215	0	787	676	0	727	546	0	788
V/C Ratio(X)	0.16	0.00	0.81	0.16	0.00	0.13	0.00	0.00	0.26	0.00	0.00	0.07
Avail Cap(c_a), veh/h	1279	0	1716	617	0	1733	676	0	727	546	0	788
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	12.1	0.0	15.2	24.2	0.0	10.5	10.4	0.0	11.0	12.4	0.0	10.1
Incr Delay (d2), s/veh	0.1	0.0	2.1	0.4	0.0	0.1	0.0	0.0	0.9	0.0	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	0.0	6.7	0.4	0.0	0.7	0.0	0.0	1.5	0.0	0.0	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.2	0.0	17.3	24.6	0.0	10.6	10.4	0.0	11.9	12.4	0.0	10.2
LnGrp LOS	B	A	B	C	A	B	B	A	B	B	A	B
Approach Vol, veh/h		736			137			189			53	
Approach Delay, s/veh		16.6			14.2			11.9			10.3	
Approach LOS		B			B			B			B	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		30.0		29.7		30.0		29.7				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		25.5		55.5		25.5		55.5				
Max Q Clear Time (g_c+I1), s		6.2		20.1		6.3		22.5				
Green Ext Time (p_c), s		1.0		5.1		0.2		0.8				
Intersection Summary												
HCM 6th Ctrl Delay				15.2								
HCM 6th LOS				B								

LANE LEVEL OF SERVICE

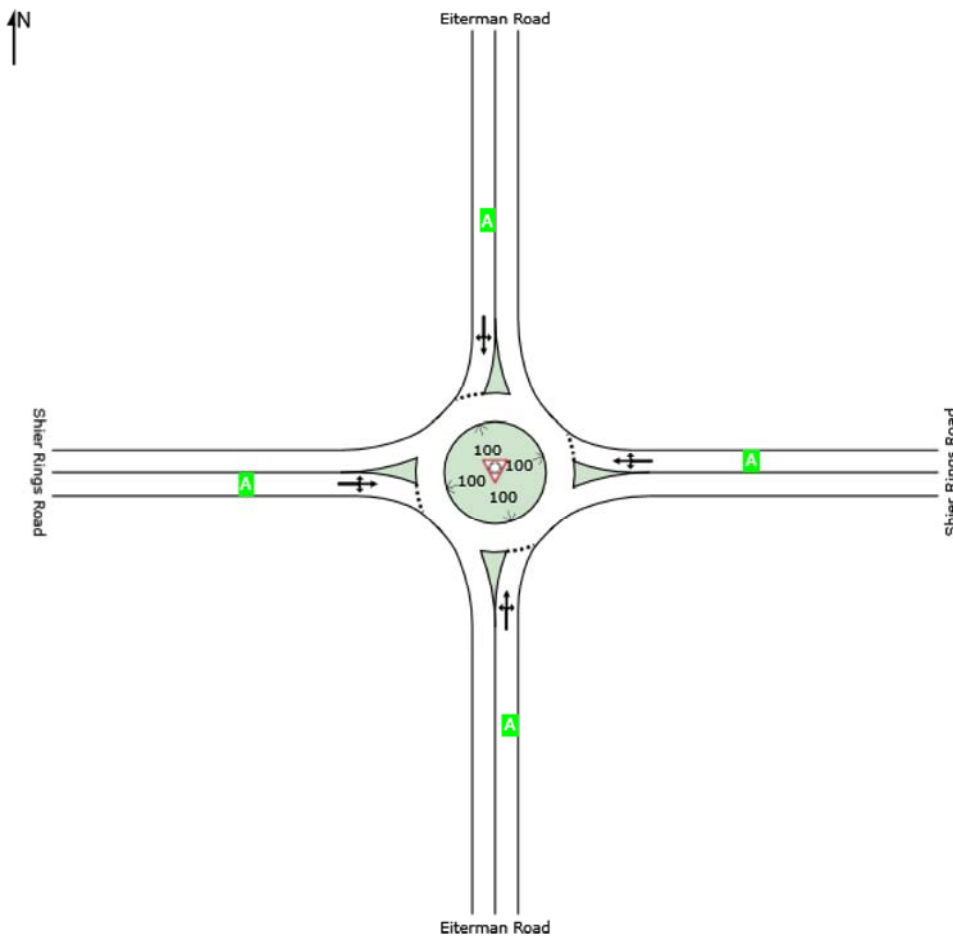
Lane Level of Service

 **Site: 101 [OY AM No Build 1.0]**

Shier Rings Road & Eiterman Road
 2021 AM Peak No Build with Improvements
 Environmental Factor 1.0
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	A	A	A	A



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 **Site: 101 [OY AM No Build 1.0]**

Shier Rings Road & Eiterman Road
 2021 AM Peak No Build with Improvements
 Environmental Factor 1.0
 Roundabout

Lane Use and Performance													
	Demand Flows		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %						Veh	Dist ft				
South: Eiterman Road													
Lane 1 ^d	189	2.0	760	0.249	100	8.3	LOS A	1.6	40.8	Full	1600	0.0	0.0
Approach	189	2.0		0.249		8.3	LOS A	1.6	40.8				
East: Shier Rings Road													
Lane 1 ^d	137	2.0	1178	0.116	100	6.1	LOS A	0.6	15.9	Full	1600	0.0	0.0
Approach	137	2.0		0.116		6.1	LOS A	0.6	15.9				
North: Eiterman Road													
Lane 1 ^d	53	2.0	1229	0.043	100	4.3	LOS A	0.2	5.6	Full	1600	0.0	0.0
Approach	53	2.0		0.043		4.3	LOS A	0.2	5.6				
West: Shier Rings Road													
Lane 1 ^d	736	2.0	1295	0.568	100	5.3	LOS A	5.1	128.5	Full	1600	0.0	0.0
Approach	736	2.0		0.568		5.3	LOS A	5.1	128.5				
Intersection	1115	2.0		0.568		5.8	LOS A	5.1	128.5				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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Timing Report, Sorted By Phase
 3: Eiterman Road & Shier Rings Road

04/23/2020

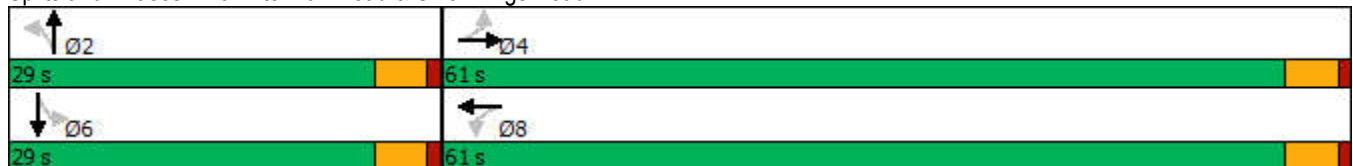


Phase Number	2	4	6	8
Movement	NBTL	EBTL	SBTL	WBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	Max	None	Max	None
Maximum Split (s)	29	61	29	61
Maximum Split (%)	32.2%	67.8%	32.2%	67.8%
Minimum Split (s)	22.5	22.5	22.5	22.5
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	7	7	7	7
Flash Dont Walk (s)	11	11	11	11
Dual Entry	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	29	0	29
End Time (s)	29	0	29	0
Yield/Force Off (s)	24.5	85.5	24.5	85.5
Yield/Force Off 170(s)	13.5	74.5	13.5	74.5
Local Start Time (s)	0	29	0	29
Local Yield (s)	24.5	85.5	24.5	85.5
Local Yield 170(s)	13.5	74.5	13.5	74.5

Intersection Summary

Cycle Length	90
Control Type	Semi Act-Uncoord
Natural Cycle	55

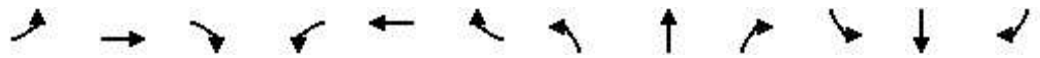
Splits and Phases: 3: Eiterman Road & Shier Rings Road



HCM 6th Signalized Intersection Summary

3: Eiterman Road & Shier Rings Road

04/23/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	95	559	43	32	98	2	1	77	96	1	44	4
Future Volume (veh/h)	95	559	43	32	98	2	1	77	96	1	44	4
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	103	608	47	35	107	2	1	84	104	1	48	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	635	745	58	218	796	15	657	314	389	528	704	59
Arrive On Green	0.43	0.43	0.43	0.43	0.43	0.43	0.41	0.41	0.41	0.41	0.41	0.41
Sat Flow, veh/h	1284	1714	132	778	1830	34	1352	760	941	1195	1703	142
Grp Volume(v), veh/h	103	0	655	35	0	109	1	0	188	1	0	52
Grp Sat Flow(s),veh/h/ln	1284	0	1847	778	0	1864	1352	0	1701	1195	0	1845
Q Serve(g_s), s	3.1	0.0	18.4	2.4	0.0	2.1	0.0	0.0	4.3	0.0	0.0	1.0
Cycle Q Clear(g_c), s	5.2	0.0	18.4	20.9	0.0	2.1	1.0	0.0	4.3	4.4	0.0	1.0
Prop In Lane	1.00		0.07	1.00		0.02	1.00		0.55	1.00		0.08
Lane Grp Cap(c), veh/h	635	0	803	218	0	811	657	0	703	528	0	763
V/C Ratio(X)	0.16	0.00	0.82	0.16	0.00	0.13	0.00	0.00	0.27	0.00	0.00	0.07
Avail Cap(c_a), veh/h	1301	0	1760	621	0	1777	657	0	703	528	0	763
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.6	0.0	14.7	23.8	0.0	10.1	10.8	0.0	11.5	12.9	0.0	10.5
Incr Delay (d2), s/veh	0.1	0.0	2.1	0.3	0.0	0.1	0.0	0.0	0.9	0.0	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	0.0	6.7	0.4	0.0	0.7	0.0	0.0	1.6	0.0	0.0	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.7	0.0	16.8	24.1	0.0	10.1	10.8	0.0	12.4	12.9	0.0	10.7
LnGrp LOS	B	A	B	C	A	B	B	A	B	B	A	B
Approach Vol, veh/h		758			144			189			53	
Approach Delay, s/veh		16.1			13.5			12.4			10.7	
Approach LOS		B			B			B			B	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.0		30.3		29.0		30.3				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		24.5		56.5		24.5		56.5				
Max Q Clear Time (g_c+I1), s		6.3		20.4		6.4		22.9				
Green Ext Time (p_c), s		0.9		5.4		0.2		0.8				
Intersection Summary												
HCM 6th Ctrl Delay				14.9								
HCM 6th LOS				B								

LANE LEVEL OF SERVICE

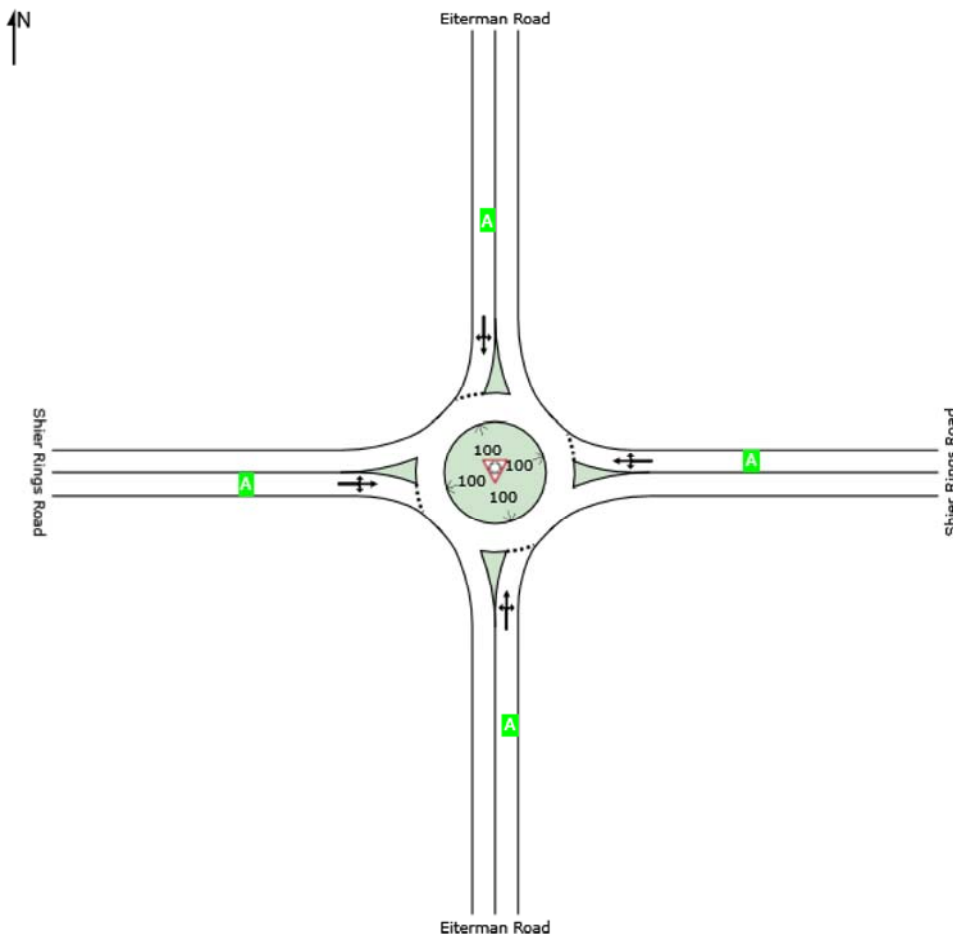
Lane Level of Service

 **Site: 101 [OY AM Build 1.0]**

Shier Rings Road & Eiterman Road
 2021 AM Peak Build with Improvements
 Environmental Factor 1.0
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	A	A	A	A



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 Site: 101 [OY AM Build 1.0]

Shier Rings Road & Eiterman Road
 2021 AM Peak Build with Improvements
 Environmental Factor 1.0
 Roundabout

Lane Use and Performance													
	Demand Flows		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %						Veh	Dist ft				
South: Eiterman Road													
Lane 1 ^d	189	2.0	742	0.255	100	8.5	LOS A	1.7	42.2	Full	1600	0.0	0.0
Approach	189	2.0		0.255		8.5	LOS A	1.7	42.2				
East: Shier Rings Road													
Lane 1 ^d	143	2.0	1176	0.122	100	6.0	LOS A	0.7	16.7	Full	1600	0.0	0.0
Approach	143	2.0		0.122		6.0	LOS A	0.7	16.7				
North: Eiterman Road													
Lane 1 ^d	53	2.0	1222	0.044	100	4.4	LOS A	0.2	5.7	Full	1600	0.0	0.0
Approach	53	2.0		0.044		4.4	LOS A	0.2	5.7				
West: Shier Rings Road													
Lane 1 ^d	758	2.0	1295	0.585	100	5.3	LOS A	5.4	136.3	Full	1600	0.0	0.0
Approach	758	2.0		0.585		5.3	LOS A	5.4	136.3				
Intersection	1143	2.0		0.585		5.9	LOS A	5.4	136.3				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE LEVEL OF SERVICE

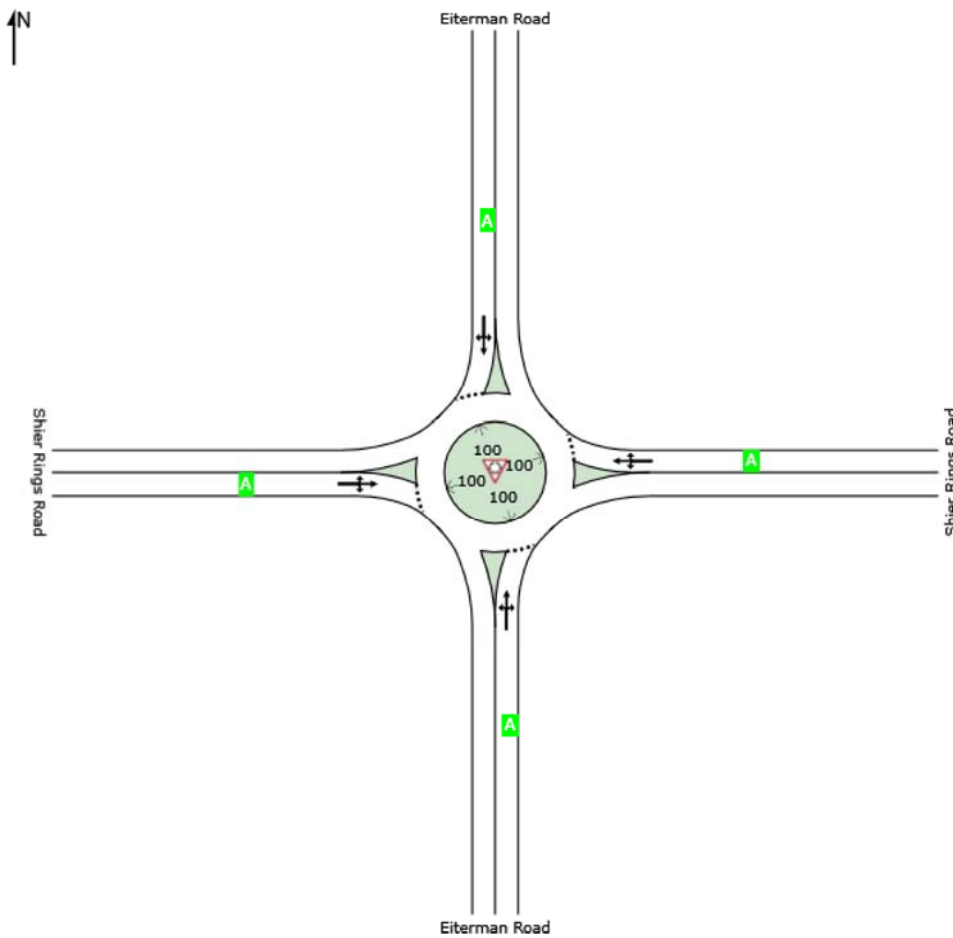
Lane Level of Service

 **Site: 101 [OY AM Build 1.1]**

Shier Rings Road & Eiterman Road
 2021 AM Peak Build with Improvements
 Environmental Factor 1.1
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	A	A	A	A



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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Project: P:\TRA\StructurePoint\Cosgray & Shier Rings Single-Family\Analysis\Capacity\Eiterman\Improvements\RBABE.F.=1.1\Shier Rings Rd &

LANE SUMMARY

 Site: 101 [OY AM Build 1.1]

Shier Rings Road & Eiterman Road
 2021 AM Peak Build with Improvements
 Environmental Factor 1.1
 Roundabout

Lane Use and Performance													
	Demand Flows		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %						Veh	Dist ft				
South: Eiterman Road													
Lane 1 ^d	189	2.0	624	0.303	100	9.4	LOS A	1.9	49.2	Full	1600	0.0	0.0
Approach	189	2.0		0.303		9.4	LOS A	1.9	49.2				
East: Shier Rings Road													
Lane 1 ^d	143	2.0	1047	0.137	100	6.2	LOS A	0.7	18.7	Full	1600	0.0	0.0
Approach	143	2.0		0.137		6.2	LOS A	0.7	18.7				
North: Eiterman Road													
Lane 1 ^d	53	2.0	1093	0.049	100	4.5	LOS A	0.2	6.3	Full	1600	0.0	0.0
Approach	53	2.0		0.049		4.5	LOS A	0.2	6.3				
West: Shier Rings Road													
Lane 1 ^d	758	2.0	1166	0.650	100	5.6	LOS A	6.7	170.1	Full	1600	0.0	0.0
Approach	758	2.0		0.650		5.6	LOS A	6.7	170.1				
Intersection	1143	2.0		0.650		6.2	LOS A	6.7	170.1				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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Timing Report, Sorted By Phase
 3: Eiterman Road & Shier Rings Road

04/23/2020

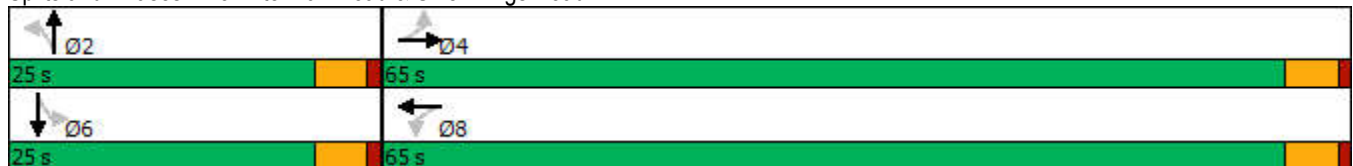


Phase Number	2	4	6	8
Movement	NBTL	EBTL	SBTL	WBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	Max	None	Max	None
Maximum Split (s)	25	65	25	65
Maximum Split (%)	27.8%	72.2%	27.8%	72.2%
Minimum Split (s)	22.5	22.5	22.5	22.5
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	7	7	7	7
Flash Dont Walk (s)	11	11	11	11
Dual Entry	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	25	0	25
End Time (s)	25	0	25	0
Yield/Force Off (s)	20.5	85.5	20.5	85.5
Yield/Force Off 170(s)	9.5	74.5	9.5	74.5
Local Start Time (s)	0	25	0	25
Local Yield (s)	20.5	85.5	20.5	85.5
Local Yield 170(s)	9.5	74.5	9.5	74.5

Intersection Summary

Cycle Length	90
Control Type	Semi Act-Uncoord
Natural Cycle	60

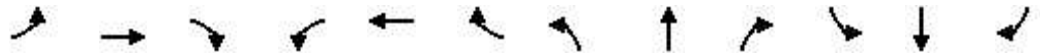
Splits and Phases: 3: Eiterman Road & Shier Rings Road



HCM 6th Signalized Intersection Summary

3: Eiterman Road & Shier Rings Road

04/23/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	171	7	144	734	2	22	67	98	1	94	71
Future Volume (veh/h)	12	171	7	144	734	2	22	67	98	1	94	71
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	13	186	8	157	798	2	24	73	107	1	102	77
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	224	920	40	665	964	2	430	230	337	427	332	251
Arrive On Green	0.52	0.52	0.52	0.52	0.52	0.52	0.34	0.34	0.34	0.34	0.34	0.34
Sat Flow, veh/h	680	1780	77	1189	1865	5	1205	685	1004	1204	989	747
Grp Volume(v), veh/h	13	0	194	157	0	800	24	0	180	1	0	179
Grp Sat Flow(s),veh/h/ln	680	0	1857	1189	0	1870	1205	0	1690	1204	0	1736
Q Serve(g_s), s	1.0	0.0	3.4	5.0	0.0	22.1	0.9	0.0	4.8	0.0	0.0	4.7
Cycle Q Clear(g_c), s	23.1	0.0	3.4	8.5	0.0	22.1	5.6	0.0	4.8	4.9	0.0	4.7
Prop In Lane	1.00		0.04	1.00		0.00	1.00		0.59	1.00		0.43
Lane Grp Cap(c), veh/h	224	0	960	665	0	966	430	0	567	427	0	583
V/C Ratio(X)	0.06	0.00	0.20	0.24	0.00	0.83	0.06	0.00	0.32	0.00	0.00	0.31
Avail Cap(c_a), veh/h	546	0	1839	1229	0	1852	430	0	567	427	0	583
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.2	0.0	8.0	10.2	0.0	12.5	17.1	0.0	15.1	16.9	0.0	15.0
Incr Delay (d2), s/veh	0.1	0.0	0.1	0.2	0.0	1.9	0.2	0.0	1.5	0.0	0.0	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	1.1	1.1	0.0	7.6	0.3	0.0	1.9	0.0	0.0	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.3	0.0	8.1	10.4	0.0	14.3	17.3	0.0	16.5	16.9	0.0	16.4
LnGrp LOS	C	A	A	B	A	B	B	A	B	B	A	B
Approach Vol, veh/h		207			957			204				180
Approach Delay, s/veh		9.0			13.7			16.6				16.4
Approach LOS		A			B			B				B
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		25.0		36.1		25.0		36.1				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		20.5		60.5		20.5		60.5				
Max Q Clear Time (g_c+I1), s		7.6		25.1		6.9		24.1				
Green Ext Time (p_c), s		0.8		1.2		0.7		7.5				
Intersection Summary												
HCM 6th Ctrl Delay				13.8								
HCM 6th LOS				B								

LANE LEVEL OF SERVICE

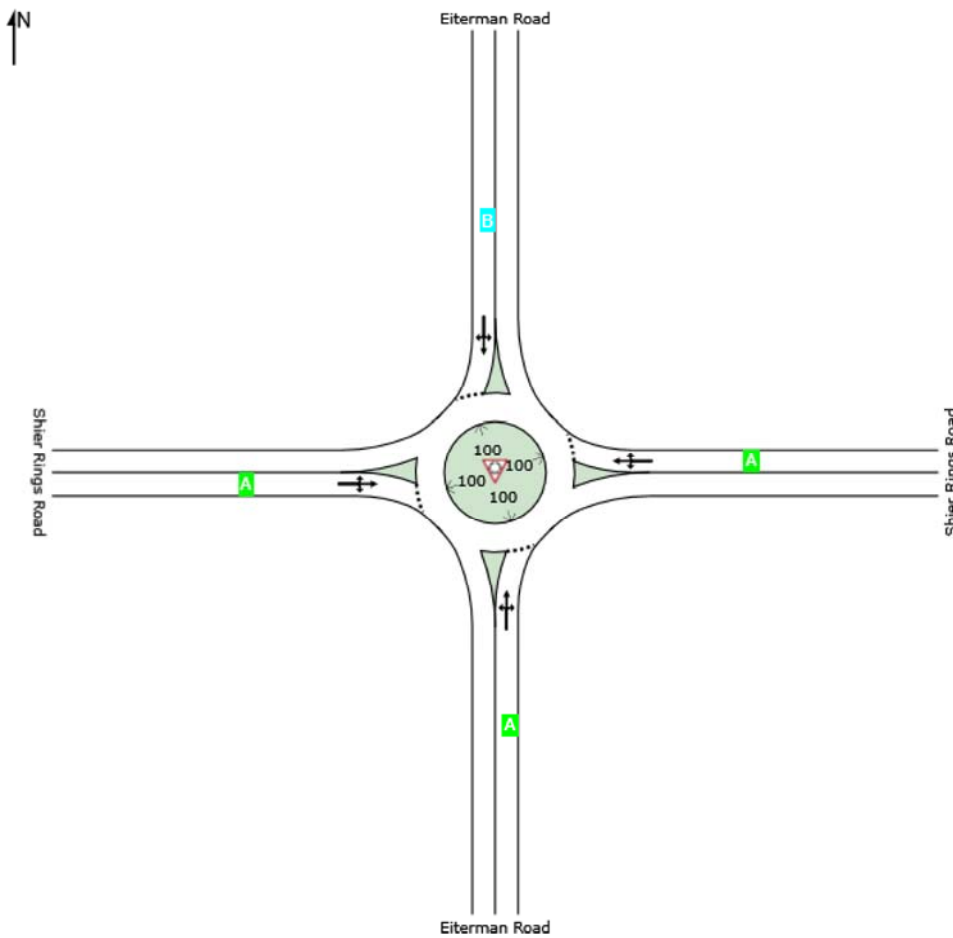
Lane Level of Service

 Site: 101 [OY PM No Build 1.0]

Shier Rings Road & Eiterman Road
 2021 PM Peak No Build with Improvements
 Environmental Factor 1.0
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	A	B	A	A



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 **Site: 101 [OY PM No Build 1.0]**

Shier Rings Road & Eiterman Road
 2021 PM Peak No Build with Improvements
 Environmental Factor 1.0
 Roundabout

Lane Use and Performance													
	Demand Flows		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %						Veh	Dist ft				
South: Eiterman Road													
Lane 1 ^d	203	2.0	1157	0.176	100	5.5	LOS A	1.0	25.8	Full	1600	0.0	0.0
Approach	203	2.0		0.176		5.5	LOS A	1.0	25.8				
East: Shier Rings Road													
Lane 1 ^d	957	2.0	1258	0.760	100	6.2	LOS A	10.0	253.1	Full	1600	0.0	0.0
Approach	957	2.0		0.760		6.2	LOS A	10.0	253.1				
North: Eiterman Road													
Lane 1 ^d	180	2.0	489	0.369	100	12.3	LOS B	2.8	70.8	Full	1600	0.0	0.0
Approach	180	2.0		0.369		12.3	LOS B	2.8	70.8				
West: Shier Rings Road													
Lane 1 ^d	207	2.0	1104	0.187	100	5.4	LOS A	1.1	27.4	Full	1600	0.0	0.0
Approach	207	2.0		0.187		5.4	LOS A	1.1	27.4				
Intersection	1547	2.0		0.760		6.7	LOS A	10.0	253.1				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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Timing Report, Sorted By Phase
 3: Eiterman Road & Shier Rings Road

04/23/2020

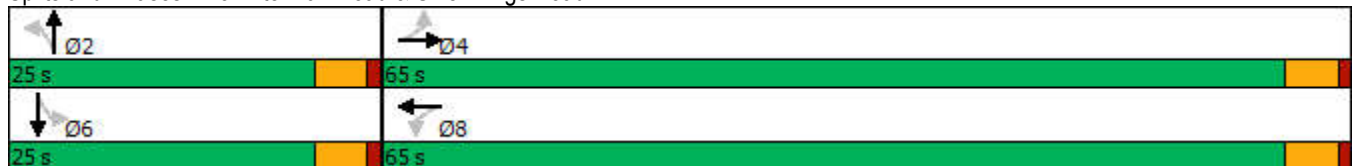


Phase Number	2	4	6	8
Movement	NBTL	EBTL	SBTL	WBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	Max	None	Max	None
Maximum Split (s)	25	65	25	65
Maximum Split (%)	27.8%	72.2%	27.8%	72.2%
Minimum Split (s)	22.5	22.5	22.5	22.5
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	7	7	7	7
Flash Dont Walk (s)	11	11	11	11
Dual Entry	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	25	0	25
End Time (s)	25	0	25	0
Yield/Force Off (s)	20.5	85.5	20.5	85.5
Yield/Force Off 170(s)	9.5	74.5	9.5	74.5
Local Start Time (s)	0	25	0	25
Local Yield (s)	20.5	85.5	20.5	85.5
Local Yield 170(s)	9.5	74.5	9.5	74.5

Intersection Summary

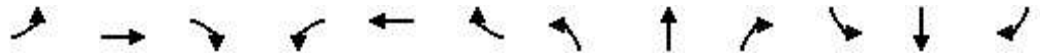
Cycle Length	90
Control Type	Semi Act-Uncoord
Natural Cycle	60

Splits and Phases: 3: Eiterman Road & Shier Rings Road



HCM 6th Signalized Intersection Summary
 3: Eiterman Road & Shier Rings Road

04/23/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	180	7	144	751	2	22	67	98	1	94	72
Future Volume (veh/h)	13	180	7	144	751	2	22	67	98	1	94	72
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	14	196	8	157	816	2	24	73	107	1	102	78
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	220	938	38	666	980	2	419	226	331	416	324	248
Arrive On Green	0.53	0.53	0.53	0.53	0.53	0.53	0.33	0.33	0.33	0.33	0.33	0.33
Sat Flow, veh/h	668	1784	73	1178	1865	5	1204	685	1004	1204	983	752
Grp Volume(v), veh/h	14	0	204	157	0	818	24	0	180	1	0	180
Grp Sat Flow(s),veh/h/ln	668	0	1857	1178	0	1870	1204	0	1690	1204	0	1735
Q Serve(g_s), s	1.1	0.0	3.6	5.1	0.0	22.9	0.9	0.0	5.0	0.0	0.0	4.8
Cycle Q Clear(g_c), s	24.1	0.0	3.6	8.7	0.0	22.9	5.8	0.0	5.0	5.0	0.0	4.8
Prop In Lane	1.00		0.04	1.00		0.00	1.00		0.59	1.00		0.43
Lane Grp Cap(c), veh/h	220	0	976	666	0	983	419	0	557	416	0	572
V/C Ratio(X)	0.06	0.00	0.21	0.24	0.00	0.83	0.06	0.00	0.32	0.00	0.00	0.31
Avail Cap(c_a), veh/h	519	0	1807	1193	0	1819	419	0	557	416	0	572
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.6	0.0	7.9	10.2	0.0	12.4	17.7	0.0	15.6	17.5	0.0	15.6
Incr Delay (d2), s/veh	0.1	0.0	0.1	0.2	0.0	1.9	0.3	0.0	1.5	0.0	0.0	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	1.2	1.1	0.0	7.9	0.3	0.0	1.9	0.0	0.0	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.7	0.0	8.0	10.4	0.0	14.4	18.0	0.0	17.2	17.5	0.0	17.0
LnGrp LOS	C	A	A	B	A	B	B	A	B	B	A	B
Approach Vol, veh/h		218			975			204				181
Approach Delay, s/veh		8.9			13.7			17.3				17.0
Approach LOS		A			B			B				B
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		25.0		37.2		25.0		37.2				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		20.5		60.5		20.5		60.5				
Max Q Clear Time (g_c+I1), s		7.8		26.1		7.0		24.9				
Green Ext Time (p_c), s		0.8		1.3		0.7		7.7				
Intersection Summary												
HCM 6th Ctrl Delay				13.9								
HCM 6th LOS				B								

LANE LEVEL OF SERVICE

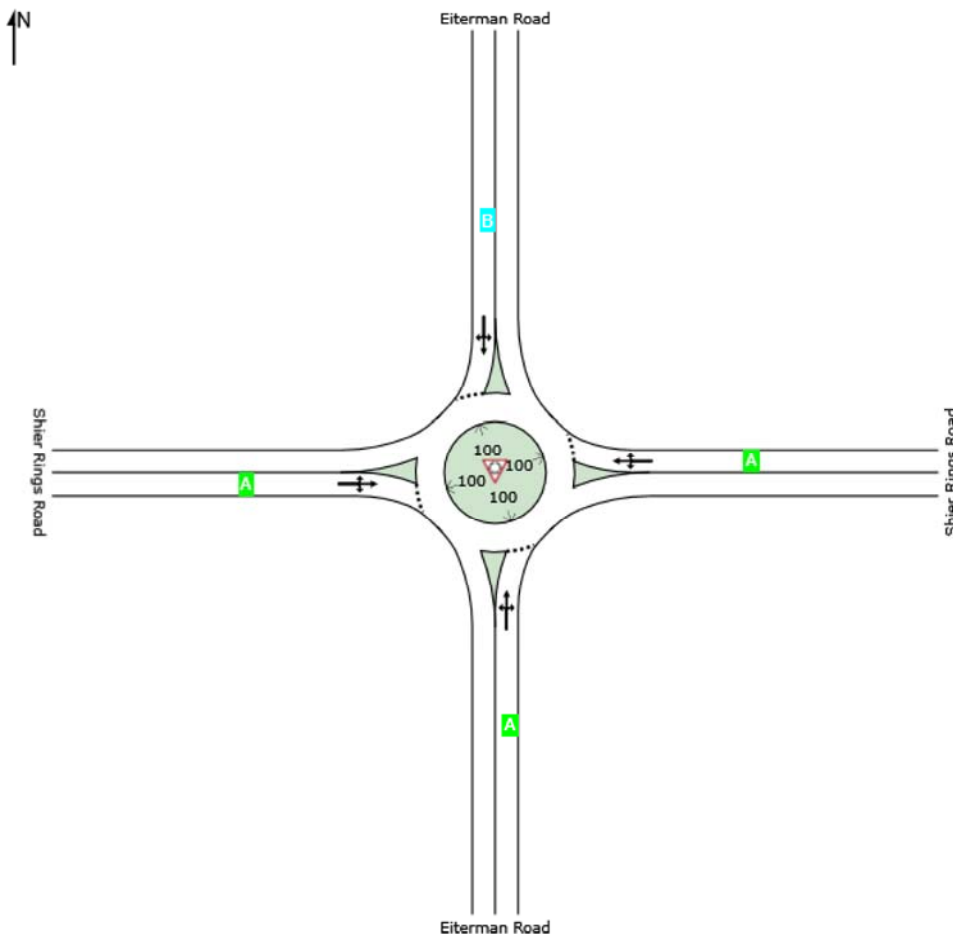
Lane Level of Service

 **Site: 101 [OY PM Build 1.0]**

Shier Rings Road & Eiterman Road
 2021 PM Peak Build with Improvements
 Environmental Factor 1.0
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	A	B	A	A



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

LANE SUMMARY

 Site: 101 [OY PM Build 1.0]

Shier Rings Road & Eiterman Road
 2021 PM Peak Build with Improvements
 Environmental Factor 1.0
 Roundabout

Lane Use and Performance													
	Demand Flows		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Queue Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %											
South: Eiterman Road													
Lane 1 ^d	203	2.0	1146	0.177	100	5.5	LOS A	1.0	26.1	Full	1600	0.0	0.0
Approach	203	2.0		0.177		5.5	LOS A	1.0	26.1				
East: Shier Rings Road													
Lane 1 ^d	975	2.0	1256	0.776	100	6.2	LOS A	10.6	268.1	Full	1600	0.0	0.0
Approach	975	2.0		0.776		6.2	LOS A	10.6	268.1				
North: Eiterman Road													
Lane 1 ^d	182	2.0	469	0.387	100	13.1	LOS B	3.0	76.5	Full	1600	0.0	0.0
Approach	182	2.0		0.387		13.1	LOS B	3.0	76.5				
West: Shier Rings Road													
Lane 1 ^d	217	2.0	1103	0.197	100	5.4	LOS A	1.1	29.2	Full	1600	0.0	0.0
Approach	217	2.0		0.197		5.4	LOS A	1.1	29.2				
Intersection	1577	2.0		0.776		6.8	LOS A	10.6	268.1				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE LEVEL OF SERVICE

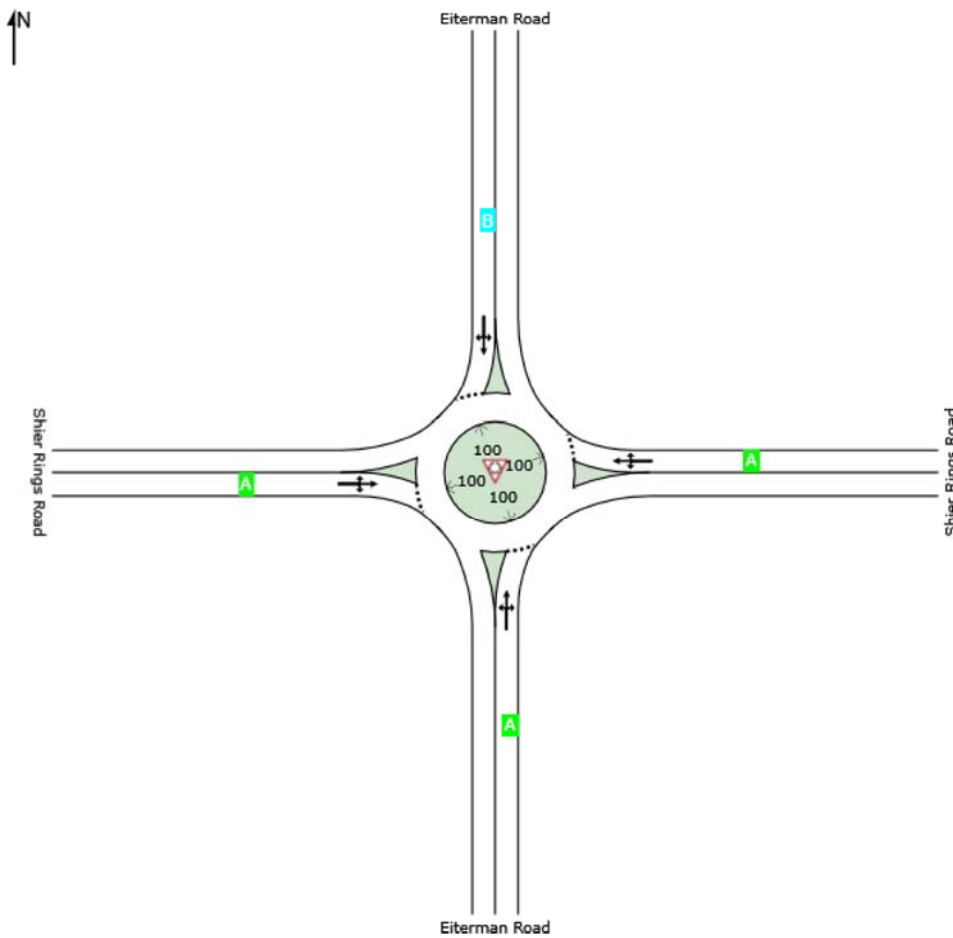
Lane Level of Service

 **Site: 101 [OY PM Build 1.1]**

Shier Rings Road & Eiterman Road
 2021 PM Peak Build with Improvements
 Environmental Factor 1.1
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	A	B	A	A



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 Site: 101 [OY PM Build 1.1]

Shier Rings Road & Eiterman Road
2021 PM Peak Build with Improvements
Environmental Factor 1.1
Roundabout

Lane Use and Performance													
	Demand Flows		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %						Veh	Dist ft				
South: Eiterman Road													
Lane 1 ^d	203	2.0	1017	0.200	100	5.8	LOS A	1.2	29.5	Full	1600	0.0	0.0
Approach	203	2.0		0.200		5.8	LOS A	1.2	29.5				
East: Shier Rings Road													
Lane 1 ^d	975	2.0	1127	0.865	100	7.8	LOS A	16.0	405.3	Full	1600	0.0	0.0
Approach	975	2.0		0.865		7.8	LOS A	16.0	405.3				
North: Eiterman Road													
Lane 1 ^d	182	2.0	348	0.522	100	19.1	LOS B	4.4	112.6	Full	1600	0.0	0.0
Approach	182	2.0		0.522		19.1	LOS B	4.4	112.6				
West: Shier Rings Road													
Lane 1 ^d	217	2.0	967	0.225	100	5.7	LOS A	1.3	34.1	Full	1600	0.0	0.0
Approach	217	2.0		0.225		5.7	LOS A	1.3	34.1				
Intersection	1577	2.0		0.865		8.5	LOS A	16.0	405.3				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE LEVEL OF SERVICE

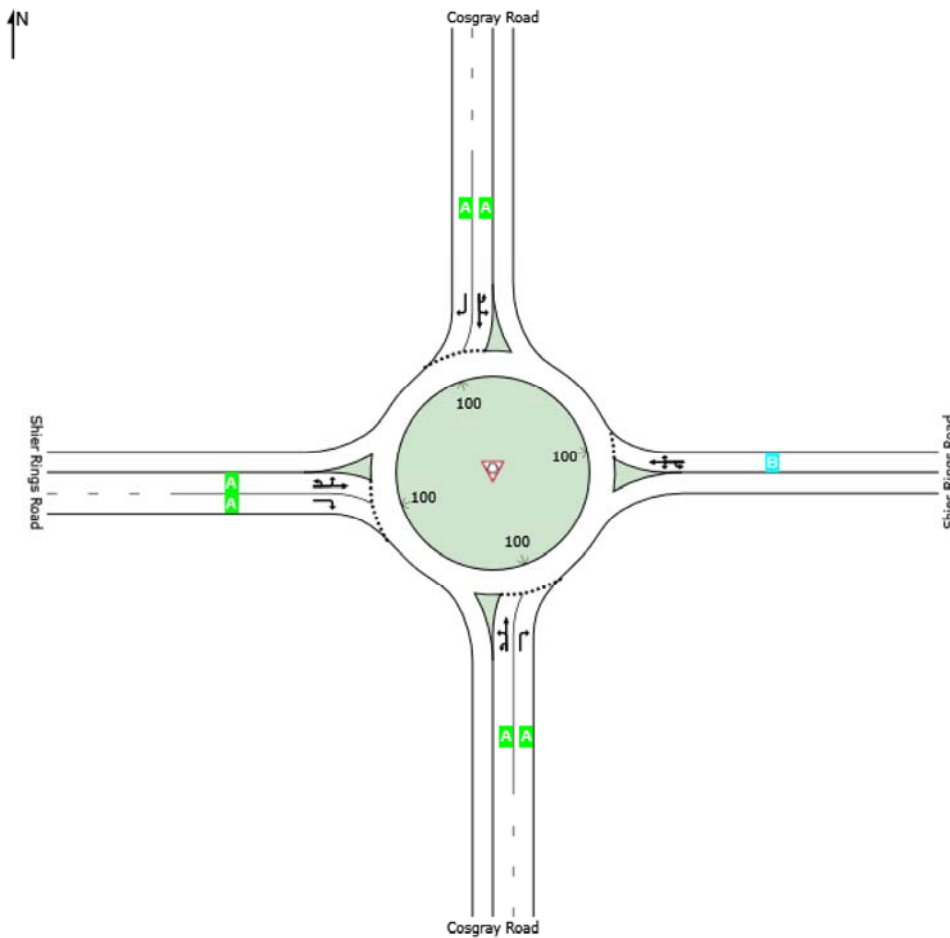
Lane Level of Service

 **Site: 101 [HY AM No Build 1.0]**

Shier Rings Road & Cosgray Road
 2031 AM Peak No Build with Improvements
 Environmental Factor 1.0
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	B	A	A	A



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 Site: 101 [HY AM No Build 1.0]

Shier Rings Road & Cosgray Road
 2031 AM Peak No Build with Improvements
 Environmental Factor 1.0
 Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist ft				
South: Cosgray Road													
Lane 1	503	2.0	1218	0.413	100	4.7	LOS A	2.9	74.5	Full	1600	0.0	0.0
Lane 2 ^d	813	2.0	1469	0.553	100	5.0	LOS A	4.8	122.1	Full	1600	0.0	0.0
Approach	1316	2.0		0.553		4.9	LOS A	4.8	122.1				
East: Shier Rings Road													
Lane 1 ^d	120	2.0	896	0.133	100	11.3	LOS B	0.8	19.8	Full	1600	0.0	0.0
Approach	120	2.0		0.133		11.3	LOS B	0.8	19.8				
North: Cosgray Road													
Lane 1 ^d	317	2.0	1487	0.213	100	6.7	LOS A	1.4	34.8	Full	1600	0.0	0.0
Lane 2	3	2.0	1010	0.003	100	4.7	LOS A	0.0	0.4	Full	1600	0.0	0.0
Approach	321	2.0		0.213		6.7	LOS A	1.4	34.8				
West: Shier Rings Road													
Lane 1 ^d	9	2.0	1230	0.007	100	6.8	LOS A	0.0	1.0	Full	1600	0.0	0.0
Lane 2	5	2.0	974	0.006	100	5.9	LOS A	0.0	0.7	Full	1600	0.0	0.0
Approach	14	2.0		0.007		6.5	LOS A	0.0	1.0				
Intersection	1771	2.0		0.553		5.7	LOS A	4.8	122.1				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE LEVEL OF SERVICE

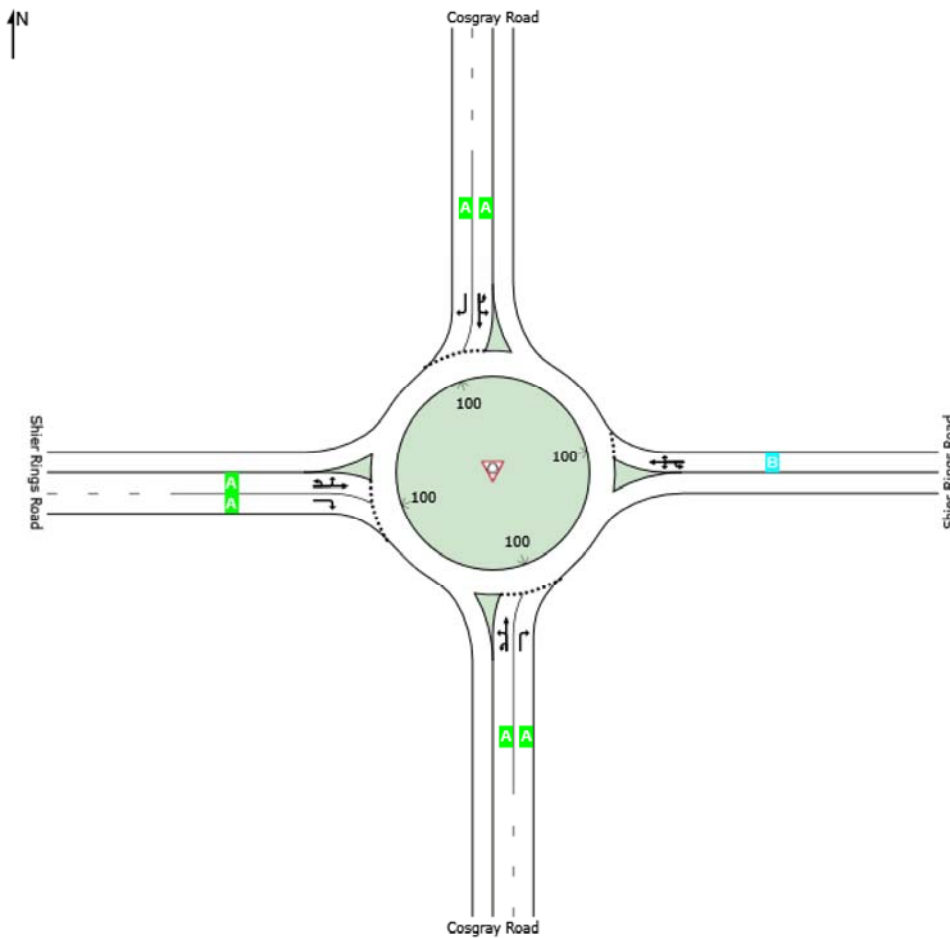
Lane Level of Service

 **Site: 101 [HY AM No Build 1.1]**

Shier Rings Road & Cosgray Road
 2031 AM Peak No Build with Improvements
 Environmental Factor 1.1
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	B	A	A	A



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 Site: 101 [HY AM No Build 1.1]

Shier Rings Road & Cosgray Road
 2031 AM Peak No Build with Improvements
 Environmental Factor 1.1
 Roundabout

Lane Use and Performance													
	Demand Flows		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %						Veh	Dist ft				
South: Cosgray Road													
Lane 1	503	2.0	1124	0.448	100	4.9	LOS A	3.3	83.5	Full	1600	0.0	0.0
Lane 2 ^d	813	2.0	1316	0.618	100	5.3	LOS A	5.9	148.9	Full	1600	0.0	0.0
Approach	1316	2.0		0.618		5.2	LOS A	5.9	148.9				
East: Shier Rings Road													
Lane 1 ^d	120	2.0	775	0.154	100	11.9	LOS B	0.9	22.3	Full	1600	0.0	0.0
Approach	120	2.0		0.154		11.9	LOS B	0.9	22.3				
North: Cosgray Road													
Lane 1 ^d	317	2.0	1336	0.238	100	6.8	LOS A	1.5	39.1	Full	1600	0.0	0.0
Lane 2	3	2.0	862	0.004	100	4.9	LOS A	0.0	0.5	Full	1600	0.0	0.0
Approach	321	2.0		0.238		6.8	LOS A	1.5	39.1				
West: Shier Rings Road													
Lane 1 ^d	9	2.0	1077	0.008	100	7.1	LOS A	0.0	1.1	Full	1600	0.0	0.0
Lane 2	5	2.0	885	0.006	100	6.2	LOS A	0.0	0.8	Full	1600	0.0	0.0
Approach	14	2.0		0.008		6.7	LOS A	0.0	1.1				
Intersection	1771	2.0		0.618		5.9	LOS A	5.9	148.9				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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Timing Report, Sorted By Phase
 3: Eiterman Road & Shier Rings Road

04/23/2020

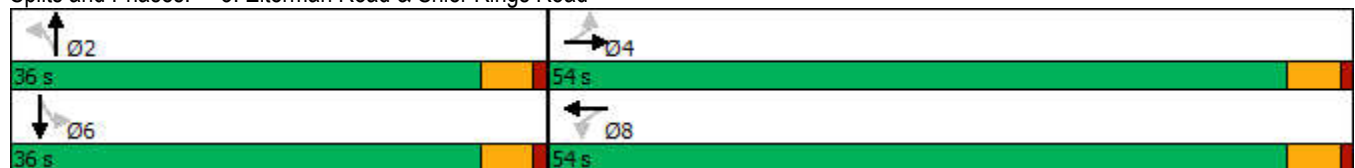


Phase Number	2	4	6	8
Movement	NBTL	EBTL	SBTL	WBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	Max	None	Max	None
Maximum Split (s)	36	54	36	54
Maximum Split (%)	40.0%	60.0%	40.0%	60.0%
Minimum Split (s)	22.5	22.5	22.5	22.5
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	7	7	7	7
Flash Dont Walk (s)	11	11	11	11
Dual Entry	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	36	0	36
End Time (s)	36	0	36	0
Yield/Force Off (s)	31.5	85.5	31.5	85.5
Yield/Force Off 170(s)	20.5	74.5	20.5	74.5
Local Start Time (s)	0	36	0	36
Local Yield (s)	31.5	85.5	31.5	85.5
Local Yield 170(s)	20.5	74.5	20.5	74.5

Intersection Summary

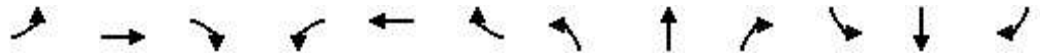
Cycle Length	90
Control Type	Semi Act-Uncoord
Natural Cycle	60

Splits and Phases: 3: Eiterman Road & Shier Rings Road



HCM 6th Signalized Intersection Summary
 3: Eiterman Road & Shier Rings Road

04/23/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	249	594	46	35	100	22	1	219	114	7	109	42
Future Volume (veh/h)	249	594	46	35	100	22	1	219	114	7	109	42
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	271	646	50	38	109	24	1	238	124	8	118	46
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	603	763	59	181	661	146	555	500	260	389	553	215
Arrive On Green	0.45	0.45	0.45	0.45	0.45	0.45	0.43	0.43	0.43	0.43	0.43	0.43
Sat Flow, veh/h	1257	1714	133	749	1485	327	1222	1158	603	1020	1281	499
Grp Volume(v), veh/h	271	0	696	38	0	133	1	0	362	8	0	164
Grp Sat Flow(s),veh/h/ln	1257	0	1846	749	0	1812	1222	0	1762	1020	0	1780
Q Serve(g_s), s	12.0	0.0	24.5	3.5	0.0	3.2	0.0	0.0	10.7	0.4	0.0	4.2
Cycle Q Clear(g_c), s	15.2	0.0	24.5	28.0	0.0	3.2	4.2	0.0	10.7	11.1	0.0	4.2
Prop In Lane	1.00		0.07	1.00		0.18	1.00		0.34	1.00		0.28
Lane Grp Cap(c), veh/h	603	0	822	181	0	807	555	0	760	389	0	768
V/C Ratio(X)	0.45	0.00	0.85	0.21	0.00	0.16	0.00	0.00	0.48	0.02	0.00	0.21
Avail Cap(c_a), veh/h	895	0	1252	355	0	1228	555	0	760	389	0	768
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	16.7	0.0	18.0	30.5	0.0	12.1	14.3	0.0	14.9	18.8	0.0	13.0
Incr Delay (d2), s/veh	0.5	0.0	3.5	0.6	0.0	0.1	0.0	0.0	2.1	0.1	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	0.0	9.9	0.6	0.0	1.2	0.0	0.0	4.3	0.1	0.0	1.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.2	0.0	21.5	31.1	0.0	12.2	14.3	0.0	17.0	18.9	0.0	13.6
LnGrp LOS	B	A	C	C	A	B	B	A	B	B	A	B
Approach Vol, veh/h		967			171			363				172
Approach Delay, s/veh		20.3			16.4			17.0				13.9
Approach LOS		C			B			B				B
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		36.0		37.0		36.0		37.0				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		31.5		49.5		31.5		49.5				
Max Q Clear Time (g_c+I1), s		12.7		26.5		13.1		30.0				
Green Ext Time (p_c), s		2.1		6.0		0.8		0.9				
Intersection Summary												
HCM 6th Ctrl Delay				18.5								
HCM 6th LOS				B								

LANE LEVEL OF SERVICE

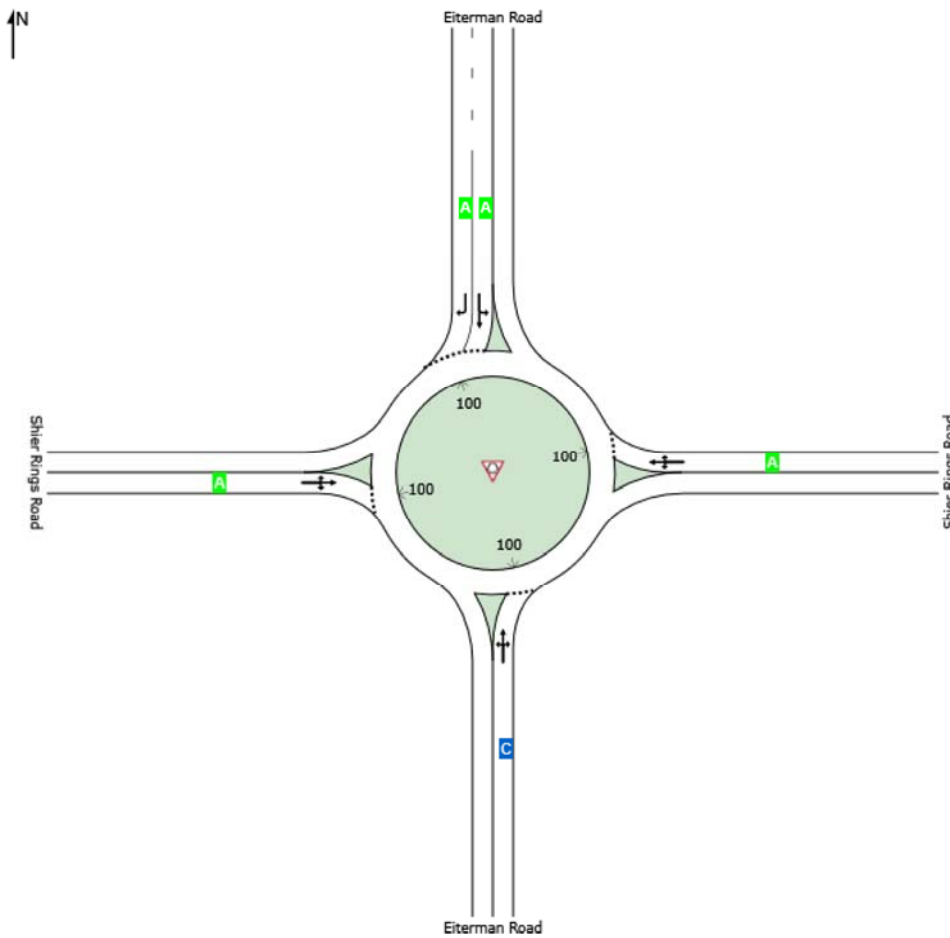
Lane Level of Service

 **Site: 101 [HY AM No Build 1.0]**

Shier Rings Road & Eiterman Road
 2031 AM Peak No Build with Improvements
 Environmental Factor 1.0
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	C	A	A	A	B



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 **Site: 101 [HY AM No Build 1.0]**

Shier Rings Road & Eiterman Road
 2031 AM Peak No Build with Improvements
 Environmental Factor 1.0
 Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist ft				
South: Eiterman Road													
Lane 1 ^d	363	2.0	493	0.737	100	24.2	LOS C	9.1	231.1	Full	1600	0.0	0.0
Approach	363	2.0		0.737		24.2	LOS C	9.1	231.1				
East: Shier Rings Road													
Lane 1 ^d	171	2.0	888	0.192	100	7.9	LOS A	1.2	29.7	Full	1600	0.0	0.0
Approach	171	2.0		0.192		7.9	LOS A	1.2	29.7				
North: Eiterman Road													
Lane 1 ^d	126	2.0	1444	0.087	100	4.5	LOS A	0.5	13.0	Full	1600	0.0	0.0
Lane 2	46	2.0	1080	0.042	100	4.8	LOS A	0.2	5.7	Full	1600	0.0	0.0
Approach	172	2.0		0.087		4.6	LOS A	0.5	13.0				
West: Shier Rings Road													
Lane 1 ^d	966	2.0	1205	0.802	100	8.7	LOS A	11.8	299.3	Full	1600	0.0	0.0
Approach	966	2.0		0.802		8.7	LOS A	11.8	299.3				
Intersection	1672	2.0		0.802		11.6	LOS B	11.8	299.3				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE LEVEL OF SERVICE

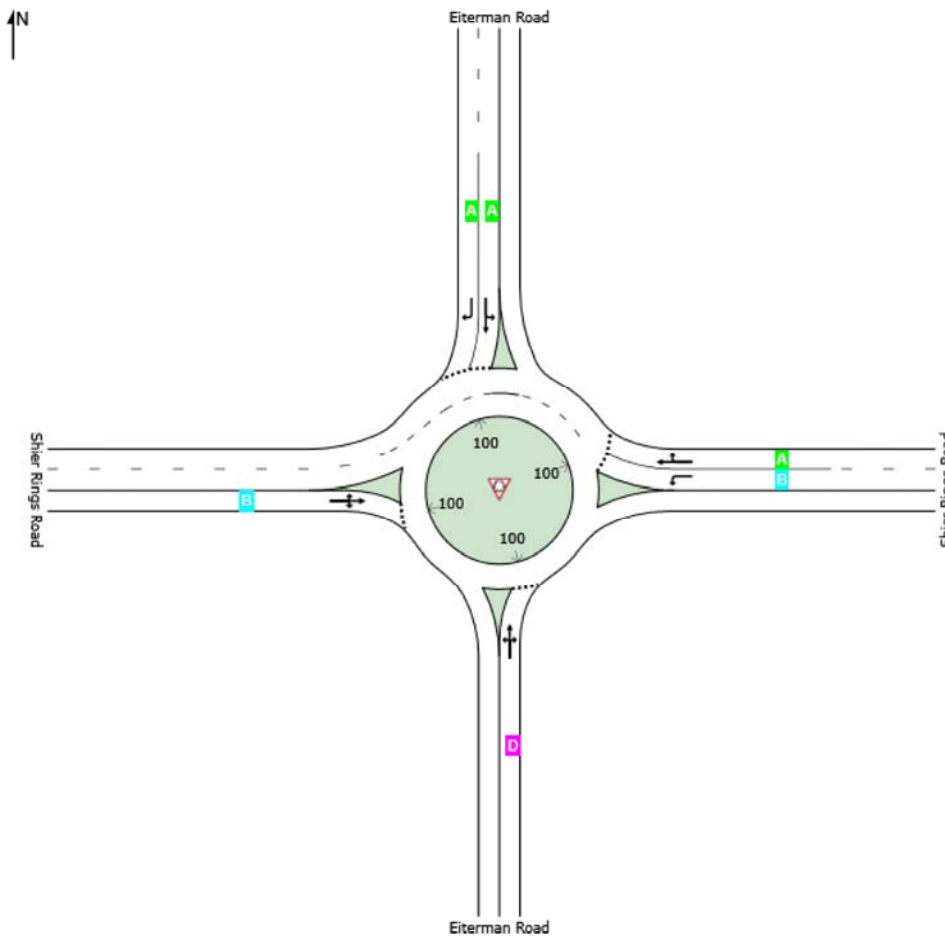
Lane Level of Service

 **Site: 101 [HY AM No Build 1.1]**

Shier Rings Road & Eiterman Road
 2031 AM Peak No Build with Improvements
 Environmental Factor 1.1
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	D	A	A	B	C



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 **Site: 101 [HY AM No Build 1.1]**

Shier Rings Road & Eiterman Road
 2031 AM Peak No Build with Improvements
 Environmental Factor 1.1
 Roundabout

Lane Use and Performance													
	Demand Flows		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %						Veh	Dist ft				
South: Eiterman Road													
Lane 1 ^d	363	2.0	380	0.956	100	54.7	LOS D	17.0	431.9	Full	1600	0.0	0.0
Approach	363	2.0		0.956		54.7	LOS D	17.0	431.9				
East: Shier Rings Road													
Lane 1	38	2.0	620	0.061	100	13.6	LOS B	0.3	8.1	Full	1600	0.0	0.0
Lane 2 ^d	133	2.0	965	0.137	100	6.2	LOS A	0.8	21.5	Full	1600	0.0	0.0
Approach	171	2.0		0.137		7.8	LOS A	0.8	21.5				
North: Eiterman Road													
Lane 1 ^d	126	2.0	1121	0.112	100	4.6	LOS A	0.5	13.1	Full	1600	0.0	0.0
Lane 2	46	2.0	815	0.056	100	5.0	LOS A	0.2	5.9	Full	1600	0.0	0.0
Approach	172	2.0		0.112		4.7	LOS A	0.5	13.1				
West: Shier Rings Road													
Lane 1 ^d	966	2.0	1078	0.897	100	13.7	LOS B	20.7	525.5	Full	1600	0.0	0.0
Approach	966	2.0		0.897		13.7	LOS B	20.7	525.5				
Intersection	1672	2.0		0.956		21.1	LOS C	20.7	525.5				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE LEVEL OF SERVICE

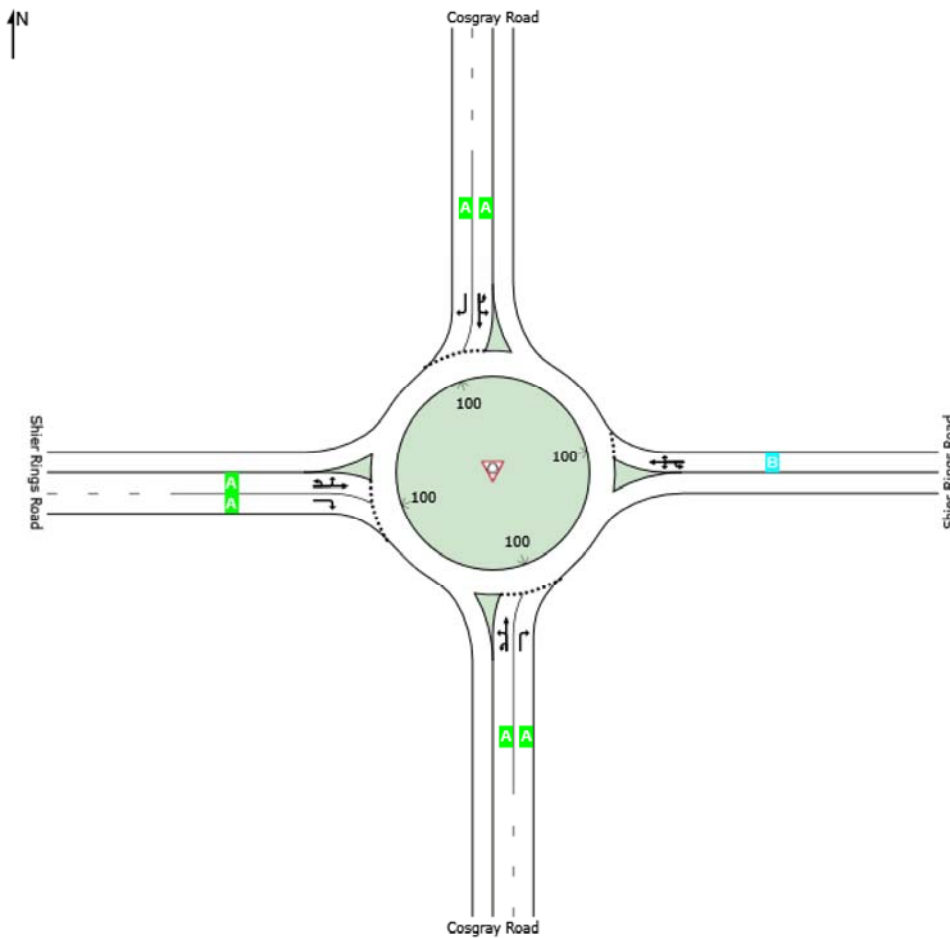
Lane Level of Service

 **Site: 101 [HY AM Build 1.0]**

Shier Rings Road & Cosgray Road
 2031 AM Peak Build with Improvements
 Environmental Factor 1.0
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	B	A	A	A



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 Site: 101 [HY AM Build 1.0]

Shier Rings Road & Cosgray Road
 2031 AM Peak Build with Improvements
 Environmental Factor 1.0
 Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist ft				
South: Cosgray Road													
Lane 1	503	2.0	1217	0.413	100	4.7	LOS A	2.9	74.6	Full	1600	0.0	0.0
Lane 2 ^d	814	2.0	1469	0.554	100	5.0	LOS A	4.8	122.5	Full	1600	0.0	0.0
Approach	1317	2.0		0.554		4.9	LOS A	4.8	122.5				
East: Shier Rings Road													
Lane 1 ^d	122	2.0	896	0.136	100	11.4	LOS B	0.8	20.2	Full	1600	0.0	0.0
Approach	122	2.0		0.136		11.4	LOS B	0.8	20.2				
North: Cosgray Road													
Lane 1 ^d	317	2.0	1484	0.214	100	6.7	LOS A	1.4	34.9	Full	1600	0.0	0.0
Lane 2	3	2.0	1008	0.003	100	4.7	LOS A	0.0	0.4	Full	1600	0.0	0.0
Approach	321	2.0		0.214		6.7	LOS A	1.4	34.9				
West: Shier Rings Road													
Lane 1 ^d	9	2.0	1228	0.007	100	6.8	LOS A	0.0	1.0	Full	1600	0.0	0.0
Lane 2	5	2.0	972	0.006	100	5.9	LOS A	0.0	0.7	Full	1600	0.0	0.0
Approach	14	2.0		0.007		6.5	LOS A	0.0	1.0				
Intersection	1774	2.0		0.554		5.7	LOS A	4.8	122.5				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE LEVEL OF SERVICE

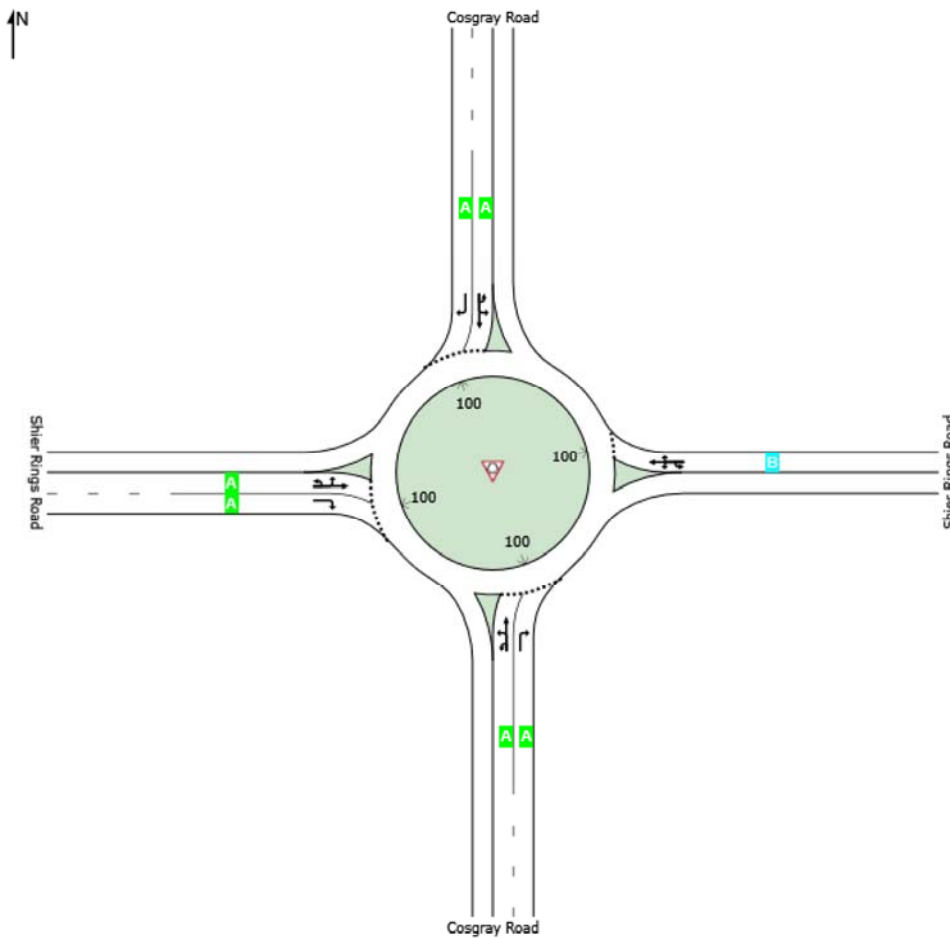
Lane Level of Service

 Site: 101 [HY AM Build 1.1]

Shier Rings Road & Cosgray Road
 2031 AM Peak Build with Improvements
 Environmental Factor 1.1
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	B	A	A	A



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 Site: 101 [HY AM Build 1.1]

Shier Rings Road & Cosgray Road
 2031 AM Peak Build with Improvements
 Environmental Factor 1.1
 Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist ft				
South: Cosgray Road													
Lane 1	503	2.0	1123	0.448	100	4.9	LOS A	3.3	83.6	Full	1600	0.0	0.0
Lane 2 ^d	814	2.0	1316	0.619	100	5.3	LOS A	5.9	149.5	Full	1600	0.0	0.0
Approach	1317	2.0		0.619		5.2	LOS A	5.9	149.5				
East: Shier Rings Road													
Lane 1 ^d	122	2.0	774	0.157	100	11.9	LOS B	0.9	22.8	Full	1600	0.0	0.0
Approach	122	2.0		0.157		11.9	LOS B	0.9	22.8				
North: Cosgray Road													
Lane 1 ^d	317	2.0	1333	0.238	100	6.8	LOS A	1.5	39.1	Full	1600	0.0	0.0
Lane 2	3	2.0	860	0.004	100	4.9	LOS A	0.0	0.5	Full	1600	0.0	0.0
Approach	321	2.0		0.238		6.8	LOS A	1.5	39.1				
West: Shier Rings Road													
Lane 1 ^d	9	2.0	1076	0.008	100	7.1	LOS A	0.0	1.1	Full	1600	0.0	0.0
Lane 2	5	2.0	883	0.006	100	6.2	LOS A	0.0	0.8	Full	1600	0.0	0.0
Approach	14	2.0		0.008		6.7	LOS A	0.0	1.1				
Intersection	1774	2.0		0.619		5.9	LOS A	5.9	149.5				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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Timing Report, Sorted By Phase

3: Eiterman Road & Shier Rings Road

04/23/2020

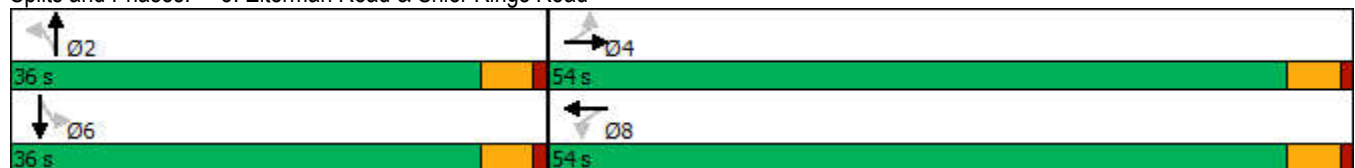


Phase Number	2	4	6	8
Movement	NBTL	EBTL	SBTL	WBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	Max	None	Max	None
Maximum Split (s)	36	54	36	54
Maximum Split (%)	40.0%	60.0%	40.0%	60.0%
Minimum Split (s)	22.5	22.5	22.5	22.5
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	7	7	7	7
Flash Dont Walk (s)	11	11	11	11
Dual Entry	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	36	0	36
End Time (s)	36	0	36	0
Yield/Force Off (s)	31.5	85.5	31.5	85.5
Yield/Force Off 170(s)	20.5	74.5	20.5	74.5
Local Start Time (s)	0	36	0	36
Local Yield (s)	31.5	85.5	31.5	85.5
Local Yield 170(s)	20.5	74.5	20.5	74.5

Intersection Summary

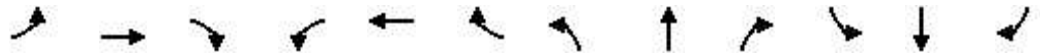
Cycle Length	90
Control Type	Semi Act-Uncoord
Natural Cycle	60

Splits and Phases: 3: Eiterman Road & Shier Rings Road



HCM 6th Signalized Intersection Summary
 3: Eiterman Road & Shier Rings Road

04/23/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	251	611	47	35	106	22	1	219	114	7	109	42
Future Volume (veh/h)	251	611	47	35	106	22	1	219	114	7	109	42
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	273	664	51	38	115	24	1	238	124	8	118	46
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	608	779	60	178	682	142	544	492	256	378	544	212
Arrive On Green	0.45	0.45	0.45	0.45	0.45	0.45	0.42	0.42	0.42	0.42	0.42	0.42
Sat Flow, veh/h	1250	1715	132	736	1501	313	1222	1158	603	1020	1281	499
Grp Volume(v), veh/h	273	0	715	38	0	139	1	0	362	8	0	164
Grp Sat Flow(s),veh/h/ln	1250	0	1847	736	0	1814	1222	0	1762	1020	0	1780
Q Serve(g_s), s	12.3	0.0	25.6	3.6	0.0	3.4	0.0	0.0	11.0	0.4	0.0	4.3
Cycle Q Clear(g_c), s	15.6	0.0	25.6	29.2	0.0	3.4	4.4	0.0	11.0	11.5	0.0	4.3
Prop In Lane	1.00		0.07	1.00		0.17	1.00		0.34	1.00		0.28
Lane Grp Cap(c), veh/h	608	0	839	178	0	824	544	0	748	378	0	756
V/C Ratio(X)	0.45	0.00	0.85	0.21	0.00	0.17	0.00	0.00	0.48	0.02	0.00	0.22
Avail Cap(c_a), veh/h	874	0	1232	334	0	1210	544	0	748	378	0	756
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	16.6	0.0	18.0	31.0	0.0	12.0	14.9	0.0	15.5	19.6	0.0	13.5
Incr Delay (d2), s/veh	0.5	0.0	4.0	0.6	0.0	0.1	0.0	0.0	2.2	0.1	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.3	0.0	10.4	0.6	0.0	1.2	0.0	0.0	4.5	0.1	0.0	1.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.1	0.0	22.0	31.6	0.0	12.1	14.9	0.0	17.7	19.7	0.0	14.2
LnGrp LOS	B	A	C	C	A	B	B	A	B	B	A	B
Approach Vol, veh/h		988			177			363				172
Approach Delay, s/veh		20.7			16.3			17.7				14.5
Approach LOS		C			B			B				B
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		36.0		38.2		36.0		38.2				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		31.5		49.5		31.5		49.5				
Max Q Clear Time (g_c+I1), s		13.0		27.6		13.5		31.2				
Green Ext Time (p_c), s		2.1		6.1		0.8		0.9				
Intersection Summary												
HCM 6th Ctrl Delay				18.9								
HCM 6th LOS				B								

LANE LEVEL OF SERVICE

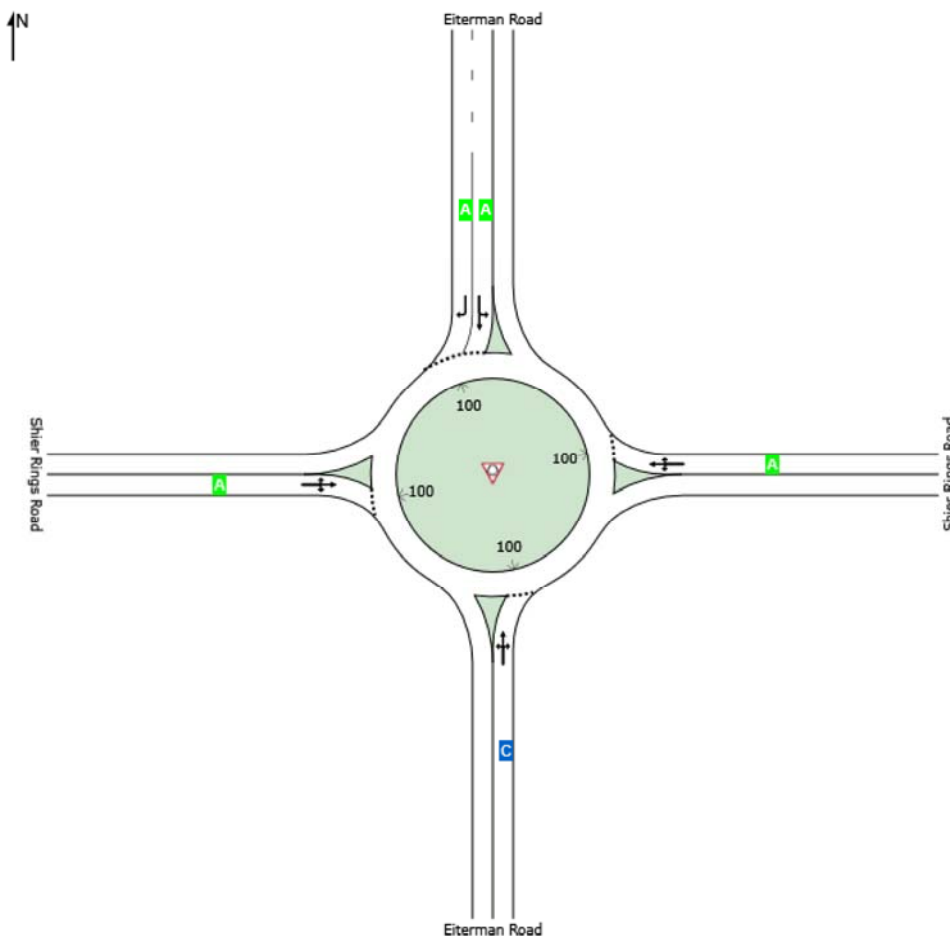
Lane Level of Service

 **Site: 101 [HY AM Build 1.0]**

Shier Rings Road & Eiterman Road
 2031 AM Peak Build with Improvements
 Environmental Factor 1.0
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	C	A	A	A	B



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 **Site: 101 [HY AM Build 1.0]**

Shier Rings Road & Eiterman Road
 2031 AM Peak Build with Improvements
 Environmental Factor 1.0
 Roundabout

Lane Use and Performance													
	Demand Flows		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %						Veh	Dist ft				
South: Eiterman Road													
Lane 1 ^d	363	2.0	469	0.774	100	27.9	LOS C	10.1	257.6	Full	1600	0.0	0.0
Approach	363	2.0		0.774		27.9	LOS C	10.1	257.6				
East: Shier Rings Road													
Lane 1 ^d	177	2.0	887	0.200	100	7.9	LOS A	1.2	31.0	Full	1600	0.0	0.0
Approach	177	2.0		0.200		7.9	LOS A	1.2	31.0				
North: Eiterman Road													
Lane 1 ^d	126	2.0	1436	0.088	100	4.5	LOS A	0.5	13.1	Full	1600	0.0	0.0
Lane 2	46	2.0	1073	0.043	100	4.8	LOS A	0.2	5.7	Full	1600	0.0	0.0
Approach	172	2.0		0.088		4.6	LOS A	0.5	13.1				
West: Shier Rings Road													
Lane 1 ^d	988	2.0	1205	0.820	100	9.1	LOS A	13.0	329.8	Full	1600	0.0	0.0
Approach	988	2.0		0.820		9.1	LOS A	13.0	329.8				
Intersection	1700	2.0		0.820		12.5	LOS B	13.0	329.8				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE LEVEL OF SERVICE

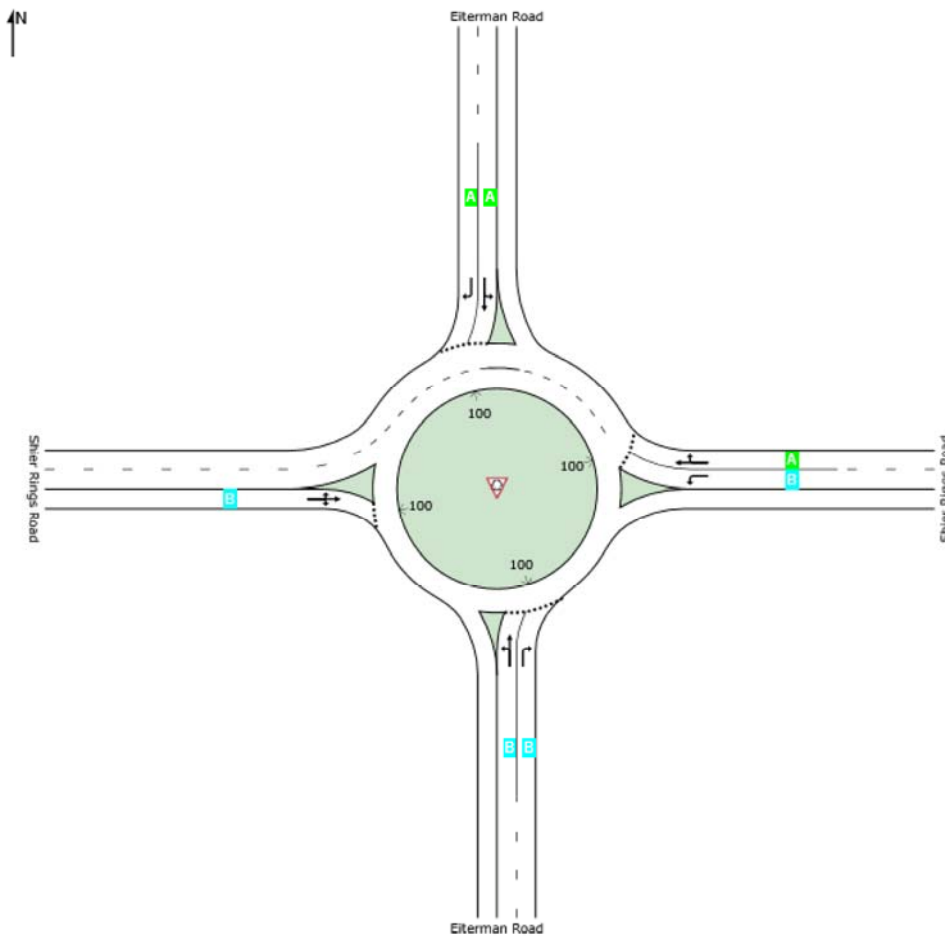
Lane Level of Service

 Site: 101 [HY AM Build 1.1]

Shier Rings Road & Eiterman Road
 2031 AM Peak Build with Improvements
 Environmental Factor 1.1
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	B	A	A	B	B



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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Project: P:\TRA\StructurePoint\Cosgray & Shier Rings Single-Family\Analysis\Capacity\Eiterman\Improvements\IRABE.F.=1.1\Shier Rings Rd &

LANE SUMMARY

 Site: 101 [HY AM Build 1.1]

Shier Rings Road & Eiterman Road
 2031 AM Peak Build with Improvements
 Environmental Factor 1.1
 Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist ft				
South: Eiterman Road													
Lane 1 ^d	239	2.0	480	0.498	100	14.3	LOS B	4.7	119.3	Full	1600	0.0	0.0
Lane 2	124	2.0	358	0.347	100	13.3	LOS B	2.5	63.2	Full	1600	0.0	0.0
Approach	363	2.0		0.498		14.0	LOS B	4.7	119.3				
East: Shier Rings Road													
Lane 1	38	2.0	606	0.063	100	13.7	LOS B	0.3	8.2	Full	1600	0.0	0.0
Lane 2 ^d	139	2.0	963	0.145	100	6.2	LOS A	0.9	22.7	Full	1600	0.0	0.0
Approach	177	2.0		0.145		7.8	LOS A	0.9	22.7				
North: Eiterman Road													
Lane 1 ^d	126	2.0	1115	0.113	100	4.6	LOS A	0.5	13.2	Full	1600	0.0	0.0
Lane 2	46	2.0	810	0.056	100	5.0	LOS A	0.2	6.0	Full	1600	0.0	0.0
Approach	172	2.0		0.113		4.7	LOS A	0.5	13.2				
West: Shier Rings Road													
Lane 1 ^d	988	2.0	1077	0.917	100	15.2	LOS B	23.6	599.2	Full	1600	0.0	0.0
Approach	988	2.0		0.917		15.2	LOS B	23.6	599.2				
Intersection	1700	2.0		0.917		13.1	LOS B	23.6	599.2				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE LEVEL OF SERVICE

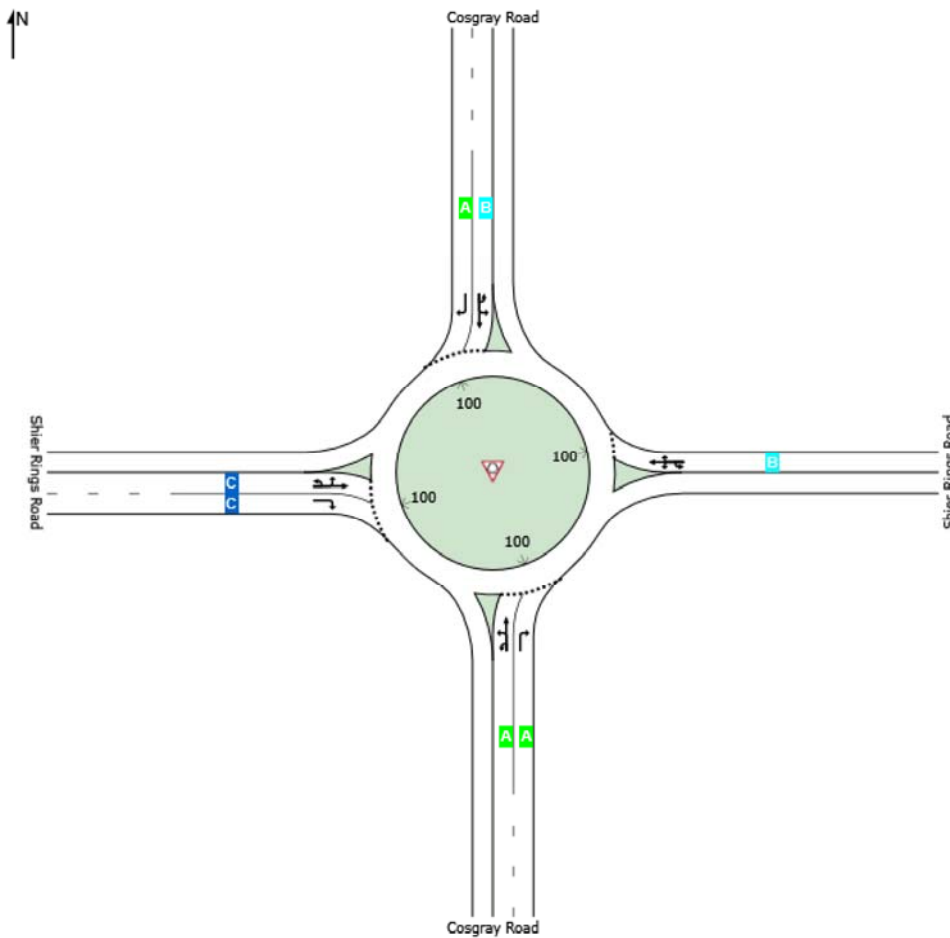
Lane Level of Service

 **Site: 101 [HY PM No Build 1.0]**

Shier Rings Road & Cosgray Road
 2031 PM Peak No Build with Improvements
 Environmental Factor 1.0
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	B	B	C	B



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 Site: 101 [HY PM No Build 1.0]

Shier Rings Road & Cosgray Road
 2031 PM Peak No Build with Improvements
 Environmental Factor 1.0
 Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist ft				
South: Cosgray Road													
Lane 1 ^d	295	2.0	1554	0.190	100	4.0	LOS A	1.3	32.3	Full	1600	0.0	0.0
Lane 2	196	2.0	1323	0.148	100	4.3	LOS A	0.9	23.4	Full	1600	0.0	0.0
Approach	490	2.0		0.190		4.1	LOS A	1.3	32.3				
East: Shier Rings Road													
Lane 1 ^d	707	2.0	1084	0.652	100	12.7	LOS B	6.6	167.7	Full	1600	0.0	0.0
Approach	707	2.0		0.652		12.7	LOS B	6.6	167.7				
North: Cosgray Road													
Lane 1 ^d	735	2.0	940	0.782	100	15.0	LOS B	12.4	315.4	Full	1600	0.0	0.0
Lane 2	4	2.0	622	0.007	100	7.9	LOS A	0.0	1.0	Full	1600	0.0	0.0
Approach	739	2.0		0.782		14.9	LOS B	12.4	315.4				
West: Shier Rings Road													
Lane 1 ^d	13	2.0	370	0.035	100	22.0	LOS C	0.3	7.8	Full	1600	0.0	0.0
Lane 2	2	2.0	273	0.008	100	22.6	LOS C	0.1	1.5	Full	1600	0.0	0.0
Approach	15	2.0		0.035		22.1	LOS C	0.3	7.8				
Intersection	1951	2.0		0.782		11.5	LOS B	12.4	315.4				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE LEVEL OF SERVICE

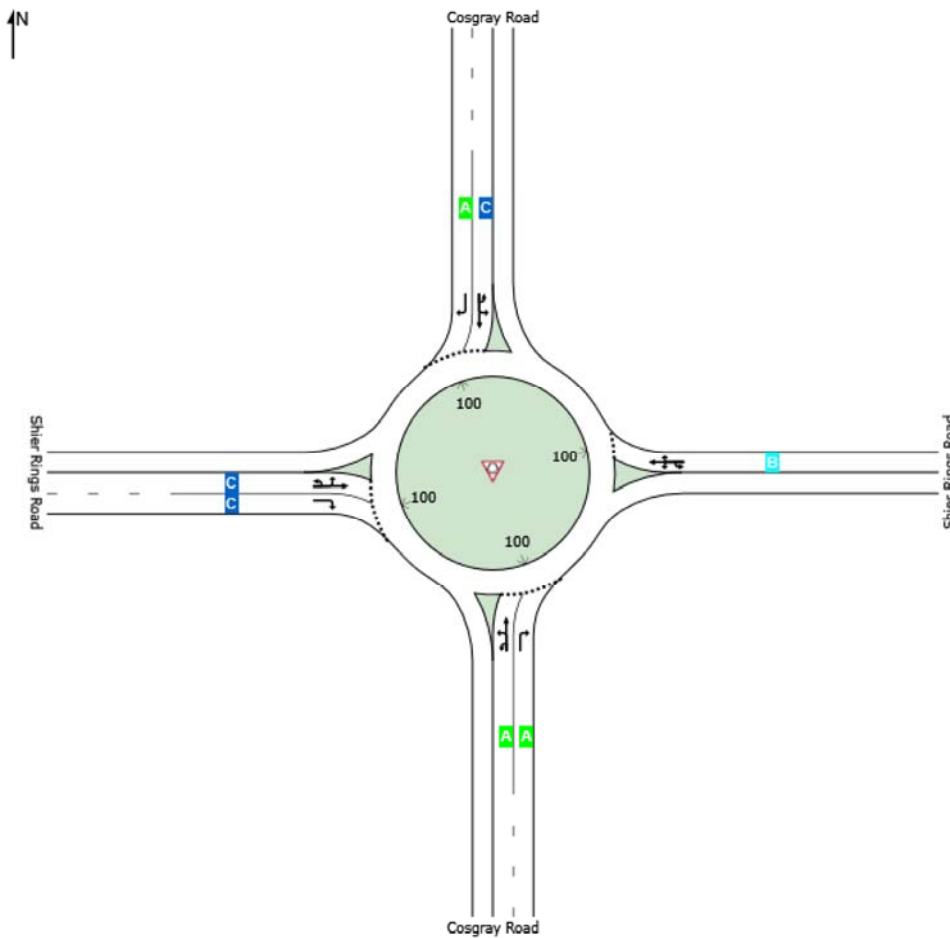
Lane Level of Service

 **Site: 101 [HY PM No Build 1.1]**

Shier Rings Road & Cosgray Road
 2031 PM Peak No Build with Improvements
 Environmental Factor 1.1
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	B	C	C	B



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 Site: 101 [HY PM No Build 1.1]

Shier Rings Road & Cosgray Road
 2031 PM Peak No Build with Improvements
 Environmental Factor 1.1
 Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist ft				
South: Cosgray Road													
Lane 1 ^d	295	2.0	1404	0.210	100	4.0	LOS A	1.4	35.7	Full	1600	0.0	0.0
Lane 2	196	2.0	1236	0.158	100	4.4	LOS A	1.0	25.0	Full	1600	0.0	0.0
Approach	490	2.0		0.210		4.2	LOS A	1.4	35.7				
East: Shier Rings Road													
Lane 1 ^d	707	2.0	955	0.739	100	15.3	LOS B	9.4	239.6	Full	1600	0.0	0.0
Approach	707	2.0		0.739		15.3	LOS B	9.4	239.6				
North: Cosgray Road													
Lane 1 ^d	735	2.0	793	0.926	100	28.5	LOS C	21.4	544.7	Full	1600	0.0	0.0
Lane 2	4	2.0	479	0.009	100	9.1	LOS A	0.0	1.3	Full	1600	0.0	0.0
Approach	739	2.0		0.926		28.4	LOS C	21.4	544.7				
West: Shier Rings Road													
Lane 1 ^d	13	2.0	310	0.042	100	23.7	LOS C	0.3	8.5	Full	1600	0.0	0.0
Lane 2	2	2.0	201	0.011	100	26.7	LOS C	0.1	1.8	Full	1600	0.0	0.0
Approach	15	2.0		0.042		24.2	LOS C	0.3	8.5				
Intersection	1951	2.0		0.926		17.5	LOS B	21.4	544.7				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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Timing Report, Sorted By Phase
 3: Eiterman Road & Shier Rings Road

04/23/2020

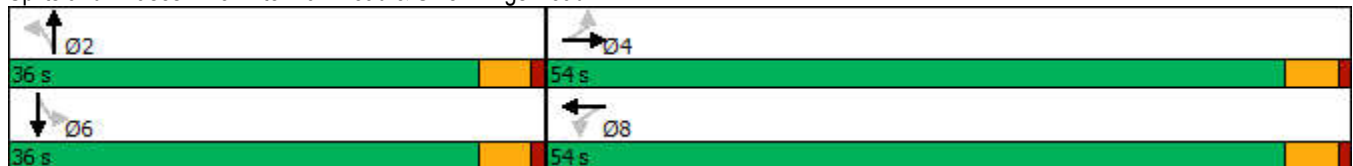


Phase Number	2	4	6	8
Movement	NBTL	EBTL	SBTL	WBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	Max	None	Max	None
Maximum Split (s)	36	54	36	54
Maximum Split (%)	40.0%	60.0%	40.0%	60.0%
Minimum Split (s)	22.5	22.5	22.5	22.5
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	7	7	7	7
Flash Dont Walk (s)	11	11	11	11
Dual Entry	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	36	0	36
End Time (s)	36	0	36	0
Yield/Force Off (s)	31.5	85.5	31.5	85.5
Yield/Force Off 170(s)	20.5	74.5	20.5	74.5
Local Start Time (s)	0	36	0	36
Local Yield (s)	31.5	85.5	31.5	85.5
Local Yield 170(s)	20.5	74.5	20.5	74.5

Intersection Summary

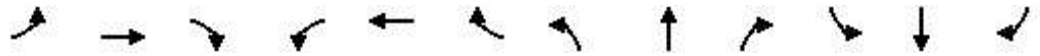
Cycle Length	90
Control Type	Semi Act-Uncoord
Natural Cycle	60

Splits and Phases: 3: Eiterman Road & Shier Rings Road



HCM 6th Signalized Intersection Summary
 3: Eiterman Road & Shier Rings Road

04/23/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	79	187	8	157	805	11	26	138	116	24	300	218
Future Volume (veh/h)	79	187	8	157	805	11	26	138	116	24	300	218
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	86	203	9	171	875	12	28	150	126	26	326	237
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	169	978	43	655	1012	14	113	329	276	330	352	256
Arrive On Green	0.55	0.55	0.55	0.55	0.55	0.55	0.35	0.35	0.35	0.35	0.35	0.35
Sat Flow, veh/h	627	1777	79	1170	1841	25	847	939	789	1103	1007	732
Grp Volume(v), veh/h	86	0	212	171	0	887	28	0	276	26	0	563
Grp Sat Flow(s),veh/h/ln	627	0	1856	1170	0	1866	847	0	1728	1103	0	1739
Q Serve(g_s), s	12.3	0.0	5.2	7.8	0.0	36.7	3.0	0.0	11.1	1.7	0.0	28.0
Cycle Q Clear(g_c), s	49.0	0.0	5.2	13.1	0.0	36.7	31.0	0.0	11.1	12.8	0.0	28.0
Prop In Lane	1.00		0.04	1.00		0.01	1.00		0.46	1.00		0.42
Lane Grp Cap(c), veh/h	169	0	1021	655	0	1026	113	0	605	330	0	609
V/C Ratio(X)	0.51	0.00	0.21	0.26	0.00	0.86	0.25	0.00	0.46	0.08	0.00	0.93
Avail Cap(c_a), veh/h	169	0	1021	655	0	1026	113	0	605	330	0	609
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	38.4	0.0	10.3	13.6	0.0	17.4	43.0	0.0	22.6	27.6	0.0	28.1
Incr Delay (d2), s/veh	2.5	0.0	0.1	0.2	0.0	7.8	5.2	0.0	2.5	0.5	0.0	22.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	0.0	2.0	2.0	0.0	16.0	0.8	0.0	4.7	0.5	0.0	14.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.9	0.0	10.4	13.8	0.0	25.2	48.2	0.0	25.1	28.0	0.0	50.2
LnGrp LOS	D	A	B	B	A	C	D	A	C	C	A	D
Approach Vol, veh/h		298			1058			304				589
Approach Delay, s/veh		19.2			23.3			27.2				49.2
Approach LOS		B			C			C				D
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		36.0		54.0		36.0		54.0				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		31.5		49.5		31.5		49.5				
Max Q Clear Time (g_c+I1), s		33.0		51.0		30.0		38.7				
Green Ext Time (p_c), s		0.0		0.0		0.6		5.2				
Intersection Summary												
HCM 6th Ctrl Delay				30.1								
HCM 6th LOS				C								

LANE LEVEL OF SERVICE

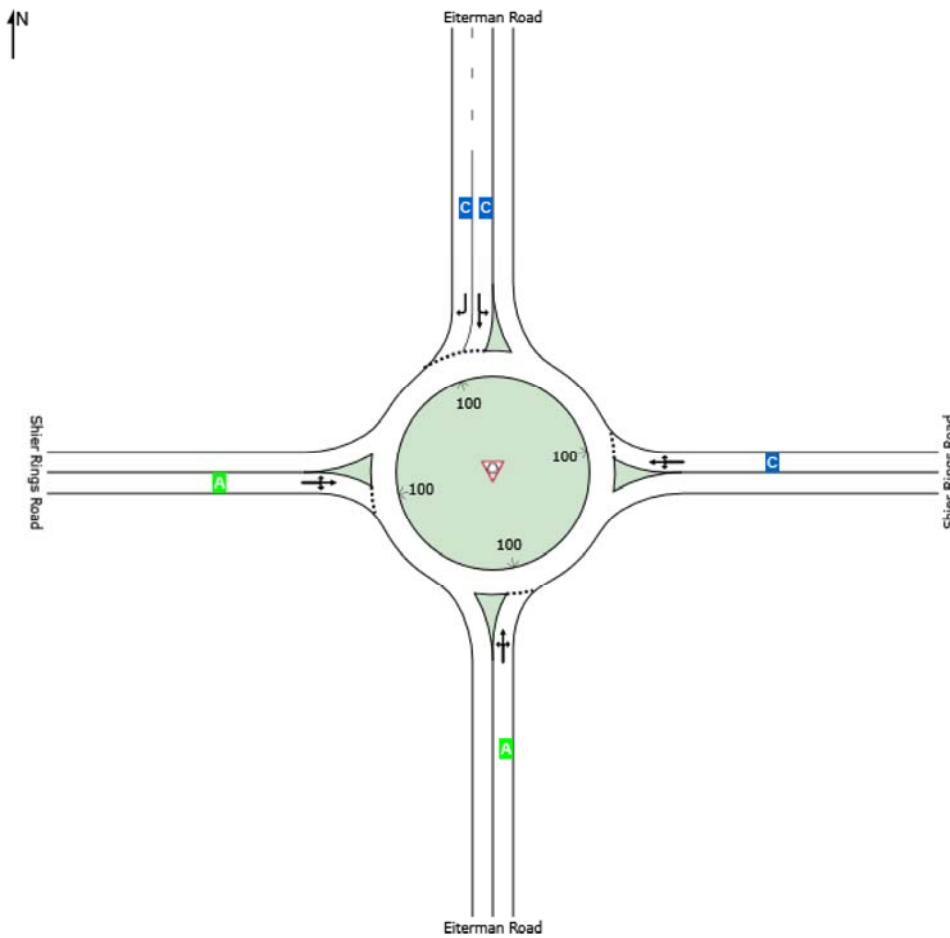
Lane Level of Service

 **Site: 101 [HY PM No Build 1.0]**

Shier Rings Road & Eiterman Road
 2031 PM Peak No Build with Improvements
 Environmental Factor 1.0
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	C	C	A	C



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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Project: P:\TRA\StructurePoint\Cosgray & Shier Rings Single-Family\Analysis\Capacity\Eiterman\Improvements\RAB\EF=1.0\Shier Rings Rd &

LANE SUMMARY

 **Site: 101 [HY PM No Build 1.0]**

Shier Rings Road & Eiterman Road
 2031 PM Peak No Build with Improvements
 Environmental Factor 1.0
 Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist ft				
South: Eiterman Road													
Lane 1 ^d	304	2.0	1031	0.295	100	6.1	LOS A	2.0	49.6	Full	1600	0.0	0.0
Approach	304	2.0		0.295		6.1	LOS A	2.0	49.6				
East: Shier Rings Road													
Lane 1 ^d	1058	2.0	1102	0.960	100	22.1	LOS C	30.0	761.8	Full	1600	0.0	0.0
Approach	1058	2.0		0.960		22.1	LOS C	30.0	761.8				
North: Eiterman Road													
Lane 1 ^d	352	2.0	456	0.772	100	33.9	LOS C	11.4	288.9	Full	1600	0.0	0.0
Lane 2	237	2.0	330	0.718	100	33.3	LOS C	7.9	201.6	Full	1600	0.0	0.0
Approach	589	2.0		0.772		33.7	LOS C	11.4	288.9				
West: Shier Rings Road													
Lane 1 ^d	298	2.0	849	0.351	100	8.7	LOS A	2.4	61.9	Full	1600	0.0	0.0
Approach	298	2.0		0.351		8.7	LOS A	2.4	61.9				
Intersection	2249	2.0		0.960		21.2	LOS C	30.0	761.8				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE LEVEL OF SERVICE

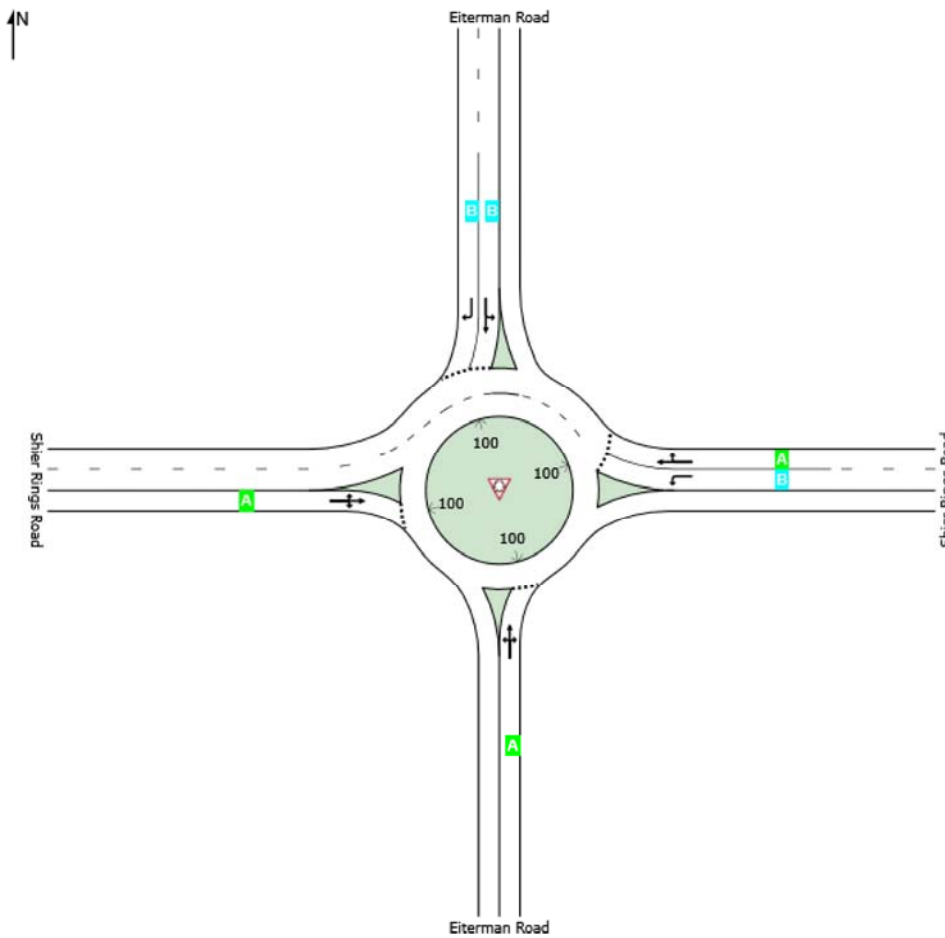
Lane Level of Service

 **Site: 101 [HY PM No Build 1.1]**

Shier Rings Road & Eiterman Road
 2031 PM Peak No Build with Improvements
 Environmental Factor 1.1
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	A	B	A	A



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 **Site: 101 [HY AM No Build 1.1]**

Shier Rings Road & Eiterman Road
 2031 AM Peak No Build with Improvements
 Environmental Factor 1.1
 Roundabout

Lane Use and Performance													
	Demand Flows		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %						Veh	Dist ft				
South: Eiterman Road													
Lane 1 ^d	363	2.0	380	0.956	100	54.7	LOS D	17.0	431.9	Full	1600	0.0	0.0
Approach	363	2.0		0.956		54.7	LOS D	17.0	431.9				
East: Shier Rings Road													
Lane 1	38	2.0	620	0.061	100	13.6	LOS B	0.3	8.1	Full	1600	0.0	0.0
Lane 2 ^d	133	2.0	965	0.137	100	6.2	LOS A	0.8	21.5	Full	1600	0.0	0.0
Approach	171	2.0		0.137		7.8	LOS A	0.8	21.5				
North: Eiterman Road													
Lane 1 ^d	126	2.0	1121	0.112	100	4.6	LOS A	0.5	13.1	Full	1600	0.0	0.0
Lane 2	46	2.0	815	0.056	100	5.0	LOS A	0.2	5.9	Full	1600	0.0	0.0
Approach	172	2.0		0.112		4.7	LOS A	0.5	13.1				
West: Shier Rings Road													
Lane 1 ^d	966	2.0	1078	0.897	100	13.7	LOS B	20.7	525.5	Full	1600	0.0	0.0
Approach	966	2.0		0.897		13.7	LOS B	20.7	525.5				
Intersection	1672	2.0		0.956		21.1	LOS C	20.7	525.5				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE LEVEL OF SERVICE

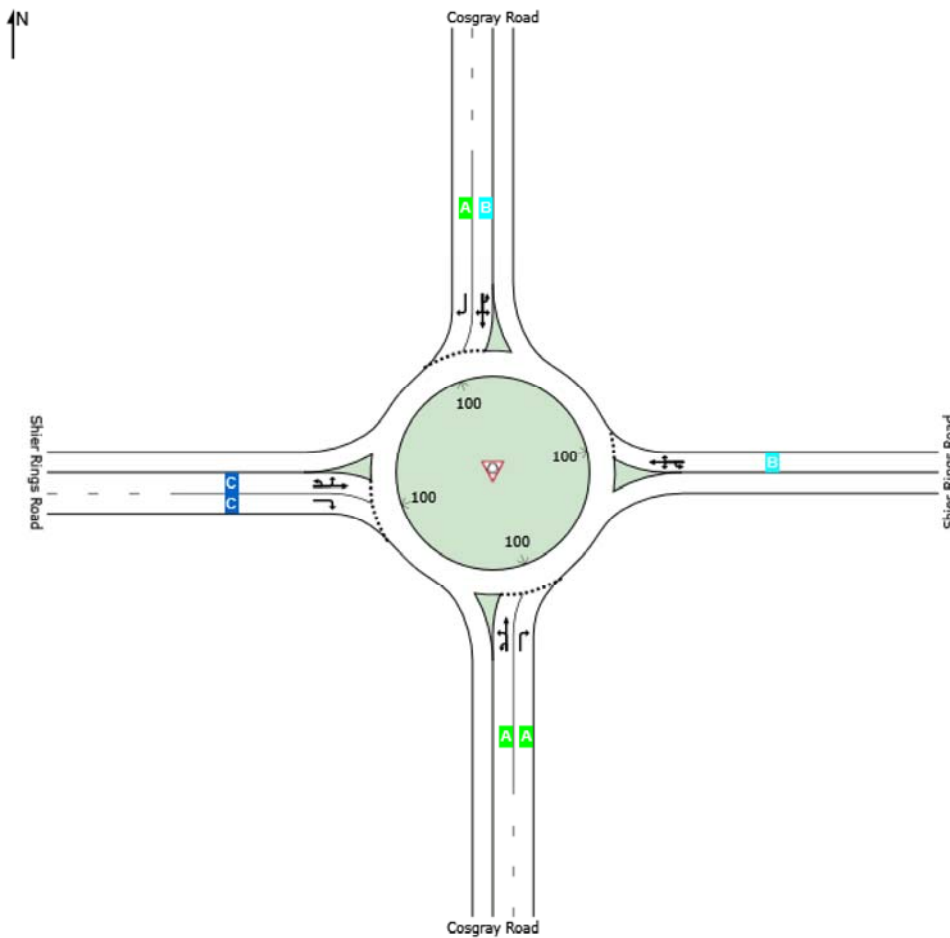
Lane Level of Service

 **Site: 101 [HY PM Build 1.0]**

Shier Rings Road & Cosgray Road
 2031 PM Peak Build with Improvements
 Environmental Factor 1.0
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	B	B	C	B



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 Site: 101 [HY PM Build 1.0]

Shier Rings Road & Cosgray Road
2031 PM Peak Build with Improvements
Environmental Factor 1.0
Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist ft				
South: Cosgray Road													
Lane 1 ^d	295	2.0	1551	0.190	100	4.0	LOS A	1.3	32.3	Full	1600	0.0	0.0
Lane 2	199	2.0	1324	0.150	100	4.3	LOS A	0.9	23.8	Full	1600	0.0	0.0
Approach	493	2.0		0.190		4.1	LOS A	1.3	32.3				
East: Shier Rings Road													
Lane 1 ^d	710	2.0	1084	0.655	100	12.7	LOS B	6.7	170.0	Full	1600	0.0	0.0
Approach	710	2.0		0.655		12.7	LOS B	6.7	170.0				
North: Cosgray Road													
Lane 1 ^d	736	2.0	937	0.785	100	15.2	LOS B	12.6	319.8	Full	1600	0.0	0.0
Lane 2	4	2.0	620	0.007	1 ⁵	8.0	LOS A	0.0	1.0	Full	1600	0.0	0.0
Approach	740	2.0		0.785		15.2	LOS B	12.6	319.8				
West: Shier Rings Road													
Lane 1 ^d	14	2.0	367	0.039	100	22.0	LOS C	0.3	8.5	Full	1600	0.0	0.0
Lane 2	2	2.0	272	0.008	100	22.8	LOS C	0.1	1.5	Full	1600	0.0	0.0
Approach	16	2.0		0.039		22.1	LOS C	0.3	8.5				
Intersection	1960	2.0		0.785		11.6	LOS B	12.6	319.8				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

⁵ Lane under-utilisation found by the program

^d Dominant lane on roundabout approach

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LANE LEVEL OF SERVICE

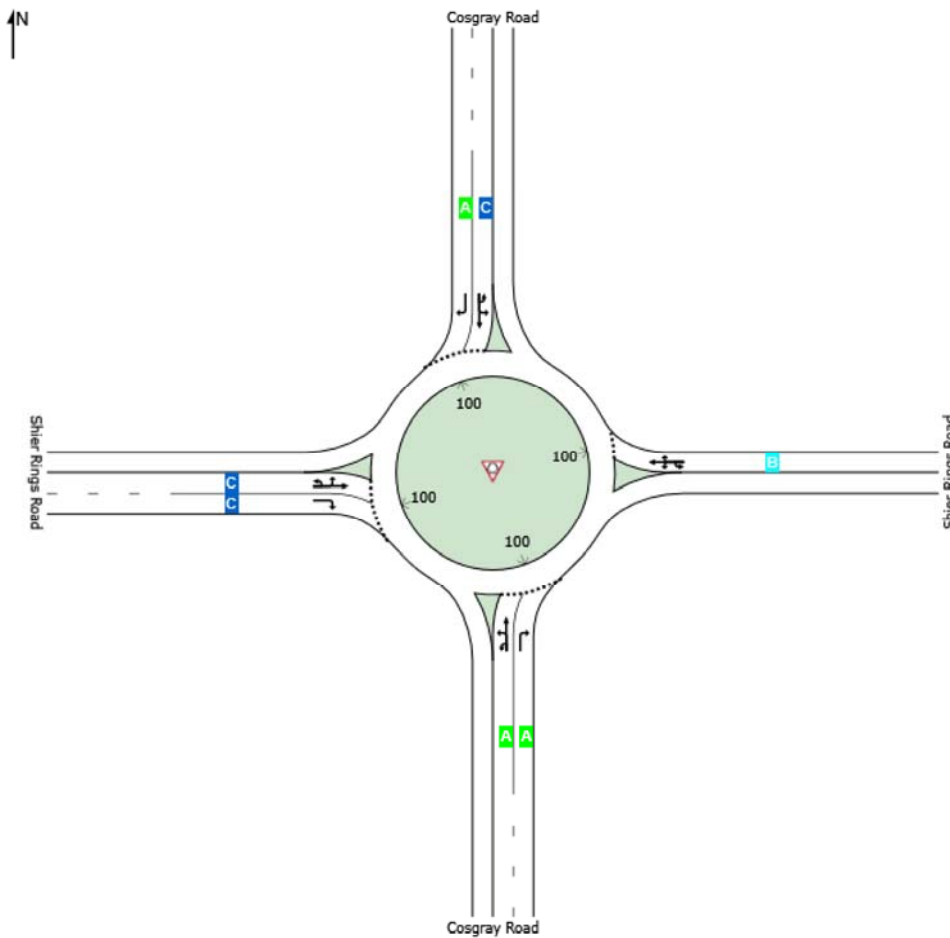
Lane Level of Service

 Site: 101 [HY PM Build 1.1]

Shier Rings Road & Cosgray Road
 2031 PM Peak Build with Improvements
 Environmental Factor 1.1
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	B	C	C	B



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 Site: 101 [HY PM Build 1.1]

Shier Rings Road & Cosgray Road
 2031 PM Peak Build with Improvements
 Environmental Factor 1.1
 Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist ft				
South: Cosgray Road													
Lane 1 ^d	295	2.0	1402	0.210	100	4.0	LOS A	1.4	35.7	Full	1600	0.0	0.0
Lane 2	199	2.0	1237	0.161	100	4.4	LOS A	1.0	25.4	Full	1600	0.0	0.0
Approach	493	2.0		0.210		4.2	LOS A	1.4	35.7				
East: Shier Rings Road													
Lane 1 ^d	710	2.0	955	0.743	100	15.4	LOS B	9.6	243.3	Full	1600	0.0	0.0
Approach	710	2.0		0.743		15.4	LOS B	9.6	243.3				
North: Cosgray Road													
Lane 1 ^d	736	2.0	790	0.931	100	29.3	LOS C	21.9	557.1	Full	1600	0.0	0.0
Lane 2	4	2.0	477	0.009	100	9.1	LOS A	0.0	1.3	Full	1600	0.0	0.0
Approach	740	2.0		0.931		29.2	LOS C	21.9	557.1				
West: Shier Rings Road													
Lane 1 ^d	14	2.0	308	0.046	100	23.8	LOS C	0.4	9.3	Full	1600	0.0	0.0
Lane 2	2	2.0	199	0.011	100	27.0	LOS C	0.1	1.8	Full	1600	0.0	0.0
Approach	16	2.0		0.046		24.2	LOS C	0.4	9.3				
Intersection	1960	2.0		0.931		17.9	LOS B	21.9	557.1				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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Timing Report, Sorted By Phase
 3: Eiterman Road & Shier Rings Road

04/23/2020

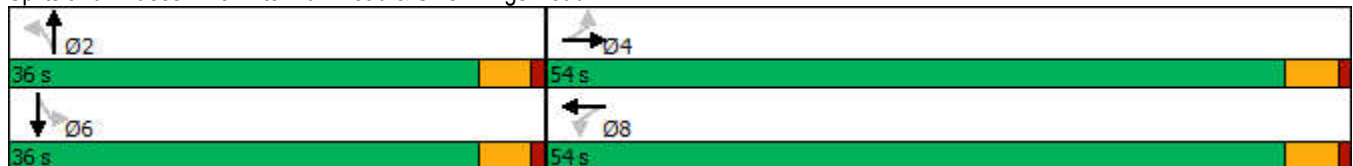


Phase Number	2	4	6	8
Movement	NBTL	EBTL	SBTL	WBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	Max	None	Max	None
Maximum Split (s)	36	54	36	54
Maximum Split (%)	40.0%	60.0%	40.0%	60.0%
Minimum Split (s)	22.5	22.5	22.5	22.5
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	7	7	7	7
Flash Dont Walk (s)	11	11	11	11
Dual Entry	Yes	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	36	0	36
End Time (s)	36	0	36	0
Yield/Force Off (s)	31.5	85.5	31.5	85.5
Yield/Force Off 170(s)	20.5	74.5	20.5	74.5
Local Start Time (s)	0	36	0	36
Local Yield (s)	31.5	85.5	31.5	85.5
Local Yield 170(s)	20.5	74.5	20.5	74.5

Intersection Summary

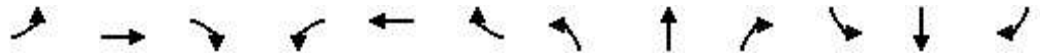
Cycle Length	90
Control Type	Semi Act-Uncoord
Natural Cycle	65

Splits and Phases: 3: Eiterman Road & Shier Rings Road



HCM 6th Signalized Intersection Summary
 3: Eiterman Road & Shier Rings Road

04/23/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	196	8	157	822	11	26	138	116	24	300	219
Future Volume (veh/h)	80	196	8	157	822	11	26	138	116	24	300	219
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	87	213	9	171	893	12	28	150	126	26	326	238
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	158	980	41	647	1013	14	112	329	276	330	352	257
Arrive On Green	0.55	0.55	0.55	0.55	0.55	0.55	0.35	0.35	0.35	0.35	0.35	0.35
Sat Flow, veh/h	616	1782	75	1159	1841	25	847	939	789	1103	1005	734
Grp Volume(v), veh/h	87	0	222	171	0	905	28	0	276	26	0	564
Grp Sat Flow(s),veh/h/ln	616	0	1857	1159	0	1866	847	0	1728	1103	0	1738
Q Serve(g_s), s	11.4	0.0	5.5	8.0	0.0	38.1	3.0	0.0	11.1	1.7	0.0	28.1
Cycle Q Clear(g_c), s	49.5	0.0	5.5	13.5	0.0	38.1	31.1	0.0	11.1	12.8	0.0	28.1
Prop In Lane	1.00		0.04	1.00		0.01	1.00		0.46	1.00		0.42
Lane Grp Cap(c), veh/h	158	0	1021	647	0	1026	112	0	605	330	0	608
V/C Ratio(X)	0.55	0.00	0.22	0.26	0.00	0.88	0.25	0.00	0.46	0.08	0.00	0.93
Avail Cap(c_a), veh/h	158	0	1021	647	0	1026	112	0	605	330	0	608
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	39.9	0.0	10.3	13.8	0.0	17.7	43.1	0.0	22.6	27.6	0.0	28.1
Incr Delay (d2), s/veh	4.1	0.0	0.1	0.2	0.0	9.1	5.3	0.0	2.5	0.5	0.0	22.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	0.0	2.1	2.0	0.0	16.9	0.8	0.0	4.7	0.5	0.0	14.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.0	0.0	10.5	14.0	0.0	26.8	48.4	0.0	25.1	28.0	0.0	50.5
LnGrp LOS	D	A	B	B	A	C	D	A	C	C	A	D
Approach Vol, veh/h		309			1076			304			590	
Approach Delay, s/veh		19.9			24.8			27.2			49.5	
Approach LOS		B			C			C			D	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		36.0		54.0		36.0		54.0				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		31.5		49.5		31.5		49.5				
Max Q Clear Time (g_c+I1), s		33.1		51.5		30.1		40.1				
Green Ext Time (p_c), s		0.0		0.0		0.6		4.8				
Intersection Summary												
HCM 6th Ctrl Delay				30.8								
HCM 6th LOS				C								

LANE LEVEL OF SERVICE

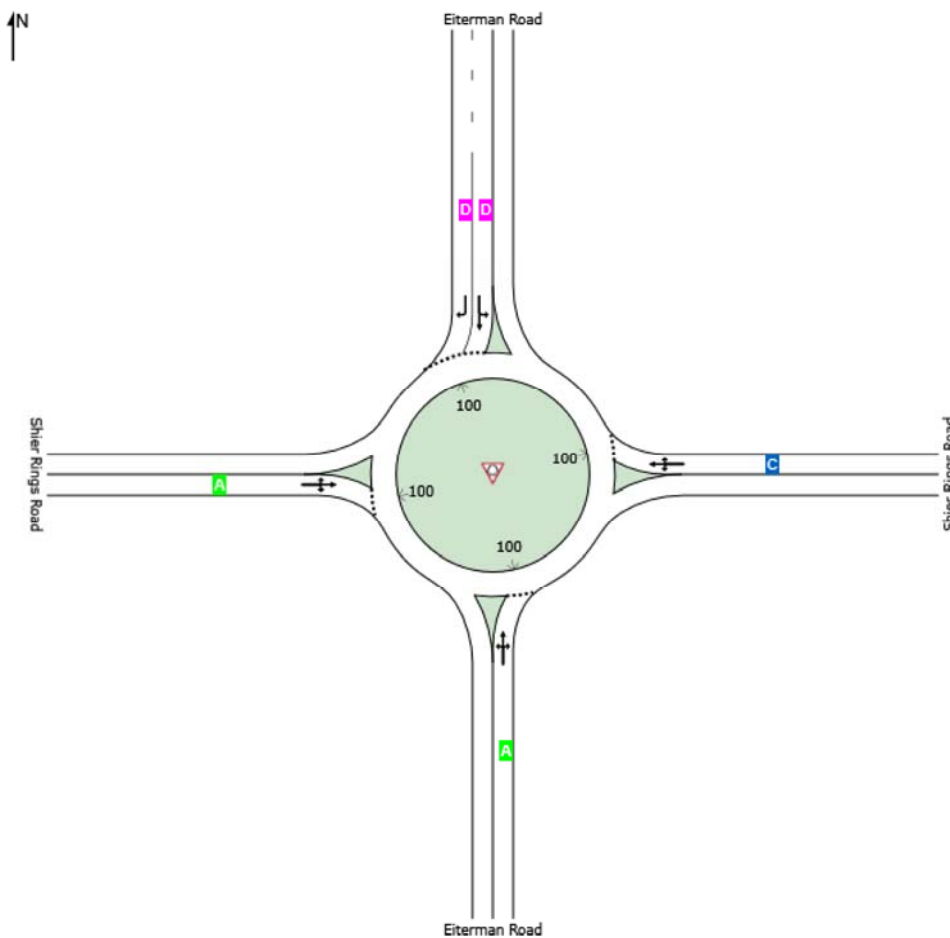
Lane Level of Service

 **Site: 101 [HY PM Build 1.0]**

Shier Rings Road & Eiterman Road
 2031 PM Peak Build with Improvements
 Environmental Factor 1.0
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	C	D	A	C



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 **Site: 101 [HY PM Build 1.0]**

Shier Rings Road & Eiterman Road
 2031 PM Peak Build with Improvements
 Environmental Factor 1.0
 Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist ft				
South: Eiterman Road													
Lane 1 ^d	304	2.0	1020	0.298	100	6.2	LOS A	2.0	50.3	Full	1600	0.0	0.0
Approach	304	2.0		0.298		6.2	LOS A	2.0	50.3				
East: Shier Rings Road													
Lane 1 ^d	1076	2.0	1100	0.978	100	25.4	LOS C	33.7	856.8	Full	1600	0.0	0.0
Approach	1076	2.0		0.978		25.4	LOS C	33.7	856.8				
North: Eiterman Road													
Lane 1 ^d	352	2.0	441	0.798	100	38.3	LOS D	12.3	312.6	Full	1600	0.0	0.0
Lane 2	238	2.0	318	0.747	100	37.4	LOS D	8.6	217.7	Full	1600	0.0	0.0
Approach	590	2.0		0.798		37.9	LOS D	12.3	312.6				
West: Shier Rings Road													
Lane 1 ^d	309	2.0	849	0.363	100	8.7	LOS A	2.5	64.7	Full	1600	0.0	0.0
Approach	309	2.0		0.363		8.7	LOS A	2.5	64.7				
Intersection	2279	2.0		0.978		23.8	LOS C	33.7	856.8				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE LEVEL OF SERVICE

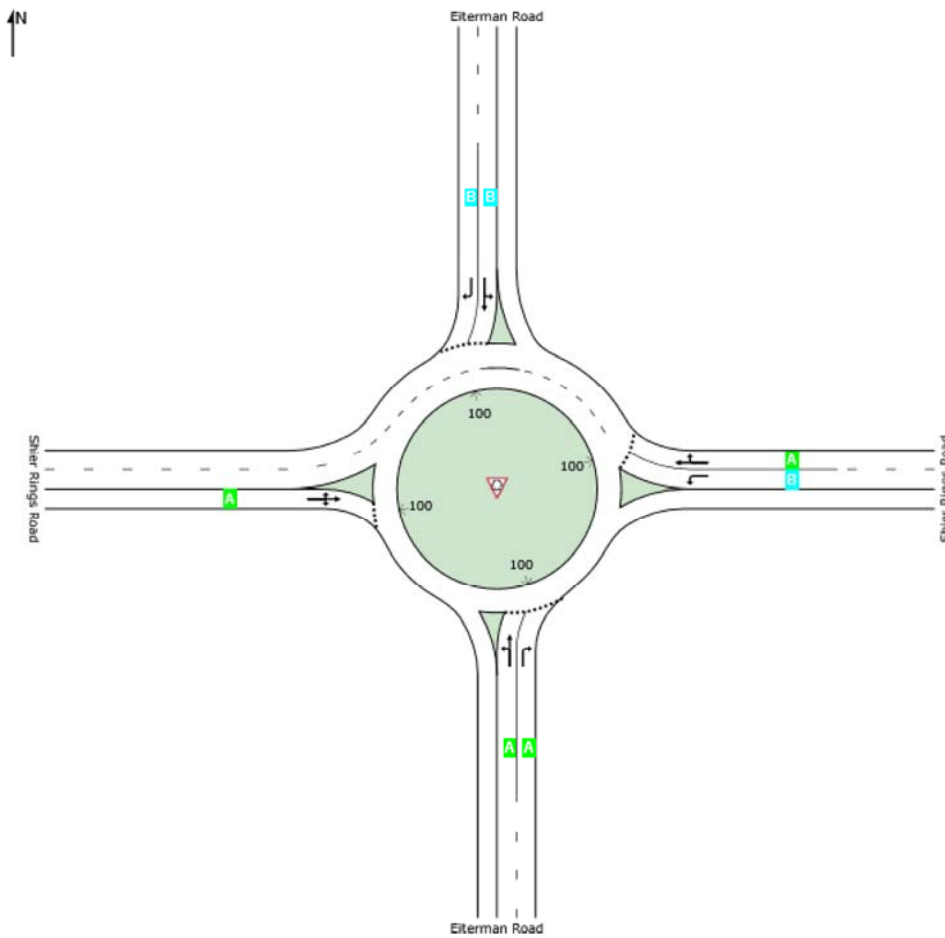
Lane Level of Service

 **Site: 101 [HY PM Build 1.1]**

Shier Rings Road & Eiterman Road
 2031 PM Peak Build with Improvements
 Environmental Factor 1.1
 Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	A	A	B	A	A



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

 Site: 101 [HY PM Build 1.1]

Shier Rings Road & Eiterman Road
 2031 PM Peak Build with Improvements
 Environmental Factor 1.1
 Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist ft				
South: Eiterman Road													
Lane 1 ^d	178	2.0	1107	0.161	100	6.1	LOS A	1.0	25.3	Full	1600	0.0	0.0
Lane 2	126	2.0	945	0.133	100	5.9	LOS A	0.8	19.7	Full	1600	0.0	0.0
Approach	304	2.0		0.161		6.0	LOS A	1.0	25.3				
East: Shier Rings Road													
Lane 1	171	2.0	744	0.229	100	12.3	LOS B	1.3	31.9	Full	1600	0.0	0.0
Lane 2 ^d	905	2.0	1195	0.757	100	8.0	LOS A	10.3	261.5	Full	1600	0.0	0.0
Approach	1076	2.0		0.757		8.7	LOS A	10.3	261.5				
North: Eiterman Road													
Lane 1 ^d	352	2.0	547	0.644	100	14.0	LOS B	5.0	127.9	Full	1600	0.0	0.0
Lane 2	238	2.0	457	0.521	100	13.0	LOS B	3.3	83.5	Full	1600	0.0	0.0
Approach	590	2.0		0.644		13.6	LOS B	5.0	127.9				
West: Shier Rings Road													
Lane 1 ^d	309	2.0	745	0.414	100	9.5	LOS A	2.8	71.9	Full	1600	0.0	0.0
Approach	309	2.0		0.414		9.5	LOS A	2.8	71.9				
Intersection	2279	2.0		0.757		9.7	LOS A	10.3	261.5				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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Appendix H

Sight Triangle Exhibit





**ROCKFORD SINGLE-FAMILY TIS
SIGHT TRIANGLE EXHIBIT**



Appendix I

Improvements Exhibit

Cosgray and Shier Rings Single-Family TIS
Traffic Volume Calculations



Year	Period	Scenario	Plate
		Improvements	

^
N

- Existing Lane
- No Build Improvement
- Build Improvement

- Existing Roundabout
- No Build Improvement Roundabout
- Build Improvement Roundabout



Cosgray Rd E.F. = 1.0, no improvements needed, basing LOS on delay

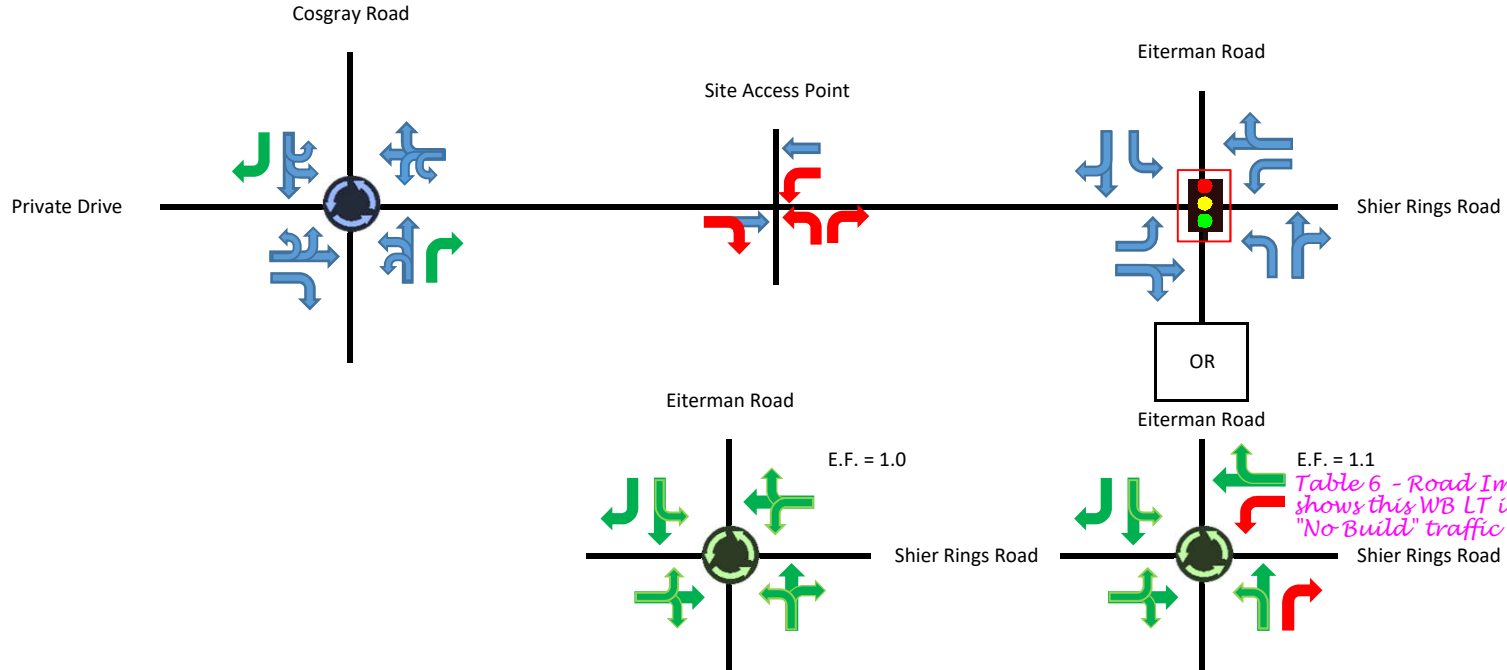


Table 6 - Road Improvements Summary shows this WB LT is needed with "No-Build" traffic (Green - EF 1.1)

The report text should note the differences between the Environmental Factor of 1.0 and 1.1 for the roundabout analysis. Mitigation can be based on EF of 1.0 in this study, given the future plans for University Blvd to carry more through volumes as the alignment builds out. If delays are incurred at the Shier Rings Road roundabouts, traffic will likely reroute to University Blvd.