

Kennett Township Five Points Intersection Analysis Report

**South Union St (SR 3013),
Kaolin Rd (SR 3013),
Old Kennett Rd (SR 3036),
And Hillendale Rd
Kennett Township, Chester County, PA**



May 2024



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Today's Commitment to Tomorrow's Challenges

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EXECUTIVE SUMMARY

At the request of Kennett Township, Carroll Engineering Corporation (CEC) has performed an updated study of existing and future traffic conditions at the Five Points intersection of South Union Street (SR 3013), Kaolin Road (SR 3013), Old Kennett Road (SR 3036), and Hillendale Road located in Kennett Township, Chester County, PA. A previous study was performed in 2017 and submitted to Kennett Township by Remington & Vernick Engineers. This report evaluates existing conditions, as well as four potential future scenarios for the Township's consideration:

- **Scenario 1 (No Build)** - The existing intersection geometry and signal equipment shall be maintained, but the signal timings and phasing shall be optimized for improved efficiency.
- **Scenario 2 (Widening)** - The existing roadways shall be widened to allow for the construction of left-turn lanes for several of the intersection approaches. This scenario may require replacement of some or all the existing traffic signal equipment. The signal timings and phasing shall be optimized. For this scenario, CEC looked at three variations:
 - **Scenario 2A** - Left-turn lanes on Kaolin Road (SR 3013) and South Union Street (SR 3013)
 - **Scenario 2B** - Left-turn lanes on Hillendale Road (both approaches)
 - **Scenario 2C** - Left-turn lanes on Hillendale Road (both approaches), Kaolin Road (SR 3013), and South Union Street (SR 3013)
- **Scenario 3 (Realignment)** - Old Kennett Road (SR 3036) shall be realigned to form a new T-Intersection with Kaolin Road (SR 3013), approximately 700' south of the existing Five Points intersection. The intersection shall then be reconfigured into a traditional four-legged signalized intersection. Traffic signal modifications shall be required to accommodate the new intersection geometry. The signal timings and phasing shall also be optimized.
- **Scenario 4 (Roundabout)** - The existing Five Points intersection shall be replaced with a roundabout. For this scenario, CEC looked at two variations:
 - **Scenario 4A** - A single lane roundabout with five approaches shall be constructed at the existing signalized intersection.
 - **Scenario 4B** - Similar to Scenario 3, Old Kennett Road (SR 3036) shall be realigned to form a new T-Intersection with Kaolin Road (SR 3013), approximately 700' south of the existing Five Points intersection. The intersection shall then be reconfigured into a single lane roundabout with four approaches.

All scenarios were analyzed using SYNCHRO. Summary tables detailing Capacity LOS & Queue matrix are included in **Appendix A**. In addition, the impacts for each alternative were projected and quantified to the maximum extent feasible. These impacts include acquisition of ROW from residential and commercial properties as well as impacts to above and below-ground utilities. A preliminary construction cost estimate was also prepared and can be found in **Appendix F**. Based upon the analysis, field observations (including observations of semi-trucks through the intersection), local knowledge, and anticipated complications associated with the other alternatives, CEC recommends Scenario 2C. In the long-term, this scenario offers a reduction in driver delays, is more compatible for pedestrian and/or bicycle accommodations that may be incorporated into final design, and the cost of this alternative is more compatible with the Township's budgetary constraints.

I. INTRODUCTION

At the request of Kennett Township, Carroll Engineering Corporation (CEC) has performed an updated study of existing and future traffic conditions at the Five Points intersection of South Union Street (SR 3013), Kaolin Road (SR 3013), Old Kennett Road (SR 3036), and Hillendale Road located in Kennett Township, Chester County, PA. A previous study was performed in 2017 and submitted to Kennett Township by Remington & Vernick Engineers. The study location is shown in *Figure 1*.

The Township has been awarded a Multimodal Transportation Grant by PennDOT, to be used for improvements to the study intersection. This report will evaluate existing conditions, as well as four potential future scenarios for the Township's consideration:

- **Scenario 1 (No Build)** - The existing intersection geometry and signal equipment shall be maintained, but the signal timings and phasing shall be optimized for improved efficiency.
- **Scenario 2 (Widening)** - The existing roadways shall be widened to allow for the construction of left-turn lanes for several of the intersection approaches. This scenario may require replacement of some or all the existing traffic signal equipment. The signal timings and phasing shall be optimized. For this scenario, CEC looked at three variations:
 - **Scenario 2A** - Left-turn lanes on Kaolin Road (SR 3013) and South Union Street (SR 3013)
 - **Scenario 2B** - Left-turn lanes on Hillendale Road (both approaches)
 - **Scenario 2C** - Left-turn lanes on Hillendale Road (both approaches), Kaolin Road (SR 3013), and South Union Street (SR 3013)
- **Scenario 3 (Realignment)** - Old Kennett Road (SR 3036) shall be realigned to form a new T-Intersection with Kaolin Road (SR 3013), approximately 700' south of the existing Five Points intersection. The intersection shall then be reconfigured into a traditional four-legged signalized intersection with north and southbound left-turn lanes. Traffic signal modifications shall be required to accommodate the new intersection geometry. The signal timings and phasing shall also be optimized.
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 - **Scenario 4A** - A single lane roundabout with five approaches shall be constructed at the existing signalized intersection.
 - **Scenario 4B** - Similar to Scenario 3, Old Kennett Road (SR 3036) shall be realigned to form a new T-Intersection with Kaolin Road (SR 3013), approximately 700' south of the existing Five Points intersection. The intersection shall then be reconfigured into a single lane roundabout with four approaches.

II. EXISTING CONDITIONS

The study intersection is a five-legged signalized intersection. **Table 1** provides information for each approach. South Union Street/Kaolin Road (SR 3013) is the major route at this intersection and carries the highest volume of traffic. The intersection is located in a semi-rural, developing area just south of Kennett Square Borough, about 0.25 mile south of Kennett High School.

Table 1: Existing Roadway Geometry

Street Name	Direction	SR #	Speed (mph)	Class ¹	Travel Lanes	Lane Width (ft)		Approach Grade
						Approach	Departure	
South Union St	SB	3013	40	Major Collector	2	11	14	0.3%
Kaolin Rd	NB	3013	40	Major Collector	2	11	14	-2.9%
Hillendale Rd	EB	--	35	Major Collector	2	10	10	-2.2%
Hillendale Rd	WB	--	35	Major Collector	2	10	10	7.5%
Old Kennett Rd	NW	3036	40	Major Collector	2	10	10	1.0%

¹ PennDOT County Functional Class Maps

In conjunction with the Township, CEC conducted a field view of the study intersection on Wednesday, November 15, 2023. The field notes and pictures can be found in **Appendix B**.

Existing Constraints



There is an existing magnolia tree of sentimental value to the property owner located on the southeast corner of the intersection, between Old Kennett Rd and Hillendale Rd. It is the Township's preference that potential future improvements at this intersection do not impact the tree negatively. In the northwest quadrant, between South Union Street and West Hillendale, a local business is located close to the road with parking in front of the building. An objective/preference of the Township is to minimize impacts to this business. It is anticipated that a sidewalk may also need to be incorporated along the South Union Street frontage of this parcel.



Existing Traffic Counts

Turning movement counts were collected on Tuesday, November 28, 2023 by Tri-State Traffic & Data. The raw count data is included in **Appendix C**. In addition, the data is summarized in **Figure 2**, which shows the 2023 Existing Weekday Morning and Weekday Afternoon Peak Hour Volumes.

Existing Pedestrian & Bike Facilities



The intersection does not include pedestrian signals and there are no sidewalks or curb ramps at the intersection. PennDOT mandated R9-3 (NO PEDESTRIAN CROSSING) signs are present for all five intersection approaches. However, there are indications of pedestrian activity, as evidenced by worn paths along South Union Street. Employees of the nearby Phillips mushroom farm are seen walking through the intersection to Kaolin Road and Old Kennett Road. There are no SEPTA bus stops or rail stations located close to the intersection.

Existing Traffic Conditions

The ADT counts for each leg of the study intersection are shown in **Table 2**.

Table 2: Roadway Daily Traffic

Street Name	PM Peak Hour ¹	K Factor ²	ADT
Hillendale Road (EB)	309	8	3,863
Hillendale Road (WB)	440	8	5,500
Kaolin Road (NB)	930	11	8,455
South Union Street (SB)	756	11	6,873
Old Kennett Road (NWB)	205	8	2,563

¹ Intersection turning movement counts (November 28, 2023)

² PennDOT TIRE Website

Information on the existing signal operation is shown in **Table 3**. In addition, the existing permit plan is included in **Appendix C**.

Table 3: Existing Signal Operation

Street Name	Direction	Phasing	Turn Lanes	RTOR	Detection	
					Stop Bar	Density
South Union St	SB	1+6 (Advance) 2+6	No	Yes	Yes	Yes
Kaolin Rd	NB	2+6	No	No	No	Yes
West Hillendale Rd	EB	4+8	No	Yes	Yes	No
East Hillendale Rd	WB	4+8	No	No	Yes	No
Old Kennett Rd	NW	9	No	No	Yes	No

The existing traffic signal operates in a four-phase sequence. The South Union Street leg gets a short, advanced phase to allow for left-turns onto Hillendale Road and Old Kennett Road, before the main South Union Street/Kaolin Road phase begins. After this phase the Hillendale Road approaches are given their green time, followed at the end of the sequence by a phase for the Old Kennett Road approach, which runs unopposed.



The existing signal equipment generally seems fit for purpose. However, while some components are relatively new, others are more dated and may not meet the latest standards. In addition, at the time of writing there have been recent issues with southbound left-turns not receiving sufficient green time. Equipment malfunction is suspected, as the timing programs have not been changed.

Crash Data Analysis

Crash data was obtained from PennDOT for the years 2018-2022 for the study intersection. The data is summarized in **Table 4** below.

Table 4: Reportable Crashes

Type/Severity	Number of Reportable Crash by Year					5 Year Total
	2018	2019	2020	2021	2022	
Angle	3	0	0	1	1	5
Head On	3	0	2	0	0	5
Rear End	0	1	0	1	0	2
Total	6	1	2	2	1	12
Suspected Serious Injury	1	0	0	0	0	1
Suspected Minor Injury	2	0	0	0	0	2
Possible Injury	1	1	1	0	0	3
Unknown Severity	0	0	0	1	0	1
Property Damage Only	2	0	1	1	1	5
Total	6	1	2	2	1	12

As can be seen, the intersection has not experienced a lot of crashes, particularly in recent years. More importantly, no serious injuries or fatalities were reported. The most commonly reported crash types were angle crashes and head-on crashes. Angle crashes are often a feature of left-turn conflicts, while head-on crashes can be related to the roadways vertical or horizontal curvature. The alternatives considered in this report (other than Scenario 1: No Build) may remove some of the potential for left-turn conflicts. For head-on crashes more research may be needed to identify issues with vertical curvature, however the proposed scenarios may reduce horizontal curvature issues associated with the current roadway geometry.

III. FUTURE CONDITIONS

As mentioned previously, the Township has been awarded a Multimodal Transportation Grant by PennDOT, to be used for improvements to the study intersection. This report will evaluate existing conditions, as well as four potential future scenarios for the Township's consideration. The future scenarios will examine anticipated traffic conditions for the years 2026 and 2033.

Projected Traffic Volumes

According to the PennDOT Bureau of Planning and Research Growth Factors for August 2022 to July 2023, the annual background growth rate for an Urban Non-Interstate roadway in Chester County is 0.54%.

Based on information provided by the Township, there are three planned developments in the vicinity that could increase traffic at the study intersection, see **Table 5** for details.

Table 5: Planned Developments

Developments	Units	Location
Parkside Apartments	150 Apartments	North Walnut Road, south of U.S. Route 1
Smith-Kotler Development	90 Homes	Creek Road (SR 0082), north of East Hillendale Road
Kennett Square Apartments	190 Apartments	600 West State Street

For the purposes of this study, it was also assumed that all developments would be completed and fully occupied by the 2026 design year. Therefore, based on the expected trip generation and anticipated travel patterns for these planned developments, it was decided to increase the PennDOT background to account for this additional traffic. To this end, the annual background growth rate of 0.54% was increased to 1%, which was then used to project the 2026 and 2033 volumes.

For Scenario 1 (No Build), Scenario 2 (Widening), and Scenario 4A (Roundabout), the annual growth of 1% was applied to the intersection volumes to get the 2026 and 2033 volumes. For Scenario 3 (Realignment) and Scenario 4B (Roundabout w/realignment), traffic volumes to and from Old Kennett Road were rerouted to Kaolin Road, and then the annual growth rate of 1% was applied, resulting in the 2026 and 2033 volumes.

Figures 3-12 show the projected 2026 and 2033 Weekday Morning and Weekday Afternoon Peak Hour Volumes for Scenarios 1, 2, 3, 4A, and 4B.

Evaluation Methodology

Capacity Analysis: For existing conditions and Scenarios 1, 2, 3, & 4, a capacity analysis was performed using the traffic analysis tool SYNCHRO. An intersection is given a Level-of-Service (LOS) performance ranking from A through F based on the average delay per vehicle experienced during the peak hour. The LOS criteria, as published in the Highway Capacity Manual (HCM), is shown for signalized and unsignalized (stop-controlled or roundabout)

intersections in **Table 6**. LOS D or better is considered acceptable.

Table 6: HCM LOS Criteria

Level of Service	Delay (sec)	
	Signalized	Unsignalized
A	≤10	≤10
B	>10 - 20	>10 - 15
C	>20 - 35	>15 - 25
D	>35 - 55	>25 - 35
E	>55 - 80	>35 - 50
F	>80	>50

95th Percentile Queue Analysis: A queuing analysis was conducted at the study intersection(s) for existing and future scenarios, again using the traffic analysis tool SYNCHRO. The 95th percentile is defined as the queue length that has a 5% probability of being exceeded during the analysis period.

Capacity LOS and 95th Percentile Queue matrix tables detailing the Synchro analysis results for all scenarios are included in **Appendix A**. The SYNCRO reports for capacity and queueing are included in **Appendix E**.

Construction Impacts: Construction Impacts were also evaluated for each scenario. Specifically, expected impacts to utilities, Right-of-Way, and estimated construction costs were determined to help CEC and the Township evaluate which option would be preferred.

IV. FUTURE SCENARIOS EVALUATION

This section details the results of the analysis and construction impacts for each alternative. Scenario 1 (No Build) serves as the baseline to which Scenarios 2, 3, and 4 will be compared.

Scenario 1 (No Build)

Figure 13 shows the existing intersection geometry and features.

Capacity Analysis: The 2026 analysis shows the intersection operating at LOS D overall for both weekday morning and afternoon peak hours. However, some individual movements show a failing LOS. The eastbound and westbound Hillendale Road approaches show LOS E for the weekday morning peak hour, while the weekday afternoon peak hour shows LOS F for the westbound Hillendale Road approach. The 2033 analysis shows similar results to 2026, with LOS D overall for the weekday morning peak hour. The weekday afternoon peak hour shows a failing overall LOS E. In addition, the individual movements showing LOS E in 2026 deteriorate to LOS F in 2033.

95th Percentile Queue Analysis: Both the 2026 and 2033 queue analyses show 95th percentile queues of up to 500', which equates to approximately 20 cars. While long, these queues should not impact the operation of other adjacent intersections.

Construction Impacts: This alternative would not impact any existing Right-of-Way or utilities. The only cost associated with this option is optimization of the signal timings.

Scenario 2 (Widening)

This scenario calls for the construction of left-turn lanes for several of the intersection approaches. This scenario may require replacement of some or all the existing traffic signal equipment. The difference between 2A, 2B, and 2C is the proposed lane configuration. Turn Lane Warrant analyses were performed to determine the need for auxiliary lanes. Left-turn lanes were shown to be warranted for the northbound and southbound approaches. The turn lane warrant analyses are included in **Appendix D**, while **Table 7** details the geometry analyzed for each scenario. **Figures 14-16** show the conceptual intersection geometry and features for Scenarios 2A, 2B, and 2C.

Table 7: Scenario 2 - Auxiliary Turn Lanes

Scenario	Approach				
	Eastbound	Westbound	Northbound	Southbound	Northwest
2A	No	No	Yes – 175'	Yes – 150'	No
2B	Yes – 150'	Yes – 150'	No	No	No
2C	Yes – 150'	Yes – 150'	Yes – 175'	Yes – 150'	No

Capacity Analysis: The 2026 and 2033 analyses shows the intersection operating at LOS C or

better overall for both weekday morning and afternoon peak hours, with all approaches operating at LOS D or better.

95th Percentile Queue Analysis: Both the 2026 and 2033 queue analyses show 95th percentile queues of up to 317', which equates to approximately 13 cars. These queues while long should not impact the operation of other adjacent intersections.

Construction Impacts: Scenario 2A would impact up to 3 nearby parcels, while scenarios 2B & 2C would each impact up to 4 parcels. Scenario 2A is also expected to impact 5 utility poles and 7 inlets, Scenario 2B is expected to impact 7 utility poles and 7 inlets, and scenario 2C is expected to impact 11 poles and 8 inlets.

Scenario 3 (Realignment)

Old Kennett Road (SR 3036) will be realigned to form a new T-Intersection with Kaolin Road (SR 3013), approximately 700' south of the existing Five Points intersection. The Five Points intersection shall then be reconfigured into a traditional four-legged signalized intersection with north and southbound left-turn lanes. Traffic signal modifications shall be required to accommodate the new intersection geometry. The signal timings and phasing shall also be optimized. **Figure 17** shows the conceptual intersection geometry and features.

Capacity Analysis: Both the 2026 and 2033 analysis show both intersections operating at LOS B or better overall. In addition, for both intersections, all approaches operate acceptably with LOS B or better during both the weekday morning and afternoon peak hours.

95th Percentile Queue Analysis: Both the 2026 and 2033 queue analyses show 95th percentile queues of up to 155', which equates to approximately 79 cars.

Construction Impacts: This scenario is expected to impact up to 12 parcels, 12 utility poles, and 7 inlets. Additional impacts are would be anticipated in order to modify the profile of Kaolin Rd to provide adequate sight distance for the new intersection.

Scenario 4 (Roundabout)

The existing Five Points intersection shall be replaced with a roundabout. Two roundabout options were studied:

- **Scenario 4A** – A single lane roundabout with five approaches shall be constructed at the existing signalized intersection.
- **Scenario 4B** – Similar to Scenario 3, Old Kennett Road (SR 3036) shall be realigned to form a new T-Intersection with Kaolin Road (SR 3013), approximately 700' south of the existing Five Points intersection. The Five Points intersection shall then be reconfigured into a single lane roundabout with four approaches.

Figures 18-19 show the conceptual roundabout and intersection geometry and features.

Capacity Analysis: Both the 2026 and 2033 analysis show both scenarios operating with little

delay overall (LOS A) at both intersections for both scenarios during both peak hours. In addition all approaches operate at LOS B or better.

95th Percentile Queue Analysis: Both the 2026 and 2033 queue analyses show 95th percentile queues of up to 75', which equates to approximately 3 cars. These queues should not impact the operation of other adjacent intersections.

Construction Impacts: Scenario 4A would impact up to 5 nearby parcels, while scenario 4B would impact up to 12 parcels. In addition, scenario 4A could be expected to impact up to 7 utility poles and 8 inlets, which scenario 2B could be expected to impact 11 utility poles and 7 inlets.

V. CONCLUSIONS & RECOMMENDATIONS

Table 8 tabulates the findings of this study for ease of comparison. Please note that the construction cost estimate is preliminary in nature.

Table 8: Scenario Comparison

Scenario	LOS		Impacts			Preliminary Construction Cost Estimate
	AM	PM	Utility Poles	Inlets	ROW ¹	
2023 Existing	D	D	--	--	--	--
2026 Scenario 1 - No Build	D	D	--	--	--	\$25,000
2033 Scenario 1 - No Build	D	E				
2026 Scenario 2A - Widening	C	C	5	7	3	\$1,500,000
2033 Scenario 2A - Widening	C	C				
2026 Scenario 2B - Widening	B	C	7	8	4	\$1,500,000
2033 Scenario 2B - Widening	C	C				
2026 Scenario 2C - Widening	B	C	11	8	4	\$2,250,000
2033 Scenario 2C - Widening	B	C				
2026 Scenario 3 - Realignment	A	B	12	7	12	(2)
2033 Scenario 3 - Realignment	B	B				
2026 Scenario 4A - Roundabout	A	A	7	8	5	\$3,750,000
2033 Scenario 4A - Roundabout	A	A				
2026 Scenario 4B - Roundabout w/Realignment	A	A	11	7	12	(2)
2033 Scenario 4B - Roundabout w/Realignment	A	A				

¹ Factored into the preliminary estimate.

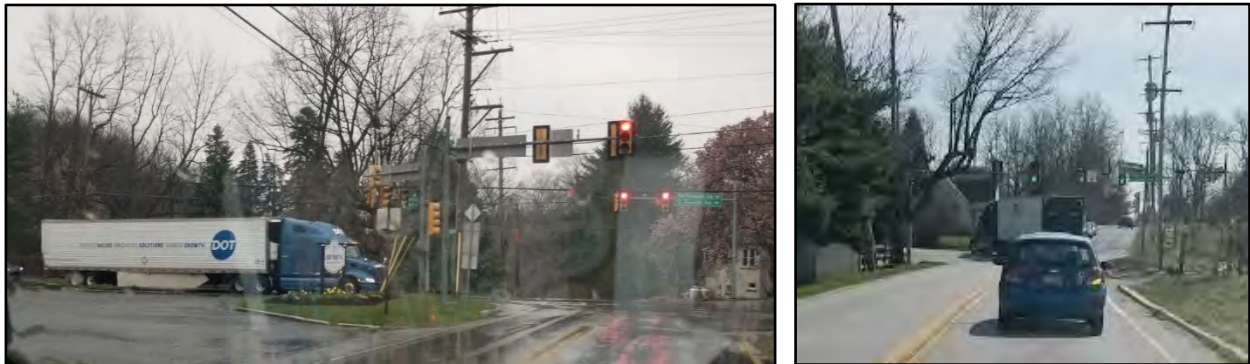
² Realignment scenarios not favored by Township, due to extensive ROW impacts as well as difficulty estimating cost.

Further details on the Preliminary Construction Cost Estimate can be found in **Appendix F**. From a capacity and queuing analysis perspective, all scenarios offer an improvement over the projected no build scenario. The roundabout options in particular show a large reduction in expected delay. However, the results shown for scenarios 2 and 3 would also be considered acceptable.

From a construction costs point of view, the alternatives get progressively more expensive. It should be noted that the township is not in favor of Scenarios 3 or 4B, both of which propose a major roadway realignment. The township has concerns regarding the compounding ROW impacts and subsequent design and construction costs. In addition, there are potential sight distance issues on Kaolin Rd that could limit the location of the potential tie-in with the realigned Old Kennett Rd. Therefore, for the purpose of this report a preliminary cost estimate was not prepared for these two alternatives.

Scenarios 2A, 2B, and 2C all offer intersection upgrades which are expected to improve capacity, but at a more cost-effective price than Scenario 4A – Roundabout. In addition Scenarios 2A, 2B, and 2C would not impact adjacent property owners and businesses to the extent that Scenario 4 would. Scenario 2C is estimated to cost approximately \$2,250,000. This option proposes auxiliary left-turn lanes on four of the five legs of the existing intersection, and associated signal upgrades. While the widening of the roadway could impact several of the surrounding properties, the township believes these impacts will be minimal, and should not impact construction costs negatively.

In comparison, Scenario 4A is estimated to cost \$3,750,000. This estimate assumes it is feasible to construct the roundabout and tie-in the existing approaches as close to their existing locations as possible, which would minimize ROW impacts and construction costs. Both pictures below show a truck travelling from southbound Union Street to southbound Old Kennett Road, which is a frequent movement at the Five Points intersection. Given the significant amount of truck traffic that navigates the intersection, it is likely the radius of the roundabout would need to be larger. This could drive up construction costs as well as utility and ROW impacts. It should also be noted that the roundabout option will require substantially greater land disturbance which will likely trigger additional permitting and mitigation requirements.



The Township’s preference is avoid or minimize impacts to the properties and businesses located between Old Kennett and Kaolin Rd, as well as the property located between Union St and westbound Hillendale Rd. Based upon the analysis of this report, field observations, local knowledge of the intersection and the significant complications noted above for the roundabout option, CEC recommends Scenario 2C. In the long-term, this scenario offers a reduction in driver delays, and is more compatible for pedestrian and/or bicycle accommodations that may be incorporated into final design. In addition the cost of this alternative is more compatible with the Township’s budgetary constraints.

Should you have any questions, please contact me directly at (215) 987-4863 or email pohalloran@carrollengineering.com.



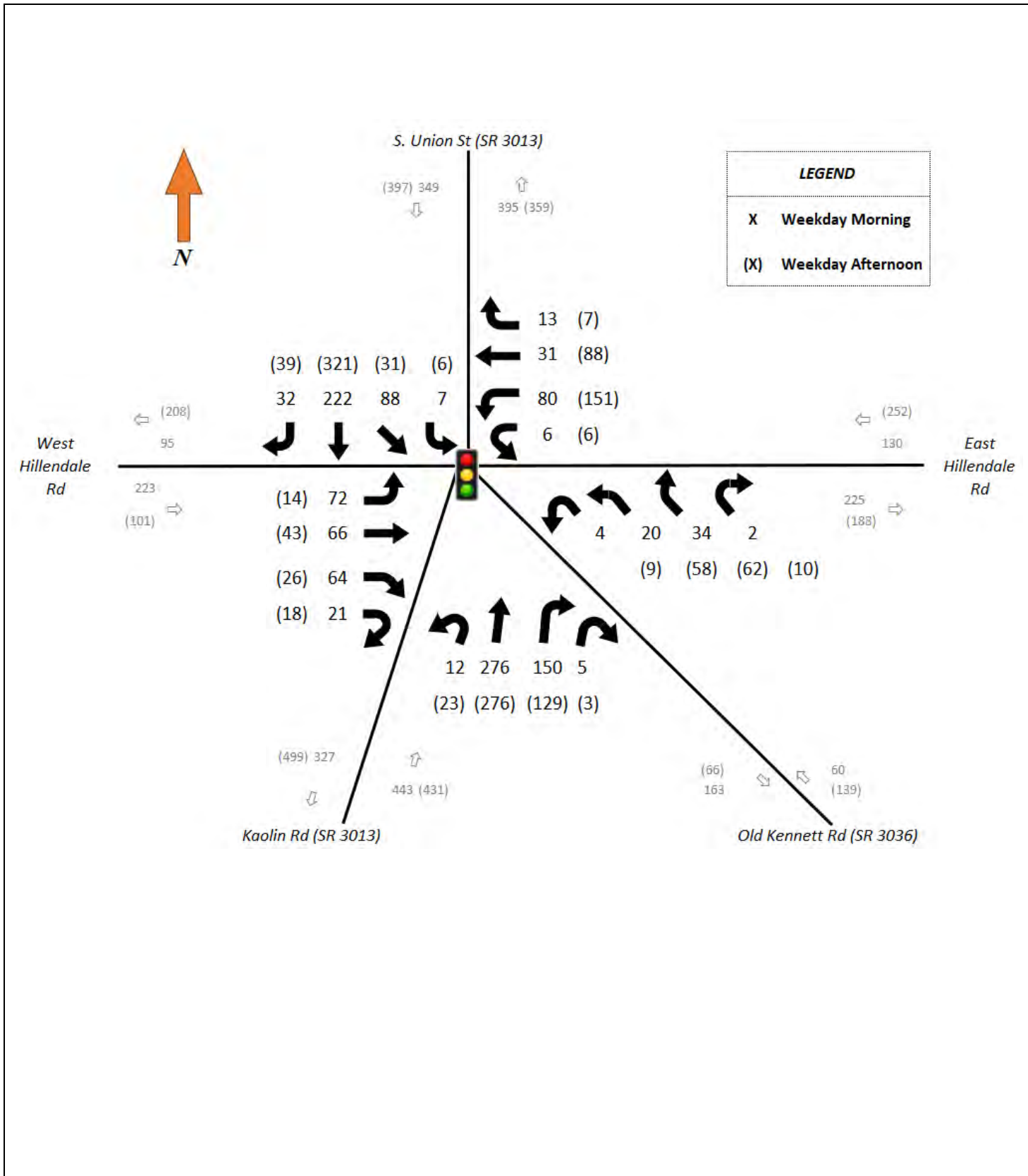
**Five Points Alternatives Analysis
Kennett Township, PA**


Location Map

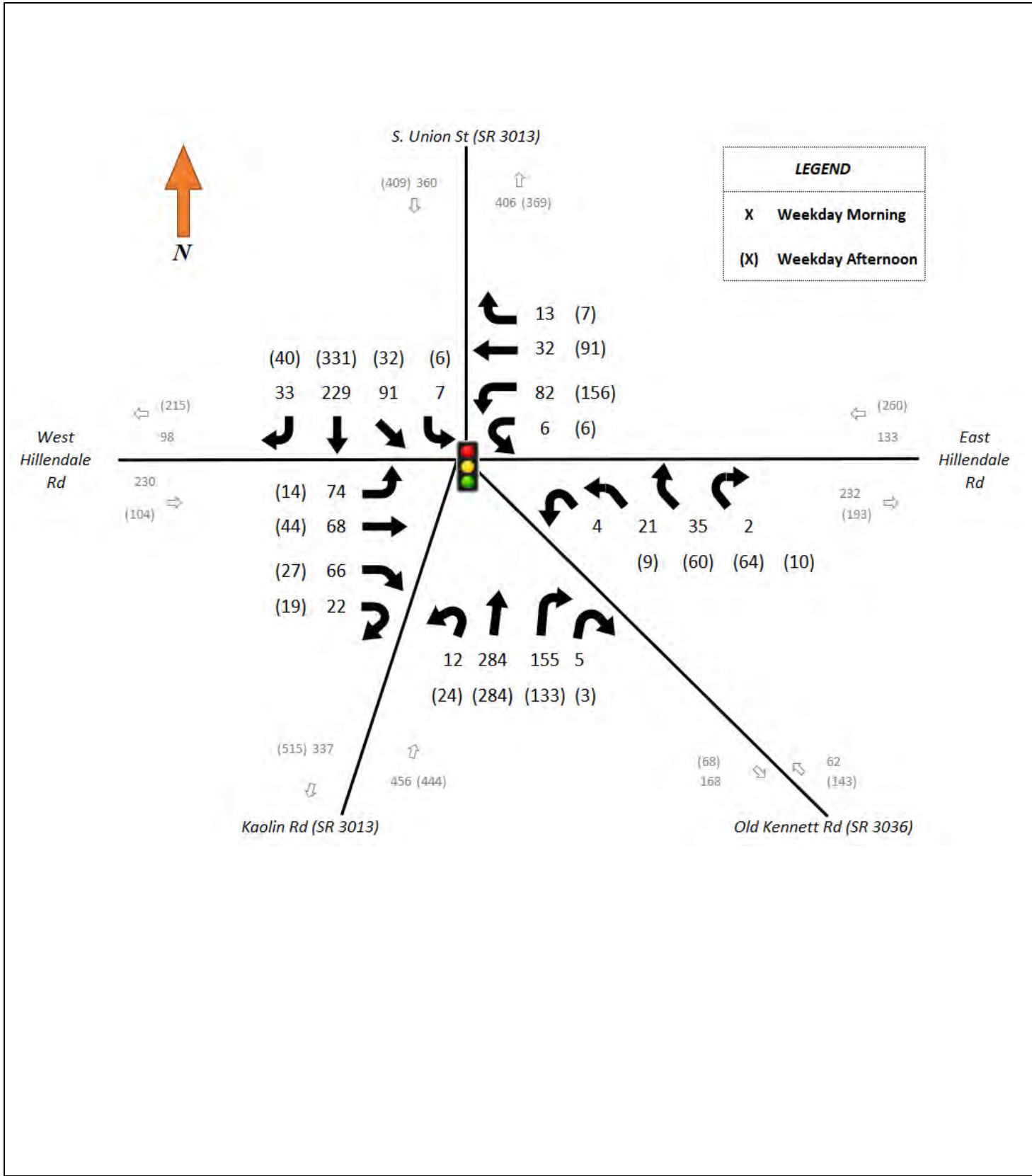


Project: 231394
Date: 02/23/2024

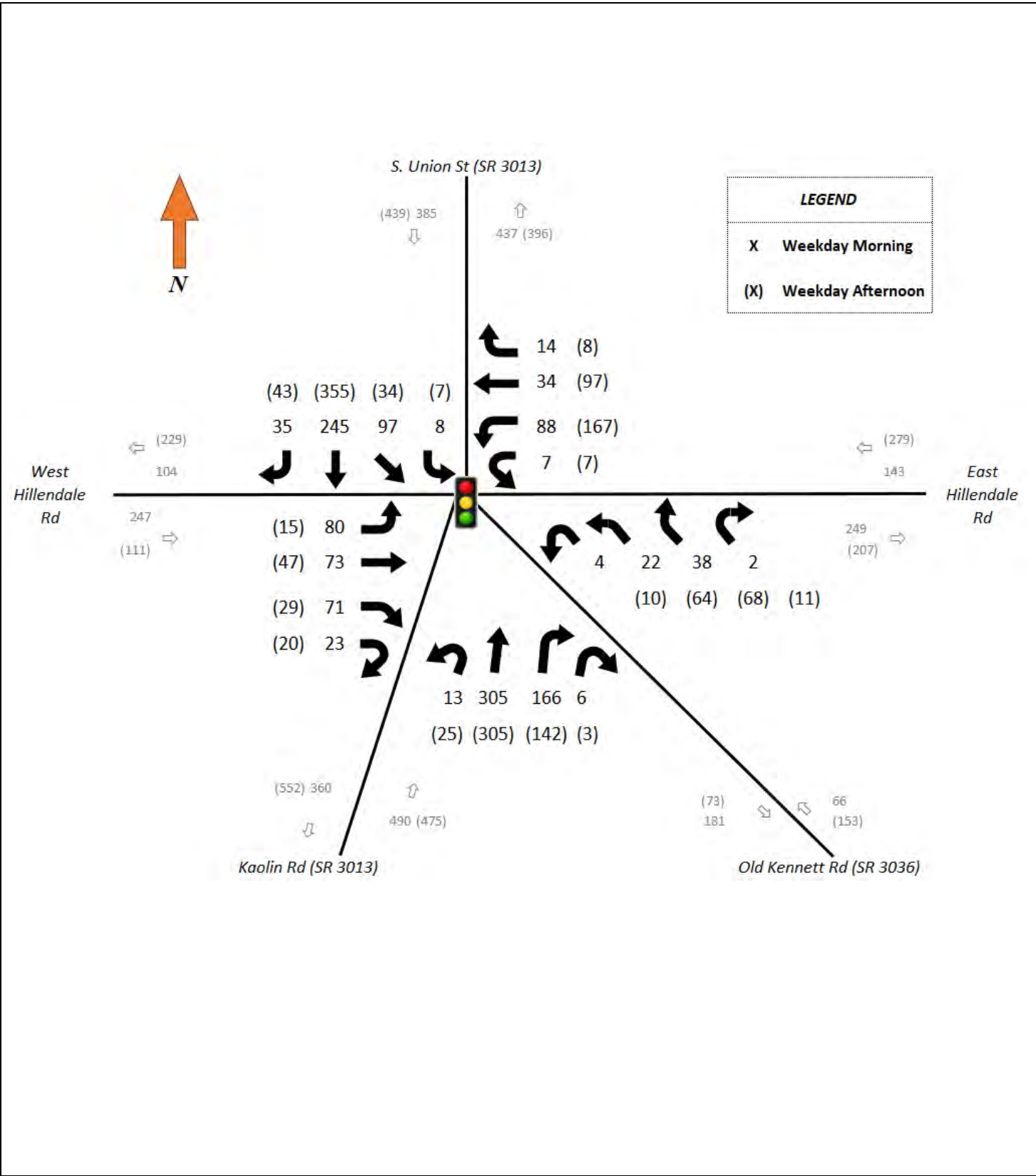
Figure 1



Five Points Alternatives Analysis		Existing Conditions	
Kennett Township, PA		2023 Peak Hour Volumes	
	Project:	231394	
	Date:	02/23/2024	
		Figure 2	



Five Points Alternatives Analysis Kennett Township, PA		Scenario 1: No Build 2026 Peak Hour Volumes	
	Project:	231394	
	Date:	02/23/2024	
		Figure 3	



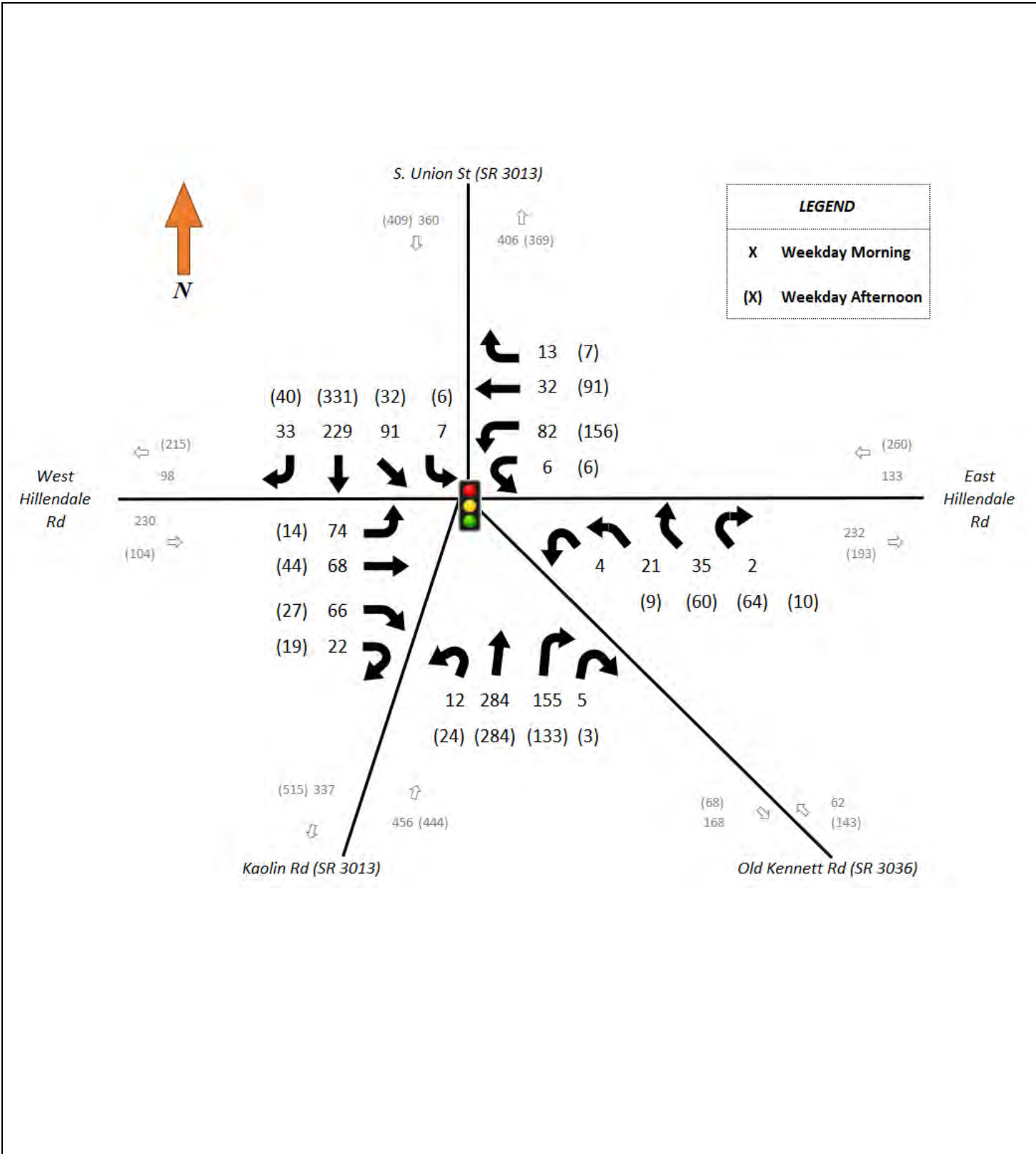
**Five Points Alternatives Analysis
Kennett Township, PA**

**Scenario 1: No Build
2033 Peak Hour Volumes**



Project: 231394
Date: 02/23/2024

Figure 4



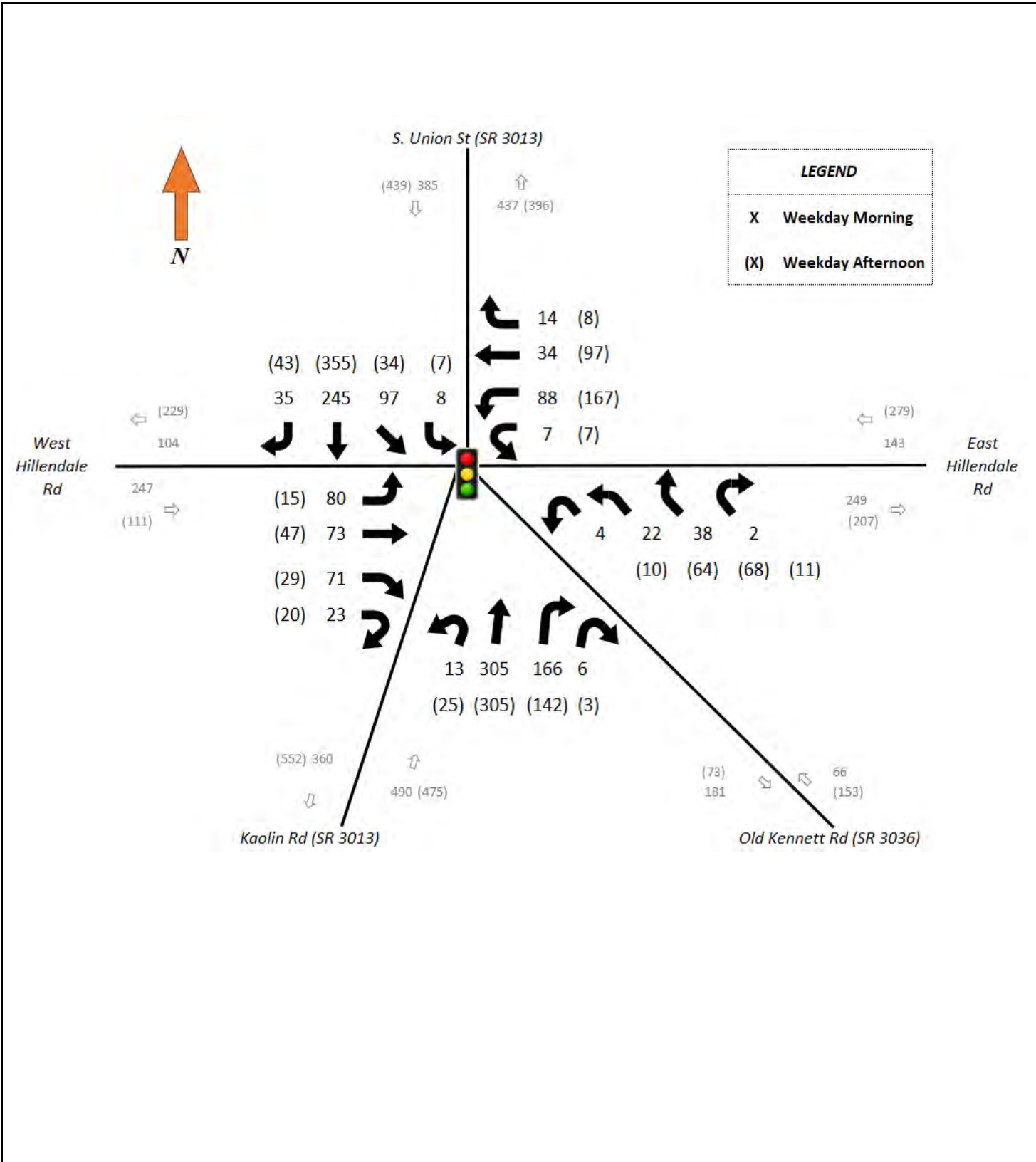
**Five Points Alternatives Analysis
Kennett Township, PA**

**Scenario 2: Widening
2026 Peak Hour Volumes**



Project: 231394
Date: 02/23/2024

Figure 5



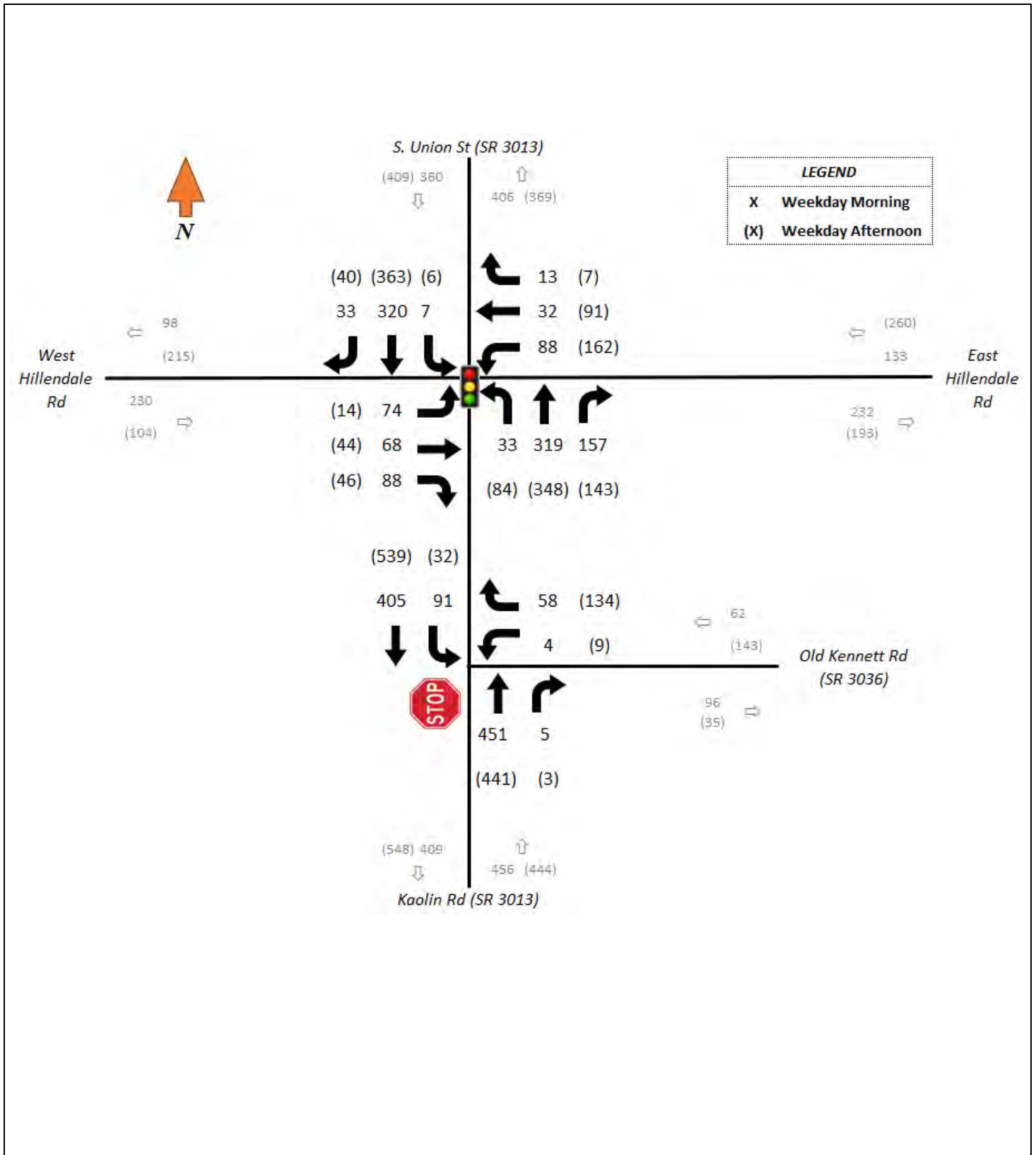
**Five Points Alternatives Analysis
Kennett Township, PA**


**Scenario 2: Widening
2033 Peak Hour Volumes**

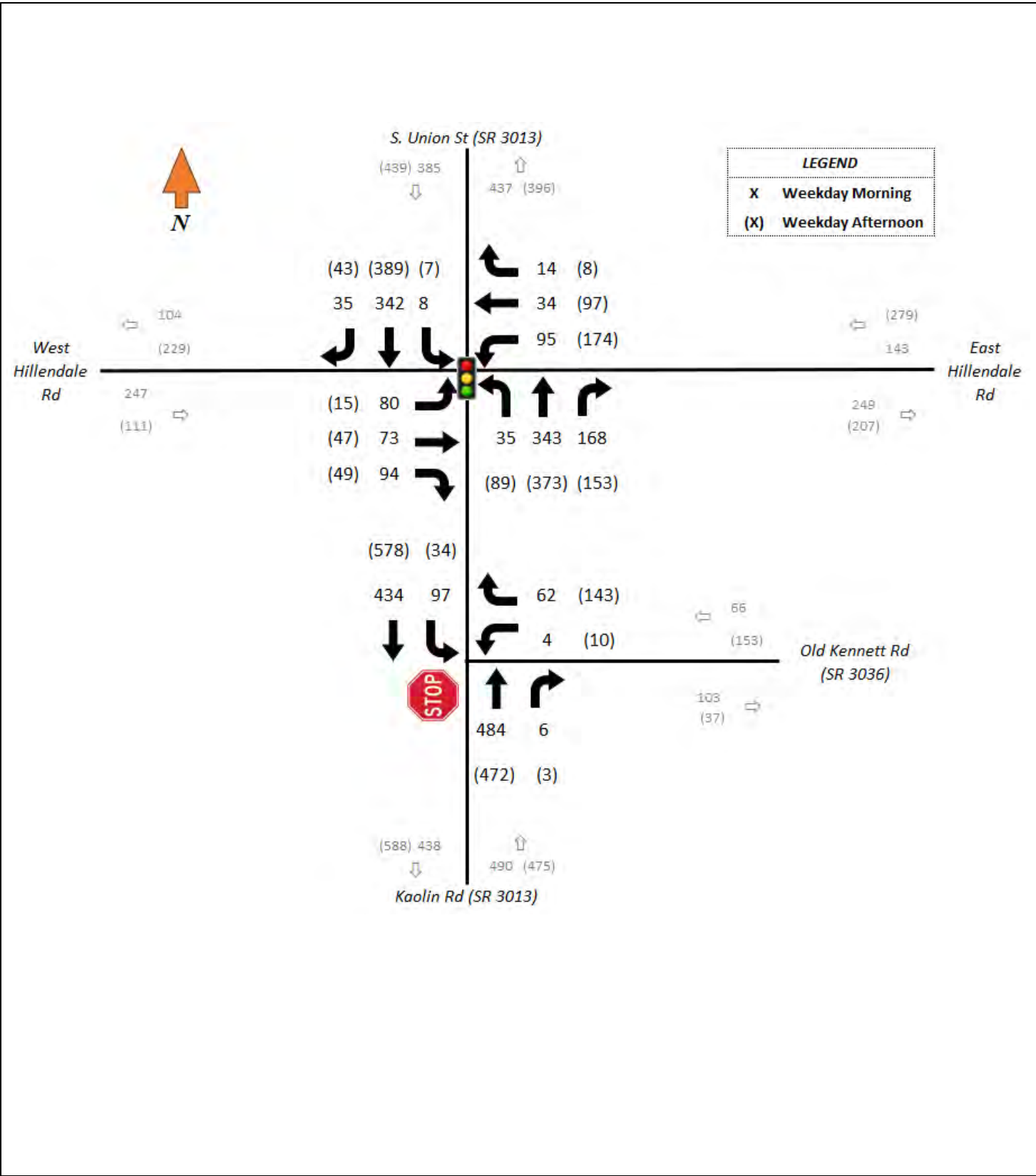


Project: 231394
Date: 02/23/2024

Figure 6



Five Points Alternatives Analysis		Scenario 3: Realignment	
Kennett Township, PA		2026 Peak Hour Volumes	
	Project:	231394	
	Date:	02/23/2024	
		Figure 7	



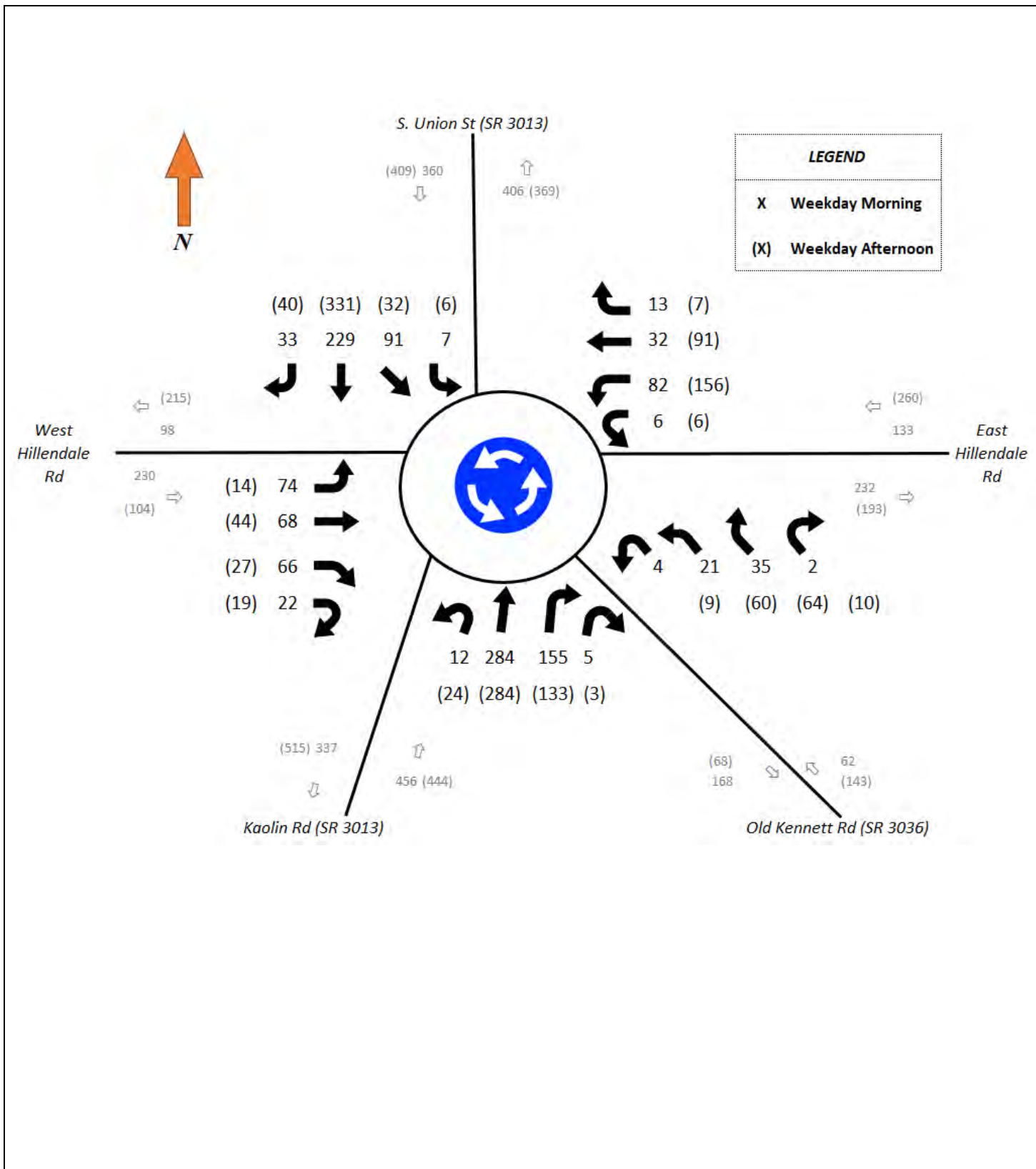
Five Points Alternatives Analysis
Kennett Township, PA

Scenario 3: Realignment
2033 Peak Hour Volumes



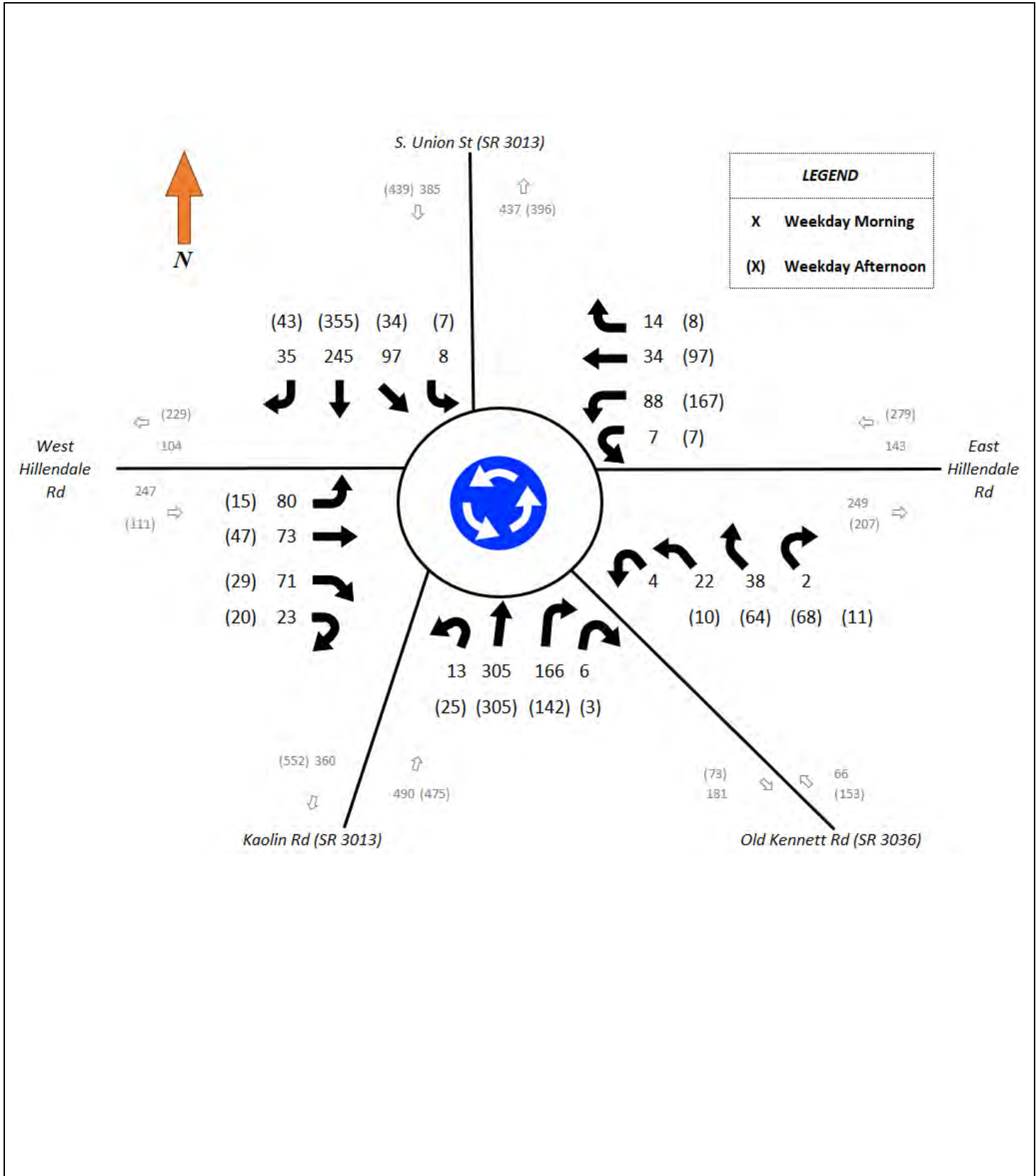
Project: 231394
 Date: 02/23/2024

Figure 8

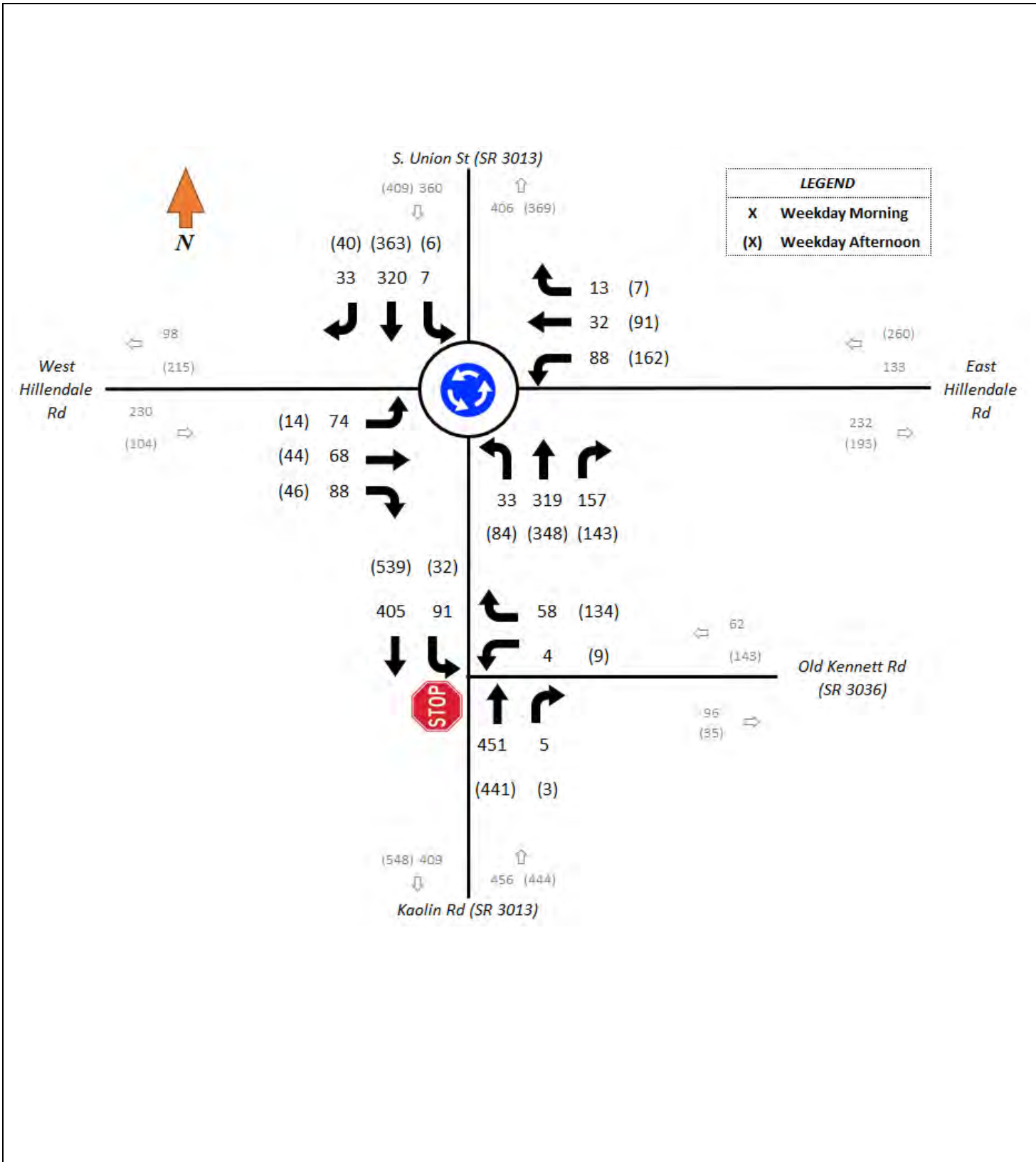


Five Points Alternatives Analysis Kennett Township, PA	Scenario 4A: Roundabout 2026 Peak Hour Volumes
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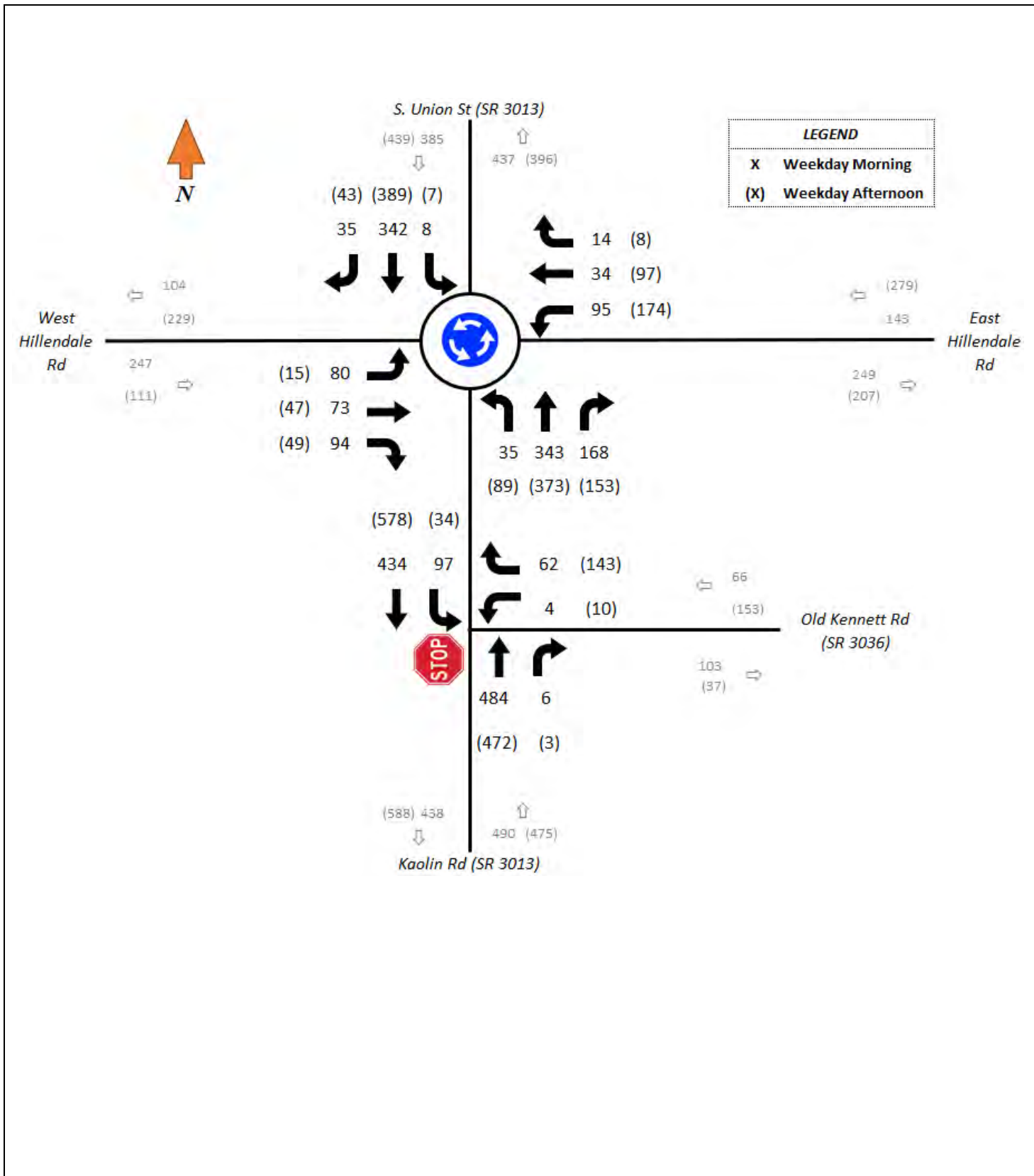
	Project:	231394	Figure 9
	Date:	02/23/2024	



Five Points Alternatives Analysis Kennett Township, PA		Scenario 4A: Roundabout 2033 Peak Hour Volumes	
	Project:	231394	
	Date:	02/23/2024	
		Figure 10	



Five Points Alternatives Analysis Kennett Township, PA		Scenario 4B: Roundabout w/Realignment 2026 Peak Hour Volumes	
	Project:	231394	
	Date:	02/23/2024	
		Figure 11	



Five Points Alternatives Analysis		Scenario 4B: Roundabout w/Realignment
Kennett Township, PA		
2033 Peak Hour Volumes		Figure 12
	Project: 231394	
	Date: 02/23/2024	



Five Points Alternatives Analysis
Kennett Township, PA

Intersection Concept - Scenario 1: No Build



Project:	231394
Date:	02/23/2024

Figure 13



**Five Points Alternatives Analysis
Kennett Township, PA**

**Intersection Concept - Scenario 2A: Widening
Left-turn lanes on South Union St & Kaolin Rd**



Project:	231394
Date:	02/23/2024

Figure 14



**Five Points Alternatives Analysis
Kennett Township, PA**

**Intersection Concept - Scenario 2B: Widening
Left-turn lanes on Hillendale Rd**



Project:	231394
Date:	02/23/2024

Figure 15



**Five Points Alternatives Analysis
Kennett Township, PA**

**Intersection Concept - Scenario 2C: Widening
Left-turn lanes on all approaches except for Old Kennett Rd**



Project:	231394
Date:	02/23/2024

Figure 16



**Five Points Alternatives Analysis
Kennett Township, PA**

**Intersection Concept - Scenario 3: Realignment
Old Kennett Rd realigned to intersect with Kaolin Rd**



Project:	231394
Date:	02/23/2024

Figure 17



**Five Points Alternatives Analysis
Kennett Township, PA**

**Intersection Concept - Scenario 4A: Roundabout
Single lane roundabout with five approaches**



Project:	231394
Date:	02/23/2024

Figure 18



Five Points Alternatives Analysis
Kennett Township, PA

Intersection Concept - Scenario 4B: Roundabout w/Realignment
Single lane roundabout with four approaches, Old Kennett Rd realigned



Project: 231394
 Date: 02/23/2024

Figure 19

APPENDIX A: Capacity LOS & Queue Matrix Tables

01 - Hillendale Rd & Kaolin Rd/Union St & Old Kennett Rd - Delay (s/veh)

Time Period		Weekday Morning Peak Hour														
Design Year		2026							2033							
Scenario		S1	S2A	S2B	S2C	S3	S4A	S4B	S1	S2A	S2B	S2C	S3	S4A	S4B	
Control Type		Signal	Signal	Signal	Signal	Signal	Round	Round	Signal	Signal	Signal	Signal	Signal	Round	Round	
Hillendale Rd	Left EB Thru S Right H Right	E	E	C	C 24.3	C 21.2	B	A	A	F	C	C 24.6	C 20.4	B	A	A
		57.6	65.2	24.7	C 31.1	C 24.0	15.5	8.0	8.0	97.6	27.1	C 31.1	C 21.9	16.5	8.8	8.7
	H Left S Left WB Thru Right	D	E	C	D 42.9	C 30.1	B	A	A	F	C	D 47.0	C 25.5	B	A	A
		53.7	62.3	21.3	C 20.6	B 18.4	14.9	6.9	6.9	105.3	24.3	C 21.0	B 17.9	16.1	7.5	7.4
Kaolin Rd	Left NB Thru S Right H Right	D	D	A 10.0	B	A 7.5	A 8.6	B	A	D	B 10.5	B	A 8.5	A 9.1	B	B
		42.0	43.5	C 22.5	12.3	B 13.4	A 7.5	11.4	9.2	45.2	C 28.5	13.6	B 17.7	A 8.0	13.2	10.1
Union St	H Left S Left SB Thru Right	B	C	B 16.6	B	B 10.2	B 10.2	A	A	C	C 26.4	B	B 13.4	B 11.1	A	A
		19.7	20.8	B 12.6	12.1	A 9.4	A 6.4	6.9	6.9	23.4	C 13.5	14.0	B 10.9	A 6.7	7.3	7.3
Old Kennett Rd	H Left S Left S Right H Right	D	D	D	D	D	(1)	A	(1)	D	D	D	D	(1)	A	(1)
		39.4	39.8	48.8	39.4	45.4	(1)	7.1	(1)	41.7	47.6	54.3	39.6	(1)	7.6	(1)
Overall		D 39.5	D 42.8	C 21.4	B 19.1	B 17.0	A 9.5	A 8.8	A 8.0	D 55.0	C 25.2	C 21.2	B 18.2	B 10.1	A 9.8	A 8.8

(1) Does not exist in this scenario

02 - Realigned Old Kennett Rd & Kaolin Rd - Delay (s/veh)

Time Period		Weekday Morning Peak Hour													
Design Year		2026					2033								
Scenario		S1	S2A	S2B	S2C	S3	S4A	S4B	S1	S2A	S2B	S2C	S3	S4A	S4B
Control Type						Stop		Stop					Stop		Stop
Realigned Old Kennett Rd	WB Left Right	(1)	(1)	(1)	(1)	B 13.7	(1)	B 13.7	(1)	(1)	(1)	(1)	B 14.4	(1)	B 14.4
		(1)	(1)	(1)	(1)	A 0.0	(1)	A 0.0	(1)	(1)	(1)	(1)	A 0.0	(1)	A 0.0
Kaolin Rd	NB Thru Right SB Left Thru	(1)	(1)	(1)	(1)	A 1.6	(1)	A 1.6	(1)	(1)	(1)	(1)	A 1.6	(1)	A 1.6
		(1)	(1)	(1)	(1)	A 1.6	(1)	A 1.6	(1)	(1)	(1)	(1)	A 1.7	(1)	A 1.7

(1) Does not exist in this scenario

01 - Hillendale Rd & Kaolin Rd/Union St & Old Kennett Rd - Delay (s/veh)

Time Period		Weekday Afternoon Peak Hour														
Design Year		2026						2033								
Scenario		S1	S2A	S2B	S2C	S3	S4A	S4B	S1	S2A	S2B	S2C	S3	S4A	S4B	
Control Type		Signal	Signal	Signal	Signal	Signal	Round	Round	Signal	Signal	Signal	Signal	Signal	Round	Round	
Hillendale Rd	Left EB Thru S Right H Right	C	C	B	B 19.4	B 19.0	B	A	A	C	B	B 18.5	B 18.8	B	A	A
		31.3	31.9	16.4	B 19.6	B 19.2	12.9	6.5	6.4	33.9	18.2	B 18.8	B 19.0	13.5	7.0	6.9
	Right WB H Left S Left Thru	F	F	C	D 40.6	D 39.8	B	A	A	F	D	D 40.0	D 44.7	B	A	A
		92.2	109.3	34.6	D 20.0	B 19.6	17.1	8.2	8.1	171.8	37.2	B 19.2	B 19.4	19.2	9.1	8.9
Kaolin Rd	Left NB Thru S Right H Right	D	D	B 13.3	C	B 11.4	B 12.8	A	A	D	B 15.4	C	B 11.8	B 14.4	A	A
		49.5	51.1	C 26.3	20.7	B 18.8	A 9.7	7.2	8.0	54.5	C 33.0	33.3	C 21.7	B 10.7	7.8	8.6
Union St	Right SB H Left S Left Thru	B	B	B 14.5	B	B 12.1	B 13.0	A	A	C	B 17.7	C	B 12.9	B 14.7	B	B
		19.5	19.8	B 19.9	18.1	B 15.8	A 8.8	9.6	9.4	20.9	C 23.8	28.8	B 17.3	A 9.6	10.8	10.5
Old Kennett Rd	Left NW H Left S Left S Right H Right	D	D	D	D	D	(1)	A	(1)	D	D	C	D	(1)	A	(1)
		43.5	45.0	50.2	41.4	39.5	(1)	6.8	(1)	48.8	46.9	33.5	45.6	(1)	7.4	(1)
Overall		D 46.6	D 50.8	C 27.4	C 24.3	C 22.4	B 11.3	A 8.0	A 8.3	E 64.7	C 30.9	C 30.6	C 25.0	B 12.5	A 8.8	A 9.1

(1) Does not exist in this scenario

02 - Realigned Old Kennett Rd & Kaolin Rd - Delay (s/veh)

Time Period		Weekday Afternoon Peak Hour													
Design Year		2026					2033								
Scenario		S1	S2A	S2B	S2C	S3	S4A	S4B	S1	S2A	S2B	S2C	S3	S4A	S4B
Control Type						Stop		Stop					Stop		Stop
Kaolin Rd	Left WB Right	(1)	(1)	(1)	(1)	B 14.5	(1)	B 14.5	(1)	(1)	(1)	(1)	C 15.7	(1)	C 15.7
	Right NB Thru	(1)	(1)	(1)	(1)	A 0.0	(1)	A 0.0	(1)	(1)	(1)	(1)	A 0.0	(1)	A 0.0
Kaolin Rd	Left SB Thru	(1)	(1)	(1)	(1)	A 0.5	(1)	A 0.5	(1)	(1)	(1)	(1)	0 0.5	(1)	A 0.5
	Overall	(1)	(1)	(1)	(1)	A 2.0	(1)	A 2.0	(1)	(1)	(1)	(1)	A 2.2	(1)	A 2.2

(1) Does not exist in this scenario

01 - Hillendale Rd & Kaolin Rd/Union St & Old Kennett Rd - 95th % Queue (ft)

Time Period		Existing & Proposed Storage Lengths (ft)								Weekday Morning Peak Hour															
Design Year		2026 & 2033								2026				2033											
Scenario		2023	S1	S2A	S2B	S2C	S3	S4A	S4B	Ex	S1	S2A	S2B	S2C	S3	S4A	S4B	S1	S2A	S2B	S2C	S3	S4A	S4B	
Control Type		Ex	S1	S2A	S2B	S2C	S3	S4A	S4B	Signal	Signal	Signal	Signal	Signal	Signal	Round	Round	Signal	Signal	Signal	Signal	Signal	Round	Round	
Hillendale Rd	Left				150	150																			
	EB Thru S Right H Right	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	375	391	206	64	62	85	25	25	428	209	65	68	100	50	50	
Kaolin Rd	Left				175	175	175																		
	NB Thru S Right H Right	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	414	432	11	244	11	8	75	75	482	12	310	11	8	100	100	
Union St	Left				150	150	150																		
	SB Thru Right	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000	223	233	72	198	63	3	50	50	254	107	261	75	3	50	50	
Old Kennett Rd	Left																								
	NW Thru S Left H Right	>1000	>1000	>1000	>1000	>1000	(1)	>1000	(1)	88	91	68	57	68	(1)	0	(1)	94	82	82	61	(1)	0	(1)	

(1) Does not exist in this scenario

02 - Realigned Old Kennett Rd & Kaolin Rd - 95th % Queue (ft)

Time Period		Existing & Proposed Storage Lengths (ft)								Weekday Morning Peak Hour															
Design Year		2026 & 2033								2026				2033											
Scenario		2023	S1	S2A	S2B	S2C	S3	S4A	S4B	Ex	S1	S2A	S2B	S2C	S3	S4A	S4B	S1	S2A	S2B	S2C	S3	S4A	S4B	
Control Type		Ex	S1	S2A	S2B	S2C	S3	S4A	S4B	Signal	Signal	Signal	Signal	Signal	Signal	Signal	Signal	Signal	Signal	Signal	Signal	Signal	Signal	Signal	
Realigned Old Kennett Rd	WB Left Right						0		0																
	NB Thru Right	(1)	(1)	(1)	(1)	(1)	0	(1)	0	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	0	
Kaolin Rd	Left						175		175																
	SB Thru																								

(1) Does not exist in this scenario

01 - Hillendale Rd & Kaolin Rd/Union St & Old Kennett Rd - 95th % Queue (ft)

Time Period		Existing & Proposed Storage Lengths (ft)								Weekday Afternoon Peak Hour														
Design Year		2026 & 2033								2026							2033							
Scenario		2023	2026 & 2033							Ex	S1	S2A	S2B	S2C	S3	S4A	S4B	S1	S2A	S2B	S2C	S3	S4A	S4B
Control Type		Ex	S1	S2A	S2B	S2C	S3	S4A	S4B	Signal	Signal	Signal	Signal	Signal	Signal	Round	Round	Signal	Signal	Signal	Signal	Signal	Round	Round
Hillendale Rd	Left				150	150				110	112	62	18	18	35	25	25	120	74	18	19	43	25	25
	EB Thru S Right H Right	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000				58	58						60	62			
Kaolin Rd	Left				175	175	175			434	454	21	21	28				507	24	21	33	50	75	
	NB Thru S Right H Right	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000				301	271	123	50	75			331	300	155		
Union St	Left				150	150	150			266	277	31	30	3				307	40	33	3	75	75	
	SB Thru Right	>1000	>1000	>1000	>1000	>1000	>1000	>1000	>1000				263	196	93	75	75			303	215	115		
Old Kennett Rd	Left									161	167	153	124	124	(1)	25	(1)	190	174	144	134	(1)	25	(1)
	NW Thru S Left S Right H Right	>1000	>1000	>1000	>1000	>1000	(1)	>1000	(1)															

(1) Does not exist in this scenario

02 - Realigned Old Kennett Rd & Kaolin Rd - 95th % Queue (ft)

Time Period		Existing & Proposed Storage Lengths (ft)								Weekday Afternoon Peak Hour														
Design Year		2026 & 2033								2026							2033							
Scenario		2023	2026 & 2033							Ex	S1	S2A	S2B	S2C	S3	S4A	S4B	S1	S2A	S2B	S2C	S3	S4A	S4B
Control Type		Ex	S1	S2A	S2B	S2C	S3	S4A	S4B	Signal	Signal	Signal	Signal	Signal	Signal	Signal	Signal	Signal	Signal	Signal	Signal	Signal	Signal	Signal
Realigned Old Kennett Rd	WB Left Right						0		0					30		30					35		35	
							0	(1)	0	(1)				0	(1)	0	(1)			(1)	0	(1)	0	
Kaolin Rd	NB Thru Right	(1)	(1)		(1)		0	(1)	0	(1)	(1)											(1)	0	
	SB Left Thru						175		175					3		3					3		3	

(1) Does not exist in this scenario

APPENDIX B: Field Notes & Photographs



Field View 1: Kaolin Road View, approaching the northbound direction.



Field View 2: Kaolin Road View, entering the intersection from the northbound approach.



Field View 3: South Union Street View, exiting the intersection.



Field View 4: West Hillendale Road View, approaching the eastbound direction.



Field View 5: West Hillendale Road View, entering the intersection from the eastbound approach.



Field View 6: East Hillendale Road View, exiting the intersection.



Field View 7: South Union Street view, approaching the southbound direction.



Field View 8: South Union Street View, entering the intersection from the southbound approach.



Field View 9: Kaolin Road View, exiting the intersection.



Field View 10: East Hillendale Road View, approaching the westbound direction.



Field View 11: East Hillendale Road View, entering the intersection from the westbound approach.



Field View 12: West Hillendale Road View, exiting the intersection.



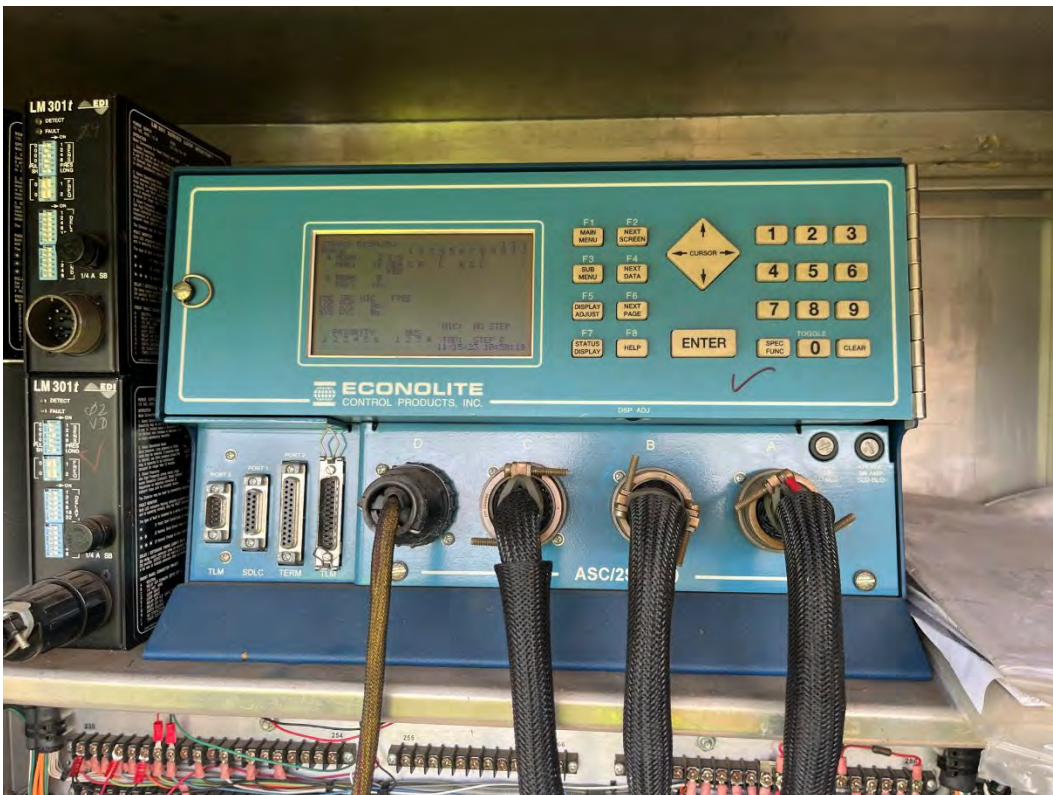
Field View 13: Old Kennett Road View, approaching the northwest-bound direction.



Field View 14: Old Kennett Road View, entering the intersection from the northwest-bound direction.



Field View 15: Old Kennett Road View, exiting the intersection.



Field View 16: View of Cabinet Controller.



Field View 17: Protected magnolia tree along the northwest-bound approach.



Field View 18: Pedestrian path along South Union Street towards the intersections.

APPENDIX C: Traffic Count Data

S Union St. & Hillendale Rd. - TMC

Tue Nov 28, 2023

Full Length (6 AM-9 AM, 3 PM-6 PM)

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Crosswalk)

All Movements

ID: 1137447, Location: 39.832669, -75.707492



Provided by: Tri-State Traffic Data, Inc.

184 Baker Road,
Coatesville, PA, 19320, US

Leg Direction	S Union St. Southbound								Hillendale Rd. Westbound								Old Kennett Rd. Northwestbound							
	R	T	BL	L	U	RR	App	Ped*	R	T	L	HL	U	RR	App	Ped*	HR	BR	BL	HL	U	HRR	App	Ped*
2023-11-28 6:00AM	5	22	7	2	0	0	36	0	0	2	7	1	0	0	10	0	0	2	0	0	0	0	2	0
6:15AM	2	21	9	2	0	0	34	0	0	0	6	0	0	0	6	0	0	7	2	0	0	1	10	0
6:30AM	3	31	11	2	0	0	47	0	1	1	2	0	0	0	4	0	0	2	2	1	0	1	6	0
6:45AM	4	32	15	0	0	0	51	0	0	10	10	1	0	0	21	0	0	3	4	2	0	1	10	0
Hourly Total	14	106	42	6	0	0	168	0	1	13	25	2	0	0	41	0	0	14	8	3	0	3	28	0
7:00AM	9	49	13	0	0	0	71	0	2	9	12	1	0	1	25	1	0	6	4	2	0	0	12	0
7:15AM	11	52	11	3	0	1	78	0	4	9	30	2	0	1	46	0	1	8	3	0	0	0	12	0
7:30AM	8	58	28	4	0	0	98	0	5	6	24	2	0	0	37	0	1	11	11	2	0	0	25	0
7:45AM	3	63	36	0	0	0	102	0	0	7	14	1	0	0	22	0	0	9	2	0	0	0	11	0
Hourly Total	31	222	88	7	0	1	349	0	11	31	80	6	0	2	130	1	2	34	20	4	0	0	60	0
8:00AM	3	44	19	2	0	1	69	0	1	7	16	1	0	0	25	0	1	12	3	0	0	0	16	0
8:15AM	8	47	16	0	0	2	73	0	0	18	22	1	0	0	41	0	0	16	9	1	0	0	26	0
8:30AM	7	59	17	2	0	1	86	0	0	9	24	0	0	0	33	0	1	9	5	0	1	0	16	0
8:45AM	7	48	19	1	0	0	75	0	3	7	25	0	0	0	35	0	0	11	6	1	0	0	18	0
Hourly Total	25	198	71	5	0	4	303	0	4	41	87	2	0	0	134	0	2	48	23	2	1	0	76	0
9:00AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00PM	5	74	7	2	0	1	89	0	4	20	24	0	0	1	49	0	2	16	13	0	0	0	31	0
3:15PM	7	39	11	0	0	0	57	0	2	14	23	1	0	0	40	0	0	12	5	1	0	0	18	0
3:30PM	2	57	9	2	0	1	71	0	0	14	25	2	0	1	42	0	1	12	16	0	0	0	29	0
3:45PM	5	62	7	1	0	0	75	0	4	20	25	2	0	0	51	0	1	8	11	1	0	0	21	0
Hourly Total	19	232	34	5	0	2	292	0	10	68	97	5	0	2	182	0	4	48	45	2	0	0	99	0
4:00PM	9	77	9	5	0	0	100	0	0	21	21	1	0	0	43	0	2	19	8	0	0	0	29	0
4:15PM	12	84	9	1	0	0	106	0	1	19	29	0	0	0	49	1	2	11	12	0	0	0	25	0
4:30PM	11	72	16	1	0	0	100	0	0	17	32	1	0	0	50	0	1	19	18	0	0	0	38	0
4:45PM	8	84	9	3	0	0	104	0	0	27	28	2	0	0	57	0	1	20	19	2	0	0	42	0
Hourly Total	40	317	43	10	0	0	410	0	1	84	110	4	0	0	199	1	6	69	57	2	0	0	134	0
5:00PM	14	84	11	0	0	0	109	0	2	18	42	1	0	0	63	0	4	16	13	5	0	0	38	0
5:15PM	10	80	7	2	0	0	99	0	2	24	42	2	0	0	70	0	5	12	17	1	0	0	35	0
5:30PM	7	73	4	0	1	0	85	0	3	19	39	1	0	0	62	0	0	14	9	1	0	0	24	0
5:45PM	9	56	8	2	0	0	75	0	1	16	31	0	0	0	48	0	1	13	11	1	0	0	26	0
Hourly Total	40	293	30	4	1	0	368	0	8	77	154	4	0	0	243	0	10	55	50	8	0	0	123	0
6:00PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	169	1368	308	37	1	7	1890	0	35	314	553	23	0	4	929	2	24	268	203	21	1	3	520	0
% Approach	8.9%	72.4%	16.3%	2.0%	0.1%	0.4%	-	-	3.8%	33.8%	59.5%	2.5%	0%	0.4%	-	-	4.6%	51.5%	39.0%	4.0%	0.2%	0.6%	-	-
% Total	2.7%	21.8%	4.9%	0.6%	0%	0.1%	30.2%	-	0.6%	5.0%	8.8%	0.4%	0%	0.1%	14.8%	-	0.4%	4.3%	3.2%	0.3%	0%	0%	8.3%	-
Lights	157	1336	284	37	1	6	1821	-	29	304	537	20	0	4	894	-	23	252	192	20	1	3	491	-
% Lights	92.9%	97.7%	92.2%	100%	100%	85.7%	96.3%	-	82.9%	96.8%	97.1%	87.0%	0%	100%	96.2%	-	95.8%	94.0%	94.6%	95.2%	100%	100%	94.4%	-
Articulated Trucks and Single-Unit Trucks	4	20	23	0	0	0	47	-	3	8	13	1	0	0	25	-	1	15	8	0	0	0	24	-
% Articulated Trucks and Single-Unit Trucks	2.4%	1.5%	7.5%	0%	0%	0%	2.5%	-	8.6%	2.5%	2.4%	4.3%	0%	0%	2.7%	-	4.2%	5.6%	3.9%	0%	0%	0%	4.6%	-
Buses	8	12	1	0	0	1	22	-	3	2	3	2	0	0	10	-	0	1	3	1	0	0	5	-
% Buses	4.7%	0.9%	0.3%	0%	0%	14.3%	1.2%	-	8.6%	0.6%	0.5%	8.7%	0%	0%	1.1%	-	0%	0.4%	1.5%	4.8%	0%	0%	1.0%	-
Pedestrians	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	0
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100%	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	0
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0%	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. BL: Bear left, BR: Bear right, HL: Hard left, HR: Hard right, HRR: Hard right on red, L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

S Union St. & Hillendale Rd. - TMC

Tue Nov 28, 2023

Full Length (6 AM-9 AM, 3 PM-6 PM)

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Crosswalk)

All Movements

ID: 1137447, Location: 39.832669, -75.707492



Provided by: Tri-State Traffic Data, Inc.

184 Baker Road, Coatesville, PA, 19320, US

Leg Direction	Kaolin Rd. Northbound									Hillendale Rd. Eastbound									Int
	HR	R	T	L	U	HRR	App	Ped*	R	BR	T	L	U	RR	App	Ped*			
2023-11-28 6:00AM	0	12	24	1	0	0	37	0	0	2	3	1	0	1	7	0	92		
6:15AM	0	18	36	2	0	0	56	0	1	3	3	3	0	0	10	0	116		
6:30AM	2	17	40	2	0	0	61	0	0	3	8	2	0	0	13	0	131		
6:45AM	0	28	56	4	0	0	88	0	2	13	13	1	0	0	29	0	199		
Hourly Total	2	75	156	9	0	0	242	0	3	21	27	7	0	1	59	0	538		
7:00AM	1	34	51	2	0	0	88	0	4	12	18	17	0	0	51	0	247		
7:15AM	1	26	100	4	0	0	131	0	6	15	7	37	0	1	66	0	333		
7:30AM	2	43	71	2	0	0	118	0	5	23	14	12	0	0	54	0	332		
7:45AM	1	47	54	4	0	0	106	0	5	14	27	6	0	0	52	0	293		
Hourly Total	5	150	276	12	0	0	443	0	20	64	66	72	0	1	223	0	1205		
8:00AM	0	27	54	1	0	0	82	0	2	17	27	1	0	0	47	0	239		
8:15AM	2	32	57	2	0	0	93	0	2	17	29	7	0	0	55	0	288		
8:30AM	1	29	55	0	0	0	85	0	2	20	21	4	0	0	47	0	267		
8:45AM	1	35	43	1	0	0	80	0	5	11	13	13	0	0	42	0	250		
Hourly Total	4	123	209	4	0	0	340	0	11	65	90	25	0	0	191	0	1044		
9:00AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
3:00PM	0	20	46	4	0	1	71	0	3	6	10	3	0	1	23	0	263		
3:15PM	0	15	43	6	0	0	64	0	4	8	18	2	0	0	32	0	211		
3:30PM	0	27	61	6	0	0	94	0	3	4	13	8	0	1	29	0	265		
3:45PM	0	28	64	2	0	0	94	0	4	9	8	10	0	0	31	0	272		
Hourly Total	0	90	214	18	0	1	323	0	14	27	49	23	0	2	115	0	1011		
4:00PM	0	17	45	3	0	0	65	0	7	8	9	3	0	0	27	0	264		
4:15PM	0	29	61	2	0	0	92	0	6	10	15	11	0	1	43	0	315		
4:30PM	0	20	63	5	0	1	89	0	5	10	14	4	0	0	33	0	310		
4:45PM	1	39	58	6	0	1	105	0	2	8	9	9	0	2	30	0	338		
Hourly Total	1	105	227	16	0	2	351	0	20	36	47	27	0	3	133	0	1227		
5:00PM	0	32	73	8	0	0	113	0	3	8	15	2	0	1	29	0	352		
5:15PM	0	27	59	6	0	0	92	0	3	6	11	1	0	1	22	0	318		
5:30PM	1	31	86	3	0	0	121	0	1	4	8	2	0	5	20	0	312		
5:45PM	0	20	51	7	0	0	78	0	6	4	10	9	0	3	32	0	259		
Hourly Total	1	110	269	24	0	0	404	0	13	22	44	14	0	10	103	0	1241		
6:00PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Total	13	653	1351	83	0	3	2103	0	81	235	323	168	0	17	824	0	6266		
% Approach	0.6%	31.1%	64.2%	3.9%	0%	0.1%	-	-	9.8%	28.5%	39.2%	20.4%	0%	2.1%	-	-	-		
% Total	0.2%	10.4%	21.6%	1.3%	0%	0%	33.6%	-	1.3%	3.8%	5.2%	2.7%	0%	0.3%	13.2%	-	-		
Lights	13	635	1319	80	0	2	2049	-	77	224	312	157	0	16	786	-	6041		
% Lights	100%	97.2%	97.6%	96.4%	0%	66.7%	97.4%	-	95.1%	95.3%	96.6%	93.5%	0%	94.1%	95.4%	-	96.4%		
Articulated Trucks and Single-Unit Trucks	0	9	20	2	0	0	31	-	2	10	5	1	0	1	19	-	146		
% Articulated Trucks and Single-Unit Trucks	0%	1.4%	1.5%	2.4%	0%	0%	1.5%	-	2.5%	4.3%	1.5%	0.6%	0%	5.9%	2.3%	-	2.3%		
Buses	0	9	12	1	0	1	23	-	2	1	6	10	0	0	19	-	79		
% Buses	0%	1.4%	0.9%	1.2%	0%	33.3%	1.1%	-	2.5%	0.4%	1.9%	6.0%	0%	0%	2.3%	-	1.3%		
Pedestrians	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	0	-		
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Bicycles on Crosswalk	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	0	-		
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

* Pedestrians and Bicycles on Crosswalk. BL: Bear left, BR: Bear right, HL: Hard left, HR: Hard right, HRR: Hard right on red, L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

S Union St. & Hillendale Rd. - TMC

Tue Nov 28, 2023

Full Length (6 AM-9 AM, 3 PM-6 PM)

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Crosswalk)

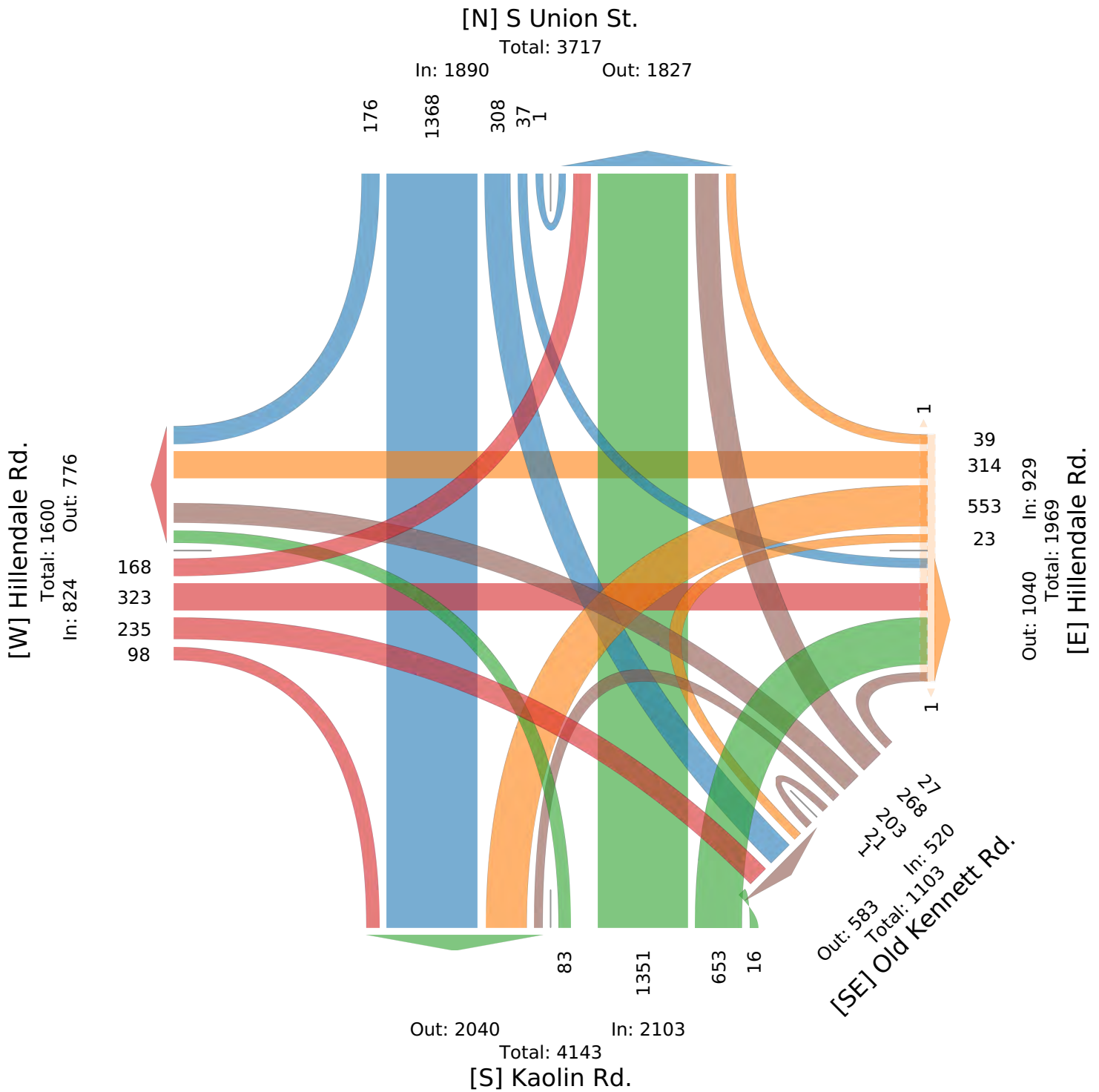
All Movements

ID: 1137447, Location: 39.832669, -75.707492



Provided by: Tri-State Traffic Data, Inc.

184 Baker Road, Coatesville, PA, 19320, US



S Union St. & Hillendale Rd. - TMC

Tue Nov 28, 2023

AM Peak (7 AM - 8 AM)

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Crosswalk)

All Movements

ID: 1137447, Location: 39.832669, -75.707492



Provided by: Tri-State Traffic Data, Inc.
184 Baker Road,
Coatesville, PA, 19320, US

Leg Direction	S Union St. Southbound									Hillendale Rd. Westbound									Old Kennett Rd. Northwestbound								
Time	R	T	BL	L	U	RR	App	Ped*	R	T	L	HL	U	RR	App	Ped*	HR	BR	BL	HL	U	HRR	App	Ped*			
2023-11-28 7:00AM	9	49	13	0	0	0	71	0	2	9	12	1	0	1	25	1	0	6	4	2	0	0	12	0			
7:15AM	11	52	11	3	0	1	78	0	4	9	30	2	0	1	46	0	1	8	3	0	0	0	12	0			
7:30AM	8	58	28	4	0	0	98	0	5	6	24	2	0	0	37	0	1	11	11	2	0	0	25	0			
7:45AM	3	63	36	0	0	0	102	0	0	7	14	1	0	0	22	0	0	9	2	0	0	0	11	0			
Total	31	222	88	7	0	1	349	0	11	31	80	6	0	2	130	1	2	34	20	4	0	0	60	0			
% Approach	8.9%	63.6%	25.2%	2.0%	0%	0.3%	-	-	8.5%	23.8%	61.5%	4.6%	0%	1.5%	-	-	3.3%	56.7%	33.3%	6.7%	0%	0%	-	-			
% Total	2.6%	18.4%	7.3%	0.6%	0%	0.1%	29.0%	-	0.9%	2.6%	6.6%	0.5%	0%	0.2%	10.8%	-	0.2%	2.8%	1.7%	0.3%	0%	0%	5.0%	-			
PHF	0.705	0.881	0.611	0.438	-	0.250	0.855	-	0.550	0.861	0.667	0.750	-	0.500	0.707	-	0.500	0.773	0.455	0.500	-	-	0.600	-			
Lights	30	215	85	7	0	1	338	-	8	27	75	5	0	2	117	-	2	30	19	3	0	0	54	-			
% Lights	96.8%	96.8%	96.6%	100%	0%	100%	96.8%	-	72.7%	87.1%	93.8%	83.3%	0%	100%	90.0%	-	100%	88.2%	95.0%	75.0%	0%	0%	90.0%	-			
Articulated Trucks and Single-Unit Trucks	0	2	3	0	0	0	5	-	1	2	3	0	0	0	6	-	0	4	0	0	0	0	4	-			
% Articulated Trucks and Single-Unit Trucks	0%	0.9%	3.4%	0%	0%	0%	1.4%	-	9.1%	6.5%	3.8%	0%	0%	0%	4.6%	-	0%	11.8%	0%	0%	0%	0%	6.7%	-			
Buses	1	5	0	0	0	0	6	-	2	2	2	1	0	0	7	-	0	0	1	1	0	0	2	-			
% Buses	3.2%	2.3%	0%	0%	0%	0%	1.7%	-	18.2%	6.5%	2.5%	16.7%	0%	0%	5.4%	-	0%	0%	5.0%	25.0%	0%	0%	3.3%	-			
Pedestrians	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	0			
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100%	-	-	-	-	-	-	-	-			
Bicycles on Crosswalk	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	0			
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0%	-	-	-	-	-	-	-	-			

*Pedestrians and Bicycles on Crosswalk. BL: Bear left, BR: Bear right, HL: Hard left, HR: Hard right, HRR: Hard right on red, L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

S Union St. & Hillendale Rd. - TMC

Tue Nov 28, 2023

AM Peak (7 AM - 8 AM)

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Crosswalk)

All Movements

ID: 1137447, Location: 39.832669, -75.707492



Provided by: Tri-State Traffic Data, Inc.
184 Baker Road,
Coatesville, PA, 19320, US

Leg Direction	Kaolin Rd. Northbound								Hillendale Rd. Eastbound								
Time	HR	R	T	L	U	HRR	App	Ped*	R	BR	T	L	U	RR	App	Ped*	Int
2023-11-28 7:00AM	1	34	51	2	0	0	88	0	4	12	18	17	0	0	51	0	247
7:15AM	1	26	100	4	0	0	131	0	6	15	7	37	0	1	66	0	333
7:30AM	2	43	71	2	0	0	118	0	5	23	14	12	0	0	54	0	332
7:45AM	1	47	54	4	0	0	106	0	5	14	27	6	0	0	52	0	293
Total	5	150	276	12	0	0	443	0	20	64	66	72	0	1	223	0	1205
% Approach	1.1%	33.9%	62.3%	2.7%	0%	0%	-	-	9.0%	28.7%	29.6%	32.3%	0%	0.4%	-	-	-
% Total	0.4%	12.4%	22.9%	1.0%	0%	0%	36.8%	-	1.7%	5.3%	5.5%	6.0%	0%	0.1%	18.5%	-	-
PHF	0.625	0.798	0.690	0.750	-	-	0.845	-	0.833	0.696	0.611	0.486	-	0.250	0.845	-	0.905
Lights	5	142	265	12	0	0	424	-	20	61	64	69	0	1	215	-	1148
% Lights	100%	94.7%	96.0%	100%	0%	0%	95.7%	-	100%	95.3%	97.0%	95.8%	0%	100%	96.4%	-	95.3%
Articulated Trucks and Single-Unit Trucks	0	4	5	0	0	0	9	-	0	2	1	0	0	0	3	-	27
% Articulated Trucks and Single-Unit Trucks	0%	2.7%	1.8%	0%	0%	0%	2.0%	-	0%	3.1%	1.5%	0%	0%	0%	1.3%	-	2.2%
Buses	0	4	6	0	0	0	10	-	0	1	1	3	0	0	5	-	30
% Buses	0%	2.7%	2.2%	0%	0%	0%	2.3%	-	0%	1.6%	1.5%	4.2%	0%	0%	2.2%	-	2.5%
Pedestrians	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	0
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	0
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. BL: Bear left, BR: Bear right, HL: Hard left, HR: Hard right, HRR: Hard right on red, L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

S Union St. & Hillendale Rd. - TMC

Tue Nov 28, 2023

AM Peak (7 AM - 8 AM)

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Crosswalk)

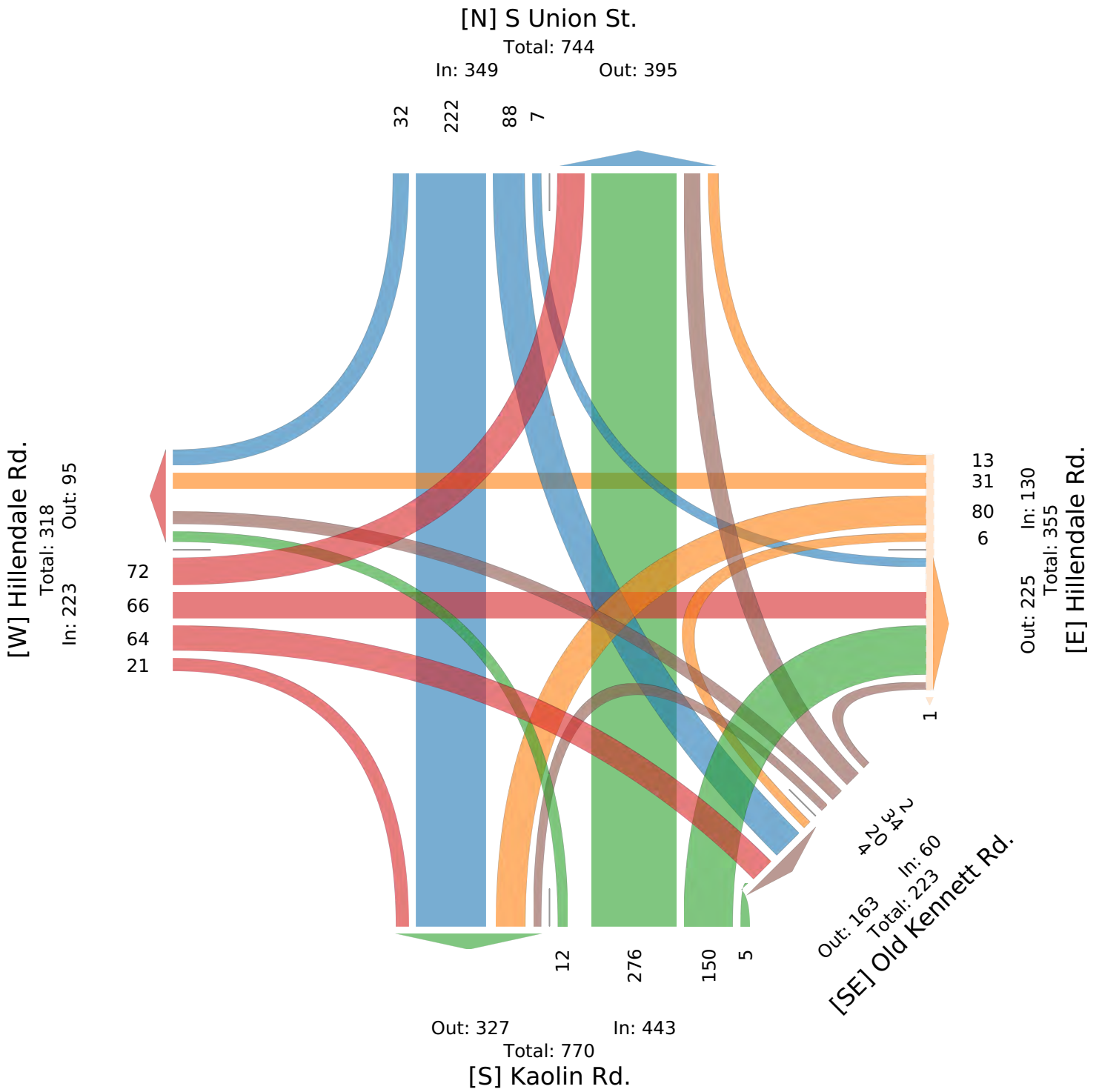
All Movements

ID: 1137447, Location: 39.832669, -75.707492



Provided by: Tri-State Traffic Data, Inc.

184 Baker Road,
Coatesville, PA, 19320, US



S Union St. & Hillendale Rd. - TMC

Tue Nov 28, 2023

PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Crosswalk)

All Movements

ID: 1137447, Location: 39.832669, -75.707492



Provided by: Tri-State Traffic Data, Inc.
184 Baker Road,
Coatesville, PA, 19320, US

Leg Direction	S Union St. Southbound							Hillendale Rd. Westbound							Old Kennett Rd. Northwestbound									
Time	R	T	BL	L	U	RR	App Ped*	R	T	L	HL	U	RR	App Ped*	HR	BR	BL	HL	U	HRR	App Ped*			
2023-11-28 4:45PM	8	84	9	3	0	0	104	0	0	27	28	2	0	0	57	0	1	20	19	2	0	0	42	0
5:00PM	14	84	11	0	0	0	109	0	2	18	42	1	0	0	63	0	4	16	13	5	0	0	38	0
5:15PM	10	80	7	2	0	0	99	0	2	24	42	2	0	0	70	0	5	12	17	1	0	0	35	0
5:30PM	7	73	4	0	1	0	85	0	3	19	39	1	0	0	62	0	0	14	9	1	0	0	24	0
Total	39	321	31	5	1	0	397	0	7	88	151	6	0	0	252	0	10	62	58	9	0	0	139	0
% Approach	9.8%	80.9%	7.8%	1.3%	0.3%	0%	-	-	2.8%	34.9%	59.9%	2.4%	0%	0%	-	-	7.2%	44.6%	41.7%	6.5%	0%	0%	-	-
% Total	3.0%	24.3%	2.3%	0.4%	0.1%	0%	30.1%	-	0.5%	6.7%	11.4%	0.5%	0%	0%	19.1%	-	0.8%	4.7%	4.4%	0.7%	0%	0%	10.5%	-
PHF	0.696	0.955	0.705	0.417	0.250	-	0.911	-	0.583	0.815	0.899	0.750	-	-	0.900	-	0.500	0.775	0.763	0.450	-	-	0.827	-
Lights	39	318	30	5	1	0	393	-	7	88	151	6	0	0	252	-	10	60	57	9	0	0	136	-
% Lights	100%	99.1%	96.8%	100%	100%	0%	99.0%	-	100%	100%	100%	100%	0%	0%	100%	-	100%	96.8%	98.3%	100%	0%	0%	97.8%	-
Articulated Trucks and Single-Unit Trucks	0	3	1	0	0	0	4	-	0	0	0	0	0	0	0	-	0	2	1	0	0	0	3	-
% Articulated Trucks and Single-Unit Trucks	0%	0.9%	3.2%	0%	0%	0%	1.0%	-	0%	0%	0%	0%	0%	0%	0%	-	0%	3.2%	1.7%	0%	0%	0%	2.2%	-
Buses	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	-
% Buses	0%	0%	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	0%	0%	-
Pedestrians	-	-	-	-	-	-	0	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	0	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	-	0	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	0	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. BL: Bear left, BR: Bear right, HL: Hard left, HR: Hard right, HRR: Hard right on red, L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

S Union St. & Hillendale Rd. - TMC

Tue Nov 28, 2023

PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Crosswalk)

All Movements

ID: 1137447, Location: 39.832669, -75.707492



Provided by: Tri-State Traffic Data, Inc.
184 Baker Road,
Coatesville, PA, 19320, US

Leg Direction	Kaolin Rd. Northbound								Hillendale Rd. Eastbound								Int
	HR	R	T	L	U	HRR	App	Ped*	R	BR	T	L	U	RR	App	Ped*	
2023-11-28 4:45PM	1	39	58	6	0	1	105	0	2	8	9	9	0	2	30	0	338
5:00PM	0	32	73	8	0	0	113	0	3	8	15	2	0	1	29	0	352
5:15PM	0	27	59	6	0	0	92	0	3	6	11	1	0	1	22	0	318
5:30PM	1	31	86	3	0	0	121	0	1	4	8	2	0	5	20	0	312
Total	2	129	276	23	0	1	431	0	9	26	43	14	0	9	101	0	1320
% Approach	0.5%	29.9%	64.0%	5.3%	0%	0.2%	-	-	8.9%	25.7%	42.6%	13.9%	0%	8.9%	-	-	-
% Total	0.2%	9.8%	20.9%	1.7%	0%	0.1%	32.7%	-	0.7%	2.0%	3.3%	1.1%	0%	0.7%	7.7%	-	-
PHF	0.500	0.827	0.802	0.719	-	0.250	0.890	-	0.750	0.813	0.717	0.389	-	0.450	0.842	-	0.938
Lights	2	127	271	23	0	1	424	-	8	25	43	13	0	9	98	-	1303
% Lights	100%	98.4%	98.2%	100%	0%	100%	98.4%	-	88.9%	96.2%	100%	92.9%	0%	100%	97.0%	-	98.7%
Articulated Trucks and Single-Unit Trucks	0	1	4	0	0	0	5	-	1	1	0	0	0	0	2	-	14
% Articulated Trucks and Single-Unit Trucks	0%	0.8%	1.4%	0%	0%	0%	1.2%	-	11.1%	3.8%	0%	0%	0%	0%	2.0%	-	1.1%
Buses	0	1	1	0	0	0	2	-	0	0	0	1	0	0	1	-	3
% Buses	0%	0.8%	0.4%	0%	0%	0%	0.5%	-	0%	0%	0%	7.1%	0%	0%	1.0%	-	0.2%
Pedestrians	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	0	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	0	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. BL: Bear left, BR: Bear right, HL: Hard left, HR: Hard right, HRR: Hard right on red, L: Left, R: Right, RR: Right on red, T: Thru, U: U-Turn

S Union St. & Hillendale Rd. - TMC

Tue Nov 28, 2023

PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour

All Classes (Lights, Articulated Trucks and Single-Unit Trucks, Buses, Pedestrians, Bicycles on Crosswalk)

All Movements

ID: 1137447, Location: 39.832669, -75.707492



Provided by: Tri-State Traffic Data, Inc.

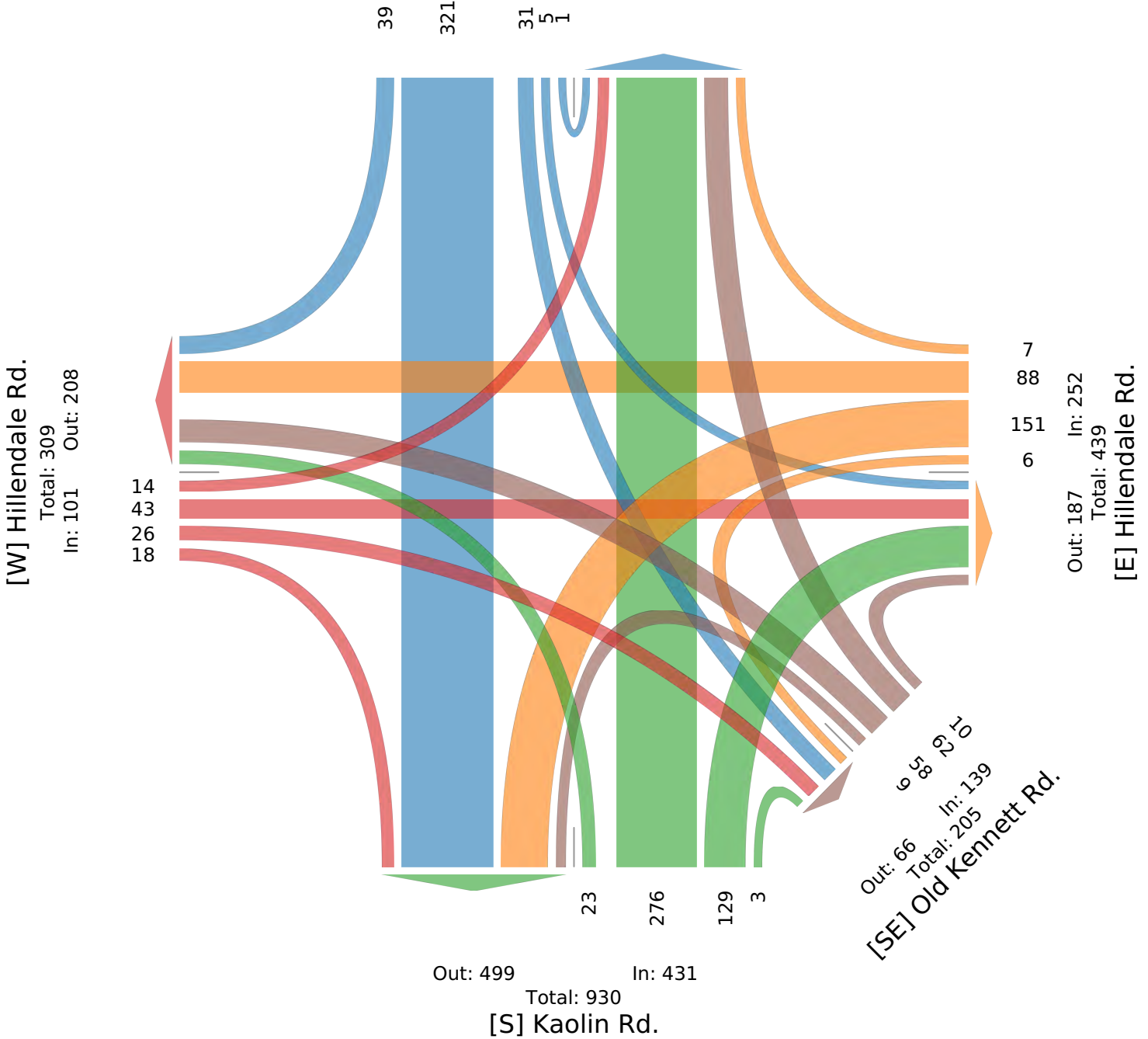
184 Baker Road,
Coatesville, PA, 19320, US

[N] S Union St.

Total: 757

In: 397

Out: 360



APPENDIX D: Turn Lane Warrant Analyses

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: <input type="text" value="Kennett Township"/> County: <input type="text" value="Chester County"/> PennDOT Engineering District: <input type="text" value="6"/>	Analysis Date: <input type="text" value="12/11/2023"/> Conducted By: <input type="text" value="SWC"/> Checked By: <input type="text" value="POH"/> Agency/Company Name: <input type="text" value="Carroll Engineering"/>
Intersection & Approach Description: <input style="width: 100%;" type="text" value="Kaolin Road (SR3013) & Hillendale Road - NB SR 3013 Approach"/>	
Analysis Period: <input type="text" value="2033 Build"/> Design Hour: <input type="text" value="AM Peak Hour"/> Intersection Control: <input type="text" value="Signalized"/> Posted Speed Limit (MPH): <input type="text" value="40"/> Type of Terrain: <input type="text" value="Level"/>	Number of Approach Lanes: <input type="text" value="1"/> Undivided or Divided Highway: <input type="text" value="Undivided"/> <div style="border: 1px solid red; padding: 2px; display: inline-block; color: red; font-weight: bold;">Type of Analysis</div> Left or Right-Turn Lane Analysis?: <input type="text" value="Left Turn Lane"/>

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations						
Movement	Include?	Volume	% Trucks	PCEV		
Advancing	Left	Yes	13	0.0%	13	Advancing Volume: <input type="text" value="502"/> Opposing Volume: <input type="text" value="392"/> Left Turn Volume: <input type="text" value="13"/>
	Through	-	305	4.0%	312	
	Right	Yes	172	5.0%	177	
Opposing	Left	Yes	105	3.0%	107	% Left Turns in Advancing Volume: <input type="text" value="2.59%"/>
	Through	-	245	3.0%	249	
	Right	Yes	35	3.0%	36	
Right Turn Lane Volume Calculations						
Movement	Include?	Volume	% Trucks	PCEV		
Advancing	Left	Yes	13	0.0%	N/A	Advancing Volume: <input type="text" value="N/A"/> Right Turn Volume: <input type="text" value="N/A"/>
	Through	-	305	4.0%	N/A	
	Right	-	172	5.0%	N/A	

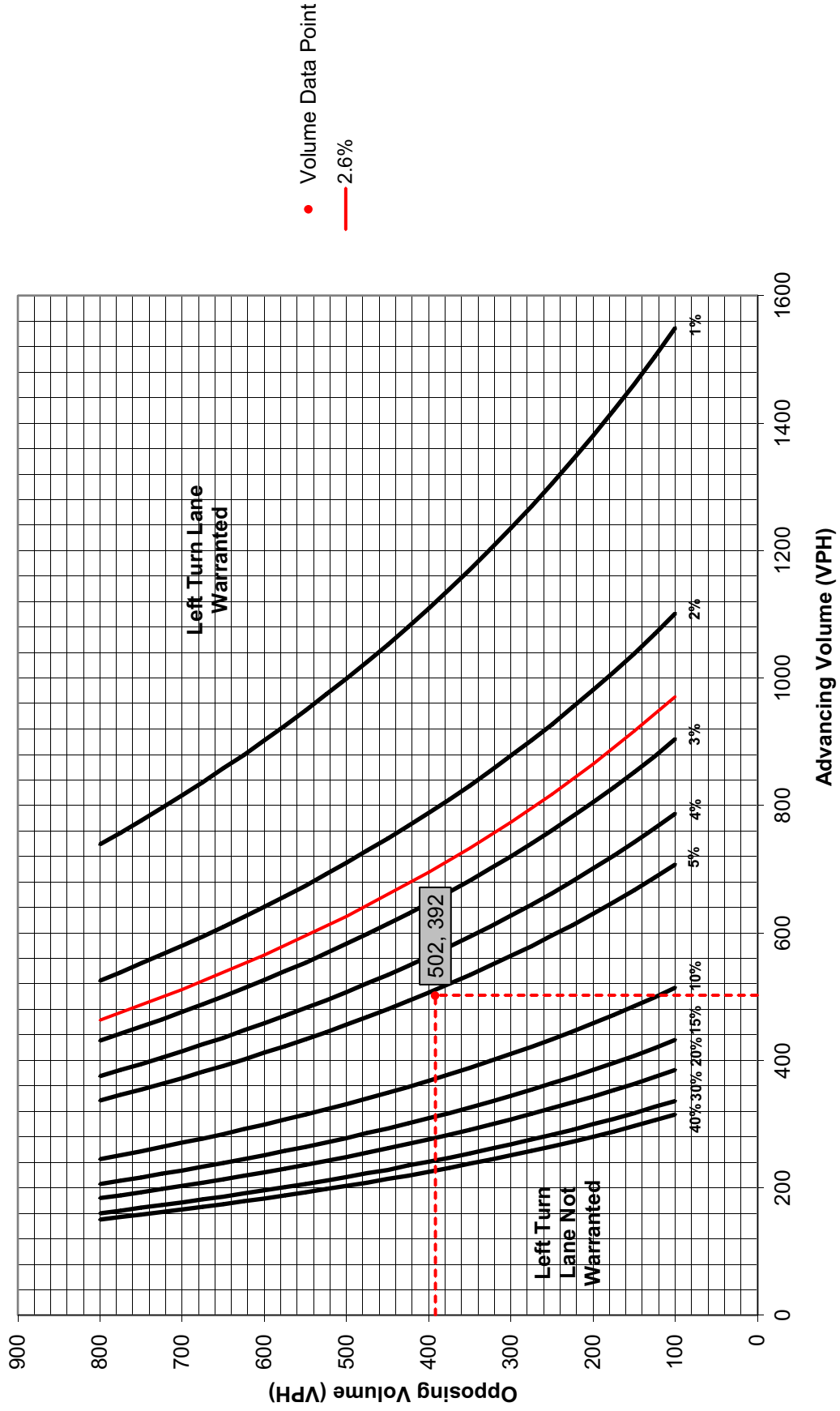
TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: <input style="width: 100px;" type="text" value="Figure 2"/> Warrant Met?: <input style="width: 100px;" type="text" value="No"/>	Applicable Warrant Figure: <input style="width: 100px;" type="text" value="N/A"/> Warrant Met?: <input style="width: 100px;" type="text" value="N/A"/>

TURN LANE LENGTH CALCULATIONS

Intersection Control: <input type="text" value="Signalized"/> Design Hour Volume of Turning Lane: <input type="text" value="13"/> Cycles Per Hour (Assumed): <input type="text" value="Known"/> Cycles Per Hour (If Known): <input type="text" value="32"/>	Average # of Vehicles/Cycle: <input style="width: 100px;" type="text" value="N/A"/>																																								
PennDOT Publication 46, Exhibit 11-6																																									
<table border="1" style="width: 100%; border-collapse: collapse; font-size: 8px;"> <thead> <tr> <th rowspan="3" style="width: 20%;">Type of Traffic Control</th> <th colspan="6" style="background-color: #FFDAB9;">Speed (MPH)</th> </tr> <tr> <th colspan="2" style="background-color: #FFDAB9;">25-35</th> <th colspan="2" style="background-color: #FFDAB9;">40-45</th> <th colspan="2" style="background-color: #FFDAB9;">50-60</th> </tr> <tr> <th colspan="6" style="background-color: #FFDAB9; text-align: center;">Turn Demand Volume</th> </tr> <tr> <th></th> <th style="background-color: #FFDAB9;">High</th> <th style="background-color: #FFDAB9;">Low</th> <th style="background-color: #FFDAB9;">High</th> <th style="background-color: #FFDAB9;">Low</th> <th style="background-color: #FFDAB9;">High</th> <th style="background-color: #FFDAB9;">Low</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Signalized</td> <td style="text-align: center;">A</td> <td style="text-align: center;">A</td> <td style="text-align: center;">B or C</td> <td style="text-align: center;">B or C</td> <td style="text-align: center;">B or C</td> <td style="text-align: center;">B or C</td> </tr> <tr> <td style="text-align: center;">Unsignalized</td> <td style="text-align: center;">A</td> <td style="text-align: center;">A</td> <td style="text-align: center;">C</td> <td style="text-align: center;">B</td> <td style="text-align: center;">B or C</td> <td style="text-align: center;">B</td> </tr> </tbody> </table>		Type of Traffic Control	Speed (MPH)						25-35		40-45		50-60		Turn Demand Volume							High	Low	High	Low	High	Low	Signalized	A	A	B or C	B or C	B or C	B or C	Unsignalized	A	A	C	B	B or C	B
Type of Traffic Control	Speed (MPH)																																								
	25-35		40-45		50-60																																				
	Turn Demand Volume																																								
	High	Low	High	Low	High	Low																																			
Signalized	A	A	B or C	B or C	B or C	B or C																																			
Unsignalized	A	A	C	B	B or C	B																																			
Left Turn Lane Storage Length, Condition A: <input style="width: 100px;" type="text" value="N/A"/> Feet Condition B: <input style="width: 100px;" type="text" value="N/A"/> Feet Condition C: <input style="width: 100px;" type="text" value="N/A"/> Feet Required Left Turn Lane Storage Length: <input style="width: 100px;" type="text" value="N/A"/> Feet																																									
Additional Findings: <input style="width: 100px;" type="text" value="N/A"/>																																									
Additional Comments / Justifications: <input style="width: 100%; height: 40px;" type="text"/>																																									

**Figure 2. Warrant for left turn lanes on two-lane highways
(40 mph speed, unsignalized and signalized intersections)**
(L = % Left Turns in Advancing Volume)



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: <input type="text" value="Kennett Township"/> County: <input type="text" value="Chester County"/> PennDOT Engineering District: <input type="text" value="6"/>	Analysis Date: <input type="text" value="12/11/2023"/> Conducted By: <input type="text" value="SWC"/> Checked By: <input type="text" value="POH"/> Agency/Company Name: <input type="text" value="PennDOT Central Office"/>
Intersection & Approach Description: <input type="text" value="Kaolin Road (SR3013) & Hillendale Road - NB SR 3013 Approach"/>	
Analysis Period: <input type="text" value="2033 Build"/> Design Hour: <input type="text" value="PM Peak Hour"/> Intersection Control: <input type="text" value="Signalized"/> Posted Speed Limit (MPH): <input type="text" value="40"/> Type of Terrain: <input type="text" value="Level"/>	Number of Approach Lanes: <input type="text" value="1"/> Undivided or Divided Highway: <input type="text" value="Undivided"/> Left or Right-Turn Lane Analysis?: <input type="text" value="Left Turn Lane"/>

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations						
Movement	Include?	Volume	% Trucks	PCEV		
Advancing	Left	Yes	25	0.0%	25	Advancing Volume: <input type="text" value="481"/> Opposing Volume: <input type="text" value="442"/> Left Turn Volume: <input type="text" value="25"/>
	Through	-	305	2.0%	309	
	Right	Yes	145	2.0%	147	
Opposing	Left	Yes	41	3.0%	42	% Left Turns in Advancing Volume: <input type="text" value="5.20%"/>
	Through	-	355	1.0%	357	
	Right	Yes	43	0.0%	43	

Right Turn Lane Volume Calculations						
Movement	Include?	Volume	% Trucks	PCEV		
Advancing	Left	Yes	25	0.0%	N/A	Advancing Volume: <input type="text" value="N/A"/> Right Turn Volume: <input type="text" value="N/A"/>
	Through	-	305	2.0%	N/A	
	Right	-	145	2.0%	N/A	

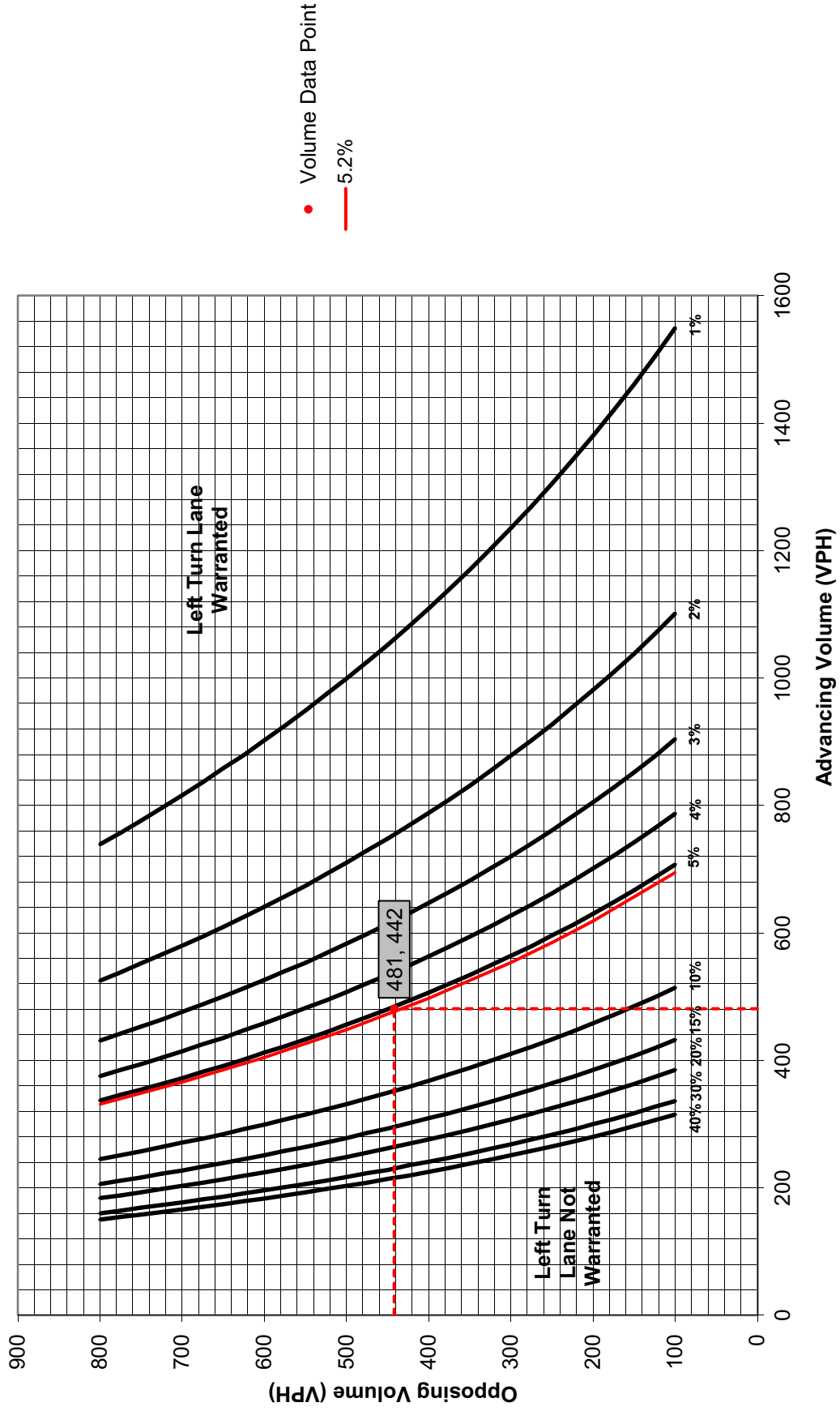
TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: <input type="text" value="Figure 2"/> Warrant Met?: <input type="text" value="Yes"/>	Applicable Warrant Figure: <input type="text" value="N/A"/> Warrant Met?: <input type="text" value="N/A"/>

TURN LANE LENGTH CALCULATIONS

Intersection Control: <input type="text" value="Signalized"/> Design Hour Volume of Turning Lane: <input type="text" value="25"/> Cycles Per Hour (Assumed): <input type="text" value="Known"/> Cycles Per Hour (If Known): <input type="text" value="15"/>	Average # of Vehicles/Cycle: <input type="text" value="2.0"/>																																								
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<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #FFDAB9;"> <th rowspan="3" style="text-align: left;">Type of Traffic Control</th> <th colspan="6" style="text-align: center;">Speed (MPH)</th> </tr> <tr style="background-color: #FFDAB9;"> <th colspan="2" style="text-align: center;">25-35</th> <th colspan="2" style="text-align: center;">40-45</th> <th colspan="2" style="text-align: center;">50-60</th> </tr> <tr style="background-color: #FFDAB9;"> <th colspan="6" style="text-align: center;">Turn Demand Volume</th> </tr> <tr> <th></th> <th style="text-align: center;">High</th> <th style="text-align: center;">Low</th> <th style="text-align: center;">High</th> <th style="text-align: center;">Low</th> <th style="text-align: center;">High</th> <th style="text-align: center;">Low</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Signalized</td> <td style="text-align: center;">A</td> <td style="text-align: center;">A</td> <td style="text-align: center;">B or C</td> <td style="text-align: center;">B or C</td> <td style="text-align: center;">B or C</td> <td style="text-align: center;">B or C</td> </tr> <tr> <td style="text-align: center;">Unsignalized</td> <td style="text-align: center;">A</td> <td style="text-align: center;">A</td> <td style="text-align: center;">C</td> <td style="text-align: center;">B</td> <td style="text-align: center;">B or C</td> <td style="text-align: center;">B</td> </tr> </tbody> </table>		Type of Traffic Control	Speed (MPH)						25-35		40-45		50-60		Turn Demand Volume							High	Low	High	Low	High	Low	Signalized	A	A	B or C	B or C	B or C	B or C	Unsignalized	A	A	C	B	B or C	B
Type of Traffic Control	Speed (MPH)																																								
	25-35		40-45		50-60																																				
	Turn Demand Volume																																								
	High	Low	High	Low	High	Low																																			
Signalized	A	A	B or C	B or C	B or C	B or C																																			
Unsignalized	A	A	C	B	B or C	B																																			
Left Turn Lane Storage Length, Condition A: <input type="text" value="N/A"/> Feet Condition B: <input type="text" value="75"/> Feet Condition C: <input type="text" value="161"/> Feet Required Left Turn Lane Storage Length: <input type="text" value="175"/> Feet																																									
Additional Findings: <input type="text" value="N/A"/>																																									
Additional Comments / Justifications: <input style="height: 40px;" type="text"/>																																									

**Figure 2. Warrant for left turn lanes on two-lane highways
(40 mph speed, unsignalized and signalized intersections)**
(L = % Left Turns in Advancing Volume)



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: <input type="text" value="Kennett Township"/> County: <input type="text" value="Chester County"/> PennDOT Engineering District: <input type="text" value="6"/>	Analysis Date: <input type="text" value="12/11/2023"/> Conducted By: <input type="text" value="SWC"/> Checked By: <input type="text" value="POH"/> Agency/Company Name: <input type="text" value="Carroll Engineering"/>
Intersection & Approach Description: <input type="text" value="Union Street (SR3013) & Hillendale Road - SB SR 3013 Approach"/>	
Analysis Period: <input type="text" value="2033 Build"/> Design Hour: <input type="text" value="AM Peak Hour"/> Intersection Control: <input type="text" value="Signalized"/> Posted Speed Limit (MPH): <input type="text" value="40"/> Type of Terrain: <input type="text" value="Level"/>	Number of Approach Lanes: <input type="text" value="1"/> Undivided or Divided Highway: <input type="text" value="Undivided"/> <div style="border: 2px solid red; padding: 2px; display: inline-block;"> Type of Analysis: <input type="text" value="Left Turn Lane"/> </div> Left or Right-Turn Lane Analysis?: <input type="text" value="Left Turn Lane"/>

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations						
Movement	Include?	Volume	% Trucks	PCEV		
Advancing	Left	Yes	105	3.0%	107	Advancing Volume: <input type="text" value="392"/> Opposing Volume: <input type="text" value="502"/> Left Turn Volume: <input type="text" value="107"/>
	Through	-	245	3.0%	249	
	Right	Yes	35	3.0%	36	
Opposing	Left	Yes	13	0.0%	13	% Left Turns in Advancing Volume: <input type="text" value="27.30%"/>
	Through	-	305	4.0%	312	
	Right	Yes	172	5.0%	177	

Right Turn Lane Volume Calculations						
Movement	Include?	Volume	% Trucks	PCEV		
Advancing	Left	Yes	105	3.0%	N/A	Advancing Volume: <input type="text" value="N/A"/> Right Turn Volume: <input type="text" value="N/A"/>
	Through	-	245	3.0%	N/A	
	Right	-	35	3.0%	N/A	

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: <input type="text" value="Figure 2"/> Warrant Met?: <input type="text" value="Yes"/>	Applicable Warrant Figure: <input type="text" value="N/A"/> Warrant Met?: <input type="text" value="N/A"/>

TURN LANE LENGTH CALCULATIONS

Intersection Control: <input type="text" value="Signalized"/> Design Hour Volume of Turning Lane: <input type="text" value="107"/> Cycles Per Hour (Assumed): <input type="text" value="Known"/> Cycles Per Hour (If Known): <input type="text" value="32"/>	Average # of Vehicles/Cycle: <input type="text" value="3.0"/>
---	---

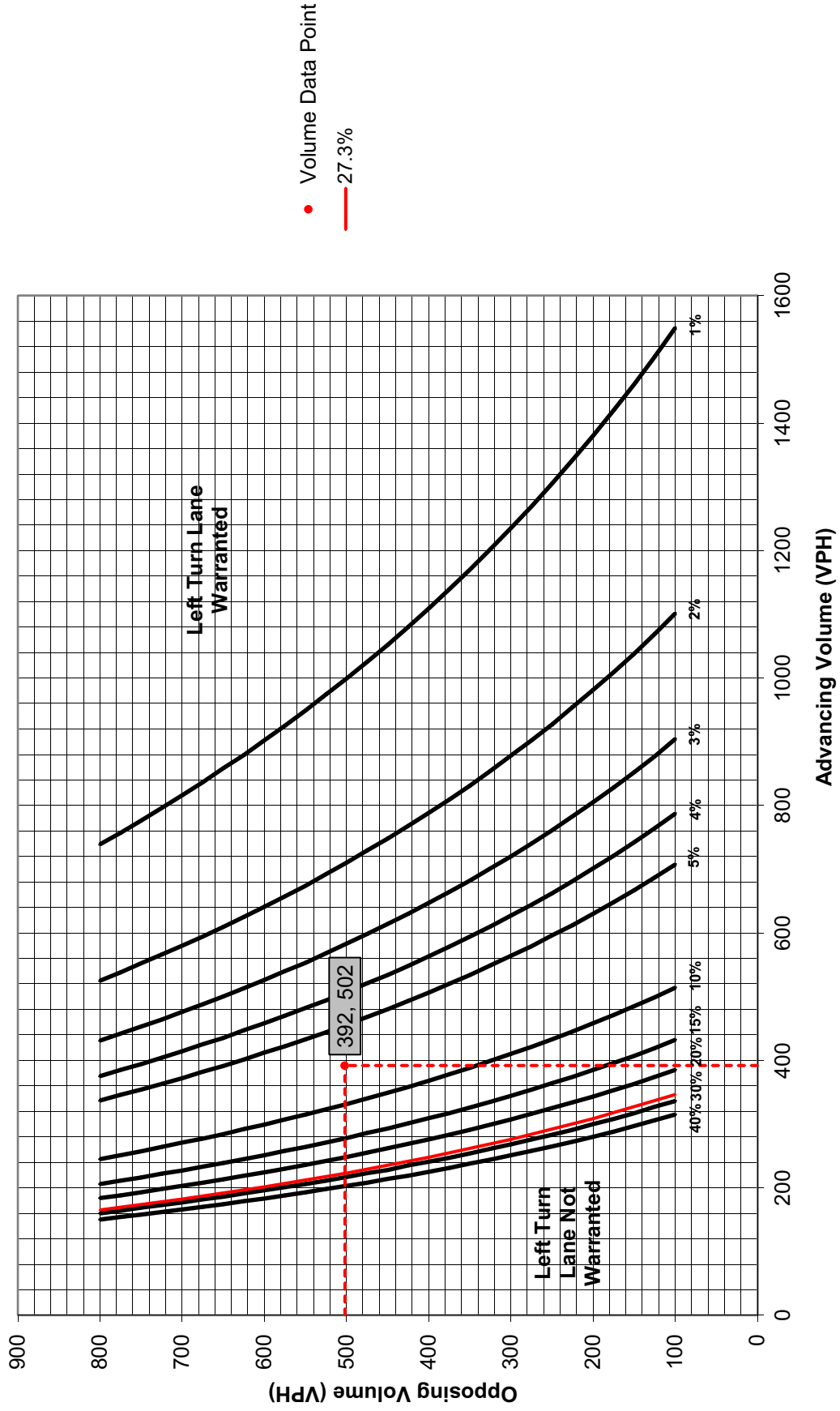
Type of Traffic Control	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

Left Turn Lane Storage Length, Condition A:	<input type="text" value="N/A"/>	Feet
Condition B:	<input type="text" value="75"/>	Feet
Condition C:	<input type="text" value="211"/>	Feet
Required Left Turn Lane Storage Length:	<input type="text" value="225"/>	Feet

Additional Findings:

Additional Comments / Justifications:

**Figure 2. Warrant for left turn lanes on two-lane highways
(40 mph speed, unsignalized and signalized intersections)**
(L = % Left Turns in Advancing Volume)



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: <input type="text" value="Kennett Township"/> County: <input type="text" value="Chester County"/> PennDOT Engineering District: <input type="text" value="6"/>	Analysis Date: <input type="text" value="12/11/2023"/> Conducted By: <input type="text" value="SWC"/> Checked By: <input type="text" value="POH"/> Agency/Company Name: <input type="text" value="PennDOT Central Office"/>
Intersection & Approach Description: <input type="text" value="Union Street (SR3013) & Hillendale Road - SB SR 3013 Approach"/>	
Analysis Period: <input type="text" value="2033 Build"/> Design Hour: <input type="text" value="PM Peak Hour"/> Intersection Control: <input type="text" value="Signalized"/> Posted Speed Limit (MPH): <input type="text" value="40"/> Type of Terrain: <input type="text" value="Level"/>	Number of Approach Lanes: <input type="text" value="1"/> Undivided or Divided Highway: <input type="text" value="Undivided"/> Left or Right-Turn Lane Analysis?: <input type="text" value="Left Turn Lane"/>

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations						
Movement	Include?	Volume	% Trucks	PCEV		
Advancing	Left	Yes	41	3.0%	42	Advancing Volume: <input type="text" value="442"/> Opposing Volume: <input type="text" value="481"/> Left Turn Volume: <input type="text" value="42"/>
	Through	-	355	1.0%	357	
	Right	Yes	43	0.0%	43	
Opposing	Left	Yes	25	0.0%	25	% Left Turns in Advancing Volume: <input type="text" value="9.50%"/>
	Through	-	305	2.0%	309	
	Right	Yes	145	2.0%	147	

Right Turn Lane Volume Calculations						
Movement	Include?	Volume	% Trucks	PCEV		
Advancing	Left	Yes	39	3.0%	N/A	Advancing Volume: <input type="text" value="N/A"/> Right Turn Volume: <input type="text" value="N/A"/>
	Through	-	339	1.0%	N/A	
	Right	-	41	0.0%	N/A	

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: <input type="text" value="Figure 2"/> Warrant Met?: <input type="text" value="Yes"/>	Applicable Warrant Figure: <input type="text" value="N/A"/> Warrant Met?: <input type="text" value="N/A"/>

TURN LANE LENGTH CALCULATIONS

Intersection Control: <input type="text" value="Signalized"/> Design Hour Volume of Turning Lane: <input type="text" value="42"/> Cycles Per Hour (Assumed): <input type="text" value="Known"/> Cycles Per Hour (If Known): <input type="text" value="32"/>	Average # of Vehicles/Cycle: <input type="text" value="1.0"/>
--	---

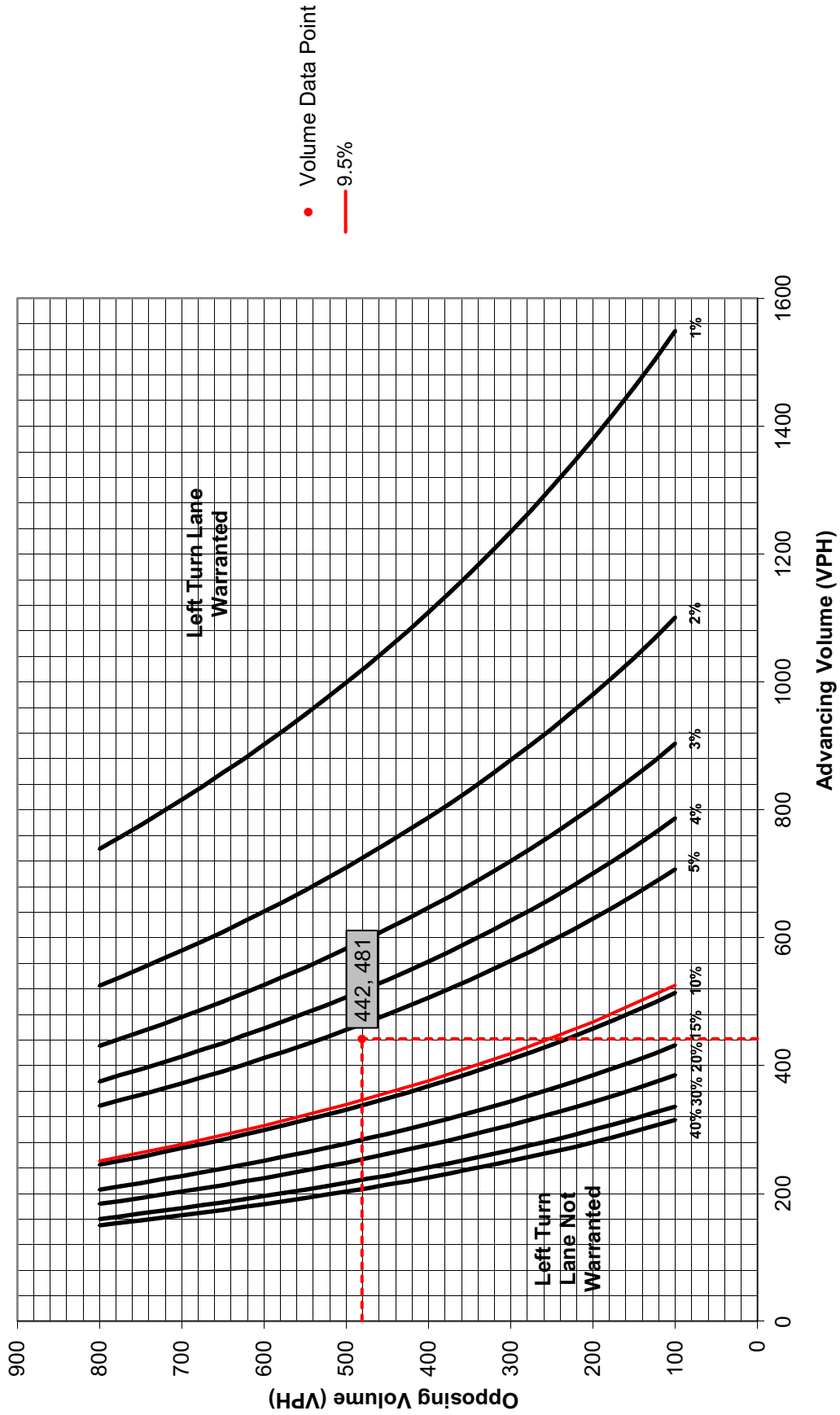
Type of Traffic Control	PennDOT Publication 46, Exhibit 11-6					
	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

Left Turn Lane Storage Length, Condition A: <input type="text" value="N/A"/> Feet Condition B: <input type="text" value="75"/> Feet Condition C: <input type="text" value="136"/> Feet Required Left Turn Lane Storage Length: <input type="text" value="150"/> Feet

Additional Findings:

Additional Comments / Justifications:

**Figure 2. Warrant for left turn lanes on two-lane highways
(40 mph speed, unsignalized and signalized intersections)**
(L = % Left Turns in Advancing Volume)



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: <input type="text" value="Kennett Township"/> County: <input type="text" value="Chester County"/> PennDOT Engineering District: <input type="text" value="6"/>	Analysis Date: <input type="text" value="12/11/2023"/> Conducted By: <input type="text" value="SWC"/> Checked By: <input type="text" value="POH"/> Agency/Company Name: <input type="text" value="Carroll Engineering"/>
Intersection & Approach Description: <input style="width: 100%;" type="text" value="Union St (SR3013) & Hillendale Road - EB SR 3013 Approach"/>	
Analysis Period: <input type="text" value="2033 Build"/> Design Hour: <input type="text" value="AM Peak Hour"/> Intersection Control: <input type="text" value="Signalized"/> Posted Speed Limit (MPH): <input type="text" value="35"/> Type of Terrain: <input type="text" value="Level"/>	Number of Approach Lanes: <input type="text" value="1"/> Undivided or Divided Highway: <input type="text" value="Undivided"/> <div style="border: 1px solid red; padding: 2px; display: inline-block; color: red; font-weight: bold;">Type of Analysis</div> Left or Right-Turn Lane Analysis?: <input type="text" value="Left Turn Lane"/>

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations						
Movement	Include?	Volume	% Trucks	PCEV		
Advancing	Left	Yes	80	4.0%	82	Advancing Volume: <input type="text" value="253"/> Opposing Volume: <input type="text" value="152"/> Left Turn Volume: <input type="text" value="82"/>
	Through	-	73	3.0%	75	
	Right	Yes	94	4.0%	96	
Opposing	Left	Yes	95	7.0%	99	% Left Turns in Advancing Volume: <input type="text" value="32.41%"/>
	Through	-	34	13.0%	37	
	Right	Yes	14	23.0%	16	
Right Turn Lane Volume Calculations						
Movement	Include?	Volume	% Trucks	PCEV		
Advancing	Left	Yes	80	4.0%	N/A	Advancing Volume: <input type="text" value="N/A"/> Right Turn Volume: <input type="text" value="N/A"/>
	Through	-	73	3.0%	N/A	
	Right	-	94	4.0%	N/A	

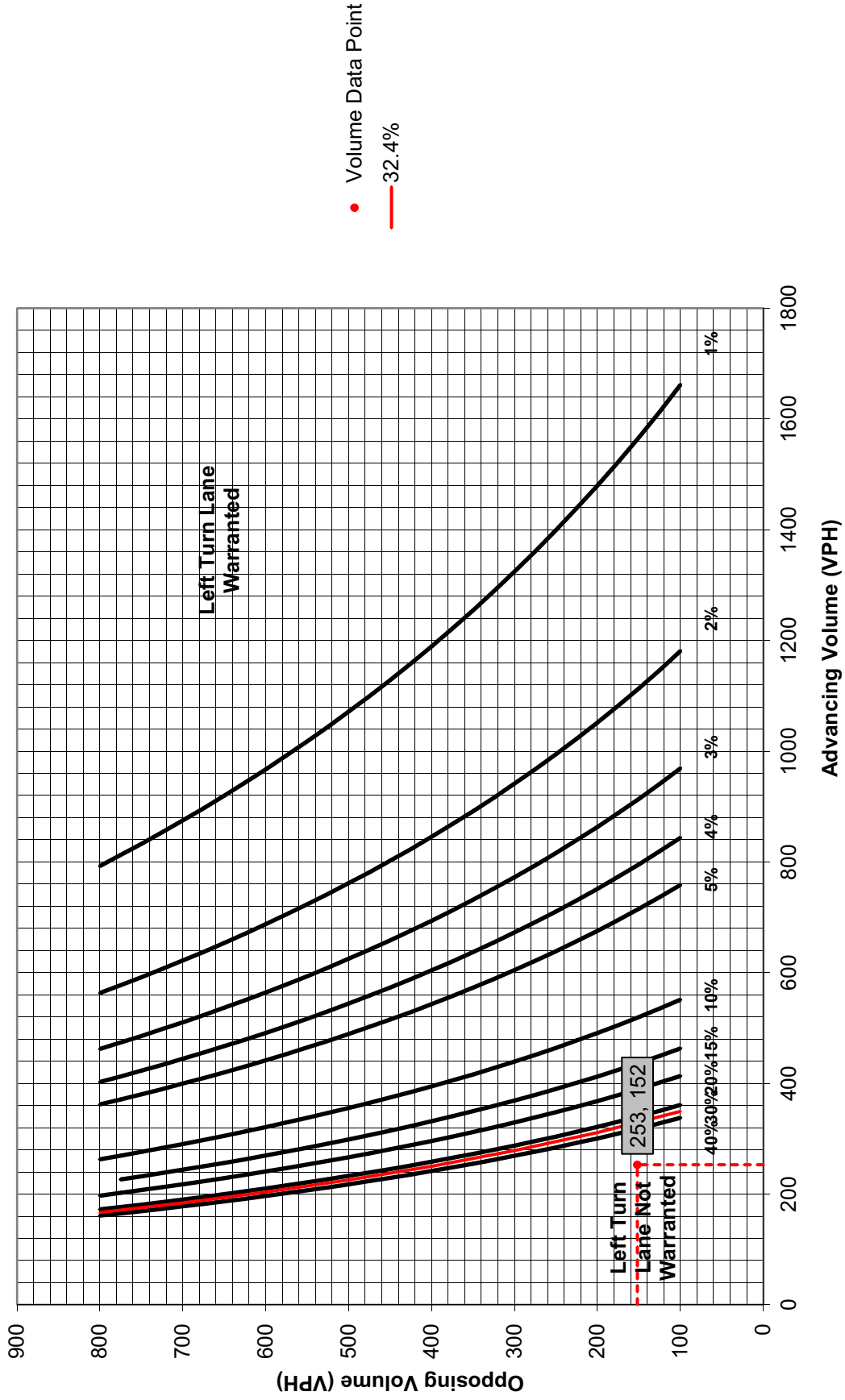
TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: <input style="width: 100px;" type="text" value="Figure 1"/> Warrant Met?: <input style="width: 100px;" type="text" value="No"/>	Applicable Warrant Figure: <input style="width: 100px;" type="text" value="N/A"/> Warrant Met?: <input style="width: 100px;" type="text" value="N/A"/>

TURN LANE LENGTH CALCULATIONS

Intersection Control: <input type="text" value="Signalized"/> Design Hour Volume of Turning Lane: <input type="text" value="82"/> Cycles Per Hour (Assumed): <input type="text" value="Known"/> Cycles Per Hour (If Known): <input type="text" value="32"/>	Average # of Vehicles/Cycle: <input style="width: 100px;" type="text" value="N/A"/>																																								
PennDOT Publication 46, Exhibit 11-6																																									
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="3" style="width: 20%;">Type of Traffic Control</th> <th colspan="6" style="background-color: #FFDAB9;">Speed (MPH)</th> </tr> <tr> <th colspan="2" style="background-color: #FFDAB9;">25-35</th> <th colspan="2" style="background-color: #FFDAB9;">40-45</th> <th colspan="2" style="background-color: #FFDAB9;">50-60</th> </tr> <tr> <th colspan="6" style="background-color: #FFDAB9;">Turn Demand Volume</th> </tr> <tr> <th></th> <th>High</th> <th>Low</th> <th>High</th> <th>Low</th> <th>High</th> <th>Low</th> </tr> </thead> <tbody> <tr> <td style="text-align: left;">Signalized</td> <td>A</td> <td>A</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> </tr> <tr> <td style="text-align: left;">Unsignalized</td> <td>A</td> <td>A</td> <td>C</td> <td>B</td> <td>B or C</td> <td>B</td> </tr> </tbody> </table>		Type of Traffic Control	Speed (MPH)						25-35		40-45		50-60		Turn Demand Volume							High	Low	High	Low	High	Low	Signalized	A	A	B or C	B or C	B or C	B or C	Unsignalized	A	A	C	B	B or C	B
Type of Traffic Control	Speed (MPH)																																								
	25-35		40-45		50-60																																				
	Turn Demand Volume																																								
	High	Low	High	Low	High	Low																																			
Signalized	A	A	B or C	B or C	B or C	B or C																																			
Unsignalized	A	A	C	B	B or C	B																																			
Left Turn Lane Storage Length, Condition A: <input style="width: 100px;" type="text" value="N/A"/> Feet Condition B: <input style="width: 100px;" type="text" value="N/A"/> Feet Condition C: <input style="width: 100px;" type="text" value="N/A"/> Feet Required Left Turn Lane Storage Length: <input style="width: 100px;" type="text" value="N/A"/> Feet																																									
Additional Findings: <input style="width: 100px;" type="text" value="N/A"/>																																									
Additional Comments / Justifications: <input style="width: 100%; height: 40px;" type="text"/>																																									

Figure 1. Warrant for left turn lanes on two-lane roadways
 (speeds to 35 mph, unsignalized and signalized intersections)
 (L = % Left Turns in Advancing Volume)



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Kennett Township	Analysis Date: 12/11/2023
County: Chester County	Conducted By: SWC
PennDOT Engineering District: 6	Checked By: POH
	Agency/Company Name: Carroll Engineering
Intersection & Approach Description: Union St (SR3013) & Hillendale Road - EB SR 3013 Approach	
Analysis Period: 2033 Build	Number of Approach Lanes: 1
Design Hour: PM Peak Hour	Undivided or Divided Highway: Undivided
Intersection Control: Signalized	
Posted Speed Limit (MPH): 35	Type of Analysis
Type of Terrain: Level	Left or Right-Turn Lane Analysis?: Left Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations						
Movement	Include?	Volume	% Trucks	PCEV		
Advancing	Left	15	7.0%	16	Advancing Volume: 114	
	Through	47	0.0%	47		Opposing Volume: 279
	Right	49	5.0%	51		Left Turn Volume: 16
Opposing	Left	174	0.0%	174	% Left Turns in Advancing Volume: 14.04%	
	Through	97	0.0%	97		
	Right	8	0.0%	8		

Right Turn Lane Volume Calculations						
Movement	Include?	Volume	% Trucks	PCEV		
Advancing	Left	15	7.0%	N/A	Advancing Volume: N/A	
	Through	47	0.0%	N/A		Right Turn Volume: N/A
	Right	49	5.0%	N/A		

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: Figure 1	Applicable Warrant Figure: N/A
Warrant Met?: No	Warrant Met?: N/A

TURN LANE LENGTH CALCULATIONS

Intersection Control: Signalized	Average # of Vehicles/Cycle: N/A
Design Hour Volume of Turning Lane: 16	
Cycles Per Hour (Assumed): Known	
Cycles Per Hour (If Known): 32	

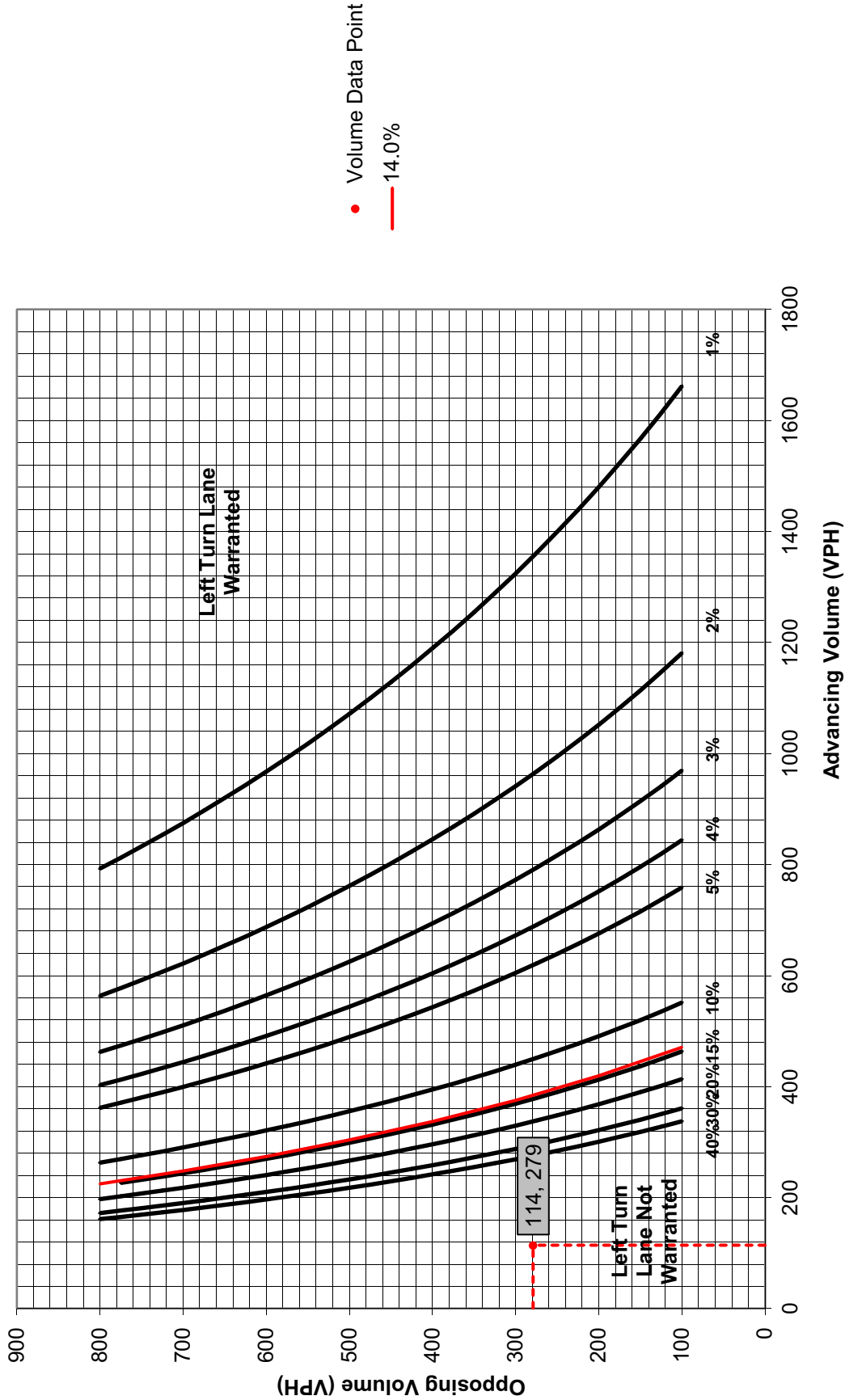
Type of Traffic Control	PennDOT Publication 46, Exhibit 11-6					
	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

Left Turn Lane Storage Length, Condition A:	N/A	Feet
Condition B:	N/A	Feet
Condition C:	N/A	Feet
Required Left Turn Lane Storage Length:	N/A	Feet

Additional Findings: **N/A**

Additional Comments / Justifications:

Figure 1. Warrant for left turn lanes on two-lane roadways
 (speeds to 35 mph, unsignalized and signalized intersections)
 (L = % Left Turns in Advancing Volume)



• Volume Data Point
 — 14.0%

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: <input type="text" value="Kennett Township"/> County: <input type="text" value="Chester County"/> PennDOT Engineering District: <input type="text" value="6"/>	Analysis Date: <input type="text" value="12/11/2023"/> Conducted By: <input type="text" value="SWC"/> Checked By: <input type="text" value="POH"/> Agency/Company Name: <input type="text" value="Carroll Engineering"/>
Intersection & Approach Description: <input type="text" value="Union Street (SR3013) & Hillendale Road - WB Hillendale Approach"/>	
Analysis Period: <input type="text" value="2033 Build"/> Design Hour: <input type="text" value="AM Peak Hour"/> Intersection Control: <input type="text" value="Signalized"/> Posted Speed Limit (MPH): <input type="text" value="35"/> Type of Terrain: <input type="text" value="Level"/>	Number of Approach Lanes: <input type="text" value="1"/> Undivided or Divided Highway: <input type="text" value="Undivided"/> <div style="border: 2px solid red; padding: 2px; display: inline-block;"> Type of Analysis: <input type="text" value="Left Turn Lane"/> </div> Left or Right-Turn Lane Analysis?: <input type="text" value="Left Turn Lane"/>

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement	Include?	Volume	% Trucks	PCEV	
Advancing	Left	95	7.0%	99	Advancing Volume: <input type="text" value="152"/> Opposing Volume: <input type="text" value="253"/> Left Turn Volume: <input type="text" value="99"/>
	Through	-	13.0%	37	
	Right	Yes	14	23.0%	
Opposing	Left	80	4.0%	82	% Left Turns in Advancing Volume: <input type="text" value="65.13%"/>
	Through	-	3.0%	75	
	Right	Yes	94	4.0%	

Right Turn Lane Volume Calculations					
Movement	Include?	Volume	% Trucks	PCEV	
Advancing	Left	95	7.0%	N/A	Advancing Volume: <input type="text" value="N/A"/> Right Turn Volume: <input type="text" value="N/A"/>
	Through	-	13.0%	N/A	
	Right	-	14	23.0%	

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: <input type="text" value="Figure 1"/> Warrant Met?: <input type="text" value="No"/>	Applicable Warrant Figure: <input type="text" value="N/A"/> Warrant Met?: <input type="text" value="N/A"/>

TURN LANE LENGTH CALCULATIONS

Intersection Control: <input type="text" value="Signalized"/> Design Hour Volume of Turning Lane: <input type="text" value="99"/> Cycles Per Hour (Assumed): <input type="text" value="Known"/> Cycles Per Hour (If Known): <input type="text" value="32"/>	Average # of Vehicles/Cycle: <input type="text" value="N/A"/>
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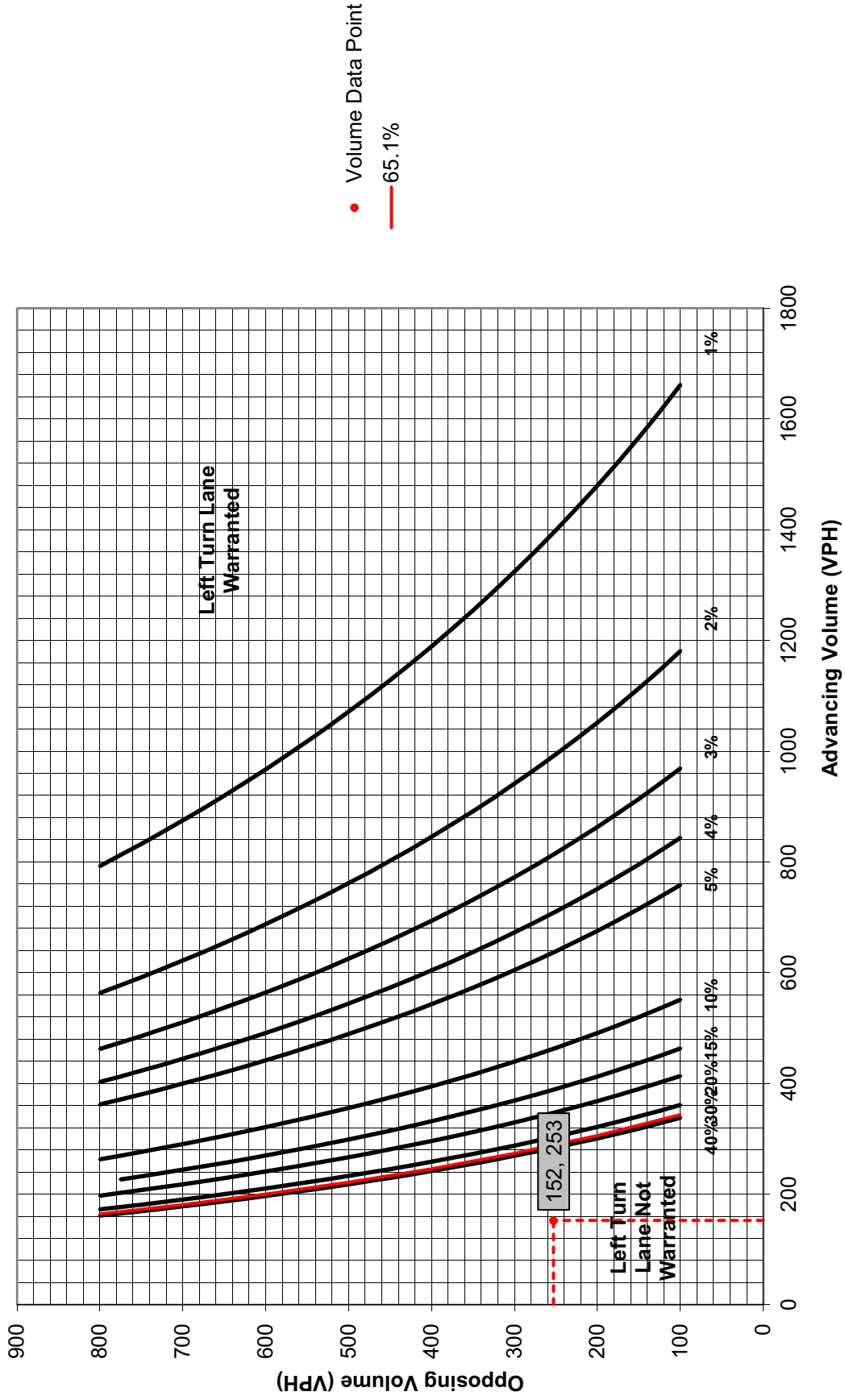
Type of Traffic Control	PennDOT Publication 46, Exhibit 11-6					
	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

Left Turn Lane Storage Length, Condition A: <input type="text" value="N/A"/> Feet Condition B: <input type="text" value="N/A"/> Feet Condition C: <input type="text" value="N/A"/> Feet Required Left Turn Lane Storage Length: <input type="text" value="N/A"/> Feet
--

Additional Findings:

Additional Comments / Justifications:

Figure 1. Warrant for left turn lanes on two-lane roadways
 (speeds to 35 mph, unsignalized and signalized intersections)
 (L = % Left Turns in Advancing Volume)



• Volume Data Point
 — 65.1%

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: <input type="text" value="Kennett Township"/> County: <input type="text" value="Chester County"/> PennDOT Engineering District: <input type="text" value="6"/>	Analysis Date: <input type="text" value="12/11/2023"/> Conducted By: <input type="text" value="SWC"/> Checked By: <input type="text" value="POH"/> Agency/Company Name: <input type="text" value="Carroll Engineering"/>
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Analysis Period: <input type="text" value="2033 Build"/> Design Hour: <input type="text" value="PM Peak Hour"/> Intersection Control: <input type="text" value="Signalized"/> Posted Speed Limit (MPH): <input type="text" value="35"/> Type of Terrain: <input type="text" value="Level"/>	Number of Approach Lanes: <input type="text" value="1"/> Undivided or Divided Highway: <input type="text" value="Undivided"/> <div style="border: 1px solid red; padding: 2px; display: inline-block; color: red; font-weight: bold;">Type of Analysis</div> Left or Right-Turn Lane Analysis?: <input type="text" value="Left Turn Lane"/>

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations						
Movement	Include?	Volume	% Trucks	PCEV		
Advancing	Left	Yes	174	0.0%	174	Advancing Volume: <input type="text" value="279"/> Opposing Volume: <input type="text" value="114"/> Left Turn Volume: <input type="text" value="174"/>
	Through	-	97	0.0%	97	
	Right	Yes	8	0.0%	8	
Opposing	Left	Yes	15	7.0%	16	% Left Turns in Advancing Volume: <input type="text" value="62.37%"/>
	Through	-	47	0.0%	47	
	Right	Yes	49	5.0%	51	
Right Turn Lane Volume Calculations						
Movement	Include?	Volume	% Trucks	PCEV		
Advancing	Left	Yes	165	0.0%	N/A	Advancing Volume: <input type="text" value="N/A"/> Right Turn Volume: <input type="text" value="N/A"/>
	Through	-	93	0.0%	N/A	
	Right	-	7	0.0%	N/A	

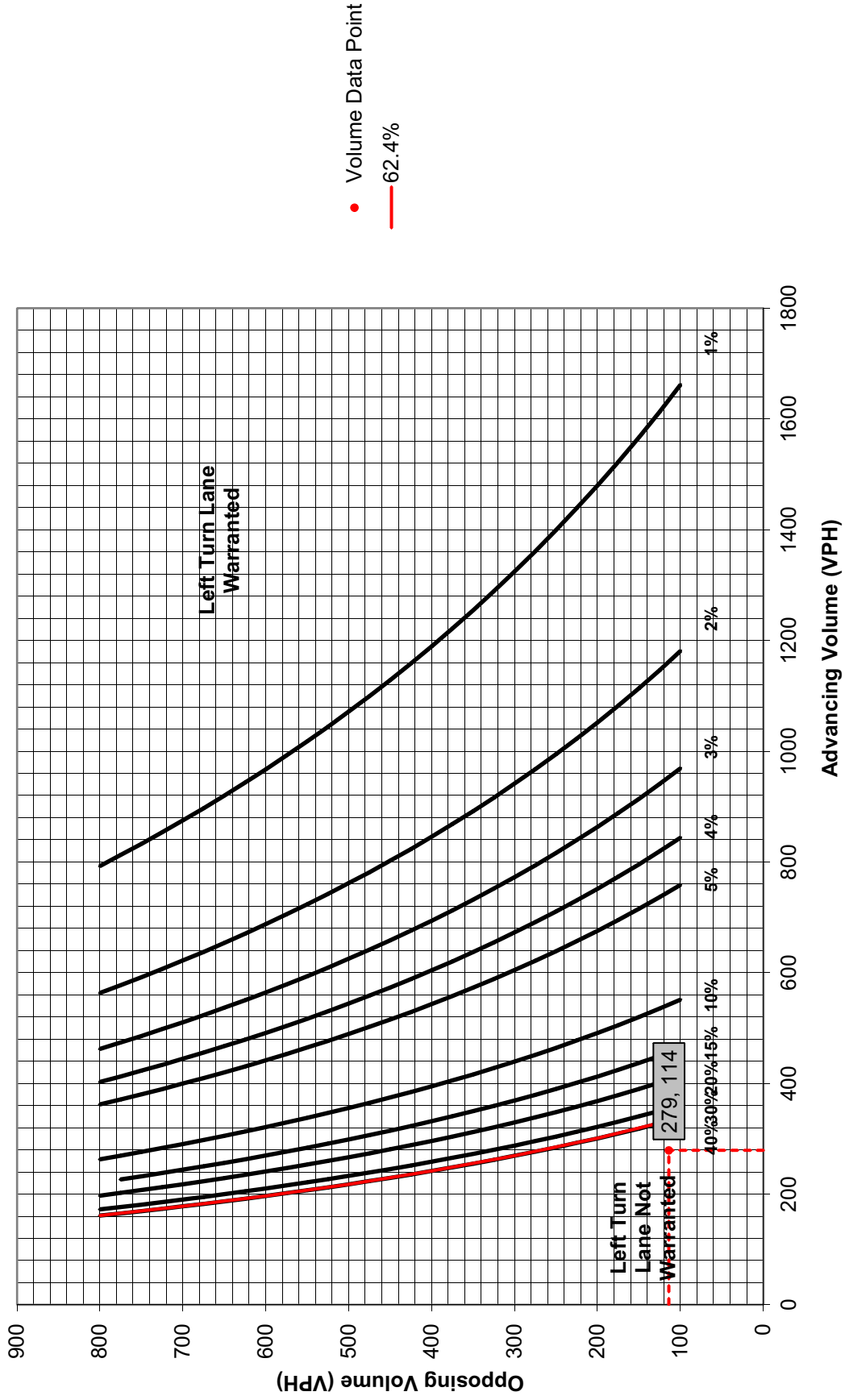
TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: <input style="width: 100px;" type="text" value="Figure 1"/> Warrant Met?: <input style="width: 100px;" type="text" value="No"/>	Applicable Warrant Figure: <input style="width: 100px;" type="text" value="N/A"/> Warrant Met?: <input style="width: 100px;" type="text" value="N/A"/>

TURN LANE LENGTH CALCULATIONS

Intersection Control: <input type="text" value="Signalized"/> Design Hour Volume of Turning Lane: <input type="text" value="174"/> Cycles Per Hour (Assumed): <input type="text" value="Known"/> Cycles Per Hour (If Known): <input type="text" value="40"/>	Average # of Vehicles/Cycle: <input type="text" value="N/A"/>																																								
PennDOT Publication 46, Exhibit 11-6																																									
<table border="1" style="width: 100%; border-collapse: collapse; font-size: 8px;"> <thead> <tr> <th rowspan="3" style="width: 20%;">Type of Traffic Control</th> <th colspan="6" style="background-color: #FFDAB9;">Speed (MPH)</th> </tr> <tr> <th colspan="2" style="background-color: #FFDAB9;">25-35</th> <th colspan="2" style="background-color: #FFDAB9;">40-45</th> <th colspan="2" style="background-color: #FFDAB9;">50-60</th> </tr> <tr> <th colspan="6" style="background-color: #FFDAB9;">Turn Demand Volume</th> </tr> <tr> <th></th> <th style="background-color: #FFDAB9;">High</th> <th style="background-color: #FFDAB9;">Low</th> <th style="background-color: #FFDAB9;">High</th> <th style="background-color: #FFDAB9;">Low</th> <th style="background-color: #FFDAB9;">High</th> <th style="background-color: #FFDAB9;">Low</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Signalized</td> <td style="text-align: center;">A</td> <td style="text-align: center;">A</td> <td style="text-align: center;">B or C</td> <td style="text-align: center;">B or C</td> <td style="text-align: center;">B or C</td> <td style="text-align: center;">B or C</td> </tr> <tr> <td style="text-align: center;">Unsignalized</td> <td style="text-align: center;">A</td> <td style="text-align: center;">A</td> <td style="text-align: center;">C</td> <td style="text-align: center;">B</td> <td style="text-align: center;">B or C</td> <td style="text-align: center;">B</td> </tr> </tbody> </table>		Type of Traffic Control	Speed (MPH)						25-35		40-45		50-60		Turn Demand Volume							High	Low	High	Low	High	Low	Signalized	A	A	B or C	B or C	B or C	B or C	Unsignalized	A	A	C	B	B or C	B
Type of Traffic Control	Speed (MPH)																																								
	25-35		40-45		50-60																																				
	Turn Demand Volume																																								
	High	Low	High	Low	High	Low																																			
Signalized	A	A	B or C	B or C	B or C	B or C																																			
Unsignalized	A	A	C	B	B or C	B																																			
Left Turn Lane Storage Length, Condition A: <input style="width: 100px;" type="text" value="N/A"/> Feet Condition B: <input style="width: 100px;" type="text" value="N/A"/> Feet Condition C: <input style="width: 100px;" type="text" value="N/A"/> Feet Required Left Turn Lane Storage Length: <input style="width: 100px;" type="text" value="N/A"/> Feet																																									
Additional Findings: <input style="width: 100px;" type="text" value="N/A"/>																																									
Additional Comments / Justifications: <div style="border: 1px solid black; height: 40px; width: 100%;"></div>																																									

Figure 1. Warrant for left turn lanes on two-lane roadways
 (speeds to 35 mph, unsignalized and signalized intersections)
 (L = % Left Turns in Advancing Volume)



APPENDIX E: Capacity LOS & Queuing Reports

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Lane Group	EBL	EBT	WBL2	WBL	WBT	NBL	NBT	SBL2	SBL	SBT	NWL
Lane Configurations											
Traffic Volume (vph)	72	66	6	80	31	12	276	7	88	222	20
Future Volume (vph)	72	66	6	80	31	12	276	7	88	222	20
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	pm+pt	pm+pt	NA	Prot
Protected Phases		4			8		2	1	1	6	9
Permitted Phases	4		8	8		2		6	6		
Detector Phase	4	4	8	8	8	2	2	1	1	6	9
Switch Phase											
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	10.0	10.0	7.0	7.0	10.0	3.0
Minimum Split (s)	9.0	9.0	9.0	9.0	9.0	16.0	16.0	13.0	13.0	16.0	9.0
Total Split (s)	23.0	23.0	23.0	23.0	23.0	55.0	55.0	13.0	13.0	68.0	22.0
Total Split (%)	20.4%	20.4%	20.4%	20.4%	20.4%	48.7%	48.7%	11.5%	11.5%	60.2%	19.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-1.0			-1.0		-1.0			-1.0	-1.0
Total Lost Time (s)		5.0			5.0		5.0			5.0	5.0
Lead/Lag						Lag	Lag	Lead	Lead		
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	Min	Min	Min	Min	Min	None

Intersection Summary

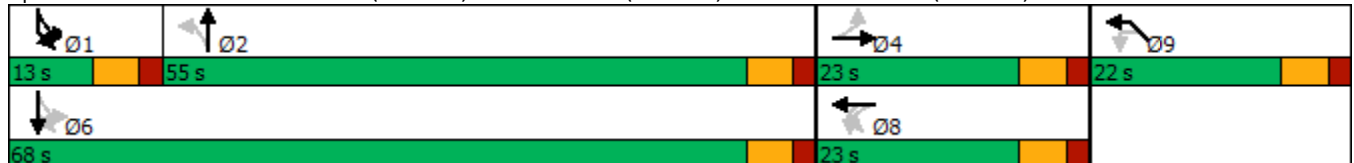
Cycle Length: 113

Actuated Cycle Length: 87.1
















Natural Cycle: 80

Control Type: Semi Act-Uncoord

Splits and Phases: 1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road

												
Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	72	66	64	21	6	80	31	13	12	276	150	5
Future Volume (vph)	72	66	64	21	6	80	31	13	12	276	150	5
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	10	10	10	10	10	10	10	10	11	11	11	11
Total Lost time (s)		5.0					5.0			5.0		
Lane Util. Factor		1.00					1.00			1.00		
Frt		0.95					0.99			0.95		
Flt Protected		0.98					0.97			1.00		
Satd. Flow (prot)		1514					1461			1589		
Flt Permitted		0.85					0.56			0.99		
Satd. Flow (perm)		1306					846			1568		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	80	73	71	23	7	89	34	14	13	307	167	6
RTOR Reduction (vph)	0	3	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	244	0	0	0	0	144	0	0	493	0	0
Heavy Vehicles (%)	4%	3%	5%	0%	17%	6%	13%	23%	0%	4%	5%	0%
Turn Type	Perm	NA			Perm	Perm	NA		Perm	NA		
Protected Phases		4					8			2		
Permitted Phases	4				8	8			2			
Actuated Green, G (s)		17.9					17.9			30.4		
Effective Green, g (s)		18.9					18.9			31.4		
Actuated g/C Ratio		0.22					0.22			0.36		
Clearance Time (s)		6.0					6.0			6.0		
Vehicle Extension (s)		3.0					3.0			4.3		
Lane Grp Cap (vph)		280					181			560		
v/s Ratio Prot												
v/s Ratio Perm		c0.19					0.17			c0.31		
v/c Ratio		0.87					0.80			0.88		
Uniform Delay, d1		33.3					32.7			26.5		
Progression Factor		1.00					1.00			1.00		
Incremental Delay, d2		24.2					21.0			15.5		
Delay (s)		57.6					53.7			42.0		
Level of Service		E					D			D		
Approach Delay (s)		57.6					53.7			42.0		
Approach LOS		E					D			D		
Intersection Summary												
HCM 2000 Control Delay			39.5				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			87.9				Sum of lost time (s)			21.0		
Intersection Capacity Utilization			80.8%				ICU Level of Service			D		
Analysis Period (min)			15									

c Critical Lane Group

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Movement	SBL2	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2
Lane Configurations			↕			↕		
Traffic Volume (vph)	7	88	222	32	4	20	34	2
Future Volume (vph)	7	88	222	32	4	20	34	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	11	11	11	11	10	10	10	10
Total Lost time (s)			5.0			5.0		
Lane Util. Factor			1.00			1.00		
Frt			0.99			0.92		
Flt Protected			0.99			0.98		
Satd. Flow (prot)			1647			1374		
Flt Permitted			0.60			0.98		
Satd. Flow (perm)			1001			1374		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	8	98	247	36	4	22	38	2
RTOR Reduction (vph)	0	0	3	0	0	0	0	0
Lane Group Flow (vph)	0	0	386	0	0	66	0	0
Heavy Vehicles (%)	0%	3%	3%	3%	25%	5%	12%	0%
Turn Type	pm+pt	pm+pt	NA		Perm	Prot		
Protected Phases	1	1	6			9		
Permitted Phases	6	6			9			
Actuated Green, G (s)			43.8			8.2		
Effective Green, g (s)			44.8			9.2		
Actuated g/C Ratio			0.51			0.10		
Clearance Time (s)			6.0			6.0		
Vehicle Extension (s)			4.3			3.0		
Lane Grp Cap (vph)			571			143		
v/s Ratio Prot			c0.06					
v/s Ratio Perm			0.28			0.05		
v/c Ratio			0.68			0.46		
Uniform Delay, d1			16.1			37.0		
Progression Factor			1.00			1.00		
Incremental Delay, d2			3.6			2.4		
Delay (s)			19.7			39.4		
Level of Service			B			D		
Approach Delay (s)			19.7			39.4		
Approach LOS			B			D		
Intersection Summary								

HCM 6th Edition methodology does not support more than 4 approaches.

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Lane Group	EBL	EBT	WBL2	WBL	WBT	NBL	NBT	SBL2	SBL	SBT	NWL
Lane Configurations											
Traffic Volume (vph)	14	43	6	151	88	23	276	6	31	321	58
Future Volume (vph)	14	43	6	151	88	23	276	6	31	321	58
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	pm+pt	pm+pt	NA	Prot
Protected Phases		4			8		2	1	1	6	9
Permitted Phases	4		8	8		2		6	6		
Detector Phase	4	4	8	8	8	2	2	1	1	6	9
Switch Phase											
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	10.0	10.0	7.0	7.0	10.0	3.0
Minimum Split (s)	9.0	9.0	9.0	9.0	9.0	16.0	16.0	13.0	13.0	16.0	9.0
Total Split (s)	25.0	25.0	25.0	25.0	25.0	43.0	43.0	13.0	13.0	56.0	22.0
Total Split (%)	24.3%	24.3%	24.3%	24.3%	24.3%	41.7%	41.7%	12.6%	12.6%	54.4%	21.4%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-1.0			-1.0		-1.0			-1.0	-1.0
Total Lost Time (s)		5.0			5.0		5.0			5.0	5.0
Lead/Lag						Lag	Lag	Lead	Lead		
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	Min	Min	Min	Min	Min	None

Intersection Summary

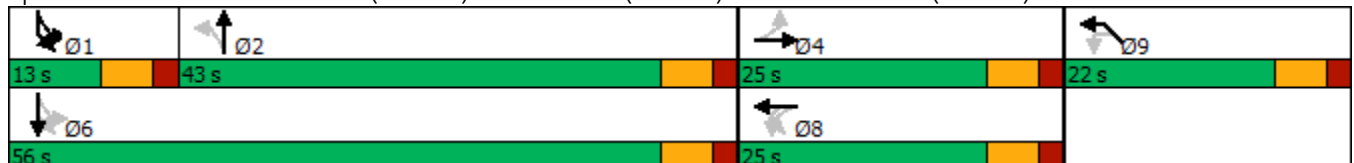
Cycle Length: 103

Actuated Cycle Length: 93.4
















Natural Cycle: 90

Control Type: Semi Act-Uncoord

Splits and Phases: 1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road

												
Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	14	43	26	18	6	151	88	7	23	276	129	3
Future Volume (vph)	14	43	26	18	6	151	88	7	23	276	129	3
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	10	10	10	10	10	10	10	10	11	11	11	11
Total Lost time (s)		5.0					5.0			5.0		
Lane Util. Factor		1.00					1.00			1.00		
Frt		0.94					1.00			0.96		
Flt Protected		0.99					0.97			1.00		
Satd. Flow (prot)		1524					1623			1633		
Flt Permitted		0.94					0.75			0.96		
Satd. Flow (perm)		1447					1247			1575		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	15	46	28	19	6	162	95	8	25	297	139	3
RTOR Reduction (vph)	0	7	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	101	0	0	0	0	271	0	0	464	0	0
Heavy Vehicles (%)	7%	0%	4%	6%	0%	0%	0%	0%	0%	2%	2%	0%
Turn Type	Perm	NA			Perm	Perm	NA		Perm	NA		
Protected Phases		4					8			2		
Permitted Phases	4				8	8			2			
Actuated Green, G (s)		19.2					19.2			29.4		
Effective Green, g (s)		20.2					20.2			30.4		
Actuated g/C Ratio		0.22					0.22			0.33		
Clearance Time (s)		6.0					6.0			6.0		
Vehicle Extension (s)		3.0					3.0			4.3		
Lane Grp Cap (vph)		313					270			514		
v/s Ratio Prot												
v/s Ratio Perm		0.07					c0.22			c0.29		
v/c Ratio		0.32					1.00			0.90		
Uniform Delay, d1		30.7					36.4			29.9		
Progression Factor		1.00					1.00			1.00		
Incremental Delay, d2		0.6					55.7			19.6		
Delay (s)		31.3					92.2			49.5		
Level of Service		C					F			D		
Approach Delay (s)		31.3					92.2			49.5		
Approach LOS		C					F			D		
Intersection Summary												
HCM 2000 Control Delay			46.6				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			93.1				Sum of lost time (s)			21.0		
Intersection Capacity Utilization			76.0%				ICU Level of Service			D		
Analysis Period (min)			15									

c Critical Lane Group

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Movement	SBL2	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2
Lane Configurations			↕			↕		
Traffic Volume (vph)	6	31	321	39	9	58	62	10
Future Volume (vph)	6	31	321	39	9	58	62	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	11	11	11	11	10	10	10	10
Total Lost time (s)			5.0			5.0		
Lane Util. Factor			1.00			1.00		
Frt			0.99			0.93		
Flt Protected			1.00			0.98		
Satd. Flow (prot)			1691			1493		
Flt Permitted			0.91			0.98		
Satd. Flow (perm)			1544			1493		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	6	33	345	42	10	62	67	11
RTOR Reduction (vph)	0	0	4	0	0	0	0	0
Lane Group Flow (vph)	0	0	422	0	0	150	0	0
Heavy Vehicles (%)	0%	3%	1%	0%	0%	2%	3%	0%
Turn Type	pm+pt	pm+pt	NA		Perm	Prot		
Protected Phases	1	1	6			9		
Permitted Phases	6	6			9			
Actuated Green, G (s)			42.5			13.4		
Effective Green, g (s)			43.5			14.4		
Actuated g/C Ratio			0.47			0.15		
Clearance Time (s)			6.0			6.0		
Vehicle Extension (s)			4.3			3.0		
Lane Grp Cap (vph)			734			230		
v/s Ratio Prot			c0.05					
v/s Ratio Perm			0.22			0.10		
v/c Ratio			0.57			0.65		
Uniform Delay, d1			18.1			37.0		
Progression Factor			1.00			1.00		
Incremental Delay, d2			1.4			6.5		
Delay (s)			19.5			43.5		
Level of Service			B			D		
Approach Delay (s)			19.5			43.5		
Approach LOS			B			D		
Intersection Summary								

HCM 6th Edition methodology does not support more than 4 approaches.

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road

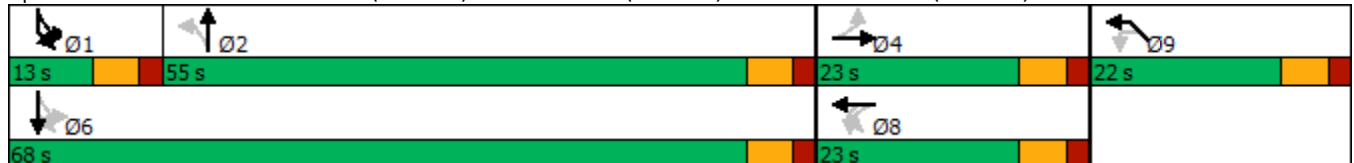


Lane Group	EBL	EBT	WBL2	WBL	WBT	NBL	NBT	SBL2	SBL	SBT	NWL
Lane Configurations											
Traffic Volume (vph)	74	68	6	82	32	12	284	7	91	229	21
Future Volume (vph)	74	68	6	82	32	12	284	7	91	229	21
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	pm+pt	pm+pt	NA	Prot
Protected Phases		4			8		2	1	1	6	9
Permitted Phases	4		8	8		2		6	6		
Detector Phase	4	4	8	8	8	2	2	1	1	6	9
Switch Phase											
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	10.0	10.0	7.0	7.0	10.0	3.0
Minimum Split (s)	9.0	9.0	9.0	9.0	9.0	16.0	16.0	13.0	13.0	16.0	9.0
Total Split (s)	23.0	23.0	23.0	23.0	23.0	55.0	55.0	13.0	13.0	68.0	22.0
Total Split (%)	20.4%	20.4%	20.4%	20.4%	20.4%	48.7%	48.7%	11.5%	11.5%	60.2%	19.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-1.0			-1.0		-1.0			-1.0	-1.0
Total Lost Time (s)		5.0			5.0		5.0			5.0	5.0
Lead/Lag						Lag	Lag	Lead	Lead		
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	Min	Min	Min	Min	Min	None

















Intersection Summary

Cycle Length: 113
 Actuated Cycle Length: 88.1
 Natural Cycle: 80
 Control Type: Semi Act-Uncoord

Splits and Phases: 1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road

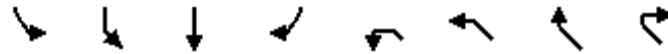


1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road

													
Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2	
Lane Configurations													
Traffic Volume (vph)	74	68	66	22	6	82	32	13	12	284	155	5	
Future Volume (vph)	74	68	66	22	6	82	32	13	12	284	155	5	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Lane Width	10	10	10	10	10	10	10	10	11	11	11	11	
Total Lost time (s)		5.0					5.0			5.0			
Lane Util. Factor		1.00					1.00			1.00			
Frt		0.95					0.99			0.95			
Flt Protected		0.98					0.97			1.00			
Satd. Flow (prot)		1514					1462			1589			
Flt Permitted		0.85					0.55			0.99			
Satd. Flow (perm)		1305					831			1569			
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Adj. Flow (vph)	82	76	73	24	7	91	36	14	13	316	172	6	
RTOR Reduction (vph)	0	3	0	0	0	0	0	0	0	0	0	0	
Lane Group Flow (vph)	0	252	0	0	0	0	148	0	0	507	0	0	
Heavy Vehicles (%)	4%	3%	5%	0%	17%	6%	13%	23%	0%	4%	5%	0%	
Turn Type	Perm	NA			Perm	Perm	NA		Perm	NA			
Protected Phases		4					8			2			
Permitted Phases	4				8	8			2				
Actuated Green, G (s)		17.9					17.9			31.2			
Effective Green, g (s)		18.9					18.9			32.2			
Actuated g/C Ratio		0.21					0.21			0.36			
Clearance Time (s)		6.0					6.0			6.0			
Vehicle Extension (s)		3.0					3.0			4.3			
Lane Grp Cap (vph)		277					176			568			
v/s Ratio Prot													
v/s Ratio Perm		c0.19					0.18			c0.32			
v/c Ratio		0.91					0.84			0.89			
Uniform Delay, d1		34.2					33.6			26.7			
Progression Factor		1.00					1.00			1.00			
Incremental Delay, d2		31.1					28.7			16.8			
Delay (s)		65.2					62.3			43.5			
Level of Service		E					E			D			
Approach Delay (s)		65.2					62.3			43.5			
Approach LOS		E					E			D			
Intersection Summary													
HCM 2000 Control Delay			42.8				HCM 2000 Level of Service			D			
HCM 2000 Volume to Capacity ratio			0.84										
Actuated Cycle Length (s)			88.9				Sum of lost time (s)			21.0			
Intersection Capacity Utilization			82.7%				ICU Level of Service			E			
Analysis Period (min)			15										

c Critical Lane Group

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Movement	SBL2	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2
Lane Configurations								
Traffic Volume (vph)	7	91	229	33	4	21	35	2
Future Volume (vph)	7	91	229	33	4	21	35	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	11	11	11	11	10	10	10	10
Total Lost time (s)			5.0			5.0		
Lane Util. Factor			1.00			1.00		
Frt			0.99			0.92		
Flt Protected			0.99			0.98		
Satd. Flow (prot)			1647			1375		
Flt Permitted			0.59			0.98		
Satd. Flow (perm)			982			1375		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	8	101	254	37	4	23	39	2
RTOR Reduction (vph)	0	0	3	0	0	0	0	0
Lane Group Flow (vph)	0	0	397	0	0	68	0	0
Heavy Vehicles (%)	0%	3%	3%	3%	25%	5%	12%	0%
Turn Type	pm+pt	pm+pt	NA		Perm	Prot		
Protected Phases	1	1	6			9		
Permitted Phases	6	6			9			
Actuated Green, G (s)			44.6			8.4		
Effective Green, g (s)			45.6			9.4		
Actuated g/C Ratio			0.51			0.11		
Clearance Time (s)			6.0			6.0		
Vehicle Extension (s)			4.3			3.0		
Lane Grp Cap (vph)			566			145		
v/s Ratio Prot			c0.07					
v/s Ratio Perm			0.29			0.05		
v/c Ratio			0.70			0.47		
Uniform Delay, d1			16.5			37.4		
Progression Factor			1.00			1.00		
Incremental Delay, d2			4.4			2.4		
Delay (s)			20.8			39.8		
Level of Service			C			D		
Approach Delay (s)			20.8			39.8		
Approach LOS			C			D		
Intersection Summary								

HCM 6th Edition methodology does not support more than 4 approaches.

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Lane Group	EBL	EBT	WBL2	WBL	WBT	NBL	NBT	SBL2	SBL	SBT	NWL
Lane Configurations											
Traffic Volume (vph)	14	44	6	156	91	24	284	6	32	331	60
Future Volume (vph)	14	44	6	156	91	24	284	6	32	331	60
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	pm+pt	pm+pt	NA	Prot
Protected Phases		4			8		2	1	1	6	9
Permitted Phases	4		8	8		2		6	6		
Detector Phase	4	4	8	8	8	2	2	1	1	6	9
Switch Phase											
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	10.0	10.0	7.0	7.0	10.0	3.0
Minimum Split (s)	9.0	9.0	9.0	9.0	9.0	16.0	16.0	13.0	13.0	16.0	9.0
Total Split (s)	25.0	25.0	25.0	25.0	25.0	43.0	43.0	13.0	13.0	56.0	22.0
Total Split (%)	24.3%	24.3%	24.3%	24.3%	24.3%	41.7%	41.7%	12.6%	12.6%	54.4%	21.4%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-1.0			-1.0		-1.0			-1.0	-1.0
Total Lost Time (s)		5.0			5.0		5.0			5.0	5.0
Lead/Lag						Lag	Lag	Lead	Lead		
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	Min	Min	Min	Min	Min	None

Intersection Summary

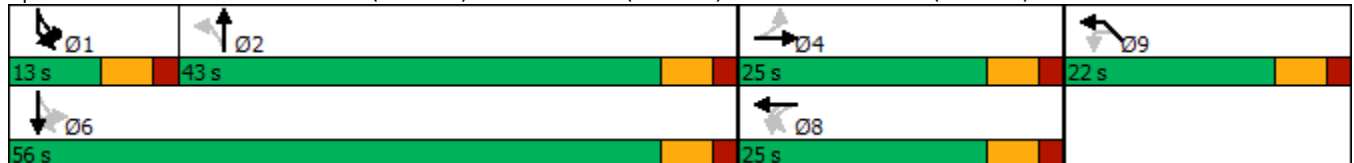
Cycle Length: 103

Actuated Cycle Length: 94.5
















Natural Cycle: 90

Control Type: Semi Act-Uncoord

Splits and Phases: 1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road

												
Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	14	44	27	19	6	156	91	7	24	284	133	3
Future Volume (vph)	14	44	27	19	6	156	91	7	24	284	133	3
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	10	10	10	10	10	10	10	10	11	11	11	11
Total Lost time (s)		5.0					5.0			5.0		
Lane Util. Factor		1.00					1.00			1.00		
Frt		0.94					1.00			0.96		
Flt Protected		0.99					0.97			1.00		
Satd. Flow (prot)		1523					1623			1633		
Flt Permitted		0.94					0.74			0.96		
Satd. Flow (perm)		1446					1233			1572		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	15	47	29	20	6	168	98	8	26	305	143	3
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	103	0	0	0	0	280	0	0	477	0	0
Heavy Vehicles (%)	7%	0%	4%	6%	0%	0%	0%	0%	0%	2%	2%	0%
Turn Type	Perm	NA			Perm	Perm	NA		Perm	NA		
Protected Phases		4					8			2		
Permitted Phases	4				8	8			2			
Actuated Green, G (s)		19.2					19.2			30.3		
Effective Green, g (s)		20.2					20.2			31.3		
Actuated g/C Ratio		0.21					0.21			0.33		
Clearance Time (s)		6.0					6.0			6.0		
Vehicle Extension (s)		3.0					3.0			4.3		
Lane Grp Cap (vph)		310					264			522		
v/s Ratio Prot												
v/s Ratio Perm		0.07					c0.23			c0.30		
v/c Ratio		0.33					1.06			0.91		
Uniform Delay, d1		31.3					37.0			30.2		
Progression Factor		1.00					1.00			1.00		
Incremental Delay, d2		0.6					72.3			21.0		
Delay (s)		31.9					109.3			51.1		
Level of Service		C					F			D		
Approach Delay (s)		31.9					109.3			51.1		
Approach LOS		C					F			D		
Intersection Summary												
HCM 2000 Control Delay			50.8				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.90									
Actuated Cycle Length (s)			94.2				Sum of lost time (s)			21.0		
Intersection Capacity Utilization			77.6%				ICU Level of Service			D		
Analysis Period (min)			15									

c Critical Lane Group

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Movement	SBL2	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2
Lane Configurations			↕			↕		
Traffic Volume (vph)	6	32	331	40	9	60	64	10
Future Volume (vph)	6	32	331	40	9	60	64	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	11	11	11	11	10	10	10	10
Total Lost time (s)			5.0			5.0		
Lane Util. Factor			1.00			1.00		
Frt			0.99			0.93		
Flt Protected			1.00			0.98		
Satd. Flow (prot)			1692			1494		
Flt Permitted			0.90			0.98		
Satd. Flow (perm)			1536			1494		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	6	34	356	43	10	65	69	11
RTOR Reduction (vph)	0	0	4	0	0	0	0	0
Lane Group Flow (vph)	0	0	435	0	0	155	0	0
Heavy Vehicles (%)	0%	3%	1%	0%	0%	2%	3%	0%
Turn Type	pm+pt	pm+pt	NA		Perm	Prot		
Protected Phases	1	1	6			9		
Permitted Phases	6	6			9			
Actuated Green, G (s)			43.4			13.6		
Effective Green, g (s)			44.4			14.6		
Actuated g/C Ratio			0.47			0.15		
Clearance Time (s)			6.0			6.0		
Vehicle Extension (s)			4.3			3.0		
Lane Grp Cap (vph)			737			231		
v/s Ratio Prot			c0.05					
v/s Ratio Perm			0.23			0.10		
v/c Ratio			0.59			0.67		
Uniform Delay, d1			18.2			37.5		
Progression Factor			1.00			1.00		
Incremental Delay, d2			1.6			7.4		
Delay (s)			19.8			45.0		
Level of Service			B			D		
Approach Delay (s)			19.8			45.0		
Approach LOS			B			D		
Intersection Summary								

HCM 6th Edition methodology does not support more than 4 approaches.

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Lane Group	EBL	EBT	WBL2	WBL	WBT	NBL	NBT	SBL2	SBL	SBT	NWL
Lane Configurations		↕			↕	↗	↖		↘	↖	↘
Traffic Volume (vph)	74	68	6	82	32	12	284	7	91	229	21
Future Volume (vph)	74	68	6	82	32	12	284	7	91	229	21
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	Perm	NA	Prot
Protected Phases		4			8		2			6	9
Permitted Phases	4		8	8		2		6	6		
Detector Phase	4	4	8	8	8	2	2	6	6	6	9
Switch Phase											
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	10.0	10.0	10.0	10.0	10.0	3.0
Minimum Split (s)	9.0	9.0	9.0	9.0	9.0	16.0	16.0	16.0	16.0	16.0	9.0
Total Split (s)	18.0	18.0	18.0	18.0	18.0	31.0	31.0	31.0	31.0	31.0	11.0
Total Split (%)	30.0%	30.0%	30.0%	30.0%	30.0%	51.7%	51.7%	51.7%	51.7%	51.7%	18.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-1.0			-1.0	-1.0	-1.0		-1.0	-1.0	-1.0
Total Lost Time (s)		5.0			5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	Min	Min	Min	Min	Min	None

Intersection Summary

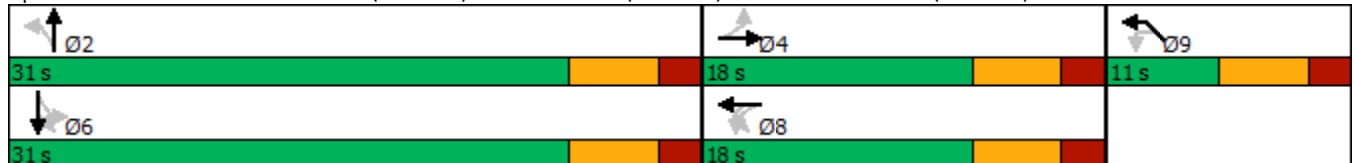
Cycle Length: 60

Actuated Cycle Length: 49.1

















Natural Cycle: 60

Control Type: Semi Act-Uncoord

Splits and Phases: 1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road

												
Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	74	68	66	22	6	82	32	13	12	284	155	5
Future Volume (vph)	74	68	66	22	6	82	32	13	12	284	155	5
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	10	10	10	10	10	10	10	10	11	11	11	11
Grade (%)		-2%					8%			-3%		
Total Lost time (s)		5.0					5.0		5.0	5.0		
Lane Util. Factor		1.00					1.00		1.00	1.00		
Frt		0.95					0.99		1.00	0.95		
Flt Protected		0.98					0.97		0.95	1.00		
Satd. Flow (prot)		1529					1403		1678	1602		
Flt Permitted		0.86					0.65		0.55	1.00		
Satd. Flow (perm)		1337					942		969	1602		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	82	76	73	24	7	91	36	14	13	316	172	6
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	249	0	0	0	0	148	0	13	494	0	0
Heavy Vehicles (%)	4%	3%	5%	0%	17%	6%	13%	23%	0%	4%	5%	0%
Turn Type	Perm	NA			Perm	Perm	NA		Perm	NA		
Protected Phases		4					8			2		
Permitted Phases	4				8	8			2			
Actuated Green, G (s)		12.2					12.2		18.6	18.6		
Effective Green, g (s)		13.2					13.2		19.6	19.6		
Actuated g/C Ratio		0.26					0.26		0.38	0.38		
Clearance Time (s)		6.0					6.0		6.0	6.0		
Vehicle Extension (s)		3.0					3.0		4.3	4.3		
Lane Grp Cap (vph)		344					242		370	612		
v/s Ratio Prot										c0.31		
v/s Ratio Perm		c0.19					0.16		0.01			
v/c Ratio		0.72					0.61		0.04	0.81		
Uniform Delay, d1		17.4					16.8		9.9	14.2		
Progression Factor		1.00					1.00		1.00	1.00		
Incremental Delay, d2		7.4					4.5		0.1	8.4		
Delay (s)		24.7					21.3		10.0	22.5		
Level of Service		C					C		A	C		
Approach Delay (s)		24.7					21.3			22.2		
Approach LOS		C					C			C		
Intersection Summary												
HCM 2000 Control Delay			21.4				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.77									
Actuated Cycle Length (s)			51.3				Sum of lost time (s)		15.0			
Intersection Capacity Utilization			69.8%				ICU Level of Service			C		
Analysis Period (min)			15									
c	Critical Lane Group											

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Movement	SBL2	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2
Lane Configurations								
Traffic Volume (vph)	7	91	229	33	4	21	35	2
Future Volume (vph)	7	91	229	33	4	21	35	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	11	11	11	11	10	10	10	10
Grade (%)			0%			1%		
Total Lost time (s)		5.0	5.0			5.0		
Lane Util. Factor		1.00	1.00			1.00		
Frt		1.00	0.98			0.92		
Flt Protected		0.95	1.00			0.98		
Satd. Flow (prot)		1608	1657			1368		
Flt Permitted		0.31	1.00			0.98		
Satd. Flow (perm)		526	1657			1368		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	8	101	254	37	4	23	39	2
RTOR Reduction (vph)	0	0	9	0	0	0	0	0
Lane Group Flow (vph)	0	109	282	0	0	68	0	0
Heavy Vehicles (%)	0%	3%	3%	3%	25%	5%	12%	0%
Turn Type	Perm	Perm	NA		Perm	Prot		
Protected Phases			6			9		
Permitted Phases	6	6			9			
Actuated Green, G (s)		18.6	18.6			2.5		
Effective Green, g (s)		19.6	19.6			3.5		
Actuated g/C Ratio		0.38	0.38			0.07		
Clearance Time (s)		6.0	6.0			6.0		
Vehicle Extension (s)		4.3	4.3			3.0		
Lane Grp Cap (vph)		200	633			93		
v/s Ratio Prot			0.17					
v/s Ratio Perm		0.21				0.05		
v/c Ratio		0.55	0.45			0.73		
Uniform Delay, d1		12.4	11.8			23.4		
Progression Factor		1.00	1.00			1.00		
Incremental Delay, d2		4.2	0.8			25.3		
Delay (s)		16.6	12.6			48.8		
Level of Service		B	B			D		
Approach Delay (s)			13.7			48.8		
Approach LOS			B			D		
Intersection Summary								

HCM 6th Edition methodology does not support more than 4 approaches.

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road

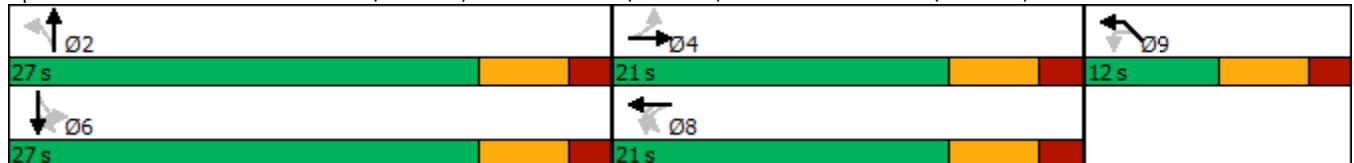


Lane Group	EBL	EBT	WBL2	WBL	WBT	NBL	NBT	SBL2	SBL	SBT	NWL
Lane Configurations		↕			↕	↗	↖		↘	↖	↘
Traffic Volume (vph)	14	44	6	156	91	24	284	6	32	331	60
Future Volume (vph)	14	44	6	156	91	24	284	6	32	331	60
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	Perm	NA	Prot
Protected Phases		4			8		2			6	9
Permitted Phases	4		8	8		2		6	6		
Detector Phase	4	4	8	8	8	2	2	6	6	6	9
Switch Phase											
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	10.0	10.0	10.0	10.0	10.0	3.0
Minimum Split (s)	9.0	9.0	9.0	9.0	9.0	16.0	16.0	16.0	16.0	16.0	9.0
Total Split (s)	21.0	21.0	21.0	21.0	21.0	27.0	27.0	27.0	27.0	27.0	12.0
Total Split (%)	35.0%	35.0%	35.0%	35.0%	35.0%	45.0%	45.0%	45.0%	45.0%	45.0%	20.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-1.0			-1.0	-1.0	-1.0		-1.0	-1.0	-1.0
Total Lost Time (s)		5.0			5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	Min	Min	Min	Min	Min	None

















Intersection Summary

Cycle Length: 60
 Actuated Cycle Length: 56.6
 Natural Cycle: 60
 Control Type: Semi Act-Uncoord

Splits and Phases: 1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road

												
Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	14	44	27	19	6	156	91	7	24	284	133	3
Future Volume (vph)	14	44	27	19	6	156	91	7	24	284	133	3
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	10	10	10	10	10	10	10	10	11	11	11	11
Grade (%)		-2%					8%			-3%		
Total Lost time (s)		5.0					5.0		5.0	5.0		
Lane Util. Factor		1.00					1.00		1.00	1.00		
Frt		0.94					1.00		1.00	0.95		
Flt Protected		0.99					0.97		0.95	1.00		
Satd. Flow (prot)		1538					1558		1678	1648		
Flt Permitted		0.94					0.78		0.37	1.00		
Satd. Flow (perm)		1457					1249		655	1648		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	15	47	29	20	6	168	98	8	26	305	143	3
RTOR Reduction (vph)	0	13	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	98	0	0	0	0	280	0	26	451	0	0
Heavy Vehicles (%)	7%	0%	4%	6%	0%	0%	0%	0%	0%	2%	2%	0%
Turn Type	Perm	NA			Perm	Perm	NA		Perm	NA		
Protected Phases		4					8			2		
Permitted Phases	4				8	8			2			
Actuated Green, G (s)		14.3					14.3		18.1	18.1		
Effective Green, g (s)		15.3					15.3		19.1	19.1		
Actuated g/C Ratio		0.27					0.27		0.34	0.34		
Clearance Time (s)		6.0					6.0		6.0	6.0		
Vehicle Extension (s)		3.0					3.0		4.3	4.3		
Lane Grp Cap (vph)		394					338		221	557		
v/s Ratio Prot										c0.27		
v/s Ratio Perm		0.07					c0.22		0.04			
v/c Ratio		0.25					0.83		0.12	0.81		
Uniform Delay, d1		16.1					19.4		12.9	17.0		
Progression Factor		1.00					1.00		1.00	1.00		
Incremental Delay, d2		0.3					15.3		0.4	9.2		
Delay (s)		16.4					34.6		13.3	26.3		
Level of Service		B					C		B	C		
Approach Delay (s)		16.4					34.6			25.6		
Approach LOS		B					C			C		
Intersection Summary												
HCM 2000 Control Delay			27.4				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			56.5				Sum of lost time (s)		15.0			
Intersection Capacity Utilization			76.3%				ICU Level of Service		D			
Analysis Period (min)			15									
c	Critical Lane Group											

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Movement	SBL2	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2
Lane Configurations								
Traffic Volume (vph)	6	32	331	40	9	60	64	10
Future Volume (vph)	6	32	331	40	9	60	64	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	11	11	11	11	10	10	10	10
Grade (%)			0%			1%		
Total Lost time (s)		5.0	5.0			5.0		
Lane Util. Factor		1.00	1.00			1.00		
Frt		1.00	0.98			0.93		
Flt Protected		0.95	1.00			0.98		
Satd. Flow (prot)		1612	1697			1486		
Flt Permitted		0.30	1.00			0.98		
Satd. Flow (perm)		518	1697			1486		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	6	34	356	43	10	65	69	11
RTOR Reduction (vph)	0	0	7	0	0	0	0	0
Lane Group Flow (vph)	0	40	392	0	0	155	0	0
Heavy Vehicles (%)	0%	3%	1%	0%	0%	2%	3%	0%
Turn Type	Perm	Perm	NA		Perm	Prot		
Protected Phases			6			9		
Permitted Phases	6	6			9			
Actuated Green, G (s)		18.1	18.1			6.1		
Effective Green, g (s)		19.1	19.1			7.1		
Actuated g/C Ratio		0.34	0.34			0.13		
Clearance Time (s)		6.0	6.0			6.0		
Vehicle Extension (s)		4.3	4.3			3.0		
Lane Grp Cap (vph)		175	573			186		
v/s Ratio Prot			0.23					
v/s Ratio Perm		0.08				0.10		
v/c Ratio		0.23	0.68			0.83		
Uniform Delay, d1		13.4	16.1			24.1		
Progression Factor		1.00	1.00			1.00		
Incremental Delay, d2		1.1	3.8			26.1		
Delay (s)		14.5	19.9			50.2		
Level of Service		B	B			D		
Approach Delay (s)			19.4			50.2		
Approach LOS			B			D		
Intersection Summary								

HCM 6th Edition methodology does not support more than 4 approaches.

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Lane Group	EBL	EBT	WBL2	WBL	WBT	NBL	NBT	SBL2	SBL	SBT	NWL
Lane Configurations											
Traffic Volume (vph)	74	68	6	82	32	12	284	7	91	229	21
Future Volume (vph)	74	68	6	82	32	12	284	7	91	229	21
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	Perm	NA	Prot
Protected Phases		4			8		2			6	9
Permitted Phases	4		8	8		2		6	6		
Detector Phase	4	4	8	8	8	2	2	6	6	6	9
Switch Phase											
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	10.0	10.0	10.0	10.0	10.0	3.0
Minimum Split (s)	9.0	9.0	9.0	9.0	9.0	16.0	16.0	16.0	16.0	16.0	9.0
Total Split (s)	16.0	16.0	16.0	16.0	16.0	32.0	32.0	32.0	32.0	32.0	12.0
Total Split (%)	26.7%	26.7%	26.7%	26.7%	26.7%	53.3%	53.3%	53.3%	53.3%	53.3%	20.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-1.0		0.0	-1.0		-1.0			-1.0	-1.0
Total Lost Time (s)	6.0	5.0		6.0	5.0		5.0			5.0	5.0
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	Min	Min	Min	Min	Min	None

Intersection Summary

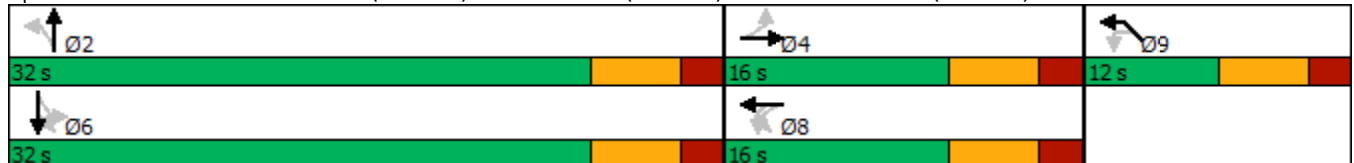
Cycle Length: 60

Actuated Cycle Length: 49.6


















Natural Cycle: 60

Control Type: Semi Act-Uncoord

Splits and Phases: 1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road

												
Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	74	68	66	22	6	82	32	13	12	284	155	5
Future Volume (vph)	74	68	66	22	6	82	32	13	12	284	155	5
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	10	10	10	10	10	10	10	10	11	11	11	11
Grade (%)		-2%					8%			-3%		
Total Lost time (s)	6.0	5.0				6.0	5.0			5.0		
Lane Util. Factor	1.00	1.00				1.00	1.00			1.00		
Frt	1.00	0.92				1.00	0.96			0.95		
Flt Protected	0.95	1.00				0.95	1.00			1.00		
Satd. Flow (prot)	1550	1503				1435	1334			1613		
Flt Permitted	0.72	1.00				0.65	1.00			0.99		
Satd. Flow (perm)	1182	1503				979	1334			1594		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	82	76	73	24	7	91	36	14	13	316	172	6
RTOR Reduction (vph)	0	10	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	82	163	0	0	0	98	50	0	0	507	0	0
Heavy Vehicles (%)	4%	3%	5%	0%	17%	6%	13%	23%	0%	4%	5%	0%
Turn Type	Perm	NA			Perm	Perm	NA		Perm	NA		
Protected Phases		4					8			2		
Permitted Phases	4				8	8			2			
Actuated Green, G (s)	7.2	7.2				7.2	7.2			25.3		
Effective Green, g (s)	7.2	8.2				7.2	8.2			26.3		
Actuated g/C Ratio	0.13	0.15				0.13	0.15			0.49		
Clearance Time (s)	6.0	6.0				6.0	6.0			6.0		
Vehicle Extension (s)	3.0	3.0				3.0	3.0			4.3		
Lane Grp Cap (vph)	159	230				131	204			783		
v/s Ratio Prot		c0.11					0.04					
v/s Ratio Perm	0.07					0.10				c0.32		
v/c Ratio	0.52	0.71				0.75	0.25			0.65		
Uniform Delay, d1	21.5	21.5				22.3	19.9			10.1		
Progression Factor	1.00	1.00				1.00	1.00			1.00		
Incremental Delay, d2	2.8	9.6				20.6	0.6			2.2		
Delay (s)	24.3	31.1				42.9	20.6			12.3		
Level of Service	C	C				D	C			B		
Approach Delay (s)		28.9					35.3			12.3		
Approach LOS		C					D			B		
Intersection Summary												
HCM 2000 Control Delay			19.1			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.66									
Actuated Cycle Length (s)			53.5			Sum of lost time (s)			15.0			
Intersection Capacity Utilization			86.6%			ICU Level of Service				E		
Analysis Period (min)			15									
c	Critical Lane Group											

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Movement	SBL2	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2
Lane Configurations								
Traffic Volume (vph)	7	91	229	33	4	21	35	2
Future Volume (vph)	7	91	229	33	4	21	35	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	11	11	11	11	10	10	10	10
Grade (%)			0%			1%		
Total Lost time (s)			5.0			5.0		
Lane Util. Factor			1.00			1.00		
Frt			0.99			0.92		
Flt Protected			0.99			0.98		
Satd. Flow (prot)			1647			1368		
Flt Permitted			0.78			0.98		
Satd. Flow (perm)			1301			1368		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	8	101	254	37	4	23	39	2
RTOR Reduction (vph)	0	0	6	0	0	0	0	0
Lane Group Flow (vph)	0	0	394	0	0	68	0	0
Heavy Vehicles (%)	0%	3%	3%	3%	25%	5%	12%	0%
Turn Type	Perm	Perm	NA		Perm	Prot		
Protected Phases			6			9		
Permitted Phases	6	6			9			
Actuated Green, G (s)			25.3			3.0		
Effective Green, g (s)			26.3			4.0		
Actuated g/C Ratio			0.49			0.07		
Clearance Time (s)			6.0			6.0		
Vehicle Extension (s)			4.3			3.0		
Lane Grp Cap (vph)			639			102		
v/s Ratio Prot								
v/s Ratio Perm			0.30			0.05		
v/c Ratio			0.62			0.67		
Uniform Delay, d1			9.9			24.1		
Progression Factor			1.00			1.00		
Incremental Delay, d2			2.2			15.2		
Delay (s)			12.1			39.4		
Level of Service			B			D		
Approach Delay (s)			12.1			39.4		
Approach LOS			B			D		
Intersection Summary								

HCM 6th Edition methodology does not support more than 4 approaches.

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Lane Group	EBL	EBT	WBL2	WBL	WBT	NBL	NBT	SBL2	SBL	SBT	NWL
Lane Configurations											
Traffic Volume (vph)	14	44	6	156	91	24	284	6	32	331	60
Future Volume (vph)	14	44	6	156	91	24	284	6	32	331	60
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	Perm	NA	Prot
Protected Phases		4			8		2			6	9
Permitted Phases	4		8	8		2		6	6		
Detector Phase	4	4	8	8	8	2	2	6	6	6	9
Switch Phase											
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	10.0	10.0	10.0	10.0	10.0	3.0
Minimum Split (s)	9.0	9.0	9.0	9.0	9.0	16.0	16.0	16.0	16.0	16.0	9.0
Total Split (s)	18.0	18.0	18.0	18.0	18.0	27.0	27.0	27.0	27.0	27.0	15.0
Total Split (%)	30.0%	30.0%	30.0%	30.0%	30.0%	45.0%	45.0%	45.0%	45.0%	45.0%	25.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-1.0		0.0	-1.0		-1.0			-1.0	-1.0
Total Lost Time (s)	6.0	5.0		6.0	5.0		5.0			5.0	5.0
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	Min	Min	Min	Min	Min	None

Intersection Summary

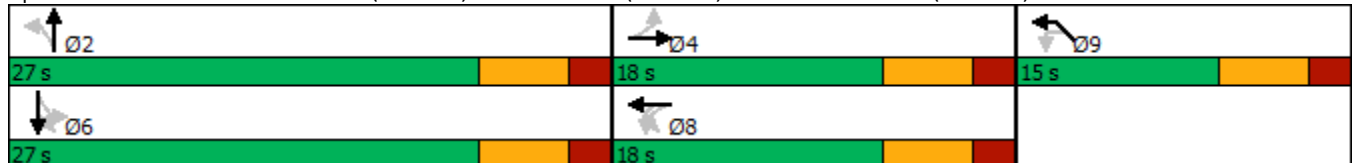
Cycle Length: 60

Actuated Cycle Length: 57.3


















Natural Cycle: 60

Control Type: Semi Act-Uncoord

Splits and Phases: 1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road

												
Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	14	44	27	19	6	156	91	7	24	284	133	3
Future Volume (vph)	14	44	27	19	6	156	91	7	24	284	133	3
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	10	10	10	10	10	10	10	10	11	11	11	11
Grade (%)		-2%					8%			-3%		
Total Lost time (s)	6.0	5.0				6.0	5.0			5.0		
Lane Util. Factor	1.00	1.00				1.00	1.00			1.00		
Frt	1.00	0.92				1.00	0.99			0.96		
Flt Protected	0.95	1.00				0.95	1.00			1.00		
Satd. Flow (prot)	1507	1529				1532	1595			1657		
Flt Permitted	0.69	1.00				0.69	1.00			0.96		
Satd. Flow (perm)	1092	1529				1121	1595			1599		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	15	47	29	20	6	168	98	8	26	305	143	3
RTOR Reduction (vph)	0	16	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	15	80	0	0	0	174	106	0	0	477	0	0
Heavy Vehicles (%)	7%	0%	4%	6%	0%	0%	0%	0%	0%	2%	2%	0%
Turn Type	Perm	NA			Perm	Perm	NA		Perm	NA		
Protected Phases		4					8			2		
Permitted Phases	4				8	8			2			
Actuated Green, G (s)	11.4	11.4				11.4	11.4			22.3		
Effective Green, g (s)	11.4	12.4				11.4	12.4			23.3		
Actuated g/C Ratio	0.19	0.21				0.19	0.21			0.40		
Clearance Time (s)	6.0	6.0				6.0	6.0			6.0		
Vehicle Extension (s)	3.0	3.0				3.0	3.0			4.3		
Lane Grp Cap (vph)	212	323				218	337			635		
v/s Ratio Prot		0.05					0.07					
v/s Ratio Perm	0.01					c0.16				c0.30		
v/c Ratio	0.07	0.25				0.80	0.31			0.75		
Uniform Delay, d1	19.3	19.2				22.5	19.5			15.2		
Progression Factor	1.00	1.00				1.00	1.00			1.00		
Incremental Delay, d2	0.1	0.4				18.1	0.5			5.5		
Delay (s)	19.4	19.6				40.6	20.0			20.7		
Level of Service	B	B				D	C			C		
Approach Delay (s)		19.6					32.8			20.7		
Approach LOS		B					C			C		
Intersection Summary												
HCM 2000 Control Delay			24.3			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			58.6			Sum of lost time (s)			15.0			
Intersection Capacity Utilization			72.1%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Movement	SBL2	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2
Lane Configurations								
Traffic Volume (vph)	6	32	331	40	9	60	64	10
Future Volume (vph)	6	32	331	40	9	60	64	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	11	11	11	11	10	10	10	10
Grade (%)			0%			1%		
Total Lost time (s)			5.0			5.0		
Lane Util. Factor			1.00			1.00		
Frt			0.99			0.93		
Flt Protected			1.00			0.98		
Satd. Flow (prot)			1692			1486		
Flt Permitted			0.94			0.98		
Satd. Flow (perm)			1590			1486		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	6	34	356	43	10	65	69	11
RTOR Reduction (vph)	0	0	6	0	0	0	0	0
Lane Group Flow (vph)	0	0	433	0	0	155	0	0
Heavy Vehicles (%)	0%	3%	1%	0%	0%	2%	3%	0%
Turn Type	Perm	Perm	NA		Perm	Prot		
Protected Phases			6			9		
Permitted Phases	6	6			9			
Actuated Green, G (s)			22.3			6.9		
Effective Green, g (s)			23.3			7.9		
Actuated g/C Ratio			0.40			0.13		
Clearance Time (s)			6.0			6.0		
Vehicle Extension (s)			4.3			3.0		
Lane Grp Cap (vph)			632			200		
v/s Ratio Prot								
v/s Ratio Perm			0.27			0.10		
v/c Ratio			0.69			0.78		
Uniform Delay, d1			14.6			24.5		
Progression Factor			1.00			1.00		
Incremental Delay, d2			3.5			16.9		
Delay (s)			18.1			41.4		
Level of Service			B			D		
Approach Delay (s)			18.1			41.4		
Approach LOS			B			D		
Intersection Summary								

HCM 6th Edition methodology does not support more than 4 approaches.

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Lane Group	EBL	EBT	WBL2	WBL	WBT	NBL	NBT	SBL2	SBL	SBT	NWL
Lane Configurations											
Traffic Volume (vph)	74	68	6	82	32	12	284	7	91	229	21
Future Volume (vph)	74	68	6	82	32	12	284	7	91	229	21
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	Perm	NA	Prot
Protected Phases		4			8		2			6	9
Permitted Phases	4		8	8		2		6	6		
Detector Phase	4	4	8	8	8	2	2	6	6	6	9
Switch Phase											
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	10.0	10.0	10.0	10.0	10.0	3.0
Minimum Split (s)	9.0	9.0	9.0	9.0	9.0	16.0	16.0	16.0	16.0	16.0	9.0
Total Split (s)	17.0	17.0	17.0	17.0	17.0	32.0	32.0	32.0	32.0	32.0	11.0
Total Split (%)	28.3%	28.3%	28.3%	28.3%	28.3%	53.3%	53.3%	53.3%	53.3%	53.3%	18.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-1.0		0.0	-1.0	-1.0	-1.0		-1.0	-1.0	-1.0
Total Lost Time (s)	6.0	5.0		6.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	Min	Min	Min	Min	Min	None

Intersection Summary

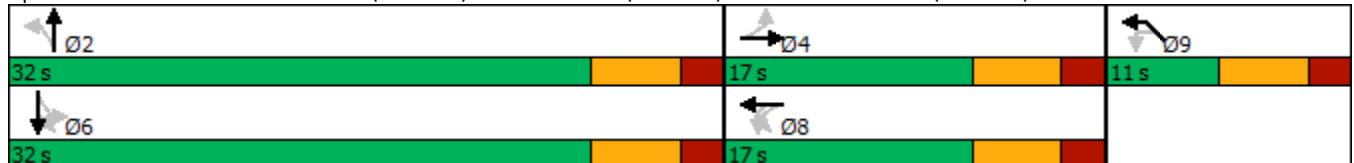
Cycle Length: 60

Actuated Cycle Length: 46.6

Natural Cycle: 60

Control Type: Semi Act-Uncoord

Splits and Phases: 1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road

Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	74	68	66	22	6	82	32	13	12	284	155	5
Future Volume (vph)	74	68	66	22	6	82	32	13	12	284	155	5
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	10	10	10	10	10	10	10	10	11	11	11	11
Grade (%)		-2%					8%			-3%		
Total Lost time (s)	6.0	5.0				6.0	5.0		5.0	5.0		
Lane Util. Factor	1.00	1.00				1.00	1.00		1.00	1.00		
Frt	1.00	0.92				1.00	0.96		1.00	0.95		
Flt Protected	0.95	1.00				0.95	1.00		0.95	1.00		
Satd. Flow (prot)	1550	1503				1435	1334		1678	1602		
Flt Permitted	0.72	1.00				0.65	1.00		0.58	1.00		
Satd. Flow (perm)	1182	1503				979	1334		1017	1602		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	82	76	73	24	7	91	36	14	13	316	172	6
RTOR Reduction (vph)	0	10	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	82	163	0	0	0	98	50	0	13	494	0	0
Heavy Vehicles (%)	4%	3%	5%	0%	17%	6%	13%	23%	0%	4%	5%	0%
Turn Type	Perm	NA			Perm	Perm	NA		Perm	NA		
Protected Phases		4					8			2		
Permitted Phases	4				8	8			2			
Actuated Green, G (s)	7.7	7.7				7.7	7.7		22.1	22.1		
Effective Green, g (s)	7.7	8.7				7.7	8.7		23.1	23.1		
Actuated g/C Ratio	0.15	0.17				0.15	0.17		0.46	0.46		
Clearance Time (s)	6.0	6.0				6.0	6.0		6.0	6.0		
Vehicle Extension (s)	3.0	3.0				3.0	3.0		4.3	4.3		
Lane Grp Cap (vph)	180	259				149	230		467	735		
v/s Ratio Prot		c0.11					0.04			c0.31		
v/s Ratio Perm	0.07					0.10			0.01			
v/c Ratio	0.46	0.63				0.66	0.22		0.03	0.67		
Uniform Delay, d1	19.4	19.3				20.1	17.9		7.4	10.6		
Progression Factor	1.00	1.00				1.00	1.00		1.00	1.00		
Incremental Delay, d2	1.8	4.7				10.0	0.5		0.0	2.8		
Delay (s)	21.2	24.0				30.1	18.4		7.5	13.4		
Level of Service	C	C				C	B		A	B		
Approach Delay (s)		23.1					26.1			13.3		
Approach LOS		C					C			B		
Intersection Summary												
HCM 2000 Control Delay			17.0			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.66									
Actuated Cycle Length (s)			50.3			Sum of lost time (s)			15.0			
Intersection Capacity Utilization			73.7%			ICU Level of Service			D			
Analysis Period (min)			15									
c	Critical Lane Group											

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Movement	SBL2	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2
Lane Configurations								
Traffic Volume (vph)	7	91	229	33	4	21	35	2
Future Volume (vph)	7	91	229	33	4	21	35	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	11	11	11	11	10	10	10	10
Grade (%)			0%			1%		
Total Lost time (s)		5.0	5.0			5.0		
Lane Util. Factor		1.00	1.00			1.00		
Frt		1.00	0.98			0.92		
Flt Protected		0.95	1.00			0.98		
Satd. Flow (prot)		1608	1657			1368		
Flt Permitted		0.37	1.00			0.98		
Satd. Flow (perm)		630	1657			1368		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	8	101	254	37	4	23	39	2
RTOR Reduction (vph)	0	0	9	0	0	0	0	0
Lane Group Flow (vph)	0	109	282	0	0	68	0	0
Heavy Vehicles (%)	0%	3%	3%	3%	25%	5%	12%	0%
Turn Type	Perm	Perm	NA		Perm	Prot		
Protected Phases			6			9		
Permitted Phases	6	6			9			
Actuated Green, G (s)		22.1	22.1			2.5		
Effective Green, g (s)		23.1	23.1			3.5		
Actuated g/C Ratio		0.46	0.46			0.07		
Clearance Time (s)		6.0	6.0			6.0		
Vehicle Extension (s)		4.3	4.3			3.0		
Lane Grp Cap (vph)		289	760			95		
v/s Ratio Prot			0.17					
v/s Ratio Perm		0.17				0.05		
v/c Ratio		0.38	0.37			0.72		
Uniform Delay, d1		8.9	8.9			22.9		
Progression Factor		1.00	1.00			1.00		
Incremental Delay, d2		1.3	0.5			22.5		
Delay (s)		10.2	9.4			45.4		
Level of Service		B	A			D		
Approach Delay (s)			9.6			45.4		
Approach LOS			A			D		
Intersection Summary								

HCM 6th Edition methodology does not support more than 4 approaches.

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Lane Group	EBL	EBT	WBL2	WBL	WBT	NBL	NBT	SBL2	SBL	SBT	NWL
Lane Configurations											
Traffic Volume (vph)	14	44	6	156	91	24	284	6	32	331	60
Future Volume (vph)	14	44	6	156	91	24	284	6	32	331	60
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	Perm	NA	Prot
Protected Phases		4			8		2			6	9
Permitted Phases	4		8	8		2		6	6		
Detector Phase	4	4	8	8	8	2	2	6	6	6	9
Switch Phase											
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	10.0	10.0	10.0	10.0	10.0	3.0
Minimum Split (s)	9.0	9.0	9.0	9.0	9.0	16.0	16.0	16.0	16.0	16.0	9.0
Total Split (s)	18.0	18.0	18.0	18.0	18.0	27.0	27.0	27.0	27.0	27.0	15.0
Total Split (%)	30.0%	30.0%	30.0%	30.0%	30.0%	45.0%	45.0%	45.0%	45.0%	45.0%	25.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-1.0		0.0	-1.0	-1.0	-1.0		-1.0	-1.0	-1.0
Total Lost Time (s)	6.0	5.0		6.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	Min	Min	Min	Min	Min	None

Intersection Summary

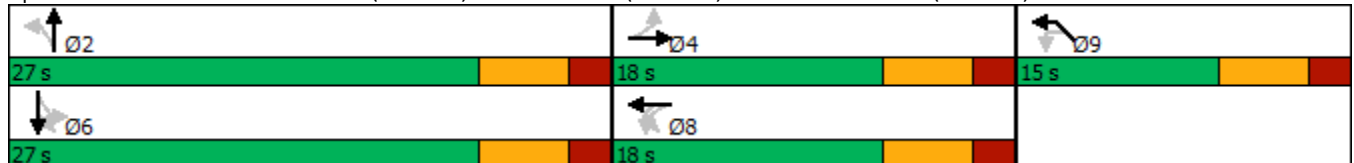
Cycle Length: 60

Actuated Cycle Length: 56.4



















Natural Cycle: 60

Control Type: Semi Act-Uncoord

Splits and Phases: 1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road

												
Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	14	44	27	19	6	156	91	7	24	284	133	3
Future Volume (vph)	14	44	27	19	6	156	91	7	24	284	133	3
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	10	10	10	10	10	10	10	10	11	11	11	11
Grade (%)		-2%					8%			-3%		
Total Lost time (s)	6.0	5.0				6.0	5.0		5.0	5.0		
Lane Util. Factor	1.00	1.00				1.00	1.00		1.00	1.00		
Frt	1.00	0.92				1.00	0.99		1.00	0.95		
Flt Protected	0.95	1.00				0.95	1.00		0.95	1.00		
Satd. Flow (prot)	1507	1529				1532	1595		1678	1648		
Flt Permitted	0.69	1.00				0.69	1.00		0.41	1.00		
Satd. Flow (perm)	1092	1529				1121	1595		722	1648		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	15	47	29	20	6	168	98	8	26	305	143	3
RTOR Reduction (vph)	0	16	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	15	80	0	0	0	174	106	0	26	451	0	0
Heavy Vehicles (%)	7%	0%	4%	6%	0%	0%	0%	0%	0%	2%	2%	0%
Turn Type	Perm	NA			Perm	Perm	NA		Perm	NA		
Protected Phases		4					8			2		
Permitted Phases	4				8	8			2			
Actuated Green, G (s)	11.3	11.3				11.3	11.3		21.4	21.4		
Effective Green, g (s)	11.3	12.3				11.3	12.3		22.4	22.4		
Actuated g/C Ratio	0.20	0.21				0.20	0.21		0.39	0.39		
Clearance Time (s)	6.0	6.0				6.0	6.0		6.0	6.0		
Vehicle Extension (s)	3.0	3.0				3.0	3.0		4.3	4.3		
Lane Grp Cap (vph)	214	326				219	340		280	640		
v/s Ratio Prot		0.05					0.07			c0.27		
v/s Ratio Perm	0.01					c0.16			0.04			
v/c Ratio	0.07	0.25				0.79	0.31		0.09	0.70		
Uniform Delay, d1	18.9	18.8				22.0	19.1		11.2	14.8		
Progression Factor	1.00	1.00				1.00	1.00		1.00	1.00		
Incremental Delay, d2	0.1	0.4				17.8	0.5		0.2	3.9		
Delay (s)	19.0	19.2				39.8	19.6		11.4	18.8		
Level of Service	B	B				D	B		B	B		
Approach Delay (s)		19.2					32.2			18.4		
Approach LOS		B					C			B		
Intersection Summary												
HCM 2000 Control Delay			22.4			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			57.6			Sum of lost time (s)			15.0			
Intersection Capacity Utilization			70.8%			ICU Level of Service				C		
Analysis Period (min)			15									
c	Critical Lane Group											

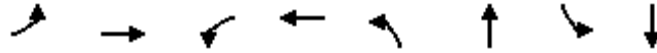
1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Movement	SBL2	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2
Lane Configurations								
Traffic Volume (vph)	6	32	331	40	9	60	64	10
Future Volume (vph)	6	32	331	40	9	60	64	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	11	11	11	11	10	10	10	10
Grade (%)			0%			1%		
Total Lost time (s)		5.0	5.0			5.0		
Lane Util. Factor		1.00	1.00			1.00		
Frt		1.00	0.98			0.93		
Flt Protected		0.95	1.00			0.98		
Satd. Flow (prot)		1612	1697			1486		
Flt Permitted		0.35	1.00			0.98		
Satd. Flow (perm)		595	1697			1486		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	6	34	356	43	10	65	69	11
RTOR Reduction (vph)	0	0	7	0	0	0	0	0
Lane Group Flow (vph)	0	40	392	0	0	155	0	0
Heavy Vehicles (%)	0%	3%	1%	0%	0%	2%	3%	0%
Turn Type	Perm	Perm	NA		Perm	Prot		
Protected Phases			6			9		
Permitted Phases	6	6			9			
Actuated Green, G (s)		21.4	21.4			6.9		
Effective Green, g (s)		22.4	22.4			7.9		
Actuated g/C Ratio		0.39	0.39			0.14		
Clearance Time (s)		6.0	6.0			6.0		
Vehicle Extension (s)		4.3	4.3			3.0		
Lane Grp Cap (vph)		231	659			203		
v/s Ratio Prot			0.23					
v/s Ratio Perm		0.07				0.10		
v/c Ratio		0.17	0.60			0.76		
Uniform Delay, d1		11.5	14.0			23.9		
Progression Factor		1.00	1.00			1.00		
Incremental Delay, d2		0.6	1.8			15.6		
Delay (s)		12.1	15.8			39.5		
Level of Service		B	B			D		
Approach Delay (s)			15.5			39.5		
Approach LOS			B			D		
Intersection Summary								

HCM 6th Edition methodology does not support more than 4 approaches.

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Hillendale Road

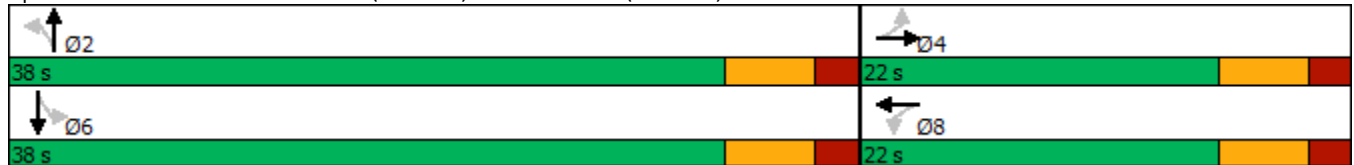


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕	↗	↖	↗	↖
Traffic Volume (vph)	74	68	88	32	33	319	7	320
Future Volume (vph)	74	68	88	32	33	319	7	320
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	3.0	3.0	3.0	3.0	10.0	10.0	10.0	10.0
Minimum Split (s)	9.0	9.0	9.0	9.0	16.0	16.0	16.0	16.0
Total Split (s)	22.0	22.0	22.0	22.0	38.0	38.0	38.0	38.0
Total Split (%)	36.7%	36.7%	36.7%	36.7%	63.3%	63.3%	63.3%	63.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-1.0		-1.0	0.0	-1.0	0.0	-1.0
Total Lost Time (s)		5.0		5.0	6.0	5.0	6.0	5.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Min	Min	Min	Min


















Intersection Summary

Cycle Length: 60
 Actuated Cycle Length: 42.7
 Natural Cycle: 40
 Control Type: Semi Act-Uncoord

Splits and Phases: 1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Hillendale Road

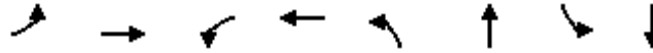


1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Hillendale Road

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	74	68	88	88	32	13	33	319	157	7	320	33
Future Volume (veh/h)	74	68	88	88	32	13	33	319	157	7	320	33
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	1818	1832	1818	1345	1260	1120	1869	1841	1841	1800	1758	1758
Adj Flow Rate, veh/h	82	76	98	98	36	14	37	354	174	8	356	37
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	4	3	4	7	13	23	3	5	5	0	3	3
Cap, veh/h	217	136	145	287	82	23	557	612	301	439	822	85
Arrive On Green	0.20	0.22	0.20	0.20	0.22	0.20	0.50	0.53	0.50	0.50	0.53	0.50
Sat Flow, veh/h	436	608	647	613	367	102	1045	1165	573	889	1566	163
Grp Volume(v), veh/h	256	0	0	148	0	0	37	0	528	8	0	393
Grp Sat Flow(s),veh/h/ln	1691	0	0	1083	0	0	1045	0	1738	889	0	1729
Q Serve(g_s), s	0.7	0.0	0.0	0.0	0.0	0.0	0.9	0.0	8.4	0.3	0.0	5.6
Cycle Q Clear(g_c), s	5.5	0.0	0.0	4.7	0.0	0.0	6.5	0.0	8.4	8.6	0.0	5.6
Prop In Lane	0.32		0.38	0.66		0.09	1.00		0.33	1.00		0.09
Lane Grp Cap(c), veh/h	456	0	0	366	0	0	557	0	913	439	0	908
V/C Ratio(X)	0.56	0.00	0.00	0.40	0.00	0.00	0.07	0.00	0.58	0.02	0.00	0.43
Avail Cap(c_a), veh/h	773	0	0	558	0	0	872	0	1437	707	0	1430
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	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	14.4	0.0	0.0	14.1	0.0	0.0	8.5	0.0	6.6	10.1	0.0	5.9
Incr Delay (d2), s/veh	1.1	0.0	0.0	0.7	0.0	0.0	0.1	0.0	0.9	0.0	0.0	0.5
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(95%),veh/ln	3.4	0.0	0.0	1.9	0.0	0.0	0.3	0.0	3.1	0.1	0.0	2.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.5	0.0	0.0	14.9	0.0	0.0	8.6	0.0	7.5	10.2	0.0	6.4
LnGrp LOS	B	A	A	B	A	A	A	A	A	B	A	A
Approach Vol, veh/h		256			148			565			401	
Approach Delay, s/veh		15.5			14.9			7.6			6.4	
Approach LOS		B			B			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		26.0		13.9		26.0		13.9				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		32.0		16.0		32.0		16.0				
Max Q Clear Time (g_c+I1), s		10.4		7.5		10.6		6.7				
Green Ext Time (p_c), s		9.6		0.6		6.5		0.3				
Intersection Summary												
HCM 6th Ctrl Delay				9.5								
HCM 6th LOS				A								

Intersection						
Int Delay, s/veh	1.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	T		T		T	
Traffic Vol, veh/h	4	58	451	5	91	405
Future Vol, veh/h	4	58	451	5	91	405
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	25	9	4	0	3	4
Mvmt Flow	4	64	501	6	101	450
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1156	504	0	0	507	0
Stage 1	504	-	-	-	-	-
Stage 2	652	-	-	-	-	-
Critical Hdwy	6.65	6.29	-	-	4.13	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.381	-	-	2.227	-
Pot Cap-1 Maneuver	196	554	-	-	1053	-
Stage 1	562	-	-	-	-	-
Stage 2	478	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	171	554	-	-	1053	-
Mov Cap-2 Maneuver	171	-	-	-	-	-
Stage 1	562	-	-	-	-	-
Stage 2	417	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	13.7	0	1.6			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	484	1053	-	
HCM Lane V/C Ratio	-	-	0.142	0.096	-	
HCM Control Delay (s)	-	-	13.7	8.8	0	
HCM Lane LOS	-	-	B	A	A	
HCM 95th %tile Q(veh)	-	-	0.5	0.3	-	

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Hillendale Road

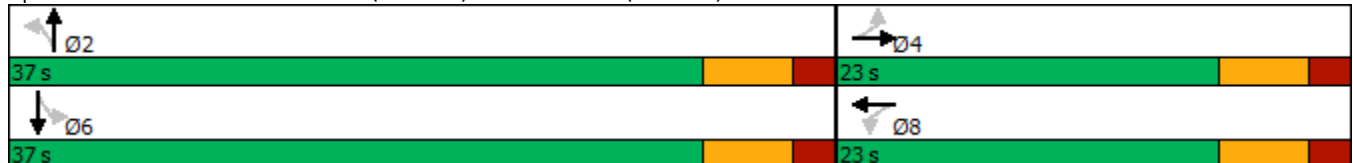


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕	↗	↖	↗	↖
Traffic Volume (vph)	14	44	162	91	84	348	6	363
Future Volume (vph)	14	44	162	91	84	348	6	363
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	3.0	3.0	3.0	3.0	10.0	10.0	10.0	10.0
Minimum Split (s)	9.0	9.0	9.0	9.0	16.0	16.0	16.0	16.0
Total Split (s)	23.0	23.0	23.0	23.0	37.0	37.0	37.0	37.0
Total Split (%)	38.3%	38.3%	38.3%	38.3%	61.7%	61.7%	61.7%	61.7%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-1.0		-1.0	0.0	-1.0	0.0	-1.0
Total Lost Time (s)		5.0		5.0	6.0	5.0	6.0	5.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Min	Min	Min	Min

















Intersection Summary

Cycle Length: 60
 Actuated Cycle Length: 47.4
 Natural Cycle: 40
 Control Type: Semi Act-Uncoord

Splits and Phases: 1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Hillendale Road



1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Hillendale Road

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	44	46	162	91	7	84	348	143	6	363	40
Future Volume (veh/h)	14	44	46	162	91	7	84	348	143	6	363	40
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	1775	1875	1803	1443	1443	1443	1898	1883	1898	1800	1786	1800
Adj Flow Rate, veh/h	15	47	49	174	98	8	90	374	154	6	390	43
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	7	0	5	0	0	0	1	2	1	0	1	0
Cap, veh/h	117	257	227	319	142	10	450	625	258	371	780	86
Arrive On Green	0.27	0.29	0.27	0.27	0.29	0.27	0.47	0.49	0.47	0.47	0.49	0.47
Sat Flow, veh/h	101	877	772	662	485	34	969	1267	522	842	1580	174
Grp Volume(v), veh/h	111	0	0	280	0	0	90	0	528	6	0	433
Grp Sat Flow(s),veh/h/ln	1750	0	0	1181	0	0	969	0	1789	842	0	1755
Q Serve(g_s), s	0.0	0.0	0.0	8.2	0.0	0.0	3.3	0.0	10.0	0.2	0.0	7.8
Cycle Q Clear(g_c), s	2.3	0.0	0.0	10.5	0.0	0.0	11.2	0.0	10.0	10.3	0.0	7.8
Prop In Lane	0.14		0.44	0.62		0.03	1.00		0.29	1.00		0.10
Lane Grp Cap(c), veh/h	564	0	0	446	0	0	450	0	883	371	0	866
V/C Ratio(X)	0.20	0.00	0.00	0.63	0.00	0.00	0.20	0.00	0.60	0.02	0.00	0.50
Avail Cap(c_a), veh/h	711	0	0	547	0	0	632	0	1219	529	0	1195
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	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	12.7	0.0	0.0	15.5	0.0	0.0	12.5	0.0	8.7	13.0	0.0	8.0
Incr Delay (d2), s/veh	0.2	0.0	0.0	1.6	0.0	0.0	0.3	0.0	1.0	0.0	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(95%),veh/ln	1.4	0.0	0.0	4.6	0.0	0.0	1.1	0.0	4.9	0.1	0.0	3.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.9	0.0	0.0	17.1	0.0	0.0	12.8	0.0	9.7	13.0	0.0	8.8
LnGrp LOS	B	A	A	B	A	A	B	A	A	B	A	A
Approach Vol, veh/h		111			280			618				439
Approach Delay, s/veh		12.9			17.1			10.2				8.8
Approach LOS		B			B			B				A
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		28.2		18.8		28.2		18.8				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		31.0		17.0		31.0		17.0				
Max Q Clear Time (g_c+I1), s		13.2		4.3		12.3		12.5				
Green Ext Time (p_c), s		9.0		0.2		6.7		0.4				
Intersection Summary												
HCM 6th Ctrl Delay				11.3								
HCM 6th LOS				B								

Intersection

Int Delay, s/veh 2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	9	134	441	3	32	539
Future Vol, veh/h	9	134	441	3	32	539
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	0	2	2	0	3	1
Mvmt Flow	10	144	474	3	34	580

Major/Minor

	Minor1	Major1	Major2		
Conflicting Flow All	1124	476	0	0	477
Stage 1	476	-	-	-	-
Stage 2	648	-	-	-	-
Critical Hdwy	6.4	6.22	-	-	4.13
Critical Hdwy Stg 1	5.4	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-
Follow-up Hdwy	3.5	3.318	-	-	2.227
Pot Cap-1 Maneuver	229	589	-	-	1080
Stage 1	629	-	-	-	-
Stage 2	524	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	218	589	-	-	1080
Mov Cap-2 Maneuver	218	-	-	-	-
Stage 1	629	-	-	-	-
Stage 2	500	-	-	-	-

Approach

	WB	NB	SB
HCM Control Delay, s	14.5	0	0.5
HCM LOS	B		

Minor Lane/Major Mvmt

	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	532	1080
HCM Lane V/C Ratio	-	-	0.289	0.032
HCM Control Delay (s)	-	-	14.5	8.4
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	1.2	0.1

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road

Intersection				
Intersection Delay, s/veh	8.8			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	255	148	507	400
Demand Flow Rate, veh/h	264	163	529	412
Vehicles Circulating, veh/h	483	500	360	187
Vehicles Exiting, veh/h	116	269	387	476
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	8.0	6.9	11.4	6.9
Approach LOS	A	A	B	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	264	163	529	412
Cap Entry Lane, veh/h	843	829	956	1140
Entry HV Adj Factor	0.965	0.909	0.959	0.972
Flow Entry, veh/h	255	148	507	400
Cap Entry, veh/h	814	753	917	1108
V/C Ratio	0.313	0.197	0.553	0.361
Control Delay, s/veh	8.0	6.9	11.4	6.9
LOS	A	A	B	A
95th %tile Queue, veh	1	1	3	2

Intersection

Intersection Delay, s/veh

Intersection LOS

Approach	NW
Entry Lanes	1
Conflicting Circle Lanes	1
Adj Approach Flow, veh/h	68
Demand Flow Rate, veh/h	75
Vehicles Circulating, veh/h	694
Vehicles Exiting, veh/h	195
Ped Vol Crossing Leg, #/h	0
Ped Cap Adj	1.000
Approach Delay, s/veh	7.1
Approach LOS	A

Lane	Left
Designated Moves	LR
Assumed Moves	LR
RT Channelized	
Lane Util	1.000
Follow-Up Headway, s	2.609
Critical Headway, s	4.976
Entry Flow, veh/h	75
Cap Entry Lane, veh/h	680
Entry HV Adj Factor	0.907
Flow Entry, veh/h	68
Cap Entry, veh/h	616
V/C Ratio	0.110
Control Delay, s/veh	7.1
LOS	A
95th %tile Queue, veh	0

Intersection				
Intersection Delay, s/veh	8.0			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	111	280	477	439
Demand Flow Rate, veh/h	114	280	486	444
Vehicles Circulating, veh/h	585	500	140	374
Vehicles Exiting, veh/h	233	210	559	406
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	6.5	8.2	7.2	9.6
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	114	280	486	444
Cap Entry Lane, veh/h	760	829	1196	942
Entry HV Adj Factor	0.974	1.000	0.981	0.990
Flow Entry, veh/h	111	280	477	439
Cap Entry, veh/h	740	829	1174	933
V/C Ratio	0.150	0.338	0.406	0.471
Control Delay, s/veh	6.5	8.2	7.2	9.6
LOS	A	A	A	A
95th %tile Queue, veh	1	1	2	3

Intersection

Intersection Delay, s/veh

Intersection LOS

Approach	NW
Entry Lanes	1
Conflicting Circle Lanes	1
Adj Approach Flow, veh/h	155
Demand Flow Rate, veh/h	158
Vehicles Circulating, veh/h	552
Vehicles Exiting, veh/h	74
Ped Vol Crossing Leg, #/h	0
Ped Cap Adj	1.000
Approach Delay, s/veh	6.8
Approach LOS	A

Lane	Left
Designated Moves	LR
Assumed Moves	LR
RT Channelized	
Lane Util	1.000
Follow-Up Headway, s	2.609
Critical Headway, s	4.976
Entry Flow, veh/h	158
Cap Entry Lane, veh/h	786
Entry HV Adj Factor	0.981
Flow Entry, veh/h	155
Cap Entry, veh/h	771
V/C Ratio	0.201
Control Delay, s/veh	6.8
LOS	A
95th %tile Queue, veh	1

Intersection				
Intersection Delay, s/veh	8.0			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	256	148	565	401
Demand Flow Rate, veh/h	265	163	593	413
Vehicles Circulating, veh/h	480	495	171	184
Vehicles Exiting, veh/h	117	269	574	474
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	8.0	6.9	9.2	6.9
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	265	163	593	413
Cap Entry Lane, veh/h	846	833	1159	1144
Entry HV Adj Factor	0.965	0.910	0.953	0.972
Flow Entry, veh/h	256	148	565	401
Cap Entry, veh/h	816	758	1105	1111
V/C Ratio	0.313	0.196	0.512	0.361
Control Delay, s/veh	8.0	6.9	9.2	6.9
LOS	A	A	A	A
95th %tile Queue, veh	1	1	3	2

Intersection

Int Delay, s/veh 1.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	4	58	451	5	91	405
Future Vol, veh/h	4	58	451	5	91	405
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	25	9	4	0	3	4
Mvmt Flow	4	64	501	6	101	450

Major/Minor

	Minor1	Major1	Major2		
Conflicting Flow All	1156	504	0	0	507
Stage 1	504	-	-	-	-
Stage 2	652	-	-	-	-
Critical Hdwy	6.65	6.29	-	-	4.13
Critical Hdwy Stg 1	5.65	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-
Follow-up Hdwy	3.725	3.381	-	-	2.227
Pot Cap-1 Maneuver	196	554	-	-	1053
Stage 1	562	-	-	-	-
Stage 2	478	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	171	554	-	-	1053
Mov Cap-2 Maneuver	171	-	-	-	-
Stage 1	562	-	-	-	-
Stage 2	417	-	-	-	-

Approach

	WB	NB	SB
HCM Control Delay, s	13.7	0	1.6
HCM LOS	B		

Minor Lane/Major Mvmt

	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	484	1053
HCM Lane V/C Ratio	-	-	0.142	0.096
HCM Control Delay (s)	-	-	13.7	8.8
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.5	0.3

Intersection				
Intersection Delay, s/veh	8.3			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	111	280	618	439
Demand Flow Rate, veh/h	114	280	628	443
Vehicles Circulating, veh/h	574	488	69	363
Vehicles Exiting, veh/h	232	209	619	405
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	6.4	8.1	8.0	9.4
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	114	280	628	443
Cap Entry Lane, veh/h	768	839	1286	953
Entry HV Adj Factor	0.974	1.000	0.983	0.991
Flow Entry, veh/h	111	280	618	439
Cap Entry, veh/h	748	839	1265	945
V/C Ratio	0.148	0.334	0.488	0.465
Control Delay, s/veh	6.4	8.1	8.0	9.4
LOS	A	A	A	A
95th %tile Queue, veh	1	1	3	3

Intersection						
Int Delay, s/veh	2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	9	134	441	3	32	539
Future Vol, veh/h	9	134	441	3	32	539
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	0	2	2	0	3	1
Mvmt Flow	10	144	474	3	34	580

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1124	476	0	0	477	0
Stage 1	476	-	-	-	-	-
Stage 2	648	-	-	-	-	-
Critical Hdwy	6.4	6.22	-	-	4.13	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.318	-	-	2.227	-
Pot Cap-1 Maneuver	229	589	-	-	1080	-
Stage 1	629	-	-	-	-	-
Stage 2	524	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	218	589	-	-	1080	-
Mov Cap-2 Maneuver	218	-	-	-	-	-
Stage 1	629	-	-	-	-	-
Stage 2	500	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.5	0	0.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	532	1080
HCM Lane V/C Ratio	-	-	0.289	0.032
HCM Control Delay (s)	-	-	14.5	8.4
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	1.2	0.1

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road

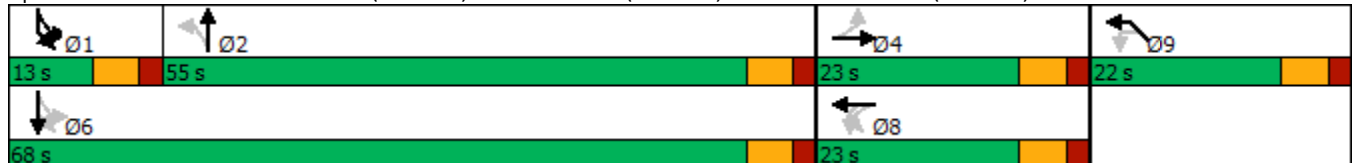


Lane Group	EBL	EBT	WBL2	WBL	WBT	NBL	NBT	SBL2	SBL	SBT	NWL
Lane Configurations		↕			↕		↕			↕	↕
Traffic Volume (vph)	80	73	7	88	34	13	305	8	97	245	22
Future Volume (vph)	80	73	7	88	34	13	305	8	97	245	22
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	pm+pt	pm+pt	NA	Prot
Protected Phases		4			8		2	1	1	6	9
Permitted Phases	4		8	8		2		6	6		
Detector Phase	4	4	8	8	8	2	2	1	1	6	9
Switch Phase											
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	10.0	10.0	7.0	7.0	10.0	3.0
Minimum Split (s)	9.0	9.0	9.0	9.0	9.0	16.0	16.0	13.0	13.0	16.0	9.0
Total Split (s)	23.0	23.0	23.0	23.0	23.0	55.0	55.0	13.0	13.0	68.0	22.0
Total Split (%)	20.4%	20.4%	20.4%	20.4%	20.4%	48.7%	48.7%	11.5%	11.5%	60.2%	19.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-1.0			-1.0		-1.0			-1.0	-1.0
Total Lost Time (s)		5.0			5.0		5.0			5.0	5.0
Lead/Lag						Lag	Lag	Lead	Lead		
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	Min	Min	Min	Min	Min	None
















Intersection Summary

Cycle Length: 113
 Actuated Cycle Length: 91.3
 Natural Cycle: 90
 Control Type: Semi Act-Uncoord

Splits and Phases: 1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road

												
Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	80	73	71	23	7	88	34	14	13	305	166	6
Future Volume (vph)	80	73	71	23	7	88	34	14	13	305	166	6
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	10	10	10	10	10	10	10	10	11	11	11	11
Total Lost time (s)		5.0					5.0			5.0		
Lane Util. Factor		1.00					1.00			1.00		
Frt		0.95					0.99			0.95		
Flt Protected		0.98					0.97			1.00		
Satd. Flow (prot)		1513					1460			1589		
Flt Permitted		0.84					0.52			0.99		
Satd. Flow (perm)		1298					789			1567		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	89	81	79	26	8	98	38	16	14	339	184	7
RTOR Reduction (vph)	0	3	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	272	0	0	0	0	160	0	0	544	0	0
Heavy Vehicles (%)	4%	3%	5%	0%	17%	6%	13%	23%	0%	4%	5%	0%
Turn Type	Perm	NA			Perm	Perm	NA		Perm	NA		
Protected Phases		4					8			2		
Permitted Phases	4				8	8			2			
Actuated Green, G (s)		17.9					17.9			34.2		
Effective Green, g (s)		18.9					18.9			35.2		
Actuated g/C Ratio		0.20					0.20			0.38		
Clearance Time (s)		6.0					6.0			6.0		
Vehicle Extension (s)		3.0					3.0			4.3		
Lane Grp Cap (vph)		266					161			598		
v/s Ratio Prot												
v/s Ratio Perm		c0.21					0.20			c0.35		
v/c Ratio		1.02					0.99			0.91		
Uniform Delay, d1		36.7					36.6			27.0		
Progression Factor		1.00					1.00			1.00		
Incremental Delay, d2		60.9					68.8			18.2		
Delay (s)		97.6					105.3			45.2		
Level of Service		F					F			D		
Approach Delay (s)		97.6					105.3			45.2		
Approach LOS		F					F			D		
Intersection Summary												
HCM 2000 Control Delay			55.0				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.89									
Actuated Cycle Length (s)			92.2				Sum of lost time (s)			21.0		
Intersection Capacity Utilization			87.5%				ICU Level of Service			E		
Analysis Period (min)			15									
c	Critical Lane Group											

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Movement	SBL2	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2
Lane Configurations			↕			↕		
Traffic Volume (vph)	8	97	245	35	4	22	38	2
Future Volume (vph)	8	97	245	35	4	22	38	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	11	11	11	11	10	10	10	10
Total Lost time (s)			5.0			5.0		
Lane Util. Factor			1.00			1.00		
Frt			0.99			0.92		
Flt Protected			0.99			0.98		
Satd. Flow (prot)			1647			1374		
Flt Permitted			0.57			0.98		
Satd. Flow (perm)			948			1374		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	9	108	272	39	4	24	42	2
RTOR Reduction (vph)	0	0	3	0	0	0	0	0
Lane Group Flow (vph)	0	0	425	0	0	72	0	0
Heavy Vehicles (%)	0%	3%	3%	3%	25%	5%	12%	0%
Turn Type	pm+pt	pm+pt	NA		Perm	Prot		
Protected Phases	1	1	6			9		
Permitted Phases	6	6			9			
Actuated Green, G (s)			47.6			8.7		
Effective Green, g (s)			48.6			9.7		
Actuated g/C Ratio			0.53			0.11		
Clearance Time (s)			6.0			6.0		
Vehicle Extension (s)			4.3			3.0		
Lane Grp Cap (vph)			563			144		
v/s Ratio Prot			c0.07					
v/s Ratio Perm			0.33			0.05		
v/c Ratio			0.75			0.50		
Uniform Delay, d1			17.1			39.0		
Progression Factor			1.00			1.00		
Incremental Delay, d2			6.3			2.7		
Delay (s)			23.4			41.7		
Level of Service			C			D		
Approach Delay (s)			23.4			41.7		
Approach LOS			C			D		
Intersection Summary								

HCM 6th Edition methodology does not support more than 4 approaches.

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Lane Group	EBL	EBT	WBL2	WBL	WBT	NBL	NBT	SBL2	SBL	SBT	NWL
Lane Configurations											
Traffic Volume (vph)	15	47	7	167	97	25	305	7	34	355	64
Future Volume (vph)	15	47	7	167	97	25	305	7	34	355	64
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	pm+pt	pm+pt	NA	Prot
Protected Phases		4			8		2	1	1	6	9
Permitted Phases	4		8	8		2		6	6		
Detector Phase	4	4	8	8	8	2	2	1	1	6	9
Switch Phase											
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	10.0	10.0	7.0	7.0	10.0	3.0
Minimum Split (s)	9.0	9.0	9.0	9.0	9.0	16.0	16.0	13.0	13.0	16.0	9.0
Total Split (s)	25.0	25.0	25.0	25.0	25.0	43.0	43.0	13.0	13.0	56.0	22.0
Total Split (%)	24.3%	24.3%	24.3%	24.3%	24.3%	41.7%	41.7%	12.6%	12.6%	54.4%	21.4%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-1.0			-1.0		-1.0			-1.0	-1.0
Total Lost Time (s)		5.0			5.0		5.0			5.0	5.0
Lead/Lag						Lag	Lag	Lead	Lead		
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	Min	Min	Min	Min	Min	None

Intersection Summary

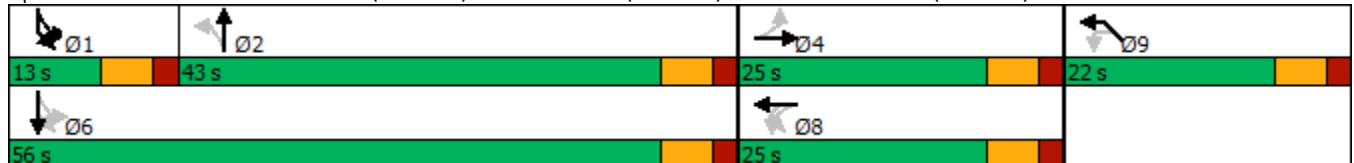
Cycle Length: 103

Actuated Cycle Length: 97.3
















Natural Cycle: 90

Control Type: Semi Act-Uncoord

Splits and Phases: 1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road

												
Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	15	47	29	20	7	167	97	8	25	305	142	3
Future Volume (vph)	15	47	29	20	7	167	97	8	25	305	142	3
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	10	10	10	10	10	10	10	10	11	11	11	11
Total Lost time (s)		5.0					5.0			5.0		
Lane Util. Factor		1.00					1.00			1.00		
Frt		0.94					1.00			0.96		
Flt Protected		0.99					0.97			1.00		
Satd. Flow (prot)		1523					1623			1633		
Flt Permitted		0.94					0.71			0.96		
Satd. Flow (perm)		1444					1188			1570		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	16	51	31	22	8	180	104	9	27	328	153	3
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	112	0	0	0	0	301	0	0	511	0	0
Heavy Vehicles (%)	7%	0%	4%	6%	0%	0%	0%	0%	0%	2%	2%	0%
Turn Type	Perm	NA			Perm	Perm	NA		Perm	NA		
Protected Phases		4					8			2		
Permitted Phases	4				8	8			2			
Actuated Green, G (s)		19.1					19.1			32.8		
Effective Green, g (s)		20.1					20.1			33.8		
Actuated g/C Ratio		0.21					0.21			0.35		
Clearance Time (s)		6.0					6.0			6.0		
Vehicle Extension (s)		3.0					3.0			4.3		
Lane Grp Cap (vph)		298					245			546		
v/s Ratio Prot												
v/s Ratio Perm		0.08					c0.25			c0.33		
v/c Ratio		0.38					1.23			0.94		
Uniform Delay, d1		33.1					38.5			30.6		
Progression Factor		1.00					1.00			1.00		
Incremental Delay, d2		0.8					133.3			23.9		
Delay (s)		33.9					171.8			54.5		
Level of Service		C					F			D		
Approach Delay (s)		33.9					171.8			54.5		
Approach LOS		C					F			D		
Intersection Summary												
HCM 2000 Control Delay			64.7				HCM 2000 Level of Service			E		
HCM 2000 Volume to Capacity ratio			0.97									
Actuated Cycle Length (s)			97.1				Sum of lost time (s)			21.0		
Intersection Capacity Utilization			82.1%				ICU Level of Service			E		
Analysis Period (min)			15									

c Critical Lane Group

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Movement	SBL2	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2
Lane Configurations			↔			↔		
Traffic Volume (vph)	7	34	355	43	10	64	68	11
Future Volume (vph)	7	34	355	43	10	64	68	11
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	11	11	11	11	10	10	10	10
Total Lost time (s)			5.0			5.0		
Lane Util. Factor			1.00			1.00		
Frt			0.99			0.93		
Flt Protected			1.00			0.98		
Satd. Flow (prot)			1691			1494		
Flt Permitted			0.88			0.98		
Satd. Flow (perm)			1497			1494		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	8	37	382	46	11	69	73	12
RTOR Reduction (vph)	0	0	4	0	0	0	0	0
Lane Group Flow (vph)	0	0	469	0	0	165	0	0
Heavy Vehicles (%)	0%	3%	1%	0%	0%	2%	3%	0%
Turn Type	pm+pt	pm+pt	NA		Perm	Prot		
Protected Phases	1	1	6			9		
Permitted Phases	6	6			9			
Actuated Green, G (s)			45.9			14.1		
Effective Green, g (s)			46.9			15.1		
Actuated g/C Ratio			0.48			0.16		
Clearance Time (s)			6.0			6.0		
Vehicle Extension (s)			4.3			3.0		
Lane Grp Cap (vph)			739			232		
v/s Ratio Prot			c0.05					
v/s Ratio Perm			0.25			0.11		
v/c Ratio			0.64			0.71		
Uniform Delay, d1			18.7			38.9		
Progression Factor			1.00			1.00		
Incremental Delay, d2			2.2			9.8		
Delay (s)			20.9			48.8		
Level of Service			C			D		
Approach Delay (s)			20.9			48.8		
Approach LOS			C			D		
Intersection Summary								

HCM 6th Edition methodology does not support more than 4 approaches.

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Lane Group	EBL	EBT	WBL2	WBL	WBT	NBL	NBT	SBL2	SBL	SBT	NWL
Lane Configurations		↕			↕	↗	↖		↕	↖	↗
Traffic Volume (vph)	80	73	7	88	34	13	305	8	97	245	22
Future Volume (vph)	80	73	7	88	34	13	305	8	97	245	22
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	Perm	NA	Prot
Protected Phases		4			8		2			6	9
Permitted Phases	4		8	8		2		6	6		
Detector Phase	4	4	8	8	8	2	2	6	6	6	9
Switch Phase											
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	10.0	10.0	10.0	10.0	10.0	3.0
Minimum Split (s)	9.0	9.0	9.0	9.0	9.0	16.0	16.0	16.0	16.0	16.0	9.0
Total Split (s)	20.0	20.0	20.0	20.0	20.0	30.0	30.0	30.0	30.0	30.0	10.0
Total Split (%)	33.3%	33.3%	33.3%	33.3%	33.3%	50.0%	50.0%	50.0%	50.0%	50.0%	16.7%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-1.0			-1.0	-1.0	-1.0		-1.0	-1.0	-1.0
Total Lost Time (s)		5.0			5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	Min	Min	Min	Min	Min	None

Intersection Summary

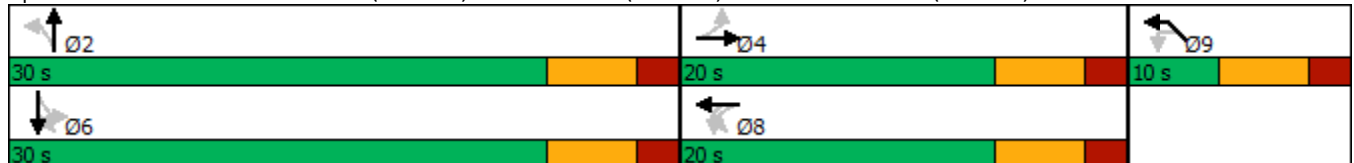
Cycle Length: 60

Actuated Cycle Length: 53

















Natural Cycle: 60

Control Type: Semi Act-Uncoord

Splits and Phases: 1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road

												
Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	80	73	71	23	7	88	34	14	13	305	166	6
Future Volume (vph)	80	73	71	23	7	88	34	14	13	305	166	6
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	10	10	10	10	10	10	10	10	11	11	11	11
Grade (%)		-2%					8%			-3%		
Total Lost time (s)		5.0					5.0		5.0	5.0		
Lane Util. Factor		1.00					1.00		1.00	1.00		
Frt		0.95					0.99		1.00	0.95		
Flt Protected		0.98					0.97		0.95	1.00		
Satd. Flow (prot)		1528					1396		1678	1602		
Flt Permitted		0.85					0.63		0.52	1.00		
Satd. Flow (perm)		1327					903		913	1602		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	89	81	79	26	8	98	38	16	14	339	184	7
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	269	0	0	0	0	160	0	14	530	0	0
Heavy Vehicles (%)	4%	3%	5%	0%	17%	6%	13%	27%	0%	4%	5%	0%
Turn Type	Perm	NA			Perm	Perm	NA		Perm	NA		
Protected Phases		4					8			2		
Permitted Phases	4				8	8			2			
Actuated Green, G (s)		13.4					13.4		19.5	19.5		
Effective Green, g (s)		14.4					14.4		20.5	20.5		
Actuated g/C Ratio		0.27					0.27		0.38	0.38		
Clearance Time (s)		6.0					6.0		6.0	6.0		
Vehicle Extension (s)		3.0					3.0		4.3	4.3		
Lane Grp Cap (vph)		355					241		347	610		
v/s Ratio Prot										c0.33		
v/s Ratio Perm		c0.20					0.18		0.02			
v/c Ratio		0.76					0.66		0.04	0.87		
Uniform Delay, d1		18.1					17.5		10.5	15.4		
Progression Factor		1.00					1.00		1.00	1.00		
Incremental Delay, d2		9.0					6.7		0.1	13.1		
Delay (s)		27.1					24.3		10.5	28.5		
Level of Service		C					C		B	C		
Approach Delay (s)		27.1					24.3			28.1		
Approach LOS		C					C			C		
Intersection Summary												
HCM 2000 Control Delay			25.2				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.81									
Actuated Cycle Length (s)			53.8				Sum of lost time (s)			15.0		
Intersection Capacity Utilization			73.1%				ICU Level of Service			D		
Analysis Period (min)			15									
c	Critical Lane Group											

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Movement	SBL2	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2
Lane Configurations								
Traffic Volume (vph)	8	97	245	35	4	22	38	2
Future Volume (vph)	8	97	245	35	4	22	38	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	11	11	11	11	10	10	10	10
Grade (%)			0%			1%		
Total Lost time (s)		5.0	5.0			5.0		
Lane Util. Factor		1.00	1.00			1.00		
Frt		1.00	0.98			0.92		
Flt Protected		0.95	1.00			0.98		
Satd. Flow (prot)		1608	1658			1367		
Flt Permitted		0.26	1.00			0.98		
Satd. Flow (perm)		448	1658			1367		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	9	108	272	39	4	24	42	2
RTOR Reduction (vph)	0	0	9	0	0	0	0	0
Lane Group Flow (vph)	0	117	302	0	0	72	0	0
Heavy Vehicles (%)	0%	3%	3%	3%	25%	5%	12%	0%
Turn Type	Perm	Perm	NA		Perm	Prot		
Protected Phases			6			9		
Permitted Phases	6	6			9			
Actuated Green, G (s)		19.5	19.5			2.9		
Effective Green, g (s)		20.5	20.5			3.9		
Actuated g/C Ratio		0.38	0.38			0.07		
Clearance Time (s)		6.0	6.0			6.0		
Vehicle Extension (s)		4.3	4.3			3.0		
Lane Grp Cap (vph)		170	631			99		
v/s Ratio Prot			0.18					
v/s Ratio Perm		0.26				0.05		
v/c Ratio		0.69	0.48			0.73		
Uniform Delay, d1		14.0	12.6			24.4		
Progression Factor		1.00	1.00			1.00		
Incremental Delay, d2		12.4	0.9			23.2		
Delay (s)		26.4	13.5			47.6		
Level of Service		C	B			D		
Approach Delay (s)			17.0			47.6		
Approach LOS			B			D		
Intersection Summary								

HCM 6th Edition methodology does not support more than 4 approaches.

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road

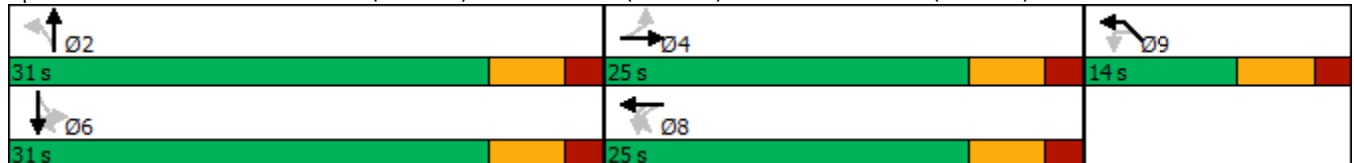


Lane Group	EBL	EBT	WBL2	WBL	WBT	NBL	NBT	SBL2	SBL	SBT	NWL
Lane Configurations		↕			↕	↗	↖		↘	↖	↘
Traffic Volume (vph)	15	47	7	167	97	25	305	7	34	355	64
Future Volume (vph)	15	47	7	167	97	25	305	7	34	355	64
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	Perm	NA	Prot
Protected Phases		4			8		2			6	9
Permitted Phases	4		8	8		2		6	6		
Detector Phase	4	4	8	8	8	2	2	6	6	6	9
Switch Phase											
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	10.0	10.0	10.0	10.0	10.0	3.0
Minimum Split (s)	9.0	9.0	9.0	9.0	9.0	16.0	16.0	16.0	16.0	16.0	9.0
Total Split (s)	25.0	25.0	25.0	25.0	25.0	31.0	31.0	31.0	31.0	31.0	14.0
Total Split (%)	35.7%	35.7%	35.7%	35.7%	35.7%	44.3%	44.3%	44.3%	44.3%	44.3%	20.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-1.0			-1.0	-1.0	-1.0		-1.0	-1.0	-1.0
Total Lost Time (s)		5.0			5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	Min	Min	Min	Min	Min	None

















Intersection Summary

Cycle Length: 70
 Actuated Cycle Length: 65.6
 Natural Cycle: 70
 Control Type: Semi Act-Uncoord

Splits and Phases: 1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road

													
Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2	
Lane Configurations													
Traffic Volume (vph)	15	47	29	20	7	167	97	8	25	305	142	3	
Future Volume (vph)	15	47	29	20	7	167	97	8	25	305	142	3	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Lane Width	10	10	10	10	10	10	10	10	11	11	11	11	
Grade (%)		-2%					8%			-3%			
Total Lost time (s)		5.0					5.0		5.0	5.0			
Lane Util. Factor		1.00					1.00		1.00	1.00			
Frt		0.94					1.00		1.00	0.95			
Flt Protected		0.99					0.97		0.95	1.00			
Satd. Flow (prot)		1538					1558		1678	1648			
Flt Permitted		0.94					0.78		0.32	1.00			
Satd. Flow (perm)		1454					1247		566	1648			
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	
Adj. Flow (vph)	16	51	31	22	8	180	104	9	27	328	153	3	
RTOR Reduction (vph)	0	11	0	0	0	0	0	0	0	0	0	0	
Lane Group Flow (vph)	0	109	0	0	0	0	301	0	27	484	0	0	
Heavy Vehicles (%)	7%	0%	4%	6%	0%	0%	0%	0%	0%	2%	2%	0%	
Turn Type	Perm	NA			Perm	Perm	NA		Perm	NA			
Protected Phases		4					8			2			
Permitted Phases	4				8	8			2				
Actuated Green, G (s)		17.9					17.9		21.4	21.4			
Effective Green, g (s)		18.9					18.9		22.4	22.4			
Actuated g/C Ratio		0.29					0.29		0.34	0.34			
Clearance Time (s)		6.0					6.0		6.0	6.0			
Vehicle Extension (s)		3.0					3.0		4.3	4.3			
Lane Grp Cap (vph)		420					360		193	564			
v/s Ratio Prot									c0.29				
v/s Ratio Perm		0.07					c0.24		0.05				
v/c Ratio		0.26					0.84		0.14	0.86			
Uniform Delay, d1		17.9					21.8		14.8	20.0			
Progression Factor		1.00					1.00		1.00	1.00			
Incremental Delay, d2		0.3					15.4		0.5	13.0			
Delay (s)		18.2					37.2		15.4	33.0			
Level of Service		B					D		B	C			
Approach Delay (s)		18.2					37.2		32.1				
Approach LOS		B					D		C				
Intersection Summary													
HCM 2000 Control Delay		30.9				HCM 2000 Level of Service				C			
HCM 2000 Volume to Capacity ratio		0.84											
Actuated Cycle Length (s)		65.4				Sum of lost time (s)				15.0			
Intersection Capacity Utilization		80.6%				ICU Level of Service				D			
Analysis Period (min)		15											
c Critical Lane Group													

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Movement	SBL2	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2
Lane Configurations								
Traffic Volume (vph)	7	34	355	43	10	64	68	11
Future Volume (vph)	7	34	355	43	10	64	68	11
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	11	11	11	11	10	10	10	10
Grade (%)			0%			1%		
Total Lost time (s)		5.0	5.0			5.0		
Lane Util. Factor		1.00	1.00			1.00		
Frt		1.00	0.98			0.93		
Flt Protected		0.95	1.00			0.98		
Satd. Flow (prot)		1613	1697			1486		
Flt Permitted		0.25	1.00			0.98		
Satd. Flow (perm)		428	1697			1486		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	8	37	382	46	11	69	73	12
RTOR Reduction (vph)	0	0	7	0	0	0	0	0
Lane Group Flow (vph)	0	45	421	0	0	165	0	0
Heavy Vehicles (%)	0%	3%	1%	0%	0%	2%	3%	0%
Turn Type	Perm	Perm	NA		Perm	Prot		
Protected Phases			6			9		
Permitted Phases	6	6			9			
Actuated Green, G (s)		21.4	21.4			8.1		
Effective Green, g (s)		22.4	22.4			9.1		
Actuated g/C Ratio		0.34	0.34			0.14		
Clearance Time (s)		6.0	6.0			6.0		
Vehicle Extension (s)		4.3	4.3			3.0		
Lane Grp Cap (vph)		146	581			206		
v/s Ratio Prot			0.25					
v/s Ratio Perm		0.11				0.11		
v/c Ratio		0.31	0.73			0.80		
Uniform Delay, d1		15.8	18.8			27.3		
Progression Factor		1.00	1.00			1.00		
Incremental Delay, d2		1.9	5.0			19.6		
Delay (s)		17.7	23.8			46.9		
Level of Service		B	C			D		
Approach Delay (s)			23.2			46.9		
Approach LOS			C			D		
Intersection Summary								

HCM 6th Edition methodology does not support more than 4 approaches.

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Lane Group	EBL	EBT	WBL2	WBL	WBT	NBL	NBT	SBL2	SBL	SBT	NWL
Lane Configurations											
Traffic Volume (vph)	80	73	7	88	34	13	305	8	97	245	22
Future Volume (vph)	80	73	7	88	34	13	305	8	97	245	22
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	Perm	NA	Prot
Protected Phases		4			8		2			6	9
Permitted Phases	4		8	8		2		6	6		
Detector Phase	4	4	8	8	8	2	2	6	6	6	9
Switch Phase											
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	10.0	10.0	10.0	10.0	10.0	3.0
Minimum Split (s)	9.0	9.0	9.0	9.0	9.0	16.0	16.0	16.0	16.0	16.0	9.0
Total Split (s)	18.0	18.0	18.0	18.0	18.0	32.0	32.0	32.0	32.0	32.0	10.0
Total Split (%)	30.0%	30.0%	30.0%	30.0%	30.0%	53.3%	53.3%	53.3%	53.3%	53.3%	16.7%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-1.0		0.0	-1.0		-1.0			-1.0	-1.0
Total Lost Time (s)	6.0	5.0		6.0	5.0		5.0			5.0	5.0
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	Min	Min	Min	Min	Min	None

Intersection Summary

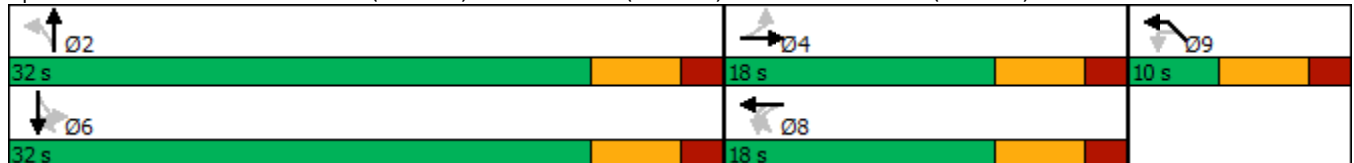
Cycle Length: 60

Actuated Cycle Length: 53.2


















Natural Cycle: 60

Control Type: Semi Act-Uncoord

Splits and Phases: 1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road

												
Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	80	73	71	23	7	88	34	14	13	305	166	6
Future Volume (vph)	80	73	71	23	7	88	34	14	13	305	166	6
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	10	10	10	10	10	10	10	10	11	11	11	11
Grade (%)		-2%					8%			-3%		
Total Lost time (s)	6.0	5.0				6.0	5.0			5.0		
Lane Util. Factor	1.00	1.00				1.00	1.00			1.00		
Frt	1.00	0.92				1.00	0.96			0.95		
Flt Protected	0.95	1.00				0.95	1.00			1.00		
Satd. Flow (prot)	1550	1502				1434	1316			1613		
Flt Permitted	0.72	1.00				0.61	1.00			0.99		
Satd. Flow (perm)	1178	1502				921	1316			1592		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	89	81	79	26	8	98	38	16	14	339	184	7
RTOR Reduction (vph)	0	10	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	89	176	0	0	0	106	54	0	0	544	0	0
Heavy Vehicles (%)	4%	3%	5%	0%	17%	6%	13%	27%	0%	4%	5%	0%
Turn Type	Perm	NA			Perm	Perm	NA		Perm	NA		
Protected Phases		4					8			2		
Permitted Phases	4				8	8			2			
Actuated Green, G (s)	8.3	8.3				8.3	8.3			26.9		
Effective Green, g (s)	8.3	9.3				8.3	9.3			27.9		
Actuated g/C Ratio	0.15	0.17				0.15	0.17			0.50		
Clearance Time (s)	6.0	6.0				6.0	6.0			6.0		
Vehicle Extension (s)	3.0	3.0				3.0	3.0			4.3		
Lane Grp Cap (vph)	174	248				136	218			791		
v/s Ratio Prot		c0.12					0.04					
v/s Ratio Perm	0.08					0.12				c0.34		
v/c Ratio	0.51	0.71				0.78	0.25			0.69		
Uniform Delay, d1	22.0	22.1				23.0	20.4			10.8		
Progression Factor	1.00	1.00				1.00	1.00			1.00		
Incremental Delay, d2	2.5	9.0				24.0	0.6			2.8		
Delay (s)	24.6	31.1				47.0	21.0			13.6		
Level of Service	C	C				D	C			B		
Approach Delay (s)		29.0					38.2			13.6		
Approach LOS		C					D			B		
Intersection Summary												
HCM 2000 Control Delay			21.2			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.70									
Actuated Cycle Length (s)			56.1			Sum of lost time (s)			15.0			
Intersection Capacity Utilization			91.4%			ICU Level of Service				F		
Analysis Period (min)			15									
c	Critical Lane Group											

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Movement	SBL2	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2
Lane Configurations								
Traffic Volume (vph)	8	97	245	35	4	22	38	2
Future Volume (vph)	8	97	245	35	4	22	38	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	11	11	11	11	10	10	10	10
Grade (%)			0%			1%		
Total Lost time (s)			5.0			5.0		
Lane Util. Factor			1.00			1.00		
Frt			0.99			0.92		
Flt Protected			0.99			0.98		
Satd. Flow (prot)			1647			1367		
Flt Permitted			0.75			0.98		
Satd. Flow (perm)			1259			1367		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	9	108	272	39	4	24	42	2
RTOR Reduction (vph)	0	0	6	0	0	0	0	0
Lane Group Flow (vph)	0	0	422	0	0	72	0	0
Heavy Vehicles (%)	0%	3%	3%	3%	25%	5%	12%	0%
Turn Type	Perm	Perm	NA		Perm	Prot		
Protected Phases			6			9		
Permitted Phases	6	6			9			
Actuated Green, G (s)			26.9			2.9		
Effective Green, g (s)			27.9			3.9		
Actuated g/C Ratio			0.50			0.07		
Clearance Time (s)			6.0			6.0		
Vehicle Extension (s)			4.3			3.0		
Lane Grp Cap (vph)			626			95		
v/s Ratio Prot								
v/s Ratio Perm			0.34			0.05		
v/c Ratio			0.67			0.76		
Uniform Delay, d1			10.7			25.6		
Progression Factor			1.00			1.00		
Incremental Delay, d2			3.3			28.6		
Delay (s)			14.0			54.3		
Level of Service			B			D		
Approach Delay (s)			14.0			54.3		
Approach LOS			B			D		
Intersection Summary								

HCM 6th Edition methodology does not support more than 4 approaches.

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Lane Group	EBL	EBT	WBL2	WBL	WBT	NBL	NBT	SBL2	SBL	SBT	NWL
Lane Configurations											
Traffic Volume (vph)	15	47	7	167	97	25	305	7	34	355	64
Future Volume (vph)	15	47	7	167	97	25	305	7	34	355	64
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	Perm	NA	Prot
Protected Phases		4			8		2			6	9
Permitted Phases	4		8	8		2		6	6		
Detector Phase	4	4	8	8	8	2	2	6	6	6	9
Switch Phase											
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	10.0	10.0	10.0	10.0	10.0	3.0
Minimum Split (s)	9.0	9.0	9.0	9.0	9.0	16.0	16.0	16.0	16.0	16.0	9.0
Total Split (s)	19.0	19.0	19.0	19.0	19.0	27.0	27.0	27.0	27.0	27.0	14.0
Total Split (%)	31.7%	31.7%	31.7%	31.7%	31.7%	45.0%	45.0%	45.0%	45.0%	45.0%	23.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-1.0		0.0	-1.0		-1.0			-1.0	-1.0
Total Lost Time (s)	6.0	5.0		6.0	5.0		5.0			5.0	5.0
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	Min	Min	Min	Min	Min	None

Intersection Summary

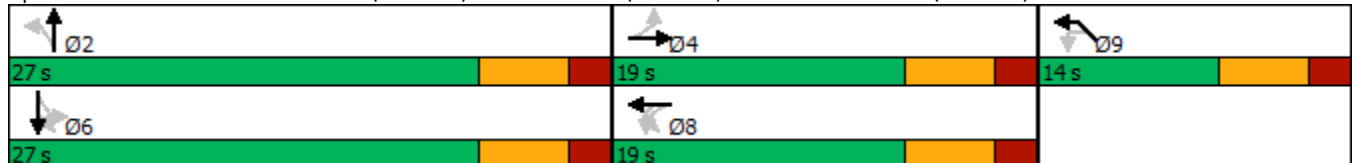
Cycle Length: 60

Actuated Cycle Length: 58.2


















Natural Cycle: 60

Control Type: Semi Act-Uncoord

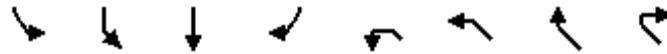
Splits and Phases: 1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road

												
Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	15	47	29	20	7	167	97	8	25	305	142	3
Future Volume (vph)	15	47	29	20	7	167	97	8	25	305	142	3
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	10	10	10	10	10	10	10	10	11	11	11	11
Grade (%)		-2%					8%			-3%		
Total Lost time (s)	6.0	5.0				6.0	5.0			5.0		
Lane Util. Factor	1.00	1.00				1.00	1.00			1.00		
Frt	1.00	0.92				1.00	0.99			0.96		
Flt Protected	0.95	1.00				0.95	1.00			1.00		
Satd. Flow (prot)	1507	1529				1532	1594			1658		
Flt Permitted	0.68	1.00				0.69	1.00			0.96		
Satd. Flow (perm)	1085	1529				1113	1594			1604		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	16	51	31	22	8	180	104	9	27	328	153	3
RTOR Reduction (vph)	0	16	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	16	88	0	0	0	188	113	0	0	511	0	0
Heavy Vehicles (%)	7%	0%	4%	6%	0%	0%	0%	0%	0%	2%	2%	0%
Turn Type	Perm	NA			Perm	Perm	NA		Perm	NA		
Protected Phases		4					8			2		
Permitted Phases	4				8	8			2			
Actuated Green, G (s)	12.2	12.2				12.2	12.2			19.9		
Effective Green, g (s)	12.2	13.2				12.2	13.2			20.9		
Actuated g/C Ratio	0.21	0.23				0.21	0.23			0.36		
Clearance Time (s)	6.0	6.0				6.0	6.0			6.0		
Vehicle Extension (s)	3.0	3.0				3.0	3.0			4.3		
Lane Grp Cap (vph)	227	347				233	362			576		
v/s Ratio Prot		0.06					0.07					
v/s Ratio Perm	0.01					c0.17				c0.32		
v/c Ratio	0.07	0.25				0.81	0.31			0.89		
Uniform Delay, d1	18.4	18.4				21.8	18.7			17.5		
Progression Factor	1.00	1.00				1.00	1.00			1.00		
Incremental Delay, d2	0.1	0.4				18.2	0.5			15.8		
Delay (s)	18.5	18.8				40.0	19.2			33.3		
Level of Service	B	B				D	B			C		
Approach Delay (s)		18.8					32.2			33.3		
Approach LOS		B					C			C		
Intersection Summary												
HCM 2000 Control Delay			30.6			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.81									
Actuated Cycle Length (s)			58.1			Sum of lost time (s)			15.0			
Intersection Capacity Utilization			76.2%			ICU Level of Service				D		
Analysis Period (min)			15									
c	Critical Lane Group											

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Movement	SBL2	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2
Lane Configurations								
Traffic Volume (vph)	7	34	355	43	10	64	68	11
Future Volume (vph)	7	34	355	43	10	64	68	11
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	11	11	11	11	10	10	10	10
Grade (%)			0%			1%		
Total Lost time (s)			5.0			5.0		
Lane Util. Factor			1.00			1.00		
Frt			0.99			0.93		
Flt Protected			1.00			0.98		
Satd. Flow (prot)			1691			1486		
Flt Permitted			0.91			0.98		
Satd. Flow (perm)			1543			1486		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	8	37	382	46	11	69	73	12
RTOR Reduction (vph)	0	0	6	0	0	0	0	0
Lane Group Flow (vph)	0	0	467	0	0	165	0	0
Heavy Vehicles (%)	0%	3%	1%	0%	0%	2%	3%	0%
Turn Type	Perm	Perm	NA		Perm	Prot		
Protected Phases			6			9		
Permitted Phases	6	6			9			
Actuated Green, G (s)			19.9			8.0		
Effective Green, g (s)			20.9			9.0		
Actuated g/C Ratio			0.36			0.15		
Clearance Time (s)			6.0			6.0		
Vehicle Extension (s)			4.3			3.0		
Lane Grp Cap (vph)			555			230		
v/s Ratio Prot								
v/s Ratio Perm			0.30			0.11		
v/c Ratio			0.84			0.72		
Uniform Delay, d1			17.1			23.3		
Progression Factor			1.00			1.00		
Incremental Delay, d2			11.7			10.2		
Delay (s)			28.8			33.5		
Level of Service			C			C		
Approach Delay (s)			28.8			33.5		
Approach LOS			C			C		
Intersection Summary								

HCM 6th Edition methodology does not support more than 4 approaches.

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Lane Group	EBL	EBT	WBL2	WBL	WBT	NBL	NBT	SBL2	SBL	SBT	NWL
Lane Configurations											
Traffic Volume (vph)	80	73	7	88	34	13	305	8	97	245	22
Future Volume (vph)	80	73	7	88	34	13	305	8	97	245	22
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	Perm	NA	Prot
Protected Phases		4			8		2			6	9
Permitted Phases	4		8	8		2		6	6		
Detector Phase	4	4	8	8	8	2	2	6	6	6	9
Switch Phase											
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	10.0	10.0	10.0	10.0	10.0	3.0
Minimum Split (s)	9.0	9.0	9.0	9.0	9.0	16.0	16.0	16.0	16.0	16.0	9.0
Total Split (s)	16.0	16.0	16.0	16.0	16.0	32.0	32.0	32.0	32.0	32.0	12.0
Total Split (%)	26.7%	26.7%	26.7%	26.7%	26.7%	53.3%	53.3%	53.3%	53.3%	53.3%	20.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-1.0		0.0	-1.0	-1.0	-1.0		-1.0	-1.0	-1.0
Total Lost Time (s)	6.0	5.0		6.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	Min	Min	Min	Min	Min	None

Intersection Summary

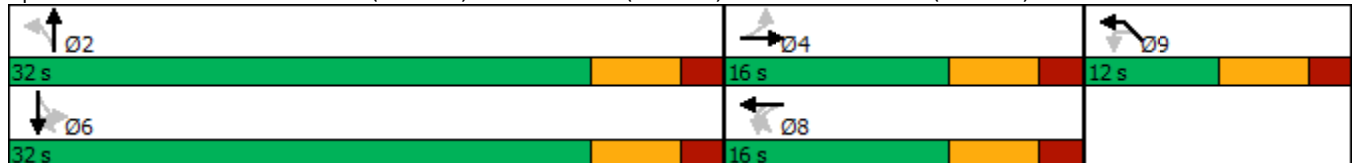
Cycle Length: 60

Actuated Cycle Length: 50.5



















Natural Cycle: 60

Control Type: Semi Act-Uncoord

Splits and Phases: 1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road

												
Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	80	73	71	23	7	88	34	14	13	305	166	6
Future Volume (vph)	80	73	71	23	7	88	34	14	13	305	166	6
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	10	10	10	10	10	10	10	10	11	11	11	11
Grade (%)		-2%					8%			-3%		
Total Lost time (s)	6.0	5.0				6.0	5.0		5.0	5.0		
Lane Util. Factor	1.00	1.00				1.00	1.00		1.00	1.00		
Frt	1.00	0.92				1.00	0.96		1.00	0.95		
Flt Protected	0.95	1.00				0.95	1.00		0.95	1.00		
Satd. Flow (prot)	1550	1502				1434	1316		1678	1602		
Flt Permitted	0.72	1.00				0.64	1.00		0.54	1.00		
Satd. Flow (perm)	1178	1502				967	1316		956	1602		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	89	81	79	26	8	98	38	16	14	339	184	7
RTOR Reduction (vph)	0	10	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	89	176	0	0	0	106	54	0	14	530	0	0
Heavy Vehicles (%)	4%	3%	5%	0%	17%	6%	13%	27%	0%	4%	5%	0%
Turn Type	Perm	NA			Perm	Perm	NA		Perm	NA		
Protected Phases		4					8			2		
Permitted Phases	4				8	8			2			
Actuated Green, G (s)	9.6	9.6				9.6	9.6		22.0	22.0		
Effective Green, g (s)	9.6	10.6				9.6	10.6		23.0	23.0		
Actuated g/C Ratio	0.18	0.20				0.18	0.20		0.44	0.44		
Clearance Time (s)	6.0	6.0				6.0	6.0		6.0	6.0		
Vehicle Extension (s)	3.0	3.0				3.0	3.0		4.3	4.3		
Lane Grp Cap (vph)	214	302				176	264		417	699		
v/s Ratio Prot		c0.12					0.04			c0.33		
v/s Ratio Perm	0.08					0.11			0.01			
v/c Ratio	0.42	0.58				0.60	0.20		0.03	0.76		
Uniform Delay, d1	19.1	19.1				19.8	17.5		8.5	12.5		
Progression Factor	1.00	1.00				1.00	1.00		1.00	1.00		
Incremental Delay, d2	1.3	2.9				5.7	0.4		0.1	5.2		
Delay (s)	20.4	21.9				25.5	17.9		8.5	17.7		
Level of Service	C	C				C	B		A	B		
Approach Delay (s)		21.4					22.9			17.5		
Approach LOS		C					C			B		
Intersection Summary												
HCM 2000 Control Delay			18.2			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.70									
Actuated Cycle Length (s)			52.7			Sum of lost time (s)			15.0			
Intersection Capacity Utilization			77.0%			ICU Level of Service			D			
Analysis Period (min)			15									
c	Critical Lane Group											

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Movement	SBL2	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2
Lane Configurations								
Traffic Volume (vph)	8	97	245	35	4	22	38	2
Future Volume (vph)	8	97	245	35	4	22	38	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	11	11	11	11	10	10	10	10
Grade (%)			0%			1%		
Total Lost time (s)		5.0	5.0			5.0		
Lane Util. Factor		1.00	1.00			1.00		
Frt		1.00	0.98			0.92		
Flt Protected		0.95	1.00			0.98		
Satd. Flow (prot)		1608	1658			1367		
Flt Permitted		0.32	1.00			0.98		
Satd. Flow (perm)		537	1658			1367		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	9	108	272	39	4	24	42	2
RTOR Reduction (vph)	0	0	9	0	0	0	0	0
Lane Group Flow (vph)	0	117	302	0	0	72	0	0
Heavy Vehicles (%)	0%	3%	3%	3%	25%	5%	12%	0%
Turn Type	Perm	Perm	NA		Perm	Prot		
Protected Phases			6			9		
Permitted Phases	6	6			9			
Actuated Green, G (s)		22.0	22.0			3.1		
Effective Green, g (s)		23.0	23.0			4.1		
Actuated g/C Ratio		0.44	0.44			0.08		
Clearance Time (s)		6.0	6.0			6.0		
Vehicle Extension (s)		4.3	4.3			3.0		
Lane Grp Cap (vph)		234	723			106		
v/s Ratio Prot			0.18					
v/s Ratio Perm		0.22				0.05		
v/c Ratio		0.50	0.42			0.68		
Uniform Delay, d1		10.7	10.2			23.7		
Progression Factor		1.00	1.00			1.00		
Incremental Delay, d2		2.6	0.6			15.9		
Delay (s)		13.4	10.9			39.6		
Level of Service		B	B			D		
Approach Delay (s)			11.5			39.6		
Approach LOS			B			D		
Intersection Summary								

HCM 6th Edition methodology does not support more than 4 approaches.

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Lane Group	EBL	EBT	WBL2	WBL	WBT	NBL	NBT	SBL2	SBL	SBT	NWL
Lane Configurations											
Traffic Volume (vph)	15	47	7	167	97	25	305	7	34	355	64
Future Volume (vph)	15	47	7	167	97	25	305	7	34	355	64
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	Perm	NA	Prot
Protected Phases		4			8		2			6	9
Permitted Phases	4		8	8		2		6	6		
Detector Phase	4	4	8	8	8	2	2	6	6	6	9
Switch Phase											
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	10.0	10.0	10.0	10.0	10.0	3.0
Minimum Split (s)	9.0	9.0	9.0	9.0	9.0	16.0	16.0	16.0	16.0	16.0	9.0
Total Split (s)	18.0	18.0	18.0	18.0	18.0	27.0	27.0	27.0	27.0	27.0	15.0
Total Split (%)	30.0%	30.0%	30.0%	30.0%	30.0%	45.0%	45.0%	45.0%	45.0%	45.0%	25.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-1.0		0.0	-1.0	-1.0	-1.0		-1.0	-1.0	-1.0
Total Lost Time (s)	6.0	5.0		6.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	Min	Min	Min	Min	Min	None

Intersection Summary

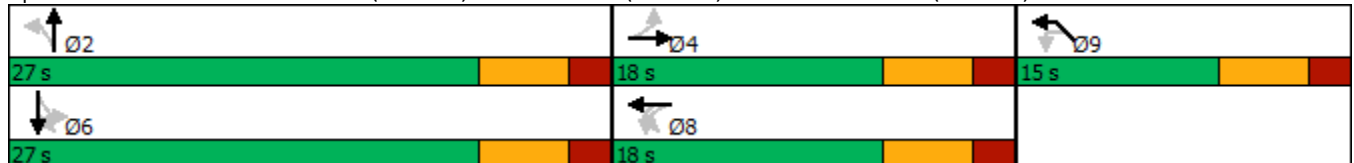
Cycle Length: 60

Actuated Cycle Length: 56.4



















Natural Cycle: 60

Control Type: Semi Act-Uncoord

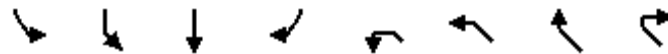
Splits and Phases: 1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road

												
Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	15	47	29	20	7	167	97	8	25	305	142	3
Future Volume (vph)	15	47	29	20	7	167	97	8	25	305	142	3
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	10	10	10	10	10	10	10	10	11	11	11	11
Grade (%)		-2%					8%			-3%		
Total Lost time (s)	6.0	5.0				6.0	5.0		5.0	5.0		
Lane Util. Factor	1.00	1.00				1.00	1.00		1.00	1.00		
Frt	1.00	0.92				1.00	0.99		1.00	0.95		
Flt Protected	0.95	1.00				0.95	1.00		0.95	1.00		
Satd. Flow (prot)	1507	1529				1532	1594		1678	1648		
Flt Permitted	0.68	1.00				0.69	1.00		0.37	1.00		
Satd. Flow (perm)	1085	1529				1113	1594		656	1648		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	16	51	31	22	8	180	104	9	27	328	153	3
RTOR Reduction (vph)	0	16	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	16	88	0	0	0	188	113	0	27	484	0	0
Heavy Vehicles (%)	7%	0%	4%	6%	0%	0%	0%	0%	0%	2%	2%	0%
Turn Type	Perm	NA			Perm	Perm	NA		Perm	NA		
Protected Phases		4					8			2		
Permitted Phases	4				8	8			2			
Actuated Green, G (s)	11.7	11.7				11.7	11.7		21.1	21.1		
Effective Green, g (s)	11.7	12.7				11.7	12.7		22.1	22.1		
Actuated g/C Ratio	0.20	0.22				0.20	0.22		0.38	0.38		
Clearance Time (s)	6.0	6.0				6.0	6.0		6.0	6.0		
Vehicle Extension (s)	3.0	3.0				3.0	3.0		4.3	4.3		
Lane Grp Cap (vph)	220	336				225	350		251	631		
v/s Ratio Prot		0.06					0.07			c0.29		
v/s Ratio Perm	0.01					c0.17			0.04			
v/c Ratio	0.07	0.26				0.84	0.32		0.11	0.77		
Uniform Delay, d1	18.6	18.6				22.1	18.9		11.5	15.6		
Progression Factor	1.00	1.00				1.00	1.00		1.00	1.00		
Incremental Delay, d2	0.1	0.4				22.7	0.5		0.3	6.1		
Delay (s)	18.8	19.0				44.7	19.4		11.8	21.7		
Level of Service	B	B				D	B		B	C		
Approach Delay (s)		19.0					35.2			21.1		
Approach LOS		B					D			C		
Intersection Summary												
HCM 2000 Control Delay			25.0			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.78									
Actuated Cycle Length (s)			57.7			Sum of lost time (s)			15.0			
Intersection Capacity Utilization			74.7%			ICU Level of Service			D			
Analysis Period (min)			15									
c	Critical Lane Group											

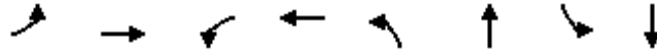
1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Movement	SBL2	SBL	SBT	SBR	NWL2	NWL	NWR	NWR2
Lane Configurations								
Traffic Volume (vph)	7	34	355	43	10	64	68	11
Future Volume (vph)	7	34	355	43	10	64	68	11
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	11	11	11	11	10	10	10	10
Grade (%)			0%			1%		
Total Lost time (s)		5.0	5.0			5.0		
Lane Util. Factor		1.00	1.00			1.00		
Frt		1.00	0.98			0.93		
Flt Protected		0.95	1.00			0.98		
Satd. Flow (prot)		1613	1697			1486		
Flt Permitted		0.31	1.00			0.98		
Satd. Flow (perm)		524	1697			1486		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	8	37	382	46	11	69	73	12
RTOR Reduction (vph)	0	0	7	0	0	0	0	0
Lane Group Flow (vph)	0	45	421	0	0	165	0	0
Heavy Vehicles (%)	0%	3%	1%	0%	0%	2%	3%	0%
Turn Type	Perm	Perm	NA		Perm	Prot		
Protected Phases			6			9		
Permitted Phases	6	6			9			
Actuated Green, G (s)		21.1	21.1			6.9		
Effective Green, g (s)		22.1	22.1			7.9		
Actuated g/C Ratio		0.38	0.38			0.14		
Clearance Time (s)		6.0	6.0			6.0		
Vehicle Extension (s)		4.3	4.3			3.0		
Lane Grp Cap (vph)		200	649			203		
v/s Ratio Prot			0.25					
v/s Ratio Perm		0.09				0.11		
v/c Ratio		0.23	0.65			0.81		
Uniform Delay, d1		12.0	14.6			24.2		
Progression Factor		1.00	1.00			1.00		
Incremental Delay, d2		0.9	2.7			21.4		
Delay (s)		12.9	17.3			45.6		
Level of Service		B	B			D		
Approach Delay (s)			16.9			45.6		
Approach LOS			B			D		
Intersection Summary								

HCM 6th Edition methodology does not support more than 4 approaches.

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Hillendale Road

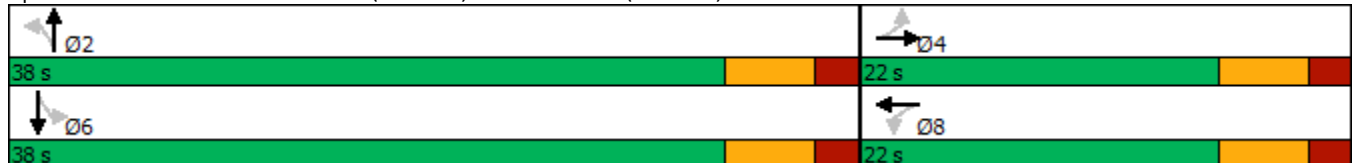


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕	↗	↖	↗	↖
Traffic Volume (vph)	80	73	95	34	35	343	8	342
Future Volume (vph)	80	73	95	34	35	343	8	342
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	3.0	3.0	3.0	3.0	10.0	10.0	10.0	10.0
Minimum Split (s)	9.0	9.0	9.0	9.0	16.0	16.0	16.0	16.0
Total Split (s)	22.0	22.0	22.0	22.0	38.0	38.0	38.0	38.0
Total Split (%)	36.7%	36.7%	36.7%	36.7%	63.3%	63.3%	63.3%	63.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-1.0		-1.0	0.0	-1.0	0.0	-1.0
Total Lost Time (s)		5.0		5.0	6.0	5.0	6.0	5.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Min	Min	Min	Min



















Intersection Summary

Cycle Length: 60
 Actuated Cycle Length: 44.3
 Natural Cycle: 45
 Control Type: Semi Act-Uncoord

Splits and Phases: 1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Hillendale Road



1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Hillendale Road

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	73	94	95	34	14	35	343	168	8	342	35
Future Volume (veh/h)	80	73	94	95	34	14	35	343	168	8	342	35
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	1818	1832	1818	1345	1260	1120	1869	1841	1841	1800	1758	1758
Adj Flow Rate, veh/h	89	81	104	106	38	16	39	381	187	9	380	39
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	4	3	4	7	13	23	3	5	5	0	3	3
Cap, veh/h	215	138	147	275	77	23	519	623	306	399	838	86
Arrive On Green	0.21	0.23	0.21	0.21	0.23	0.21	0.51	0.53	0.51	0.51	0.53	0.51
Sat Flow, veh/h	445	601	640	580	336	102	967	1166	572	812	1568	161
Grp Volume(v), veh/h	274	0	0	160	0	0	39	0	568	9	0	419
Grp Sat Flow(s),veh/h/ln	1686	0	0	1018	0	0	967	0	1738	812	0	1729
Q Serve(g_s), s	0.3	0.0	0.0	0.0	0.0	0.0	1.1	0.0	9.7	0.3	0.0	6.3
Cycle Q Clear(g_c), s	6.2	0.0	0.0	5.9	0.0	0.0	7.5	0.0	9.7	10.0	0.0	6.3
Prop In Lane	0.32		0.38	0.66		0.10	1.00		0.33	1.00		0.09
Lane Grp Cap(c), veh/h	461	0	0	351	0	0	519	0	928	399	0	923
V/C Ratio(X)	0.59	0.00	0.00	0.46	0.00	0.00	0.08	0.00	0.61	0.02	0.00	0.45
Avail Cap(c_a), veh/h	722	0	0	506	0	0	754	0	1351	596	0	1344
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	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.3	0.0	0.0	15.1	0.0	0.0	9.0	0.0	7.0	11.1	0.0	6.1
Incr Delay (d2), s/veh	1.2	0.0	0.0	0.9	0.0	0.0	0.1	0.0	1.0	0.0	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(95%),veh/ln	4.0	0.0	0.0	2.3	0.0	0.0	0.3	0.0	3.8	0.1	0.0	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	16.5	0.0	0.0	16.1	0.0	0.0	9.1	0.0	8.0	11.1	0.0	6.7
LnGrp LOS	B	A	A	B	A	A	A	A	A	B	A	A
Approach Vol, veh/h		274			160			607			428	
Approach Delay, s/veh		16.5			16.1			8.1			6.8	
Approach LOS		B			B			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		27.7		14.8		27.7		14.8				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		32.0		16.0		32.0		16.0				
Max Q Clear Time (g_c+I1), s		11.7		8.2		12.0		7.9				
Green Ext Time (p_c), s		10.0		0.6		6.7		0.3				
Intersection Summary												
HCM 6th Ctrl Delay				10.1								
HCM 6th LOS				B								

Intersection

Int Delay, s/veh 1.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	4	62	484	6	97	434
Future Vol, veh/h	4	62	484	6	97	434
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	25	9	4	0	3	4
Mvmt Flow	4	69	538	7	108	482

Major/Minor

	Minor1	Major1	Major2		
Conflicting Flow All	1240	542	0	0	545
Stage 1	542	-	-	-	-
Stage 2	698	-	-	-	-
Critical Hdwy	6.65	6.29	-	-	4.13
Critical Hdwy Stg 1	5.65	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-
Follow-up Hdwy	3.725	3.381	-	-	2.227
Pot Cap-1 Maneuver	174	527	-	-	1019
Stage 1	539	-	-	-	-
Stage 2	454	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	149	527	-	-	1019
Mov Cap-2 Maneuver	149	-	-	-	-
Stage 1	539	-	-	-	-
Stage 2	388	-	-	-	-

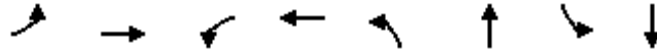
Approach

	WB	NB	SB
HCM Control Delay, s	14.4	0	1.6
HCM LOS	B		

Minor Lane/Major Mvmt

	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	457	1019
HCM Lane V/C Ratio	-	-	0.16	0.106
HCM Control Delay (s)	-	-	14.4	8.9
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.6	0.4

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Hillendale Road

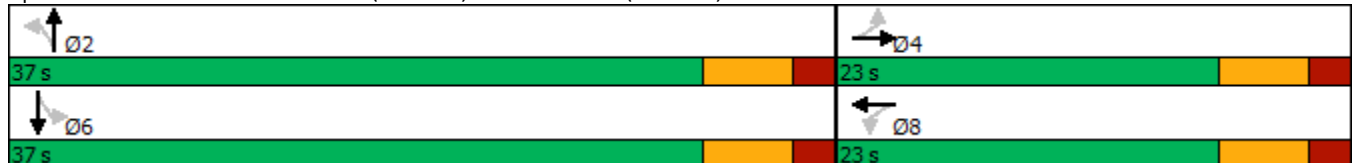


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕	↗	↖	↗	↖
Traffic Volume (vph)	15	47	174	97	89	373	7	389
Future Volume (vph)	15	47	174	97	89	373	7	389
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	3.0	3.0	3.0	3.0	10.0	10.0	10.0	10.0
Minimum Split (s)	9.0	9.0	9.0	9.0	16.0	16.0	16.0	16.0
Total Split (s)	23.0	23.0	23.0	23.0	37.0	37.0	37.0	37.0
Total Split (%)	38.3%	38.3%	38.3%	38.3%	61.7%	61.7%	61.7%	61.7%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-1.0		-1.0	0.0	-1.0	0.0	-1.0
Total Lost Time (s)		5.0		5.0	6.0	5.0	6.0	5.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Min	Min	Min	Min



















Intersection Summary

Cycle Length: 60
 Actuated Cycle Length: 48.4
 Natural Cycle: 50
 Control Type: Semi Act-Uncoord

Splits and Phases: 1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Hillendale Road



1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Hillendale Road

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	47	49	174	97	8	89	373	153	7	389	43
Future Volume (veh/h)	15	47	49	174	97	8	89	373	153	7	389	43
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	1775	1875	1803	1443	1443	1443	1898	1883	1898	1800	1786	1800
Adj Flow Rate, veh/h	16	51	53	187	104	9	96	401	165	8	418	46
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	7	0	5	0	0	0	1	2	1	0	1	0
Cap, veh/h	112	269	237	321	143	11	420	629	259	339	784	86
Arrive On Green	0.29	0.31	0.29	0.29	0.31	0.29	0.48	0.50	0.48	0.48	0.50	0.48
Sat Flow, veh/h	101	879	775	672	468	35	942	1268	522	813	1581	174
Grp Volume(v), veh/h	120	0	0	300	0	0	96	0	566	8	0	464
Grp Sat Flow(s),veh/h/ln	1755	0	0	1176	0	0	942	0	1789	813	0	1755
Q Serve(g_s), s	0.0	0.0	0.0	9.6	0.0	0.0	4.0	0.0	11.9	0.4	0.0	9.2
Cycle Q Clear(g_c), s	2.7	0.0	0.0	12.2	0.0	0.0	13.2	0.0	11.9	12.2	0.0	9.2
Prop In Lane	0.13		0.44	0.62		0.03	1.00		0.29	1.00		0.10
Lane Grp Cap(c), veh/h	583	0	0	452	0	0	420	0	888	339	0	871
V/C Ratio(X)	0.21	0.00	0.00	0.66	0.00	0.00	0.23	0.00	0.64	0.02	0.00	0.53
Avail Cap(c_a), veh/h	665	0	0	508	0	0	549	0	1133	450	0	1111
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	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	13.3	0.0	0.0	16.5	0.0	0.0	14.0	0.0	9.5	14.7	0.0	8.8
Incr Delay (d2), s/veh	0.2	0.0	0.0	2.8	0.0	0.0	0.4	0.0	1.2	0.0	0.0	0.8
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(95%),veh/ln	1.7	0.0	0.0	5.7	0.0	0.0	1.3	0.0	6.2	0.1	0.0	4.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.5	0.0	0.0	19.2	0.0	0.0	14.4	0.0	10.7	14.7	0.0	9.6
LnGrp LOS	B	A	A	B	A	A	B	A	B	B	A	A
Approach Vol, veh/h		120			300			662				472
Approach Delay, s/veh		13.5			19.2			11.3				9.7
Approach LOS		B			B			B				A
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		30.1		20.5		30.1		20.5				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		31.0		17.0		31.0		17.0				
Max Q Clear Time (g_c+I1), s		15.2		4.7		14.2		14.2				
Green Ext Time (p_c), s		8.9		0.3		6.7		0.3				
Intersection Summary												
HCM 6th Ctrl Delay				12.5								
HCM 6th LOS				B								

Intersection

Int Delay, s/veh 2.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	143	472	3	34	578
Future Vol, veh/h	10	143	472	3	34	578
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	0	2	2	0	3	1
Mvmt Flow	11	154	508	3	37	622

Major/Minor

	Minor1	Major1	Major2		
Conflicting Flow All	1206	510	0	0	511
Stage 1	510	-	-	-	-
Stage 2	696	-	-	-	-
Critical Hdwy	6.4	6.22	-	-	4.13
Critical Hdwy Stg 1	5.4	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-
Follow-up Hdwy	3.5	3.318	-	-	2.227
Pot Cap-1 Maneuver	205	563	-	-	1049
Stage 1	607	-	-	-	-
Stage 2	498	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	194	563	-	-	1049
Mov Cap-2 Maneuver	194	-	-	-	-
Stage 1	607	-	-	-	-
Stage 2	471	-	-	-	-

Approach

	WB	NB	SB
HCM Control Delay, s	15.7	0	0.5
HCM LOS	C		

Minor Lane/Major Mvmt

	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	501	1049
HCM Lane V/C Ratio	-	-	0.328	0.035
HCM Control Delay (s)	-	-	15.7	8.6
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	1.4	0.1

Intersection				
Intersection Delay, s/veh	9.8			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	275	160	544	428
Demand Flow Rate, veh/h	285	176	567	440
Vehicles Circulating, veh/h	518	537	388	200
Vehicles Exiting, veh/h	122	287	415	513
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	8.8	7.5	13.2	7.3
Approach LOS	A	A	B	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	285	176	567	440
Cap Entry Lane, veh/h	814	798	929	1125
Entry HV Adj Factor	0.963	0.908	0.960	0.972
Flow Entry, veh/h	275	160	544	428
Cap Entry, veh/h	784	724	892	1094
V/C Ratio	0.350	0.221	0.610	0.391
Control Delay, s/veh	8.8	7.5	13.2	7.3
LOS	A	A	B	A
95th %tile Queue, veh	2	1	4	2

Intersection

Intersection Delay, s/veh

Intersection LOS

Approach	NW
Entry Lanes	1
Conflicting Circle Lanes	1
Adj Approach Flow, veh/h	72
Demand Flow Rate, veh/h	79
Vehicles Circulating, veh/h	745
Vehicles Exiting, veh/h	210
Ped Vol Crossing Leg, #/h	0
Ped Cap Adj	1.000
Approach Delay, s/veh	7.6
Approach LOS	A

Lane	Left
Designated Moves	LR
Assumed Moves	LR
RT Channelized	
Lane Util	1.000
Follow-Up Headway, s	2.609
Critical Headway, s	4.976
Entry Flow, veh/h	79
Cap Entry Lane, veh/h	645
Entry HV Adj Factor	0.911
Flow Entry, veh/h	72
Cap Entry, veh/h	588
V/C Ratio	0.122
Control Delay, s/veh	7.6
LOS	A
95th %tile Queue, veh	0

Intersection

Intersection Delay, s/veh	8.8
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	120	301	511	473
Demand Flow Rate, veh/h	123	301	521	478
Vehicles Circulating, veh/h	631	535	154	400
Vehicles Exiting, veh/h	247	227	600	436
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	7.0	9.1	7.8	10.8
Approach LOS	A	A	A	B

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	123	301	521	478
Cap Entry Lane, veh/h	725	800	1179	918
Entry HV Adj Factor	0.976	1.000	0.982	0.990
Flow Entry, veh/h	120	301	511	473
Cap Entry, veh/h	707	800	1158	908
V/C Ratio	0.170	0.376	0.442	0.521
Control Delay, s/veh	7.0	9.1	7.8	10.8
LOS	A	A	A	B
95th %tile Queue, veh	1	2	2	3

Intersection

Intersection Delay, s/veh

Intersection LOS

Approach	NW
Entry Lanes	1
Conflicting Circle Lanes	1
Adj Approach Flow, veh/h	165
Demand Flow Rate, veh/h	168
Vehicles Circulating, veh/h	594
Vehicles Exiting, veh/h	81
Ped Vol Crossing Leg, #/h	0
Ped Cap Adj	1.000
Approach Delay, s/veh	7.4
Approach LOS	A

Lane	Left
Designated Moves	LR
Assumed Moves	LR
RT Channelized	
Lane Util	1.000
Follow-Up Headway, s	2.609
Critical Headway, s	4.976
Entry Flow, veh/h	168
Cap Entry Lane, veh/h	753
Entry HV Adj Factor	0.982
Flow Entry, veh/h	165
Cap Entry, veh/h	739
V/C Ratio	0.223
Control Delay, s/veh	7.4
LOS	A
95th %tile Queue, veh	1

Intersection				
Intersection Delay, s/veh	8.8			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	274	160	607	428
Demand Flow Rate, veh/h	284	176	636	440
Vehicles Circulating, veh/h	513	533	185	196
Vehicles Exiting, veh/h	123	288	612	513
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	8.7	7.4	10.1	7.3
Approach LOS	A	A	B	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	284	176	636	440
Cap Entry Lane, veh/h	818	801	1143	1130
Entry HV Adj Factor	0.963	0.909	0.954	0.972
Flow Entry, veh/h	274	160	607	428
Cap Entry, veh/h	788	729	1090	1098
V/C Ratio	0.347	0.220	0.557	0.389
Control Delay, s/veh	8.7	7.4	10.1	7.3
LOS	A	A	B	A
95th %tile Queue, veh	2	1	4	2

Intersection

Int Delay, s/veh 1.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	4	62	484	6	97	434
Future Vol, veh/h	4	62	484	6	97	434
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	25	9	4	0	3	4
Mvmt Flow	4	69	538	7	108	482

Major/Minor

	Minor1	Major1	Major2		
Conflicting Flow All	1240	542	0	0	545
Stage 1	542	-	-	-	-
Stage 2	698	-	-	-	-
Critical Hdwy	6.65	6.29	-	-	4.13
Critical Hdwy Stg 1	5.65	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-
Follow-up Hdwy	3.725	3.381	-	-	2.227
Pot Cap-1 Maneuver	174	527	-	-	1019
Stage 1	539	-	-	-	-
Stage 2	454	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	149	527	-	-	1019
Mov Cap-2 Maneuver	149	-	-	-	-
Stage 1	539	-	-	-	-
Stage 2	388	-	-	-	-

Approach

	WB	NB	SB
HCM Control Delay, s	14.4	0	1.6
HCM LOS	B		

Minor Lane/Major Mvmt

	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	457	1019
HCM Lane V/C Ratio	-	-	0.16	0.106
HCM Control Delay (s)	-	-	14.4	8.9
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.6	0.4

Intersection				
Intersection Delay, s/veh	9.1			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	120	300	662	472
Demand Flow Rate, veh/h	124	300	673	476
Vehicles Circulating, veh/h	617	523	76	388
Vehicles Exiting, veh/h	247	226	665	435
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	6.9	8.9	8.6	10.5
Approach LOS	A	A	A	B
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	124	300	673	476
Cap Entry Lane, veh/h	735	809	1277	929
Entry HV Adj Factor	0.968	1.000	0.984	0.991
Flow Entry, veh/h	120	300	662	472
Cap Entry, veh/h	712	809	1256	921
V/C Ratio	0.169	0.371	0.527	0.512
Control Delay, s/veh	6.9	8.9	8.6	10.5
LOS	A	A	A	B
95th %tile Queue, veh	1	2	3	3

Intersection

Int Delay, s/veh	2.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		T			T
Traffic Vol, veh/h	10	143	472	3	34	578
Future Vol, veh/h	10	143	472	3	34	578
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	0	2	2	0	3	1
Mvmt Flow	11	154	508	3	37	622

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1206	510	0	0	511
Stage 1	510	-	-	-	-
Stage 2	696	-	-	-	-
Critical Hdwy	6.4	6.22	-	-	4.13
Critical Hdwy Stg 1	5.4	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-
Follow-up Hdwy	3.5	3.318	-	-	2.227
Pot Cap-1 Maneuver	205	563	-	-	1049
Stage 1	607	-	-	-	-
Stage 2	498	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	194	563	-	-	1049
Mov Cap-2 Maneuver	194	-	-	-	-
Stage 1	607	-	-	-	-
Stage 2	471	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.7	0	0.5
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	501	1049
HCM Lane V/C Ratio	-	-	0.328	0.035
HCM Control Delay (s)	-	-	15.7	8.6
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	1.4	0.1

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Lane Group	EBT	WBT	NBT	SBT	NWL
Lane Group Flow (vph)	247	144	493	389	66
v/c Ratio	0.86	0.78	0.88	0.67	0.38
Control Delay	65.9	68.3	44.5	21.3	46.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	65.9	68.3	44.5	21.3	46.0
Queue Length 50th (ft)	134	78	254	131	34
Queue Length 95th (ft)	#375	#245	414	223	88
Internal Link Dist (ft)	685	830	725	624	572
Turn Bay Length (ft)					
Base Capacity (vph)	288	184	950	804	283
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.86	0.78	0.52	0.48	0.23

Intersection Summary

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

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Lane Group	EBT	WBT	NBT	SBT	NWL
Lane Group Flow (vph)	108	271	464	426	150
v/c Ratio	0.34	1.00	0.91	0.58	0.66
Control Delay	34.8	96.4	52.9	21.2	52.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	34.8	96.4	52.9	21.2	52.9
Queue Length 50th (ft)	52	~184	265	175	87
Queue Length 95th (ft)	110	#367	#434	266	161
Internal Link Dist (ft)	685	830	725	624	572
Turn Bay Length (ft)					
Base Capacity (vph)	321	270	649	870	275
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.34	1.00	0.71	0.49	0.55

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Lane Group	EBT	WBT	NBT	SBT	NWL
Lane Group Flow (vph)	255	148	507	400	68
v/c Ratio	0.90	0.83	0.89	0.69	0.39
Control Delay	72.5	75.8	45.7	22.3	46.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	72.5	75.8	45.7	22.3	46.6
Queue Length 50th (ft)	142	82	266	137	36
Queue Length 95th (ft)	#391	#256	432	233	91
Internal Link Dist (ft)	685	830	725	624	572
Turn Bay Length (ft)					
Base Capacity (vph)	284	178	939	785	280
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.90	0.83	0.54	0.51	0.24

Intersection Summary

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

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Lane Group	EBT	WBT	NBT	SBT	NWL
Lane Group Flow (vph)	111	280	477	439	155
v/c Ratio	0.35	1.06	0.92	0.59	0.67
Control Delay	35.1	112.6	54.6	21.7	54.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	35.1	112.6	54.6	21.7	54.2
Queue Length 50th (ft)	55	~207	279	184	92
Queue Length 95th (ft)	112	#384	#454	277	#167
Internal Link Dist (ft)	685	830	725	624	572
Turn Bay Length (ft)					
Base Capacity (vph)	317	263	639	855	271
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.35	1.06	0.75	0.51	0.57

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Lane Group	EBT	WBT	NBT	SBT	NWL
Lane Group Flow (vph)	275	160	544	428	72
v/c Ratio	1.01	0.98	0.91	0.75	0.41
Control Delay	99.4	110.1	47.2	25.0	48.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	99.4	110.1	47.2	25.0	48.6
Queue Length 50th (ft)	~187	~107	298	152	41
Queue Length 95th (ft)	#428	#282	482	254	94
Internal Link Dist (ft)	685	830	725	624	572
Turn Bay Length (ft)					
Base Capacity (vph)	272	163	903	742	269
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.01	0.98	0.60	0.58	0.27

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Lane Group	EBT	WBT	NBT	SBT	NWL
Lane Group Flow (vph)	120	301	511	473	165
v/c Ratio	0.39	1.23	0.94	0.64	0.71
Control Delay	36.9	168.6	57.5	23.0	57.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	36.9	168.6	57.5	23.0	57.7
Queue Length 50th (ft)	64	~255	310	206	103
Queue Length 95th (ft)	120	#423	#507	307	#190
Internal Link Dist (ft)	685	830	725	624	572
Turn Bay Length (ft)					
Base Capacity (vph)	306	245	618	809	262
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.39	1.23	0.83	0.58	0.63

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	NWL
Lane Group Flow (vph)	255	148	13	494	109	291	68
v/c Ratio	0.69	0.58	0.03	0.77	0.52	0.43	0.38
Control Delay	33.8	33.3	10.3	23.2	22.8	13.2	32.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.8	33.3	10.3	23.2	22.8	13.2	32.3
Queue Length 50th (ft)	75	43	3	139	27	64	21
Queue Length 95th (ft)	#206	#133	11	#245	72	118	#68
Internal Link Dist (ft)	685	830		725		624	572
Turn Bay Length (ft)			175		150		
Base Capacity (vph)	381	264	544	899	295	936	177
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.56	0.02	0.55	0.37	0.31	0.38

Intersection Summary

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

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road

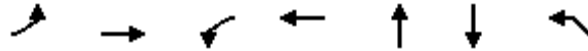


Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	NWL
Lane Group Flow (vph)	111	280	26	451	40	399	155
v/c Ratio	0.27	0.83	0.12	0.81	0.23	0.69	0.84
Control Delay	17.1	44.5	14.3	30.6	17.2	22.7	66.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.1	44.5	14.3	30.6	17.2	22.7	66.2
Queue Length 50th (ft)	26	95	6	138	10	112	56
Queue Length 95th (ft)	62	#216	21	#271	31	196	#153
Internal Link Dist (ft)	685	830		725		624	572
Turn Bay Length (ft)			175		150		
Base Capacity (vph)	427	356	256	645	202	671	185
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.79	0.10	0.70	0.20	0.59	0.84

Intersection Summary

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

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road

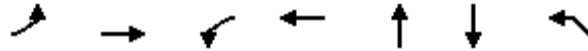


Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	NWL
Lane Group Flow (vph)	82	173	98	50	507	400	68
v/c Ratio	0.37	0.54	0.54	0.18	0.56	0.54	0.33
Control Delay	27.2	27.5	36.6	22.3	15.0	15.1	28.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.2	27.5	36.6	22.3	15.0	15.1	28.8
Queue Length 50th (ft)	27	54	33	16	140	105	23
Queue Length 95th (ft)	64	#124	#94	42	244	198	57
Internal Link Dist (ft)		685		830	725	624	572
Turn Bay Length (ft)	150		150				
Base Capacity (vph)	257	370	214	320	940	772	209
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.47	0.46	0.16	0.54	0.52	0.33

Intersection Summary

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

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	NWL
Lane Group Flow (vph)	15	96	174	106	477	439	155
v/c Ratio	0.07	0.28	0.78	0.31	0.73	0.67	0.62
Control Delay	20.6	18.7	50.3	22.6	25.7	22.5	36.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.6	18.7	50.3	22.6	25.7	22.5	36.6
Queue Length 50th (ft)	4	23	60	32	151	131	53
Queue Length 95th (ft)	18	58	#153	70	#301	#263	#124
Internal Link Dist (ft)		685		830	725	624	572
Turn Bay Length (ft)	150		150				
Base Capacity (vph)	230	365	237	365	655	658	261
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.26	0.73	0.29	0.73	0.67	0.59

Intersection Summary

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

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	NWL
Lane Group Flow (vph)	82	173	98	50	13	494	109	291	68
v/c Ratio	0.34	0.49	0.49	0.17	0.02	0.58	0.33	0.33	0.35
Control Delay	24.1	23.3	30.8	20.2	9.8	15.6	14.8	11.1	30.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.1	23.3	30.8	20.2	9.8	15.6	14.8	11.1	30.6
Queue Length 50th (ft)	22	44	27	13	3	134	25	62	20
Queue Length 95th (ft)	62	108	#87	41	11	233	63	113	#68
Internal Link Dist (ft)		685		830		725		624	572
Turn Bay Length (ft)	150		150		175		150		
Base Capacity (vph)	304	432	252	375	644	1014	399	1055	192
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.40	0.39	0.13	0.02	0.49	0.27	0.28	0.35

Intersection Summary

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

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	NWL
Lane Group Flow (vph)	15	96	174	106	26	451	40	399	155
v/c Ratio	0.07	0.27	0.77	0.30	0.09	0.69	0.17	0.59	0.62
Control Delay	20.5	18.5	48.6	22.4	13.7	23.4	15.4	19.0	35.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.5	18.5	48.6	22.4	13.7	23.4	15.4	19.0	35.8
Queue Length 50th (ft)	4	23	60	32	6	138	10	112	53
Queue Length 95th (ft)	18	58	#153	70	21	#271	30	196	#124
Internal Link Dist (ft)		685		830		725		624	572
Turn Bay Length (ft)	150		150		175		150		
Base Capacity (vph)	235	371	241	371	297	678	245	706	266
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.26	0.72	0.29	0.09	0.67	0.16	0.57	0.58

Intersection Summary

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

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	NWL
Lane Group Flow (vph)	275	160	14	530	117	311	72
v/c Ratio	0.75	0.65	0.04	0.85	0.68	0.48	0.53
Control Delay	35.9	36.3	10.8	30.9	37.7	14.9	44.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.9	36.3	10.8	30.9	37.7	14.9	44.4
Queue Length 50th (ft)	88	51	3	160	32	73	25
Queue Length 95th (ft)	#209	#137	12	#317	#107	132	#82
Internal Link Dist (ft)	685	830		725		624	572
Turn Bay Length (ft)			175		150		
Base Capacity (vph)	403	270	456	800	223	835	136
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.59	0.03	0.66	0.52	0.37	0.53

Intersection Summary

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

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road

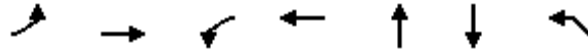


Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	NWL
Lane Group Flow (vph)	120	301	27	484	45	428	165
v/c Ratio	0.28	0.84	0.14	0.86	0.31	0.73	0.80
Control Delay	19.0	46.0	16.9	37.2	22.6	26.8	60.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.0	46.0	16.9	37.2	22.6	26.8	60.9
Queue Length 50th (ft)	34	121	8	181	13	147	71
Queue Length 95th (ft)	74	#254	24	#334	40	243	#174
Internal Link Dist (ft)	685	830		725		624	572
Turn Bay Length (ft)			175		150		
Base Capacity (vph)	459	384	226	661	171	686	205
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.78	0.12	0.73	0.26	0.62	0.80

Intersection Summary

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

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road

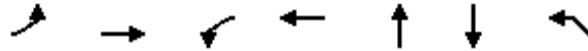


Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	NWL
Lane Group Flow (vph)	89	186	106	54	544	428	72
v/c Ratio	0.39	0.56	0.60	0.19	0.61	0.61	0.53
Control Delay	26.4	26.7	38.1	21.3	17.4	18.2	44.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.4	26.7	38.1	21.3	17.4	18.2	44.4
Queue Length 50th (ft)	28	56	35	16	155	118	26
Queue Length 95th (ft)	65	113	#94	42	#310	#261	#82
Internal Link Dist (ft)		685		830	725	624	572
Turn Bay Length (ft)	150		150				
Base Capacity (vph)	283	400	221	343	862	686	136
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.47	0.48	0.16	0.63	0.62	0.53

Intersection Summary

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

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	NWL
Lane Group Flow (vph)	16	104	188	113	511	473	165
v/c Ratio	0.07	0.29	0.80	0.31	0.89	0.84	0.72
Control Delay	19.7	18.2	50.6	21.9	38.5	33.6	45.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.7	18.2	50.6	21.9	38.5	33.6	45.6
Queue Length 50th (ft)	5	24	64	34	167	148	58
Queue Length 95th (ft)	18	60	#161	72	#331	#303	#144
Internal Link Dist (ft)		685		830	725	624	572
Turn Bay Length (ft)	150		150				
Base Capacity (vph)	243	386	250	385	609	592	230
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.27	0.75	0.29	0.84	0.80	0.72

Intersection Summary

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

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	NWL
Lane Group Flow (vph)	89	186	106	54	14	530	117	311	72
v/c Ratio	0.40	0.57	0.58	0.19	0.03	0.73	0.48	0.41	0.37
Control Delay	27.0	28.2	38.1	21.9	9.7	20.0	19.8	12.0	29.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.0	28.2	38.1	21.9	9.7	20.0	19.8	12.0	29.1
Queue Length 50th (ft)	26	52	32	15	3	149	28	67	22
Queue Length 95th (ft)	68	#138	#103	44	11	#272	75	122	#61
Internal Link Dist (ft)		685		830		725		624	572
Turn Bay Length (ft)	150		150		175		150		
Base Capacity (vph)	245	353	201	301	537	901	302	939	199
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.53	0.53	0.18	0.03	0.59	0.39	0.33	0.36

Intersection Summary

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

1: Kaolin Road (SR 3013)/S Union Street (SR 3013) & Old Kennett Road (SR 3036) & Hillendale Road



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	NWL
Lane Group Flow (vph)	16	104	188	113	27	484	45	428	165
v/c Ratio	0.07	0.29	0.82	0.32	0.11	0.75	0.22	0.64	0.65
Control Delay	20.6	18.8	54.3	22.6	14.1	26.2	16.8	20.4	37.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.6	18.8	54.3	22.6	14.1	26.2	16.8	20.4	37.8
Queue Length 50th (ft)	5	25	66	35	6	152	11	123	57
Queue Length 95th (ft)	19	62	#168	74	21	#300	33	215	#134
Internal Link Dist (ft)		685		830		725		624	572
Turn Bay Length (ft)	150		150		175		150		
Base Capacity (vph)	234	373	239	372	264	664	211	690	266
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.28	0.79	0.30	0.10	0.73	0.21	0.62	0.62

Intersection Summary

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

APPENDIX F: Preliminary Construction Cost Estimate Worksheets

Preliminary Construction Cost Estimate - May 2024

Item	Scenario 2A/2B - Widening	Scenario 2C - Widening	Scenario 4A - Roundabout ^{1, 2, 3}
Excavation	\$ 25,000.00	\$ 50,000.00	\$ 150,000.00
Utility Pole Relocation	\$ 90,000.00	\$ 105,000.00	\$ 105,000.00
Truck Apron	\$ -	\$ -	\$ 50,000.00
Plain Cement Concrete Pavement	\$ -	\$ -	\$ 66,000.00
Concrete Curb 6"	\$ 10,000.00	\$ 20,000.00	\$ 50,000.00
Full Depth Pavement	\$ 100,000.00	\$ 200,000.00	\$ 560,976.00
Mill & Overlay Pavement	\$ 60,000.00	\$ 120,000.00	\$ 20,000.00
Clearing/Grubbing/Earthwork	\$ 10,000.00	\$ 20,000.00	\$ 40,000.00
Traffic Signalization	\$ 300,000.00	\$ 300,000.00	\$ 25,000.00
Signage	\$ 4,000.00	\$ 8,000.00	\$ 20,000.00
Pavement Markings	\$ 3,000.00	\$ 6,000.00	\$ 15,000.00
Erosion and Sedimentation Control	\$ 10,000.00	\$ 20,000.00	\$ 50,000.00
Stormwater inlets/manholes/pipes	\$ 80,000.00	\$ 150,000.00	\$ 250,000.00
Landscaping	\$ 4,000.00	\$ 8,000.00	\$ 40,000.00
Mobilization	\$ 50,000.00	\$ 50,000.00	\$ 70,000.00
Incidental Construction Items	\$ 5,000.00	\$ 10,000.00	\$ 25,000.00
Subtotal Construction Item Cost	\$ 751,000.00	\$ 1,067,000.00	\$ 1,536,976.00
Maintenance & Protection of Traffic	\$ 150,000.00	\$ 215,000.00	\$ 400,000.00
Construction Subtotal	\$ 901,000.00	\$ 1,282,000.00	\$ 1,936,976.00
Construction Contingency 30%	\$ 270,300.00	\$ 384,600.00	\$ 581,092.80
Total Construction Cost	\$ 1,171,300.00	\$ 1,666,600.00	\$ 2,518,068.80
Construction Oversight 12%	\$ 140,556.00	\$ 199,992.00	\$ 302,168.26
Design Engineering Fee 15%	\$ 175,695.00	\$ 249,990.00	\$ 377,710.32
Estimated Project Total Cost	\$ 1,490,000.00	\$ 2,120,000.00	\$ 3,200,000.00
Anticipated ROW Costs	\$ 50,000.00	\$ 100,000.00	\$ 500,000.00
Preliminary Construction Cost Estimate	\$ 1,540,000.00	\$ 2,220,000.00	\$ 3,700,000.00

¹ The roundabout estimate assumes it is feasible to construct the roundabout and tie into the existing roadways with minimal approach work, which would minimize ROW impacts and construction costs.

² Given the significant amount of truck traffic that navigates the intersection, it is likely the radius of the roundabout would need to be larger. This could drive up construction costs as well as utility and ROW impacts.

³ It should also be noted that the roundabout option will require substantially greater land disturbance which will likely trigger additional permitting and mitigation requirements.