

TRAFFIC IMPACT STUDY

Heartland Market Lee's Summit, MO



Prepared For:
Great American Dream LLC

Prepared By:
Renaissance Infrastructure Consulting
November 2022

November 7, 2022

Great American Dream LLC
Jack Hopkins
PO BOX 200
Raymore, MO 64083

**RE: NE Colbern Road & NE Rice Road C-Store - Traffic Impact Study
Lee's Summit, MO**

Dear Jack Hopkins,

In response to your request, RIC has completed a traffic impact study for a proposed Convenience Store to be located northeast of NE Colbern Road & Rice Road in Lee's Summit, MO. The purpose of this study was to assess the impact of the proposed development on the surrounding transportation system. The following report documents our analysis and recommendations.

Please do not hesitate to contact us should you have any questions.

Sincerely,

Renaissance Infrastructure Consulting

Grant Niehus, PE, PTOE
Traffic Engineer

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1 Introduction

In response to your request, Renaissance Infrastructure Consulting (RIC) has completed the following Traffic Impact Study (TIS) for a proposed development in Lee's Summit, MO. The purpose of this study was to assess the impact of the proposed development on the existing roadway network. To evaluate the increase of traffic on adjacent streets, the number of trips in the AM and PM peak periods were estimated. Existing traffic counts were collected to conduct a capacity analysis at the study intersections. The study also includes analysis on access management and provides recommendations for proposed geometric and traffic control improvements that may be necessary for the proposed development.

Figure 1 – Project Location



2 Study Scope

Guidance provided by the City of Lee's Summit Access Management Code and MoDOT's Engineering Policy Guide were used in the development of this study and its associated scope.

2.1 Study Area

Based on discussions with the city and MoDOT, the study area for this TIS includes the following intersections:

- *Missouri Route 291 Northbound Ramp & NE Colbern Road*
- *NE Colbern Road & NE Rice Road*
- *NE Colbern Road & NE Todd George Parkway*
- *NE Colbern Road & Lucky Road*
- *NE Rice Road & Ikerd Road*
- *Lucky Road & Proposed East Driveway*

2.2 Analysis Scenarios

For this traffic study, analysis was completed for the following scenarios:

- *Existing Conditions*
- *Existing Plus Proposed Conditions*

2.3 Analysis Methodology

For all study intersections, trip generation estimates were developed for both the AM and PM peak hours using ITE's Trip Generation Manual, 11th Edition. Intersection Capacity Analysis was performed using PTV VISTRO 2022 which uses Highway Capacity Manual (HCM) methodology for the analysis.

3 Project Description

The proposed development is located northeast of Colbern Road and Rice Road in Lee's Summit, MO. It will include a gas station with 16 fueling stations and an associated convenience store on an approximately 1.70 acre lot. The site plan for the proposed development is included in **Appendix A**.

The proposed development will be accessed through two driveways, one on a yet to be built public road that extends east from Rice Road, north of Colbern Road. The other driveway is located on another yet to be built public road that extends north from Colbern Road. Both public roads are

proposed to be constructed by the master developer of the larger property. Lucky Road will intersect Colbern Road approximately 511 feet east of Rice Road measured center-to-center, aligning with the existing driveway of Lakeland Community Church, located south of Colbern Road. The other proposed public road, Ikerd Road is located approximately 352 feet north of Colbern Road, measured center-to-center.

Figure 3 – Study Intersections



Note: NE Colbern Road & NE Todd George Parkway is located further east beyond the limits of the figure

3.1 Existing Street Network and Land Uses

Missouri Route 291 runs north/south and is located to the west of the proposed development. It is 4-lane divided roadway with a posted speed limit of 55 mph. It is classified as 'Other Principal Arterial' by MoDOT's Functional Classification Map and merges with Interstate 470 north of Colbern Road.

Northeast Colbern Road is located to the south of the proposed development. It is a 4-lane divided roadway supporting eastbound and westbound traffic with median openings and exclusive left turn lanes at each intersection. It is classified as 'Major Arterial' in Lee's Summit's Roadway Classification Map and has a posted speed limit of 40 mph.

Northeast Rice Road is located to the west of the proposed development. It is a 2-lane roadway supporting northbound and southbound traffic. It is classified as 'Commercial/ Industrial Collector' in Lee's Summit's Roadway Classification Map and has a posted speed limit of 45 mph to the north and 25 mph to the south of Colbern Road.

Table 3.1 – Roadway Characteristics

Roadway	Functional Classification	Posted Speed	Travel Lanes	Sidewalks
MO Route 291	Other Principal Arterial	55	4	No
NE Colbern Road	Major Arterial	40	4	Both Sides
NE Rice Road	Commercial/ Industrial Collector	45 ⁽¹⁾	2	No

(1) 25 mph south of Colbern Road

The lot for the proposed development is currently vacant and is zoned as 'Planned Community Commercial (CP-2)' according to Lee's Summit's zoning map.

3.2 Existing Traffic Volumes

Traffic Counts were collected on August 9th, 2022, between 7:00 - 9:00 AM and 4:00 - 6:00 PM. The collected traffic data revealed that all the intersections had a peak hour window of 7:15 – 8:15 AM and 4:30 – 5:30 PM. A summary of existing traffic counts is included in **Appendix B**.

Traffic counts were also collected at the Public Library driveway on Colbern Road on October 4th and 6th between 7:00 – 9:00 AM and 4:00 – 6:00 PM.

3.3 Planned Colbern Road Improvements

Improvements to Colbern Road have been proposed by the master developer of the property that the Convenience Store/Gas Station is proposed to be located on. Those improvements include constructing a raised median on Colbern Road that restricts north and south Rice Road to right only movements. The median is planned to extend from Rice Road to Paradise Park Drive, with a break at the planned intersection of Lucky Road to provide a full-access intersection with eastbound and westbound left turn lanes. Note that the recommendations included in this study only include the projected traffic for the proposed gas station parcel, it does not account for future development in the larger site or surrounding area.

4 Proposed Conditions

4.1 Trip Generation

Trip generation estimates developed for this study are based on the 11th Edition of the Trip Generation Manual published by the Institute of Transportation Engineers (ITE). The Manual is the most widely used industry resource for this type of data. The trip generation data are organized

by land use types, with more than 170 different categories of land uses. For each category, the manual provides a data set for use in estimating the number of vehicle and person trips generated by a site based on its characteristics such as physical size or intensity. Trips may be estimated by direction (entering or exiting the site) and for time periods typically pertaining to a full day (weekday or weekend), peak hours of the adjacent roadway, and peak hours of the particular land use. Used properly, the Trip Generation Manual provides an objective basis for estimating trips generated by a proposed development.

The ITE category Convenience Store/Gas Station was used to project traffic volumes for the proposed development using the listed intensity for the development. Both the AM and PM Peak hour trips were estimated based on projections from various studies included in ITE's Trip Generation Manual for the hours of 7-9 am & 4-6 pm, respectively. An average of 6,930 vehicles per day are expected to access the development for the Existing plus Proposed scenario.

Table 4a – Trip Generation

Land Use	Intensity	ITE Code	Weekday Trips	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
C-Store/Gas Station	5,400 S.F. 16 Fueling Positions	945	6,930	246	247	493	213	213	426

Convenience Store/Gas Station's typically generate significant pass-by vehicle trips, which represent trips which have other final destinations that are interrupted to visit the proposed development. Hence, pass-by trips do not add new traffic to the adjoining street system. The ITE Trip Generation Manual recommends an average pass-by rate of 76% for the AM Peak Hours and 75% for the PM Peak Hours for ITE Land Use 945, Convenience Store/Gas Station. For simplicity, an average pass-by rate of 75% for both the AM and PM peak periods was applied in this study.

As a general guideline, the number of pass-by trips assumed for a site should not exceed 10% of the adjacent street traffic. To check this, the calculated number of pass-by trips were compared to two-way volume on Colbern Road adjacent to the project site for each analysis hour. No more than 136 pass-by trips should be assumed for the AM peak hour analysis (10% of 1359), and 174 for the PM peak hour analysis (10% of 1733).

It is expected that diverted trips from MO-291 and I-470 will also contribute to the total trips for the development. A diverted trip represents a vehicle trip made as an intermediate stop while traveling from an origin to a primary destination with a route diversion from a primary route to another roadway to gain access to the site. A diverted trip reduction was calculated by subtracting the pass-by trips after the 10 percent check was applied, from the average pass-by rate of 75% provided by ITE, resulting in approximately 48% and 34% of the total trips for AM and PM peak

hours, respectively. The results of the pass-by reduction and diverted trips are included in **Table 3**.

Table 4b – Trip Generation w/ Pass-By and Diverted Trips Reduction

Land Use	Intensity	ITE Code	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
C-Store/Gas Station	5,400 S.F.	945	246	247	493	213	213	426
Pass-by Trips ⁽¹⁾			-68	-68	-136	-87	-87	-174
Diverted Trips ⁽²⁾			-117	-117	-234	-73	-73	-146
Total New Development Trips			61	62	123	53	53	106

(1) Pass-by Trips are reported as 10% of the adjacent, two-way, traffic on Colbern Road.

(2) Diverted Trips are reported as 48% and 34% for the AM and PM peak hours, respectively, of the total trips

4.2 Trip Distribution

The traffic generated by the proposed development was distributed to the adjacent roadway system based on engineering judgement. It is anticipated that a significant portion of the primary trips (trips navigating to a destination and returning back to their original departure location) will be arriving on Colbern Road from the east (50%) and west (30%) directions. Remaining traffic will be arriving from the north (10%) and south (10%) directions using Rice Road as shown in **Figure 4.2a**.

The trips arriving from the west and south directions will be required to use Lucky Road to access the development due to the right-in/right-out restriction at Rice Road. The trips from the north will access the development via Ikerd Road.

Figure 4.2a – Trip Distribution – Primary Trips



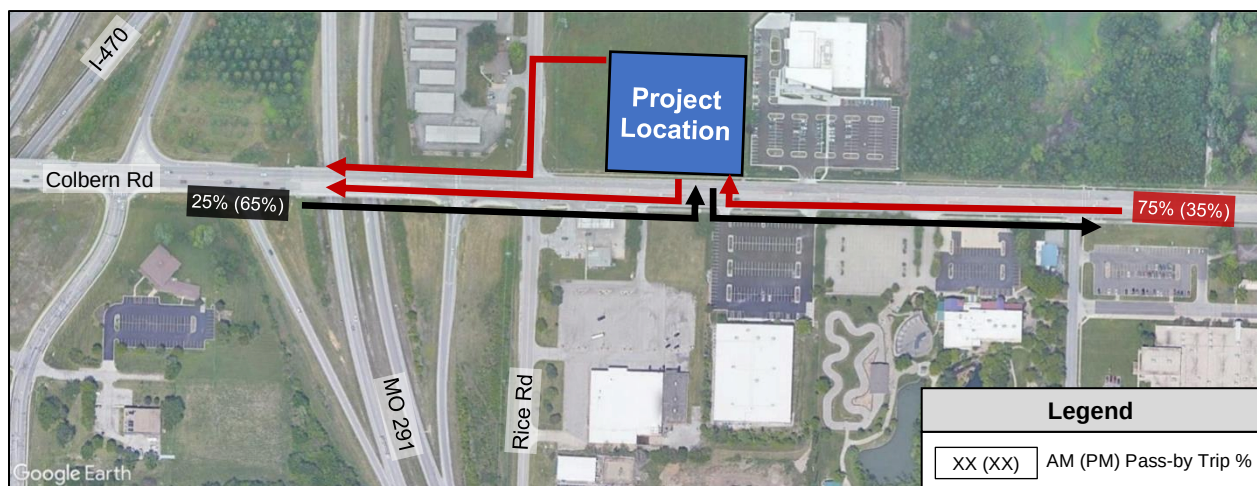
A 75/25 split was applied for the diverted trips arriving from I-470 and MO-291 based on the directional peak hour data for the past five years obtained from MoDOT's traffic volume map as shown in **Figure 4.2b**. All diverted trips will enter the proposed development using the proposed Lucky Road and a 50/50 split was applied between Lucky Road and Rice Road for the exiting diverted trips.

Figure 4.2b – Trip Distribution- Diverted Trips



The pass-by trip percentage distribution for both AM and PM peak hours was based on adjacent street traffic volume on Colbern Road as shown in **Figure 4.2c**. All pass-by trips are expected to enter via Lucky Road. Traffic exiting and going east will be required to use Lucky Road and traffic exiting to go west is expected to have a 50/50 split between Lucky Road and Rice Road.

Figure 4.2c – Trip Distribution - Pass-by Trips



4.3 Access Management

The curb radius requirements for the two proposed private driveways, one on Lucky Road and the other on Ikerd Road were analyzed against the Lee's Summit's design criteria. A minimum curb radius of 35 feet measured at the back of the curb is required for a driveway on a Commercial Collector. Both driveways are proposed with a 35-foot curb radius and meet city requirements.

The curb return of Lucky Road intersecting Colbern Road is currently proposed with a 25-foot radius. In order to meet city requirements for a Commercial Collector, the radius should be increased to 35 feet.

Lee's Summit requires a 28 ft. driveway width for a Low Volume approach and 42 ft. for a Medium Volume approach based on their Access Management Code. The driveway on Ikerd is expected to fall under the Low Volume approach classification and the driveway on Lucky Road is expected to fall under the Medium Volume driveway classification. Both driveways meet city requirements for driveway width.

The access spacing criteria for both proposed driveways were analyzed based on guidelines in Lee's Summit Access Management Code. The proposed driveway on Ikerd Road should be located at least 125 feet from Rice Road to meet city requirements for spacing on Commercial Local roads. The driveway on Ikerd Road, measured at approximately 225 feet from Rice Road, measured center-to-center, exceeds the minimum required spacing.

The proposed driveway on Lucky Road is located approximately 180 feet north of Colbern Road and does not meet the city spacing requirement of 300 feet, measured center-to-center, for a Commercial Collector. It is recommended that a raised median be constructed on Lucky Road to prevent northbound left-turn vehicles into the development. The current spacing of approximately 180 feet would provide enough stacking distance for vehicles on the southbound approach of Colbern Road & Lucky Road.

Minimum throat length for each driveway was analyzed against Lee's Summit Access Management Code. The driveway on Ikerd Road should have a minimum throat length of 75 feet and the driveway on Lucky Road should have a minimum throat length of 100 feet based on the projected peak hour trips accessing each driveway and using an adjacent Roadway Classification of Collector. The throat length of the driveway on Ikerd Road, measured at 120 feet, exceeds the minimum requirement. However, the proposed driveway on Lucky Road, measured at 50 feet, does not meet the minimum requirement of 100 feet. However, with a restricted median proposed on Lucky Road, the queueing for exiting vehicles will be limited to traffic taking a right-turn from the development. Our analysis shows a 95th percentile queue length of 25 feet which is lower than the proposed throat length.

4.3.1 Turn Lane Requirements

All intersections within the study area were analyzed for turn lane requirements.

4.3.1.1 Colbern Road & Lucky Road

Lee's Summit's Access Management Code requires a minimum of 200 feet plus taper for left turn lanes on Arterial streets intersecting Collectors. The westbound left turn lane is currently proposed with a storage length of 122.5 feet. The storage length should be increased to 200 feet to meet city requirements. The taper should be designed with two 150-foot reverse curves.

The westbound left turn lane is currently proposed with a storage length of 81.61 feet. The storage length should be increased to 200 feet to meet city requirements. The taper should be designed with two 150-foot reverse curves.

The projected volume for right turns onto Lucky Road from Colbern Road exceeds the threshold for constructing a right turn lane on Major Arterial Streets. The peak hour right-turn volume of 107 vehicles in the AM Peak hour and 51 vehicles in the PM Peak hour are greater than the 30 vehicles per hour threshold as documented in the city's Access Management Code. However, the existing library driveway would prevent constructing the required minimum storage length for right-turn lanes on Arterials intersecting Collectors and would need to be relocated.

4.3.1.2 Colbern Road & Rice Road

The westbound left turn lane at Colbern Road & Rice Road will not have enough room to construct a full 200-foot left turn lane if a full 200-foot eastbound left turn is constructed at Lucky Road. The results of the capacity analysis showed a larger expected queue length for the left turn lane at Lucky Road so it is recommended that the full 200-foot length be provided there and a storage length of 135 feet be provided for the westbound left turn lane at Rice Road.

4.3.1.3 Colbern Road & MO-291 NB Ramp

There are no turning movements on Colbern Road at this intersection, so no changes are recommended.

No other turn lane modifications or additions are recommended.

5 Intersection Capacity Analysis

To analyze the existing traffic, operating conditions were analyzed using PTV Vistro, a macroscopic analysis and optimization software. PTV Vistro is based on study procedures outlined in the Highway Capacity Manual, 7th edition. The analysis determines the “Level of Service” of the intersections and is based on factors such as the number and types of lanes, signal timing, traffic volumes, pedestrian activity, etc. This manual, which is used universally by traffic engineers to measure roadway capacity, establishes six levels of traffic service: Level A (“Free Flow”) to Level F (“Fully Saturated”).

Table 5 – Level of Service Criteria		
Level of Service	Signalized Intersection (sec/veh)	Unsignalized Intersection (sec/veh)
A	< 10 seconds	< 10 seconds
B	< 20 seconds	< 15 seconds
C	< 35 seconds	< 25 seconds
D	< 55 seconds	< 35 seconds
E	< 80 seconds	< 50 seconds
F	≥ 80 seconds	≥ 50 seconds

Level of Service “D” is typically considered the minimum acceptable LOS, however in some cases Level of Service “E” is acceptable in peak times. The above table shows the thresholds for Levels of Service A through F for unsignalized intersections.

Intersection capacity analysis was performed for Existing Conditions and Existing + Proposed Conditions scenarios. Detailed capacity analysis can be found in **Appendix C**.

5.1 MO-291 Northbound Ramp & NE Colbern Road

Table 5.1 summarizes the LOS, control delay, and 95th percentile queue lengths at the existing ramp off MO-291.

Table 5.1 – MO-291 Northbound Ramp & NE Colbern Road

Condition	Measure	NB		EB	WB	Intersection
		NBL	NBR	EBT	WBT	LOS (Delay)
AM Peak Hour						
Existing Conditions	LOS (Delay)	D (46.6)		A (3.1)	A (4.7)	A (8.3)
	95% Queue	173'	173'	28'	124'	
Existing plus Proposed Conditions	LOS (Delay)	D (46.6)		A (3.3)	A (5.2)	A (8.1)
	95% Queue	173'	173'	40'	152'	

PM Peak Hour						
Existing Conditions	LOS (Delay)	B (16.7)		A (6.3)	A (5.7)	A (6.8)
	95% Queue	42'	42'	43'	30'	
Existing plus Proposed Conditions	LOS (Delay)	B (16.9)		A (6.3)	A (5.7)	A (6.8)
	95% Queue	43'	43'	44'	31'	

As shown in **Table 5.1**, the intersection is expected to operate with acceptable conditions in both the Existing conditions and Existing and Proposed conditions scenarios.

5.2 NE Colbern Road & NE Rice Road

Table 5.2 summarizes the LOS, control delay, and 95th percentile queue lengths at the intersection of Colbern Road and Rice Road.

Table 5.2 – NE Colbern Road & NE Rice Road

Condition	Measure	NB	SB	EB			WB		
		NBLTR	SBLTR	EBL	EBT	EBTR	WBL	WBT	WBTR
AM Peak Hour									
Existing Conditions	LOS (Delay)	D (31.4)	C (17.1)	A (0.8)			A (0.1)		
	95% Queue	25'	25'	25'	25'	25'	25'	25'	25'
Existing plus Proposed Conditions	LOS (Delay)	B (10.4)*	C (17.4)*	-	A (0.0)		A (0.4)		
	95% Queue	25'*	37'*	-	25'	25'	25'	25'	25'
PM Peak Hour									
Existing Conditions	LOS (Delay)	F (108.7)	D (33.7)	A (0.5)			A (0.2)		
	95% Queue	70'	53'	25'	25'	25'	25'	25'	25'
Existing plus Proposed Conditions	LOS (Delay)	C (15.4)*	B (12.0)*	-	A (0.0)		A (0.7)		
	95% Queue	25'*	25'*	-	25'	25'	25'	25'	25'

* Restricted to right-in/right-out access.

As shown in **Table 5.2**, the northbound approach operates with a LOS D and F in the Existing Condition scenario for the AM and PM peak period, respectively.

In the Existing plus Proposed Conditions, the southbound and northbound approach is planned to operate as a right-in/right-out approach due to the proposed raised median and is expected to operate with an acceptable LOS.

5.3 NE Colbern Road & NE Lucky Road

Table 5.3 summarizes the LOS, control delay, and 95th percentile queue lengths at the intersection of Colbern Road and Lucky Road.

Table 5.3 – NE Colbern Road & Lucky Road

Condition	Measure	NB	SB		EB			WB			Intersection
		NBLTR	SBLT	SBR	EBL	EBT	EBTR	WBL	WBT	WBTR	LOS (Delay)
AM Peak Hour											
Existing plus Proposed Conditions (Stop Controlled)	LOS (Delay)	F (104.7)	F (850.3)		C (16.0)			A (0.0)			
	95% Queue	25'	283'	29'	137'	25'	25'	25'	25'	25'	
Existing plus Proposed Conditions (Signalized)	LOS (Delay)	A (0.0)	B (20.5)		A (9.1)			B (19.7)			B (16.4)
	95% Queue	25'	44'	32'	50'	41'	41'	25'	255'	252'	
PM Peak Hour											
Existing plus Proposed Conditions (Stop Controlled)	LOS (Delay)	F (526.9)	F (1198.9)		A (2.7)			A (0.0)			
	95% Queue	61'	389'	25'	50'	25'	25'	25'	25'	25'	
Existing plus Proposed Conditions (Signalized)	LOS (Delay)	C (25.4)	B (13.0)		B (13.3)			B (19.5)			B (15.2)
	95% Queue	25'	44'	25'	60'	196'	195'	25'	139'	137'	

As shown in **Table 5.4**, both northbound and southbound approaches are expected to have a LOS F, with the southbound approach having an average delay per vehicle of over 10 minutes.

A second scenario was developed that modeled the intersection as a signal. (See Section 6 for Signal Warrant Analysis) The intersection is expected to operate with an acceptable LOS in this scenario.

5.4 NE Rice Road & NE Ikerd Road

Table 5.4 summarizes the LOS, control delay, and 95th percentile queue lengths at the intersection of Rice Road and Ikerd Road.

Table 5.4 – NE Rice Road & Ikerd Road

Condition	Measure	NB	SB	WB
		NBLTR	SBLTR	WBLTR
AM Peak Hour				
Existing plus Proposed Conditions	LOS (Delay)	A (0.0)	A (2.3)	A (9.4)
	95% Queue	25'	25'	25'
PM Peak Hour				
Existing plus Proposed Conditions	LOS (Delay)	A (0.0)	A (2.4)	A (9.7)
	95% Queue	25'	25'	25'

As shown in **Table 5.4**, the intersection is expected to operate with acceptable conditions for the Existing Conditions and Existing Conditions plus Proposed scenario.

5.5 NE Colbern Road & NE Todd George Parkway

Table 5.5 summarizes the LOS, control delay, and 95th percentile queue lengths at the intersection of Colbern Road and Todd George Parkway.

Table 5.5 – NE Colbern Rd & NE Todd George Parkway

Condition	Measure	NB			SB			EB			WB			Intersection
		NBL	NBT	NBR	SBL	SBT	SBTR	EBL	EBT	EBR	WBL	WBT	WBTR	LOS (Delay)
AM Peak Hour														
Existing Conditions	LOS (Delay)	B (13.8)			B (13.0)			B (13.5)			B (15.4)			B (14.5)
	95% Queue	87'	129'	25'	25'	25'	25'	25'	35'	25'	25'	183'	175'	
Existing plus Proposed Conditions	LOS (Delay)	B (14.3)			B (13.5)			B (13.6)			B (15.7)			B (14.8)
	95% Queue	91'	135'	25'	25'	25'	25'	25'	47'	25'	25'	199'	192'	
PM Peak Hour														
Existing Conditions	LOS (Delay)	B (15.0)			B (14.1)			B (16.6)			B (14.6)			B (15.3)
	95% Queue	41'	118'	25'	79'	79'	78'	25'	170'	46'	25'	96'	92'	
Existing plus Proposed Conditions	LOS (Delay)	B (15.2)			B (14.3)			B (16.7)			B (14.7)			B (15.4)
	95% Queue	42'	120'	25'	81'	80'	79'	25'	176'	46'	25'	102'	97'	

As shown in **Table 5.3**, the intersection is expected to operate with acceptable conditions in both the Existing Conditions and Existing plus Proposed Conditions scenarios.

5.6 NE Lucky Road & Proposed East Driveway

Table 5.6 summarizes the LOS, control delay, and 95th percentile queue lengths at the intersection of NE Lucky Road & Proposed East Driveway.

Table 5.6 – NE Lucky Road & Proposed East Driveway

Condition	Measure	NB	SB	EB
		NBT	SBTR	EBR
AM Peak Hour				
Existing plus Proposed Conditions	LOS (Delay)	A (0.0)	A (0.0)	A (9.1)
	95% Queue	25'	25'	25'
PM Peak Hour				
Existing plus Proposed Conditions	LOS (Delay)	A (0.0)	A (0.0)	A (9.1)
	95% Queue	25'	25'	25'

As shown in Table 5.6, the intersection is expected to operate with acceptable conditions in the Existing plus Proposed Conditions scenario.

6 Signal Warrant Analysis

Traffic signal warrants were evaluated for the intersection of Colbern Road & Lucky Road for the Existing + Proposed scenario. To warrant traffic signalization, an intersection must satisfy one or more of the nine warrants presented in the MUTCD. However, the satisfaction of a signal warrant shall not in itself require the installation of a traffic signal.

The nine warrants outlined in the MUTCD are as follows:

- *Warrant 1, Eight-Hour Vehicular Volume*
- *Warrant 2, Four-Hour Vehicular Volume*
- *Warrant 3, Peak Hour*
- *Warrant 4, Pedestrian Volume*
- *Warrant 5, School Crossing*
- *Warrant 6, Coordinated Signal System*
- *Warrant 7, Crash Experience*
- *Warrant 8, Roadway Network*
- *Warrant 9, Intersection Near a Grade Crossing*

For the purpose of this study process, the traffic signal warrant evaluation was limited to Signal Warrant 3 for the existing plus proposed condition. Warrant 1 and 2 were not evaluated since the intersections were analyzed for a future proposed scenario. A brief description of the warrant, based on traffic volumes, as presented in the MUTCD is provided as follows:

6.1 Signal Warrant 3 - Peak-hour volume

The Peak Hour Signal Warrant is intended for use at a location where traffic conditions are such that for a minimum of one hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street. This warrant is intended to apply for unusual cases where a facility generates or attracts an unusual amount of traffic over a short time.

Colbern Road & Lucky Road was analyzed against this warrant, and it was observed that a signal was warranted for the Existing + Proposed scenario. The signal warrant analysis was conducted in accordance with the methodology presented in Chapter 4C of the MUTCD. A detailed summary of the Signal Warrant Analysis is included in **Appendix D**.

Figure 6.1 – Peak Hour Warrant

Warrant 3: Peak Hour Volume

100%

Warrant Evaluated? Yes

Condition justifying use of warrant:

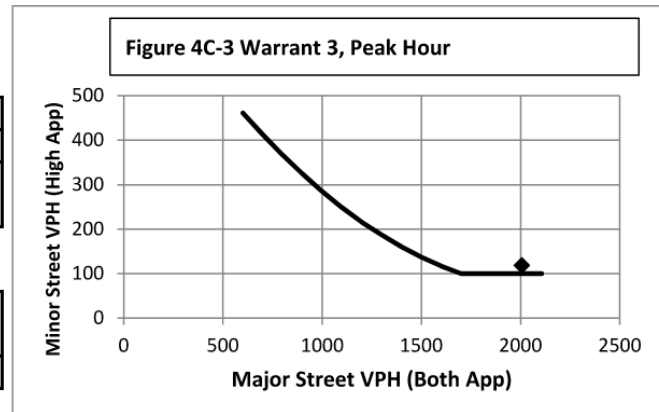
Criteria		Met?
Delay on Minor Approach	4	Yes
Volume on Minor Approach	100	
Total Entering Volume (veh/h)	800	

Manually Set Peak Hour?

Peak Hour	Major Road Vol. (Both App.)	Minor Road Vol. (High App.)
16:00	2006	118

Warrant Satisfied? Yes

Manually Set To:



7 Summary

RIC completed the preceding analysis to study the traffic impacts associated with a proposed development located northeast of NE Colbern Road & Rice Road in Lee's Summit, MO.

Based on the traffic analysis completed for the Existing Conditions scenario, the following summary is provided:

- All study intersections currently operate with an acceptable LOS except for the northbound approach at Colbern Road and Rice Road, with a LOS F for the PM Peak Hour.

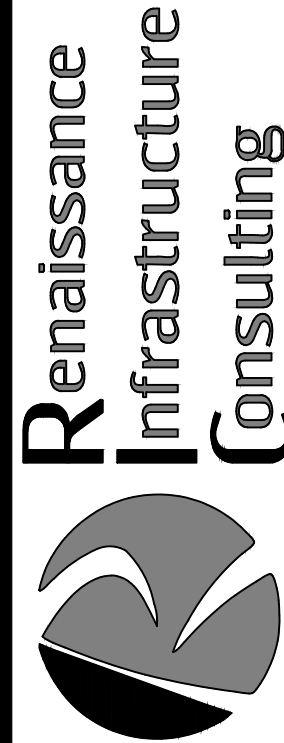
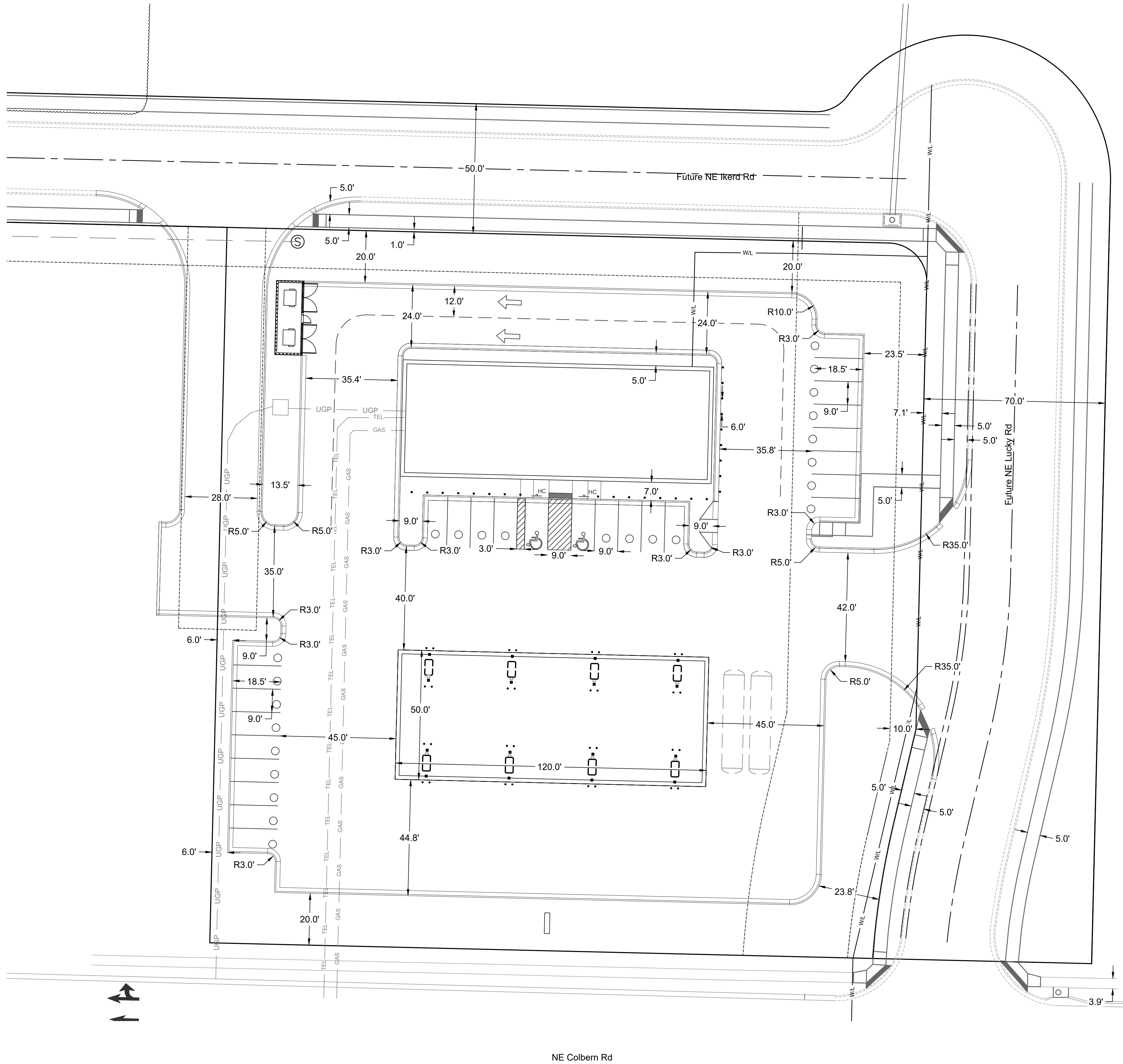
Based on the traffic analysis completed for the Existing plus Proposed Conditions scenario, the following summary is provided.

- The curb return of Lucky Road intersecting Colbern Road is currently proposed with a 25-foot radius. To meet city requirements for a Commercial Collector, the radius should be increased to 35 feet, measured at the back of curb.
- The proposed location of the gas station driveway on Lucky Road does not meet the city requirement of 300 feet spacing for driveways on Commercial Collectors. It is recommended that a raised median be constructed on Lucky Road to restrict left turns from the development and northbound left-turn vehicles into the development. The current spacing of approximately 180 feet would provide enough stacking distance for vehicles on the southbound approach of Colbern Road & Lucky Road.

- The throat length of the proposed driveway on Lucky Road does not meet the minimum requirement of 100 feet. However, the 95th percentile queue length for exiting vehicles from the development was determined to be 25 feet, lower than the proposed throat length of 50 feet.
- The westbound and eastbound left-turn lanes at Colbern Road & Lucky Road should be constructed with a storage length of 200 feet and a taper with two 150-foot reverse curves.
- The westbound left-turn lane at Colbern Road and Rice Road should be constructed with a storage length of 135 feet and a taper with two 150-foot reverse curves.
- A right-turn lane is required to be constructed at Colbern Road & Lucky Road to meet city requirements. A storage length of 200 feet plus 150-foot straight lane taper should be provided. The library driveway to the east of Lucky Road would need to be relocated to fit the required turn lane.
- The proposed intersection of Colbern Road & Lucky Road meets peak hour signal warrants and is recommended to be designed as a signalized intersection.
- All study intersections are expected to operate with acceptable conditions for the Existing plus Proposed conditions with recommended improvements.

Appendix A - Site Plan

zmousel
Nov 07, 2022 8:43am
Z:\RIC Design\2022\22-0113\DrawgSheets\22-0113 PDP-GENLAY-01.dwg



400 E 17TH STREET
KANSAS CITY, MISSOURI 64108
816.800.0950
WWW.RIC-CONSULT.COM

MO Certificate of Authority: E-2010033630

NO.	DATE	REVISION
2	10/11/2022	Revised Per City Comment
1	09/09/2022	PDP Submittal

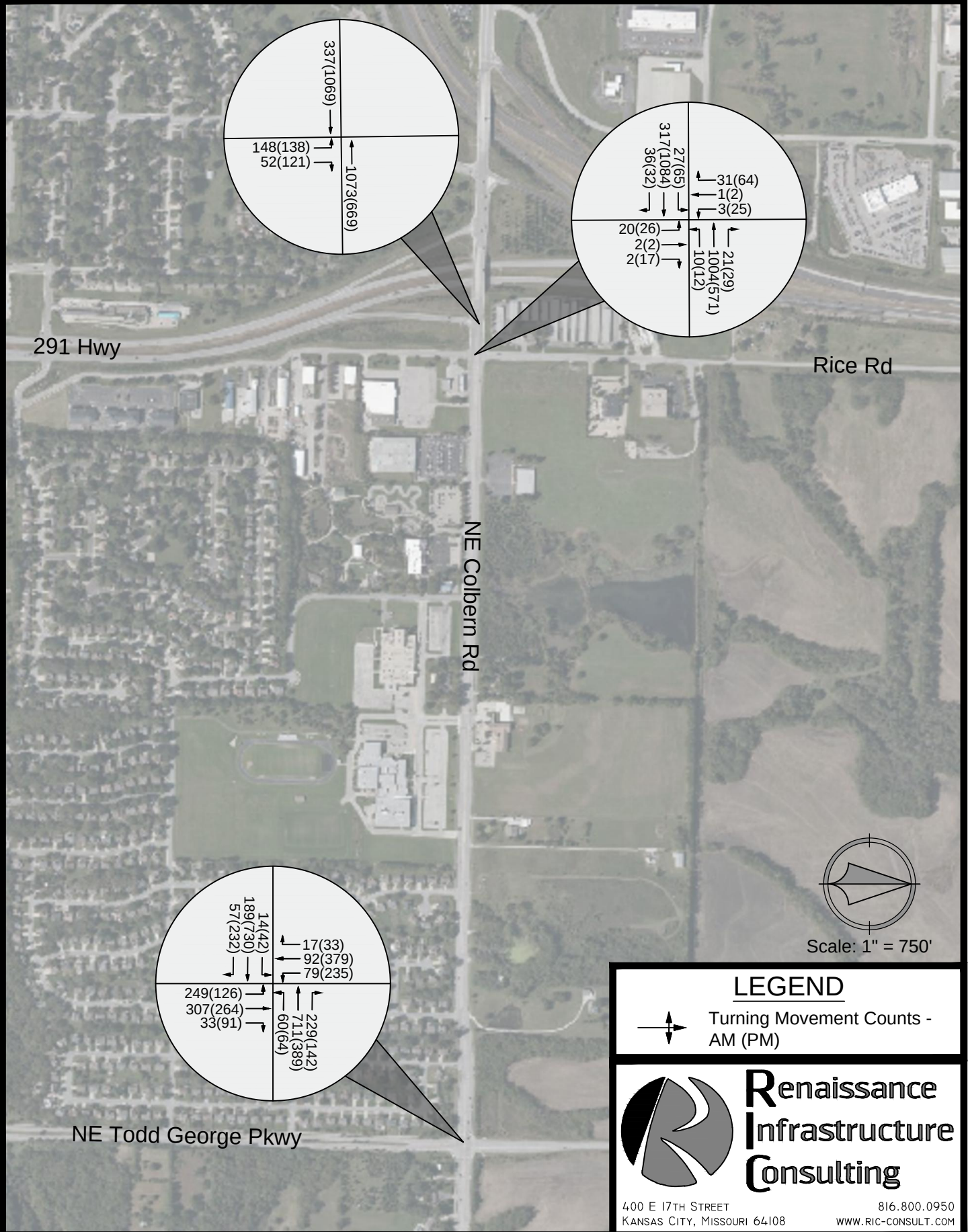
DRAWN BY: ZM
CHECKED BY: DB

Dimension Plan

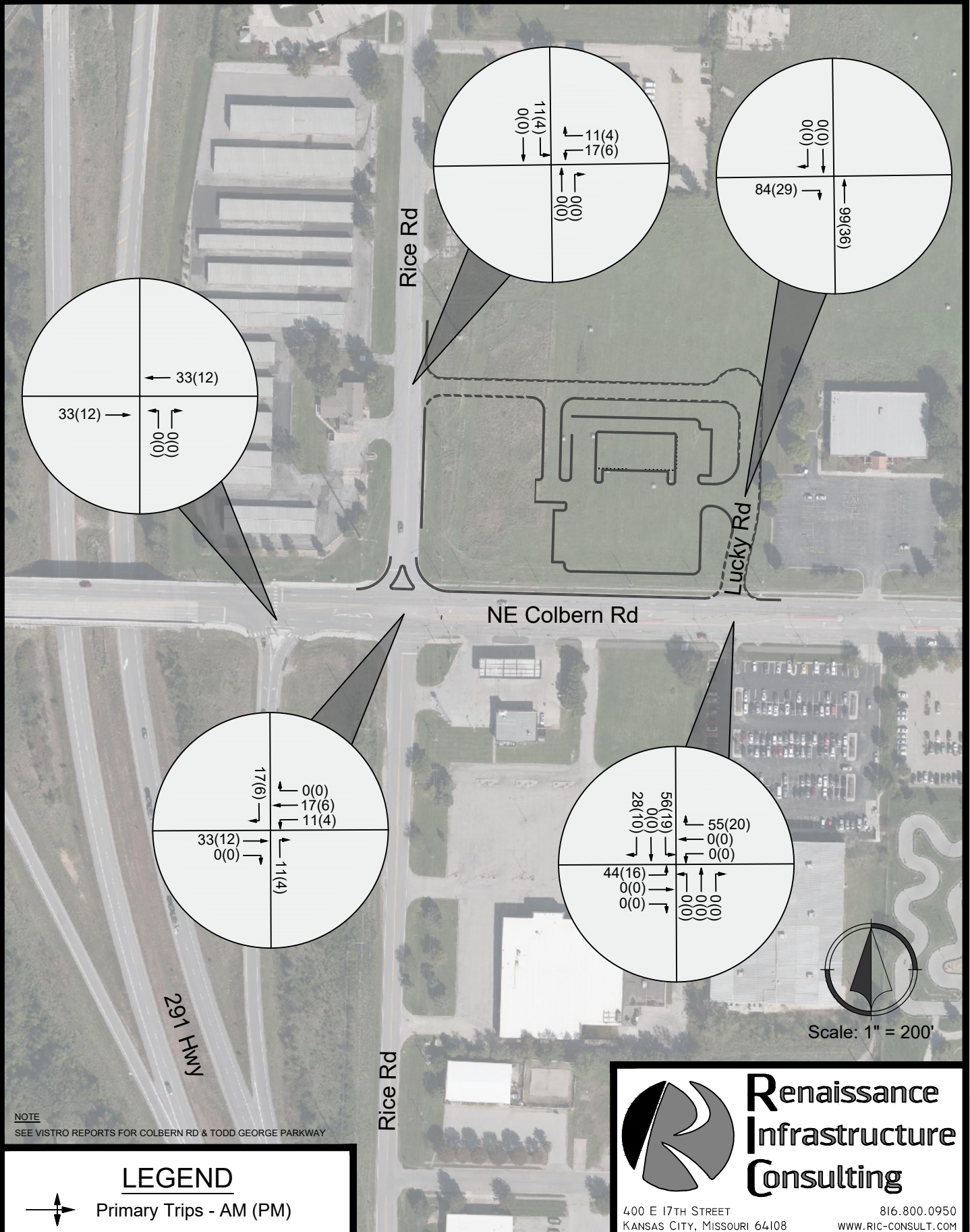
Preliminary Development Plans
22-0133
Heartland Market - Lee's Summit
Lee's Summit, Jackson County, Missouri

Appendix B - Traffic Volumes

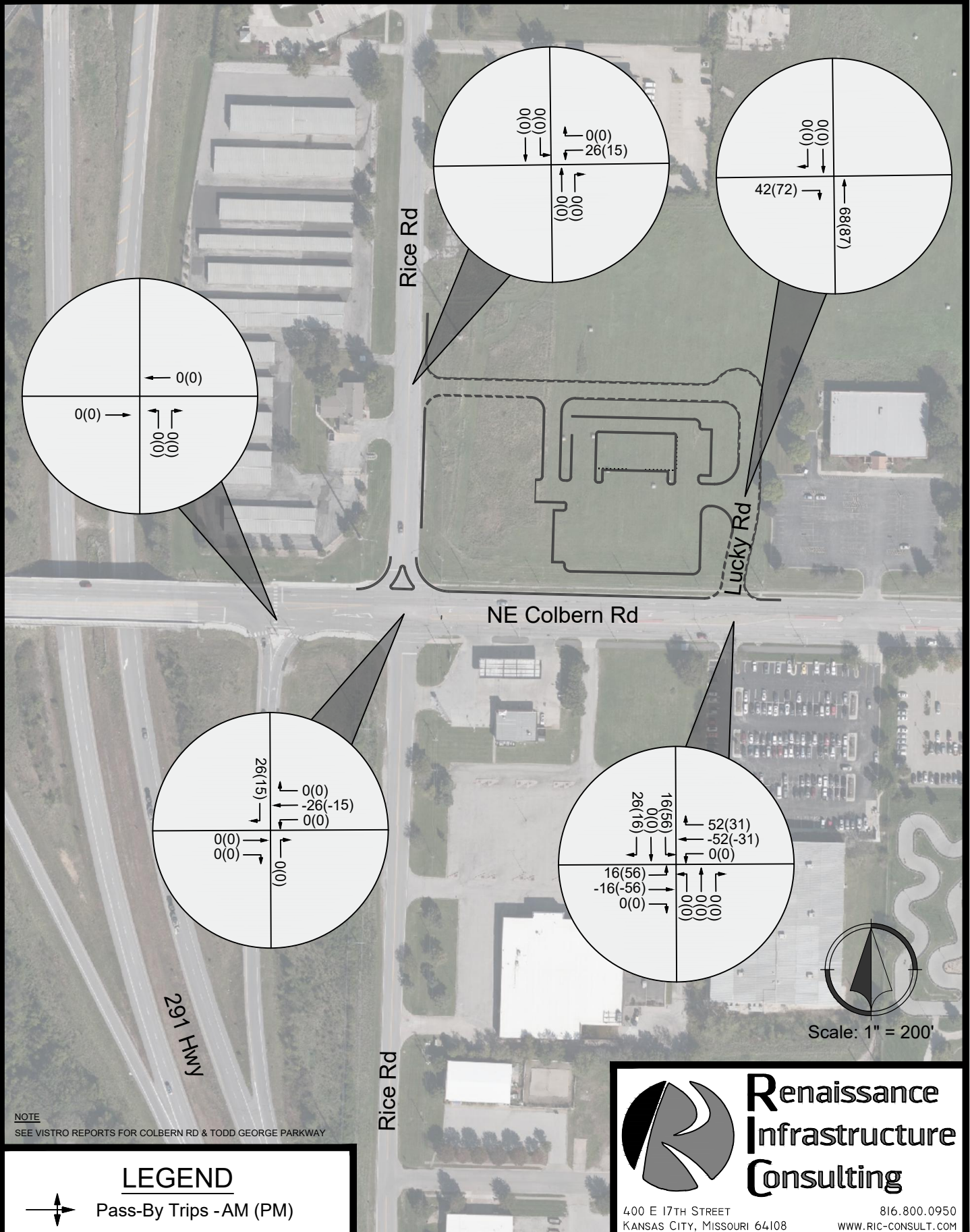
Volume - Existing Conditions



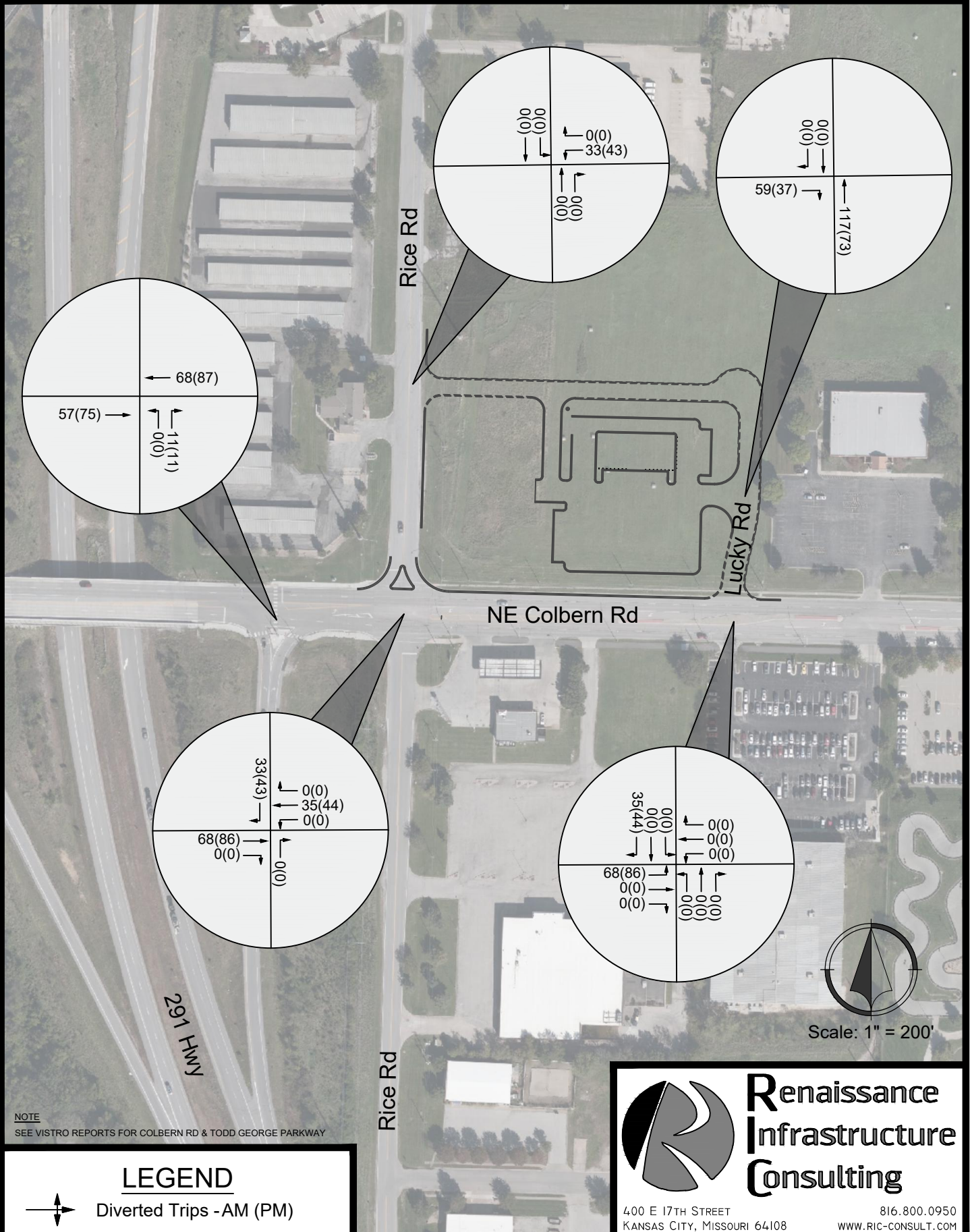
Primary Trips - Existing Plus Proposed Conditions



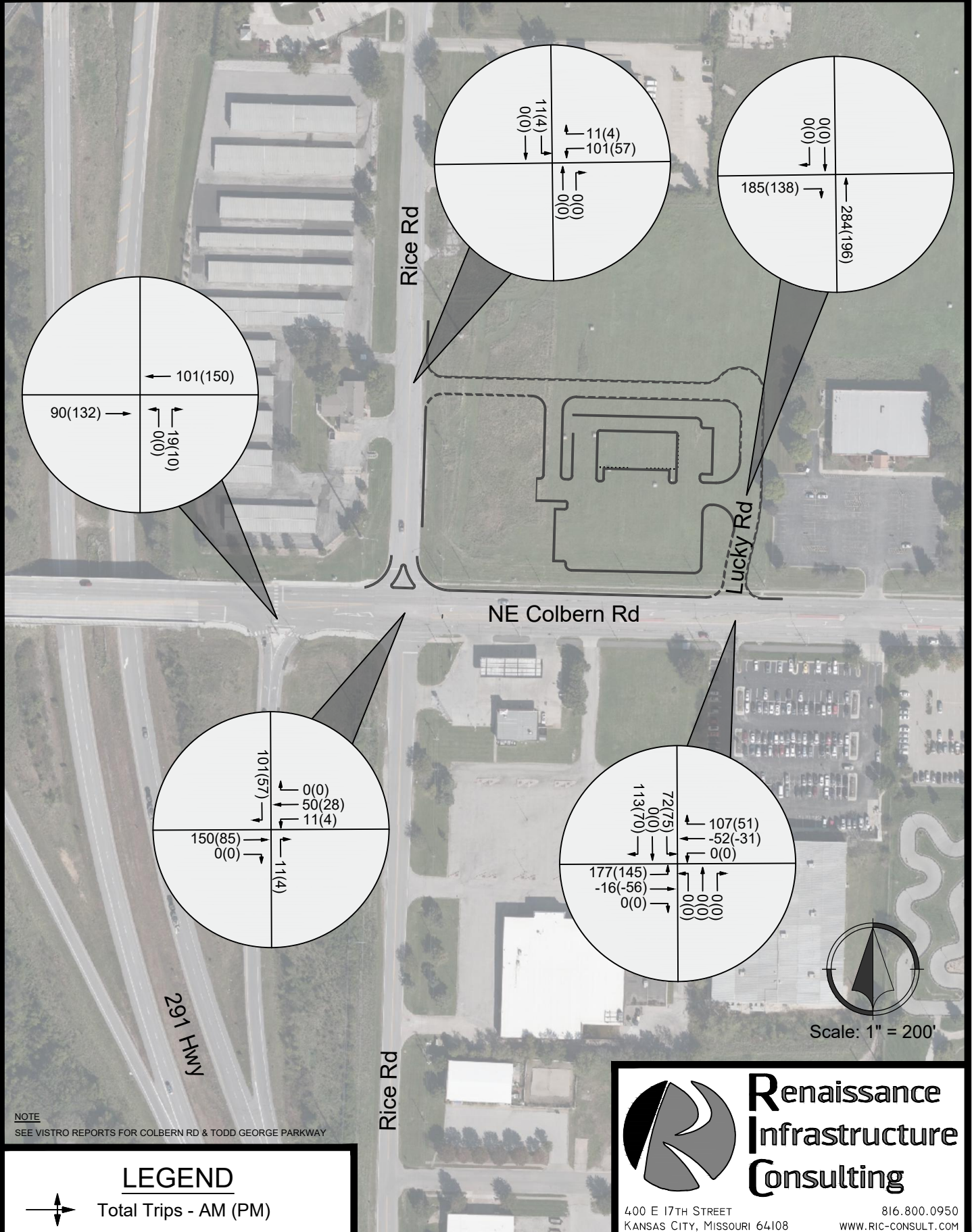
Pass-By Trips - Existing Plus Proposed Conditions



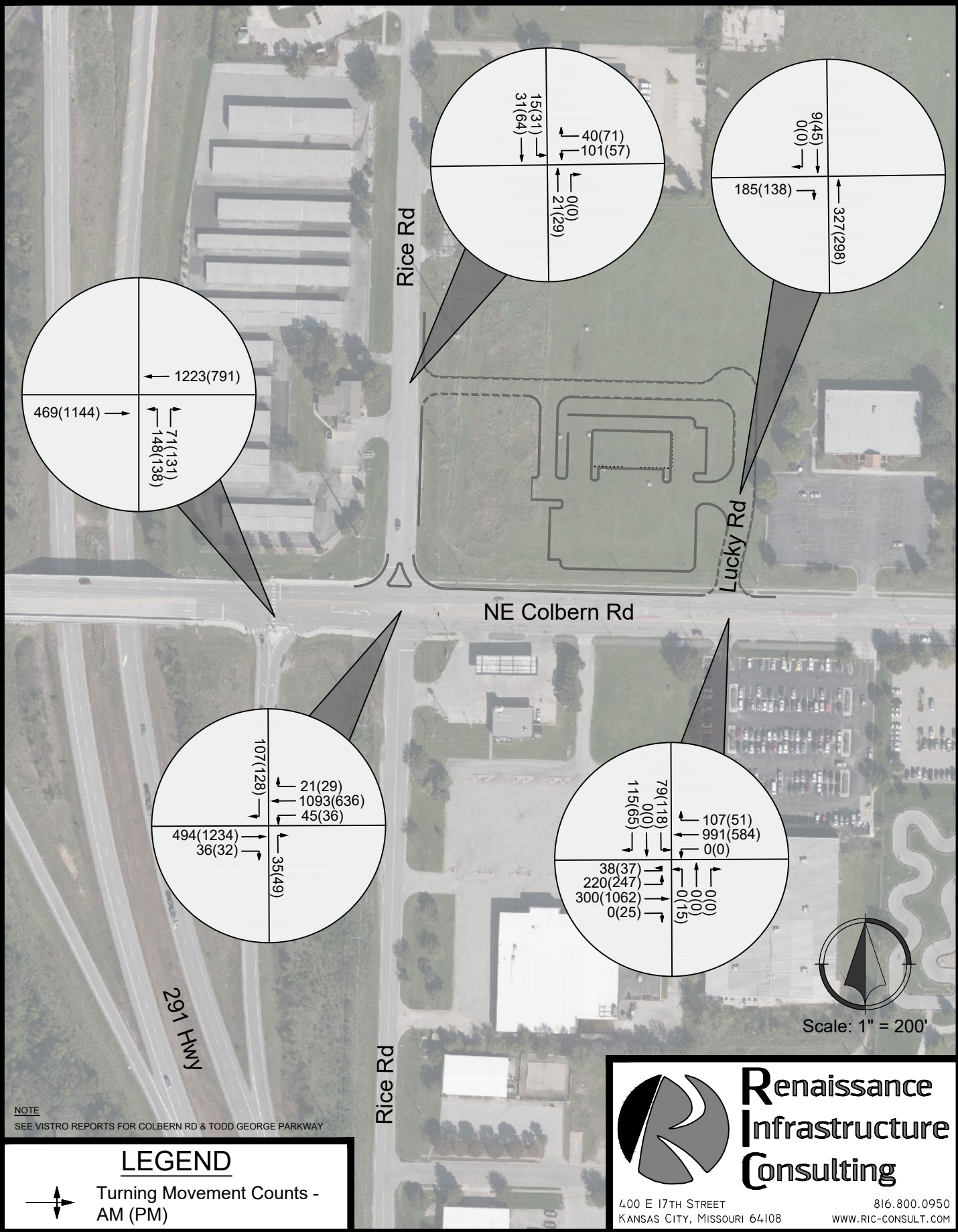
Diverted Trips - Existing Plus Proposed Conditions



Total Trips - Existing Plus Proposed Conditions



Turning Movement Counts - Existing Plus Proposed Conditions w/ Improvements



LEGEND



Turning Movement Counts -
AM (PM)



**Renaissance
Infrastructure
Consulting**

400 E 17TH STREET
KANSAS CITY, MISSOURI 64108

816.800.0950
WWW.RIC-CONSULT.COM

Trip Generation Data for Adjacent Properties

Peak Hour

Date: 10/04/2022

	Colbern Road & Library Driveway							
	NB		SB		EB		WB	
	L	R	L	R	L	R	L	R
4:00 PM	0	0	3	9	8	0	0	7
4:15 PM	0	0	4	14	3	0	0	2
4:30 PM	0	1	2	8	10	0	0	2
4:45 PM	0	1	4	10	15	0	2	10
5:00 PM	7	1	6	14	6	0	2	3
5:15 PM	8	3	6	12	4	3	8	5
5:30 PM	6	5	4	6	13	2	6	1
5:45 PM	0	2	4	5	10	2	0	2

	Colbern Road & Lakeland Church West Driveway							
	NB		SB		EB		WB	
	L	R	L	R	L	R	L	R
4:00 PM	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	10	0	0
5:15 PM	0	0	0	0	0	15	0	0
5:30 PM	0	0	0	0	0	2	0	0
5:45 PM	0	0	0	0	0	1	0	0

Date: 10/06/2022

	Colbern Road & Library Driveway							
	NB		SB		EB		WB	
	L	R	L	R	L	R	L	R
7:00 AM	0	0	0	2	2	0	0	0
7:15 AM	0	0	1	0	1	0	0	0
7:30 AM	0	0	0	0	3	0	0	1
7:45 AM	0	0	2	2	4	0	0	3
8:00 AM	0	0	2	3	6	0	0	1
8:15 AM	0	0	0	3	3	0	0	1
8:30 AM	0	0	0	6	5	0	1	3
8:45 AM	0	0	0	3	8	0	0	2

	Colbern Road & Lakeland Church West Driveway							
	NB		SB		EB		WB	
	L	R	L	R	L	R	L	R
7:00 AM	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0

Colbern Rd & Rice Rd - TMC

Tue Aug 9, 2022

Full Length (7 AM-9 AM, 4 PM-6 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 976528, Location: 38.946176, -94.359562



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Rice Northbound					Rice Southbound					Colbern Eastbound					Colbern Westbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2022-08-09 7:00AM	1	1	1	0	3	2	0	4	0	6	2	41	1	0	44	1	211	6	0	218	271
7:15AM	8	0	0	0	8	1	0	8	0	9	10	70	5	0	85	2	257	7	0	266	368
7:30AM	6	0	2	0	8	0	0	8	0	8	10	86	11	0	107	5	269	8	0	282	405
7:45AM	4	1	0	0	5	2	0	9	0	11	6	77	15	1	99	2	280	5	0	287	402
Hourly Total	19	2	3	0	24	5	0	29	0	34	28	274	32	1	335	10	1017	26	0	1053	1446
8:00AM	2	1	0	0	3	0	1	6	0	7	1	84	5	0	90	1	198	1	0	200	300
8:15AM	10	1	3	0	14	1	2	6	0	9	6	82	5	0	93	1	171	2	0	174	290
8:30AM	1	0	0	0	1	3	1	8	0	12	9	82	7	0	98	0	135	2	0	137	248
8:45AM	4	0	1	0	5	3	0	15	0	18	11	82	9	0	102	1	150	6	0	157	282
Hourly Total	17	2	4	0	23	7	4	35	0	46	27	330	26	0	383	3	654	11	0	668	1120
4:00PM	7	0	3	0	10	3	1	15	0	19	19	210	9	0	238	2	128	7	0	137	404
4:15PM	5	0	1	0	6	2	1	15	0	18	9	198	5	0	212	2	124	5	0	131	367
4:30PM	7	0	5	0	12	10	1	20	0	31	23	250	5	0	278	1	132	7	0	140	461
4:45PM	6	1	3	0	10	6	0	12	0	18	18	266	11	0	295	3	147	8	0	158	481
Hourly Total	25	1	12	0	38	21	3	62	0	86	69	924	30	0	1023	8	531	27	0	566	1713
5:00PM	8	1	4	0	13	5	1	19	0	25	14	268	6	0	288	3	130	9	0	142	468
5:15PM	5	0	5	0	10	4	0	13	0	17	10	300	10	0	320	5	162	5	0	172	519
5:30PM	8	0	6	0	14	2	0	6	0	8	4	257	10	0	271	3	116	2	0	121	414
5:45PM	5	0	1	0	6	2	0	5	0	7	7	230	6	0	243	0	132	0	0	132	388
Hourly Total	26	1	16	0	43	13	1	43	0	57	35	1055	32	0	1122	11	540	16	0	567	1789
Total	87	6	35	0	128	46	8	169	0	223	159	2583	120	1	2863	32	2742	80	0	2854	6068
% Approach	68.0%	4.7%	27.3%	0%	-	20.6%	3.6%	75.8%	0%	-	5.6%	90.2%	4.2%	0%	-	1.1%	96.1%	2.8%	0%	-	-
% Total	1.4%	0.1%	0.6%	0%	2.1%	0.8%	0.1%	2.8%	0%	3.7%	2.6%	42.6%	2.0%	0%	47.2%	0.5%	45.2%	1.3%	0%	47.0%	-
Lights	87	3	34	0	124	46	8	164	0	218	157	2542	108	1	2808	30	2698	80	0	2808	5958
% Lights	100%	50.0%	97.1%	0%	96.9%	100%	100%	97.0%	0%	97.8%	98.7%	98.4%	90.0%	100%	98.1%	93.8%	98.4%	100%	0%	98.4%	98.2%
Articulated Trucks	0	0	0	0	0	0	0	1	0	1	0	6	0	0	6	0	9	0	0	9	16
% Articulated Trucks	0%	0%	0%	0%	0%	0%	0%	0.6%	0%	0.4%	0%	0.2%	0%	0%	0.2%	0%	0.3%	0%	0%	0.3%	0.3%
Buses and Single-Unit Trucks	0	3	1	0	4	0	0	4	0	4	2	35	12	0	49	2	35	0	0	37	94
% Buses and Single-Unit Trucks	0%	50.0%	2.9%	0%	3.1%	0%	0%	2.4%	0%	1.8%	1.3%	1.4%	10.0%	0%	1.7%	6.3%	1.3%	0%	0%	1.3%	1.5%

*L: Left, R: Right, T: Thru, U: U-Turn

Colbern Rd & Rice Rd - TMC

Tue Aug 9, 2022

Full Length (7 AM-9 AM, 4 PM-6 PM)

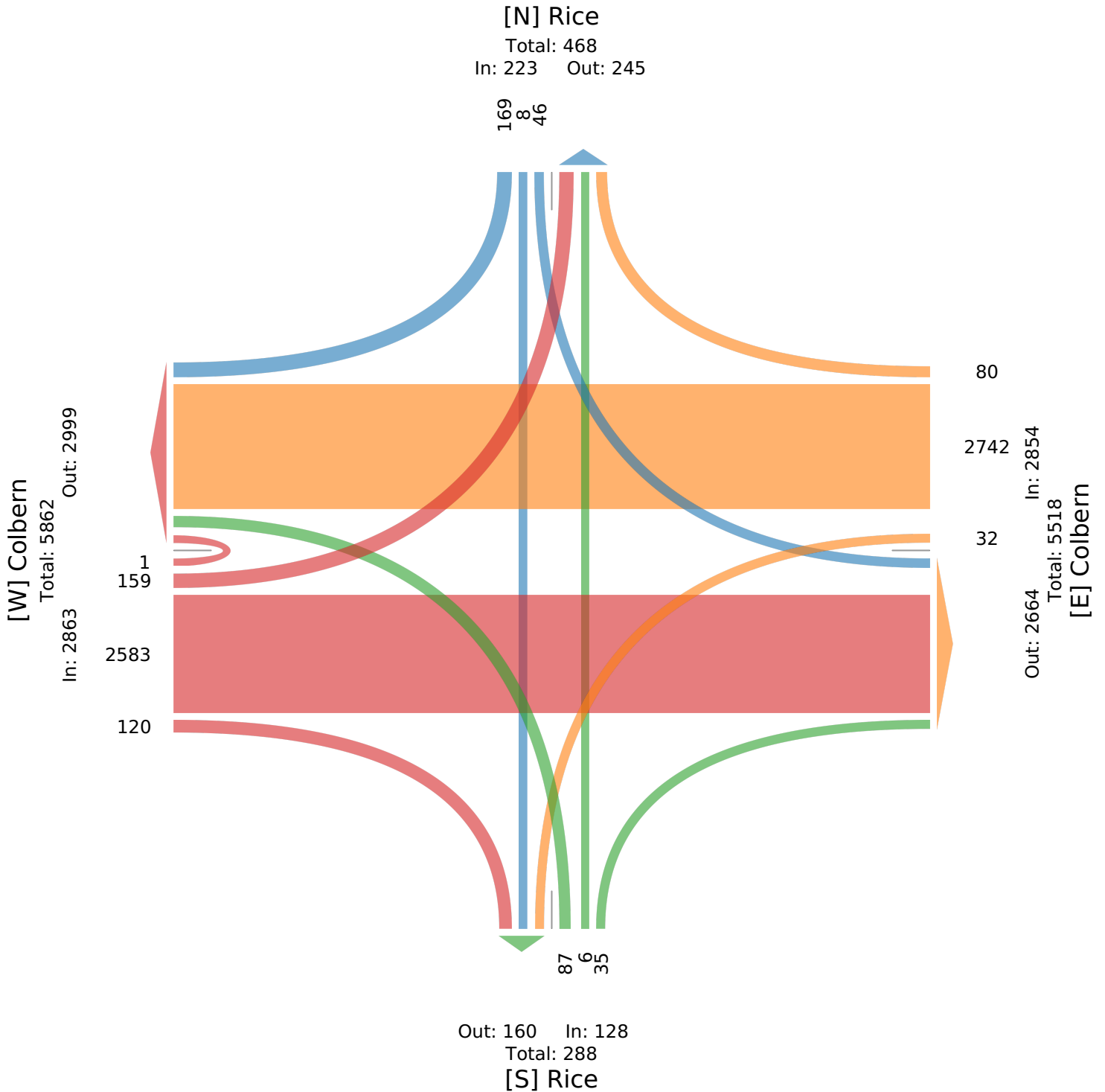
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 976528, Location: 38.946176, -94.359562



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



Colbern Rd & Rice Rd - TMC

Tue Aug 9, 2022

AM Peak (7:15 AM - 8:15 AM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 976528, Location: 38.946176, -94.359562

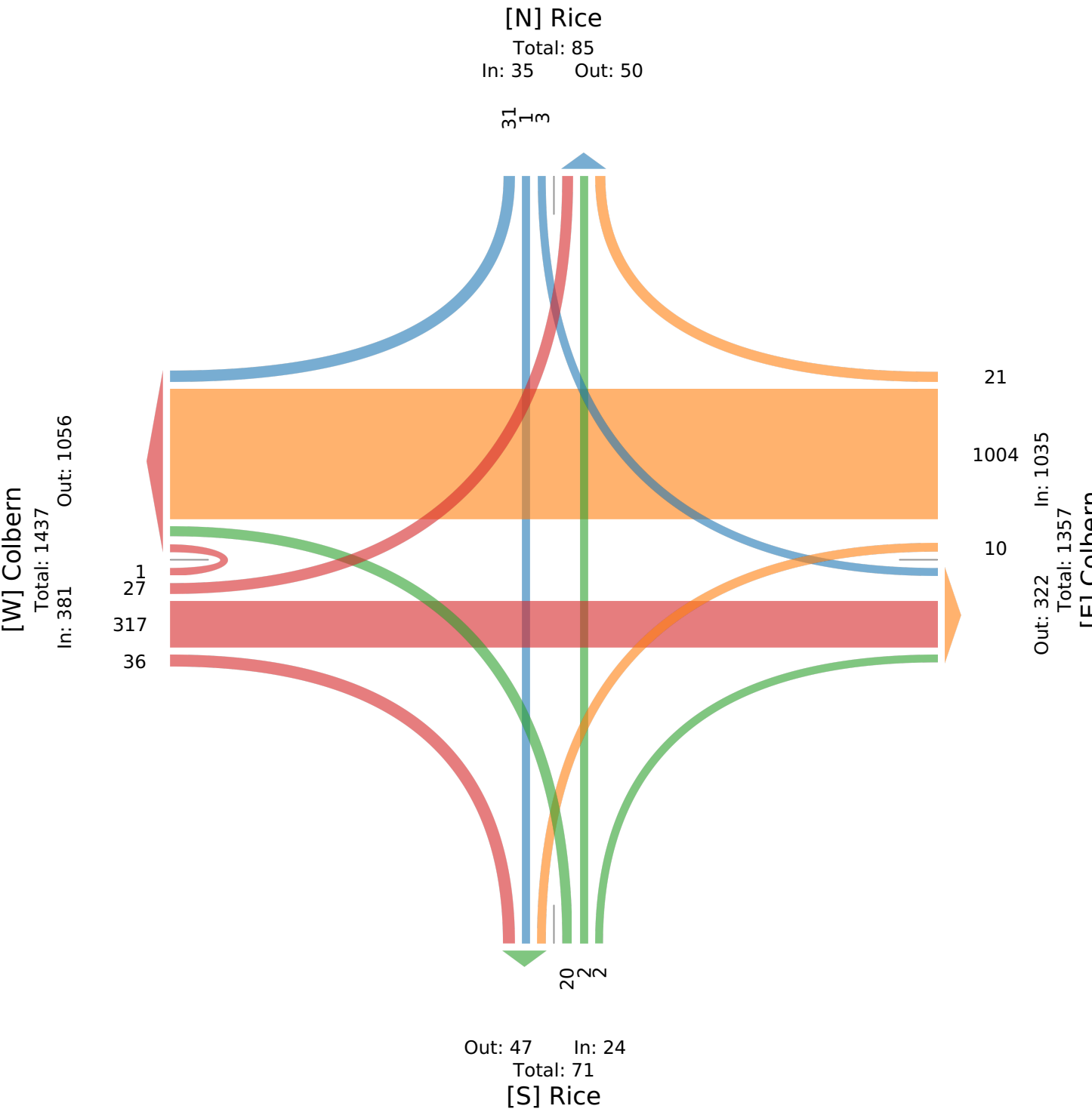


Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Rice Northbound					Rice Southbound					Colbern Eastbound					Colbern Westbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2022-08-09 7:15AM	8	0	0	0	8	1	0	8	0	9	10	70	5	0	85	2	257	7	0	266	368
7:30AM	6	0	2	0	8	0	0	8	0	8	10	86	11	0	107	5	269	8	0	282	405
7:45AM	4	1	0	0	5	2	0	9	0	11	6	77	15	1	99	2	280	5	0	287	402
8:00AM	2	1	0	0	3	0	1	6	0	7	1	84	5	0	90	1	198	1	0	200	300
Total	20	2	2	0	24	3	1	31	0	35	27	317	36	1	381	10	1004	21	0	1035	1475
% Approach	83.3%	8.3%	8.3%	0%	-	8.6%	2.9%	88.6%	0%	-	7.1%	83.2%	9.4%	0.3%	-	1.0%	97.0%	2.0%	0%	-	-
% Total	1.4%	0.1%	0.1%	0%	1.6%	0.2%	0.1%	2.1%	0%	2.4%	1.8%	21.5%	2.4%	0.1%	25.8%	0.7%	68.1%	1.4%	0%	70.2%	-
PHF	0.625	0.500	0.250	-	0.750	0.375	0.250	0.861	-	0.795	0.675	0.922	0.600	0.250	0.890	0.500	0.896	0.656	-	0.902	0.910
Lights	20	1	2	0	23	3	1	30	0	34	27	299	33	1	360	9	993	21	0	1023	1440
% Lights	100%	50.0%	100%	0%	95.8%	100%	100%	96.8%	0%	97.1%	100%	94.3%	91.7%	100%	94.5%	90.0%	98.9%	100%	0%	98.8%	97.6%
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	2
% Articulated Trucks	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.3%	0%	0%	0.3%	0%	0.1%	0%	0%	0.1%	0.1%
Buses and Single-Unit Trucks	0	1	0	0	1	0	0	1	0	1	0	17	3	0	20	1	10	0	0	11	33
% Buses and Single-Unit Trucks	0%	50.0%	0%	0%	4.2%	0%	0%	3.2%	0%	2.9%	0%	5.4%	8.3%	0%	5.2%	10.0%	1.0%	0%	0%	1.1%	2.2%

* L: Left, R: Right, T: Thru, U: U-Turn

Colbern Rd & Rice Rd - TMC
Tue Aug 9, 2022
AM Peak (7:15 AM - 8:15 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 976528, Location: 38.946176, -94.359562



Colbern Rd & Rice Rd - TMC

Tue Aug 9, 2022

PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 976528, Location: 38.946176, -94.359562



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Rice Northbound					Rice Southbound					Colbern Eastbound					Colbern Westbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2022-08-09 4:30PM	7	0	5	0	12	10	1	20	0	31	23	250	5	0	278	1	132	7	0	140	461
4:45PM	6	1	3	0	10	6	0	12	0	18	18	266	11	0	295	3	147	8	0	158	481
5:00PM	8	1	4	0	13	5	1	19	0	25	14	268	6	0	288	3	130	9	0	142	468
5:15PM	5	0	5	0	10	4	0	13	0	17	10	300	10	0	320	5	162	5	0	172	519
Total	26	2	17	0	45	25	2	64	0	91	65	1084	32	0	1181	12	571	29	0	612	1929
% Approach	57.8%	4.4%	37.8%	0%	-	27.5%	2.2%	70.3%	0%	-	5.5%	91.8%	2.7%	0%	-	2.0%	93.3%	4.7%	0%	-	-
% Total	1.3%	0.1%	0.9%	0%	2.3%	1.3%	0.1%	3.3%	0%	4.7%	3.4%	56.2%	1.7%	0%	61.2%	0.6%	29.6%	1.5%	0%	31.7%	-
PHF	0.813	0.500	0.850	-	0.865	0.625	0.500	0.800	-	0.734	0.707	0.903	0.727	-	0.923	0.600	0.881	0.806	-	0.890	0.929
Lights	26	2	17	0	45	25	2	63	0	90	64	1076	31	0	1171	12	561	29	0	602	1908
% Lights	100%	100%	100%	0%	100%	100%	100%	98.4%	0%	98.9%	98.5%	99.3%	96.9%	0%	99.2%	100%	98.2%	100%	0%	98.4%	98.9%
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	2
% Articulated Trucks	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.1%	0%	0%	0.1%	0%	0.2%	0%	0%	0.2%	0.1%
Buses and Single-Unit Trucks	0	0	0	0	0	0	0	1	0	1	1	7	1	0	9	0	9	0	0	9	19
% Buses and Single-Unit Trucks	0%	0%	0%	0%	0%	0%	0%	1.6%	0%	1.1%	1.5%	0.6%	3.1%	0%	0.8%	0%	1.6%	0%	0%	1.5%	1.0%

* L: Left, R: Right, T: Thru, U: U-Turn

Colbern Rd & Rice Rd - TMC

Tue Aug 9, 2022

PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour

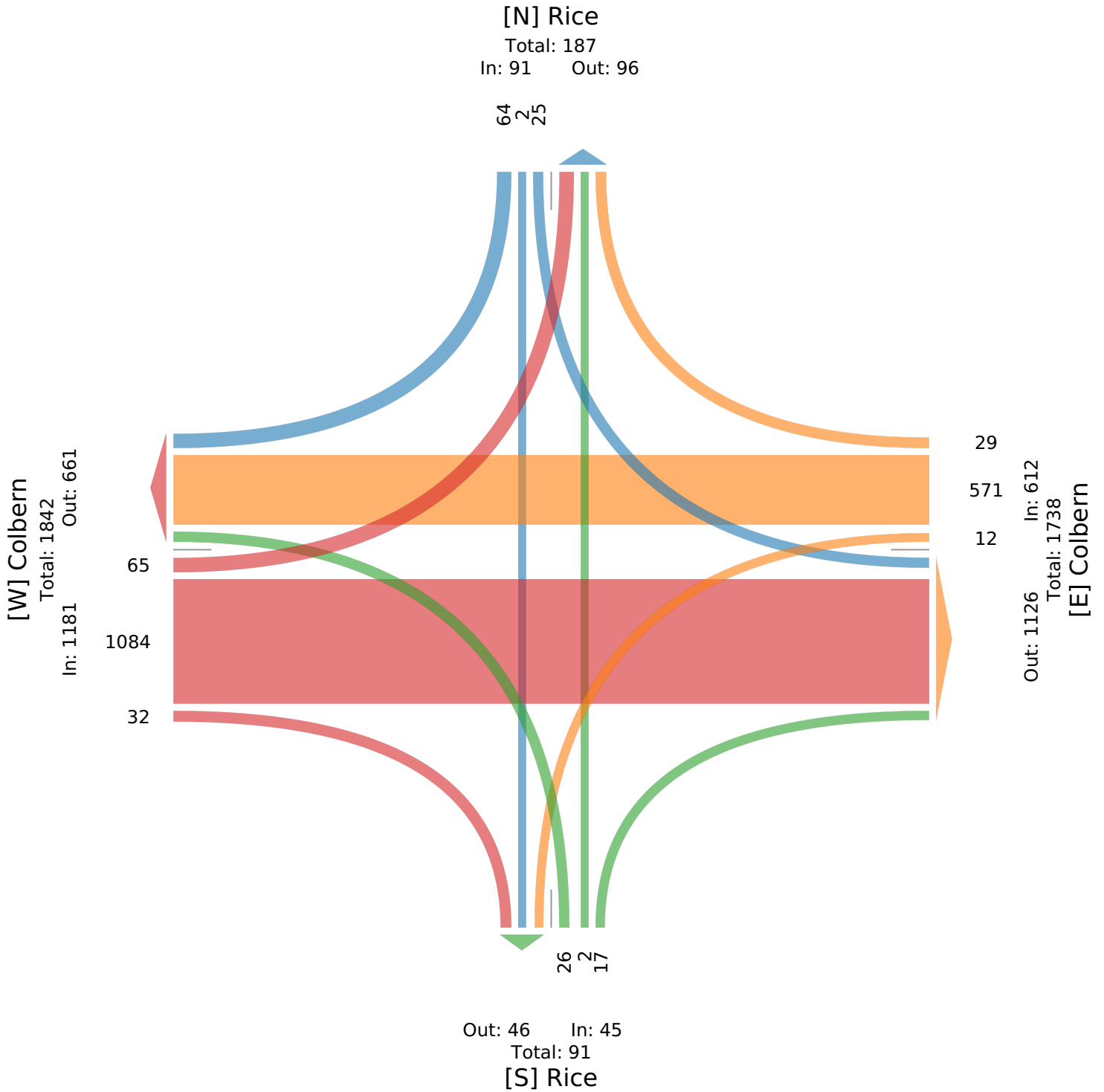
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 976528, Location: 38.946176, -94.359562



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



291 Hwy & Northbound Ramp - TMC

Tue Aug 9, 2022

Full Length (7 AM-9 AM, 4 PM-6 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 976529, Location: 38.946164, -94.360232

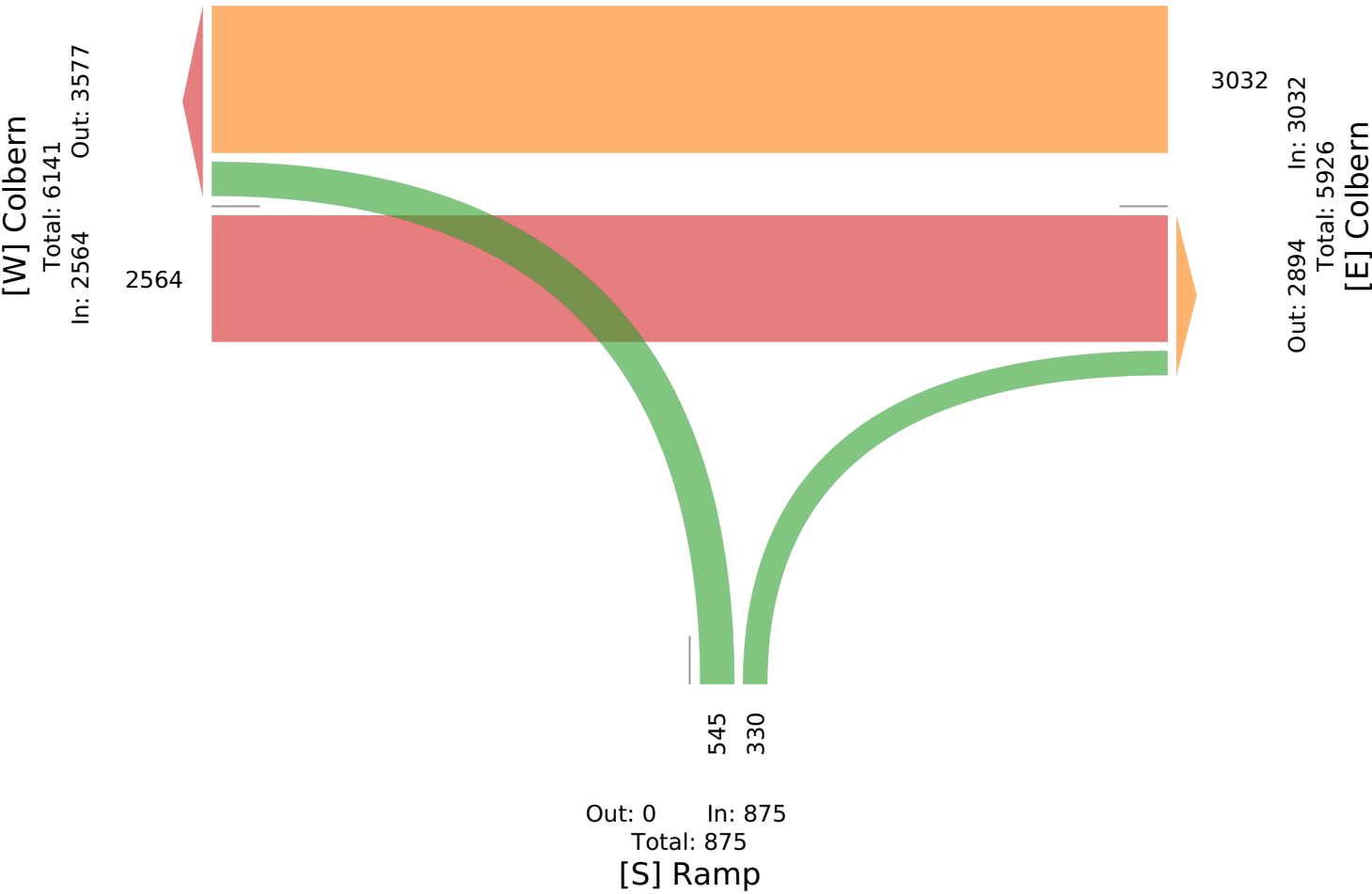


Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Ramp Northbound				Colbern Eastbound				Colbern Westbound				
Time	L	R	U	App	T	R	U	App	L	T	U	App	Int
2022-08-09 7:00AM	40	7	0	47	43	0	0	43	0	214	0	214	304
7:15AM	48	12	0	60	73	0	0	73	0	280	0	280	413
7:30AM	34	19	0	53	90	0	0	90	0	285	0	285	428
7:45AM	41	8	0	49	92	0	0	92	0	300	0	300	441
Hourly Total	163	46	0	209	298	0	0	298	0	1079	0	1079	1586
8:00AM	25	13	0	38	82	0	0	82	0	208	0	208	328
8:15AM	36	19	0	55	76	0	0	76	0	188	0	188	319
8:30AM	30	16	0	46	85	0	0	85	0	141	0	141	272
8:45AM	33	15	0	48	84	0	0	84	0	173	0	173	305
Hourly Total	124	63	0	187	327	0	0	327	0	710	0	710	1224
4:00PM	32	23	0	55	214	0	0	214	0	153	0	153	422
4:15PM	24	16	0	40	199	0	0	199	0	146	0	146	385
4:30PM	34	23	0	57	255	0	0	255	0	159	0	159	471
4:45PM	30	35	0	65	262	0	0	262	0	169	0	169	496
Hourly Total	120	97	0	217	930	0	0	930	0	627	0	627	1774
5:00PM	45	29	0	74	263	0	0	263	0	157	0	157	494
5:15PM	29	34	0	63	289	0	0	289	0	184	0	184	536
5:30PM	38	25	0	63	245	0	0	245	0	134	0	134	442
5:45PM	26	36	0	62	212	0	0	212	0	141	0	141	415
Hourly Total	138	124	0	262	1009	0	0	1009	0	616	0	616	1887
Total	545	330	0	875	2564	0	0	2564	0	3032	0	3032	6471
% Approach	62.3%	37.7%	0%	-	100%	0%	0%	-	0%	100%	0%	-	-
% Total	8.4%	5.1%	0%	13.5%	39.6%	0%	0%	39.6%	0%	46.9%	0%	46.9%	-
Lights	526	322	0	848	2503	0	0	2503	0	2983	0	2983	6334
% Lights	96.5%	97.6%	0%	96.9%	97.6%	0%	0%	97.6%	0%	98.4%	0%	98.4%	97.9%
Articulated Trucks	2	1	0	3	4	0	0	4	0	9	0	9	16
% Articulated Trucks	0.4%	0.3%	0%	0.3%	0.2%	0%	0%	0.2%	0%	0.3%	0%	0.3%	0.2%
Buses and Single-Unit Trucks	17	7	0	24	57	0	0	57	0	40	0	40	121
% Buses and Single-Unit Trucks	3.1%	2.1%	0%	2.7%	2.2%	0%	0%	2.2%	0%	1.3%	0%	1.3%	1.9%

*L: Left, R: Right, T: Thru, U: U-Turn

291 Hwy & Northbound Ramp - TMC
Tue Aug 9, 2022
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 976529, Location: 38.946164, -94.360232



291 Hwy & Northbound Ramp - TMC

Tue Aug 9, 2022

AM Peak (7:15 AM - 8:15 AM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 976529, Location: 38.946164, -94.360232



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Ramp Northbound				Colbern Eastbound				Colbern Westbound				
Time	L	R	U	App	T	R	U	App	L	T	U	App	Int
2022-08-09 7:15AM	48	12	0	60	73	0	0	73	0	280	0	280	413
7:30AM	34	19	0	53	90	0	0	90	0	285	0	285	428
7:45AM	41	8	0	49	92	0	0	92	0	300	0	300	441
8:00AM	25	13	0	38	82	0	0	82	0	208	0	208	328
Total	148	52	0	200	337	0	0	337	0	1073	0	1073	1610
% Approach	74.0%	26.0%	0%	-	100%	0%	0%	-	0%	100%	0%	-	-
% Total	9.2%	3.2%	0%	12.4%	20.9%	0%	0%	20.9%	0%	66.6%	0%	66.6%	-
PHF	0.771	0.684	-	0.833	0.916	-	-	0.916	-	0.894	-	0.894	0.913
Lights	143	51	0	194	313	0	0	313	0	1060	0	1060	1567
% Lights	96.6%	98.1%	0%	97.0%	92.9%	0%	0%	92.9%	0%	98.8%	0%	98.8%	97.3%
Articulated Trucks	0	0	0	0	2	0	0	2	0	4	0	4	6
% Articulated Trucks	0%	0%	0%	0%	0.6%	0%	0%	0.6%	0%	0.4%	0%	0.4%	0.4%
Buses and Single-Unit Trucks	5	1	0	6	22	0	0	22	0	9	0	9	37
% Buses and Single-Unit Trucks	3.4%	1.9%	0%	3.0%	6.5%	0%	0%	6.5%	0%	0.8%	0%	0.8%	2.3%

* L: Left, R: Right, T: Thru, U: U-Turn

291 Hwy & Northbound Ramp - TMC

Tue Aug 9, 2022

AM Peak (7:15 AM - 8:15 AM)

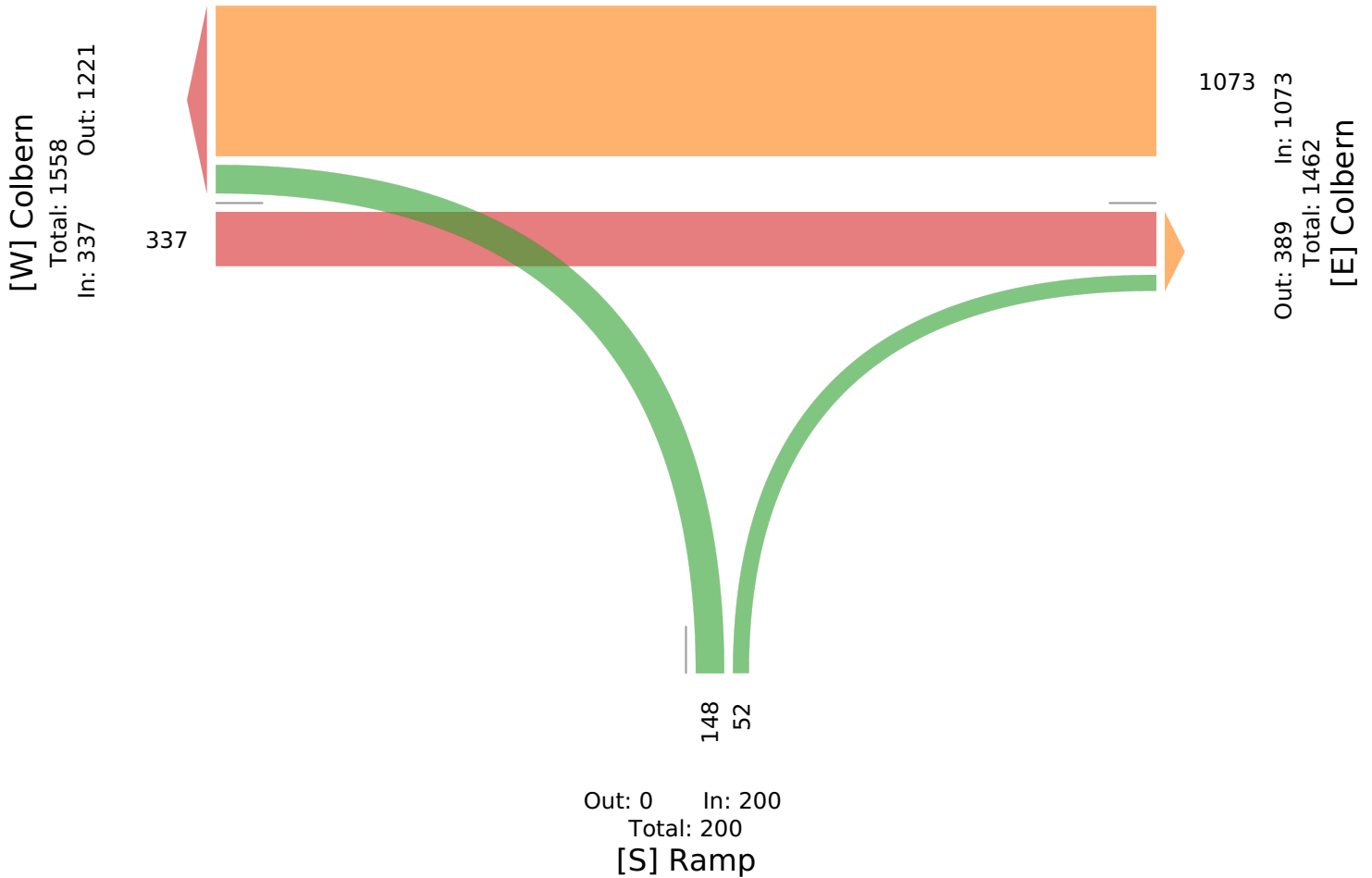
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 976529, Location: 38.946164, -94.360232



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



291 Hwy & Northbound Ramp - TMC

Tue Aug 9, 2022

PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 976529, Location: 38.946164, -94.360232

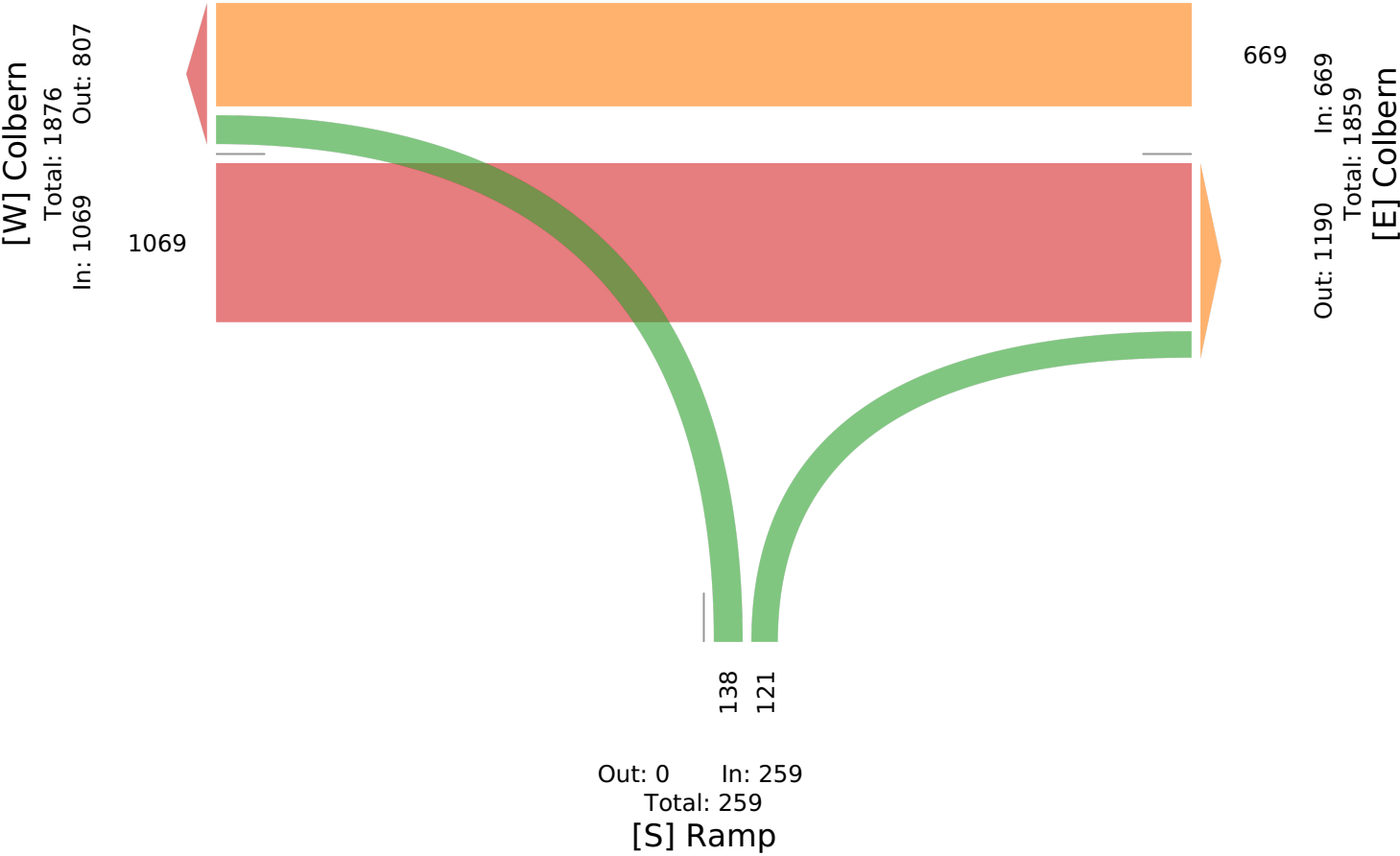


Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Ramp Northbound				Colbern Eastbound				Colbern Westbound				
Time	L	R	U	App	T	R	U	App	L	T	U	App	Int
2022-08-09 4:30PM	34	23	0	57	255	0	0	255	0	159	0	159	471
4:45PM	30	35	0	65	262	0	0	262	0	169	0	169	496
5:00PM	45	29	0	74	263	0	0	263	0	157	0	157	494
5:15PM	29	34	0	63	289	0	0	289	0	184	0	184	536
Total	138	121	0	259	1069	0	0	1069	0	669	0	669	1997
% Approach	53.3%	46.7%	0%	-	100%	0%	0%	-	0%	100%	0%	-	-
% Total	6.9%	6.1%	0%	13.0%	53.5%	0%	0%	53.5%	0%	33.5%	0%	33.5%	-
PHF	0.767	0.864	-	0.875	0.925	-	-	0.925	-	0.909	-	0.909	0.931
Lights	136	120	0	256	1055	0	0	1055	0	658	0	658	1969
% Lights	98.6%	99.2%	0%	98.8%	98.7%	0%	0%	98.7%	0%	98.4%	0%	98.4%	98.6%
Articulated Trucks	0	0	0	0	1	0	0	1	0	1	0	1	2
% Articulated Trucks	0%	0%	0%	0%	0.1%	0%	0%	0.1%	0%	0.1%	0%	0.1%	0.1%
Buses and Single-Unit Trucks	2	1	0	3	13	0	0	13	0	10	0	10	26
% Buses and Single-Unit Trucks	1.4%	0.8%	0%	1.2%	1.2%	0%	0%	1.2%	0%	1.5%	0%	1.5%	1.3%

* L: Left, R: Right, T: Thru, U: U-Turn

291 Hwy & Northbound Ramp - TMC
Tue Aug 9, 2022
PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 976529, Location: 38.946164, -94.360232



Colbern Rd & Phillips 66 Driveway - TMC

Tue Aug 9, 2022

Full Length (7 AM-9 AM, 4 PM-6 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 976527, Location: 38.946122, -94.358941

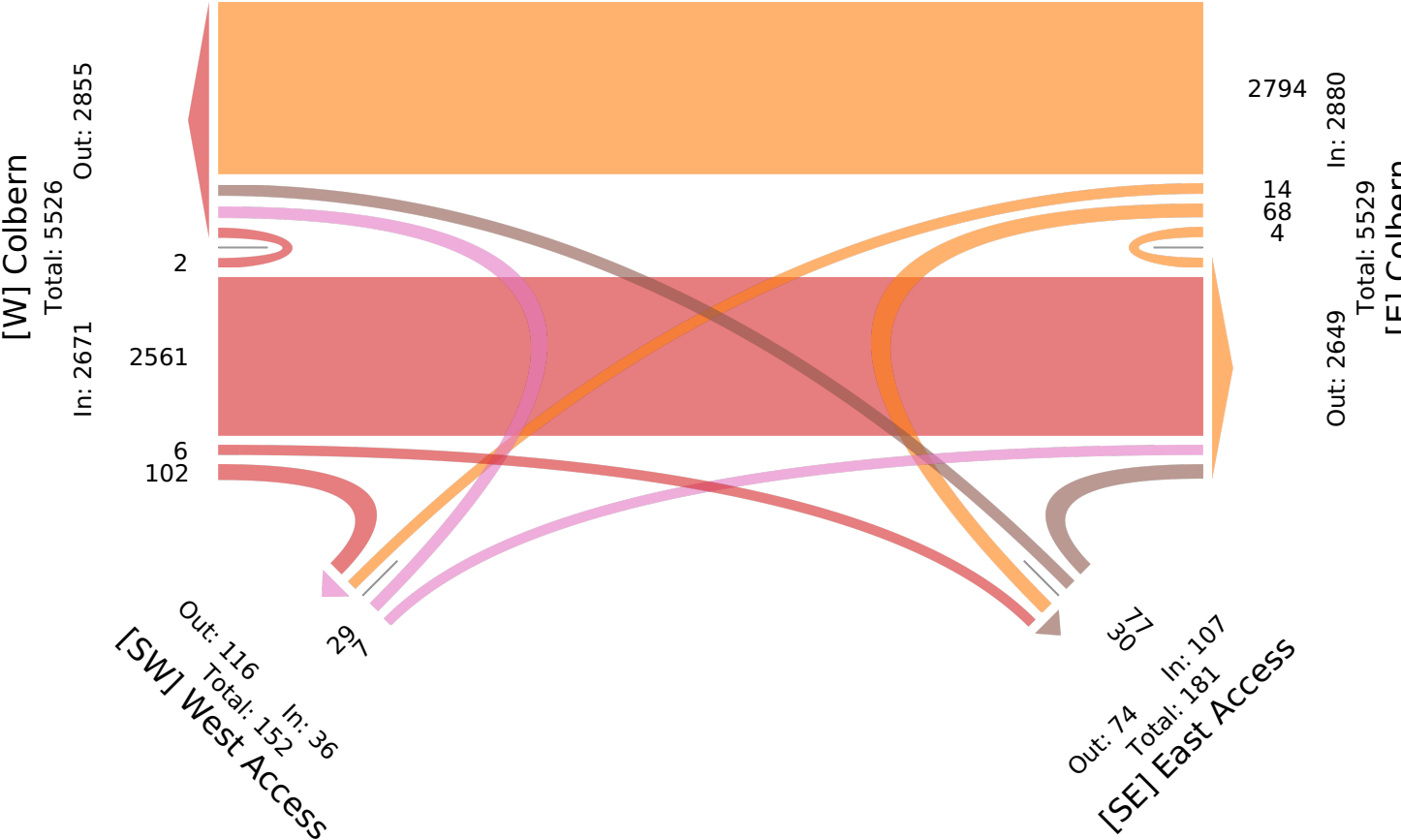


Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Colbern Eastbound					Colbern Westbound					West Access Northeastbound					East Access Northwestbound					
Time	T	BR	HR	U	App	HL	BL	T	U	App	HL	BR	R	U	App	L	BL	HR	U	App	Int
2022-08-09 7:00AM	41	0	3	0	44	8	2	213	0	223	5	0	0	0	5	0	2	4	0	6	278
7:15AM	68	0	4	0	72	5	0	266	0	271	2	0	0	0	2	0	3	0	0	3	348
7:30AM	85	0	2	0	87	10	1	279	0	290	2	2	0	0	4	0	2	2	0	4	385
7:45AM	75	0	5	0	80	5	0	277	0	282	0	0	0	0	0	0	4	3	0	7	369
Hourly Total	269	0	14	0	283	28	3	1035	0	1066	9	2	0	0	11	0	11	9	0	20	1380
8:00AM	81	0	5	0	86	2	0	198	0	200	2	0	0	0	2	0	3	0	0	3	291
8:15AM	81	2	5	0	88	2	0	170	0	172	3	0	0	0	3	0	2	2	0	4	267
8:30AM	83	2	2	0	87	5	0	140	0	145	0	1	0	0	1	0	1	4	0	5	238
8:45AM	77	0	5	0	82	4	4	150	0	158	2	0	0	0	2	0	2	5	0	7	249
Hourly Total	322	4	17	0	343	13	4	658	0	675	7	1	0	0	8	0	8	11	0	19	1045
4:00PM	207	0	9	0	216	4	0	131	0	135	1	0	0	0	1	0	3	5	0	8	360
4:15PM	197	0	4	0	201	2	0	127	0	129	3	0	0	0	3	0	1	6	0	7	340
4:30PM	258	0	9	0	267	3	1	142	0	146	0	0	0	0	0	0	1	7	0	8	421
4:45PM	264	0	9	0	273	5	3	150	0	158	2	0	0	0	2	0	2	10	0	12	445
Hourly Total	926	0	31	0	957	14	4	550	0	568	6	0	0	0	6	0	7	28	0	35	1566
5:00PM	268	0	7	0	275	3	0	138	1	142	2	0	0	0	2	0	1	8	0	9	428
5:15PM	297	1	13	1	312	2	1	166	0	169	1	1	0	0	2	0	2	4	0	6	489
5:30PM	250	0	9	0	259	3	1	119	0	123	1	3	0	0	4	0	1	10	0	11	397
5:45PM	229	1	11	1	242	5	1	128	3	137	3	0	0	0	3	0	0	7	0	7	389
Hourly Total	1044	2	40	2	1088	13	3	551	4	571	7	4	0	0	11	0	4	29	0	33	1703
Total	2561	6	102	2	2671	68	14	2794	4	2880	29	7	0	0	36	0	30	77	0	107	5694
% Approach	95.9%	0.2%	3.8%	0.1%	-	2.4%	0.5%	97.0%	0.1%	-	80.6%	19.4%	0%	0%	-	0%	28.0%	72.0%	0%	-	-
% Total	45.0%	0.1%	1.8%	0%	46.9%	1.2%	0.2%	49.1%	0.1%	50.6%	0.5%	0.1%	0%	0%	0.6%	0%	0.5%	1.4%	0%	1.9%	-
Lights	2522	5	100	2	2629	68	14	2759	4	2845	28	4	0	0	32	0	30	77	0	107	5613
% Lights	98.5%	83.3%	98.0%	100%	98.4%	100%	100%	98.7%	100%	98.8%	96.6%	57.1%	0%	0%	88.9%	0%	100%	100%	0%	100%	98.6%
Articulated Trucks	10	0	0	0	10	0	0	8	0	8	0	0	0	0	0	0	0	0	0	0	18
% Articulated Trucks	0.4%	0%	0%	0%	0.4%	0%	0%	0.3%	0%	0.3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.3%
Buses and Single-Unit Trucks	29	1	2	0	32	0	0	27	0	27	1	3	0	0	4	0	0	0	0	0	63
% Buses and Single-Unit Trucks	1.1%	16.7%	2.0%	0%	1.2%	0%	0%	1.0%	0%	0.9%	3.4%	42.9%	0%	0%	11.1%	0%	0%	0%	0%	0%	1.1%

*BL: Bear left, BR: Bear right, HL: Hard left, HR: Hard right, L: Left, R: Right, T: Thru, U: U-Turn

Colbern Rd & Phillips 66 Driveway - TMC
Tue Aug 9, 2022
Full Length (7 AM-9 AM, 4 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 976527, Location: 38.946122, -94.358941



Colbern Rd & Phillips 66 Driveway - TMC

Tue Aug 9, 2022

AM Peak (7:15 AM - 8:15 AM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 976527, Location: 38.946122, -94.358941

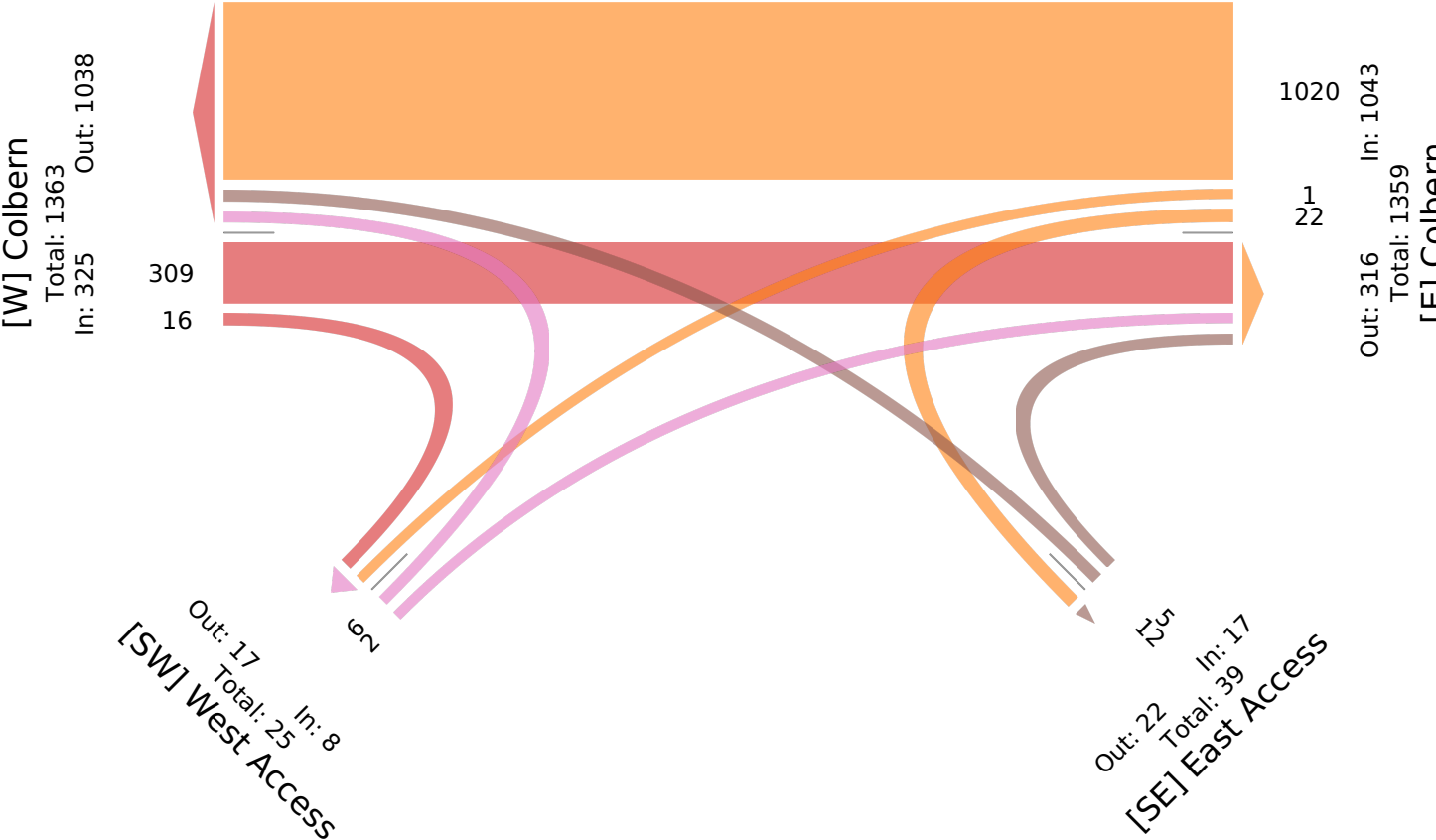


Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Colbern Eastbound					Colbern Westbound					West Access Northeastbound					East Access Northwestbound					
Time	T	BR	HR	U	App	HL	BL	T	U	App	HL	BR	R	U	App	L	BL	HR	U	App	Int
2022-08-09 7:15AM	68	0	4	0	72	5	0	266	0	271	2	0	0	0	2	0	3	0	0	3	348
7:30AM	85	0	2	0	87	10	1	279	0	290	2	2	0	0	4	0	2	2	0	4	385
7:45AM	75	0	5	0	80	5	0	277	0	282	0	0	0	0	0	0	4	3	0	7	369
8:00AM	81	0	5	0	86	2	0	198	0	200	2	0	0	0	2	0	3	0	0	3	291
Total	309	0	16	0	325	22	1	1020	0	1043	6	2	0	0	8	0	12	5	0	17	1393
% Approach	95.1%	0%	4.9%	0%	-	2.1%	0.1%	97.8%	0%	-	75.0%	25.0%	0%	0%	-	0%	70.6%	29.4%	0%	-	-
% Total	22.2%	0%	1.1%	0%	23.3%	1.6%	0.1%	73.2%	0%	74.9%	0.4%	0.1%	0%	0%	0.6%	0%	0.9%	0.4%	0%	1.2%	-
PHF	0.909	-	0.800	-	0.934	0.550	0.250	0.914	-	0.899	0.750	0.250	-	-	0.500	-	0.750	0.417	-	0.607	0.905
Lights	291	0	15	0	306	22	1	1010	0	1033	6	0	0	0	6	0	12	5	0	17	1362
% Lights	94.2%	0%	93.8%	0%	94.2%	100%	100%	99.0%	0%	99.0%	100%	0%	0%	0%	75.0%	0%	100%	100%	0%	100%	97.8%
Articulated Trucks	6	0	0	0	6	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	8
% Articulated Trucks	1.9%	0%	0%	0%	1.8%	0%	0%	0.2%	0%	0.2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.6%
Buses and Single-Unit Trucks	12	0	1	0	13	0	0	8	0	8	0	2	0	0	2	0	0	0	0	0	23
% Buses and Single-Unit Trucks	3.9%	0%	6.3%	0%	4.0%	0%	0%	0.8%	0%	0.8%	0%	100%	0%	0%	25.0%	0%	0%	0%	0%	0%	1.7%

* BL: Bear left, BR: Bear right, HL: Hard left, HR: Hard right, L: Left, R: Right, T: Thru, U: U-Turn

Colbern Rd & Phillips 66 Driveway - TMC
Tue Aug 9, 2022
AM Peak (7:15 AM - 8:15 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Movements
ID: 976527, Location: 38.946122, -94.358941



Colbern Rd & Phillips 66 Driveway - TMC

Tue Aug 9, 2022

PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 976527, Location: 38.946122, -94.358941

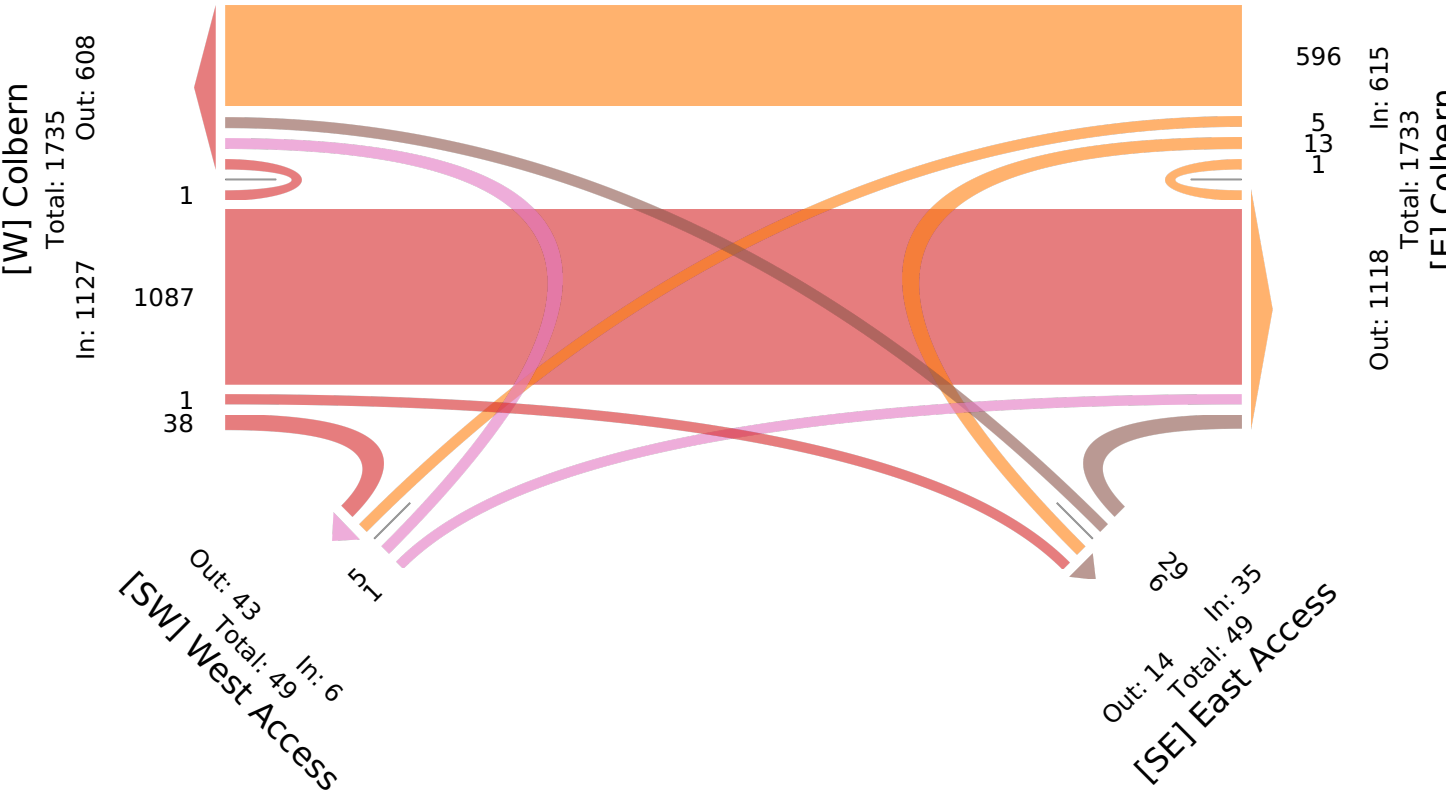


Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Colbern Eastbound					Colbern Westbound					West Access Northeastbound					East Access Northwestbound					
Time	T	BR	HR	U	App	HL	BL	T	U	App	HL	BR	R	U	App	L	BL	HR	U	App	Int
2022-08-09 4:30PM	258	0	9	0	267	3	1	142	0	146	0	0	0	0	0	0	1	7	0	8	421
4:45PM	264	0	9	0	273	5	3	150	0	158	2	0	0	0	2	0	2	10	0	12	445
5:00PM	268	0	7	0	275	3	0	138	1	142	2	0	0	0	2	0	1	8	0	9	428
5:15PM	297	1	13	1	312	2	1	166	0	169	1	1	0	0	2	0	2	4	0	6	489
Total	1087	1	38	1	1127	13	5	596	1	615	5	1	0	0	6	0	6	29	0	35	1783
% Approach	96.5%	0.1%	3.4%	0.1%	-	2.1%	0.8%	96.9%	0.2%	-	83.3%	16.7%	0%	0%	-	0%	17.1%	82.9%	0%	-	-
% Total	61.0%	0.1%	2.1%	0.1%	63.2%	0.7%	0.3%	33.4%	0.1%	34.5%	0.3%	0.1%	0%	0%	0.3%	0%	0.3%	1.6%	0%	2.0%	-
PHF	0.915	0.250	0.731	0.250	0.903	0.650	0.417	0.898	0.250	0.910	0.625	0.250	-	-	0.750	-	0.750	0.725	-	0.729	0.912
Lights	1080	1	38	1	1120	13	5	588	1	607	5	1	0	0	6	0	6	29	0	35	1768
% Lights	99.4%	100%	100%	100%	99.4%	100%	100%	98.7%	100%	98.7%	100%	100%	0%	0%	100%	0%	100%	100%	0%	100%	99.2%
Articulated Trucks	1	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	2
% Articulated Trucks	0.1%	0%	0%	0%	0.1%	0%	0%	0.2%	0%	0.2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.1%
Buses and Single-Unit Trucks	6	0	0	0	6	0	0	7	0	7	0	0	0	0	0	0	0	0	0	0	13
% Buses and Single-Unit Trucks	0.6%	0%	0%	0%	0.5%	0%	0%	1.2%	0%	1.1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.7%

* BL: Bear left, BR: Bear right, HL: Hard left, HR: Hard right, L: Left, R: Right, T: Thru, U: U-Turn

Colbern Rd & Phillips 66 Driveway - TMC
 Tue Aug 9, 2022
 PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour
 All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
 All Movements
 ID: 976527, Location: 38.946122, -94.358941



Northeast Colbern Road & Northeast Todd Geor... - TMC

Tue Aug 9, 2022

Full Length (7 AM-9 AM, 4 PM-6 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 976526, Location: 38.945912, -94.343388



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	TGP Northbound					TGP Southbound					Colbern Eastbound					Colbern Westbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2022-08-09 7:00AM	48	64	4	0	116	12	16	8	0	36	2	27	7	0	36	10	140	40	0	190	378
7:15AM	66	79	6	0	151	12	19	6	0	37	3	45	12	0	60	20	184	57	0	261	509
7:30AM	68	89	11	0	168	21	26	6	0	53	4	49	12	1	66	11	192	45	0	248	535
7:45AM	65	76	7	0	148	18	25	3	0	46	4	41	16	1	62	19	218	76	0	313	569
Hourly Total	247	308	28	0	583	63	86	23	0	172	13	162	47	2	224	60	734	218	0	1012	1991
8:00AM	50	63	9	0	122	28	22	2	0	52	3	54	17	0	74	10	117	51	0	178	426
8:15AM	30	62	10	0	102	24	28	3	0	55	2	53	16	0	71	14	128	29	0	171	399
8:30AM	29	61	19	0	109	33	25	4	0	62	5	51	12	0	68	13	101	42	0	156	395
8:45AM	31	57	12	0	100	30	32	7	0	69	1	64	18	0	83	14	113	36	0	163	415
Hourly Total	140	243	50	0	433	115	107	16	0	238	11	222	63	0	296	51	459	158	0	668	1635
4:00PM	22	50	26	0	98	44	64	6	0	114	9	144	43	0	196	13	95	28	1	137	545
4:15PM	9	55	29	0	93	58	77	6	0	141	10	126	45	1	182	18	81	17	0	116	532
4:30PM	33	58	25	0	116	52	107	8	0	167	5	175	46	0	226	15	91	26	0	132	641
4:45PM	34	70	21	0	125	60	93	5	0	158	8	170	63	0	241	17	93	37	0	147	671
Hourly Total	98	233	101	0	432	214	341	25	0	580	32	615	197	1	845	63	360	108	1	532	2389
5:00PM	33	74	20	0	127	55	90	5	0	150	10	183	54	0	247	15	97	39	0	151	675
5:15PM	26	62	25	0	113	68	89	15	0	172	19	202	69	0	290	17	108	40	0	165	740
5:30PM	19	53	16	0	88	54	75	9	0	138	11	165	50	0	226	16	81	26	0	123	575
5:45PM	31	54	17	0	102	52	57	6	0	115	5	147	53	0	205	13	91	27	0	131	553
Hourly Total	109	243	78	0	430	229	311	35	0	575	45	697	226	0	968	61	377	132	0	570	2543
Total	594	1027	257	0	1878	621	845	99	0	1565	101	1696	533	3	2333	235	1930	616	1	2782	8558
% Approach	31.6%	54.7%	13.7%	0%	-	39.7%	54.0%	6.3%	0%	-	4.3%	72.7%	22.8%	0.1%	-	8.4%	69.4%	22.1%	0%	-	-
% Total	6.9%	12.0%	3.0%	0%	21.9%	7.3%	9.9%	1.2%	0%	18.3%	1.2%	19.8%	6.2%	0%	27.3%	2.7%	22.6%	7.2%	0%	32.5%	-
Lights	590	1015	252	0	1857	603	838	98	0	1539	100	1666	523	3	2292	233	1891	593	1	2718	8406
% Lights	99.3%	98.8%	98.1%	0%	98.9%	97.1%	99.2%	99.0%	0%	98.3%	99.0%	98.2%	98.1%	100%	98.2%	99.1%	98.0%	96.3%	100%	97.7%	98.2%
Articulated Trucks	0	3	1	0	4	8	0	1	0	9	0	5	2	0	7	1	8	7	0	16	36
% Articulated Trucks	0%	0.3%	0.4%	0%	0.2%	1.3%	0%	1.0%	0%	0.6%	0%	0.3%	0.4%	0%	0.3%	0.4%	0.4%	1.1%	0%	0.6%	0.4%
Buses and Single-Unit Trucks	4	9	4	0	17	10	7	0	0	17	1	25	8	0	34	1	31	16	0	48	116
% Buses and Single-Unit Trucks	0.7%	0.9%	1.6%	0%	0.9%	1.6%	0.8%	0%	0%	1.1%	1.0%	1.5%	1.5%	0%	1.5%	0.4%	1.6%	2.6%	0%	1.7%	1.4%

*L: Left, R: Right, T: Thru, U: U-Turn

Northeast Colbern Road & Northeast Todd Geor... - TMC

Tue Aug 9, 2022

Full Length (7 AM-9 AM, 4 PM-6 PM)

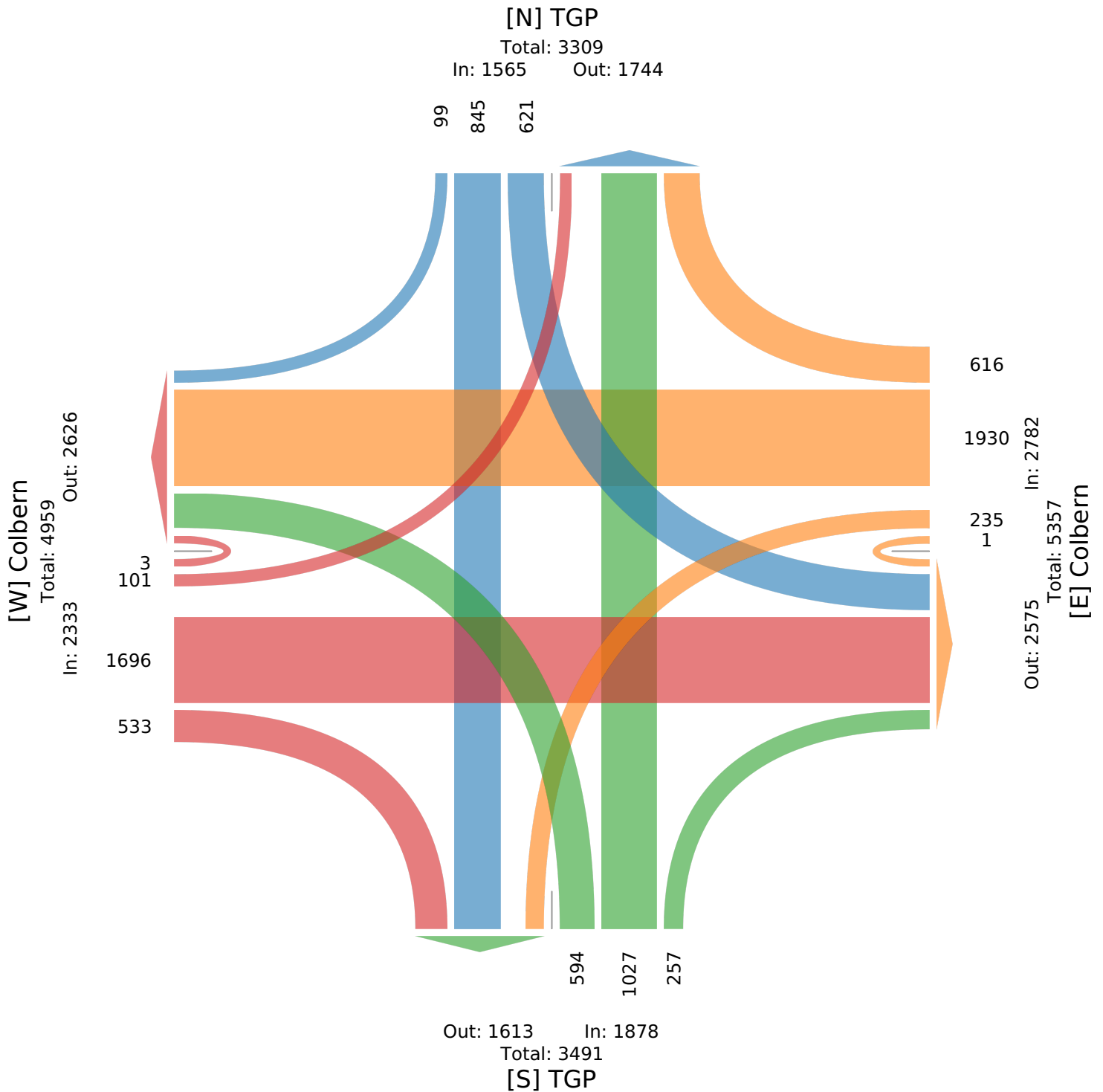
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 976526, Location: 38.945912, -94.343388



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



Northeast Colbern Road & Northeast Todd Geor... - TMC

Tue Aug 9, 2022

AM Peak (7:15 AM - 8:15 AM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 976526, Location: 38.945912, -94.343388



Provided by: Gewalt Hamilton Associates Inc.

625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	TGP Northbound					TGP Southbound					Colbern Eastbound					Colbern Westbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2022-08-09 7:15AM	66	79	6	0	151	12	19	6	0	37	3	45	12	0	60	20	184	57	0	261	509
7:30AM	68	89	11	0	168	21	26	6	0	53	4	49	12	1	66	11	192	45	0	248	535
7:45AM	65	76	7	0	148	18	25	3	0	46	4	41	16	1	62	19	218	76	0	313	569
8:00AM	50	63	9	0	122	28	22	2	0	52	3	54	17	0	74	10	117	51	0	178	426
Total	249	307	33	0	589	79	92	17	0	188	14	189	57	2	262	60	711	229	0	1000	2039
% Approach	42.3%	52.1%	5.6%	0%	-	42.0%	48.9%	9.0%	0%	-	5.3%	72.1%	21.8%	0.8%	-	6.0%	71.1%	22.9%	0%	-	-
% Total	12.2%	15.1%	1.6%	0%	28.9%	3.9%	4.5%	0.8%	0%	9.2%	0.7%	9.3%	2.8%	0.1%	12.8%	2.9%	34.9%	11.2%	0%	49.0%	-
PHF	0.915	0.862	0.750	-	0.876	0.705	0.885	0.708	-	0.887	0.875	0.875	0.838	0.500	0.885	0.750	0.815	0.753	-	0.799	0.896
Lights	248	303	32	0	583	73	90	16	0	179	14	179	52	2	247	59	701	221	0	981	1990
% Lights	99.6%	98.7%	97.0%	0%	99.0%	92.4%	97.8%	94.1%	0%	95.2%	100%	94.7%	91.2%	100%	94.3%	98.3%	98.6%	96.5%	0%	98.1%	97.6%
Articulated Trucks	0	2	0	0	2	3	0	1	0	4	0	2	2	0	4	1	2	3	0	6	16
% Articulated Trucks	0%	0.7%	0%	0%	0.3%	3.8%	0%	5.9%	0%	2.1%	0%	1.1%	3.5%	0%	1.5%	1.7%	0.3%	1.3%	0%	0.6%	0.8%
Buses and Single-Unit Trucks	1	2	1	0	4	3	2	0	0	5	0	8	3	0	11	0	8	5	0	13	33
% Buses and Single-Unit Trucks	0.4%	0.7%	3.0%	0%	0.7%	3.8%	2.2%	0%	0%	2.7%	0%	4.2%	5.3%	0%	4.2%	0%	1.1%	2.2%	0%	1.3%	1.6%

* L: Left, R: Right, T: Thru, U: U-Turn

Northeast Colbern Road & Northeast Todd Geor... - TMC

Tue Aug 9, 2022

AM Peak (7:15 AM - 8:15 AM)

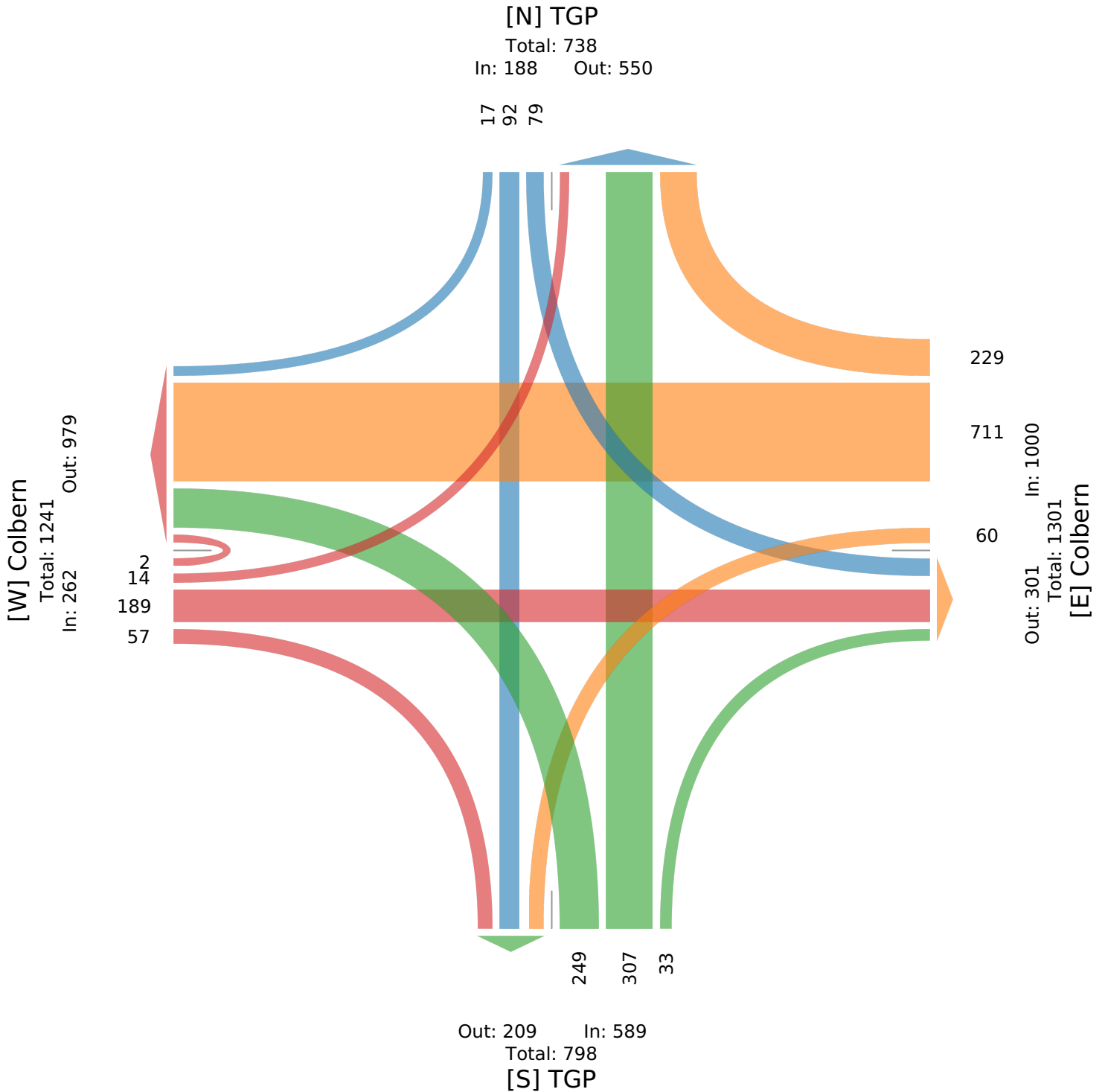
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 976526, Location: 38.945912, -94.343388



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



Northeast Colbern Road & Northeast Todd Geor... - TMC

Tue Aug 9, 2022

PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 976526, Location: 38.945912, -94.343388



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	TGP Northbound					TGP Southbound					Colbern Eastbound					Colbern Westbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2022-08-09 4:30PM	33	58	25	0	116	52	107	8	0	167	5	175	46	0	226	15	91	26	0	132	641
4:45PM	34	70	21	0	125	60	93	5	0	158	8	170	63	0	241	17	93	37	0	147	671
5:00PM	33	74	20	0	127	55	90	5	0	150	10	183	54	0	247	15	97	39	0	151	675
5:15PM	26	62	25	0	113	68	89	15	0	172	19	202	69	0	290	17	108	40	0	165	740
Total	126	264	91	0	481	235	379	33	0	647	42	730	232	0	1004	64	389	142	0	595	2727
% Approach	26.2%	54.9%	18.9%	0%	-	36.3%	58.6%	5.1%	0%	-	4.2%	72.7%	23.1%	0%	-	10.8%	65.4%	23.9%	0%	-	-
% Total	4.6%	9.7%	3.3%	0%	17.6%	8.6%	13.9%	1.2%	0%	23.7%	1.5%	26.8%	8.5%	0%	36.8%	2.3%	14.3%	5.2%	0%	21.8%	-
PHF	0.926	0.892	0.910	-	0.947	0.864	0.886	0.550	-	0.940	0.553	0.903	0.841	-	0.866	0.941	0.900	0.888	-	0.902	0.921
Lights	126	262	89	0	477	232	379	33	0	644	42	723	231	0	996	64	381	139	0	584	2701
% Lights	100%	99.2%	97.8%	0%	99.2%	98.7%	100%	100%	0%	99.5%	100%	99.0%	99.6%	0%	99.2%	100%	97.9%	97.9%	0%	98.2%	99.0%
Articulated Trucks	0	0	0	0	0	1	0	0	0	1	0	1	0	0	1	0	1	1	0	2	4
% Articulated Trucks	0%	0%	0%	0%	0%	0.4%	0%	0%	0%	0.2%	0%	0.1%	0%	0%	0.1%	0%	0.3%	0.7%	0%	0.3%	0.1%
Buses and Single-Unit Trucks	0	2	2	0	4	2	0	0	0	2	0	6	1	0	7	0	7	2	0	9	22
% Buses and Single-Unit Trucks	0%	0.8%	2.2%	0%	0.8%	0.9%	0%	0%	0%	0.3%	0%	0.8%	0.4%	0%	0.7%	0%	1.8%	1.4%	0%	1.5%	0.8%

* L: Left, R: Right, T: Thru, U: U-Turn

Northeast Colbern Road & Northeast Todd Geor... - TMC

Tue Aug 9, 2022

PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour

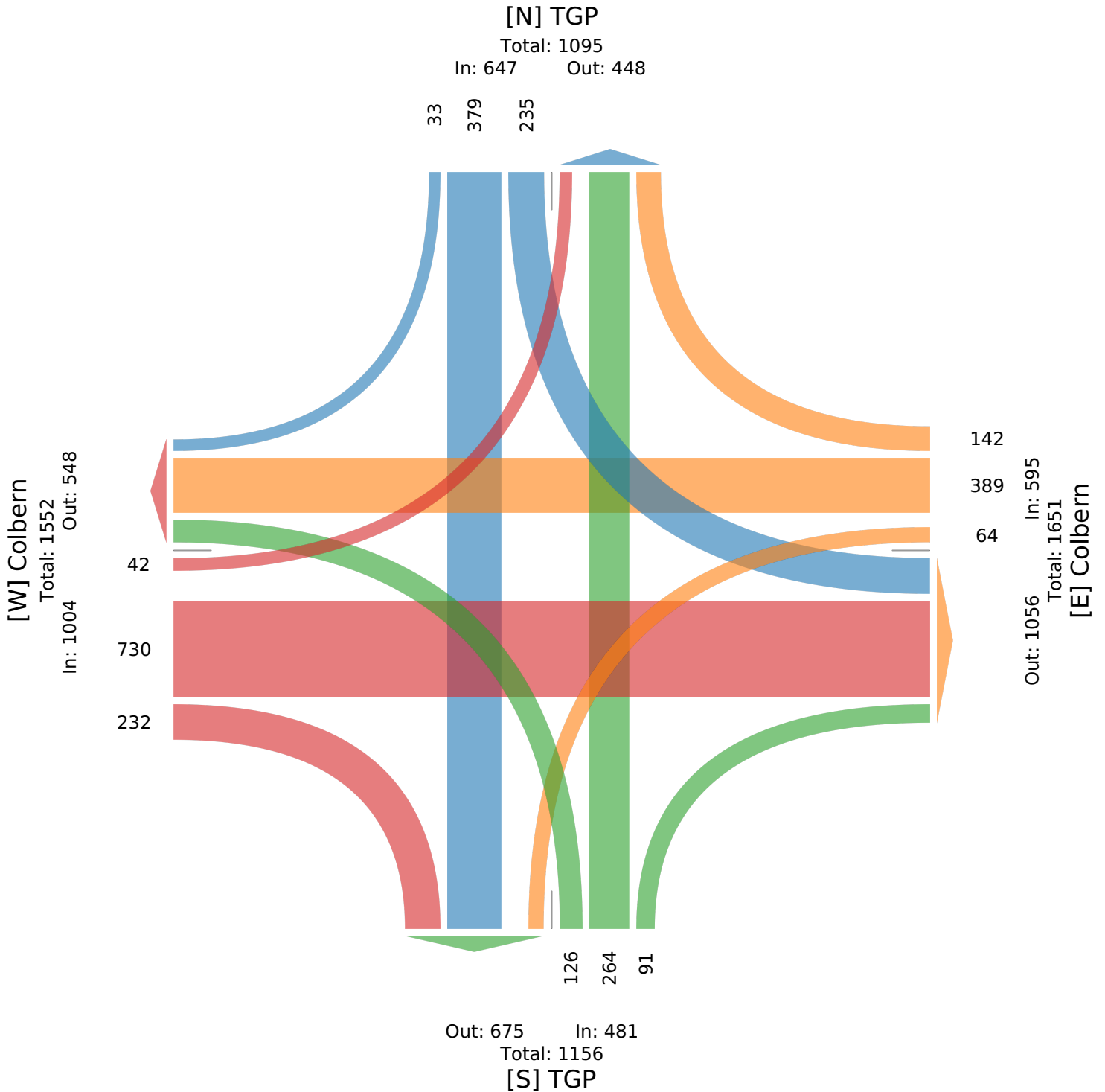
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 976526, Location: 38.945912, -94.343388

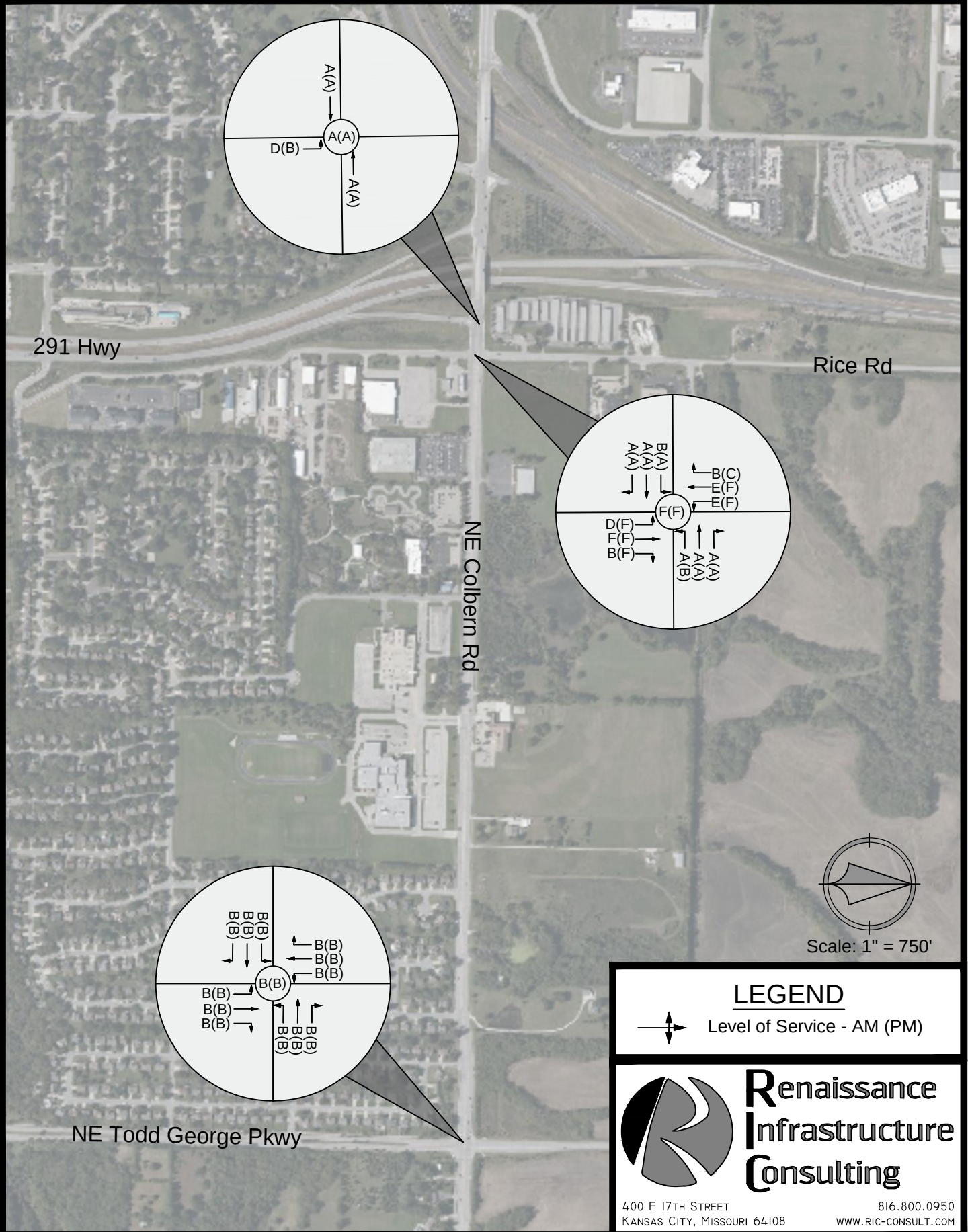


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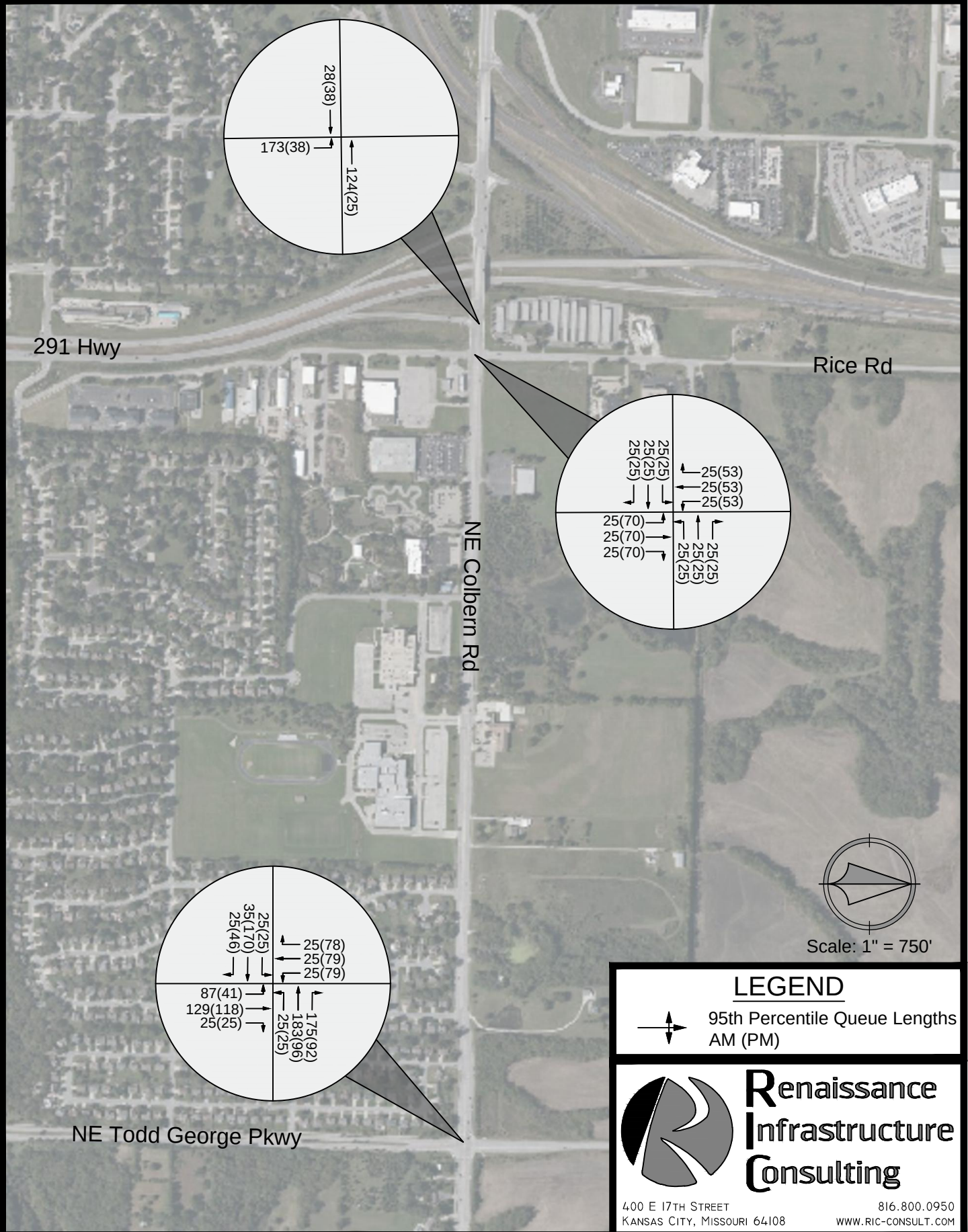


Appendix C - Operational Analysis

Level of Service - Existing Conditions



Queue Lengths - Existing Conditions



LEGEND



95th Percentile Queue Lengths
AM (PM)

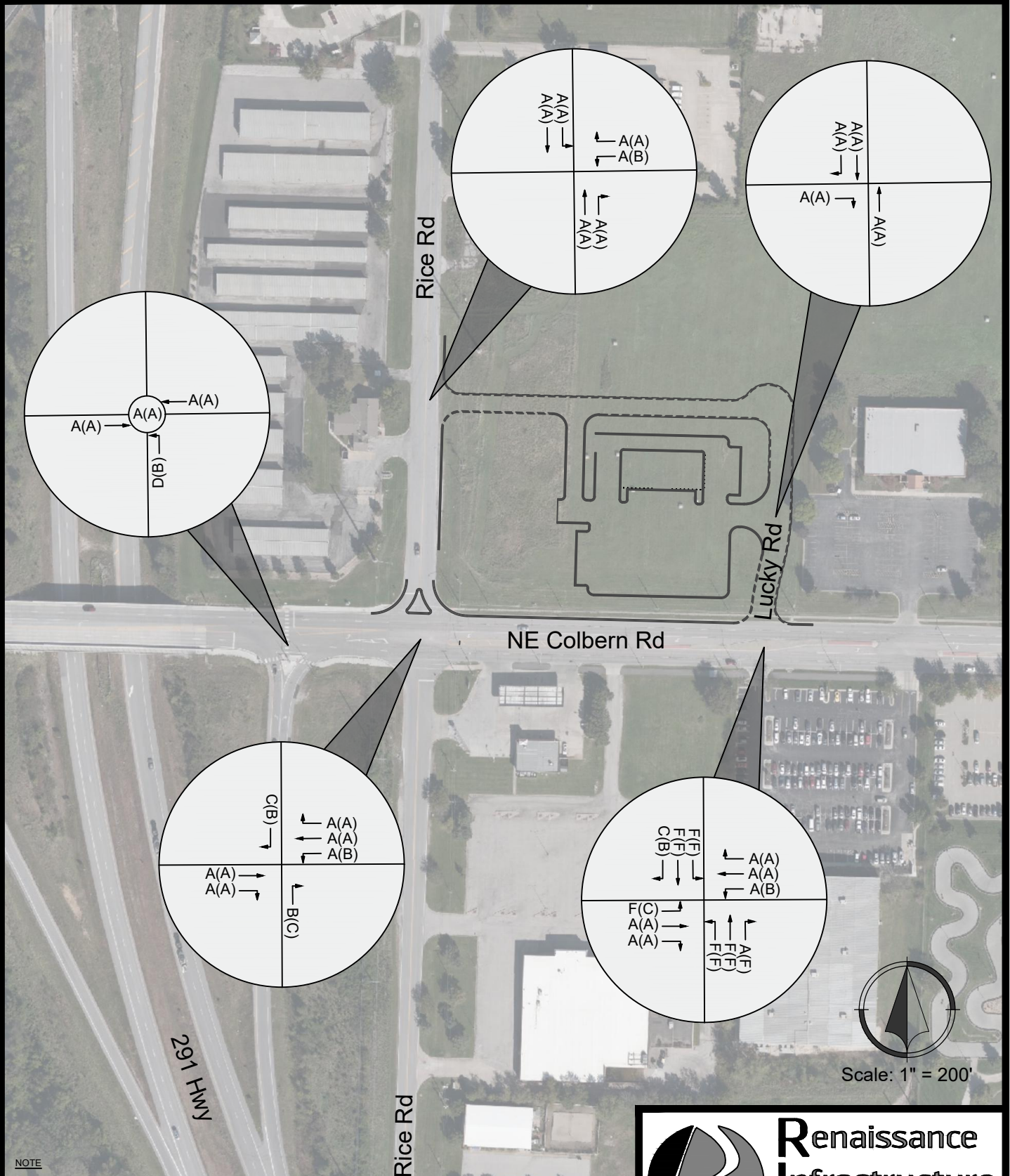


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WWW.RIC-CONSULT.COM

Level of Service - Existing Plus Proposed Conditions



LEGEND



Level of Service - AM (PM)

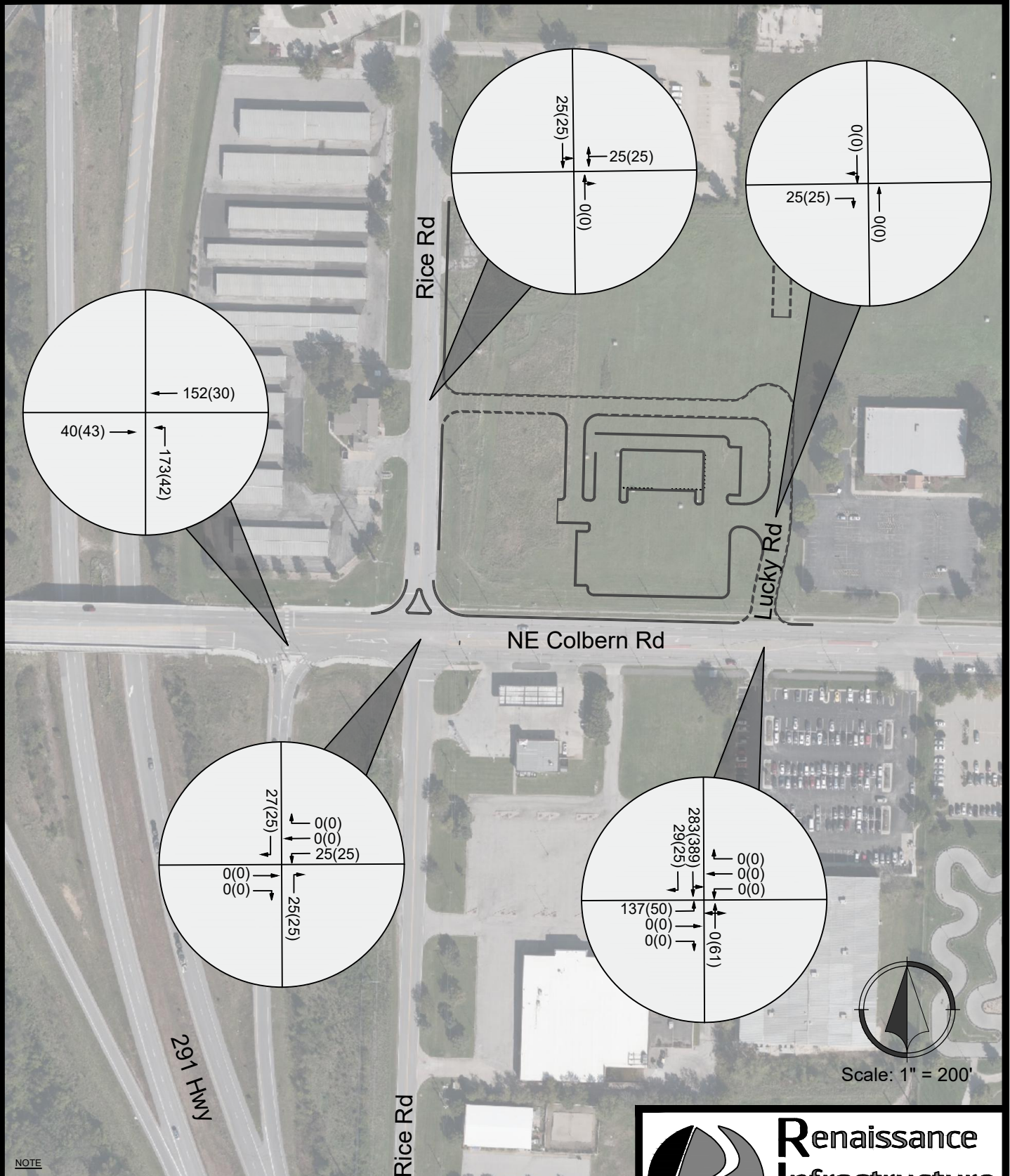


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Queue Lengths - Existing Plus Proposed Conditions



NOTE
SEE VISTRO REPORTS FOR COLBERN RD & TODD GEORGE PARKWAY

LEGEND



95th Percentile Queue Lengths
AM (PM)

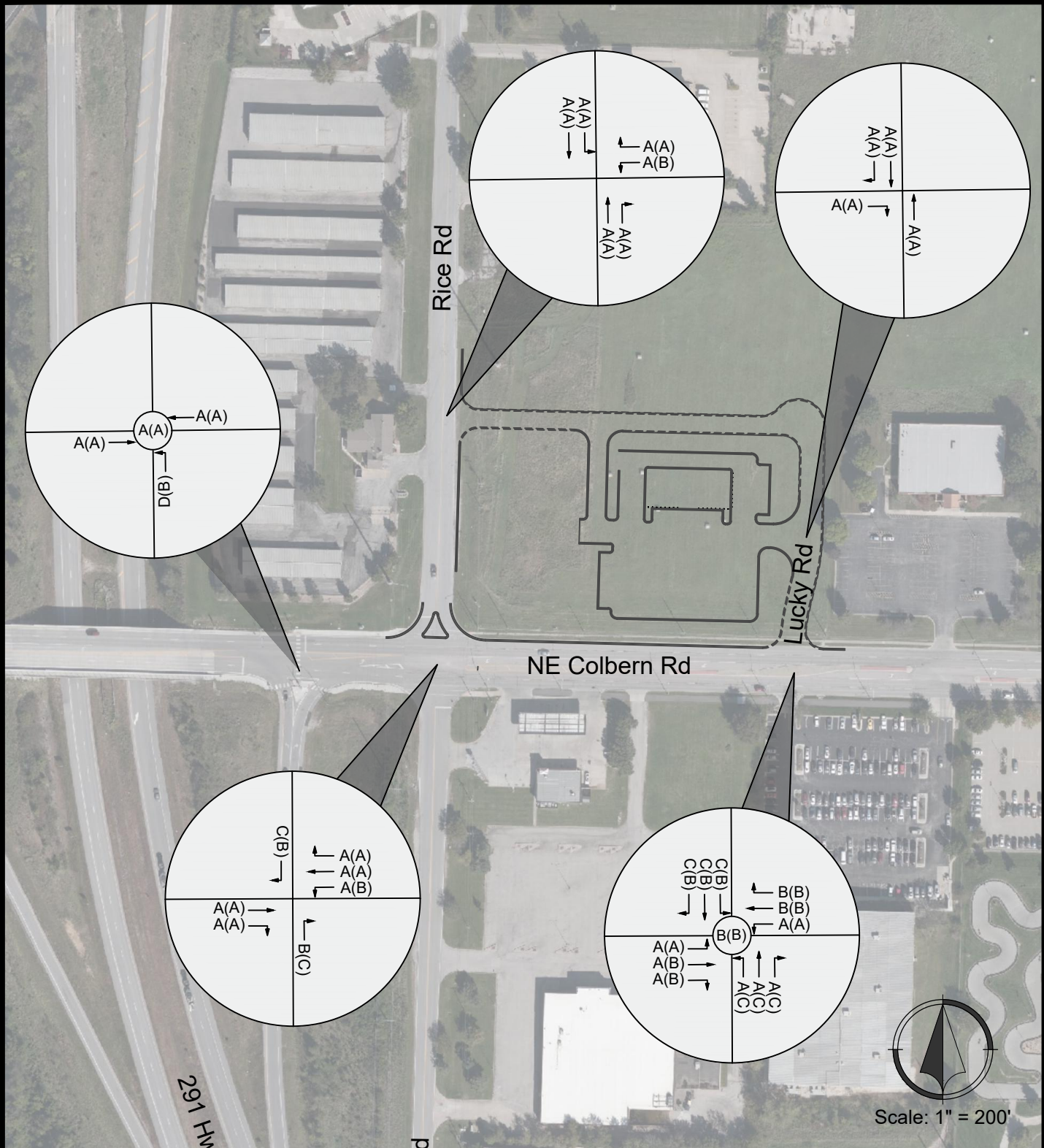


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Level of Service - Existing Plus Proposed Conditions w/ Improvements



NOTE
SEE VISTRO REPORTS FOR COLBERN RD & TODD GEORGE PARKWAY

LEGEND



Level of Service - AM (PM)

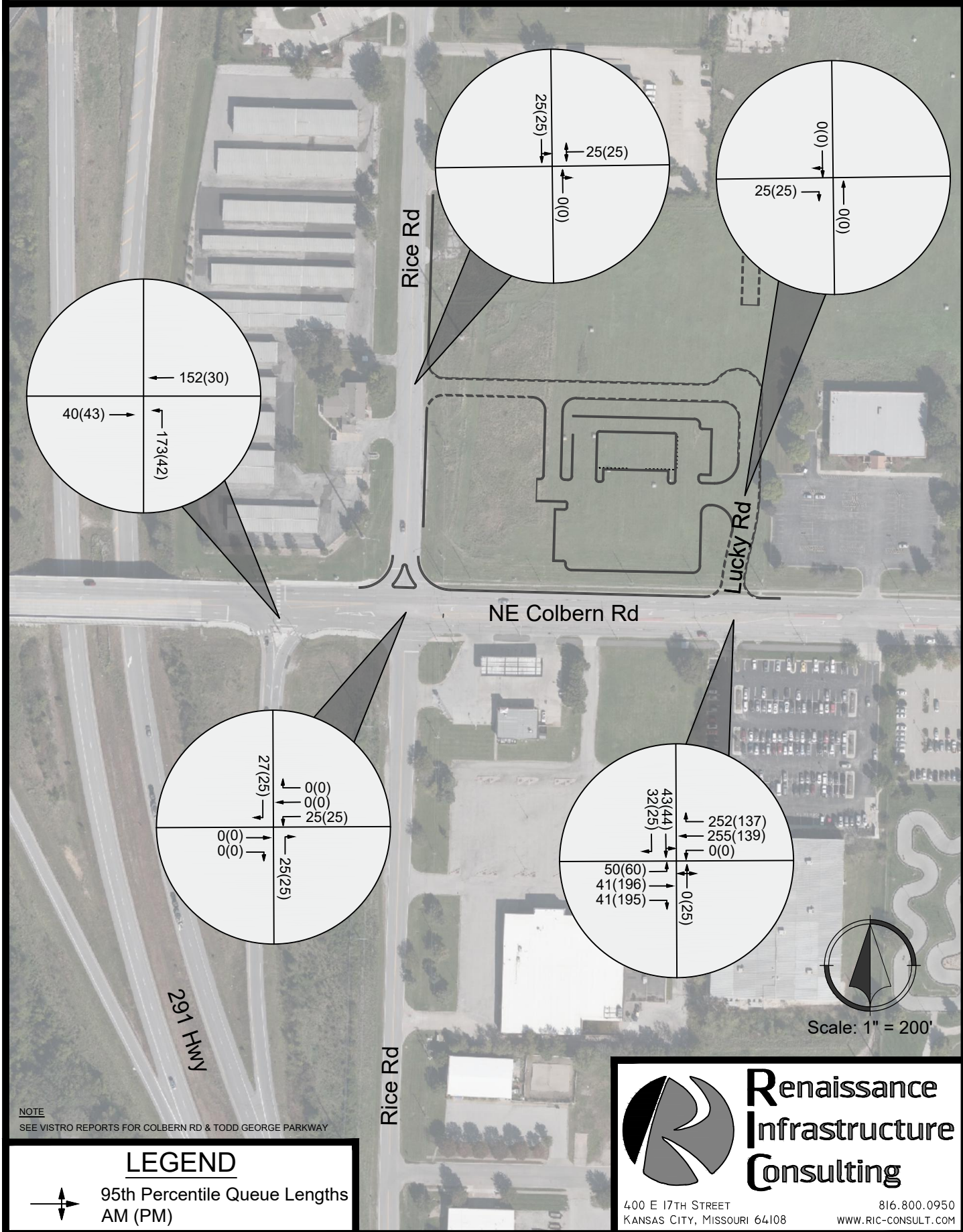


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Queue Lengths - Existing Plus Proposed Conditions w/ Improvements



Intersection Level Of Service Report
Intersection 1: MO 291 & Colbern Rd

Control Type: Signalized
Analysis Method: HCM 7th Edition
Analysis Period: 15 minutes

Delay (sec / veh): 8.3
Level Of Service: A
Volume to Capacity (v/c): 0.420

Intersection Setup

Name						
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	0	0	0	0
Entry Pocket Length [ft]	100.00	210.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	35.00		40.00		40.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		No		Yes	

Volumes

Name						
Base Volume Input [veh/h]	148	52	337	0	0	1073
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.40	1.90	7.10	2.00	2.00	1.20
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	26	0	0	0	0
Total Hourly Volume [veh/h]	148	52	337	0	0	1073
Peak Hour Factor	0.9130	0.9130	0.9130	1.0000	1.0000	0.9130
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	41	14	92	0	0	294
Total Analysis Volume [veh/h]	162	57	369	0	0	1175
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	79.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permissive	Unsignalized	Permissive	Permissive	Permissive	Permissive
Signal Group	3	0	6	0	0	2
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	-	-
Minimum Green [s]	5	0	6	0	0	6
Maximum Green [s]	25	0	40	0	0	40
Amber [s]	3.0	0.0	4.4	0.0	0.0	3.5
All red [s]	2.9	0.0	1.3	0.0	0.0	2.9
Split [s]	30	0	36	0	0	40
Vehicle Extension [s]	3.0	0.0	3.0	0.0	0.0	3.0
Walk [s]	7	0	7	0	0	0
Pedestrian Clearance [s]	18	0	28	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk	No		No			No
I1, Start-Up Lost Time [s]	2.0	0.0	2.0	0.0	0.0	2.0
I2, Clearance Lost Time [s]	3.9	0.0	3.7	0.0	0.0	4.4
Minimum Recall	No		Yes			Yes
Maximum Recall	No		No			No
Pedestrian Recall	No		No			No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C
C, Cycle Length [s]	90	90	90
L, Total Lost Time per Cycle [s]	5.90	5.70	6.40
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.90	3.70	4.40
g_i, Effective Green Time [s]	10	68	67
g / C, Green / Cycle	0.11	0.76	0.75
(v / s)_i Volume / Saturation Flow Rate	0.09	0.11	0.33
s, saturation flow rate [veh/h]	1761	3415	3583
c, Capacity [veh/h]	200	2587	2687
d1, Uniform Delay [s]	38.92	2.96	4.18
k, delay calibration	0.11	0.50	0.50
l, Upstream Filtering Factor	1.00	1.00	1.00
d2, Incremental Delay [s]	7.71	0.12	0.52
d3, Initial Queue Delay [s]	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.81	0.14	0.44
d, Delay for Lane Group [s/veh]	46.63	3.08	4.70
Lane Group LOS	D	A	A
Critical Lane Group	Yes	No	Yes
50th-Percentile Queue Length [veh/ln]	3.83	0.60	2.73
50th-Percentile Queue Length [ft/ln]	95.65	15.06	68.35
95th-Percentile Queue Length [veh/ln]	6.89	1.08	4.92
95th-Percentile Queue Length [ft/ln]	172.17	27.11	123.04

Movement, Approach, & Intersection Results

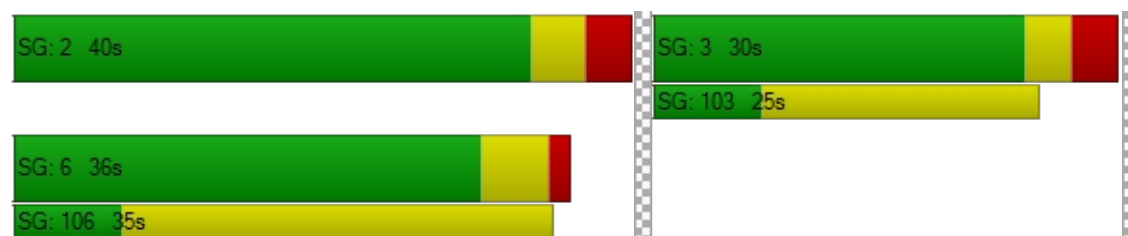
d_M, Delay for Movement [s/veh]	46.63	0.00	3.08	0.00	0.00	4.70
Movement LOS	D		A			A
d_A, Approach Delay [s/veh]	46.63		3.08		4.70	
Approach LOS	D		A		A	
d_I, Intersection Delay [s/veh]	8.33					
Intersection LOS	A					
Intersection V/C	0.420					

Other Modes

g_Walk,mi, Effective Walk Time [s]	11.0	0.0	11.0
M_corner, Corner Circulation Area [ft ² /ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft ² /ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	34.65	0.00	34.65
I_p,int, Pedestrian LOS Score for Intersection	1.806	0.000	2.632
Crosswalk LOS	A	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	536	674	747
d_b, Bicycle Delay [s]	24.10	19.78	17.65
I_b,int, Bicycle LOS Score for Intersection	1.560	1.864	2.529
Bicycle LOS	A	A	B

Sequence

Ring 1	-	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 2: Rice Rd & Colbern Rd

Control Type: Two-way stop
 Analysis Method: HCM 7th Edition
 Analysis Period: 15 minutes

Delay (sec / veh): 64.8
 Level Of Service: F
 Volume to Capacity (v/c): 0.031

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	+			+			T T T			T T T		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	60.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00			45.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	20	2	2	3	1	31	27	317	36	10	1004	21
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	50.00	0.00	0.00	0.00	3.20	0.00	5.70	8.30	10.00	1.10	0.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	20	2	2	3	1	31	27	317	36	10	1004	21
Peak Hour Factor	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	1	1	1	0	9	7	87	10	3	276	6
Total Analysis Volume [veh/h]	22	2	2	3	1	34	30	348	40	11	1103	23
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

[illegible]

Intersection Level Of Service Report
Intersection 3: NE Colbern Rd & Todd George Pkwy

Control Type:	Signalized	Delay (sec / veh):	14.5
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.482

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	1	0	1	1	0	0
Entry Pocket Length [ft]	215.00	100.00	100.00	265.00	100.00	100.00	130.00	100.00	185.00	160.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			45.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	Yes			Yes			Yes			Yes		
Crosswalk	Yes			Yes			Yes			No		

Volumes

Name												
Base Volume Input [veh/h]	249	307	33	79	92	17	14	189	57	60	711	229
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.40	1.40	3.00	7.60	2.20	5.90	0.00	5.30	8.80	1.70	1.40	3.50
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	17	0	0	9	0	0	29	0	0	115
Total Hourly Volume [veh/h]	249	307	16	79	92	8	14	189	28	60	711	114
Peak Hour Factor	0.8960	0.8960	0.8960	0.8960	0.8960	0.8960	0.8960	0.8960	0.8960	0.8960	0.8960	0.8960
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	69	86	4	22	26	2	4	53	8	17	198	32
Total Analysis Volume [veh/h]	278	343	18	88	103	9	16	211	31	67	794	127
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Free Running
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Beginning of First Red
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss
Signal Group	1	6	0	5	2	0	7	4	0	3	8	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	10	0	5	10	0	5	10	0	5	10	0
Maximum Green [s]	15	40	0	15	40	0	20	40	0	20	40	0
Amber [s]	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0	0.0
All red [s]	2.5	2.5	0.0	2.5	2.5	0.0	2.5	2.5	0.0	2.5	2.5	0.0
Split [s]	0	0	0	0	0	0	0	0	0	0	0	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	0	0
Pedestrian Clearance [s]	0	30	0	0	29	0	0	28	0	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I2, Clearance Lost Time [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum Recall	No	No		No	No		No	No		No	No	
Maximum Recall	No	No		No	No		No	No		No	No	
Pedestrian Recall	No	No		No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	C	L	C	R	L	C	C
C, Cycle Length [s]	53	53	53	53	53	53	53	53	53	53	53	53
L, Total Lost Time per Cycle [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
g_i, Effective Green Time [s]	27	17	17	27	15	15	26	16	16	26	18	18
g / C, Green / Cycle	0.51	0.32	0.32	0.51	0.28	0.28	0.49	0.31	0.31	0.49	0.35	0.35
(v / s)_i Volume / Saturation Flow Rate	0.18	0.18	0.01	0.07	0.03	0.03	0.02	0.06	0.02	0.05	0.25	0.25
s, saturation flow rate [veh/h]	1530	1879	1577	1247	1867	1815	964	3466	1503	1380	1879	1790
c, Capacity [veh/h]	888	599	503	625	515	501	473	1066	462	765	652	621
d1, Uniform Delay [s]	11.78	15.09	12.48	11.16	14.38	14.39	12.03	13.58	13.02	11.10	15.14	15.14
k, delay calibration	0.10	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.19	0.32	0.01	0.04	0.03	0.04	0.01	0.03	0.02	0.02	0.57	0.60
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, 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
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.31	0.57	0.04	0.14	0.11	0.11	0.03	0.20	0.07	0.09	0.72	0.72
d, Delay for Lane Group [s/veh]	11.97	15.41	12.49	11.20	14.41	14.42	12.04	13.62	13.05	11.12	15.71	15.74
Lane Group LOS	B	B	B	B	B	B	B	B	B	B	B	B
Critical Lane Group	No	Yes	No	Yes	No	No	Yes	No	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	1.91	2.86	0.12	0.51	0.42	0.41	0.10	0.78	0.22	0.42	4.05	3.87
50th-Percentile Queue Length [ft/ln]	47.81	71.55	3.08	12.81	10.41	10.31	2.45	19.38	5.50	10.50	101.37	96.68
95th-Percentile Queue Length [veh/ln]	3.44	5.15	0.22	0.92	0.75	0.74	0.18	1.40	0.40	0.76	7.30	6.96
95th-Percentile Queue Length [ft/ln]	86.06	128.78	5.55	23.05	18.74	18.56	4.40	34.88	9.90	18.90	182.47	174.02

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	11.97	15.41	12.49	11.20	14.42	14.42	12.04	13.62	13.05	11.12	15.72	15.74
Movement LOS	B	B	B	B	B	B	B	B	B	B	B	B
d_A, Approach Delay [s/veh]	13.83			13.00			13.45			15.41		
Approach LOS	B			B			B			B		
d_I, Intersection Delay [s/veh]	14.45											
Intersection LOS	B											
Intersection V/C	0.482											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	-6.5	9.0	0.0
M_corner, Corner Circulation Area [ft ² /ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft ² /ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	18.26	33.39	18.26	0.00
I_p,int, Pedestrian LOS Score for Intersection	2.557	2.446	2.875	0.000
Crosswalk LOS	B	B	C	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1510	1510	1510	1510
d_b, Bicycle Delay [s]	1.59	1.59	1.59	1.59
I_b,int, Bicycle LOS Score for Intersection	2.642	1.732	1.796	2.470
Bicycle LOS	B	A	A	B

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 1: MO 291 & Colbern Rd

Control Type: Signalized
Analysis Method: HCM 7th Edition
Analysis Period: 15 minutes

Delay (sec / veh): 6.8
Level Of Service: A
Volume to Capacity (v/c): 0.403

Intersection Setup

Name						
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	0	0	0	0
Entry Pocket Length [ft]	100.00	210.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	35.00		40.00		40.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		No		Yes	

Volumes

Name						
Base Volume Input [veh/h]	138	121	1069	0	0	669
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	1.40	0.80	1.30	2.00	2.00	1.60
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	61	0	0	0	0
Total Hourly Volume [veh/h]	138	121	1069	0	0	669
Peak Hour Factor	0.9310	0.9310	0.9310	1.0000	1.0000	0.9310
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	37	32	287	0	0	180
Total Analysis Volume [veh/h]	148	130	1148	0	0	719
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	100
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	92.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permissive	Unsignalized	Permissive	Permissive	Permissive	Permissive
Signal Group	3	0	6	0	0	2
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	-	-
Minimum Green [s]	5	0	6	0	0	6
Maximum Green [s]	25	0	40	0	0	40
Amber [s]	3.0	0.0	4.4	0.0	0.0	3.5
All red [s]	2.9	0.0	1.3	0.0	0.0	2.9
Split [s]	20	0	80	0	0	80
Vehicle Extension [s]	3.0	0.0	3.0	0.0	0.0	3.0
Walk [s]	7	0	7	0	0	0
Pedestrian Clearance [s]	18	0	28	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk	No		No			No
I1, Start-Up Lost Time [s]	2.0	0.0	2.0	0.0	0.0	2.0
I2, Clearance Lost Time [s]	3.9	0.0	3.7	0.0	0.0	4.4
Minimum Recall	No		Yes			Yes
Maximum Recall	No		No			No
Pedestrian Recall	No		No			No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C
C, Cycle Length [s]	28	28	28
L, Total Lost Time per Cycle [s]	5.90	5.70	6.40
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.90	3.70	4.40
g_i, Effective Green Time [s]	3	13	13
g / C, Green / Cycle	0.12	0.47	0.44
(v / s)_i Volume / Saturation Flow Rate	0.08	0.32	0.20
s, saturation flow rate [veh/h]	1790	3580	3572
c, Capacity [veh/h]	220	1682	1591
d1, Uniform Delay [s]	11.95	5.89	5.49
k, delay calibration	0.11	0.11	0.11
l, Upstream Filtering Factor	1.00	1.00	1.00
d2, Incremental Delay [s]	3.53	0.49	0.20
d3, Initial Queue Delay [s]	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.67	0.68	0.45
d, Delay for Lane Group [s/veh]	15.47	6.39	5.69
Lane Group LOS	B	A	A
Critical Lane Group	Yes	Yes	No
50th-Percentile Queue Length [veh/ln]	0.83	0.83	0.52
50th-Percentile Queue Length [ft/ln]	20.78	20.87	12.88
95th-Percentile Queue Length [veh/ln]	1.50	1.50	0.93
95th-Percentile Queue Length [ft/ln]	37.41	37.56	23.18

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	15.47	0.00	6.39	0.00	0.00	5.69
Movement LOS	B		A			A
d_A, Approach Delay [s/veh]	15.47		6.39		5.69	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	6.81					
Intersection LOS	A					
Intersection V/C	0.403					

Other Modes

g_Walk,mi, Effective Walk Time [s]	11.0	0.0	11.0
M_corner, Corner Circulation Area [ft ² /ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft ² /ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	5.33	0.00	5.33
I_p,int, Pedestrian LOS Score for Intersection	1.723	0.000	2.662
Crosswalk LOS	A	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	993	5231	5182
d_b, Bicycle Delay [s]	3.60	37.07	35.95
I_b,int, Bicycle LOS Score for Intersection	1.560	2.507	2.153
Bicycle LOS	A	B	B

Sequence

Ring 1	-	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 2: Rice Rd & Colbern Rd

Control Type: Two-way stop
 Analysis Method: HCM 7th Edition
 Analysis Period: 15 minutes

Delay (sec / veh): 132.1
 Level Of Service: F
 Volume to Capacity (v/c): 0.544

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	60.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00			45.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	26	2	17	25	2	64	65	1084	32	12	571	29
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	1.50	0.70	3.10	0.00	1.80	0.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	26	2	17	25	2	64	65	1084	32	12	571	29
Peak Hour Factor	0.9290	0.9290	0.9290	0.9290	0.9290	0.9290	0.9290	0.9290	0.9290	0.9290	0.9290	0.9290
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	1	5	7	1	17	17	292	9	3	154	8
Total Analysis Volume [veh/h]	28	2	18	27	2	69	70	1167	34	13	615	31
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

[illegible]

Intersection Level Of Service Report
Intersection 3: NE Colbern Rd & Todd George Pkwy

Control Type:	Signalized	Delay (sec / veh):	15.3
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.520

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	1	0	1	1	0	0
Entry Pocket Length [ft]	215.00	100.00	100.00	265.00	100.00	100.00	130.00	100.00	185.00	160.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			45.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	Yes			Yes			Yes			Yes		
Crosswalk	Yes			Yes			Yes			No		

Volumes

Name												
Base Volume Input [veh/h]	126	264	91	235	379	33	42	730	232	64	389	142
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.80	2.20	1.30	0.00	0.00	0.00	0.90	0.40	0.00	2.10	2.10
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	46	0	0	17	0	0	116	0	0	71
Total Hourly Volume [veh/h]	126	264	45	235	379	16	42	730	116	64	389	71
Peak Hour Factor	0.9210	0.9210	0.9210	0.9210	0.9210	0.9210	0.9210	0.9210	0.9210	0.9210	0.9210	0.9210
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	34	72	12	64	103	4	11	198	31	17	106	19
Total Analysis Volume [veh/h]	137	287	49	255	412	17	46	793	126	69	422	77
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Free Running
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Beginning of First Red
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss
Signal Group	1	6	0	5	2	0	7	4	0	3	8	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	10	0	5	10	0	5	10	0	5	10	0
Maximum Green [s]	15	40	0	15	40	0	20	40	0	20	40	0
Amber [s]	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0	0.0
All red [s]	2.5	2.5	0.0	2.5	2.5	0.0	2.5	2.5	0.0	2.5	2.5	0.0
Split [s]	0	0	0	0	0	0	0	0	0	0	0	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	0	0
Pedestrian Clearance [s]	0	30	0	0	29	0	0	28	0	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I2, Clearance Lost Time [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum Recall	No	No		No	No		No	No		No	No	
Maximum Recall	No	No		No	No		No	No		No	No	
Pedestrian Recall	No	No		No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	C	L	C	R	L	C	C
C, Cycle Length [s]	56	56	56	56	56	56	56	56	56	56	56	56
L, Total Lost Time per Cycle [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
g_i, Effective Green Time [s]	29	16	16	29	18	18	27	17	17	27	18	18
g / C, Green / Cycle	0.51	0.29	0.29	0.51	0.32	0.32	0.49	0.31	0.31	0.49	0.33	0.33
(v / s)_i Volume / Saturation Flow Rate	0.11	0.15	0.03	0.19	0.11	0.11	0.04	0.22	0.08	0.07	0.14	0.14
s, saturation flow rate [veh/h]	1293	1888	1587	1364	1900	1874	1211	3592	1610	1045	1868	1770
c, Capacity [veh/h]	705	555	467	691	600	591	626	1127	505	521	611	578
d1, Uniform Delay [s]	11.34	16.46	14.40	12.57	14.80	14.80	11.61	16.93	14.31	12.61	14.70	14.72
k, delay calibration	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.05	0.28	0.04	0.12	0.14	0.14	0.02	0.30	0.09	0.04	0.17	0.18
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, 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
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.19	0.52	0.11	0.37	0.36	0.36	0.07	0.70	0.25	0.13	0.42	0.42
d, Delay for Lane Group [s/veh]	11.39	16.74	14.44	12.69	14.93	14.94	11.63	17.23	14.41	12.65	14.87	14.90
Lane Group LOS	B	B	B	B	B	B	B	B	B	B	B	B
Critical Lane Group	No	Yes	No	Yes	No	No	No	Yes	No	Yes	No	No
50th-Percentile Queue Length [veh/ln]	0.91	2.61	0.39	1.75	1.74	1.72	0.31	3.77	1.01	0.46	2.13	2.04
50th-Percentile Queue Length [ft/ln]	22.65	65.37	9.72	43.86	43.48	42.94	7.63	94.24	25.33	11.62	53.24	51.01
95th-Percentile Queue Length [veh/ln]	1.63	4.71	0.70	3.16	3.13	3.09	0.55	6.79	1.82	0.84	3.83	3.67
95th-Percentile Queue Length [ft/ln]	40.78	117.67	17.50	78.94	78.26	77.30	13.73	169.63	45.59	20.92	95.83	91.82

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	11.39	16.74	14.44	12.69	14.94	14.94	11.63	17.23	14.41	12.65	14.88	14.90
Movement LOS	B	B	B	B	B	B	B	B	B	B	B	B
d_A, Approach Delay [s/veh]	14.95			14.10			16.59			14.61		
Approach LOS	B			B			B			B		
d_I, Intersection Delay [s/veh]	15.25											
Intersection LOS	B											
Intersection V/C	0.520											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	-6.5	9.0	0.0
M_corner, Corner Circulation Area [ft ² /ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft ² /ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	19.64	34.79	19.64	0.00
I_p,int, Pedestrian LOS Score for Intersection	2.696	2.608	3.019	0.000
Crosswalk LOS	B	B	C	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1433	1433	1433	1433
d_b, Bicycle Delay [s]	2.24	2.24	2.24	2.24
I_b,int, Bicycle LOS Score for Intersection	2.416	2.138	2.451	2.087
Bicycle LOS	B	B	B	B

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 1: MO 291 & Colbern RdControl Type:
Analysis Method:
Analysis Period:Signalized
HCM 7th Edition
15 minutesDelay (sec / veh):
Level Of Service:
Volume to Capacity (v/c):8.0
A
0.477**Intersection Setup**

Name						
Approach	Northbound		Eastbound		Westbound	
Lane Configuration	↵↵		↑↑		↑↑	
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	0	0	0	0
Entry Pocket Length [ft]	100.00	210.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	35.00		40.00		40.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		No		Yes	

Volumes

Name						
Base Volume Input [veh/h]	148	52	337	0	0	1073
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.40	1.90	7.10	2.00	2.00	1.20
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	33	0	0	33
Diverted Trips [veh/h]	0	19	99	0	0	117
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	38
Right Turn on Red Volume [veh/h]	0	36	0	0	0	0
Total Hourly Volume [veh/h]	148	71	469	0	0	1261
Peak Hour Factor	0.9130	0.9130	0.9130	1.0000	1.0000	0.9130
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	41	19	128	0	0	345
Total Analysis Volume [veh/h]	162	78	514	0	0	1381
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permissive	Unsignalized	Permissive	Permissive	Permissive	Permissive
Signal Group	3	0	6	0	0	2
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	-	-
Minimum Green [s]	5	0	6	0	0	6
Maximum Green [s]	25	0	40	0	0	40
Amber [s]	3.0	0.0	4.4	0.0	0.0	3.5
All red [s]	2.9	0.0	1.3	0.0	0.0	2.9
Split [s]	30	0	36	0	0	40
Vehicle Extension [s]	3.0	0.0	3.0	0.0	0.0	3.0
Walk [s]	7	0	7	0	0	0
Pedestrian Clearance [s]	18	0	28	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk	No		No			No
I1, Start-Up Lost Time [s]	2.0	0.0	2.0	0.0	0.0	2.0
I2, Clearance Lost Time [s]	3.9	0.0	3.7	0.0	0.0	4.4
Minimum Recall	No		Yes			Yes
Maximum Recall	No		No			No
Pedestrian Recall	No		No			No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C
C, Cycle Length [s]	90	90	90
L, Total Lost Time per Cycle [s]	5.90	5.70	6.40
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.90	3.70	4.40
g_i, Effective Green Time [s]	10	68	67
g / C, Green / Cycle	0.11	0.76	0.75
(v / s)_i Volume / Saturation Flow Rate	0.09	0.15	0.39
s, saturation flow rate [veh/h]	1761	3415	3583
c, Capacity [veh/h]	200	2587	2687
d1, Uniform Delay [s]	38.92	3.11	4.58
k, delay calibration	0.11	0.50	0.50
l, Upstream Filtering Factor	1.00	1.00	1.00
d2, Incremental Delay [s]	7.71	0.17	0.71
d3, Initial Queue Delay [s]	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.81	0.20	0.51
d, Delay for Lane Group [s/veh]	46.63	3.28	5.28
Lane Group LOS	D	A	A
Critical Lane Group	Yes	No	Yes
50th-Percentile Queue Length [veh/ln]	3.83	0.88	3.53
50th-Percentile Queue Length [ft/ln]	95.65	22.06	88.21
95th-Percentile Queue Length [veh/ln]	6.89	1.59	6.35
95th-Percentile Queue Length [ft/ln]	172.17	39.70	158.78

Movement, Approach, & Intersection Results

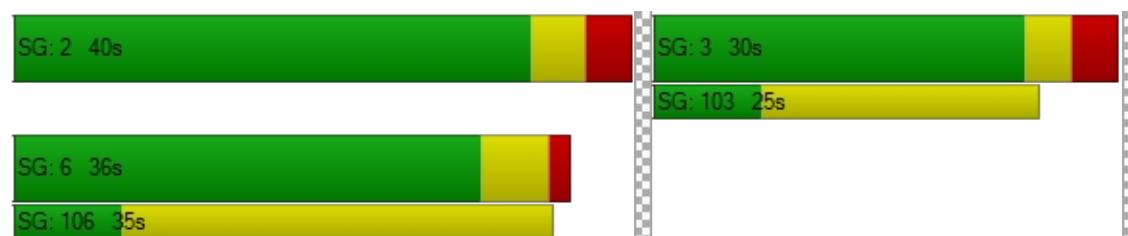
d_M, Delay for Movement [s/veh]	46.63	0.00	3.28	0.00	0.00	5.28
Movement LOS	D		A			A
d_A, Approach Delay [s/veh]	46.63		3.28		5.28	
Approach LOS	D		A		A	
d_I, Intersection Delay [s/veh]	8.04					
Intersection LOS	A					
Intersection V/C	0.477					

Other Modes

g_Walk,mi, Effective Walk Time [s]	11.0	0.0	11.0
M_corner, Corner Circulation Area [ft ² /ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft ² /ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	34.65	0.00	34.65
I_p,int, Pedestrian LOS Score for Intersection	1.806	0.000	2.746
Crosswalk LOS	A	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	536	674	747
d_b, Bicycle Delay [s]	24.10	19.78	17.65
I_b,int, Bicycle LOS Score for Intersection	1.560	1.984	2.699
Bicycle LOS	A	A	B

Sequence

Ring 1	-	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 2: Rice Rd & Colbern Rd

Control Type: Two-way stop
 Analysis Method: HCM 7th Edition
 Analysis Period: 15 minutes

Delay (sec / veh): 17.4
 Level Of Service: C
 Volume to Capacity (v/c): 0.335

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↶			↶			↑			↶ ↑		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00			45.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	20	2	2	3	1	31	27	317	36	10	1004	21
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	50.00	0.00	0.00	0.00	3.20	0.00	5.70	8.30	10.00	1.10	0.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	11	0	0	17	0	33	0	11	17	0
Diverted Trips [veh/h]	0	0	0	0	0	58	0	117	0	0	59	0
Pass-by Trips [veh/h]	0	0	0	0	0	26	0	0	0	0	-26	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	22	0	0	0	0	27	0	24	39	0
Total Hourly Volume [veh/h]	20	2	35	3	1	132	27	494	36	45	1093	21
Peak Hour Factor	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	1	10	1	0	36	7	136	10	12	300	6
Total Analysis Volume [veh/h]	22	2	38	3	1	145	30	543	40	49	1201	23
Pedestrian Volume [ped/h]	0			0			0			0		

Priority Scheme	Stop	Stop	Free	Free
Flared Lane				
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

[illegible]

Intersection Level Of Service Report**Intersection 3: NE Colbern Rd & Todd George Pkwy**

Control Type:	Signalized	Delay (sec / veh):	14.8
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.498

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	1	0	1	1	0	0
Entry Pocket Length [ft]	215.00	100.00	100.00	265.00	100.00	100.00	130.00	100.00	185.00	160.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	1	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.21	0.00	0.00	0.00
Speed [mph]	40.00			45.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	Yes			Yes			Yes			Yes		
Crosswalk	Yes			Yes			Yes			No		

Volumes

Name												
Base Volume Input [veh/h]	249	307	33	79	92	17	14	189	57	60	711	229
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.40	1.40	3.00	7.60	2.20	5.90	0.00	5.30	8.80	1.70	1.40	3.50
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	56	0	0	55	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	17	0	0	9	0	0	29	0	0	115
Total Hourly Volume [veh/h]	249	307	16	79	92	8	14	245	28	60	766	114
Peak Hour Factor	0.8960	0.8960	0.8960	0.8960	0.8960	0.8960	0.8960	0.8960	0.8960	0.8960	0.8960	0.8960
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	69	86	4	22	26	2	4	68	8	17	214	32
Total Analysis Volume [veh/h]	278	343	18	88	103	9	16	273	31	67	855	127
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Free Running
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Beginning of First Red
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss
Signal Group	1	6	0	5	2	0	7	4	0	3	8	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	10	0	5	10	0	5	10	0	5	10	0
Maximum Green [s]	15	40	0	15	40	0	20	40	0	20	40	0
Amber [s]	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0	0.0
All red [s]	2.5	2.5	0.0	2.5	2.5	0.0	2.5	2.5	0.0	2.5	2.5	0.0
Split [s]	0	0	0	0	0	0	0	0	0	0	0	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	0	0
Pedestrian Clearance [s]	0	30	0	0	29	0	0	28	0	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I2, Clearance Lost Time [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum Recall	No	No		No	No		No	No		No	No	
Maximum Recall	No	No		No	No		No	No		No	No	
Pedestrian Recall	No	No		No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	C	L	C	R	L	C	C
C, Cycle Length [s]	54	54	54	54	54	54	54	54	54	54	54	54
L, Total Lost Time per Cycle [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
g_i, Effective Green Time [s]	27	17	17	27	15	15	27	17	17	27	19	19
g / C, Green / Cycle	0.50	0.31	0.31	0.50	0.27	0.27	0.50	0.32	0.32	0.50	0.36	0.36
(v / s)_i Volume / Saturation Flow Rate	0.18	0.18	0.01	0.07	0.03	0.03	0.02	0.08	0.02	0.05	0.27	0.27
s, saturation flow rate [veh/h]	1531	1879	1577	1246	1867	1815	927	3466	1503	1332	1879	1795
c, Capacity [veh/h]	874	592	497	610	505	491	457	1104	478	736	672	642
d1, Uniform Delay [s]	12.24	15.60	12.90	11.60	14.91	14.92	12.15	13.71	12.90	11.03	15.32	15.32
k, delay calibration	0.11	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.22	0.33	0.01	0.04	0.04	0.04	0.01	0.04	0.02	0.02	0.63	0.66
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, 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
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.32	0.58	0.04	0.14	0.11	0.11	0.03	0.25	0.06	0.09	0.75	0.75
d, Delay for Lane Group [s/veh]	12.46	15.93	12.91	11.64	14.95	14.96	12.16	13.75	12.92	11.05	15.95	15.98
Lane Group LOS	B	B	B	B	B	B	B	B	B	B	B	B
Critical Lane Group	No	Yes	No	Yes	No	No	Yes	No	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	2.01	2.98	0.13	0.54	0.43	0.43	0.10	1.03	0.22	0.42	4.46	4.27
50th-Percentile Queue Length [ft/ln]	50.20	74.52	3.21	13.44	10.87	10.77	2.47	25.83	5.55	10.61	111.58	106.77
95th-Percentile Queue Length [veh/ln]	3.61	5.37	0.23	0.97	0.78	0.78	0.18	1.86	0.40	0.76	7.93	7.66
95th-Percentile Queue Length [ft/ln]	90.35	134.13	5.78	24.19	19.57	19.39	4.45	46.50	9.99	19.10	198.20	191.50

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	12.46	15.93	12.91	11.64	14.95	14.96	12.16	13.75	12.92	11.05	15.96	15.98
Movement LOS	B	B	B	B	B	B	B	B	B	B	B	B
d_A, Approach Delay [s/veh]	14.34			13.49			13.59			15.65		
Approach LOS	B			B			B			B		
d_I, Intersection Delay [s/veh]	14.78											
Intersection LOS	B											
Intersection V/C	0.498											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	-6.5	9.0	0.0
M_corner, Corner Circulation Area [ft ² /ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft ² /ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	18.84	33.98	18.84	0.00
I_p,int, Pedestrian LOS Score for Intersection	2.560	2.447	2.996	0.000
Crosswalk LOS	B	B	C	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1476	1476	1476	1476
d_b, Bicycle Delay [s]	1.86	1.86	1.86	1.86
I_b,int, Bicycle LOS Score for Intersection	2.642	1.732	1.848	2.520
Bicycle LOS	B	A	A	B

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 13: NE Rice Rd & NE Ikerd Rd

Control Type:	Two-way stop	Delay (sec / veh):	9.6
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.092

Intersection Setup

Name	Northbound		Southbound		Westbound	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	45.00		45.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name						
Base Volume Input [veh/h]	21	0	0	31	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.04	2.00	2.00	3.20	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	11	0	17	11
Diverted Trips [veh/h]	0	0	0	0	33	0
Pass-by Trips [veh/h]	0	0	0	0	26	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	4	0	0	29
Total Hourly Volume [veh/h]	21	0	15	31	76	40
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	6	0	4	8	21	11
Total Analysis Volume [veh/h]	23	0	16	34	83	43
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.01	0.00	0.09	0.04
d_M, Delay for Movement [s/veh]	0.00	0.00	7.28	0.00	9.57	9.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.03	0.03	0.46	0.46
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.67	0.67	11.43	11.43
d_A, Approach Delay [s/veh]	0.00		2.33		9.37	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	6.52					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 14: NE Colbern Rd & NE Lucky Rd

Control Type:	Two-way stop	Delay (sec / veh):	2,062.6
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	4.653

Intersection Setup

Name													
Approach	Northbound			Southbound			Eastbound				Westbound		
Lane Configuration	+			+r			+l+tr				+l+tr		
Turning Movement	Left	Thru	Right	Left	Thru	Right	U-tu	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	0	0	1	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	200.0	100.0	100.0	100.0	60.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00			25.00			40.00				40.00		
Grade [%]	0.00			0.00			0.00				0.00		
Crosswalk	Yes			Yes			No				No		

Volumes

Name													
Base Volume Input [veh/h]	0	0	0	0	0	0	0	0	316	0	0	1043	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	5.80	2.00	2.00	1.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	56	0	28	0	44	0	0	0	0	55
Diverted Trips [veh/h]	0	0	0	0	0	59	0	117	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	16	0	26	0	16	-16	0	0	-52	52
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	7	0	2	38	43	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	79	0	115	38	220	300	0	0	991	107
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.920	0.920	0.920	0.920	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	21	0	31	10	60	82	0	0	269	29
Total Analysis Volume [veh/h]	0	0	0	86	0	125	41	239	326	0	0	1077	116
Pedestrian Volume [ped/h]	0			0			0				0		

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

[illegible]

Intersection Level Of Service Report
Intersection 20: NE Lucky Rd & Prop East Dr.

Control Type: Two-way stop
 Analysis Method: HCM 7th Edition
 Analysis Period: 15 minutes

Delay (sec / veh): 9.1
 Level Of Service: A
 Volume to Capacity (v/c): 0.172

Intersection Setup

Name						
Approach	Northbound		Southbound		Eastbound	
Lane Configuration	↑		↑		↗	
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00		25.00		25.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		Yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	99	0	0	0	84
Diverted Trips [veh/h]	0	117	0	0	0	59
Pass-by Trips [veh/h]	0	68	0	0	0	42
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	43	9	0	0	0
Total Hourly Volume [veh/h]	0	327	9	0	0	185
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	82	2	0	0	46
Total Analysis Volume [veh/h]	0	327	9	0	0	185
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.17
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	0.00	0.00	9.05
Movement LOS		A	A	A		A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.62
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	15.54
d_A, Approach Delay [s/veh]	0.00		0.00		9.05	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	3.22					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 1: MO 291 & Colbern Rd

Control Type: Signalized
Analysis Method: HCM 7th Edition
Analysis Period: 15 minutes

Delay (sec / veh): 6.8
Level Of Service: A
Volume to Capacity (v/c): 0.426

Intersection Setup

Name						
Approach	Northbound		Eastbound		Westbound	
Lane Configuration	↵↵		↑↑		↑↑	
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	0	0	0	0
Entry Pocket Length [ft]	100.00	210.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	35.00		40.00		40.00	
Grade [%]	0.00		0.00		0.00	
Curb Present	No		No		No	
Crosswalk	Yes		No		Yes	

Volumes

Name						
Base Volume Input [veh/h]	138	121	1069	0	0	669
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	1.40	0.80	1.30	2.00	2.00	1.60
Proportion of CAVs [%]	0.00					
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	12	0	0	12
Diverted Trips [veh/h]	0	10	63	0	0	73
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	37
Right Turn on Red Volume [veh/h]	0	66	0	0	0	0
Total Hourly Volume [veh/h]	138	131	1144	0	0	791
Peak Hour Factor	0.9310	0.9310	0.9310	1.0000	1.0000	0.9310
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	37	35	307	0	0	212
Total Analysis Volume [veh/h]	148	141	1229	0	0	850
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0		0		0	
v_di, Inbound Pedestrian Volume crossing m	0		0		0	
v_co, Outbound Pedestrian Volume crossing	0		0		0	
v_ci, Inbound Pedestrian Volume crossing mi	0		0		0	
v_ab, Corner Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	100
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	92.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permissive	Unsignalized	Permissive	Permissive	Permissive	Permissive
Signal Group	3	0	6	0	0	2
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	-	-
Minimum Green [s]	5	0	6	0	0	6
Maximum Green [s]	25	0	40	0	0	40
Amber [s]	3.0	0.0	4.4	0.0	0.0	3.5
All red [s]	2.9	0.0	1.3	0.0	0.0	2.9
Split [s]	20	0	80	0	0	80
Vehicle Extension [s]	3.0	0.0	3.0	0.0	0.0	3.0
Walk [s]	7	0	7	0	0	0
Pedestrian Clearance [s]	18	0	28	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk	No		No			No
I1, Start-Up Lost Time [s]	2.0	0.0	2.0	0.0	0.0	2.0
I2, Clearance Lost Time [s]	3.9	0.0	3.7	0.0	0.0	4.4
Minimum Recall	No		Yes			Yes
Maximum Recall	No		No			No
Pedestrian Recall	No		No			No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C
C, Cycle Length [s]	30	30	30
L, Total Lost Time per Cycle [s]	5.90	5.70	6.40
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.90	3.70	4.40
g_i, Effective Green Time [s]	4	15	14
g / C, Green / Cycle	0.12	0.49	0.47
(v / s)_i Volume / Saturation Flow Rate	0.08	0.34	0.24
s, saturation flow rate [veh/h]	1790	3580	3572
c, Capacity [veh/h]	214	1775	1687
d1, Uniform Delay [s]	12.74	5.84	5.51
k, delay calibration	0.11	0.11	0.11
l, Upstream Filtering Factor	1.00	1.00	1.00
d2, Incremental Delay [s]	3.94	0.49	0.23
d3, Initial Queue Delay [s]	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.69	0.69	0.50
d, Delay for Lane Group [s/veh]	16.68	6.33	5.74
Lane Group LOS	B	A	A
Critical Lane Group	Yes	Yes	No
50th-Percentile Queue Length [veh/ln]	0.92	0.94	0.65
50th-Percentile Queue Length [ft/ln]	22.98	23.61	16.35
95th-Percentile Queue Length [veh/ln]	1.65	1.70	1.18
95th-Percentile Queue Length [ft/ln]	41.36	42.49	29.42

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	16.68	0.00	6.33	0.00	0.00	5.74
Movement LOS	B		A			A
d_A, Approach Delay [s/veh]	16.68		6.33		5.74	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	6.79					
Intersection LOS	A					
Intersection V/C	0.426					

Other Modes

g_Walk,mi, Effective Walk Time [s]	11.0	0.0	11.0
M_corner, Corner Circulation Area [ft ² /ped]	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft ² /ped]	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	6.04	0.00	6.04
I_p,int, Pedestrian LOS Score for Intersection	1.728	0.000	2.736
Crosswalk LOS	A	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	938	4944	4897
d_b, Bicycle Delay [s]	4.24	32.56	31.53
I_b,int, Bicycle LOS Score for Intersection	1.560	2.574	2.261
Bicycle LOS	A	B	B

Sequence

Ring 1	-	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 2: Rice Rd & Colbern Rd

Control Type: Two-way stop
 Analysis Method: HCM 7th Edition
 Analysis Period: 15 minutes

Delay (sec / veh): 15.4
 Level Of Service: C
 Volume to Capacity (v/c): 0.133

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↶			↶			⌈⌋			⌈⌋⌈⌋		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00			45.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			No			No		

Volumes

Name												
Base Volume Input [veh/h]	26	2	17	25	2	64	65	1084	32	12	571	29
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	1.50	2.00	3.10	0.00	2.00	0.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	4	0	0	6	0	12	0	4	6	0
Diverted Trips [veh/h]	0	0	0	0	0	36	0	73	0	0	37	0
Pass-by Trips [veh/h]	0	0	0	0	0	15	0	0	0	0	-15	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	28	0	0	0	0	65	0	20	37	0
Total Hourly Volume [veh/h]	26	2	49	25	2	121	65	1234	32	36	636	29
Peak Hour Factor	0.9290	0.9290	0.9290	0.9290	0.9290	0.9290	0.9290	0.9290	0.9290	0.9290	0.9290	0.9290
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	1	13	7	1	33	17	332	9	10	171	8
Total Analysis Volume [veh/h]	28	2	53	27	2	130	70	1328	34	39	685	31
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane				
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

[illegible]

Intersection Level Of Service Report**Intersection 3: NE Colbern Rd & Todd George Pkwy**

Control Type:	Signalized	Delay (sec / veh):	15.4
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.526

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	1	0	1	1	0	0
Entry Pocket Length [ft]	215.00	100.00	100.00	265.00	100.00	100.00	130.00	100.00	185.00	160.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	1	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.21	0.00	0.00	0.00
Speed [mph]	40.00			45.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	Yes			Yes			Yes			Yes		
Crosswalk	Yes			Yes			Yes			No		

Volumes

Name												
Base Volume Input [veh/h]	126	264	91	235	379	33	42	730	232	64	389	142
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.80	2.20	1.30	0.00	0.00	0.00	0.90	0.40	0.00	2.10	2.10
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	19	0	0	20	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	46	0	0	17	0	0	116	0	0	71
Total Hourly Volume [veh/h]	126	264	45	235	379	16	42	749	116	64	409	71
Peak Hour Factor	0.9210	0.9210	0.9210	0.9210	0.9210	0.9210	0.9210	0.9210	0.9210	0.9210	0.9210	0.9210
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	34	72	12	64	103	4	11	203	31	17	111	19
Total Analysis Volume [veh/h]	137	287	49	255	412	17	46	813	126	69	444	77
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Free Running
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Beginning of First Red
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss	ProtPer	Permiss	Permiss
Signal Group	1	6	0	5	2	0	7	4	0	3	8	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	10	0	5	10	0	5	10	0	5	10	0
Maximum Green [s]	15	40	0	15	40	0	20	40	0	20	40	0
Amber [s]	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0	0.0
All red [s]	2.5	2.5	0.0	2.5	2.5	0.0	2.5	2.5	0.0	2.5	2.5	0.0
Split [s]	0	0	0	0	0	0	0	0	0	0	0	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	0	0
Pedestrian Clearance [s]	0	30	0	0	29	0	0	28	0	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I2, Clearance Lost Time [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum Recall	No	No		No	No		No	No		No	No	
Maximum Recall	No	No		No	No		No	No		No	No	
Pedestrian Recall	No	No		No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	C	L	C	R	L	C	C
C, Cycle Length [s]	56	56	56	56	56	56	56	56	56	56	56	56
L, Total Lost Time per Cycle [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
g_i, Effective Green Time [s]	29	16	16	29	18	18	28	18	18	28	19	19
g / C, Green / Cycle	0.51	0.29	0.29	0.51	0.31	0.31	0.49	0.32	0.32	0.49	0.33	0.33
(v / s)_i Volume / Saturation Flow Rate	0.11	0.15	0.03	0.19	0.11	0.11	0.04	0.23	0.08	0.07	0.14	0.14
s, saturation flow rate [veh/h]	1293	1888	1587	1366	1900	1874	1194	3592	1610	1032	1868	1774
c, Capacity [veh/h]	700	550	463	685	597	588	618	1142	512	516	618	587
d1, Uniform Delay [s]	11.51	16.72	14.63	12.77	14.99	15.00	11.60	16.99	14.26	12.64	14.74	14.76
k, delay calibration	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.05	0.28	0.04	0.12	0.14	0.14	0.02	0.31	0.09	0.04	0.18	0.19
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, 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
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.20	0.52	0.11	0.37	0.36	0.36	0.07	0.71	0.25	0.13	0.43	0.43
d, Delay for Lane Group [s/veh]	11.56	17.00	14.67	12.89	15.13	15.13	11.61	17.30	14.35	12.68	14.92	14.95
Lane Group LOS	B	B	B	B	B	B	B	B	B	B	B	B
Critical Lane Group	No	Yes	No	Yes	No	No	No	Yes	No	Yes	No	No
50th-Percentile Queue Length [veh/ln]	0.92	2.66	0.40	1.79	1.77	1.75	0.31	3.91	1.02	0.47	2.25	2.15
50th-Percentile Queue Length [ft/ln]	23.07	66.50	9.89	44.69	44.18	43.64	7.65	97.65	25.41	11.66	56.14	53.83
95th-Percentile Queue Length [veh/ln]	1.66	4.79	0.71	3.22	3.18	3.14	0.55	7.03	1.83	0.84	4.04	3.88
95th-Percentile Queue Length [ft/ln]	41.53	119.70	17.80	80.45	79.53	78.55	13.77	175.76	45.74	20.99	101.05	96.90

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	11.56	17.00	14.67	12.89	15.13	15.13	11.61	17.30	14.35	12.68	14.93	14.95
Movement LOS	B	B	B	B	B	B	B	B	B	B	B	B
d_A, Approach Delay [s/veh]	15.19			14.30			16.65			14.67		
Approach LOS	B			B			B			B		
d_I, Intersection Delay [s/veh]	15.38											
Intersection LOS	B											
Intersection V/C	0.526											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	-6.5	9.0	0.0
M_corner, Corner Circulation Area [ft ² /ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft ² /ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	19.87	35.03	19.87	0.00
I_p,int, Pedestrian LOS Score for Intersection	2.697	2.609	3.116	0.000
Crosswalk LOS	B	B	C	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	1421	1421	1421	1421
d_b, Bicycle Delay [s]	2.36	2.36	2.36	2.36
I_b,int, Bicycle LOS Score for Intersection	2.416	2.138	2.468	2.105
Bicycle LOS	B	B	B	B

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 13: NE Rice Rd & NE Ikerd Rd

Control Type:	Two-way stop	Delay (sec / veh):	10.2
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.087

Intersection Setup

Name	Northbound		Southbound		Westbound	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	45.00		45.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name						
Base Volume Input [veh/h]	29	0	0	64	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	1.50	2.00	2.00	0.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	4	0	6	4
Diverted Trips [veh/h]	0	0	0	0	43	0
Pass-by Trips [veh/h]	0	0	0	0	15	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	27	0	0	67
Total Hourly Volume [veh/h]	29	0	31	64	64	71
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	8	0	8	17	17	19
Total Analysis Volume [veh/h]	32	0	34	70	70	77
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.02	0.00	0.09	0.07
d_M, Delay for Movement [s/veh]	0.00	0.00	7.32	0.00	10.25	9.21
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.06	0.06	0.57	0.57
95th-Percentile Queue Length [ft/ln]	0.00	0.00	1.44	1.44	14.33	14.33
d_A, Approach Delay [s/veh]	0.00		2.39		9.71	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	5.92					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 14: NE Colbern Rd & NE Lucky Rd

Control Type:	Two-way stop	Delay (sec / veh):	1,857.7
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	4.505

Intersection Setup

Name													
Approach	Northbound			Southbound			Eastbound				Westbound		
Lane Configuration													
Turning Movement	Left	Thru	Right	Left	Thru	Right	U-tu	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	0	0	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	200.0	100.0	100.0	100.0	60.00	100.00	150.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00			25.00			40.00				40.00		
Grade [%]	0.00			0.00			0.00				0.00		
Crosswalk	Yes			Yes			No				No		

Volumes

Name													
Base Volume Input [veh/h]	0	0	0	0	0	0	0	0	1118	0	0	615	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	19	0	10	0	16	0	0	0	0	20
Diverted Trips [veh/h]	0	0	0	0	0	37	0	73	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	56	0	16	0	56	-56	0	0	-31	31
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	15	0	0	43	0	2	37	102	0	25	0	0	0
Total Hourly Volume [veh/h]	15	0	0	118	0	65	37	247	1062	25	0	584	51
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.920	0.920	0.920	0.920	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	0	0	32	0	18	10	67	289	7	0	159	14
Total Analysis Volume [veh/h]	16	0	0	128	0	71	40	268	1154	27	0	635	55
Pedestrian Volume [ped/h]	0			0			0				0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

[illegible]

Intersection Level Of Service Report
Intersection 18: NE Lucky Rd & Prop East Dr.

Control Type: Two-way stop
 Analysis Method: HCM 7th Edition
 Analysis Period: 15 minutes

Delay (sec / veh): 9.1
 Level Of Service: A
 Volume to Capacity (v/c): 0.147

Intersection Setup

Name						
Approach	Northbound		Southbound		Eastbound	
Lane Configuration	↑		↑		↗	
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00		25.00		25.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		Yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	36	0	0	0	29
Diverted Trips [veh/h]	0	73	0	0	0	37
Pass-by Trips [veh/h]	0	87	0	0	0	72
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	102	45	0	0	0
Total Hourly Volume [veh/h]	0	298	45	0	0	138
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	81	12	0	0	38
Total Analysis Volume [veh/h]	0	324	49	0	0	150
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.15
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	0.00	0.00	9.14
Movement LOS		A	A	A		A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.52
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	12.88
d_A, Approach Delay [s/veh]	0.00		0.00		9.14	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	2.62					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 14: NE Colbern Rd & NE Lucky Rd

Control Type:	Signalized	Delay (sec / veh):	16.4
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.446

Intersection Setup

Name													
Approach	Northbound			Southbound			Eastbound				Westbound		
Lane Configuration													
Turning Movement	Left	Thru	Right	Left	Thru	Right	U-tu	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	0	0	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	200.0	100.0	100.0	100.0	60.00	100.00	150.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00			25.00			40.00				40.00		
Grade [%]	0.00			0.00			0.00				0.00		
Curb Present	No			No			No				No		
Crosswalk	Yes			Yes			Yes				Yes		

Volumes

Name													
Base Volume Input [veh/h]	0	0	0	0	0	0	0	0	316	0	0	1043	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	5.80	2.00	2.00	1.00	2.00
Proportion of CAVs [%]	0.00												
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	56	0	28	0	44	0	0	0	0	55
Diverted Trips [veh/h]	0	0	0	0	0	59	0	117	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	16	0	26	0	16	-16	0	0	-52	52
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	7	0	2	38	43	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	58	0	0	0	0	0	0	54
Total Hourly Volume [veh/h]	0	0	0	79	0	57	38	220	300	0	0	991	53
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.920	0.920	0.920	0.920	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	21	0	15	10	60	82	0	0	269	14
Total Analysis Volume [veh/h]	0	0	0	86	0	62	41	239	326	0	0	1077	58
Presence of On-Street Parking	No		No	No		No	No			No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0				0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0				0		
v_co, Outbound Pedestrian Volume crossing	0			0			0				0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0				0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0				0		
Bicycle Volume [bicycles/h]	0			0			0				0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	100
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	ProtPer	Permiss	Permiss	Permi	ProtP	Permi	Permi	ProtPer	Permiss	Permiss
Signal Group	1	6	0	5	2	0	0	3	8	0	7	4	0
Auxiliary Signal Groups													
Lead / Lag	Lead	-	-	Lead	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	10	0	5	10	0	0	5	10	0	5	10	0
Maximum Green [s]	10	30	0	10	30	0	0	30	30	0	30	30	0
Amber [s]	3.0	4.0	0.0	3.0	4.0	0.0	0.0	4.0	4.0	0.0	4.0	4.0	0.0
All red [s]	2.0	2.5	0.0	2.0	2.5	0.0	0.0	2.5	2.5	0.0	2.5	2.5	0.0
Split [s]	15	34	0	19	53	0	0	12	35	0	12	35	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	7	0	0	7	0	0	0	7	0	0	7	0
Pedestrian Clearance [s]	0	20	0	0	20	0	0	0	20	0	0	20	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No				No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	3.0	4.5	0.0	3.0	4.5	0.0	0.0	4.5	4.5	0.0	4.5	4.5	0.0
Minimum Recall		No		Yes	No			No	No		No	No	
Maximum Recall		No		No	No			No	No		No	No	
Pedestrian Recall		No		No	No			No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	C	R	L	C	C	L	C	C
C, Cycle Length [s]	57	57	57	57	57	57	57	57	57
L, Total Lost Time per Cycle [s]	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	4.50	0.00	4.50	0.00	4.50	4.50	0.00	4.50	4.50
g_i, Effective Green Time [s]	0	10	10	34	27	27	34	20	20
g / C, Green / Cycle	0.00	0.18	0.18	0.59	0.48	0.48	0.59	0.36	0.36
(v / s)_i Volume / Saturation Flow Rate	0.00	0.05	0.04	0.30	0.09	0.09	0.00	0.30	0.30
s, saturation flow rate [veh/h]	1870	1708	1589	927	1813	1813	1150	1885	1851
c, Capacity [veh/h]	64	490	280	603	872	872	824	679	667
d1, Uniform Delay [s]	0.00	20.28	20.09	9.27	8.42	8.42	0.00	16.70	16.70
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.00	0.17	0.40	0.56	0.10	0.10	0.00	2.95	3.02
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.00	0.18	0.22	0.46	0.19	0.19	0.00	0.84	0.84
d, Delay for Lane Group [s/veh]	0.00	20.45	20.48	9.83	8.52	8.52	0.00	19.65	19.72
Lane Group LOS	A	C	C	A	A	A	A	B	B
Critical Lane Group	No	Yes	No	Yes	No	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	0.00	0.96	0.70	1.11	0.90	0.90	0.00	6.11	6.02
50th-Percentile Queue Length [ft/ln]	0.00	23.93	17.44	27.68	22.38	22.38	0.00	152.85	150.52
95th-Percentile Queue Length [veh/ln]	0.00	1.72	1.26	1.99	1.61	1.61	0.00	10.17	10.05
95th-Percentile Queue Length [ft/ln]	0.00	43.08	31.40	49.83	40.28	40.28	0.00	254.23	251.13

Movement, Approach, & Intersection Results

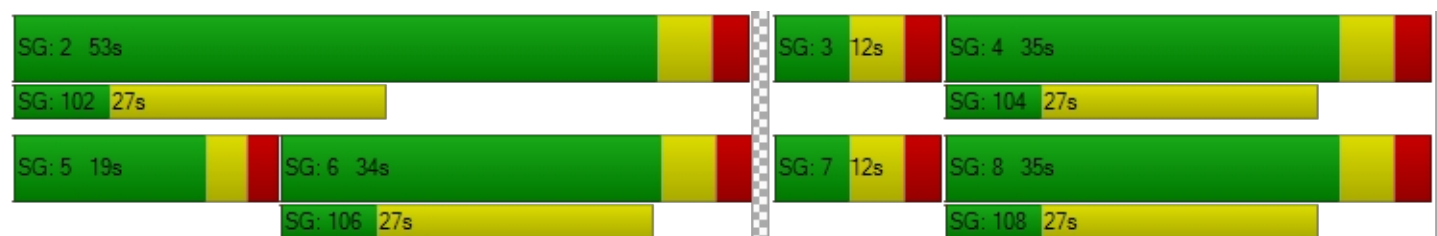
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	20.45	20.45	20.48	9.83	9.83	8.52	8.52	0.00	19.68	19.72
Movement LOS	A	A	A	C	C	C	A	A	A	A	A	B	B
d_A, Approach Delay [s/veh]	0.00			20.46			9.12				19.69		
Approach LOS	A			C			A				B		
d_I, Intersection Delay [s/veh]	16.36												
Intersection LOS	B												
Intersection V/C	0.446												

Other Modes

g_Walk,mi, Effective Walk Time [s]	11.0			11.0			11.0			11.0			
M_corner, Corner Circulation Area [ft ² /ped]	0.00			0.00			0.00			0.00			
M_CW, Crosswalk Circulation Area [ft ² /ped]	0.00			0.00			0.00			0.00			
d_p, Pedestrian Delay [s]	18.46			18.46			18.46			18.46			
I_p,int, Pedestrian LOS Score for Intersection	1.689			2.305			2.900			2.771			
Crosswalk LOS	A			B			C			C			
s_b, Saturation Flow Rate of the bicycle lane	2000			2000			2000			2000			
c_b, Capacity of the bicycle lane [bicycles/h]	968			1637			1004			1004			
d_b, Bicycle Delay [s]	7.56			0.93			7.05			7.05			
I_b,int, Bicycle LOS Score for Intersection	1.560			1.900			1.862			2.541			
Bicycle LOS	A			A			A			B			

Sequence

Ring 1	-	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 14: NE Colbern Rd & NE Lucky Rd

Control Type:	Signalized	Delay (sec / veh):	15.1
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.654

Intersection Setup

Name													
Approach	Northbound			Southbound			Eastbound				Westbound		
Lane Configuration													
Turning Movement	Left	Thru	Right	Left	Thru	Right	U-tu	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	0	0	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	200.0	100.0	100.0	100.0	60.00	100.00	150.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00			25.00			40.00				40.00		
Grade [%]	0.00			0.00			0.00				0.00		
Curb Present	No			No			No				No		
Crosswalk	Yes			Yes			Yes				Yes		

Volumes

Name													
Base Volume Input [veh/h]	0	0	0	0	0	0	0	0	1118	0	0	615	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00												
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	19	0	10	0	16	0	0	0	0	20
Diverted Trips [veh/h]	0	0	0	0	0	37	0	73	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	56	0	16	0	56	-56	0	0	-31	31
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	15	0	0	43	0	2	37	102	0	25	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	33	0	0	0	13	0	0	26
Total Hourly Volume [veh/h]	15	0	0	118	0	32	37	247	1062	12	0	584	25
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.920	0.920	0.920	0.920	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	0	0	32	0	9	10	67	289	3	0	159	7
Total Analysis Volume [veh/h]	16	0	0	128	0	35	40	268	1154	13	0	635	27
Presence of On-Street Parking	No		No	No		No	No			No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0				0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0				0		
v_co, Outbound Pedestrian Volume crossing	0			0			0				0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0				0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0				0		
Bicycle Volume [bicycles/h]	0			0			0				0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	100
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	ProtPer	Permiss	Permiss	Permi	ProtP	Permi	Permi	ProtPer	Permiss	Permiss
Signal Group	1	6	0	5	2	0	3	3	8	0	7	4	0
Auxiliary Signal Groups													
Lead / Lag	Lead	-	-	Lead	-	-	Lead	Lead	-	-	Lead	-	-
Minimum Green [s]	5	10	0	5	10	0	5	5	10	0	5	10	0
Maximum Green [s]	10	30	0	10	30	0	30	30	30	0	10	30	0
Amber [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	1.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0
Split [s]	13	34	0	10	44	0	24	24	46	0	10	32	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	7	0	0	7	0	0	0	7	0	0	7	0
Pedestrian Clearance [s]	0	20	0	0	20	0	0	0	20	0	0	20	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No				No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0
Minimum Recall		No		Yes	No			No	No		Yes	No	
Maximum Recall		No		No	No			No	No		No	No	
Pedestrian Recall		No		No	No			No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	C	R	L	C	C	L	C	C
C, Cycle Length [s]	48	48	48	48	48	48	48	48	48
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	0.00	3.00	0.00	3.00	3.00	0.00	3.00	3.00
g_i, Effective Green Time [s]	4	14	14	24	19	19	24	11	11
g / C, Green / Cycle	0.08	0.29	0.29	0.50	0.40	0.40	0.50	0.24	0.24
(v / s)_i Volume / Saturation Flow Rate	1.28	0.07	0.02	0.25	0.31	0.31	0.00	0.18	0.18
s, saturation flow rate [veh/h]	13	1733	1589	1218	1870	1863	643	1870	1843
c, Capacity [veh/h]	151	726	460	706	744	741	412	446	440
d1, Uniform Delay [s]	23.98	13.04	12.38	8.32	12.66	12.66	0.00	16.92	16.93
k, delay calibration	0.50	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
l, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	1.41	0.11	0.07	0.43	1.88	1.90	0.00	2.52	2.57
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.11	0.18	0.08	0.44	0.79	0.79	0.00	0.75	0.75
d, Delay for Lane Group [s/veh]	25.39	13.16	12.45	8.74	14.54	14.56	0.00	19.44	19.50
Lane Group LOS	C	B	B	A	B	B	A	B	B
Critical Lane Group	Yes	Yes	No	No	No	Yes	No	No	No
50th-Percentile Queue Length [veh/ln]	0.23	0.96	0.25	1.31	4.38	4.37	0.00	3.07	3.04
50th-Percentile Queue Length [ft/ln]	5.78	23.99	6.30	32.83	109.39	109.19	0.00	76.73	75.90
95th-Percentile Queue Length [veh/ln]	0.42	1.73	0.45	2.36	7.81	7.80	0.00	5.52	5.46
95th-Percentile Queue Length [ft/ln]	10.41	43.17	11.33	59.09	195.15	194.88	0.00	138.11	136.62

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	25.39	25.39	25.39	13.16	13.16	12.45	8.74	8.74	14.55	14.56	0.00	19.47	19.50
Movement LOS	C	C	C	B	B	B	A	A	B	B	A	B	B
d_A, Approach Delay [s/veh]	25.39			13.00			13.34				19.47		
Approach LOS	C			B			B				B		
d_I, Intersection Delay [s/veh]	15.15												
Intersection LOS	B												
Intersection V/C	1.654												

Other Modes

g_Walk,mi, Effective Walk Time [s]	11.0			11.0			11.0			11.0			
M_corner, Corner Circulation Area [ft ² /ped]	0.00			0.00			0.00			0.00			
M_CW, Crosswalk Circulation Area [ft ² /ped]	0.00			0.00			0.00			0.00			
d_p, Pedestrian Delay [s]	14.22			14.22			14.22			14.22			
I_p,int, Pedestrian LOS Score for Intersection	1.696			2.214			3.001			2.835			
Crosswalk LOS	A			B			C			C			
s_b, Saturation Flow Rate of the bicycle lane	2000			2000			2000			2000			
c_b, Capacity of the bicycle lane [bicycles/h]	1210			1628			1711			1127			
d_b, Bicycle Delay [s]	3.73			0.83			0.50			4.56			
I_b,int, Bicycle LOS Score for Intersection	1.586			1.883			2.566			2.127			
Bicycle LOS	A			A			B			B			

Sequence

Ring 1	-	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Appendix D - Signal Warrant Analysis

Wisconsin Department of Transportation Traffic Signal Warrant

Summary Worksheet

100%

The Worksheet(s) attached are provided as an attachment to the Engineering Investigation Study for:

Intersection: Colbern Road & Prop. Lucky Road

County: Jackson County

City: Lee's Summit

Major Street: Colbern Road

Critical Approach Speed: 40 mph

Lanes: 2 or more lanes

Minor Street: Prop. Lucky Road

Critical Approach Speed: 25 mph

Lanes: 1 lane

% Right Turns Included

From North (SB) 0%

From East (WB) 100%

From South (NB) 100%

From West (EB) 100%

In built-up area of isolated community of < 10,000 population? No

Total number of approaches at intersection? 4 or more

If it is a "T" intersection, inflate minor threshold to 150%?

Manually set volume level?

Analysis based on **PROJECTED** volume data.

Forecast Year	Within 5 Years of Construction?	Time (HH:MM)			
		From	AM / PM	To	AM / PM

Warrant Evaluation Summary	Warrant Met:
Warrant 1: Eight - Hour Vehicular Volume	N/A
Condition A: Minimum Vehicular Volume	
Condition B: Interruption of Continuous Traffic	
Condition C: Combination: 80% of A and B	
Warrant 2: Four-Hour Volume	N/A
Warrant 3: Peak Hour Volume	Yes
Warrant 4: Pedestrian Volume	N/A
Criterion A: Four-Hour	
Criterion B: Peak-Hour	
Warrant 5: School Crossing	N/A
Warrant 6: Coordinated Signal System	N/A
Warrant 7: Crash Experience	N/A
Warrant 8: Roadway Network	N/A
Warrant 9: Intersection Near a Grade Crossing	N/A

Warrant Analysis Conducted By:

Name: Akshay Patel

Agency: Renaissance Infrastructure Consulting

Date: 11/2/2022

Warrant 3: Peak Hour Volume

100%

Warrant Evaluated? Yes

Warrant Satisfied? Yes

Manually Set To:

Condition justifying use of warrant:

Criteria		Met?
Delay on Minor Approach	4	Yes
Volume on Minor Approach	100	
Total Entering Volume (veh/h)	800	

Manually Set Peak Hour?

Peak Hour	Major Road Vol. (Both App.)	Minor Road Vol. (High App.)
16:00	2006	118

Figure 4C-3 Warrant 3, Peak Hour

