Lincoln Road—Montana to I-15

Traffic Engineering Report

CM STWD (246)
UPN: 8559000

December 30, 2014

Prepared for:
Montana Department of Transportation
Helena, MT

MONTANA MDT DEPARTMENT OF TRANSPORTATION

RPA

Prepared by:
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1.0 INTRODUCTION

The north valley outside of Helena has experienced rapid growth in recent years due in part to development activity and changes in land use. Traffic volumes have been increasing rapidly near the Lincoln Interchange. The recent construction of the Custer Interchange has also resulted in unanticipated changes to traffic patterns and operations at the Lincoln Interchange. As a result, traffic performance has deteriorated as congestion has increased. This area is currently experiencing vehicle congestion during the peak hours and is expected to experience increased growth in the coming years due to continued development. If remained unchanged, increasing vehicle delay and safety issues are likely to compound.

It is the intent of this *Traffic Engineering Report* to identify and evaluate potential options to improve safety and operations for the Lincoln Road corridor between North Montana Avenue and Interstate 15 (I-15). The alternatives identified in this study are intended to be implementable in the short-term and do not include full reconstruction of the Lincoln Interchange or the Lincoln Road corridor. Potential barriers and constraints to project development were also identified to determine the feasibility of developing the alternatives.

1.1 Study Area

The study area is located approximately six miles north of Helena and includes the intersections of Lincoln Road with North Montana Avenue and the I-15 ramp terminals at the Lincoln Interchange. The land use adjacent to Lincoln Road currently consists of irrigated farm land, commercial businesses, and residential dwellings. Bob's Valley Market convenience store / gas station is located on the northeast corner of the North Montana Avenue / Lincoln Road intersection. The Grub Stake restaurant is located along the north side of Lincoln Road just west of the interchange. Jim Darcy School lies west of the intersection with North Montana Avenue. Land within the vicinity of the Lincoln Interchange is prime for future residential and mixed-use commercial development. **Figure 1.1** shows a vicinity map of the Lincoln Road study area.

Figure 1.1: Vicinity Map

2.0 EXISTING CONDITIONS

The Lincoln Interchange is located at reference post (RP) 200 along I-15. The interchange is currently configured as a standard "diamond interchange" with one lane on each ramp. Lincoln Road is a major collector roadway on the secondary highway system east of the interchange (S-453), and a minor arterial urban route west of the interchange (U-5826). Lincoln Road consists of one travel lane in each direction and has a posted speed limit of 45 miles per hour (mph) within the study area.

North Montana Avenue has one travel lane in each direction and is designated as a minor arterial secondary highway south of Lincoln Road (S-229), and a minor collector local roadway north of Lincoln Road. The speed limit of North Montana Avenue is 60 mph south of Lincoln Road, and 55 mph north of Lincoln Road.

2.1 Traffic Volumes

In order to supplement existing information, a detailed traffic data collection effort was conducted in November, 2013 to establish existing conditions. The data collection effort consisted of turning movement counts, vehicle queue counts, and field observations. Data collection and field review were conducted to collect existing conditions information to establish baseline conditions. The field review included evaluations of physical characteristics, geometric features, surfacing, posted speed limits, and other elements.

The Montana Department of Transportation (MDT) Data and Statistics Bureau provided Average Annual Daily Traffic (AADT) counts for the study area. This data is shown in **Table 2.1**. Vehicle turning movement counts were collected using *Miovision* video collection units. Turning movements were collected for 24-hour periods and were used to determine peak travel times. **Figure 2.1** shows the existing conditions traffic data including peak hour turning movements, and Average Daily Traffic (ADT) volumes on intersection approach legs, as collected by the *Miovision* video collection units. The raw existing conditions data is provided in **Appendix A**.

Table 2.1: Existing Average Annual Daily Traffic

Site ID	Location	Description	2013 AADT
25-7A-1	I-15	1 Mile North of Lincoln Road Interchange (RP 201)	4,300
25-7B-87	I-15	North of Custer Interchange	10,730
25-7A-13	Lincoln Road	0.5 Miles East of I-15 (RP 0.5)	3,030
25-7A-24	Lincoln Road	Between I-15 and Montana Avenue	7,200
25-7A-3	Lincoln Road	West of Montana Avenue	5,110
25-7A-78	Montana Avenue	North of Lincoln Road	6,070
25-7A-2	Montana Avenue	South of Lincoln Road	3,690

Figure 2.1: Existing Conditions (2013)

2.2 Intersection Operational Analysis

A Level of Service (LOS) analysis of existing data was performed for all of the subject intersections in the study area. The LOS analysis was completed using *Synchro 8* software. Field collected data was used for input for the software as discussed previously. The results of the existing conditions intersection operational analysis are shown in **Table 2.1.** The table provides the total intersection delay and LOS as well as the delay and LOS of each approach leg. Peak observed queue lengths are shown in **Figure 2.2**. More detailed data is contained in **Appendix B**.

Table 2.2: Existing Intersection Operational Analysis

Intersection	AM Peak Hour		PM Peak Hour	
	Delay (s)	LOS	Delay (s)	LOS
Lincoln Rd / Montana Ave	**29.1**	**D**	**21.6**	**C**
Eastbound	*27.5*	*D*	*13.1*	*B*
Westbound	*13.6*	*B*	*30.8*	*D*
Northbound	*13.0*	*B*	*13.4*	*B*
Southbound	*40.4*	*E*	*14.2*	*B*
Lincoln Rd / I-15 SB	**3.0**	**A**	**1.4**	**A**
Westbound	*8.6*	*A*	*0.7*	*A*
Southbound	*15.1*	*C*	*15.5*	*C*
Lincoln Rd / I-15 NB	**10.5**	**B**	**45.2**	**E**
Eastbound	*8.2*	*A*	*10.5*	*B*
Westbound	*11.2*	*B*	*11.1*	*B*
Northbound	*9.6*	*A*	*56.9*	*F*

Lincoln Road / North Montana Avenue Intersection

The intersection of Lincoln Road and North Montana Avenue currently has all-way stop control including an overhead flashing beacon. Each approach leg consists of one lane with combined left, through, and right turn movements. The existing conditions operational analysis shows that the intersection of Lincoln Road and North Montana Avenue currently operates at a LOS D during the AM peak hour and a LOS C for the PM peak hour. During the AM peak hour, this intersection experiences high amounts of delay due to a high volume of southbound and eastbound traffic. The most common turning movements during the AM peak hour are those directed towards the interchange (i.e. southbound left and eastbound through). Peak vehicle queues of approximately 1,500 feet for the southbound approach leg and 750 feet for the eastbound approach leg were observed during the AM peak hour. During the PM peak hour, the highest turning movement, and subsequently the highest amount of vehicle delay, is related to the westbound right turn movement. Peak queues of approximately 1,500 feet along the westbound approach were noted during the PM peak hour.

Lincoln Road / I-15 SB Ramps

The intersection of Lincoln Road and the I-15 SB ramps has stop control provided along the SB off-ramp approach. There are currently no dedicated turn bays. The existing conditions operational analysis shows low overall vehicle delay. Field observation noted some delay during the AM peak hour along the westbound approach due to left-turning vehicles conflicting with eastbound right-turning vehicles. Peak queues of approximately 350 feet were noted along the westbound approach leg during the AM peak hour. There was very minimal vehicle queuing associated with the intersection observed during the PM peak hour.

Lincoln Road / I-15 NB Ramps

The intersection of Lincoln Road and the I-15 NB ramps was recently modified to provide all-way stop control in response to poor traffic operations and vehicle queues during the PM peak hour. In addition, transverse rumble strips were installed along the eastbound and westbound approaches to alert motorists of the intersection traffic control. The intersection is shown to operate with minimal delay during the AM peak hour. Under the current configuration (i.e. all-way stop control), there are high levels of vehicle delay along the northbound off ramp during the PM peak hour. An overall intersection LOS of E was calculated during the PM peak hour. Peak vehicle queues of approximately 700 feet were noted along the off ramp during the PM peak hour. The distance from the intersection to the mainline of I-15 is approximately 1,000 feet.

Figure 2.2: Observed Peak Hour Queue Lengths

3.0 PROJECTED CONDITIONS

The study area has experienced rapid traffic growth recently due to residential development and changes in traffic patterns. It is expected that traffic will continue to increase in the future. The selection of an appropriate growth rate for the area is important for forecasting future traffic conditions and to help identify mitigation needs. This section looks at historic traffic and growth characteristics and defines projected conditions for the study area.

3.1 Historic Traffic and Growth Rates

Historic AADT traffic counts for the locations presented in **Section 2.1** were provided by MDT as shown in **Figure 3.1**. These counts provide a look at traffic conditions within the study area over the past 20 years. The historic traffic counts can be used to help evaluate how traffic has changed in the area.

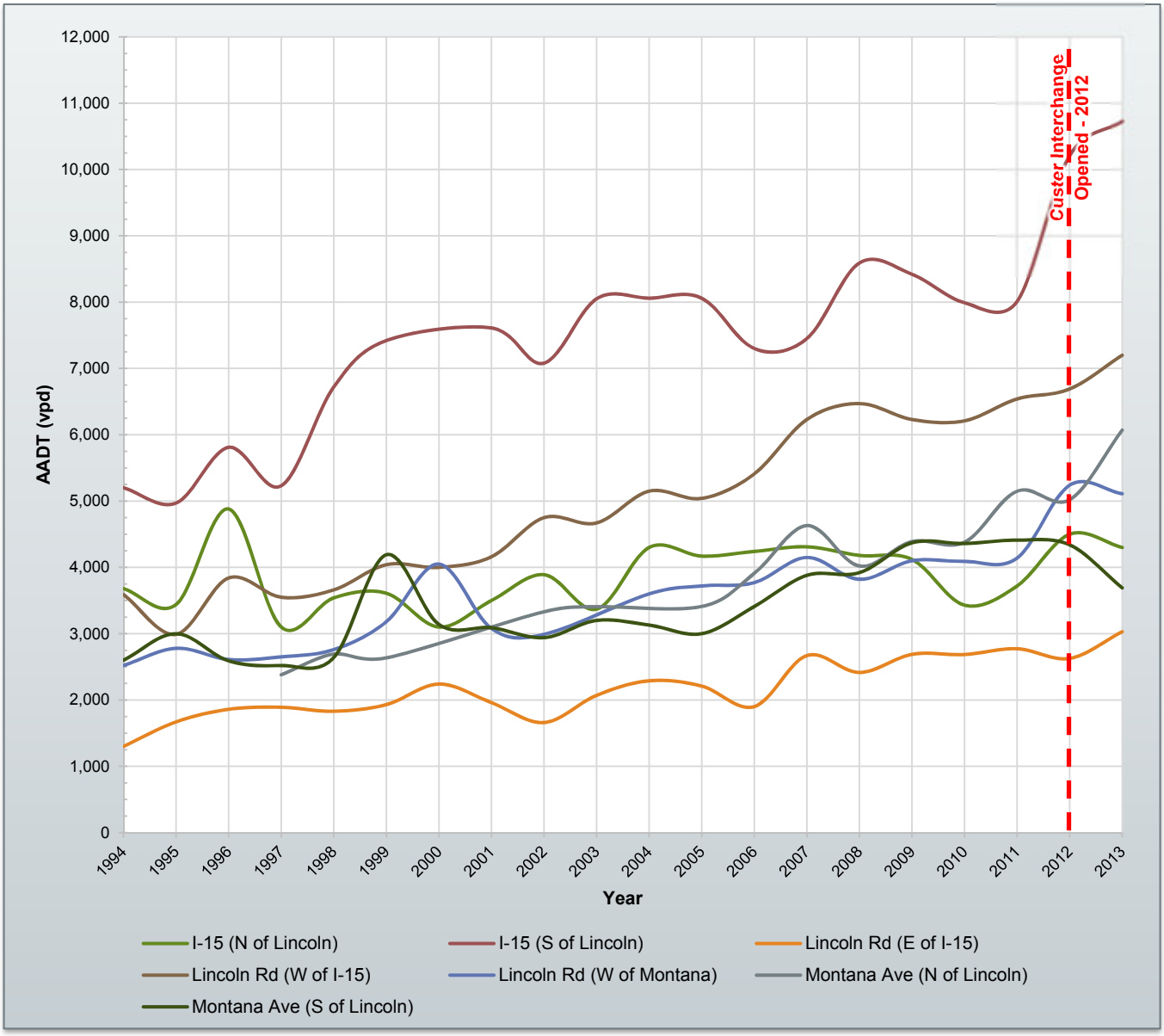


Figure 3.1: Historic AADT Counts

Growth rates for the study area are needed to project future traffic conditions. The growth rates were used to project existing traffic volumes out to the future analysis years. Average annual growth rates (AAGR) were calculated using the following equations:

$$i = \sqrt[n]{\frac{f}{p}} - 1; \quad F = P(1+i)^n$$

Where:

F = Future Traffic Volume; P = Present Traffic Volume; i = Growth Rate; n = Number of Years

Traffic volumes can vary greatly over short periods of time. As such, an analysis of multiple years of historic data is needed to more accurately project future conditions. **Table 3.1** shows the growth rates experienced during various time periods along the corridor.

Table 3.1: Historic AADT Growth Rates

	AADT Count Location							
	I-15		Lincoln Road			Montana Avenue		
Time Period	N of Lincoln	S of Lincoln	E of I-15	W of I-15	W of Montana	N of Lincoln	S of Lincoln	Weighted Average
1994 - 2013	0.87%	3.14%	3.26%	4.37%	3.41%	5.23%	2.67%	3.44%
1994 - 2003	-0.95%	5.42%	3.06%	4.00%	3.48%	6.08%	2.29%	3.87%
2004 - 2013	-0.50%	3.00%	3.54%	3.64%	3.73%	5.75%	3.58%	3.35%
2000 - 2009	3.06%	1.23%	3.19%	5.51%	2.13%	4.48%	3.81%	3.18%
2009 - 2013	3.63%	7.57%	2.20%	3.71%	7.12%	8.17%	-3.37%	5.08%
2004 - 2008	-0.24%	0.49%	3.00%	6.91%	2.31%	6.85%	7.33%	3.58%

As **Table 3.1** shows, the study area has generally experienced a growing trend with peak growth occurring over the past five years. The weighted average growth in the study area is 3.44% per year over the past 20 years.

MDT provided various growth rates for the study area. The growth rates are based on a number of factors, including an analysis of historic traffic volumes. The following annual growth rates were provided by MDT:

- Interstate 15: 1.8%
- Lincoln Road (east of I-15): 3.5%
- Lincoln Road (between I-15 and N Montana Ave): 2.9%
- Lincoln Road (west of N Montana Ave): 2.3%
- N Montana Ave (north of Lincoln Road): 3.5%
- N Montana Ave (south of Lincoln Road): 3.5%

Through comparison of historic traffic trends and available data, the rates provided by MDT were used to project future traffic conditions for the study area. These rates appear to be appropriate based on the historic data, land use characteristics, and anticipated changes in travel patterns. As such, all future projections contained in this report utilize the MDT provided growth rates. If, over time, traffic growth occurs in a manner different than that assumed in this report, the analysis and conclusions made may need to be revisited.

Future projections were made for multiple time periods in order to analyze traffic characteristics at various points in time. The projections were made for years 2018 (short-term), 2028 (interim) and 2038 (future). **Figures 3.2** through **3.4** show the projected traffic volumes for the future year scenarios.

Figure 3.2: Short-Term Year (2018) Traffic Volumes

Figure 3.3: Interim Year (2028) Traffic Volumes

Figure 3.4: Future Year (2038) Traffic Volumes

3.2 Projected Operational Analysis

Intersection turning movement volumes were projected out to estimate future year conditions. The growth rates discussed previously were applied to the existing turning movement volumes for all future year scenarios. The analysis assumes that no geometric modifications would be made to the intersections. **Table 3.2** show the results of the projected intersection operational analysis.

Table 3.2: Projected Intersection Operational Analysis

Intersection	Short-Term (2018)				Interim (2028)				Future (2038)			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
Lincoln Rd / Montana Ave	**67.3**	**F**	**47.0**	**E**	**228.2**	**F**	**211.5**	**F**	**551.3**	**F**	**479.6**	**F**
Eastbound	*46.6*	*E*	*15.9*	*C*	*160.4*	*F*	*30.1*	*D*	*418.3*	*F*	*71.8*	*F*
Westbound	*16.0*	*C*	*81.9*	*F*	*23.2*	*C*	*416.4*	*F*	*49.9*	*E*	*870.9*	*F*
Northbound	*15.4*	*C*	*16.6*	*C*	*22.8*	*C*	*35.4*	*E*	*54.2*	*F*	*148.0*	*F*
Southbound	*115.2*	*F*	*18.1*	*C*	*398.5*	*F*	*47.1*	*E*	*924.9*	*F*	*224.7*	*F*
Lincoln Rd / I-15 SB	**4.0**	**A**	**1.6**	**A**	**14.6**	**B**	**2.7**	**A**	**(i)**	**F**	**10.7**	**B**
Westbound	*11.2*	*B*	*0.9*	*A*	*39.5*	*E*	*1.5*	*A*	*376.5*	*F*	*4.7*	*A*
Southbound	*19.3*	*C*	*18.4*	*C*	*79.7*	*F*	*34.3*	*D*	*(i)*	*F*	*174.1*	*F*
Lincoln Rd / I-15 NB	**12.0**	**B**	**93.2**	**F**	**22.9**	**C**	**266.3**	**F**	**110.1**	**F**	**533.2**	**F**
Eastbound	*8.5*	*A*	*10.9*	*B*	*9.4*	*A*	*11.9*	*B*	*10.4*	*B*	*13.8*	*B*
Westbound	*13.2*	*B*	*11.8*	*B*	*28.6*	*D*	*14.0*	*B*	*159.0*	*F*	*19.8*	*C*
Northbound	*10.3*	*B*	*121.5*	*F*	*13.2*	*B*	*355.8*	*F*	*18.4*	*C*	*719.9*	*F*

(i) Value outside of software bounds.

Lincoln Road / North Montana Avenue

The intersection of Lincoln Road and Montana Avenue is shown to fail within five years and will continue to experience increasing delays during the peak hours. During the AM peak hour, high vehicle delay is shown along the southbound and eastbound approach legs. The PM peak hour experiences the most delay along the westbound approach leg.

Lincoln Road / I-15 SB Ramps

The intersection of Lincoln Road and the I-15 SB ramps currently has minimal vehicle delay. Delay is projected to increase during the AM peak hour due to the high volume of eastbound right-turning traffic conflicting with westbound left-turns. The operational analysis also projects the southbound approach leg to fail in the future due to a lack of available gaps. It should be noted, however, that the traffic volumes along the southbound approach leg are minimal.

Lincoln Road / I-15 NB Ramps

The intersection of Lincoln Road and the I-15 NB ramps is projected to fail during the PM peak hour by the year 2018. If remained unchanged, this intersection is shown to have excessive delays during the PM peak hour due to a predominance of northbound left-turning vehicles. Additionally, during the AM peak hour it is projected that the westbound approach leg will continue to see increasing vehicle delay with a projected LOS of D by the year 2028.

4.0 SAFETY

MDT provided crash data for the study area including the type, frequency, location, and severity of each crash. Crash data was provided for the most recent ten years period for which information was available (July 01, 2003 to June 30, 2013). A total of 59 crashes occurred within the study area during this time period. Of the 59 reported crashes, there were 17 that resulted in injuries (28.8%) and no fatalities. Detailed crash data is provided in **Appendix A**.

Note that there have been multiple projects that have occurred during the ten year crash analysis period. The Lincoln Interchange bridge was reconstructed in 2005 to increase shoulder widths and improve sight distances. The Custer Interchange was constructed and open to the public in June of 2012. As discussed previously, the new interchange resulted in a shift in travel patterns and increased overall traffic usage at the Lincoln Interchange. All-way stop control was installed during the summer of 2012 to help improve traffic operations and reduce vehicle queuing at the intersection of Lincoln Road and the I-15 NB ramps in response to the increased traffic at the interchange. Transverse rumble strips were later installed along Lincoln Road to alert motorists of the change in traffic control at the intersection with the I-15 NB ramps.

4.1 Crash Location

Nine crashes were identified at the intersection of Lincoln Road and North Montana Avenue. Of the nine crashes, seven involved multiple vehicles and were either rear end or right angle crashes. The remaining two crashes at this location were single vehicle crashes resulting from driver behavior error.

Four crashes occurred along the southbound ramps or at the intersection of Lincoln Road and the I-15 SB ramps. Three crashes were single vehicle crashes resulting from driver error along the ramps while the fourth was a rear end crash related to the intersection.

A total of 32 crashes were noted along the northbound off ramp or at the intersection of Lincoln Road and the I-15 NB ramps. Twelve of the 32 crashes involved only a single vehicle. The majority of the multi-vehicle crashes were right angle or rear end crashes related to the intersection. Three crashes were reported after the all-way stop control was installed in 2012 (two of these crashes were single vehicle alcohol related and one was a right angle crash resulting from disregarding the stop sign).

The remaining 14 crashes occurred along Lincoln Road between Montana Avenue and the Interchange. Twelve of these 14 crashes involved more than one vehicle with the predominate type being rear end crashes.

4.2 Crash Period

Crash data for the study area was evaluated based on the period of time when the crash occurred. The number of crashes per month for each year in which data was analyzed has varied over the analysis period. **Figure 4.1** shows the average number of crashes per month over the 10-year analysis period.

Figure 4.1: Average Number of Crashes per Month

When examined by time of year, the most common months for crashes are December and July, both with eight crashes. It is common for the early winter months to have the highest number of crashes due to inclement weather conditions. Also, during the summer months traffic volumes are highest at this location, thereby increasing the exposure rate for potential crashes. Additionally, over 27 percent of crashes occurred on a Friday, by far the most common day of the week. In total, 83 percent of crashes occurred on a weekday.

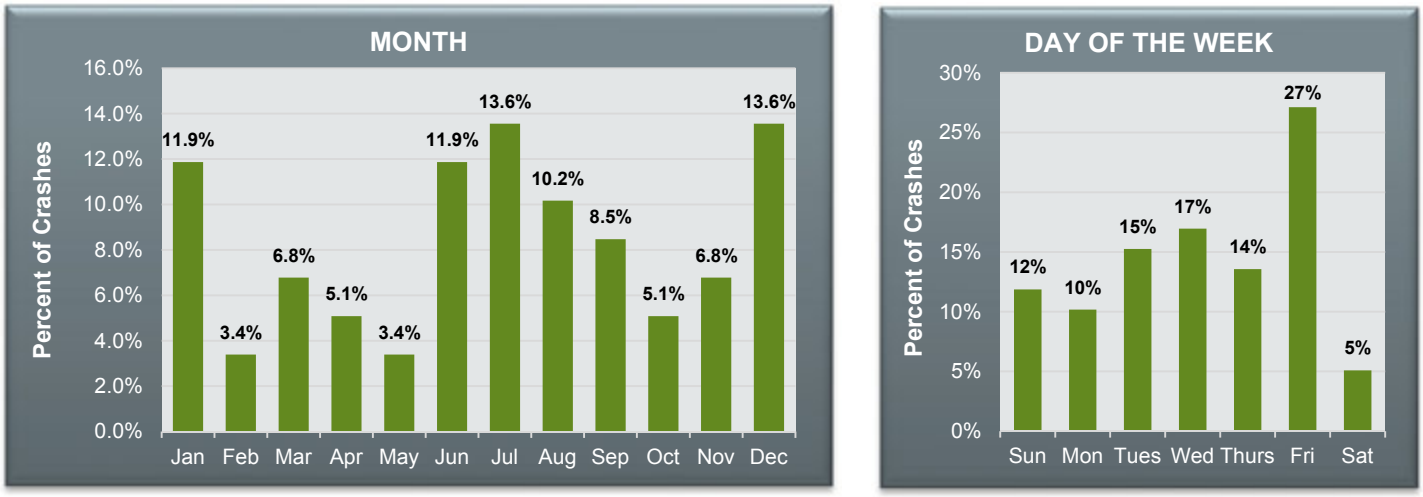


Figure 4.2: Crash Statistics for Month and Day of the Week

With regards to time of day, spikes in the number of crashes generally occurred during the peak hours when traffic volumes are the highest. For the study area, the most common time period for crashes occurred during the AM peak hour (7:00 AM to 8:00 AM), followed by the PM peak hour (5:00 PM to 6:00 PM). Over 42 percent of crashes occurred between 4:00 PM and 11:00 PM.

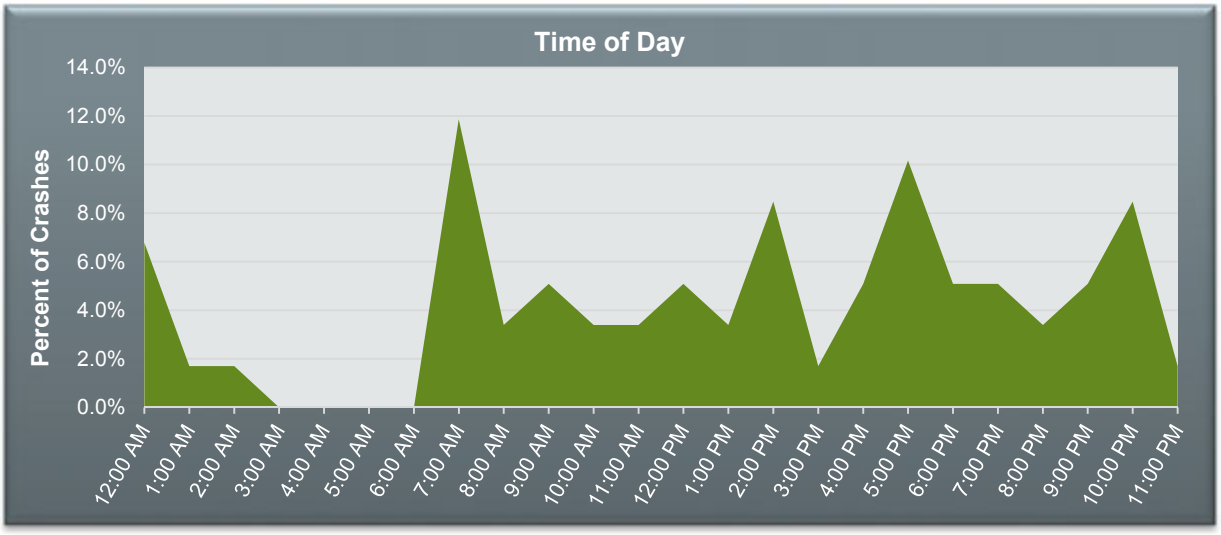


Figure 4.3: Crash Statistics for Time of Day

4.3 Environmental Factors

Crash data was reviewed to evaluate trends related to environmental factors such as weather, roadway surfacing, and light conditions. Approximately 78 percent of the reported crashes occurred while road surfacing was dry while approximately 20 percent occurred on wet, icy, snowy or slushy surfacing. Inclement weather conditions (i.e. rain, snow, sleet, or fog) were present for approximately 12 percent of the crashes. Almost 56 percent of reported crashes occurred during the daylight, while almost 29 percent were reported under dark, not lighted conditions.

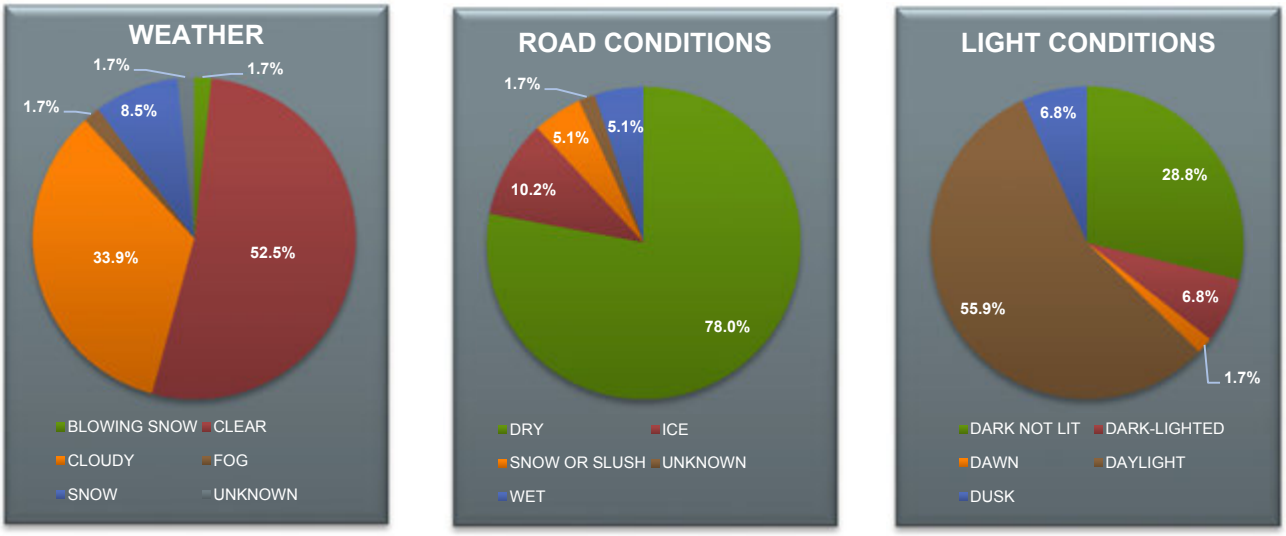


Figure 4.4: Crash Statistics for Environmental Factors

4.4 Crash Type

Over 52 percent of crashes occurred in an intersection or were related to an intersection / driveway. Almost 12 percent of crashes were at or related to an interchange. The remaining approximately 36 percent were non-junction related. The majority of crashes (over 67 percent) involved more than one vehicle. The most

common manner of collisions were rear end (40 percent) and right angle (22 percent). Note that approximately 32 percent of crashes did not list the manner of collision.

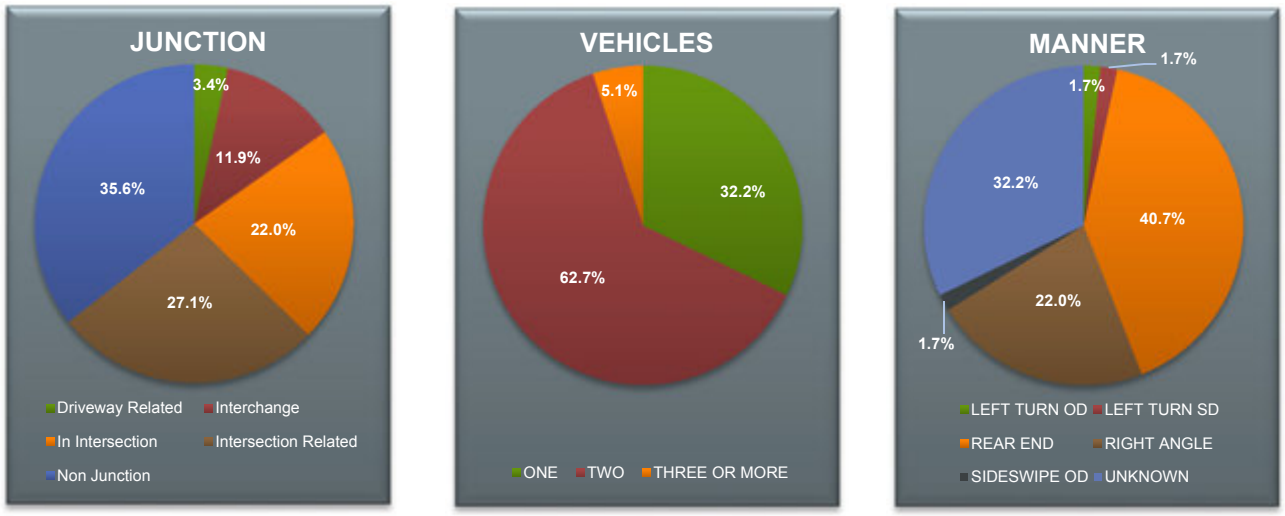


Figure 4.5: Crash Statistics for Crash Type

Approximately three out of four crashes reported driver behavior as being a contributing circumstance. Alcohol and/or drugs were involved in six percent of the crashes. Inclement weather or environmental conditions contributed to eight percent of crashes.

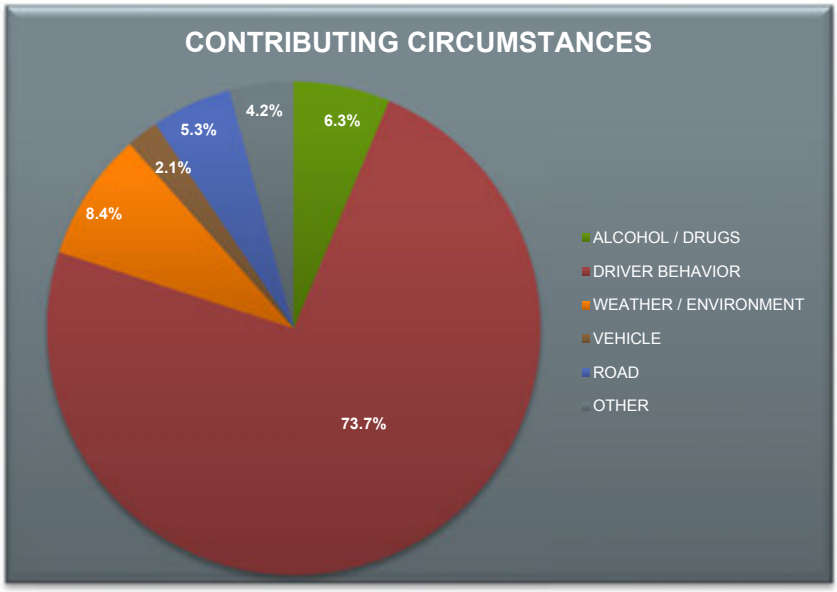


Figure 4.6: Crash Statistics for Contributing Circumstances

5.0 IMPROVEMENT OPTIONS

A list of transportation system improvements and strategies was developed to address identified needs within the study area. The goal of the improvement options is to improve safety and operations by providing the appropriate traffic control and geometrics to address existing and projected traffic conditions. Three steps were applied to develop the preliminary improvement options:

1. Identify roadway issues and areas of concern based on field review, engineering analysis of traffic data, crash analysis, and consultation with MDT and Lewis and Clark County.
2. Identify the needs of the corridor.
3. Analyze the information gathered to develop a range of improvement options that address the roadway issues and areas of concern, as well as satisfying corridor needs.

Note that implementation of improvement options ultimately depends on funding availability, right-of-way needs, available personnel resources, and other project delivery elements. The improvement options identified were developed with the understanding that the project could be developed within approximately five years and that full interchange reconstruction would not be required. Ultimately, the improvement options are aimed at being a short-term improvement that can improve traffic operations and conditions until such time that the interchange can be fully reconstructed.

5.1 IMPROVEMENT OPTIONS CONSIDERED

A list of improvement options considered was developed for the intersections of Lincoln Road with North Montana Avenue, I-15 SB ramps, and I-15 NB ramps. The traffic operations for each intersection were evaluated individually for existing and projected years using either *Synchro 8* or for detailed roundabout analysis, *Sidra Intersections 6*. Basic assumptions for geometrics, signal timings, etc., were made to conduct a "planning-level" analysis. Detailed data from the intersection operation analysis is contained in the appendix.

In addition to the traffic operations analysis, a list of identified advantages and disadvantages, as well as potential barriers and constraints to project development were developed for each improvement option. Planning level cost estimates are also included and are listed in 2014 dollars. The planning level costs include estimates for right-of-way, preliminary engineering, construction engineering, construction, and indirect and incidental costs (IDIC). Cost ranges are provided in some cases, indicating unknown factors at the particular planning level stage.

For each improvement option, a conclusion was made whether to advance or not advance for further analysis based on the preliminary evaluation. Those options that met the objectives and that were seen to be implementable were advanced for further "corridor-wide" evaluation.

5.1.1 Lincoln Road / Montana Avenue

L.1. No Action

Description:

The intersection of Lincoln Road and North Montana Avenue currently consists of stop control in all directions. No dedicated turn bays are provided on any approach.

The No Action alternative includes existing geometrics and traffic control and is representative of conditions if no changes were made to the intersection. This alternative was used to establish baseline conditions and to calibrate the traffic analysis models as accurately as possible.

Traffic Operations:

Year	AM		PM	
	Delay	LOS	Delay	LOS
2013	29.1	D	21.6	C
2018	67.3	F	47.0	E
2028	228.2	F	211.5	F
2038	551.3	F	479.6	F

- High volumes of southbound left-turn and eastbound through movements during the AM peak hour resulting in high delay and poor LOS.
- The westbound approach leg experiences excessive delay and poor LOS due to a high proportion of right-turning traffic.

Advantages:

- No reconstruction required.

Disadvantages:

- Does not address identified issues.
- Poor LOS and high vehicle delay.

Potential Barriers / Constraints:

N/A

Estimated Cost:

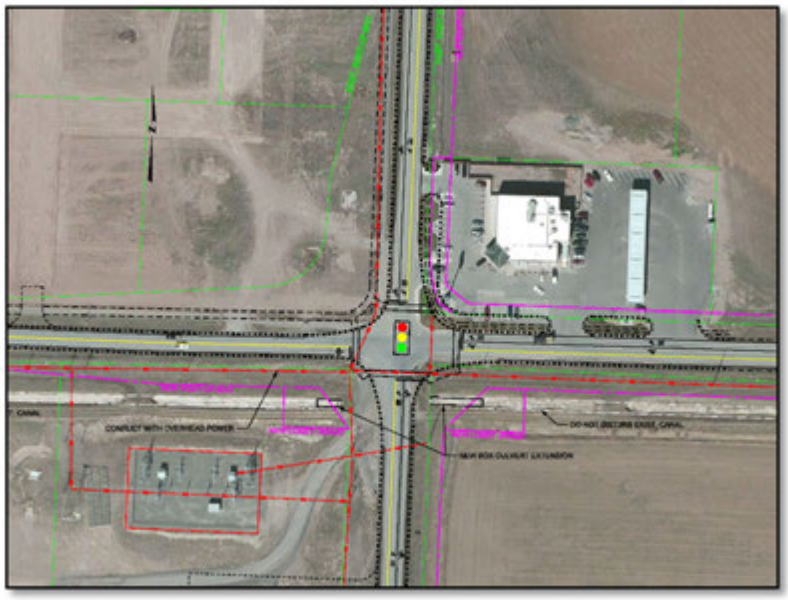
N/A

Conclusion:

ADVANCED – Used to establish baseline conditions.

L.2. Traffic Signal (A)

Description:



This alternative includes replacing the all-way stop control with a traffic signal. Dedicated left-turn bays are included along the northbound and southbound approach legs. In addition, a right-turn bay is included along the westbound approach leg. This alternative is envisioned as a "minimal impact" traffic signal option for the intersection.

Traffic Operations:

Year	AM		PM	
	Delay	LOS	Delay	LOS
2013	12.1	B	14.7	B
2018	13.2	B	14.8	B
2028	20.6	C	16.7	B
2038	59.9	E	33.1	C

- LOS of C or better up to the year 2028 during the peak hours.
- Projected to fail during the AM peak hour under the design year due to high volumes on the southbound approach.
- Estimated design life of 2030 during AM peak hour.
- Adequate performance during PM peak hour under all future year scenarios.

Advantages:

- Minimal impacts to adjacent lands.
- Improved peak hour LOS.

Disadvantages:

- Some induced delay during off-peak hours due to signal.
- May increase vehicle speeds through the intersection.
- Potential for increase in severe crashes.
- Projected to fail in the future year during the AM peak hour.

Potential Barriers / Constraints:

- Some minor impacts to Bob's site layout.

Estimated Cost:

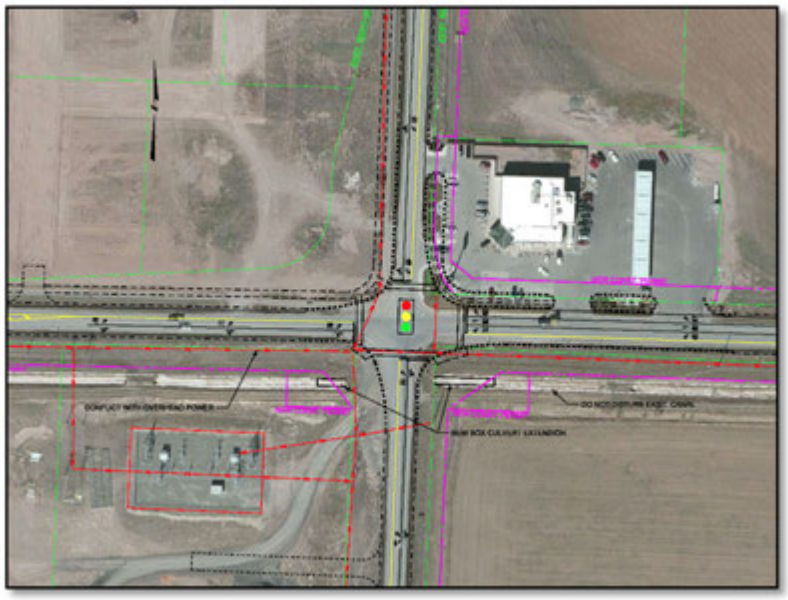
$3.0M to 3.5M

Conclusion:

NOT ADVANCED – Does not include EB and WB left-turn bays. EB and WB left-turn bays are desired for long-term needs and expandability.

L.3. Traffic Signal (B)

Description:



This alternative includes replacing the all-way stop control with a traffic signal. Dedicated left-turn bays are included along each approach leg. In addition, a right-turn bay is included along the westbound approach leg. This alternative is envisioned as a "full build-out" traffic signal option for the intersection. For the purposes of the traffic operations analysis, protected left-turn phasing was provided for each approach leg. Note that in the short-term, protected phasing may not be necessary for the eastbound and westbound directions.

Traffic Operations:

	AM		PM	
Year	Delay	LOS	Delay	LOS
2013	14.5	B	16.7	B
2018	15.8	B	17.0	B
2028	27.9	C	19.5	B
2038	52.8	D	28.0	C

- LOS of C or better up to the year 2028 during the peak hours.
- Projected to have increasing delay durning the AM peak hour under the design year due to high volumes on the north leg.
- Minor increases in average vehicle delay prior to 2038 over **Option L.2** due to the protected left-turn signal phasing.

Advantages:

- Minimal impacts to adjacent lands.
- Improved peak hour LOS.
- Improved long-term performance over **Option L.2**.

Disadvantages:

- Some induced delay during off-peak hours due to signal.
- May increase vehicle speeds through the intersection.
- Potential for increase in severe crashes.
- Some increased short-term delay over **Option L.2** due to protected left-turn signal phasing.

Potential Barriers / Constraints:

- Some minor impacts to Bob's site layout.

Estimated Cost:

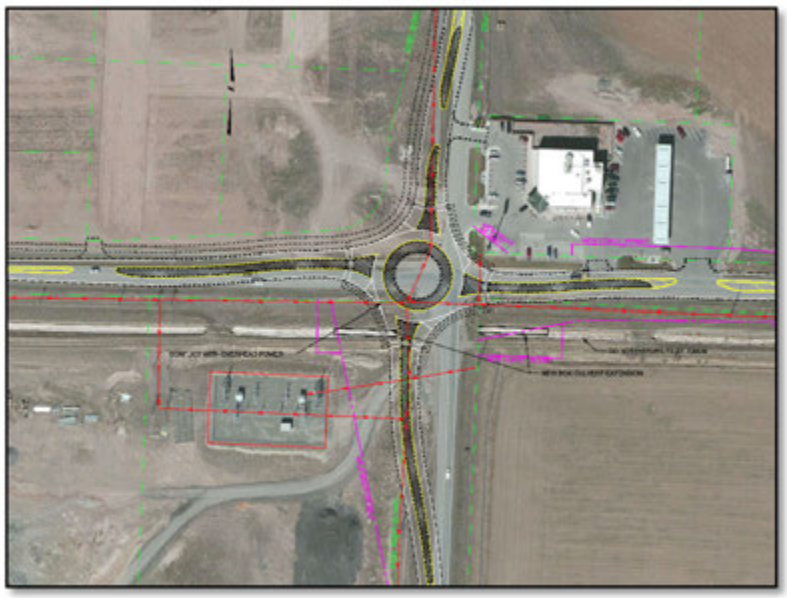
$3.5M – 4.0M

Conclusion:

ADVANCED – Advanced for further consideration.

L.4. SINGLE-LANE ROUNDABOUT

Description:



This alternative includes replacing the all-way stop control with a single-lane roundabout. Roundabout geometrics would accommodate a WB-67 design vehicle.

Traffic Operations:

Year		AM		PM	
		Delay	LOS	Delay	LOS
HCM 2010	2013	8.1	A	7.4	A
	2018	9.9	A	8.9	A
	2028	20.3	C	17.8	C
	2038	92.6	F	81.4	F
SIDRA	2013	3.2	A	2.2	A
	2018	4.7	A	3.5	A
	2028	39.4	E	18.5	C
	2038	159.2	F	126.8	F

- Lower delay compared to the traffic signal options during the short- and mid-term.
- High vehicle delay during the design year (2038)
- Estimated design life of 2030 during the peak hours.
- Improved performance during off-peak hours.

Advantages:

- Improved peak hour LOS.
- Minimal new R/W needed.
- Improved safety.
- Improved off-peak performance.

Disadvantages:

- Long-term capacity concerns.
- May be difficult to expand to increase capacity in the future.

Potential Barriers / Constraints:

- Minor potential impacts to Bob's parking lot and site circulation.

Estimated Cost:

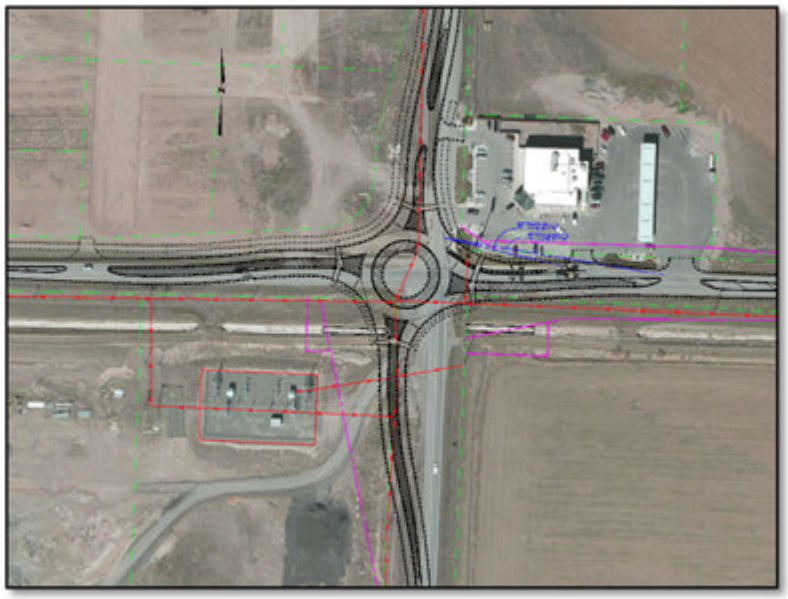
$3.0M – 3.5M

Conclusion:

NOT ADVANCED – Poor long-term performance.

L.5. Single-Lane Roundabout w/ RT Bypass

Description:



This alternative includes replacing the all-way stop control with a single-lane roundabout. Roundabout geometrics would accommodate a WB-67 design vehicle. Also included is a right-turn bypass lane along the westbound approach leg. The bypass lane is included to address the high amount of westbound to northbound right-turn movements during the PM peak hour. The bypass lane was evaluated as a "yield on entry" lane.

Traffic Operations:

	Year	AM		PM	
		Delay	LOS	Delay	LOS
HCM 2010	2013	8.0	A	5.6	A
	2018	9.8	A	6.3	A
	2028	20.2	C	8.4	A
	2038	92.4	F	14.0	B
SIDRA	2013	3.1	A	1.5	A
	2018	4.7	A	1.8	A
	2028	39.1	E	3.1	A
	2038	158.5	F	9.8	A

- Lower delay compared to the traffic signal options during the short- and mid-term.
- High AM peak hour vehicle delay during the design year (2038).
- Estimated design life of 2030 during the AM peak hour.
- LOS of B or better for all analysis years during the PM peak hour.
- Improved performance during off-peak hours.

Advantages:

- Improved peak hour LOS over **Option L.4**.
- Minimal new R/W needed.
- Improved safety.
- Improved off-peak performance.

Disadvantages:

- Future AM peak hour capacity concerns.
- May be difficult to expand to increase capacity in the future.
- Increased footprint compared to **Option L.4**.

Potential Barriers / Constraints:

- Minor potential impacts to Bob's parking lot and site circulation.

Estimated Cost:

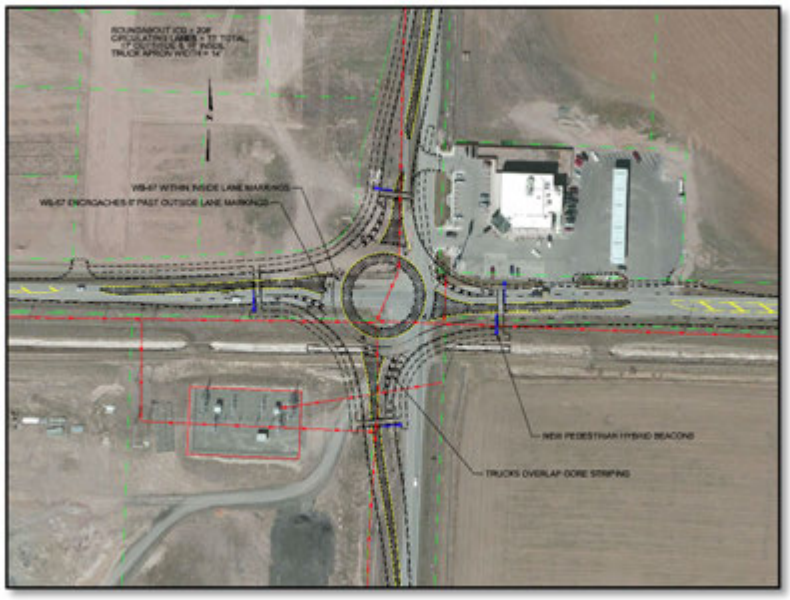
$3.5M – 4.0M

Conclusion:

ADVANCED – Advanced for further consideration.

L.6. Multi-Lane Roundabout

Description:



This alternative includes replacing the all-way stop control with a multi-lane roundabout. The roundabout would include two circulating lanes along all quadrants except the northeast, which would have one lane. Each approach leg would have two lanes. A right-turn bypass lane is included along the westbound approach. This configuration is aimed at improving the capacity of the southbound left-turning movement.

Traffic Operations:

	Year	AM		PM	
		Delay	LOS	Delay	LOS
HCM 2010	2013	6.1	A	5.1	A
	2018	6.9	A	5.7	A
	2028	10.2	B	7.3	A
	2038	27.9	D	10.9	B
SIDRA	2013	1.3	A	1.0	A
	2018	1.6	A	1.2	A
	2028	2.7	A	1.8	A
	2038	8.3	A	2.8	A

- Lowest delay among all options.
- Estimated design life past the design year of 2038.
- Available future year capacity.

Advantages:

- Improved peak hour LOS.
- Available capacity during future year.
- Improved off-peak performance.

Disadvantages:

- Decreased safety from single-lane roundabout.
- More difficult for driver navigation.
- Large footprint.

Potential Barriers / Constraints:

- Impacts to Bob's parking lot and site circulation.
- Reconstruction of Lincoln Road between Montana Avenue and I-15.

Estimated Cost:

$5.0M – 6.0M

Conclusion:

NOT ADVANCED – Would require reconstruction along Lincoln Road.

5.1.2 Lincoln Road / I-15 SB Ramps

S.1. No Action

Description:

The southbound off-ramp currently has stop control. There are no dedicated turn bays provided on any approach.

The No Action alternative includes existing geometrics and traffic control and is representative of conditions if no changes were made to the intersection. This alternative was used to establish baseline conditions and to calibrate the traffic analysis models as accurately as possible.

Traffic Operations:

	AM		PM	
Year	Delay	LOS	Delay	LOS
2013	3.0	A	1.4	A
2018	4.0	A	1.6	A
2028	14.6	B	2.7	A
2038	*	F	10.7	B

** Outside bounds of software.*

- Minimal overal delay during the peak hours.
- Observed existing delay and vehicle queuing during AM peak hour due to westbound left-turn movement conflicting with heavy eastbound right-turn movement.

Advantages:

- No reconstruction required.

Disadvantages:

- Does not address identified issues.

Potential Barriers / Constraints:

N/A

Estimated Cost:

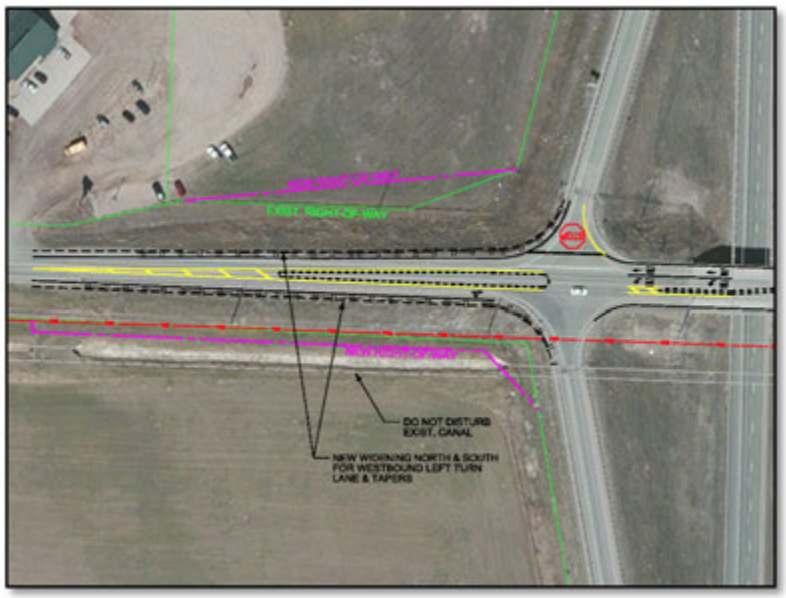
N/A

Conclusion:

ADVANCED – Used to establish baseline conditions.

S.2 WB Left-Turn Lane

Description:



This option includes a designated left-turn lane along the westbound approach leg. The existing roadway and bridge structure along the westbound approach would be re-striped to accommodate the turn bay. Minor reconstruction would likely be needed along the eastbound approach to properly align the intersection.

Traffic Operations:

Year	AM		PM	
	Delay	LOS	Delay	LOS
2013	2.3	A	1.2	A
2018	2.9	A	1.3	A
2028	8.3	B	2.0	A
2038	*	F	7.8	A

** Outside bounds of software.*

- Minimal improvements to peak hour delay.
- Conflicts between westbound left-turns and eastbound right-turns result in vehicle queuing and delay along east approach leg.

Advantages:

- Minimal impacts.
- Would remove westbound left-turn vehicles from traffic stream.

Disadvantages:

- Only minor improvements to traffic operations.
- Would require some reconstruction of the west approach leg.
- Limited westbound left-turn storage.
- Conflict between left-turn and right-turn would remain.

Potential Barriers / Constraints:

- Minimal impacts to irrigation canal.

Estimated Cost:

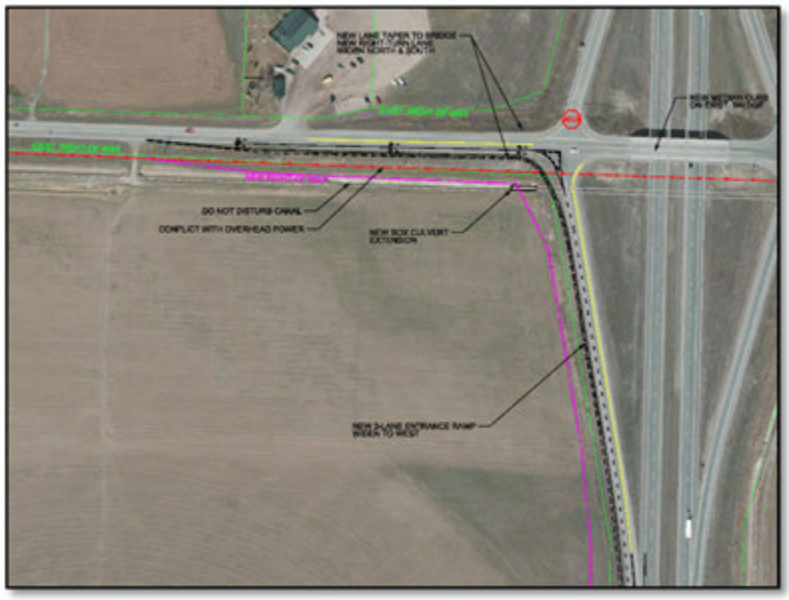
$0.5M to 0.75M

Conclusion:

NOT ADVANCED – Minimal improvement to traffic operations.

S.3. Ramp Modifications

Description:



This option includes an additional southbound on-ramp lane. Eastbound right-turning vehicles would be channelized into a new lane along the southbound on-ramp. Westbound left-turning vehicles would have a dedicated receiving lane, separate from the eastbound right-turning vehicles. This option would remove the conflict between the two major movements during the AM peak hour (eastbound right and westbound left).

A designated right-turn lane would also be included along the eastbound approach.

Traffic Operations:

Year	AM		PM	
	Delay	LOS	Delay	LOS
2013	1.7	A	1.3	A
2018	1.9	A	1.4	A
2028	2.2	A	2.2	A
2038	2.9	A	6.8	A

- Reduces the vehicle delay and queuing currently associated with the conflict between westbound left-turns and eastbound right-turns.
- Low vehicle delay and optimum LOS during all analysis periods.

Advantages:

- LOS A during all analysis periods.
- Removes the conflict between westbound left-turns and eastbound right-turns.
- Increases capacity.

Disadvantages:

- Requires reconstruction of southbound on-ramp.
- Dual lanes along southbound on-ramp requires merging downstream.

Potential Barriers / Constraints:

- Minimal impacts to irrigation canal
- Potential impacts to irrigated farmland.

Estimated Cost:

$2.0M to 2.5M

Conclusion:

ADVANCED – This option was advanced for further consideration.

S.4. Traffic Signal (A)

Description:

This option would involve the installation of a traffic signal. The intersection geometrics would remain largely unchanged. No modifications would be made to the existing approach leg lane configurations.

Traffic Operations:

Year	AM		PM	
	Delay	LOS	Delay	LOS
2013	18.9	B	6.4	A
2018	112.7	F	6.1	A
2028	761.9	F	7.2	A
2038	1477.5	F	42.4	D

- Increases existing and projected peak hour delay.
- Conflicts between westbound left-turns and eastbound right-turns result in vehicle queuing and delay along east approach leg.
- Reduced delay along the southbound off-ramp minor apprach leg.

Advantages:

- Minimal impacts.
- Improvements to operations along SB off-ramp.

Disadvantages:

- Increases vehicle delay and queuing.
- Conflict exists between westbound left-turns and eastbound right-turns.
- Failing AM peak hour LOS during short- and long-term.

Potential Barriers / Constraints:

- None identified

Estimated Cost:

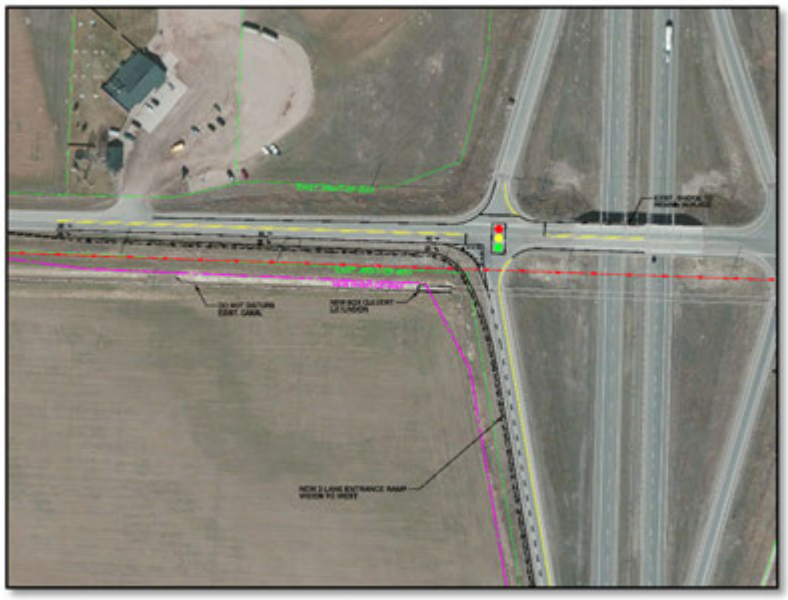
$0.5M to 0.75M

Conclusion:

NOT ADVANCED – This option does not address the conflict between westbound left-turns and eastbound right-turns.

S.5. Traffic Signal (B)

Description:



This option would combine options **S.3** and **S.4**. A channelized right-turn lane would be added to the west approach along with a second lane on the southbound on-ramp. A traffic signal would be installed to replace the existing traffic control.

Traffic Operations:

Year	AM		PM	
	Delay	LOS	Delay	LOS
2013	11.0	B	5.5	A
2018	6.4	A	17.5	B
2028	3.3	A	12.2	B
2038	6.4	A	21.9	C

- Reduced peak hour delay during future years.
- Removes the conflicts between westbound left-turns and eastbound right-turns
- Reduced delay along the southbound off-ramp minor approch leg.

Advantages:

- Improvements to operations along southbound off-ramp.
- Removed the conflict between westbound left-turns and eastbound right-turns.
- Increases capacity.

Disadvantages:

- Requires reconstruction of southbound on-ramp.
- Dual lanes along southbound on-ramp requires merging downstream.
- Induced off-peak delay due to signal cycles.

Potential Barriers / Constraints:

- Minimal impacts to irrigation canal.
- Potential impacts to irrigated farmland.

Estimated Cost:

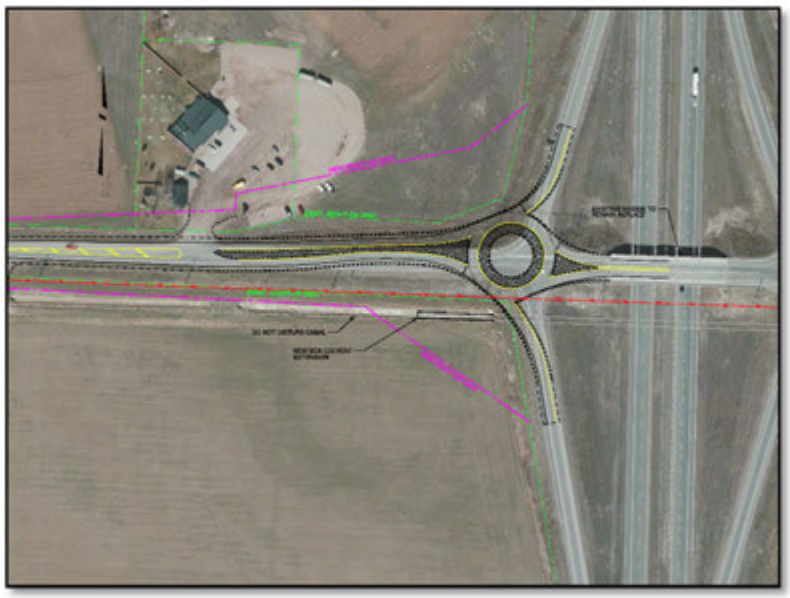
$2.5M to 3.0M

Conclusion:

NOT ADVANCED – Minimal benefit over **Option S.3**.

S.6. Single-Lane Roundabout

Description:



This option includes a single-lane roundabout at the intersection of Lincoln Road and the I-15 SB ramps. The roundabout would accommodate a WB-67 design vehicle. Extensive work would be needed along each intersection quadrant to accommodate the roundabout. The remaining bridge structure would remain in place, however.

Traffic Operations:

Year	AM		PM	
	Delay	LOS	Delay	LOS
2013	46.8	E	9.1	A
2018	100.2	F	11.3	B
2028	284.5	F	30.4	D
2038	600.8	F	134.3	F

- Eastbound right-turning vehicles would be required to yield to westbound left-turn vehicles.
- Delay during the AM peak hour is shown to increase.
- Extensive vehicle delay along the eastbound approach leg due to limited available gaps.

Advantages:

- Improved intersection safety.
- Reduction in conflict points.
- Improved performance along southbound and westbound approaches.

Disadvantages:

- Increased vehicle delay.
- Poor peak hour LOS.
- Extensive construction impacts.

Potential Barriers / Constraints:

- Impacts to irrigation canal and farmland.
- Potential impacts to the Grub Steak site.
- Additional R/W needed.

Estimated Cost:

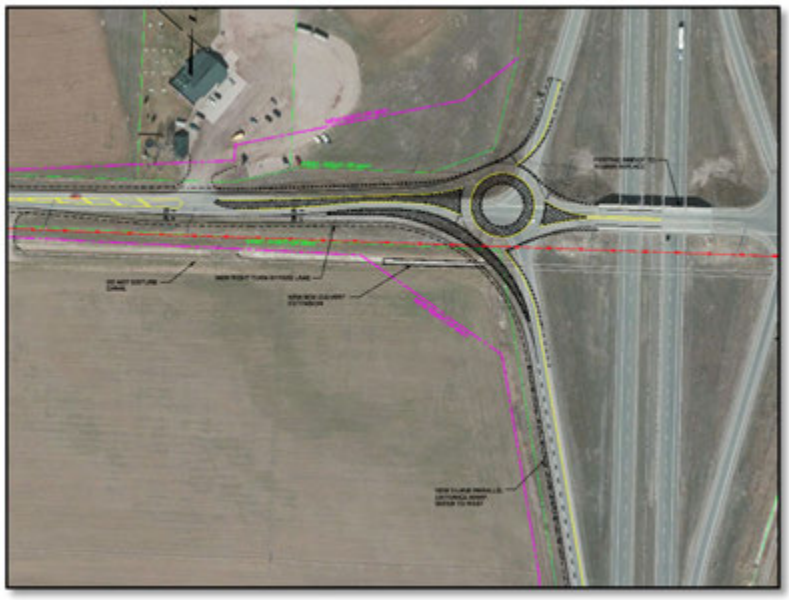
$2.5M to 3.0M

Conclusion:

NOT ADVANCED – Does not improve vehicle operations.

S.7. Single-Lane Roundabout w/ Ramp Modifications

Description:



This option would combine options **S.3** and **S.6**. A right-turn bypass lane would be added to the eastbound approach along with a second lane on the southbound on-ramp. A single-lane roundabout would be installed to replace the existing traffic control.

Traffic Operations:

Year	AM		PM	
	Delay	LOS	Delay	LOS
2013	2.7	A	7.8	A
2018	3.2	A	10.0	A
2028	4.9	A	28.6	D
2038	13.8	B	132.0	F

- Reduced peak hour delay during projected years.
- Removes the conflicts between westbound left-turns and eastbound right-turns
- Reduced delay along the southbound off-ramp minor apprach leg.

Advantages:

- Improved intersection safety.
- Reduction in conflict points.
- Improved traffic operations.

Disadvantages:

- Requires reconstruction of southbound on-ramp.
- Dual lanes along southbound on-ramp requires merging downstream.
- Extensive construction impacts.

Potential Barriers / Constraints:

- Impacts to irrigation canal and farmland.
- Potential impacts to the Grub Steak site.
- Additional R/W needed.

Estimated Cost:

$4.5M to 5.0M

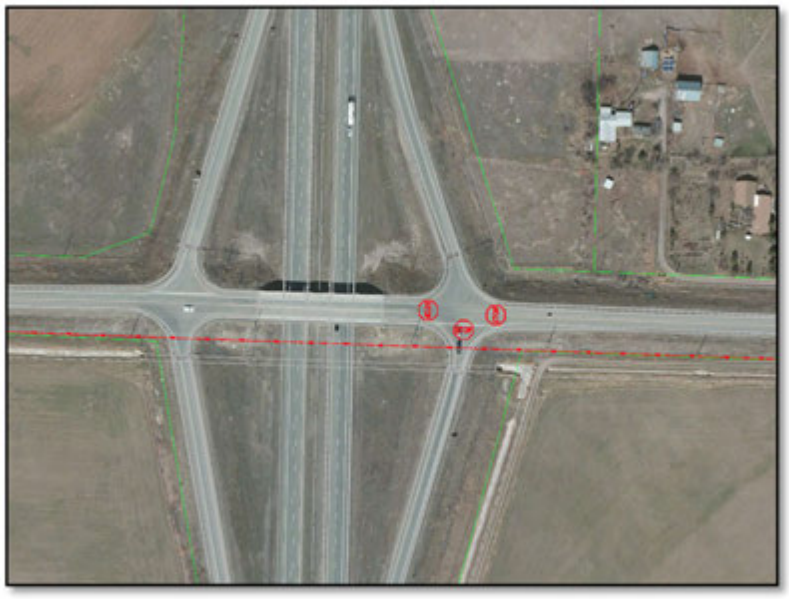
Conclusion:

NOT ADVANCED – Major impacts to surrounding area.

5.1.3 Lincoln Road / I-15 NB Ramps

N.1. No Action

Description:



The intersection of Lincoln Road and the northbound interchange ramps currently has stop-control in all directions. No dedicated turn bays are provided on any approach.

The No Action alternative includes existing geometrics and traffic control and is representative of conditions if no changes were made to the intersection. This alternative was used to establish baseline conditions and to calibrate the traffic analysis models as accurately as possible.

Traffic Operations:

	AM		PM	
Year	Delay	LOS	Delay	LOS
2013	10.5	B	45.2	E
2018	12.0	B	93.2	F
2028	22.9	C	266.3	F
2038	110.1	F	533.2	F

- High volumes of northbound left-turn movements during the PM peak hour resulting in high delay and poor LOS.
- Existing vehicle queues during the PM peak hour along the northbound off-ramp.

Advantages:

- No reconstruction required.

Disadvantages:

- Does not address identified issues.
- Failing PM peak hour.

Potential Barriers / Constraints:

N/A

Estimated Cost:

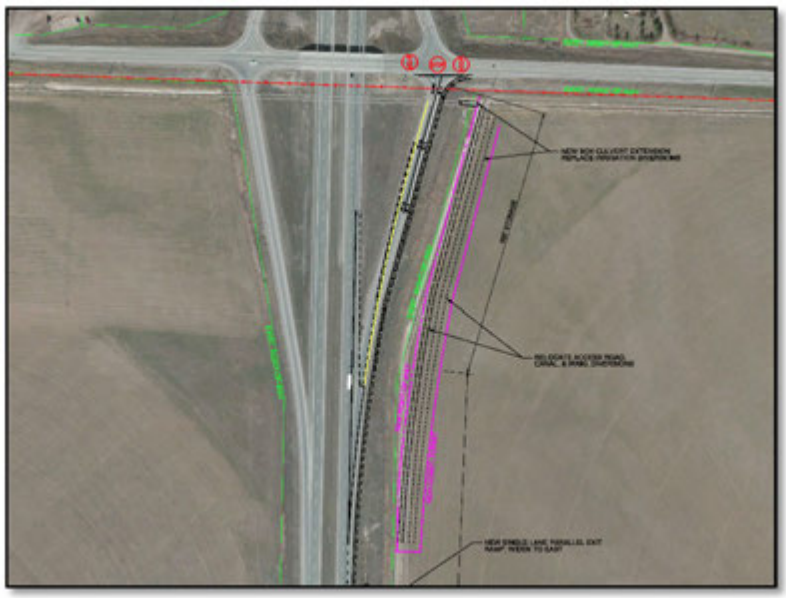
N/A

Conclusion:

ADVANCED – Used to establish baseline conditions.

N.2. Ramp Modifications

Description:



This option consists of reconstruction of the northbound off-ramp. The off-ramp would be extended and geometrics improved to meet existing standards. Additionally, a shared left/through lane and dedicated right-turn lane would be provided along the off-ramp. All-way stop control would remain at the intersection.

Traffic Operations:

Year	AM		PM	
	Delay	LOS	Delay	LOS
2013	10.5	B	36.2	E
2018	12.1	B	68.0	F
2028	23.4	C	185.4	F
2038	110.0	F	361.7	F

- Minimal improvements to traffic operations.
- High volumes of northbound left-turn movements during the PM peak hour resulting in high delay and poor LOS.

Advantages:

- Minor improvement to traffic operations.
- Improved off-ramp geometrics.
- Increased vehicle storage along off-ramp.

Disadvantages:

- Does not address identified issues.
- Poor PM peak hour performance.

Potential Barriers / Constraints:

- Some impacts to irrigation.
- Minimal additional R/W needed.

Estimated Cost:

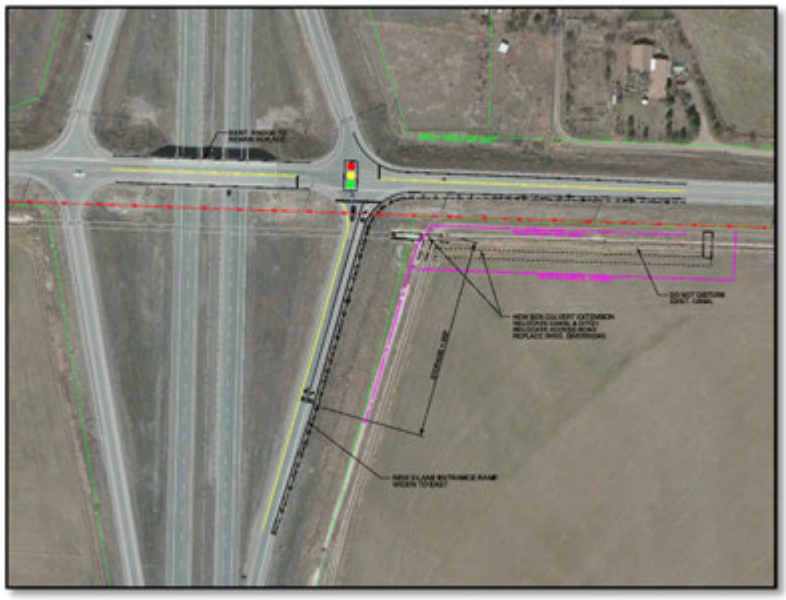
$1.25M to 1.75M

Conclusion:

NOT ADVANCED – Minimal improvement to traffic operations.

N.3. Traffic Signal

Description:



This option would replace the existing all-way stop control with a traffic signal. The south approach leg would accommodate a shared left/through lane and a dedicated right-turn lane.

Traffic Operations:

Year	AM		PM	
	Delay	LOS	Delay	LOS
2013	13.2	B	10.5	B
2018	13.5	B	14.1	B
2028	15.6	B	18.1	B
2038	21.7	C	70.2	E

- Reduced vehicle delay during PM peak hour under all scenarios.
- Reduced vehicle delay during AM peak hour under future scenarios.

Advantages:

- Reduced PM peak hour delay.
- Increased capacity.
- Additional vehicle storage along northbound off-ramp.

Disadvantages:

- Some induced delay during off-peak hours.

Potential Barriers / Constraints:

- Some impacts to irrigation.
- Minimal additional R/W needed.

Estimated Cost:

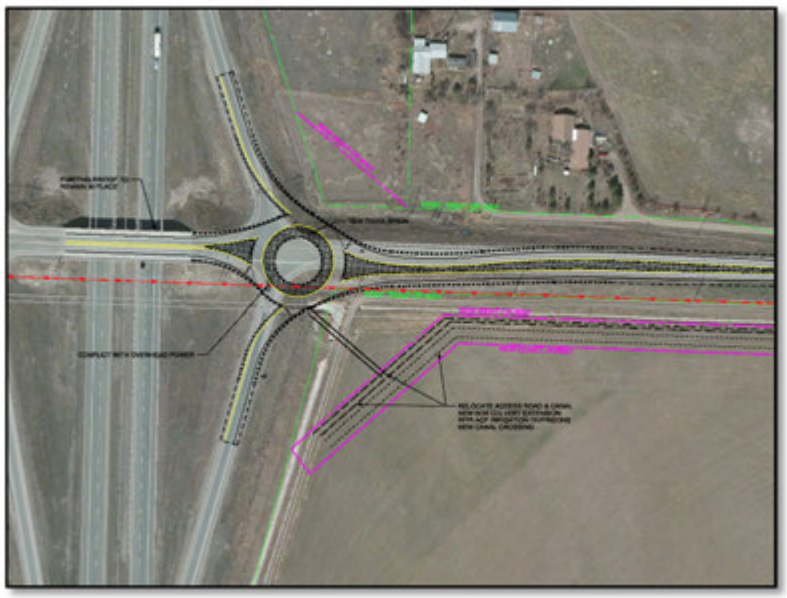
$1.0M to 1.5M

Conclusion:

ADVANCED – This option was advanced for further consideration.

N.4. Single-Lane Roundabout

Description:



This option would replace the existing all-way stop control with a single-lane roundabout. The roundabout would accommodate a WB-67 design vehicle. Extensive work would be needed along each intersection quadrant to accommodate the roundabout. The remaining bridge structure would remain in place, however.

Traffic Operations:

	Year	AM		PM	
		Delay	LOS	Delay	LOS
HCM 2010	2013	5.6	A	10.4	B
	2018	6.3	A	14.0	B
	2028	9.2	A	51.8	F
	2038	22.7	C	183.3	F
SIDRA	2013	0.9	A	1.9	A
	2018	1.2	A	2.8	A
	2028	2.6	A	50.4	F
	2038	17.2	C	200.8	F

- Decreased vehicle delay.
- Anticipated future PM peak hour concerns along the northbound approach.
- LOS C or better during the AM peak hour under all scenarios.

Advantages:

- Reduced delay under all scenarios.
- Improved safety.
- Improved off-peak performance.

Disadvantages:

- Extensive construction impacts.
- Future capacity constraints during PM peak hour.

Potential Barriers / Constraints:

- Extensive construction impacts.
- Additional R/W needed.

Estimated Cost:

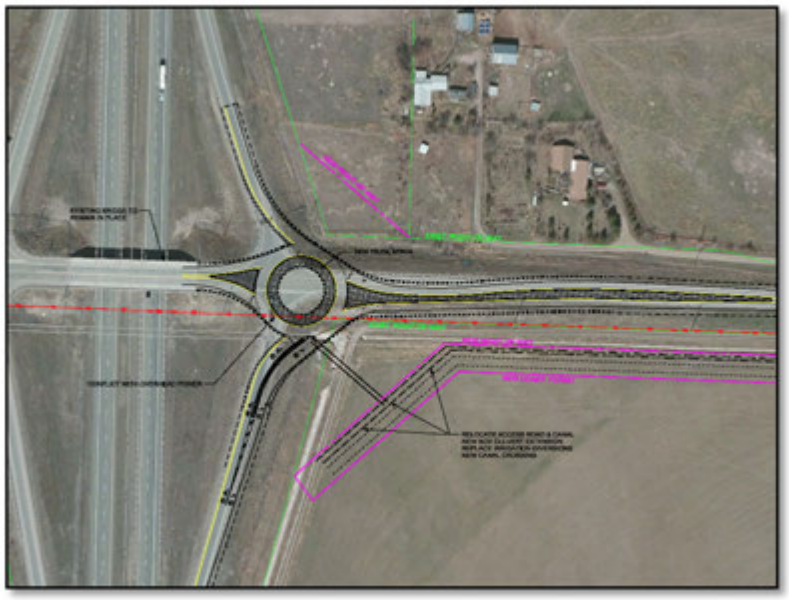
$2.5M to 3.0M

Conclusion:

NOT ADVANCED – Future PM peak hour capacity constraints.

N.5. Single-Lane Roundabout w/ RT Bypass

Description:



This option would replace the existing all-way stop control with a single-lane roundabout. Additionally, a right-turn bypass lane would be provided along the south approach leg. The bypass lane is intended to increase the capacity of the south approach. Extensive work would be needed along each intersection quadrant to accommodate the roundabout. The remaining bridge structure would remain in place, however.

Traffic Operations:

	Year	AM		PM	
		Delay	LOS	Delay	LOS
HCM 2010	2013	5.5	A	7.4	A
	2018	6.2	A	8.8	A
	2028	9.0	A	15.8	C
	2038	22.4	C	62.7	F
SIDRA	2013	0.9	A	1.2	A
	2018	1.1	A	1.6	A
	2028	2.5	A	4.3	A
	2038	16.5	C	99.0	F

- Lowest delay among all options.
- LOS C or better during AM peak hour under all scenarios.
- Future PM peak hour performance issues.

Advantages:

- Reduced delay under all scenarios.
- Improved safety.
- Improved off-peak performance.

Disadvantages:

- Extensive construction impacts.
- Future PM peak hour capacity constraints.
- Increased footprint compared to **Option N.4**.

Potential Barriers / Constraints:

- Extensive construction impacts.
- Additional R/W needed.

Estimated Cost:

$3.0M to 3.5M

Conclusion:

ADVANCED – This option was advanced for further consideration.

5.1.4 Other Options Considered

The following additional options were considered but dropped prior to detailed analysis due to identified constraints:

- Single-Point Urban Interchange – Geometrics would not be accommodated within existing constraints.
- Teardrop Roundabouts – Major construction impacts would be necessary. The project would be excessive at the intersection with the southbound ramps.
- Loop Ramp – A loop ramp was considered as a northbound off-ramp. This option would impact a local residence and could not be accommodated within existing constraints.

5.1.5 Improvement Options Summary

A full range of improvement options were developed for analysis based on existing and projected traffic conditions and area needs. The improvement options identified previously were based on corridor needs, existing traffic operations, projected future growth, and identified constraints. **Table 5.1** summarizes the improvement options and identified action.

Table 5.1: Improvement Options Summary

Option	Level of Service (AM/PM)				Estimated Cost	Action
	2013	2018	2028	2038		
Lincoln Road / North Montana Avenue						
L.1. No Action	D/C	F/E	F/F	F/F	N/A	ADVANCED
L.2. Traffic Signal (A)	B/B	B/B	C/B	E/C	$3.0M to 3.5M	NOT ADVANCED
L.3. Traffic Signal (B)	B/B	B/C	C/C	E/C	$3.5M to 4.0M	ADVANCED
L.4. Single-Lane Roundabout	A/A	A/A	E/C	F/F	$3.0M to 3.5M	NOT ADVANCED
L.5. Single-Lane Roundabout w/ RT Bypass	A/A	A/A	E/A	F/A	$3.5M to 4.0M	ADVANCED
L.6. Multi-Lane Roundabout	A/A	A/A	A/A	A/A	$5.0M to 6.0M	NOT ADVANCED
Lincoln Road / I-15 SB Ramps						
S.1. No Action	A/A	A/A	B/A	F/B	N/A	ADVANCED
S.2. WB Left-Turn Lane	A/A	A/A	A/A	F/A	$0.5M to 0.75M	NOT ADVANCED
S.3. Ramp Modifications	A/A	A/A	A/A	A/A	$2.0M to 2.5M	ADVANCED
S.4. Traffic Signal (A)	B/A	F/A	F/A	F/D	$0.5M to 0.75M	NOT ADVANCED
S.5. Traffic Signal (B)	B/B	A/B	A/B	A/C	$2.5M to 3.0M	NOT ADVANCED
S.6. Single-Lane Roundabout	E/A	F/B	F/D	F/F	$2.5M to 3.0M	NOT ADVANCED
S.7. Single-Lane Roundabout w/ Ramp Mods	A/A	A/A	A/D	B/F	$4.5M to 5.0M	NOT ADVANCED
Lincoln Road / I-15 NB Ramps						
N.1. No Action	B/E	B/F	C/F	F/F	N/A	ADVANCED
N.2. Ramp Modifications	B/E	B/F	C/F	F/F	$1.25M to 1.75M	NOT ADVANCED
N.3. Traffic Signal	B/B	B/B	B/B	C/E	$1.0M to 1.5M	ADVANCED
N.4. Single-Lane Roundabout	A/A	A/A	A/F	C/F	$2.5M to 3.0M	NOT ADVANCED
N.5. Single-Lane Roundabout w/ RT Bypass	A/A	A/A	A/A	C/F	$3.0M to 3.5M	ADVANCED

5.2 Corridor-Wide Analysis

The improvement options identified for advancement in the previous section were evaluated in more detail as part of a corridor-wide analysis. Traffic models for each option were developed using PTV Vision's *VISSIM* software. The *VISSIM* models were developed using procedures provided by PTV Vision. In addition, guidelines and parameters contained in the *FHWA Traffic Analysis Toolbox*[1] and the *ODOT VISSIM Protocol*[2] report were incorporated as "best practice" measures.

A base model was created to represent existing conditions and to aid in calibrating the model to reflect actual operating conditions and the local environment. For the options that include a traffic signal, timing was initially identified from the results of the *Synchro* analysis discussed previously. Modifications to timing plans were made as necessary as determined through the model review. The roundabout options were based on the preliminary geometrics developed previously. The roundabout models were calibrated and adjusted by modifying the Wiedemann 74 car following parameters as well as the conflict area safety distance factor. For the roundabout options, driver behavior was progressively set more aggressive for future years to account for increasing driver acceptance and familiarity with roundabouts. All models, other than the No Action, include **Option S.3** which consists of an additional lane along the southbound on-ramp.

5.2.1 Scenario Evaluation

For comparison purposes, the improvement option scenarios were evaluated based on a number of performance factors. Average network performance was measured in terms of vehicle delay, number of stops, and vehicle speed. Counters were included in the model to measure travel time between points along the most common routes during the peak hours. A queue length analysis was also conducted for the major approaches. Note that for the queue length analysis, *VISSIM* records average and maximum queue lengths for each specified time interval. For the purposes of the report, 95th percentile queues were calculated using the procedure outlined in the *ODOT VISSIM Protocol* report.

Note that the No Action option was not evaluated under future conditions using the traffic model. Rather, the option was only used to develop and calibrate the existing model. Existing field measured and observed data served as the basis for the development and calibration of the No Action option. The following sections discuss the results of the *VISSIM* traffic model analysis.

C.1. No Action

The No Action option was developed to represent existing conditions as accurately as possible. The base traffic model was calibrated to existing conditions using the data and field review information collected in November, 2013. The calibrated base model was used as a starting point for developing the corridor-wide option analysis. The following parameters were used to create and calibrate the base model:

- **Geometrics** – Existing geometrics were based on aerial photography and field review.
- **Vehicle Inputs** – Vehicle inputs were coded from turning movement counts, vehicle classifications, and speed data collected during the data collection effort. Vehicle inputs were developed for each 15-minute interval during the peak hours. In addition, five-minute seeding intervals were included prior to each peak hour.

[1] *Traffic Analysis Toolbox Volume III: Guidelines for Applying Traffic Microsimulation Modeling Software,* Federal Highway Administration, Publication No. FHWA-HRT-04-040, July 2004.
[2] *Protocol for VISSIM Simulation,* Oregon Department of Transportation, June 2011.

- **Routing** – Vehicles were routed through the network using static routing. Routing volumes were coded into the model using existing turning movement counts. Interchange movements were combined with the off ramp movements to prevent undesired vehicle routes (such as left-turn from the off ramp followed by a left turn onto the on ramp in the opposite direction).

- **Speeds** – Speed distributions were developed based on posted speed limits and actual observed speeds. Additional speed distributions were coded for reduced speed turning zones.

- **Conflict Areas and Priority Rules** – Conflict areas were defined in locations where links and/or connectors cross and have the potential for vehicles to cross paths. Additional stop distances were adjusted where necessary to ensure vehicles remain near the stop bar locations while avoiding vehicle conflicts. In addition, priority rules were necessary in locations where conflict areas would not sufficiently replicate the behavior of conflicting vehicles. Priority rule parameters were set to reflect actual field conditions to the extent practicable.

- **Driving Behavior** – Driving behavior parameters were set based on urban (motorized) standards. The default parameters were adjusted to more accurately model actual conditions. In order to account for more representative saturation flow rates, the default values for the Wiedemann 74 car following model were adjusted as necessary to improve the accuracy of the model.

- **Simulation** – The *VISSIM* traffic model simulates traffic flow by moving vehicles through the network based on the parameters discussed previously. Visual simulation provides feedback on operational and geometric characteristics of the network. As part of the simulation effort, multiple simulation runs were made to account for model variations. It was determined that ten random simulations would conservatively represent the network.

- **Evaluation –** In order to generate model output data, evaluation types were defined. Of importance for performance analysis are vehicle delay, travel time, number of vehicles, and queue lengths. Evaluation files were created for each simulation run for network performance, node evaluation, and queue length counters. Node evaluation areas were established at each intersection, queue length counters were placed at each stop bar location to measure applicable vehicle queues, and travel time segments were defined at the entry and exit points of the model to review calibration and provide information for the operational evaluation.

The review of the base model focused on checking for errors of the coded data as well as a visual review of the animation. The model simulation runs were reviewed for vehicle conflicts, priority, coding parameters, vehicle routing, speeds, and undesired vehicle behaviors. Some parameters in the model were adjusted based on the modeler's judgment and field conditions to more accurately reflect the interactions of vehicles on the network as part of this review.

During the AM peak hour under existing conditions, queue lengths of approximately 1,500 feet and 750 feet are realized at the intersection of Lincoln Road and North Montana Avenue along the southbound and eastbound legs, respectively. Also observed during the AM peak hour were queue lengths of approximately 350 feet along the westbound leg of the intersection with the I-15 SB ramps. During the PM peak hour at the intersection of Lincoln Road and North Montana Avenue, existing queue lengths of approximately 1,500 feet along the westbound approach and 600 feet along the eastbound approach currently exist. Queues of approximately 700 feet along the northbound off ramp were also noted during the PM peak hour.

C.2 Traffic Signals (L.3/S.3/N.3)

This corridor-wide configuration includes traffic signals at the intersections of Lincoln Road with North Montana Avenue (**L.3**) and with the I-15 NB ramps (**N.3**), as well as an additional lane along the southbound on-ramp (**S.3**). The results of the traffic simulation for this option are shown in **Table 5-2**.

Table 5.2: Option C.2 Operations Analysis

Performance Measure		AM Peak Hour				PM Peak Hour			
		2013	2018	2028	2038	2013	2018	2028	2038
Network Average	Delay (s)	28.4	26.7	48.4	89.1	34.7	29.4	33.3	71.7
	Stops	0.7	0.7	1.0	1.2	0.8	0.8	0.9	1.1
	Speed (mph)	29.4	29.7	24.9	18.6	29.2	30.0	29.0	23.1
Travel Time (s)	N Montana to I-15 On	107.1	113.0	178.2	220.3				
	Jim Darcy to I-15 On	96.7	97.3	111.2	142.7				
	I-15 Off to N Montana					114.7	117.0	120.4	137.6
	I-15 Off to Jim Darcy					117.1	120.1	123.8	138.6
95% Queue (ft)	SB Lincoln / Montana	111	155	1072	>2000				
	EB Lincoln / Montana	81	95	168	588				
	NB Lincoln / Montana	30	34	53	92				
	WB Lincoln / Montana					60	69	98	128
	NB Lincoln / I-15					102	109	185	649
	WB Lincoln / I-15					27	30	62	95

During the AM peak hour, the traffic model shows low average vehicle delay and minimal queuing under the existing and 2018 scenarios. As traffic volumes increase in the future, however, delays are shown to increase and queues along the southbound approach of North Montana Avenue increase substantially under the 2028 and 2038 scenarios. Modifications to signal timings were relatively ineffective in improving delay and reducing vehicle queuing under the future scenarios. The high volume of southbound left-turns indicate a future need for dual left-turns if traffic performance is to be improved.

PM peak hour delay and vehicle queuing improves drastically under this option. Queue lengths are shown to be smaller than existing queues along the northbound off-ramp even under the 2038 scenario. Additionally, queueing at the intersection with North Montana Avenue is minimized due to the inclusion of the dedicated westbound right-turn lane.

Total Estimated Cost: $7.0M

C.3. Roundabouts (L.5/S.3/N.5)

This option includes single-lane roundabouts with right-turn bypass lanes at Lincoln Road with North Montana Avenue (**L.5**) and with the I-15 NB ramps (**N.5**) as well as an additional lane along the southbound on-ramp (**S.3**). The results of the traffic simulation for this option are shown in **Table 5-3**.

Table 5.3: Option C.3 Operations Analysis

		AM Peak Hour				PM Peak Hour			
		2013	2018	2028	2038	2013	2018	2028	2038
Network Average	Delay (s)	14.0	20.2	82.4	274.4	13.8	15.8	28.0	73.7
	Stops	0.2	0.4	1.6	6.0	0.2	0.2	0.6	2.0
	Speed (mph)	30.5	29.1	20.7	9.4	30.4	29.9	27.3	20.4
Travel Time (s)	N Montana to I-15 On	107.7	110.1	116.4	196.8				
	Jim Darcy to I-15 On	108.9	124.3	199.7	304.5				
	I-15 Off to N Montana					125.5	128.1	139.8	167.9
	I-15 Off to Jim Darcy					120.9	124.2	135.3	164.7
95% Queue (ft)	SB Lincoln / Montana	18	24	55	1889				
	EB Lincoln / Montana	81	237	>2000	>2000				
	NB Lincoln / Montana	28	73	175	471				
	WB Lincoln / Montana					15	24	46	115
	NB Lincoln / I-15					14	23	56	146
	WB Lincoln / I-15					21	44	308	1963

The traffic simulation shows minimal delay and queueing under the existing and 2018 scenarios. During the AM peak hour under the 2028 and 2038 scenarios, however, vehicle queueing is shown to increase along the eastbound approach at the intersection of Lincoln Road and North Montana Avenue. The increased queueing results due to a lack of available gaps for eastbound traffic resulting from the high volume of southbound left-turns. To improve the AM peak hour performance, additional lanes would be required along the southbound and eastbound approaches.

PM peak hour analysis shows minimal queuing along the northbound off-ramp. Under the 2083 scenario, vehicle queuing is noted along the westbound approach at the intersection with the northbound ramps due to a lack of available gaps for westbound traffic. Queueing is minimal at the intersection with North Montana Avenue during the PM peak hour due to the right-turn bypass lane along the westbound approach.

Total Estimated Cost: $9.3M

C.4. Signal / Roundabout (L.3/S.3/N.3)

This option includes a traffic signal at the intersection with North Montana Avenue **(L.3**), a single-lane roundabout with right-turn bypass lane at the intersection with the I-15 NB ramps (**N.5**), and an additional lane along the southbound on-ramp (**S.3**). The results of the traffic simulation for this option are shown in **Table 5-4**.

Table 5.4: Option C.4 Operations Analysis

		AM Peak Hour				PM Peak Hour			
		2013	2018	2028	2038	2013	2018	2028	2038
Network Average	Delay (s)	23.0	24.5	36.3	75.3	22.5	24.1	33.2	67.3
	Stops	0.6	0.6	0.8	1.1	0.6	0.6	0.9	1.9
	Speed (mph)	30.1	29.6	26.8	20.0	30.5	30.1	27.8	21.5
Travel Time (s)	N Montana to I-15 On	106.3	111.7	148.6	215.2				
	Jim Darcy to I-15 On	96.5	97.1	107.7	124.4				
	I-15 Off to N Montana					115.7	117.4	123.8	142.7
	I-15 Off to Jim Darcy					120.5	122.6	128.6	147.0
95% Queue (ft)	SB Lincoln / Montana	107	148	570	>2000				
	EB Lincoln / Montana	79	95	153	352				
	NB Lincoln / Montana	30	34	53	89				
	WB Lincoln / Montana					55	63	88	84
	NB Lincoln / I-15					19	21	55	236
	WB Lincoln / I-15					27	41	315	1418

As with **Option C.2**, large vehicle queues are noted during the AM peak hour of the 2038 scenario along the southbound approach leg of North Montana Avenue. Dual southbound left-turn lanes would likely be necessary to reduce vehicle queueing along this approach under the signalized option.

During the PM peak hour, queue lengths are generally minimal with the exception of the westbound approach leg at the intersection with the northbound ramps. Similar to **Option C.3**, vehicle queues are shifted from the northbound approach to the westbound approach due to the need of vehicles entering the roundabout needing to yield to those circulating.

Total Estimated Cost: $9.0M

C.5. Roundabout / Signal (L.5/S.3/N.3)

This option includes a single-lane with right-turn bypass lane at the intersection with North Montana Avenue **(L.5**), a traffic signal at the intersection with the I-15 NB ramps (**N.3**), and an additional lane along the southbound on-ramp (**S.3**). The results of the traffic simulation for this option are shown in **Table 5-5**.

Table 5.5: Option C.5 Operations Analysis

		AM Peak Hour				PM Peak Hour			
		2013	2018	2028	2038	2013	2018	2028	2038
Network Average	Delay (s)	14.1	18.8	58.8	157.8	19.0	35.6	31.6	66.7
	Stops	0.3	0.5	1.3	3.2	0.5	0.5	0.7	0.9
	Speed (mph)	30.2	28.9	21.2	12.3	30.1	27.9	27.0	20.9
Travel Time (s)	N Montana to I-15 On	108.1	110.9	117.9	205.7				
	Jim Darcy to I-15 On	104.5	116.0	192.8	293.9				
	I-15 Off to N Montana					123.9	127.1	143.5	189.4
	I-15 Off to Jim Darcy					117.9	121.4	136.5	185.7
95% Queue (ft)	SB Lincoln / Montana	19	32	69	1840				
	EB Lincoln / Montana	65	169	>2000	>2000				
	NB Lincoln / Montana	36	62	257	1126				
	WB Lincoln / Montana					21	27	57	153
	NB Lincoln / I-15					88	180	171	843
	WB Lincoln / I-15					28	31	53	115

The AM peak hour analysis shows minimal delay and short vehicle queue lengths under existing and 2018 scenarios. As with **Option C.3**, however, long vehicle queues occur along the eastbound approach leg at the intersection with North Montana Avenue under the future year scenarios.

During the PM peak hour, minimal vehicle queueing is noted along all approach legs. Similar to **Option C.2**, the longest queues during the PM peak hour exist along the northbound off ramp.

Total Estimated Cost: $7.3M

5.2.2 Corridor-Wide Analysis Summary

The *VISSIM* traffic models were used to evaluate operational characteristics and performance of the Lincoln Interchange corridor under various configurations and time scenarios. A model representing existing conditions was developed and calibrated based on field verified parameters and industry accepted standards and best practice methods. Multiple random scenario runs were conducted to ensure statistical accuracy. The calibrated model was used as the base model for developing alternative scenarios.

The corridor-wide options were developed based on the individual intersection options advanced from **Section 5.1**. Specifically, for the intersections of Lincoln Road with North Montana Avenue and with the I-15 NB ramps, a traffic signal option and single-lane roundabout with right-turn bypass option were evaluated for corridor-wide performance. At the intersection with the southbound ramps, a second lane along the southbound on-ramp was included.

The evaluation of the corridor-wide options provides simulated traffic operation parameters for vehicle delay, number of stops, speed, travel time, and queue lengths. The modeling did not result in a specific configuration being identified as a recommendation, rather it provided additional operational information and allowed for the evaluation of the interaction of the intersections along the corridor. No “fatal flaws” were identified in the corridor-wide evaluation. Additionally, there were no major issues identified related to the interaction of the intersections. That is, individual intersection treatment can be identified independently of

each other; queue lengths and signal timings were not shown to influence the other intersections. The following summarizes the traffic operational characteristics at the three intersections.

Lincoln Road / North Montana Avenue

During the AM peak hour, the intersection begins to experience issues with vehicle queuing and delay under the traffic signal and roundabout options by the year 2028. For the traffic signal option, vehicle queueing along the southbound approach is the major concern. In order to improve the performance of the southbound approach, dual left-turn lanes would likely be needed in the future. Dual left-turn lanes were not evaluated, however, due to the need for reconstruction of Lincoln Road to provide an extra receiving lane. The roundabout option resulted in vehicle queuing along the eastbound approach leg due to a lack of available gaps to enter the roundabout. Additional lanes along the eastbound and southbound approaches would be necessary to improve the performance of the roundabout. However, dual receiving lanes would also be needed resulting in reconstruction of Lincoln Road.

The traffic signal and roundabout options showed minimal vehicle delay and short queue lengths under all PM peak hour scenarios. The major PM peak hour movement is the westbound right-turn which is adequately accommodated under all options.

Lincoln Road / I-15 SB Ramps

All options include a second lane along the southbound on-ramp. The additional lane would separate eastbound right-turning vehicles from westbound left-turning vehicles. This configuration would accommodate all future year scenarios and results in minimal vehicle delay and queueing.

Lincoln Road / I-15 NB Ramps

AM peak hour analysis showed adequate capacity, minimal vehicle delay, and short vehicle queues with the traffic signal and roundabout options under all scenarios. The most common movement during the AM peak hour is westbound through. With a roundabout, there is minimal conflicting volume; with a traffic signal, the majority of green time can be allocated to the eastbound and westbound directions.

During the PM peak hour, the major movement is the northbound left-turn. The roundabout option allows mostly free-flow operations along the off-ramp due to low conflicting volumes. This results in minimal vehicle queuing along the off ramp. However, westbound vehicles entering the roundabout would be required to yield on entry which resulting in some queuing under future year scenarios. The traffic signal option shows little delay and minimal queuing under existing, 2018, and 2028 scenarios. Queue lengths begin to lengthen by the future year 2038 along the off-ramp.

6.0 ADDITIONAL CONSIDERATIONS

The previous sections focused on the traffic operations of various options. Additional considerations should be taken into account when identifying the appropriate recommendations. This section addresses additional considerations relevant to the development of improvements to the Lincoln Interchange corridor.

6.1 Future Growth

Land use plays a critical role in the function and design of the transportation system. Land use helps to define travel patterns and traffic volumes. The future growth rates defined for the project corridor are based on historic and anticipated future growth characteristics. The location, type, and design of land use developments ultimately impacts the existing and future transportation system. If growth occurs at the rates identified in this report, it is anticipated that full reconstruction of Lincoln Road and the interchange will be needed before the future year (2038) time period. However, if growth in the area differs from those assumptions made in this report, the results of the traffic operational analysis may be no longer hold true.

Note that Lewis and Clark County is currently working to update the Growth Policy for the Helena valley. The update defined four important issues for the valley: water supply, waste water disposal, roads, and fire protection. It is expected that the growth policy update will help identify areas within the Helena valley where growth and development pressure will be seen and help provide strategies to cope with new development. Existing constraints such as availability of water, soil conditions, high water table, environmental factors, and available infrastructure are all expected to shape growth within the valley. It is anticipated that growth rates may be tempered at some point in the future due to these constraints. The update to the County Growth Policy should provide some guidance on what to expect in the future for the Helena valley.

6.2 Travel Patterns

The traffic analysis in this report focused on existing travel patterns during the AM and PM peak hours. Those existing patterns were projected using defined growth rates to represent future year conditions. Ultimately, travel patterns have a major effect on the traffic operations of the corridor.

The peak hour analysis represents the traffic conditions during time periods with the highest amounts of traffic during a typical weekday. Due to the proximity of the Lincoln Interchange and the land use in the area, the peak hours represent short time periods of higher traffic volumes. Combined, the AM and PM peak hours account for over 21 percent of the total daily traffic along the corridor. Due to the high intensity of traffic during the peak hours, operational issues may only exist during a small segment of the day.

During the AM peak hour the most common traffic movement is heading south on North Montana Avenue, east on Lincoln Road, and south on I-15. During the PM peak hour, the reverse is true. These movements are directly related to commuter traffic from the high density of houses in the North valley and the location of employment and services in the City of Helena.

Consideration should be given to changes in traffic patterns and characteristics when identifying recommendations. Future development and land use changes may change the travel patterns of the corridor, which may result in differing traffic operations from those projected in this report.

6.3 Safety

A detailed discussion about existing safety and crash trends for the corridor is provided in **Section 4.0**. Additional consideration should be given to the future impacts on safety should an improvement option(s) be developed. Roundabouts, for example, have shown to result in significant reductions in injury and fatal

crashes over stop-controlled or signalized intersections. Studies of intersections converted from traffic signals or stop signs to roundabouts within the United States have shown a reduction in injury crashes of 72 to 80 percent and a reduction in all crashes of 35 to 47 percent.[3] Roundabouts have the safety benefit of reducing conflict points and reducing vehicle speeds through physical deflection measures.

Currently, Lincoln Road has a posted speed limit of 45 mph through the project corridor. North Montana Avenue is posted at 55 mph north of Lincoln Road, and 60 mph south of Lincoln Road. An evaluation of speeds at the intersection of Lincoln Road and North Montana may be necessary during project development. Additionally, the existing I-15 overpass structure restricts some sight distances at the intersections with the interchange ramps. Appropriate sight distances would need to be provided for any alternative under consideration.

6.4 Non-Motorized Considerations

Non-motorized considerations were not specifically addressed during the improvement options analysis. During the field review, very little non-motorized traffic was documented. However, assumed signal timings were developed to provide for pedestrian crossing timing. It is expected that non-motorized accommodations would be provided as needed during project development. There are currently no sidewalks or bike lanes within the project corridor. The only non-motorized facility that exists within the study area is a multi-use path along the west side of North Montana Avenue. Desire has been expressed by Lewis and Clark County to include an enhanced pedestrian crossing of Lincoln Road near Jim Darcy School with any improvement option.

6.5 Project Phasing

The idea of phasing projects for the corridor was discussed during this study. If projects were to be constructed in separate phases, there is concern about what the impacts of improving one location will be on the rest of the corridor. A corridor-wide approach should be taken for project development.

[3] Insurance Institute for Highway Safety (IIHS), http://www.iihs.org/iihs/topics/t/roundabouts/topicoverview

7.0 CONCLUSIONS AND RECOMMENDATIONS

This *Traffic Engineering Report* provides a thorough study of the Lincoln Road corridor between North Montana Avenue and I-15. The corridor is currently experiencing traffic operational issues related to peak hour traffic congestion. The corridor was identified by MDT's Traffic Bureau to evaluate improvement options to address increasing volumes and operational concerns.

The existing conditions of the corridor were defined through field review and data collection in November, 2013. Future projections were made for years 2018, 2028, 2038. The intersection of Lincoln Road and North Montana experiences high vehicle delay and poor LOS during the peak hours. The current configuration and all-way stop control does not provide enough capacity to handle existing or projected demands. Similarly, the intersection of Lincoln Road and the I-15 NB ramps is experiencing congestion-related issues specifically during the PM peak hour. Vehicle queues along the NB off-ramp are nearing the interstate mainline, and if remained unchanged, are expected to continue to increase.

Identification of potential improvement options for the intersections along Lincoln Road resulted in six potential options at North Montana Avenue, seven at the I-15 SB ramps, and five at the I-15 NB ramps. After a thorough analysis of each individual improvement option, five corridor-wide options (including No Action) were carried forward for further analysis. The corridor-wide evaluation resulted in similar operational benefits and the study initially did not conclude with a preferred alternative based strictly on the traffic evaluation. Rather, it was determined that the options should be moved forward through the project development process and vetted through public involvement.

7.1 Public Involvement

An informational meeting was held on November 6th, 2014 at the Helena Regional Airport to discuss potential improvement options to the Lincoln Road Corridor. The purpose of the meeting was to inform interested parties about the scope and purpose of the improvement options being considered, and to solicit input from the public. Presented to the public were options for a traffic signal and single-lane roundabout at the intersections of Lincoln Road with North Montana Avenue and the I-15 NB ramps.

The informational meeting consisted of an open house format from 5:00 PM to 6:00 PM, followed by a presentation. During the meeting, information was presented about existing conditions, projected conditions, and the results of the traffic analysis for the improvement options being considered. Traffic simulation models and display boards were used to help during the presentation and open house. The informational meeting materials are included in **Appendix F**.

A project website, newsletter and meeting flyer were developed to encourage public involvement. A 30-day public comment period was opened on November 6th and ended on December 5th. The public comments are included for reference in **Appendix G**. In addition, direct contact with potentially affected landowners and/or their representatives was made by MDT prior to the informational meeting.

7.2 Recommendations and Next Steps

Following the public involvement process, final recommendations were developed for the Lincoln Road corridor. The following describes the recommendations, as well as additional considerations for any forthcoming project development activities.

Lincoln Road / North Montana Avenue

The preferred alternative at the intersection of Lincoln Road and North Montana Avenue is a single-lane roundabout with a westbound right-turn bypass lane (**Option L.5**). This alternative is recommended due to improvements to the traffic operations and safety of the intersection. **Figure 7.1** provides a conceptual representation of the recommendation. Ultimately, the design may vary from the concept shown in the figure.

The traffic projections used in this report suggest that a single-lane roundabout may not be able to fully accommodate long-term growth during the peak hours toward the latter years of the 20-year analysis period. Consideration for future growth should be made during project development. It may be desirable to develop the single-lane roundabout so that it can be expanded to a multi-lane roundabout should the need arise. Acquiring necessary right-of-way and setting construction limits to accommodate long-term growth would help plan for future needs. The expansion of the single-lane roundabout could only occur if Lincoln Road was reconstructed to accommodate additional travel lanes between North Montana Avenue and I-15.

Additional considerations should be made regarding the impacts to adjacent development. Bob's Valley Market is located along the northeast quadrant of the intersection. Issues such as truck routing, delivery, location of fuel tanks, and existing monitoring wells should be evaluated during the design process. Consideration should be made to minimize impacts to development while providing for an appropriate level of access and circulation.

Figure 7.1: Lincoln Rd / N Montana Ave Improvement Concept

Lincoln Road / I-15 Ramps

At the intersection of Lincoln Road and the I-15 SB ramps, it is recommended that an additional lane be added to the southbound on-ramp (**Option S.3**). The additional lane should be configured to provide separation of eastbound right-turning vehicles and westbound left-turning vehicles. This recommendation would reduce vehicle conflicts and improve traffic operations.

At the intersection of Lincoln Road and the I-15 NB ramps, it is recommended that a single-lane roundabout with a northbound right-turn bypass lane be developed (**Option N.5**). This recommendation is intended to improve traffic operations and safety at the intersection. **Figure 7.2** provides a conceptual representation of the I-15 interchange. Note that this recommendation would not result in reconstruction of the existing overpass structure. Actual design configuration may vary from that shown in the figure.

As with the recommendation made at the intersection with North Montana Avenue, consideration should be made for future expandability at the I-15 NB ramps. The long-term vision for this corridor may result in a reconstructed overpass structure to accommodate additional lanes along Lincoln Road. While this vision is outside the limits of this study timeframe, it may be desirable to acquire necessary right-of-way and to set construction limits to accommodate the long-term configuration.

Figure 7.2: Interchange Intersections Improvement Concepts

HELENA, MT – CORPORATE OFFICE
825 Custer Avenue
Helena, MT 59604
(P) 406.447.5000

KALISPELL, MT
102 Cooperative Way, Suite 300
Kalispell, MT 59903
(P) 406.752.5025

FORT COLLINS, CO
400 Remington Street, Suite B
Fort Collins, CO 80524
(P) 970.484.3205

www.rpa-hln.com

APPENDIX A

Data Collection

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Location: 46.7044535708624, -112.020941376686

Count Name: Helena_Montana Ave_Lincoln Rd (L&C County)
Site Code:
Start Date: 11/06/2013
Page No: 1

Turning Movement Data

Start Time	Northbound Approach				Southbound Approach				Eastbound Approach				Westbound Approach				Int. Total
	Northbound				Southbound				Eastbound				Westbound				
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
9:00 AM	7	7	7	21	2	10	22	34	3	27	5	35	9	21	16	46	136
9:15 AM	6	8	3	17	1	18	17	36	4	24	0	28	13	18	12	43	124
9:30 AM	9	5	6	20	7	26	19	52	4	23	5	32	6	14	7	27	131
9:45 AM	6	7	6	19	3	14	13	30	2	15	5	22	8	12	8	28	99
Hourly Total	28	27	22	77	13	68	71	152	13	89	15	117	36	65	43	144	490
10:00 AM	7	13	0	20	3	13	19	35	9	17	9	35	13	10	5	28	118
10:15 AM	12	11	5	28	5	11	18	34	8	19	3	30	8	12	8	28	120
10:30 AM	8	10	7	25	4	11	14	29	7	25	4	36	11	25	11	47	137
10:45 AM	9	11	6	26	7	8	13	28	6	13	3	22	12	16	9	37	113
Hourly Total	36	45	18	99	19	43	64	126	30	74	19	123	44	63	33	140	488
11:00 AM	4	5	9	18	6	11	14	31	8	22	7	37	13	17	4	34	120
11:15 AM	7	10	7	24	2	15	14	31	2	24	4	30	14	18	5	37	122
11:30 AM	8	16	3	27	2	11	12	25	4	19	0	23	12	24	10	46	121
11:45 AM	5	11	3	19	1	12	9	22	4	13	0	17	11	27	9	47	105
Hourly Total	24	42	22	88	11	49	49	109	18	78	11	107	50	86	28	164	468
12:00 PM	6	23	5	34	6	7	9	22	6	25	14	45	27	20	13	60	161
12:15 PM	5	13	7	25	6	14	15	35	8	25	8	41	14	20	8	42	143
12:30 PM	6	17	7	30	4	12	21	37	5	27	6	38	15	18	8	41	146
12:45 PM	8	18	8	34	6	13	14	33	5	19	8	32	15	22	9	46	145
Hourly Total	25	71	27	123	22	46	59	127	24	96	36	156	71	80	38	189	595
1:00 PM	7	14	11	32	6	10	8	24	3	11	4	18	14	22	8	44	118
1:15 PM	5	10	7	22	3	12	17	32	7	24	2	33	20	15	3	38	125
1:30 PM	7	18	8	33	4	8	14	26	2	23	3	28	19	16	3	38	125
1:45 PM	11	17	6	34	6	12	13	31	8	23	4	35	13	31	6	50	150
Hourly Total	30	59	32	121	19	42	52	113	20	81	13	114	66	84	20	170	518
2:00 PM	7	11	15	33	10	9	12	31	9	21	5	35	17	21	8	46	145
2:15 PM	6	15	7	28	6	12	10	28	8	18	3	29	11	26	1	38	123
2:30 PM	8	20	10	38	7	3	10	20	3	18	4	25	9	20	5	34	117
2:45 PM	7	16	11	34	8	17	13	38	12	31	3	46	21	25	9	55	173
Hourly Total	28	62	43	133	31	41	45	117	32	88	15	135	58	92	23	173	558
3:00 PM	10	20	10	40	30	13	17	60	11	12	6	29	23	49	10	82	211
3:15 PM	7	20	15	42	15	19	9	43	13	46	41	100	22	39	7	68	253
3:30 PM	12	29	7	48	8	13	13	34	6	33	20	59	39	35	7	81	222
3:45 PM	7	29	7	43	5	16	22	43	9	28	10	47	35	34	14	83	216
Hourly Total	36	98	39	173	58	61	61	180	39	119	77	235	119	157	38	314	902
4:00 PM	7	20	10	37	2	11	21	34	10	27	10	47	46	47	5	98	216
4:15 PM	6	19	6	31	6	10	17	33	11	22	15	48	43	25	7	75	187
4:30 PM	9	32	4	45	5	15	23	43	6	26	14	46	51	41	9	101	235
4:45 PM	7	26	8	41	2	14	15	31	10	25	11	46	45	51	7	103	221
Hourly Total	29	97	28	154	15	50	76	141	37	100	50	187	185	164	28	377	859
5:00 PM	9	31	7	47	11	16	17	44	4	30	9	43	56	51	9	116	250
5:15 PM	12	26	9	47	11	15	31	57	7	32	13	52	79	53	5	137	293
5:30 PM	7	31	11	49	14	17	23	54	5	23	16	44	65	53	7	125	272
5:45 PM	5	34	10	49	16	12	19	47	7	22	16	45	55	41	10	106	247
Hourly Total	33	122	37	192	52	60	90	202	23	107	54	184	255	198	31	484	1062
6:00 PM	10	20	11	41	12	11	22	45	5	11	8	24	36	40	7	83	193
6:15 PM	2	32	10	44	6	12	13	31	9	13	5	27	36	25	11	72	174
6:30 PM	11	15	2	28	7	13	18	38	2	18	5	25	27	20	8	55	146
6:45 PM	6	27	7	40	8	11	11	30	2	14	6	22	34	25	6	65	157
Hourly Total	29	94	30	153	33	47	64	144	18	56	24	98	133	110	32	275	670
7:00 PM	4	14	4	22	2	7	5	14	3	9	12	24	20	23	5	48	108
7:15 PM	4	16	2	22	6	7	6	19	5	8	10	23	25	13	10	48	112
7:30 PM	3	16	3	22	6	3	12	21	1	6	2	9	21	19	4	44	96
7:45 PM	2	15	3	20	6	3	8	17	0	7	8	15	17	21	2	40	92
Hourly Total	13	61	12	86	20	20	31	71	9	30	32	71	83	76	21	180	408
8:00 PM	3	14	6	23	3	5	10	18	0	8	6	14	16	15	3	34	89
8:15 PM	2	14	7	23	2	5	7	14	1	10	4	15	28	19	1	48	100
8:30 PM	3	17	4	24	5	7	7	19	3	2	4	9	26	9	7	42	94
8:45 PM	4	19	5	28	4	3	6	13	1	6	1	8	20	13	1	34	83
Hourly Total	12	64	22	98	14	20	30	64	5	26	15	46	90	56	12	158	366
9:00 PM	3	9	4	16	1	2	2	5	1	0	1	2	18	10	3	31	54
9:15 PM	3	4	4	11	0	5	4	9	1	5	0	6	18	11	4	33	59
9:30 PM	3	4	1	8	1	3	2	6	2	6	2	10	8	9	2	19	43
9:45 PM	0	6	1	7	2	0	3	5	1	5	1	7	11	10	3	24	43
Hourly Total	9	23	10	42	4	10	11	25	5	16	4	25	55	40	12	107	199

10:00 PM	0	3	5	8	1	2	0	3	2	5	2	9	13	9	3	25	45
10:15 PM	0	2	1	3	0	2	3	5	0	0	2	2	7	5	3	15	25
10:30 PM	1	4	2	7	0	1	0	1	1	3	0	4	9	7	0	16	28
10:45 PM	2	2	2	6	1	0	0	1	0	1	0	1	6	3	1	10	18
Hourly Total	3	11	10	24	2	5	3	10	3	9	4	16	35	24	7	66	116
11:00 PM	0	2	2	4	0	1	2	3	0	3	0	3	0	0	0	0	10
11:15 PM	0	0	0	0	0	1	1	2	0	2	0	2	4	1	1	6	10
11:30 PM	2	0	0	2	0	0	2	2	0	1	0	1	4	2	1	7	12
11:45 PM	0	0	2	2	0	1	0	1	0	0	1	1	4	1	0	5	9
Hourly Total	2	2	4	8	0	3	5	8	0	6	1	7	12	4	2	18	41
12:00 AM	1	3	1	5	1	1	1	3	1	0	0	1	4	2	1	7	16
12:15 AM	2	3	1	6	2	2	0	4	1	1	0	2	4	6	1	11	23
12:30 AM	0	1	3	4	0	0	2	2	0	0	0	0	5	4	0	9	15
12:45 AM	1	1	0	2	0	0	1	1	0	1	0	1	3	2	1	6	10
Hourly Total	4	8	5	17	3	3	4	10	2	2	0	4	16	14	3	33	64
1:00 AM	1	3	0	4	0	0	0	0	0	1	1	2	0	0	0	0	6
1:15 AM	0	0	0	0	2	1	1	4	0	1	1	2	4	4	0	8	14
1:30 AM	0	1	0	1	0	0	0	0	0	1	1	2	2	4	1	7	10
1:45 AM	0	0	0	0	0	0	2	2	0	1	0	1	1	0	0	1	4
Hourly Total	1	4	0	5	2	1	3	6	0	4	3	7	7	8	1	16	34
2:00 AM	0	0	1	1	0	2	0	2	0	1	0	1	2	1	0	3	7
2:15 AM	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	2
2:30 AM	0	1	0	1	0	0	1	1	0	1	1	2	1	0	0	1	5
2:45 AM	0	0	0	0	0	1	0	1	0	3	0	3	0	0	0	0	4
Hourly Total	0	2	2	4	0	3	1	4	0	5	1	6	3	1	0	4	18
3:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
3:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	4
3:30 AM	1	0	0	1	0	1	2	3	0	1	0	1	0	0	1	1	6
3:45 AM	0	0	1	1	0	0	2	2	0	0	0	0	0	0	0	0	3
Hourly Total	1	0	1	2	0	1	4	5	0	1	0	1	5	0	1	6	14
4:00 AM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	1	2
4:15 AM	1	0	1	2	0	2	1	3	2	2	0	4	1	2	1	4	13
4:30 AM	1	0	0	1	0	1	5	6	0	3	0	3	2	2	0	4	14
4:45 AM	0	0	0	0	0	4	5	9	0	6	0	6	1	1	0	2	17
Hourly Total	2	0	1	3	0	7	11	18	2	12	0	14	4	5	2	11	46
5:00 AM	0	1	2	3	0	3	7	10	1	2	1	4	2	0	0	2	19
5:15 AM	0	0	0	0	1	6	9	16	1	11	0	12	0	1	2	3	31
5:30 AM	4	2	0	6	1	4	18	23	1	14	0	15	1	3	1	5	49
5:45 AM	2	2	2	6	2	10	13	25	0	15	2	17	1	4	2	7	55
Hourly Total	6	5	4	15	4	23	47	74	3	42	3	48	4	8	5	17	154
6:00 AM	1	2	2	5	4	11	20	35	1	18	3	22	3	10	1	14	76
6:15 AM	7	4	2	13	8	1	27	36	2	24	1	27	1	5	2	8	84
6:30 AM	7	2	5	14	5	21	50	76	5	45	5	55	2	15	2	19	164
6:45 AM	7	4	4	15	7	11	63	81	1	30	4	35	7	8	4	19	150
Hourly Total	22	12	13	47	24	44	160	228	9	117	13	139	13	38	9	60	474
7:00 AM	7	4	3	14	8	22	67	97	9	26	2	37	10	14	4	28	176
7:15 AM	7	4	2	13	2	27	79	108	4	45	6	55	7	25	7	39	215
7:30 AM	13	8	2	23	6	23	98	127	2	97	6	105	14	21	7	42	297
7:45 AM	15	13	10	38	12	32	77	121	9	79	13	101	11	18	6	35	295
Hourly Total	42	29	17	88	28	104	321	453	24	247	27	298	42	78	24	144	983
8:00 AM	7	17	7	31	26	27	40	93	14	77	14	105	9	24	5	38	267
8:15 AM	13	9	10	32	43	17	25	85	16	53	24	93	8	31	3	42	252
8:30 AM	8	7	4	19	9	15	34	58	7	36	22	65	16	21	3	40	182
8:45 AM	7	6	3	16	2	14	18	34	3	21	7	31	8	16	8	32	113
Hourly Total	35	39	24	98	80	73	117	270	40	187	67	294	41	92	19	152	814
9:00 AM	4	3	1	8	3	8	19	30	4	22	4	30	14	15	7	36	104
9:15 AM	5	7	2	14	3	9	14	26	5	21	2	28	12	8	9	29	97
9:30 AM	8	3	3	14	0	12	15	27	10	20	3	33	6	13	3	22	96
9:45 AM	2	7	5	14	5	11	20	36	2	20	7	29	9	16	9	34	113
Hourly Total	19	20	11	50	11	40	68	119	21	83	16	120	41	52	28	121	410
10:00 AM	7	9	2	18	6	10	14	30	8	17	9	34	14	9	5	28	110
10:15 AM	5	4	6	15	3	8	17	28	3	20	4	27	12	17	7	36	106
10:30 AM	2	11	3	16	5	9	19	33	11	22	9	42	8	11	3	22	113
10:45 AM	6	13	5	24	4	16	17	37	5	15	5	25	6	13	5	24	110
Hourly Total	20	37	16	73	18	43	67	128	27	74	27	128	40	50	20	110	439
11:00 AM	8	14	6	28	4	17	13	34	7	17	5	29	8	16	6	30	121
11:15 AM	11	14	6	31	7	8	10	25	4	26	6	36	14	11	12	37	129
11:30 AM	15	11	1	27	4	11	16	31	7	25	5	37	23	14	7	44	139
11:45 AM	8	8	3	19	8	10	14	32	5	17	9	31	14	20	10	44	126
Hourly Total	42	47	16	105	23	46	53	122	23	85	25	133	59	61	35	155	515
12:00 PM	9	12	18	39	3	10	21	34	2	21	12	35	20	26	6	52	160
12:15 PM	8	20	3	31	13	11	24	48	9	19	4	32	23	22	13	58	169
12:30 PM	9	12	11	32	5	13	17	35	13	26	10	49	20	18	8	46	162
12:45 PM	9	16	3	28	5	14	18	37	6	19	2	27	20	24	14	58	150
Hourly Total	35	60	35	130	26	48	80	154	30	85	28	143	83	90	41	214	641
1:00 PM	15	20	3	38	6	7	15	28	2	18	5	25	17	24	12	53	144
1:15 PM	12	17	7	36	11	11	11	33	4	24	10	38	21	24	12	57	164

1:30 PM	4	18	4	26	5	8	23	36	7	12	3	22	15	21	16	52	136
1:45 PM	10	25	8	43	11	15	16	42	11	22	3	36	21	16	5	42	163
Hourly Total	41	80	22	143	33	41	65	139	24	76	21	121	74	85	45	204	607
2:00 PM	6	17	9	32	5	16	16	37	6	20	6	32	25	16	8	49	150
2:15 PM	5	17	8	30	3	13	17	33	6	15	5	26	14	20	13	47	136
2:30 PM	7	15	5	27	6	16	21	43	6	16	6	28	19	21	6	46	144
2:45 PM	6	21	9	36	9	17	13	39	4	17	5	26	19	30	5	54	155
Hourly Total	24	70	31	125	23	62	67	152	22	68	22	112	77	87	32	196	585
3:00 PM	8	12	11	31	31	12	18	61	4	12	8	24	20	51	6	77	193
3:15 PM	4	13	7	24	19	11	14	44	20	32	38	90	20	45	5	70	228
3:30 PM	3	20	8	31	6	16	18	40	8	45	25	78	33	43	11	87	236
3:45 PM	9	23	2	34	5	21	29	55	11	33	14	58	25	37	11	73	220
Hourly Total	24	68	28	120	61	60	79	200	43	122	85	250	98	176	33	307	877
4:00 PM	9	28	6	43	10	20	23	53	6	18	14	38	40	35	8	83	217
4:15 PM	6	40	12	58	11	10	19	40	4	17	11	32	44	48	7	99	229
4:30 PM	9	30	15	54	10	13	16	39	8	29	12	49	39	33	9	81	223
4:45 PM	13	37	14	64	7	25	23	55	8	28	15	51	65	40	10	115	285
Hourly Total	37	135	47	219	38	68	81	187	26	92	52	170	188	156	34	378	954
5:00 PM	9	37	6	52	7	16	23	46	10	22	15	47	57	45	8	110	255
5:15 PM	12	41	12	65	9	18	21	48	8	16	17	41	58	59	4	121	275
5:30 PM	11	41	9	61	13	19	26	58	9	27	20	56	54	54	8	116	291
5:45 PM	10	38	10	58	7	12	15	34	3	13	10	26	59	39	11	109	227
Hourly Total	42	157	37	236	36	65	85	186	30	78	62	170	228	197	31	456	1048
6:00 PM	8	23	7	38	6	12	14	32	3	17	8	28	50	37	6	93	191
6:15 PM	5	24	8	37	18	18	15	51	5	7	4	16	43	37	6	86	190
6:30 PM	9	25	10	44	8	14	14	36	5	19	10	34	31	21	4	56	170
6:45 PM	3	17	2	22	6	8	5	19	3	10	2	15	35	25	2	62	118
Hourly Total	25	89	27	141	38	52	48	138	16	53	24	93	159	120	18	297	669
7:00 PM	0	17	6	23	4	5	9	18	1	13	5	19	23	30	6	59	119
7:15 PM	4	20	6	30	6	7	7	20	1	15	2	18	30	15	2	47	115
7:30 PM	0	16	7	23	2	4	3	9	4	6	5	15	26	11	6	43	90
7:45 PM	5	14	5	24	4	5	3	12	3	10	1	14	21	12	4	37	87
Hourly Total	9	67	24	100	16	21	22	59	9	44	13	66	100	68	18	186	411
8:00 PM	3	9	4	16	3	7	6	16	2	11	7	20	21	15	1	37	89
8:15 PM	3	18	3	24	5	3	6	14	1	4	3	8	23	24	6	53	99
8:30 PM	1	11	3	15	6	4	7	17	1	3	4	8	18	18	1	37	77
8:45 PM	3	8	6	17	4	6	6	16	2	5	2	9	17	17	2	36	78
Hourly Total	10	46	16	72	18	20	25	63	6	23	16	45	79	74	10	163	343
9:00 PM	1	9	1	11	1	7	3	11	1	3	4	8	14	12	5	31	61
9:15 PM	3	9	2	14	2	4	5	11	2	5	3	10	22	5	4	31	66
9:30 PM	4	10	1	15	2	4	8	14	1	7	2	10	15	8	3	26	65
9:45 PM	0	11	1	12	4	4	1	9	0	6	0	6	9	5	2	16	43
Hourly Total	8	39	5	52	9	19	17	45	4	21	9	34	60	30	14	104	235
10:00 PM	1	6	0	7	2	3	3	8	3	3	1	7	10	9	2	21	43
10:15 PM	1	6	1	8	0	1	1	2	0	2	0	2	11	4	4	19	31
10:30 PM	1	3	1	5	0	2	0	2	2	2	1	5	11	5	0	16	28
10:45 PM	1	4	1	6	1	1	1	3	0	1	3	4	5	4	2	11	24
Hourly Total	4	19	3	26	3	7	5	15	5	8	5	18	37	22	8	67	126
11:00 PM	0	1	0	1	1	4	0	5	0	3	1	4	4	2	2	8	18
11:15 PM	0	3	0	3	0	0	0	0	1	1	0	2	2	3	0	5	10
11:30 PM	0	0	1	1	0	1	2	3	0	3	0	3	5	3	2	10	17
11:45 PM	0	2	0	2	0	0	0	0	0	0	0	0	2	5	0	7	9
Hourly Total	0	6	1	7	1	5	2	8	1	7	1	9	13	13	4	30	54
12:00 AM	0	1	1	2	0	2	0	2	0	0	1	1	4	1	0	5	10
12:15 AM	1	2	1	4	0	0	0	0	0	1	0	1	1	2	1	4	9
12:30 AM	2	1	2	5	0	0	1	1	0	1	0	1	1	1	0	2	9
12:45 AM	0	1	0	1	0	0	0	0	0	0	1	1	2	2	1	5	7
Hourly Total	3	5	4	12	0	2	1	3	0	2	2	4	8	6	2	16	35
1:00 AM	2	0	0	2	0	0	1	1	1	1	0	2	0	1	0	1	6
1:15 AM	0	2	0	2	0	0	1	1	0	0	0	0	1	4	0	5	8
1:30 AM	0	1	0	1	1	0	0	1	0	1	0	1	1	0	1	2	5
1:45 AM	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	3	4
Hourly Total	2	3	0	5	1	0	2	3	1	3	0	4	3	6	2	11	23
2:00 AM	0	1	1	2	0	0	0	0	0	0	0	0	2	0	1	3	5
2:15 AM	0	2	1	3	0	0	0	0	0	1	0	1	1	0	0	1	5
2:30 AM	0	0	0	0	1	1	0	2	0	0	2	2	3	0	1	4	8
2:45 AM	0	0	0	0	0	1	1	2	0	1	0	1	3	0	0	3	6
Hourly Total	0	3	2	5	1	2	1	4	0	2	2	4	9	0	2	11	24
3:00 AM	1	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0	2
3:15 AM	3	0	1	4	0	0	0	0	0	2	0	2	0	1	0	1	7
3:30 AM	0	0	0	0	0	1	0	1	0	0	0	0	1	1	0	2	3
3:45 AM	1	1	0	2	0	0	0	0	1	2	0	3	0	0	0	0	5
Hourly Total	5	1	1	7	0	1	0	1	1	5	0	6	1	2	0	3	17
4:00 AM	0	0	0	0	1	0	0	1	0	1	1	2	1	0	0	1	4
4:15 AM	0	1	0	1	0	1	2	3	1	1	1	3	0	0	1	1	8
4:30 AM	0	0	0	0	1	4	3	8	0	2	0	2	1	0	0	1	11
4:45 AM	0	1	1	2	0	1	5	6	0	6	0	6	0	4	1	5	19

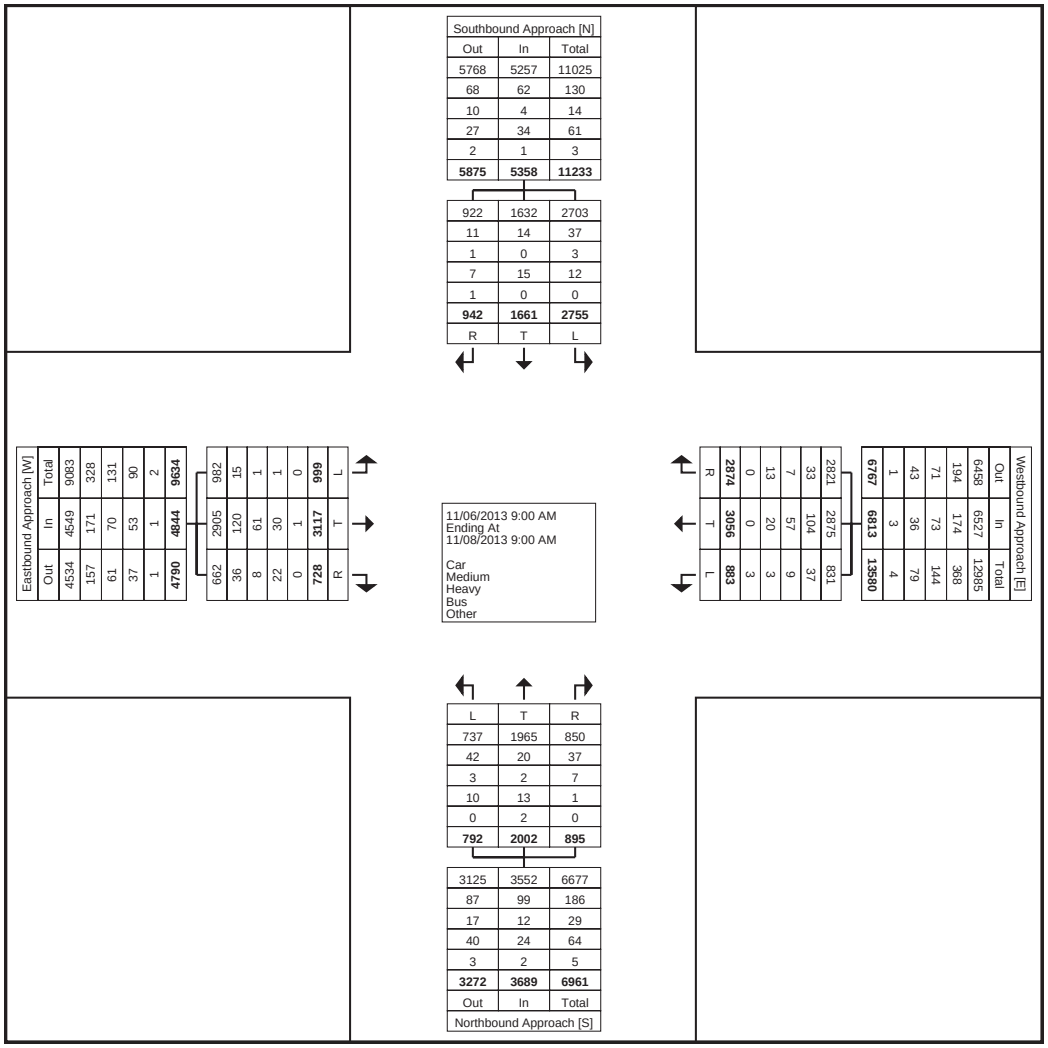
Hourly Total	0	2	1	3	2	6	10	18	1	10	2	13	2	4	2	8	42
5:00 AM	0	1	0	1	1	4	7	12	1	5	1	7	0	1	3	4	24
5:15 AM	1	1	1	3	1	4	12	17	1	10	0	11	2	5	0	7	38
5:30 AM	2	1	0	3	0	7	12	19	1	14	2	17	0	0	2	2	41
5:45 AM	2	1	2	5	0	5	9	14	2	18	2	22	0	9	2	11	52
Hourly Total	5	4	3	12	2	20	40	62	5	47	5	57	2	15	7	24	155
6:00 AM	3	3	0	6	3	7	18	28	1	15	0	16	1	10	0	11	61
6:15 AM	3	5	0	8	5	10	30	45	3	20	4	27	0	10	2	12	92
6:30 AM	7	3	1	11	7	11	40	58	2	34	4	40	2	9	1	12	121
6:45 AM	8	8	2	18	8	19	56	83	3	33	4	40	4	6	4	14	155
Hourly Total	21	19	3	43	23	47	144	214	9	102	12	123	7	35	7	49	429
7:00 AM	6	3	1	10	9	16	62	87	3	39	3	45	8	12	5	25	167
7:15 AM	8	4	5	17	6	28	75	109	3	57	7	67	5	21	5	31	224
7:30 AM	9	10	3	22	9	18	86	113	6	90	8	104	8	17	14	39	278
7:45 AM	16	12	3	31	8	30	61	99	12	85	14	111	13	32	6	51	292
Hourly Total	39	29	12	80	32	92	284	408	24	271	32	327	34	82	30	146	961
8:00 AM	8	4	7	19	23	31	41	95	12	47	10	69	10	22	11	43	226
8:15 AM	8	5	8	21	35	17	20	72	14	45	14	73	11	31	7	49	215
8:30 AM	7	4	3	14	10	12	35	57	13	50	21	84	11	17	6	34	189
8:45 AM	7	6	6	19	5	10	34	49	5	22	9	36	13	12	4	29	133
Hourly Total	30	19	24	73	73	70	130	273	44	164	54	262	45	82	28	155	763
Grand Total	895	2002	792	3689	942	1661	2755	5358	728	3117	999	4844	2874	3056	883	6813	20704
Approach %	24.3	54.3	21.5	-	17.6	31.0	51.4	-	15.0	64.3	20.6	-	42.2	44.9	13.0	-	-
Total %	4.3	9.7	3.8	17.8	4.5	8.0	13.3	25.9	3.5	15.1	4.8	23.4	13.9	14.8	4.3	32.9	-
Car	850	1965	737	3552	922	1632	2703	5257	662	2905	982	4549	2821	2875	831	6527	19885
% Car	95.0	98.2	93.1	96.3	97.9	98.3	98.1	98.1	90.9	93.2	98.3	93.9	98.2	94.1	94.1	95.8	96.0
Medium	37	20	42	99	11	14	37	62	36	120	15	171	33	104	37	174	506
% Medium	4.1	1.0	5.3	2.7	1.2	0.8	1.3	1.2	4.9	3.8	1.5	3.5	1.1	3.4	4.2	2.6	2.4
Heavy	7	2	3	12	1	0	3	4	8	61	1	70	7	57	9	73	159
% Heavy	0.8	0.1	0.4	0.3	0.1	0.0	0.1	0.1	1.1	2.0	0.1	1.4	0.2	1.9	1.0	1.1	0.8
Bus	1	13	10	24	7	15	12	34	22	30	1	53	13	20	3	36	147
% Bus	0.1	0.6	1.3	0.7	0.7	0.9	0.4	0.6	3.0	1.0	0.1	1.1	0.5	0.7	0.3	0.5	0.7
Pedal Bike (Road)	0	0	0	0	1	0	0	1	0	1	0	1	0	0	0	0	2
% Pedal Bike (Road)	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Motor Bike	0	2	0	2	0	0	0	0	0	0	0	0	0	0	3	3	5
% Motor Bike	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0

Location: 46.7044535708624, -112.020941376686

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Count Name: Helena_Montana Ave_Lincoln Rd (L&C County)
Site Code:
Start Date: 11/06/2013
Page No: 5



Turning Movement Data Plot

Montana Department of Transportation
2701 Prospect

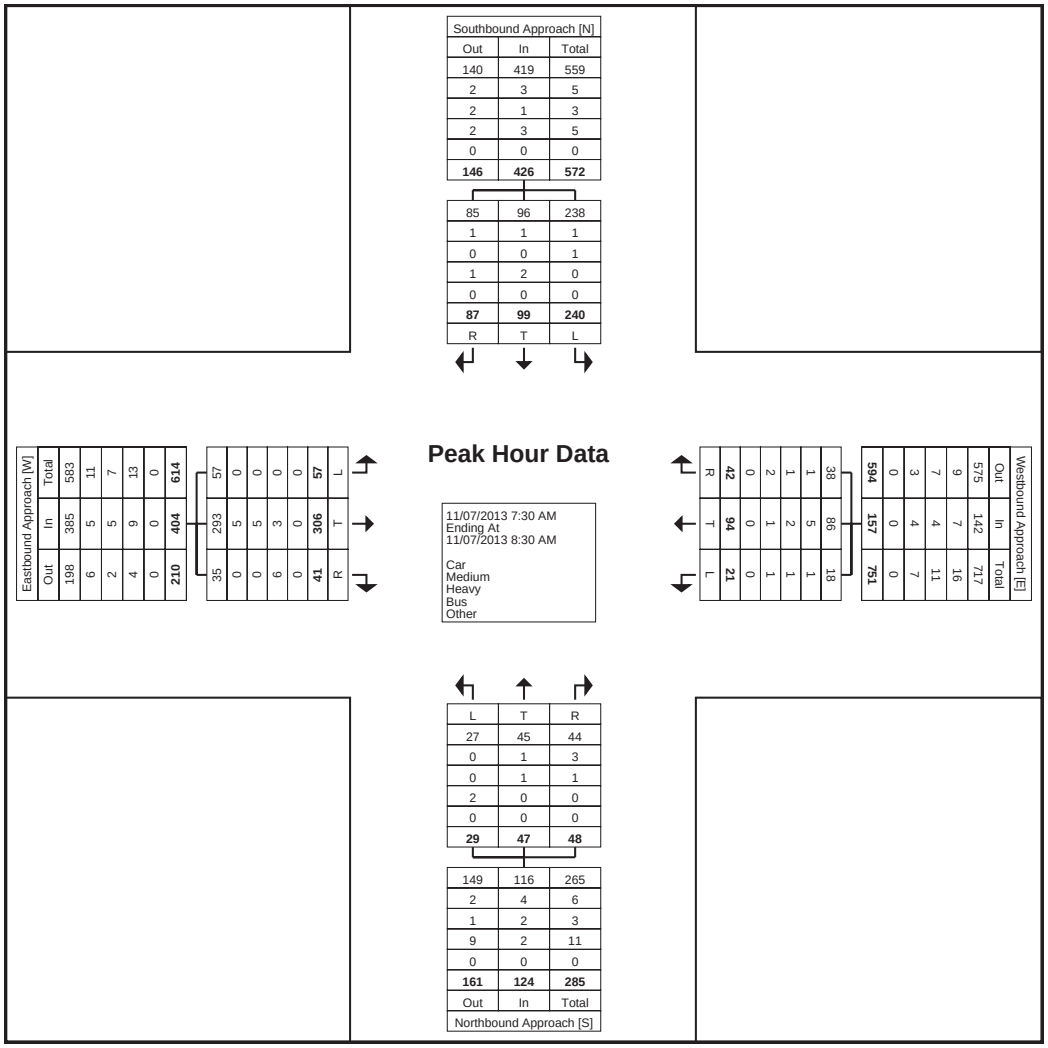
Helena, Montana, United States 59620
406-444-9417

Location: 46.7044535708624, -112.020941376686

Count Name: Helena_Montana Ave_Lincoln Rd (L&C County)
Site Code:
Start Date: 11/06/2013

Turning Movement Peak Hour Data (7:30 AM)

Start Time	Northbound Approach Northbound				Southbound Approach Southbound				Eastbound Approach Eastbound				Westbound Approach Westbound				
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
7:30 AM	13	8	2	23	6	23	98	127	2	97	6	105	14	21	7	42	297
7:45 AM	15	13	10	38	12	32	77	121	9	79	13	101	11	18	6	35	295
8:00 AM	7	17	7	31	26	27	40	93	14	77	14	105	9	24	5	38	267
8:15 AM	13	9	10	32	43	17	25	85	16	53	24	93	8	31	3	42	252
Total	48	47	29	124	87	99	240	426	41	306	57	404	42	94	21	157	1111
Approach %	38.7	37.9	23.4	-	20.4	23.2	56.3	-	10.1	75.7	14.1	-	26.8	59.9	13.4	-	-
Total %	4.3	4.2	2.6	11.2	7.8	8.9	21.6	38.3	3.7	27.5	5.1	36.4	3.8	8.5	1.9	14.1	-
PHF	0.800	0.691	0.725	0.816	0.506	0.773	0.612	0.839	0.641	0.789	0.594	0.962	0.750	0.758	0.750	0.935	0.935
Car	44	45	27	116	85	96	238	419	35	293	57	385	38	86	18	142	1062
% Car	91.7	95.7	93.1	93.5	97.7	97.0	99.2	98.4	85.4	95.8	100.0	95.3	90.5	91.5	85.7	90.4	95.6
Medium	3	1	0	4	1	1	1	3	0	5	0	5	1	5	1	7	19
% Medium	6.3	2.1	0.0	3.2	1.1	1.0	0.4	0.7	0.0	1.6	0.0	1.2	2.4	5.3	4.8	4.5	1.7
Heavy	1	1	0	2	0	0	1	1	0	5	0	5	1	2	1	4	12
% Heavy	2.1	2.1	0.0	1.6	0.0	0.0	0.4	0.2	0.0	1.6	0.0	1.2	2.4	2.1	4.8	2.5	1.1
Bus	0	0	2	2	1	2	0	3	6	3	0	9	2	1	1	4	18
% Bus	0.0	0.0	6.9	1.6	1.1	2.0	0.0	0.7	14.6	1.0	0.0	2.2	4.8	1.1	4.8	2.5	1.6
Pedal Bike (Road)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Pedal Bike (Road)	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	0.0	0.0	0.0	0.0
Motor Bike	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Motor Bike	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	0.0	0.0	0.0	0.0



Turning Movement Peak Hour Data Plot (7:30 AM)

Montana Department of Transportation
2701 Prospect

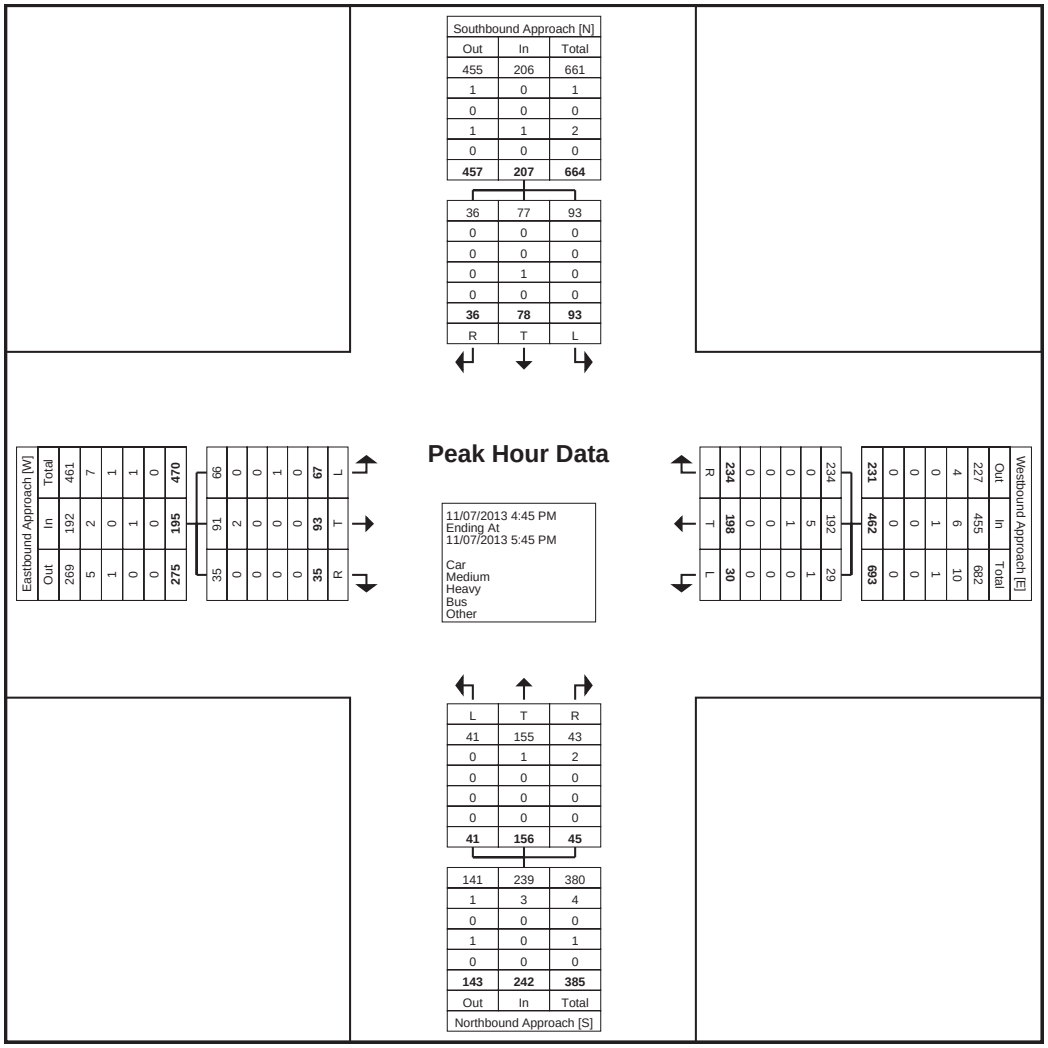
Helena, Montana, United States 59620
406-444-9417

Location: 46.7044535708624, -112.020941376686

Count Name: Helena_Montana Ave_Lincoln Rd (L&C County)
Site Code:
Start Date: 11/06/2013

Turning Movement Peak Hour Data (4:45 PM)

Start Time	Northbound Approach Northbound				Southbound Approach Southbound				Eastbound Approach Eastbound				Westbound Approach Westbound				
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
4:45 PM	13	37	14	64	7	25	23	55	8	28	15	51	65	40	10	115	285
5:00 PM	9	37	6	52	7	16	23	46	10	22	15	47	57	45	8	110	255
5:15 PM	12	41	12	65	9	18	21	48	8	16	17	41	58	59	4	121	275
5:30 PM	11	41	9	61	13	19	26	58	9	27	20	56	54	54	8	116	291
Total	45	156	41	242	36	78	93	207	35	93	67	195	234	198	30	462	1106
Approach %	18.6	64.5	16.9	-	17.4	37.7	44.9	-	17.9	47.7	34.4	-	50.6	42.9	6.5	-	-
Total %	4.1	14.1	3.7	21.9	3.3	7.1	8.4	18.7	3.2	8.4	6.1	17.6	21.2	17.9	2.7	41.8	-
PHF	0.865	0.951	0.732	0.931	0.692	0.780	0.894	0.892	0.875	0.830	0.838	0.871	0.900	0.839	0.750	0.955	0.950
Car	43	155	41	239	36	77	93	206	35	91	66	192	234	192	29	455	1092
% Car	95.6	99.4	100.0	98.8	100.0	98.7	100.0	99.5	100.0	97.8	98.5	98.5	100.0	97.0	96.7	98.5	98.7
Medium	2	1	0	3	0	0	0	0	0	2	0	2	0	5	1	6	11
% Medium	4.4	0.6	0.0	1.2	0.0	0.0	0.0	0.0	0.0	2.2	0.0	1.0	0.0	2.5	3.3	1.3	1.0
Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
% Heavy	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	0.5	0.0	0.2	0.1
Bus	0	0	0	0	0	1	0	1	0	0	1	1	0	0	0	0	2
% Bus	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.5	0.0	0.0	1.5	0.5	0.0	0.0	0.0	0.0	0.2
Pedal Bike (Road)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Pedal Bike (Road)	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	0.0	0.0	0.0	0.0
Motor Bike	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Motor Bike	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	0.0	0.0	0.0	0.0



Turning Movement Peak Hour Data Plot (4:45 PM)

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Location: 46.7044535708624, -112.020941376686

Count Name: Helena_Montana Ave_Lincoln Rd (L&C County)
Site Code:
Start Date: 11/06/2013

Location: 46.7044701250678, -112.011089622974

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Count Name: Lincoln Rd_I-15 NB Ramps (Lewis and Clark Cnty)
Site Code:
Start Date: 11/13/2013
Page No: 1

Turning Movement Data

Start Time	Northbound Approach				Eastbound Approach				Westbound Approach				
	Northbound				Eastbound				Westbound				
	Right	Thru	Left	App. Total	Thru	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
10:00 AM	8	0	15	23	6	3	0	9	1	18	0	19	51
10:15 AM	5	0	24	29	10	1	0	11	1	13	0	14	54
10:30 AM	6	0	29	35	7	3	0	10	2	11	0	13	58
10:45 AM	10	0	28	38	11	9	0	20	1	19	0	20	78
Hourly Total	29	0	96	125	34	16	0	50	5	61	0	66	241
11:00 AM	3	0	24	27	14	5	0	19	0	25	0	25	71
11:15 AM	17	0	31	48	12	2	1	15	2	19	0	21	84
11:30 AM	6	0	29	35	5	5	0	10	1	22	0	23	68
11:45 AM	10	0	47	57	7	4	0	11	0	24	0	24	92
Hourly Total	36	0	131	167	38	16	1	55	3	90	0	93	315
12:00 PM	9	0	32	41	9	1	0	10	1	15	0	16	67
12:15 PM	6	0	46	52	18	3	0	21	2	24	0	26	99
12:30 PM	8	1	29	38	13	7	0	20	0	24	0	24	82
12:45 PM	6	0	28	34	5	4	0	9	2	14	0	16	59
Hourly Total	29	1	135	165	45	15	0	60	5	77	0	82	307
1:00 PM	8	0	39	47	13	1	0	14	0	21	0	21	82
1:15 PM	18	0	28	46	12	5	0	17	0	15	0	15	78
1:30 PM	8	0	26	34	19	8	0	27	2	22	0	24	85
1:45 PM	13	0	40	53	13	4	0	17	1	15	0	16	86
Hourly Total	47	0	133	180	57	18	0	75	3	73	0	76	331
2:00 PM	12	0	26	38	8	9	0	17	0	17	0	17	72
2:15 PM	14	0	39	53	15	9	0	24	0	24	0	24	101
2:30 PM	14	0	44	58	15	3	0	18	0	19	0	19	95
2:45 PM	8	0	52	60	16	5	0	21	1	23	0	24	105
Hourly Total	48	0	161	209	54	26	0	80	1	83	0	84	373
3:00 PM	19	0	48	67	16	5	0	21	2	15	0	17	105
3:15 PM	14	1	59	74	16	6	0	22	1	28	0	29	125
3:30 PM	23	0	75	98	25	6	0	31	0	26	0	26	155
3:45 PM	26	0	65	91	19	8	0	27	0	17	0	17	135
Hourly Total	82	1	247	330	76	25	0	101	3	86	0	89	520
4:00 PM	22	0	87	109	18	5	0	23	2	30	0	32	164
4:15 PM	31	0	88	119	10	4	0	14	3	26	0	29	162
4:30 PM	31	0	84	115	17	9	0	26	0	17	0	17	158
4:45 PM	23	1	117	141	18	7	0	25	1	24	0	25	191
Hourly Total	107	1	376	484	63	25	0	88	6	97	0	103	675
5:00 PM	21	0	107	128	19	5	0	24	0	19	0	19	171
5:15 PM	46	0	144	190	14	4	0	18	1	19	0	20	228
5:30 PM	37	0	99	136	14	0	0	14	0	30	0	30	180
5:45 PM	22	0	91	113	10	3	0	13	0	25	0	25	151
Hourly Total	126	0	441	567	57	12	0	69	1	93	0	94	730
6:00 PM	27	0	74	101	20	1	0	21	0	18	0	18	140
6:15 PM	20	1	57	78	12	2	0	14	0	18	0	18	110
6:30 PM	9	0	52	61	10	1	0	11	0	17	0	17	89
6:45 PM	12	0	62	74	9	2	0	11	0	21	0	21	106
Hourly Total	68	1	245	314	51	6	0	57	0	74	0	74	445
7:00 PM	3	0	44	47	10	1	0	11	0	6	0	6	64
7:15 PM	18	0	46	64	16	1	0	17	0	12	0	12	93
7:30 PM	8	0	36	44	9	1	0	10	0	7	0	7	61
7:45 PM	13	0	36	49	2	2	0	4	0	4	0	4	57
Hourly Total	42	0	162	204	37	5	0	42	0	29	0	29	275
8:00 PM	9	0	35	44	8	2	0	10	0	6	0	6	60
8:15 PM	12	0	27	39	8	0	1	9	0	15	0	15	63
8:30 PM	12	0	41	53	3	0	0	3	0	6	0	6	62
8:45 PM	7	0	24	31	5	0	0	5	1	7	0	8	44
Hourly Total	40	0	127	167	24	2	1	27	1	34	0	35	229
9:00 PM	11	0	35	46	4	1	0	5	0	3	0	3	54
9:15 PM	10	0	26	36	7	0	0	7	0	10	0	10	53
9:30 PM	7	0	32	39	2	0	0	2	0	5	0	5	46
9:45 PM	10	0	24	34	8	4	0	12	0	3	0	3	49
Hourly Total	38	0	117	155	21	5	0	26	0	21	0	21	202
10:00 PM	4	0	25	29	3	1	0	4	0	6	0	6	39
10:15 PM	3	1	23	27	1	0	0	1	0	1	0	1	29
10:30 PM	2	1	16	19	1	0	0	1	0	1	0	1	21
10:45 PM	0	0	6	6	1	1	0	2	0	3	0	3	11
Hourly Total	9	2	70	81	6	2	0	8	0	11	0	11	100

11:00 PM	0	0	9	9	2	0	0	2	0	0	0	0	11
11:15 PM	4	0	8	12	1	0	0	1	0	1	0	1	14
11:30 PM	3	0	5	8	0	0	0	0	0	0	0	0	8
11:45 PM	2	0	8	10	0	0	0	0	0	0	0	0	10
Hourly Total	9	0	30	39	3	0	0	3	0	1	0	1	43
12:00 AM	0	0	8	8	0	0	0	0	0	0	0	0	8
12:15 AM	0	0	3	3	1	0	0	1	0	2	0	2	6
12:30 AM	2	0	7	9	2	0	0	2	0	0	0	0	11
12:45 AM	0	0	4	4	0	0	0	0	0	0	0	0	4
Hourly Total	2	0	22	24	3	0	0	3	0	2	0	2	29
1:00 AM	1	0	3	4	0	0	0	0	0	0	0	0	4
1:15 AM	0	0	1	1	0	0	0	0	0	0	0	0	1
1:30 AM	0	0	2	2	0	0	0	0	0	1	0	1	3
1:45 AM	1	0	3	4	0	0	0	0	0	4	0	4	8
Hourly Total	2	0	9	11	0	0	0	0	0	5	0	5	16
2:00 AM	0	0	3	3	0	0	0	0	0	0	0	0	3
2:15 AM	2	0	2	4	0	0	0	0	0	0	0	0	4
2:30 AM	0	0	0	0	0	1	0	1	0	1	0	1	2
2:45 AM	0	0	5	5	0	0	0	0	0	0	0	0	5
Hourly Total	2	0	10	12	0	1	0	1	0	1	0	1	14
3:00 AM	1	0	2	3	0	0	0	0	0	0	0	0	3
3:15 AM	1	0	3	4	0	1	0	1	0	0	0	0	5
3:30 AM	0	0	1	1	0	0	0	0	0	0	0	0	1
3:45 AM	1	0	0	1	0	0	0	0	0	0	0	0	1
Hourly Total	3	0	6	9	0	1	0	1	0	0	0	0	10
4:00 AM	1	0	0	1	0	0	0	0	0	2	0	2	3
4:15 AM	0	0	1	1	0	1	0	1	0	1	0	1	3
4:30 AM	0	0	3	3	0	1	0	1	1	3	0	4	8
4:45 AM	1	0	2	3	0	2	0	2	0	2	0	2	7
Hourly Total	2	0	6	8	0	4	0	4	1	8	0	9	21
5:00 AM	0	0	0	0	1	1	0	2	0	4	0	4	6
5:15 AM	0	0	6	6	1	1	0	2	0	5	0	5	13
5:30 AM	3	0	5	8	0	3	0	3	1	12	0	13	24
5:45 AM	2	0	5	7	4	6	0	10	0	10	0	10	27
Hourly Total	5	0	16	21	6	11	0	17	1	31	0	32	70
6:00 AM	2	0	6	8	3	5	0	8	2	17	0	19	35
6:15 AM	0	0	11	11	2	5	0	7	2	21	0	23	41
6:30 AM	0	1	14	15	2	6	0	8	0	38	0	38	61
6:45 AM	0	0	13	13	4	2	0	6	1	33	0	34	53
Hourly Total	2	1	44	47	11	18	0	29	5	109	0	114	190
7:00 AM	0	0	17	17	5	2	0	7	0	46	0	46	70
7:15 AM	0	0	19	19	6	3	0	9	0	54	0	54	82
7:30 AM	0	0	18	18	8	3	0	11	0	83	0	83	112
7:45 AM	0	0	22	22	7	3	0	10	1	62	0	63	95
Hourly Total	0	0	76	76	26	11	0	37	1	245	0	246	359
8:00 AM	7	0	25	32	8	1	0	9	2	34	0	36	77
8:15 AM	10	0	24	34	11	7	0	18	0	53	0	53	105
8:30 AM	9	0	23	32	12	9	0	21	0	29	0	29	82
8:45 AM	7	0	21	28	6	2	0	8	0	20	0	20	56
Hourly Total	33	0	93	126	37	19	0	56	2	136	0	138	320
9:00 AM	8	0	22	30	6	3	0	9	1	15	0	16	55
9:15 AM	7	0	13	20	8	5	0	13	0	22	0	22	55
9:30 AM	6	0	23	29	3	6	0	9	1	14	0	15	53
9:45 AM	9	0	19	28	3	1	0	4	1	25	0	26	58
Hourly Total	30	0	77	107	20	15	0	35	3	76	0	79	221
10:00 AM	6	0	16	22	11	6	0	17	0	17	0	17	56
10:15 AM	11	0	27	38	7	8	0	15	1	22	0	23	76
10:30 AM	11	0	13	24	11	6	0	17	0	18	0	18	59
10:45 AM	7	0	24	31	13	7	0	20	1	25	0	26	77
Hourly Total	35	0	80	115	42	27	0	69	2	82	0	84	268
11:00 AM	6	0	22	28	5	5	0	10	1	20	0	21	59
11:15 AM	6	0	31	37	10	6	0	16	0	20	0	20	73
11:30 AM	9	0	33	42	14	4	0	18	0	27	0	27	87
11:45 AM	10	0	30	40	8	2	0	10	0	23	0	23	73
Hourly Total	31	0	116	147	37	17	0	54	1	90	0	91	292
12:00 PM	13	1	33	47	12	3	0	15	0	16	0	16	78
12:15 PM	12	0	41	53	7	7	0	14	1	18	0	19	86
12:30 PM	15	0	27	42	11	5	0	16	0	19	0	19	77
12:45 PM	8	1	25	34	11	4	0	15	2	22	0	24	73
Hourly Total	48	2	126	176	41	19	0	60	3	75	0	78	314
1:00 PM	14	0	38	52	11	5	0	16	0	17	0	17	85
1:15 PM	10	0	32	42	10	6	0	16	1	22	0	23	81
1:30 PM	7	0	31	38	15	7	0	22	0	31	0	31	91
1:45 PM	11	0	39	50	10	7	0	17	0	17	0	17	84
Hourly Total	42	0	140	182	46	25	0	71	1	87	0	88	341
2:00 PM	8	0	33	41	9	5	0	14	0	7	0	7	62
2:15 PM	10	0	36	46	20	5	0	25	0	11	0	11	82

2:30 PM	13	0	54	67	13	10	0	23	1	19	0	20	110
2:45 PM	11	1	53	65	13	8	0	21	0	27	0	27	113
Hourly Total	42	1	176	219	55	28	0	83	1	64	0	65	367
3:00 PM	13	0	56	69	8	10	0	18	0	21	0	21	108
3:15 PM	18	0	52	70	22	3	0	25	0	25	0	25	120
3:30 PM	15	0	76	91	20	6	0	26	2	19	0	21	138
3:45 PM	27	0	60	87	14	13	0	27	0	14	0	14	128
Hourly Total	73	0	244	317	64	32	0	96	2	79	0	81	494
4:00 PM	22	0	91	113	14	6	0	20	1	25	0	26	159
4:15 PM	20	0	73	93	17	5	0	22	1	25	0	26	141
4:30 PM	33	0	99	132	7	4	0	11	1	23	0	24	167
4:45 PM	27	0	102	129	18	8	0	26	0	21	0	21	176
Hourly Total	102	0	365	467	56	23	0	79	3	94	0	97	643
5:00 PM	27	0	122	149	14	6	0	20	0	22	0	22	191
5:15 PM	44	0	146	190	17	4	0	21	0	39	0	39	250
5:30 PM	26	0	113	139	11	3	0	14	0	33	0	33	186
5:45 PM	30	0	96	126	12	5	0	17	1	27	0	28	171
Hourly Total	127	0	477	604	54	18	0	72	1	121	0	122	798
6:00 PM	24	0	53	77	19	2	0	21	0	13	0	13	111
6:15 PM	10	0	67	77	20	3	0	23	0	14	0	14	114
6:30 PM	7	0	53	60	13	1	0	14	0	16	0	16	90
6:45 PM	19	0	48	67	6	0	0	6	0	15	0	15	88
Hourly Total	60	0	221	281	58	6	0	64	0	58	0	58	403
7:00 PM	16	0	56	72	11	8	0	19	0	6	0	6	97
7:15 PM	15	0	38	53	11	1	0	12	0	6	0	6	71
7:30 PM	15	0	37	52	5	1	0	6	0	13	0	13	71
7:45 PM	8	0	21	29	9	2	0	11	0	7	0	7	47
Hourly Total	54	0	152	206	36	12	0	48	0	32	0	32	286
8:00 PM	10	1	24	35	7	1	0	8	0	5	0	5	48
8:15 PM	3	0	29	32	9	0	0	9	0	8	0	8	49
8:30 PM	3	0	25	28	6	1	0	7	0	7	0	7	42
8:45 PM	7	0	27	34	2	0	0	2	1	5	0	6	42
Hourly Total	23	1	105	129	24	2	0	26	1	25	0	26	181
9:00 PM	11	0	27	38	5	1	0	6	0	5	0	5	49
9:15 PM	7	0	28	35	4	0	0	4	0	6	0	6	45
9:30 PM	5	0	21	26	3	1	0	4	0	4	0	4	34
9:45 PM	1	0	17	18	2	2	0	4	1	7	0	8	30
Hourly Total	24	0	93	117	14	4	0	18	1	22	0	23	158
10:00 PM	8	0	20	28	4	2	0	6	0	2	0	2	36
10:15 PM	8	0	14	22	3	0	0	3	0	3	0	3	28
10:30 PM	4	0	14	18	1	0	0	1	0	1	0	1	20
10:45 PM	3	0	14	17	4	0	0	4	0	0	0	0	21
Hourly Total	23	0	62	85	12	2	0	14	0	6	0	6	105
11:00 PM	1	0	6	7	1	0	0	1	0	0	0	0	8
11:15 PM	5	0	6	11	0	0	0	0	0	4	0	4	15
11:30 PM	1	0	7	8	0	0	0	0	0	0	0	0	8
11:45 PM	2	0	7	9	0	0	0	0	0	0	0	0	9
Hourly Total	9	0	26	35	1	0	0	1	0	4	0	4	40
12:00 AM	0	0	4	4	0	1	0	1	0	1	0	1	6
12:15 AM	2	0	7	9	1	0	0	1	0	0	0	0	10
12:30 AM	0	0	3	3	0	0	0	0	0	1	0	1	4
12:45 AM	1	0	5	6	0	0	0	0	0	1	0	1	7
Hourly Total	3	0	19	22	1	1	0	2	0	3	0	3	27
1:00 AM	1	0	2	3	0	0	0	0	0	0	0	0	3
1:15 AM	0	0	4	4	0	0	0	0	0	0	0	0	4
1:30 AM	0	0	3	3	1	0	0	1	0	1	0	1	5
1:45 AM	0	0	2	2	0	0	0	0	0	0	0	0	2
Hourly Total	1	0	11	12	1	0	0	1	0	1	0	1	14
2:00 AM	3	0	4	7	0	0	0	0	0	0	0	0	7
2:15 AM	1	0	2	3	0	0	0	0	0	0	0	0	3
2:30 AM	1	0	3	4	1	0	0	1	0	1	0	1	6
2:45 AM	1	0	1	2	1	0	0	1	0	0	0	0	3
Hourly Total	6	0	10	16	2	0	0	2	0	1	0	1	19
3:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 AM	1	0	2	3	0	0	0	0	0	1	0	1	4
3:30 AM	0	0	0	0	0	0	0	0	1	1	0	2	2
3:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	1	0	2	3	0	0	0	0	1	2	0	3	6
4:00 AM	0	0	1	1	1	0	0	1	0	1	0	1	3
4:15 AM	0	0	2	2	0	0	0	0	0	1	0	1	3
4:30 AM	0	0	3	3	0	1	0	1	0	3	0	3	7
4:45 AM	1	0	4	5	1	3	0	4	0	8	0	8	17
Hourly Total	1	0	10	11	2	4	0	6	0	13	0	13	30
5:00 AM	0	0	0	0	1	2	0	3	0	5	0	5	8
5:15 AM	1	0	8	9	2	1	0	3	0	5	0	5	17
5:30 AM	0	0	2	2	1	3	0	4	0	10	0	10	16
5:45 AM	2	0	4	6	5	7	0	12	0	14	0	14	32

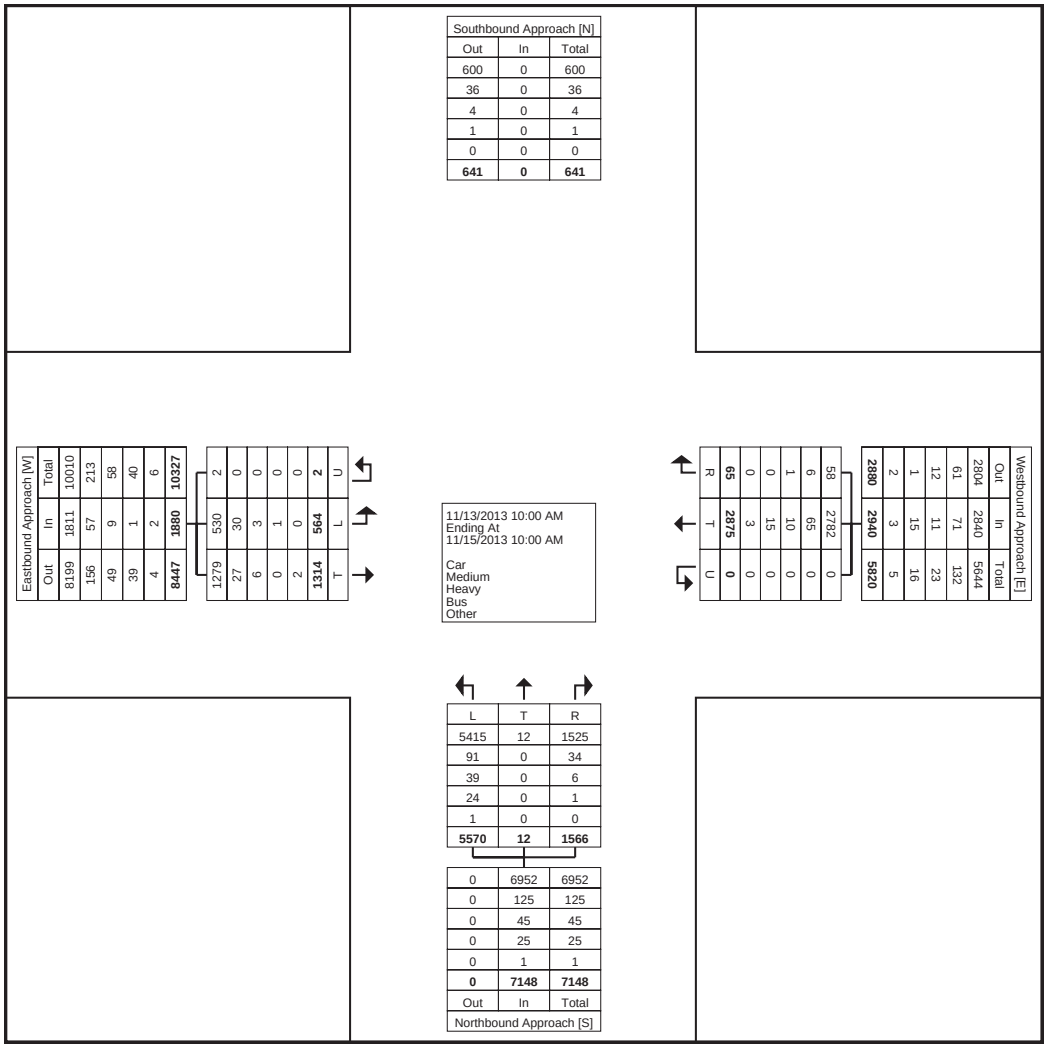
Hourly Total	3	0	14	17	9	13	0	22	0	34	0	34	73
6:00 AM	0	0	9	9	2	8	0	10	0	14	0	14	33
6:15 AM	2	0	14	16	2	3	0	5	0	18	0	18	39
6:30 AM	2	0	13	15	4	5	0	9	0	26	0	26	50
6:45 AM	0	0	8	8	2	7	0	9	0	25	0	25	42
Hourly Total	4	0	44	48	10	23	0	33	0	83	0	83	164
7:00 AM	0	0	15	15	3	5	0	8	0	36	0	36	59
7:15 AM	5	0	14	19	3	7	0	10	0	63	0	63	92
7:30 AM	0	0	23	23	4	1	0	5	1	91	0	92	120
7:45 AM	4	0	12	16	6	2	0	8	0	58	0	58	82
Hourly Total	9	0	64	73	16	15	0	31	1	248	0	249	353
8:00 AM	7	0	37	44	6	5	0	11	1	45	0	46	101
8:15 AM	6	0	21	27	9	6	0	15	1	43	0	44	86
8:30 AM	9	0	29	38	11	8	0	19	1	28	0	29	86
8:45 AM	10	0	24	34	12	4	0	16	1	16	0	17	67
Hourly Total	32	0	111	143	38	23	0	61	4	132	0	136	340
9:00 AM	4	1	21	26	8	4	0	12	0	16	0	16	54
9:15 AM	8	0	16	24	6	4	0	10	1	19	0	20	54
9:30 AM	5	0	21	26	6	4	0	10	0	22	0	22	58
9:45 AM	5	0	14	19	6	5	0	11	1	19	0	20	50
Hourly Total	22	1	72	95	26	17	0	43	2	76	0	78	216
Grand Total	1566	12	5570	7148	1314	564	2	1880	65	2875	0	2940	11968
Approach %	21.9	0.2	77.9	-	69.9	30.0	0.1	-	2.2	97.8	0.0	-	-
Total %	13.1	0.1	46.5	59.7	11.0	4.7	0.0	15.7	0.5	24.0	0.0	24.6	-
Car	1525	12	5415	6952	1279	530	2	1811	58	2782	0	2840	11603
% Car	97.4	100.0	97.2	97.3	97.3	94.0	100.0	96.3	89.2	96.8	-	96.6	97.0
Medium	34	0	91	125	27	30	0	57	6	65	0	71	253
% Medium	2.2	0.0	1.6	1.7	2.1	5.3	0.0	3.0	9.2	2.3	-	2.4	2.1
Heavy	6	0	39	45	6	3	0	9	1	10	0	11	65
% Heavy	0.4	0.0	0.7	0.6	0.5	0.5	0.0	0.5	1.5	0.3	-	0.4	0.5
Bus	1	0	24	25	0	1	0	1	0	15	0	15	41
% Bus	0.1	0.0	0.4	0.3	0.0	0.2	0.0	0.1	0.0	0.5	-	0.5	0.3
Pedal Bike (Road)	0	0	0	0	2	0	0	2	0	3	0	3	5
% Pedal Bike (Road)	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.1	-	0.1	0.0
Motor Bike	0	0	1	1	0	0	0	0	0	0	0	0	1
% Motor Bike	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Location: 46.7044701250678, -112.011089622974

Count Name: Lincoln Rd_I-15 NB Ramps (Lewis and Clark Cnty)
Site Code:
Start Date: 11/13/2013
Page No: 5



Turning Movement Data Plot

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Location: 46.7044701250678, -112.011089622974

Count Name: Lincoln Rd_I-15 NB Ramps (Lewis and Clark Cnty)
Site Code:
Start Date: 11/13/2013

Turning Movement Peak Hour Data (7:30 AM)

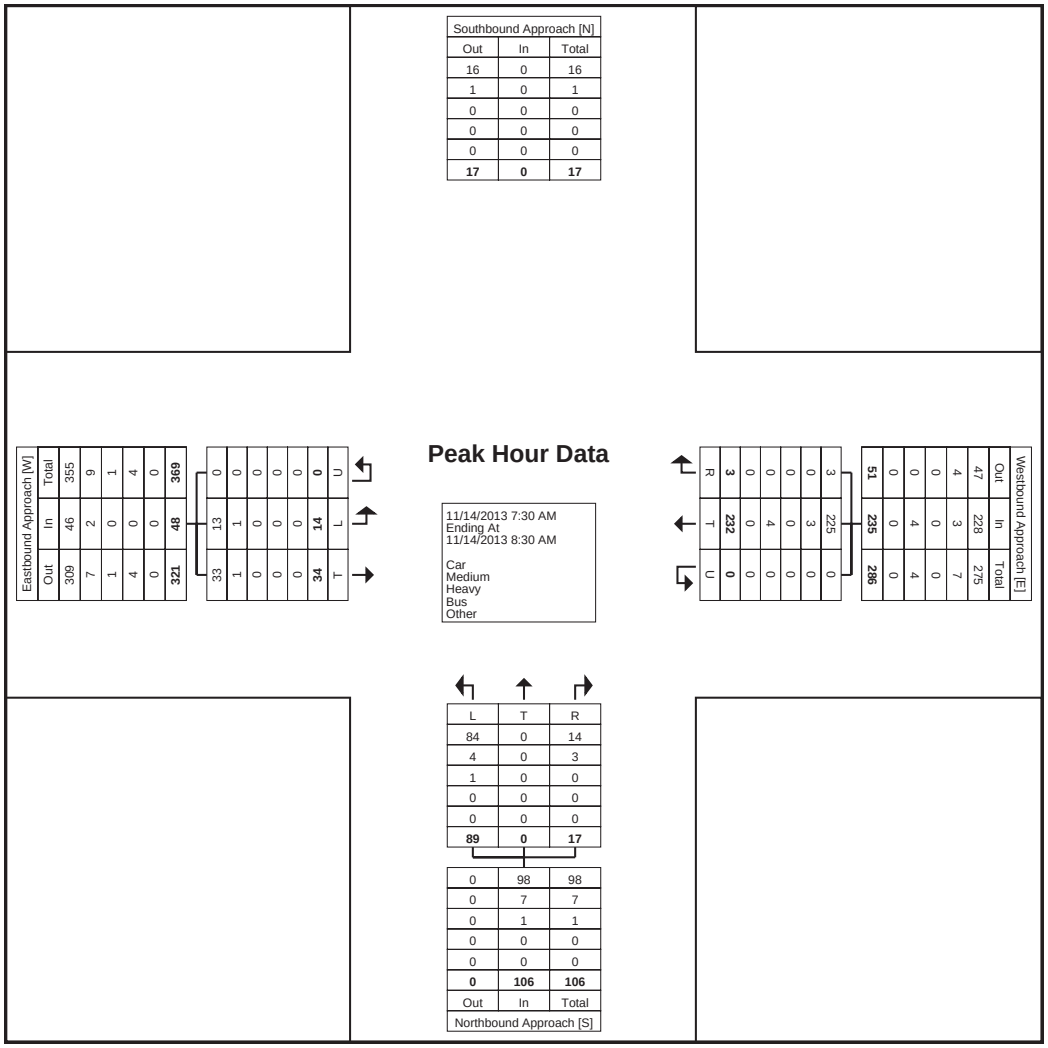
Start Time	Northbound Approach				Eastbound Approach				Westbound Approach				
	Northbound				Eastbound				Westbound				
	Right	Thru	Left	App. Total	Thru	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
7:30 AM	0	0	18	18	8	3	0	11	0	83	0	83	112
7:45 AM	0	0	22	22	7	3	0	10	1	62	0	63	95
8:00 AM	7	0	25	32	8	1	0	9	2	34	0	36	77
8:15 AM	10	0	24	34	11	7	0	18	0	53	0	53	105
Total	17	0	89	106	34	14	0	48	3	232	0	235	389
Approach %	16.0	0.0	84.0	-	70.8	29.2	0.0	-	1.3	98.7	0.0	-	-
Total %	4.4	0.0	22.9	27.2	8.7	3.6	0.0	12.3	0.8	59.6	0.0	60.4	-
PHF	0.425	0.000	0.890	0.779	0.773	0.500	0.000	0.667	0.375	0.699	0.000	0.708	0.868
Car	14	0	84	98	33	13	0	46	3	225	0	228	372
% Car	82.4	-	94.4	92.5	97.1	92.9	-	95.8	100.0	97.0	-	97.0	95.6
Medium	3	0	4	7	1	1	0	2	0	3	0	3	12
% Medium	17.6	-	4.5	6.6	2.9	7.1	-	4.2	0.0	1.3	-	1.3	3.1
Heavy	0	0	1	1	0	0	0	0	0	0	0	0	1
% Heavy	0.0	-	1.1	0.9	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.3
Bus	0	0	0	0	0	0	0	0	0	4	0	4	4
% Bus	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	1.7	-	1.7	1.0
Pedal Bike (Road)	0	0	0	0	0	0	0	0	0	0	0	0	0
% Pedal Bike (Road)	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0
Motor Bike	0	0	0	0	0	0	0	0	0	0	0	0	0
% Motor Bike	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Location: 46.7044701250678, -112.011089622974

Count Name: Lincoln Rd_I-15 NB Ramps (Lewis and Clark Cnty)
Site Code:
Start Date: 11/13/2013



Turning Movement Peak Hour Data Plot (7:30 AM)

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Location: 46.7044701250678, -112.011089622974

Count Name: Lincoln Rd_I-15 NB Ramps (Lewis and Clark Cnty)
Site Code:
Start Date: 11/13/2013

Turning Movement Peak Hour Data (4:45 PM)

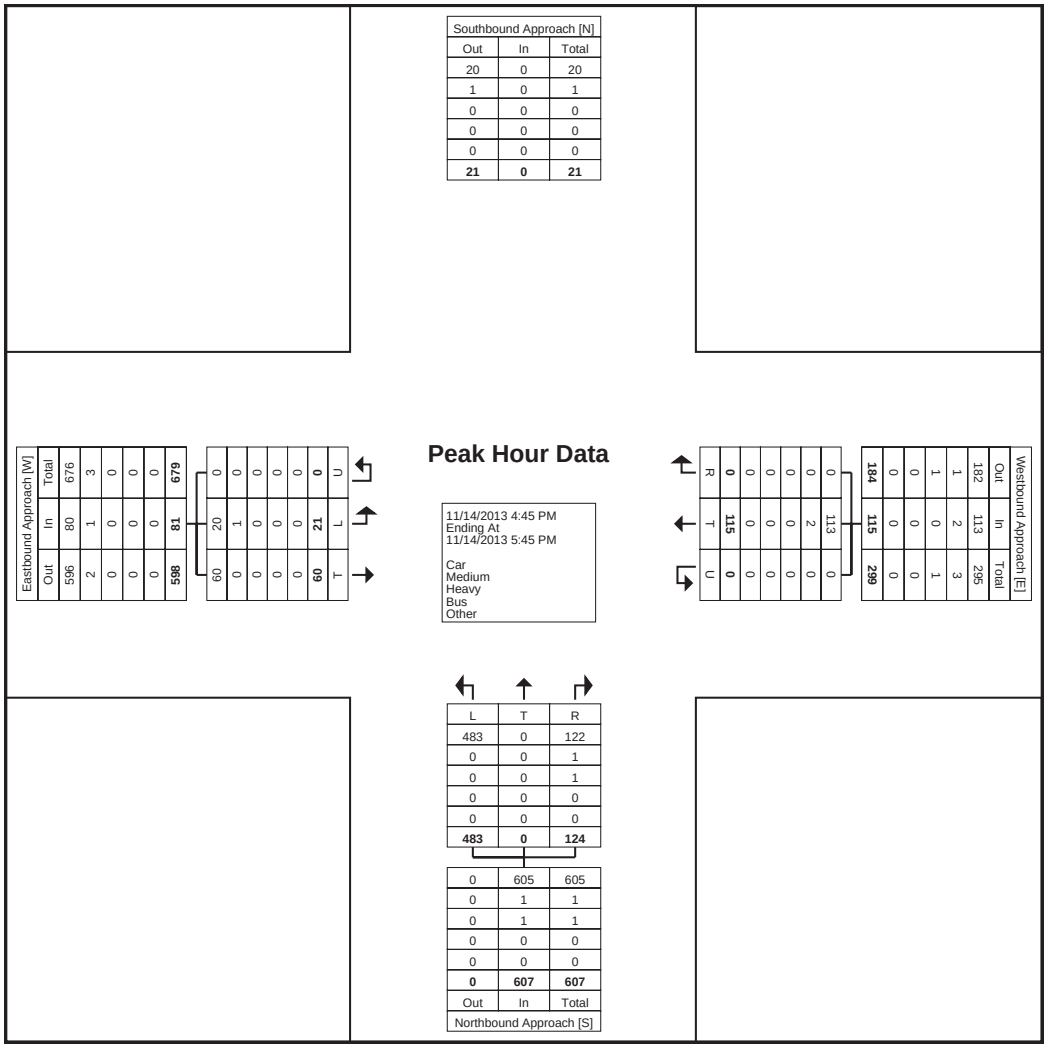
Start Time	Northbound Approach				Eastbound Approach				Westbound Approach				
	Northbound				Eastbound				Westbound				
	Right	Thru	Left	App. Total	Thru	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
4:45 PM	27	0	102	129	18	8	0	26	0	21	0	21	176
5:00 PM	27	0	122	149	14	6	0	20	0	22	0	22	191
5:15 PM	44	0	146	190	17	4	0	21	0	39	0	39	250
5:30 PM	26	0	113	139	11	3	0	14	0	33	0	33	186
Total	124	0	483	607	60	21	0	81	0	115	0	115	803
Approach %	20.4	0.0	79.6	-	74.1	25.9	0.0	-	0.0	100.0	0.0	-	-
Total %	15.4	0.0	60.1	75.6	7.5	2.6	0.0	10.1	0.0	14.3	0.0	14.3	-
PHF	0.705	0.000	0.827	0.799	0.833	0.656	0.000	0.779	0.000	0.737	0.000	0.737	0.803
Car	122	0	483	605	60	20	0	80	0	113	0	113	798
% Car	98.4	-	100.0	99.7	100.0	95.2	-	98.8	-	98.3	-	98.3	99.4
Medium	1	0	0	1	0	1	0	1	0	2	0	2	4
% Medium	0.8	-	0.0	0.2	0.0	4.8	-	1.2	-	1.7	-	1.7	0.5
Heavy	1	0	0	1	0	0	0	0	0	0	0	0	1
% Heavy	0.8	-	0.0	0.2	0.0	0.0	-	0.0	-	0.0	-	0.0	0.1
Bus	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bus	0.0	-	0.0	0.0	0.0	0.0	-	0.0	-	0.0	-	0.0	0.0
Pedal Bike (Road)	0	0	0	0	0	0	0	0	0	0	0	0	0
% Pedal Bike (Road)	0.0	-	0.0	0.0	0.0	0.0	-	0.0	-	0.0	-	0.0	0.0
Motor Bike	0	0	0	0	0	0	0	0	0	0	0	0	0
% Motor Bike	0.0	-	0.0	0.0	0.0	0.0	-	0.0	-	0.0	-	0.0	0.0

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Location: 46.7044701250678, -112.011089622974

Count Name: Lincoln Rd_I-15 NB Ramps (Lewis and Clark Cnty)
Site Code:
Start Date: 11/13/2013



Southbound Approach [N]		
Out	In	Total
20	0	20
1	0	1
0	0	0
0	0	0
0	0	0
21	**0**	**21**

Eastbound Approach [W]		
Out	In	Total
596	80	676
2	1	3
0	0	0
0	0	0
0	0	0
598	**81**	**679**

60	20	0
0	1	0
0	0	0
0	0	0
0	0	0
60	**21**	**0**
T	L	U

U	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	113	0
0	**115**	**0**
R	T	U

Out	In	Total
182	113	295
1	2	3
1	0	1
0	0	0
0	0	0
184	**115**	**299**

Westbound Approach [E]		
Out	In	Total
182	113	295
1	2	3
1	0	1
0	0	0
0	0	0
184	**115**	**299**

L	T	R
483	0	122
0	0	1
0	0	1
0	0	0
0	0	0
483	**0**	**124**

0	605	605
0	1	1
0	1	1
0	0	0
0	0	0
0	**607**	**607**
Out	In	Total
Northbound Approach [S]		

Turning Movement Peak Hour Data Plot (4:45 PM)

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Location: 46.7044701250678, -112.011089622974

Count Name: Lincoln Rd_I-15 NB Ramps (Lewis and Clark Cnty)
Site Code:
Start Date: 11/13/2013

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Location: 46.7044590889314, -112.012905478477

Count Name: I-15_Lincoln Rd SB Ramps
Site Code:
Start Date: 11/06/2013

Turning Movement Data

Start Time	SB Off Ramp Southbound				Eastbound St. Eastbound				Westbound St. Westbound				
	Right	Thru	Left	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Int. Total
10:00 AM	3	1	1	5	37	17	0	54	31	7	0	38	97
10:15 AM	3	0	1	4	34	20	0	54	26	10	0	36	94
10:30 AM	6	0	0	6	36	15	0	51	40	7	0	47	104
10:45 AM	6	0	1	7	32	12	0	44	31	12	0	43	94
Hourly Total	18	1	3	22	139	64	0	203	128	36	0	164	389
11:00 AM	1	0	0	1	33	12	0	45	43	10	0	53	99
11:15 AM	3	0	1	4	34	17	0	51	43	12	0	55	110
11:30 AM	3	0	0	3	29	12	0	41	46	17	0	63	107
11:45 AM	5	0	0	5	20	15	0	35	41	9	0	50	90
Hourly Total	12	0	1	13	116	56	0	172	173	48	0	221	406
12:00 PM	4	0	0	4	23	14	0	37	56	5	0	61	102
12:15 PM	5	0	0	5	41	17	0	58	35	16	0	51	114
12:30 PM	1	0	2	3	43	14	0	57	42	15	0	57	117
12:45 PM	1	0	0	1	40	14	0	54	43	8	0	51	106
Hourly Total	11	0	2	13	147	59	0	206	176	44	0	220	439
1:00 PM	5	0	0	5	22	9	0	31	41	8	0	49	85
1:15 PM	5	0	0	5	31	17	0	48	45	10	0	55	108
1:30 PM	2	0	0	2	33	21	0	54	37	5	0	42	98
1:45 PM	7	0	1	8	31	13	0	44	46	14	0	60	112
Hourly Total	19	0	1	20	117	60	0	177	169	37	0	206	403
2:00 PM	8	0	0	8	28	13	0	41	45	8	0	53	102
2:15 PM	3	0	0	3	30	12	0	42	33	8	0	41	86
2:30 PM	7	0	1	8	31	16	0	47	36	13	0	49	104
2:45 PM	4	0	3	7	35	17	0	52	58	10	0	68	127
Hourly Total	22	0	4	26	124	58	0	182	172	39	0	211	419
3:00 PM	8	0	2	10	31	15	0	46	72	7	0	79	135
3:15 PM	3	0	0	3	43	30	0	73	69	12	0	81	157
3:30 PM	4	0	0	4	41	27	0	68	83	11	0	94	166
3:45 PM	8	0	1	9	41	29	0	70	80	9	0	89	168
Hourly Total	23	0	3	26	156	101	0	257	304	39	0	343	626
4:00 PM	3	0	1	4	40	24	0	64	105	9	0	114	182
4:15 PM	2	0	2	4	36	10	0	46	89	4	0	93	143
4:30 PM	6	0	1	7	44	25	0	69	100	11	0	111	187
4:45 PM	5	0	0	5	30	14	0	44	110	6	0	116	165
Hourly Total	16	0	4	20	150	73	0	223	404	30	0	434	677
5:00 PM	9	0	3	12	44	16	0	60	141	10	0	151	223
5:15 PM	8	0	1	9	51	23	0	74	153	6	0	159	242
5:30 PM	3	1	1	5	34	28	0	62	139	7	0	146	213
5:45 PM	10	0	5	15	31	14	0	45	102	7	0	109	169
Hourly Total	30	1	10	41	160	81	0	241	535	30	0	565	847
6:00 PM	6	1	0	7	26	13	0	39	108	16	0	124	170
6:15 PM	4	0	1	5	22	12	0	34	82	5	0	87	126
6:30 PM	5	0	0	5	28	13	0	41	61	5	0	66	112
6:45 PM	3	0	3	6	18	11	0	29	55	4	0	59	94
Hourly Total	18	1	4	23	94	49	0	143	306	30	0	336	502
7:00 PM	4	0	0	4	10	9	0	19	50	2	0	52	75
7:15 PM	3	0	0	3	18	7	0	25	45	6	0	51	79
7:30 PM	1	0	0	1	13	11	0	24	37	2	0	39	64
7:45 PM	1	0	0	1	14	5	0	19	35	3	0	38	58
Hourly Total	9	0	0	9	55	32	0	87	167	13	0	180	276
8:00 PM	2	0	0	2	13	5	0	18	32	2	0	34	54
8:15 PM	2	0	1	3	16	13	0	29	37	2	0	39	71
8:30 PM	2	0	0	2	6	9	0	15	42	2	0	44	61
8:45 PM	1	0	0	1	11	8	0	19	38	3	0	41	61
Hourly Total	7	0	1	8	46	35	0	81	149	9	0	158	247
9:00 PM	2	0	0	2	6	3	0	9	31	3	0	34	45
9:15 PM	1	0	0	1	7	4	0	11	32	4	0	36	48
9:30 PM	1	0	0	1	10	3	0	13	16	2	0	18	32
9:45 PM	0	0	0	0	8	1	0	9	26	1	0	27	36
Hourly Total	4	0	0	4	31	11	0	42	105	10	0	115	161
10:00 PM	2	1	1	4	5	4	0	9	27	2	0	29	42
10:15 PM	0	0	1	1	2	1	0	3	15	1	0	16	20
10:30 PM	0	0	0	0	4	2	0	6	13	0	0	13	19
10:45 PM	0	0	0	0	0	3	0	3	7	4	0	11	14
Hourly Total	2	1	2	5	11	10	0	21	62	7	0	69	95

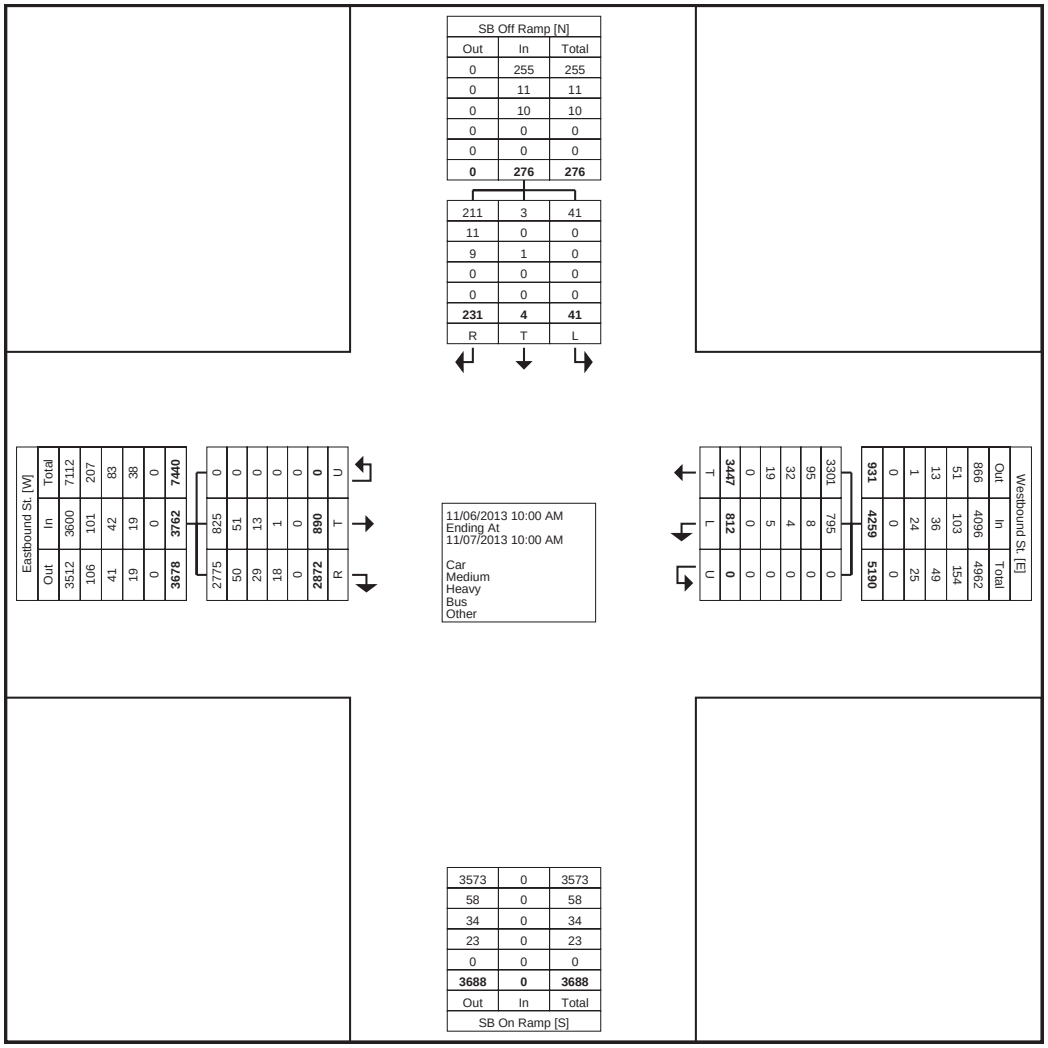
11:00 PM	0	0	0	0	3	2	0	5	0	0	0	0	5
11:15 PM	0	0	0	0	3	0	0	3	6	0	0	6	9
11:30 PM	0	0	0	0	3	2	0	5	8	0	0	8	13
11:45 PM	0	0	0	0	0	0	0	0	7	0	0	7	7
Hourly Total	0	0	0	0	9	4	0	13	21	0	0	21	34
12:00 AM	1	0	0	1	2	2	0	4	7	0	0	7	12
12:15 AM	1	0	0	1	1	0	0	1	10	0	0	10	12
12:30 AM	1	0	0	1	2	0	0	2	8	0	0	8	11
12:45 AM	1	0	0	1	2	1	0	3	4	0	0	4	8
Hourly Total	4	0	0	4	7	3	0	10	29	0	0	29	43
1:00 AM	0	0	0	0	1	0	0	1	1	0	0	1	2
1:15 AM	0	0	0	0	2	1	0	3	9	0	0	9	12
1:30 AM	0	0	0	0	2	1	0	3	4	1	0	5	8
1:45 AM	0	0	0	0	3	0	0	3	1	0	0	1	4
Hourly Total	0	0	0	0	8	2	0	10	15	1	0	16	26
2:00 AM	0	0	0	0	1	0	0	1	3	0	0	3	4
2:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 AM	0	0	0	0	2	0	0	2	0	0	0	0	2
2:45 AM	0	0	0	0	3	0	0	3	0	0	0	0	3
Hourly Total	0	0	0	0	6	0	0	6	3	0	0	3	9
3:00 AM	0	0	0	0	0	0	0	0	2	0	0	2	2
3:15 AM	0	0	0	0	0	0	0	0	3	0	0	3	3
3:30 AM	0	0	0	0	3	1	0	4	1	0	0	1	5
3:45 AM	0	0	0	0	2	0	0	2	0	0	0	0	2
Hourly Total	0	0	0	0	5	1	0	6	6	0	0	6	12
4:00 AM	1	0	0	1	2	0	0	2	1	2	0	3	6
4:15 AM	0	0	0	0	3	2	0	5	4	1	0	5	10
4:30 AM	0	0	0	0	7	1	0	8	4	4	0	8	16
4:45 AM	0	0	0	0	9	0	0	9	3	5	0	8	17
Hourly Total	1	0	0	1	21	3	0	24	12	12	0	24	49
5:00 AM	0	0	0	0	9	3	0	12	3	5	0	8	20
5:15 AM	0	0	0	0	14	6	0	20	4	7	0	11	31
5:30 AM	0	0	0	0	31	6	0	37	6	13	0	19	56
5:45 AM	1	0	0	1	25	5	0	30	7	9	0	16	47
Hourly Total	1	0	0	1	79	20	0	99	20	34	0	54	154
6:00 AM	0	0	1	1	36	7	0	43	15	16	0	31	75
6:15 AM	0	0	0	0	58	6	0	64	13	12	0	25	89
6:30 AM	0	0	0	0	98	6	0	104	19	26	0	45	149
6:45 AM	1	0	0	1	107	4	0	111	17	29	0	46	158
Hourly Total	1	0	1	2	299	23	0	322	64	83	0	147	471
7:00 AM	1	0	0	1	105	6	0	111	32	36	0	68	180
7:15 AM	1	0	0	1	138	6	0	144	37	47	0	84	229
7:30 AM	2	0	1	3	216	7	0	223	47	67	0	114	340
7:45 AM	2	0	0	2	172	16	0	188	31	46	0	77	267
Hourly Total	6	0	1	7	631	35	0	666	147	196	0	343	1016
8:00 AM	2	0	1	3	117	15	0	132	39	27	0	66	201
8:15 AM	1	0	0	1	81	22	0	103	51	26	0	77	181
8:30 AM	3	0	0	3	71	20	0	91	40	16	0	56	150
8:45 AM	3	0	0	3	36	13	0	49	29	14	0	43	95
Hourly Total	9	0	1	10	305	70	0	375	159	83	0	242	627
9:00 AM	4	0	0	4	42	11	0	53	38	7	0	45	102
9:15 AM	7	0	0	7	32	10	0	42	24	10	0	34	83
9:30 AM	5	0	0	5	39	12	0	51	29	7	0	36	92
9:45 AM	2	0	3	5	43	7	0	50	30	7	0	37	92
Hourly Total	18	0	3	21	156	40	0	196	121	31	0	152	369
Grand Total	231	4	41	276	2872	890	0	3762	3447	812	0	4259	8297
Approach %	83.7	1.4	14.9	-	76.3	23.7	0.0	-	80.9	19.1	0.0	-	-
Total %	2.8	0.0	0.5	3.3	34.6	10.7	0.0	45.3	41.5	9.8	0.0	51.3	-
Car	211	3	41	255	2775	825	0	3600	3301	795	0	4096	7951
% Car	91.3	75.0	100.0	92.4	96.6	92.7	-	95.7	95.8	97.9	-	96.2	95.8
Medium	11	0	0	11	50	51	0	101	95	8	0	103	215
% Medium	4.8	0.0	0.0	4.0	1.7	5.7	-	2.7	2.8	1.0	-	2.4	2.6
Heavy	9	1	0	10	29	13	0	42	32	4	0	36	88
% Heavy	3.9	25.0	0.0	3.6	1.0	1.5	-	1.1	0.9	0.5	-	0.8	1.1
Bus	0	0	0	0	18	1	0	19	19	5	0	24	43
% Bus	0.0	0.0	0.0	0.0	0.6	0.1	-	0.5	0.6	0.6	-	0.6	0.5
Pedal Bike (Road)	0	0	0	0	0	0	0	0	0	0	0	0	0
% Pedal Bike (Road)	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0
Motor Bike	0	0	0	0	0	0	0	0	0	0	0	0	0
% Motor Bike	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Location: 46.7044590889314, -112.012905478477

Count Name: I-15_Lincoln Rd SB Ramps
Site Code:
Start Date: 11/06/2013



Turning Movement Data Plot

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Location: 46.7044590889314, -112.012905478477

Count Name: I-15_Lincoln Rd SB Ramps
Site Code:
Start Date: 11/06/2013

Turning Movement Peak Hour Data (5:00 PM)

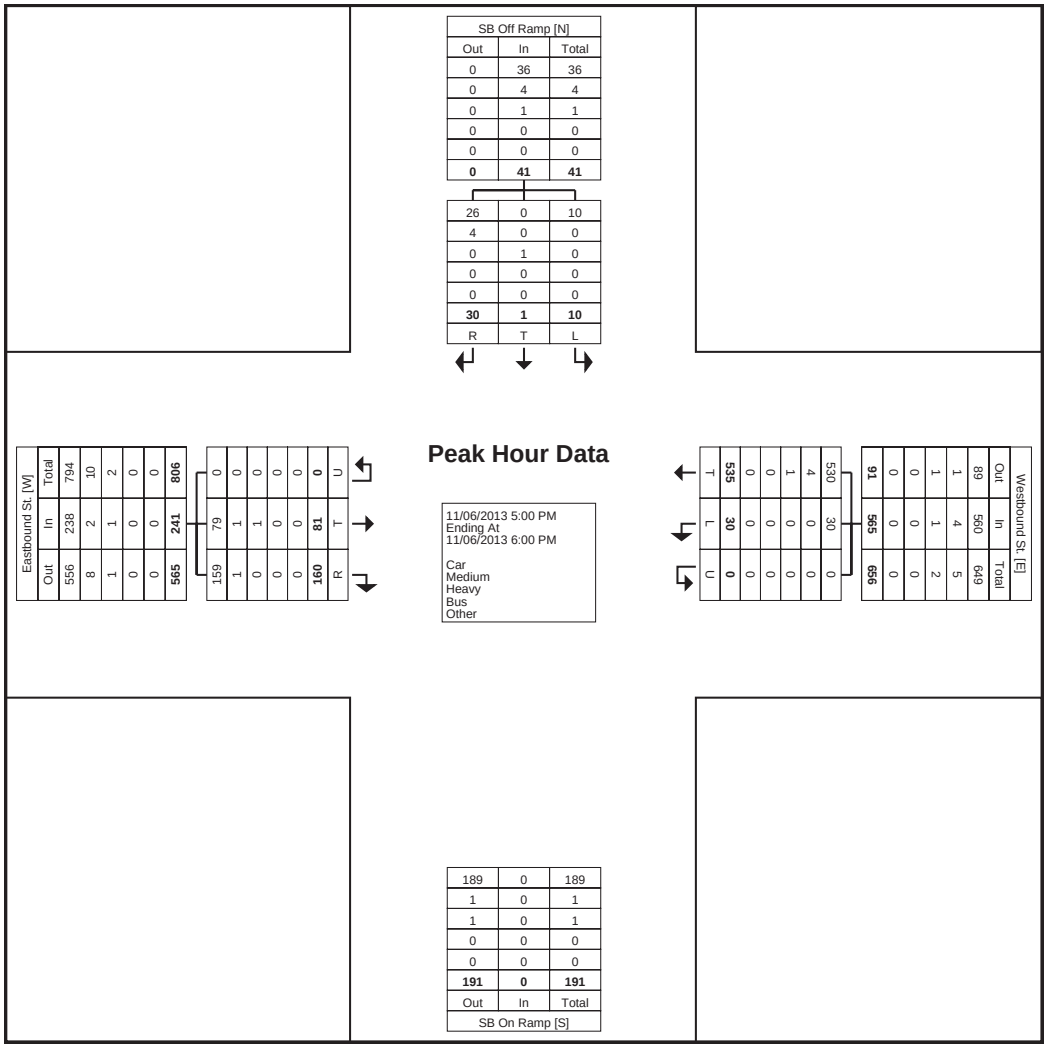
Start Time	SB Off Ramp Southbound				Eastbound St. Eastbound				Westbound St. Westbound				
	Right	Thru	Left	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Int. Total
5:00 PM	9	0	3	12	44	16	0	60	141	10	0	151	223
5:15 PM	8	0	1	9	51	23	0	74	153	6	0	159	242
5:30 PM	3	1	1	5	34	28	0	62	139	7	0	146	213
5:45 PM	10	0	5	15	31	14	0	45	102	7	0	109	169
Total	30	1	10	41	160	81	0	241	535	30	0	565	847
Approach %	73.2	2.4	24.4	-	66.4	33.6	0.0	-	94.7	5.3	0.0	-	-
Total %	3.5	0.1	1.2	4.8	18.9	9.6	0.0	28.5	63.2	3.5	0.0	66.7	-
PHF	0.750	0.250	0.500	0.683	0.784	0.723	0.000	0.814	0.874	0.750	0.000	0.888	0.875
Car	26	0	10	36	159	79	0	238	530	30	0	560	834
% Car	86.7	0.0	100.0	87.8	99.4	97.5	-	98.8	99.1	100.0	-	99.1	98.5
Medium	4	0	0	4	1	1	0	2	4	0	0	4	10
% Medium	13.3	0.0	0.0	9.8	0.6	1.2	-	0.8	0.7	0.0	-	0.7	1.2
Heavy	0	1	0	1	0	1	0	1	1	0	0	1	3
% Heavy	0.0	100.0	0.0	2.4	0.0	1.2	-	0.4	0.2	0.0	-	0.2	0.4
Bus	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bus	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0
Pedal Bike (Road)	0	0	0	0	0	0	0	0	0	0	0	0	0
% Pedal Bike (Road)	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0
Motor Bike	0	0	0	0	0	0	0	0	0	0	0	0	0
% Motor Bike	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Location: 46.7044590889314, -112.012905478477

Count Name: I-15_Lincoln Rd SB Ramps
Site Code:
Start Date: 11/06/2013



Turning Movement Peak Hour Data Plot (5:00 PM)

Montana Department of Transportation
2701 Prospect

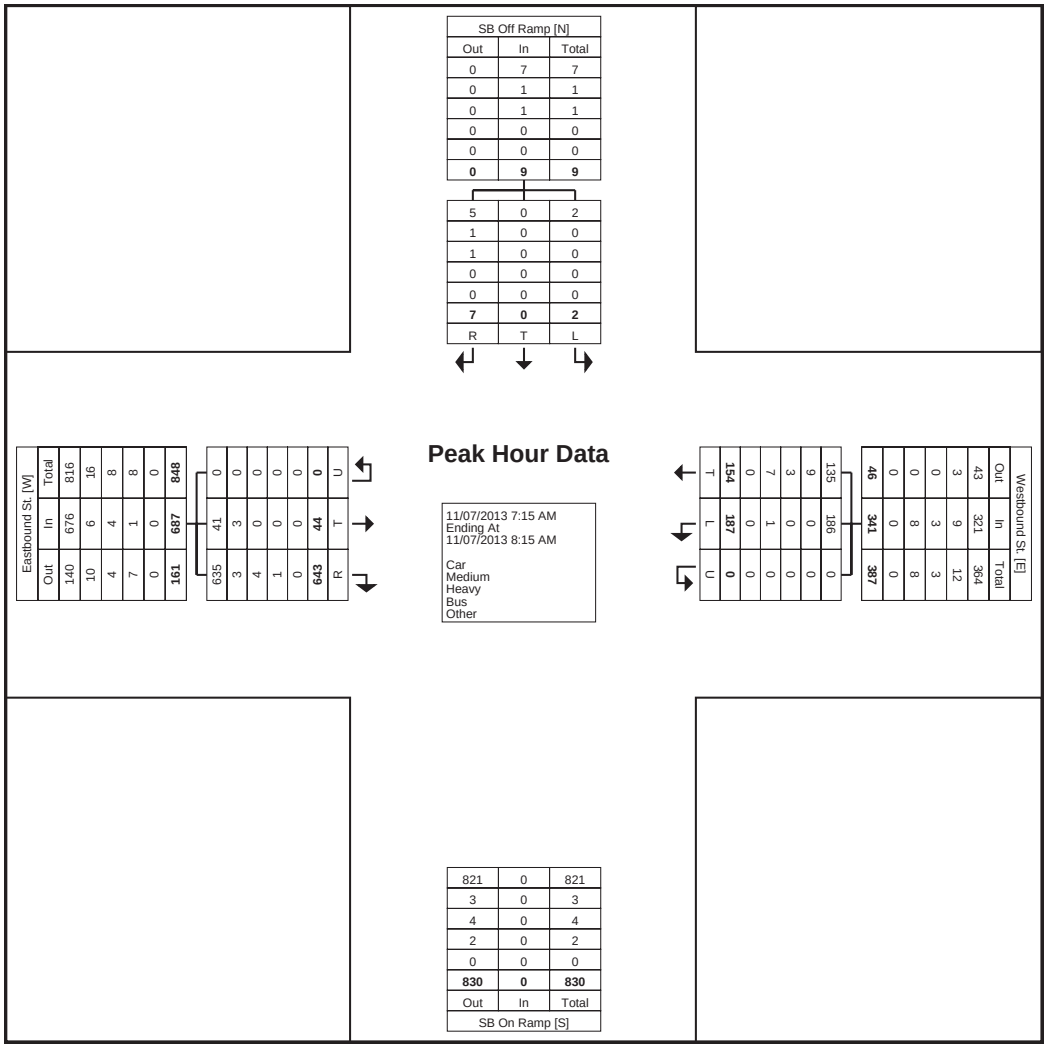
Helena, Montana, United States 59620
406-444-9417

Location: 46.7044590889314, -112.012905478477

Count Name: I-15_Lincoln Rd SB Ramps
Site Code:
Start Date: 11/06/2013

Turning Movement Peak Hour Data (7:15 AM)

Start Time	SB Off Ramp Southbound				Eastbound St. Eastbound				Westbound St. Westbound				
	Right	Thru	Left	App. Total	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Int. Total
7:15 AM	1	0	0	1	138	6	0	144	37	47	0	84	229
7:30 AM	2	0	1	3	216	7	0	223	47	67	0	114	340
7:45 AM	2	0	0	2	172	16	0	188	31	46	0	77	267
8:00 AM	2	0	1	3	117	15	0	132	39	27	0	66	201
Total	7	0	2	9	643	44	0	687	154	187	0	341	1037
Approach %	77.8	0.0	22.2	-	93.6	6.4	0.0	-	45.2	54.8	0.0	-	-
Total %	0.7	0.0	0.2	0.9	62.0	4.2	0.0	66.2	14.9	18.0	0.0	32.9	-
PHF	0.875	0.000	0.500	0.750	0.744	0.688	0.000	0.770	0.819	0.698	0.000	0.748	0.763
Car	5	0	2	7	635	41	0	676	135	186	0	321	1004
% Car	71.4	-	100.0	77.8	98.8	93.2	-	98.4	87.7	99.5	-	94.1	96.8
Medium	1	0	0	1	3	3	0	6	9	0	0	9	16
% Medium	14.3	-	0.0	11.1	0.5	6.8	-	0.9	5.8	0.0	-	2.6	1.5
Heavy	1	0	0	1	4	0	0	4	3	0	0	3	8
% Heavy	14.3	-	0.0	11.1	0.6	0.0	-	0.6	1.9	0.0	-	0.9	0.8
Bus	0	0	0	0	1	0	0	1	7	1	0	8	9
% Bus	0.0	-	0.0	0.0	0.2	0.0	-	0.1	4.5	0.5	-	2.3	0.9
Pedal Bike (Road)	0	0	0	0	0	0	0	0	0	0	0	0	0
% Pedal Bike (Road)	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0
Motor Bike	0	0	0	0	0	0	0	0	0	0	0	0	0
% Motor Bike	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0



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

Montana Department of Transportation
2701 Prospect

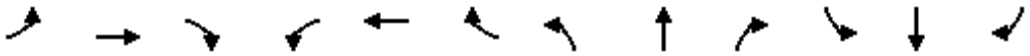
Helena, Montana, United States 59620
406-444-9417

Location: 46.7044590889314, -112.012905478477

Count Name: I-15_Lincoln Rd SB Ramps
Site Code:
Start Date: 11/06/2013

APPENDIX B

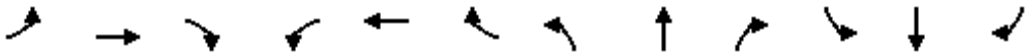
Existing Year (2013) Operational Analysis



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	57	306	41	21	94	42	29	47	48	240	99	87
Peak Hour Factor	0.96	0.96	0.96	0.94	0.94	0.94	0.82	0.82	0.82	0.84	0.84	0.84
Hourly flow rate (vph)	59	319	43	22	100	45	35	57	59	286	118	104

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	421	167	151	507
Volume Left (vph)	59	22	35	286
Volume Right (vph)	43	45	59	104
Hadj (s)	0.00	-0.10	-0.15	0.02
Departure Headway (s)	6.5	7.1	7.0	6.3
Degree Utilization, x	0.76	0.33	0.30	0.89
Capacity (veh/h)	526	462	455	549
Control Delay (s)	27.5	13.6	13.0	40.4
Approach Delay (s)	27.5	13.6	13.0	40.4
Approach LOS	D	B	B	E

Intersection Summary			
Delay	29.1		
Level of Service	D		
Intersection Capacity Utilization	66.6%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	54	107	23	31	198	255	37	122	33	90	60	52
Peak Hour Factor	0.89	0.89	0.89	0.88	0.88	0.88	0.98	0.98	0.98	0.89	0.89	0.89
Hourly flow rate (vph)	61	120	26	35	225	290	38	124	34	101	67	58

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	207	550	196	227
Volume Left (vph)	61	35	38	101
Volume Right (vph)	26	290	34	58
Hadj (s)	0.02	-0.27	-0.03	-0.03
Departure Headway (s)	6.4	5.5	6.7	6.6
Degree Utilization, x	0.37	0.84	0.36	0.42
Capacity (veh/h)	508	639	486	499
Control Delay (s)	13.1	30.8	13.4	14.2
Approach Delay (s)	13.1	30.8	13.4	14.2
Approach LOS	B	D	B	B

Intersection Summary				
Delay	21.6			
Level of Service	C			
Intersection Capacity Utilization	58.6%	ICU Level of Service	B	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	57	306	41	21	94	42	29	47	48	240	99	87
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	190.0	186.3	190.0	190.0	186.3	186.3	186.3	186.3	190.0	186.3	186.3	190.0
Adj Flow Rate, veh/h	61	326	44	22	100	45	31	50	51	255	105	93
Adj No. of Lanes	0	1	0	0	1	1	1	1	0	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	156	469	59	158	537	765	394	114	117	558	236	209
Arrive On Green	0.33	0.33	0.33	0.33	0.33	0.33	0.03	0.13	0.13	0.15	0.26	0.26
Sat Flow, veh/h	155	1419	179	150	1626	1583	1774	847	864	1774	912	808
Grp Volume(v), veh/h	431	0	0	122	0	45	31	0	101	255	0	198
Grp Sat Flow(s),veh/h/ln	1753	0	0	1776	0	1583	1774	0	1710	1774	0	1720
Q Serve(g_s), s	3.8	0.0	0.0	0.0	0.0	0.6	0.6	0.0	2.1	4.4	0.0	3.8
Cycle Q Clear(g_c), s	8.4	0.0	0.0	1.8	0.0	0.6	0.6	0.0	2.1	4.4	0.0	3.8
Prop In Lane	0.14		0.10	0.18		1.00	1.00		0.50	1.00		0.47
Lane Grp Cap(c), veh/h	684	0	0	695	0	765	394	0	231	558	0	444
V/C Ratio(X)	0.63	0.00	0.00	0.18	0.00	0.06	0.08	0.00	0.44	0.46	0.00	0.45
Avail Cap(c_a), veh/h	1077	0	0	1067	0	1129	523	0	741	558	0	833
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.6	0.0	0.0	9.4	0.0	5.4	14.0	0.0	15.6	10.4	0.0	12.2
Incr Delay (d2), s/veh	1.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	1.3	0.6	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.3	0.0	0.0	1.0	0.0	0.3	0.3	0.0	1.1	2.1	0.0	1.8
LnGrp Delay(d),s/veh	12.5	0.0	0.0	9.5	0.0	5.4	14.0	0.0	16.9	11.0	0.0	12.9
LnGrp LOS	B			A		A	B		B	B		B
Approach Vol, veh/h		431			167			132			453	
Approach Delay, s/veh		12.5			8.4			16.2			11.8	
Approach LOS		B			A			B			B	

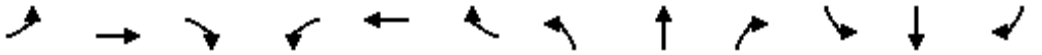
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.0	10.3		18.0	6.1	15.1		18.0
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0
Max Green Setting (Gmax), s	6.0	17.0		22.0	4.0	19.0		22.0
Max Q Clear Time (g_c+I1), s	6.4	4.1		10.4	2.6	5.8		3.8
Green Ext Time (p_c), s	0.0	1.2		2.6	0.0	1.2		3.1

Intersection Summary	
HCM 2010 Ctrl Delay	12.1
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	54	107	23	31	198	255	37	122	33	90	60	52
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	190.0	186.3	190.0	190.0	186.3	186.3	186.3	186.3	190.0	186.3	186.3	190.0
Adj Flow Rate, veh/h	59	118	25	34	218	280	41	134	36	99	66	57
Adj No. of Lanes	0	1	0	0	1	1	1	1	0	1	1	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	138	212	37	111	400	472	699	588	158	669	406	350
Arrive On Green	0.24	0.24	0.24	0.24	0.24	0.24	0.03	0.42	0.42	0.06	0.44	0.44
Sat Flow, veh/h	204	885	154	136	1667	1583	1774	1415	380	1774	924	798
Grp Volume(v), veh/h	202	0	0	252	0	280	41	0	170	99	0	123
Grp Sat Flow(s),veh/h/ln	1242	0	0	1802	0	1583	1774	0	1796	1774	0	1722
Q Serve(g_s), s	2.1	0.0	0.0	0.0	0.0	7.9	0.7	0.0	3.2	1.6	0.0	2.3
Cycle Q Clear(g_c), s	8.3	0.0	0.0	6.3	0.0	7.9	0.7	0.0	3.2	1.6	0.0	2.3
Prop In Lane	0.29		0.12	0.13		1.00	1.00		0.21	1.00		0.46
Lane Grp Cap(c), veh/h	387	0	0	511	0	472	699	0	746	669	0	756
V/C Ratio(X)	0.52	0.00	0.00	0.49	0.00	0.59	0.06	0.00	0.23	0.15	0.00	0.16
Avail Cap(c_a), veh/h	532	0	0	691	0	637	773	0	746	769	0	756
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	17.7	0.0	0.0	17.5	0.0	15.7	8.1	0.0	9.9	7.8	0.0	8.9
Incr Delay (d2), s/veh	1.1	0.0	0.0	0.7	0.0	1.2	0.0	0.0	0.7	0.1	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	0.0	0.0	3.3	0.0	3.6	0.3	0.0	1.7	0.8	0.0	1.2
LnGrp Delay(d),s/veh	18.8	0.0	0.0	18.2	0.0	16.9	8.2	0.0	10.6	7.9	0.0	9.3
LnGrp LOS	B			B		B	A		B	A		A
Approach Vol, veh/h		202			532			211			222	
Approach Delay, s/veh		18.8			17.5			10.1			8.7	
Approach LOS		B			B			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.1	26.7		17.6	6.8	28.0		17.6
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0
Max Green Setting (Gmax), s	6.0	21.0		18.0	4.0	23.0		18.0
Max Q Clear Time (g_c+I1), s	3.6	5.2		10.3	2.7	4.3		9.9
Green Ext Time (p_c), s	0.0	1.2		2.2	0.0	1.3		2.3

Intersection Summary	
HCM 2010 Ctrl Delay	14.7
HCM 2010 LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	57	306	41	21	94	42	29	47	48	240	99	87
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	61	326	44	22	100	45	31	50	51	255	105	93
Adj No. of Lanes	1	1	0	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	515	458	62	305	481	649	365	108	111	526	229	203
Arrive On Green	0.05	0.28	0.28	0.02	0.26	0.26	0.03	0.13	0.13	0.15	0.25	0.25
Sat Flow, veh/h	1774	1607	217	1774	1863	1583	1774	847	864	1774	912	808
Grp Volume(v), veh/h	61	0	370	22	100	45	31	0	101	255	0	198
Grp Sat Flow(s),veh/h/ln	1774	0	1824	1774	1863	1583	1774	0	1710	1774	0	1720
Q Serve(g_s), s	1.1	0.0	8.0	0.4	1.9	0.8	0.7	0.0	2.4	5.0	0.0	4.3
Cycle Q Clear(g_c), s	1.1	0.0	8.0	0.4	1.9	0.8	0.7	0.0	2.4	5.0	0.0	4.3
Prop In Lane	1.00		0.12	1.00		1.00	1.00		0.50	1.00		0.47
Lane Grp Cap(c), veh/h	515	0	519	305	481	649	365	0	219	526	0	432
V/C Ratio(X)	0.12	0.00	0.71	0.07	0.21	0.07	0.08	0.00	0.46	0.48	0.00	0.46
Avail Cap(c_a), veh/h	672	0	1197	527	1243	1297	555	0	743	538	0	786
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	10.9	0.0	14.2	12.1	12.8	7.9	16.0	0.0	17.9	12.0	0.0	14.0
Incr Delay (d2), s/veh	0.1	0.0	1.8	0.1	0.2	0.0	0.1	0.0	1.5	0.7	0.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	4.3	0.2	1.0	0.3	0.3	0.0	1.2	2.5	0.0	2.1
LnGrp Delay(d),s/veh	11.1	0.0	16.0	12.2	13.1	8.0	16.1	0.0	19.4	12.7	0.0	14.8
LnGrp LOS	B		B	B	B	A	B		B	B		B
Approach Vol, veh/h		431			167			132			453	
Approach Delay, s/veh		15.3			11.6			18.6			13.6	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.7	12.2	3.9	18.4	4.3	17.6	5.1	17.2
Change Period (Y+Rc), s	3.0	6.5	3.0	5.8	3.0	6.5	3.0	5.8
Max Green Setting (Gmax), s	7.0	19.2	6.5	29.0	6.0	20.2	6.0	29.5
Max Q Clear Time (g_c+I1), s	7.0	4.4	2.4	10.0	2.7	6.3	3.1	3.9
Green Ext Time (p_c), s	0.0	1.2	0.0	2.6	0.0	1.2	0.0	2.7

Intersection Summary	
HCM 2010 Ctrl Delay	14.5
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	54	107	23	31	198	255	37	122	33	90	60	52
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	59	118	25	34	218	280	41	134	36	99	66	57
Adj No. of Lanes	1	1	0	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	317	368	78	401	435	457	597	500	134	569	347	300
Arrive On Green	0.04	0.25	0.25	0.03	0.23	0.23	0.03	0.35	0.35	0.06	0.38	0.38
Sat Flow, veh/h	1774	1491	316	1774	1863	1583	1774	1415	380	1774	924	798
Grp Volume(v), veh/h	59	0	143	34	218	280	41	0	170	99	0	123
Grp Sat Flow(s),veh/h/ln	1774	0	1807	1774	1863	1583	1774	0	1796	1774	0	1722
Q Serve(g_s), s	1.4	0.0	3.8	0.8	5.9	8.9	0.8	0.0	3.9	2.0	0.0	2.8
Cycle Q Clear(g_c), s	1.4	0.0	3.8	0.8	5.9	8.9	0.8	0.0	3.9	2.0	0.0	2.8
Prop In Lane	1.00		0.17	1.00		1.00	1.00		0.21	1.00		0.46
Lane Grp Cap(c), veh/h	317	0	445	401	435	457	597	0	635	569	0	647
V/C Ratio(X)	0.19	0.00	0.32	0.08	0.50	0.61	0.07	0.00	0.27	0.17	0.00	0.19
Avail Cap(c_a), veh/h	426	0	910	533	938	885	721	0	635	653	0	647
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	16.1	0.0	17.9	16.2	19.3	17.8	11.2	0.0	13.4	10.7	0.0	12.2
Incr Delay (d2), s/veh	0.3	0.0	0.4	0.1	0.9	1.3	0.0	0.0	1.0	0.1	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.0	1.9	0.4	3.1	4.0	0.4	0.0	2.1	1.0	0.0	1.4
LnGrp Delay(d),s/veh	16.3	0.0	18.3	16.3	20.2	19.2	11.2	0.0	14.4	10.9	0.0	12.8
LnGrp LOS	B		B	B	C	B	B		B	B		B
Approach Vol, veh/h		202			532			211			222	
Approach Delay, s/veh		17.7			19.4			13.8			12.0	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.2	27.0	4.7	20.1	4.9	28.3	5.5	19.3
Change Period (Y+Rc), s	3.0	6.5	3.0	5.8	3.0	6.5	3.0	5.8
Max Green Setting (Gmax), s	6.0	20.5	6.0	29.2	6.0	20.5	6.0	29.2
Max Q Clear Time (g_c+I1), s	4.0	5.9	2.8	5.8	2.8	4.8	3.4	10.9
Green Ext Time (p_c), s	0.0	1.2	0.0	2.8	0.0	1.2	0.0	2.7

Intersection Summary	
HCM 2010 Ctrl Delay	16.7
HCM 2010 LOS	B

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - AM

L.4 - Single-Lane Roundabout
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	36	2.0	0.204	7.1	LOS A	0.7	16.9	0.51	0.51	39.8
8	T1	58	2.0	0.204	7.1	LOS A	0.7	16.9	0.51	0.51	40.0
18	R2	59	2.0	0.204	7.1	LOS A	0.7	16.9	0.51	0.51	38.7
Approach		152	2.0	0.204	7.1	LOS A	0.7	16.9	0.51	0.51	39.4
East: Lincoln Road											
1	L2	22	2.0	0.150	4.5	LOS A	0.5	12.8	0.24	0.15	38.1
6	T1	101	2.0	0.150	4.5	LOS A	0.5	12.8	0.24	0.15	38.0
16	R2	45	2.0	0.150	4.5	LOS A	0.5	12.8	0.24	0.15	36.8
Approach		168	2.0	0.150	4.5	LOS A	0.5	12.8	0.24	0.15	37.7
North: N Montana Avenue											
7	L2	286	2.0	0.457	8.2	LOS A	2.2	56.0	0.36	0.24	37.8
4	T1	118	2.0	0.457	8.2	LOS A	2.2	56.0	0.36	0.24	37.9
14	R2	104	2.0	0.457	8.2	LOS A	2.2	56.0	0.36	0.24	36.8
Approach		508	2.0	0.457	8.2	LOS A	2.2	56.0	0.36	0.24	37.6
West: Lincoln Road											
5	L2	59	2.0	0.467	9.8	LOS A	2.2	55.3	0.55	0.55	35.0
2	T1	318	2.0	0.467	9.8	LOS A	2.2	55.3	0.55	0.55	35.0
12	R2	43	2.0	0.467	9.8	LOS A	2.2	55.3	0.55	0.55	33.9
Approach		420	2.0	0.467	9.8	LOS A	2.2	55.3	0.55	0.55	34.9
All Vehicles		1248	2.0	0.467	8.1	LOS A	2.2	56.0	0.42	0.36	36.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - AM

L.4 - Single-Lane Roundabout
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	36	2.0	0.246	5.3	LOS A	1.5	37.3	0.75	0.69	41.1
8	T1	58	2.0	0.246	5.3	LOS A	1.5	37.3	0.75	0.69	41.3
18	R2	59	2.0	0.246	5.3	LOS A	1.5	37.3	0.75	0.69	39.9
Approach		152	2.0	0.246	5.3	LOS A	1.5	37.3	0.75	0.69	40.7
East: Lincoln Road											
1	L2	22	2.0	0.164	1.0	LOS A	0.9	23.3	0.38	0.22	39.7
6	T1	101	2.0	0.164	1.0	LOS A	0.9	23.3	0.38	0.22	39.6
16	R2	45	2.0	0.164	1.0	LOS A	0.9	23.3	0.38	0.22	38.3
Approach		168	2.0	0.164	1.0	LOS A	0.9	23.3	0.38	0.22	39.3
North: N Montana Avenue											
7	L2	286	2.0	0.498	1.6	LOS A	3.8	96.4	0.53	0.35	41.7
4	T1	118	2.0	0.498	1.6	LOS A	3.8	96.4	0.53	0.35	42.0
14	R2	104	2.0	0.498	1.6	LOS A	3.8	96.4	0.53	0.35	40.6
Approach		508	2.0	0.498	1.6	LOS A	3.8	96.4	0.53	0.35	41.6
West: Lincoln Road											
5	L2	59	2.0	0.537	5.1	LOS A	4.4	111.7	0.78	0.74	37.7
2	T1	318	2.0	0.537	5.1	LOS A	4.4	111.7	0.78	0.74	37.7
12	R2	43	2.0	0.537	5.1	LOS A	4.4	111.7	0.78	0.74	36.4
Approach		420	2.0	0.537	5.1	LOS A	4.4	111.7	0.78	0.74	37.6
All Vehicles		1248	2.0	0.537	3.2	LOS A	4.4	111.7	0.62	0.51	39.7

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - PM

L.4 - Single-Lane Roundabout
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	38	2.0	0.195	5.4	LOS A	0.7	17.0	0.35	0.27	41.2
8	T1	124	2.0	0.195	5.4	LOS A	0.7	17.0	0.35	0.27	41.4
18	R2	34	2.0	0.195	5.4	LOS A	0.7	17.0	0.35	0.27	40.0
Approach		196	2.0	0.195	5.4	LOS A	0.7	17.0	0.35	0.27	41.1
East: Lincoln Road											
1	L2	35	2.0	0.519	9.6	LOS A	2.6	67.1	0.46	0.36	35.3
6	T1	224	2.0	0.519	9.6	LOS A	2.6	67.1	0.46	0.36	35.2
16	R2	289	2.0	0.519	9.6	LOS A	2.6	67.1	0.46	0.36	34.1
Approach		548	2.0	0.519	9.6	LOS A	2.6	67.1	0.46	0.36	34.6
North: N Montana Avenue											
7	L2	102	2.0	0.229	5.8	LOS A	0.8	20.6	0.37	0.30	39.8
4	T1	68	2.0	0.229	5.8	LOS A	0.8	20.6	0.37	0.30	40.0
14	R2	59	2.0	0.229	5.8	LOS A	0.8	20.6	0.37	0.30	38.7
Approach		228	2.0	0.229	5.8	LOS A	0.8	20.6	0.37	0.30	39.6
West: Lincoln Road											
5	L2	61	2.0	0.194	5.1	LOS A	0.7	17.2	0.30	0.20	37.1
2	T1	121	2.0	0.194	5.1	LOS A	0.7	17.2	0.30	0.20	37.1
12	R2	26	2.0	0.194	5.1	LOS A	0.7	17.2	0.30	0.20	35.9
Approach		208	2.0	0.194	5.1	LOS A	0.7	17.2	0.30	0.20	36.9
All Vehicles		1180	2.0	0.519	7.4	LOS A	2.6	67.1	0.39	0.30	36.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - PM

L.4 - Single-Lane Roundabout
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	38	2.0	0.216	2.0	LOS A	1.2	30.5	0.51	0.37	43.1
8	T1	124	2.0	0.216	2.0	LOS A	1.2	30.5	0.51	0.37	43.4
18	R2	34	2.0	0.216	2.0	LOS A	1.2	30.5	0.51	0.37	41.9
Approach		196	2.0	0.216	2.0	LOS A	1.2	30.5	0.51	0.37	43.1
East: Lincoln Road											
1	L2	35	2.0	0.571	2.4	LOS A	4.6	117.3	0.66	0.49	39.0
6	T1	224	2.0	0.571	2.4	LOS A	4.6	117.3	0.66	0.49	39.0
16	R2	289	2.0	0.571	2.4	LOS A	4.6	117.3	0.66	0.49	37.6
Approach		548	2.0	0.571	2.4	LOS A	4.6	117.3	0.66	0.49	38.2
North: N Montana Avenue											
7	L2	102	2.0	0.261	2.2	LOS A	1.6	39.9	0.56	0.43	42.0
4	T1	68	2.0	0.261	2.2	LOS A	1.6	39.9	0.56	0.43	42.2
14	R2	59	2.0	0.261	2.2	LOS A	1.6	39.9	0.56	0.43	40.8
Approach		228	2.0	0.261	2.2	LOS A	1.6	39.9	0.56	0.43	41.8
West: Lincoln Road											
5	L2	61	2.0	0.214	1.5	LOS A	1.2	31.4	0.46	0.30	38.8
2	T1	121	2.0	0.214	1.5	LOS A	1.2	31.4	0.46	0.30	38.8
12	R2	26	2.0	0.214	1.5	LOS A	1.2	31.4	0.46	0.30	37.4
Approach		208	2.0	0.214	1.5	LOS A	1.2	31.4	0.46	0.30	38.6
All Vehicles		1180	2.0	0.571	2.2	LOS A	4.6	117.3	0.58	0.43	39.7

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - AM

L.5 - Single-Lane Roundabout w/ RT Bypass
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	36	2.0	0.204	7.1	LOS A	0.7	16.9	0.51	0.51	39.8
8	T1	58	2.0	0.204	7.1	LOS A	0.7	16.9	0.51	0.51	40.0
18	R2	59	2.0	0.204	7.1	LOS A	0.7	16.9	0.51	0.51	38.7
Approach		152	2.0	0.204	7.1	LOS A	0.7	16.9	0.51	0.51	39.4
East: Lincoln Road											
1	L2	22	2.0	0.110	4.2	LOS A	0.4	9.0	0.23	0.14	38.1
6	T1	101	2.0	0.110	4.2	LOS A	0.4	9.0	0.23	0.14	38.1
16	R2	45	2.0	0.039	3.5	LOS A	0.1	3.0	0.19	0.09	37.9
Approach		168	2.0	0.110	4.0	LOS A	0.4	9.0	0.22	0.12	38.0
North: N Montana Avenue											
7	L2	286	2.0	0.457	8.2	LOS A	2.2	56.0	0.36	0.24	37.8
4	T1	118	2.0	0.457	8.2	LOS A	2.2	56.0	0.36	0.24	37.9
14	R2	104	2.0	0.457	8.2	LOS A	2.2	56.0	0.36	0.24	36.8
Approach		508	2.0	0.457	8.2	LOS A	2.2	56.0	0.36	0.24	37.6
West: Lincoln Road											
5	L2	59	2.0	0.467	9.8	LOS A	2.2	55.3	0.55	0.55	35.0
2	T1	318	2.0	0.467	9.8	LOS A	2.2	55.3	0.55	0.55	35.0
12	R2	43	2.0	0.467	9.8	LOS A	2.2	55.3	0.55	0.55	33.9
Approach		420	2.0	0.467	9.8	LOS A	2.2	55.3	0.55	0.55	34.9
All Vehicles		1248	2.0	0.467	8.0	LOS A	2.2	56.0	0.42	0.36	36.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - AM

L.5 - Single-Lane Roundabout w/ RT Bypass
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	36	2.0	0.246	5.3	LOS A	1.5	37.3	0.75	0.69	41.1
8	T1	58	2.0	0.246	5.3	LOS A	1.5	37.3	0.75	0.69	41.3
18	R2	59	2.0	0.246	5.3	LOS A	1.5	37.3	0.75	0.69	39.9
Approach		152	2.0	0.246	5.3	LOS A	1.5	37.3	0.75	0.69	40.7
East: Lincoln Road											
1	L2	22	2.0	0.098	0.7	LOS A	0.5	13.6	0.34	0.18	39.6
6	T1	101	2.0	0.098	0.7	LOS A	0.5	13.6	0.34	0.18	39.6
16	R2	45	2.0	0.034	0.5	LOS A	0.2	4.5	0.28	0.12	39.3
Approach		168	2.0	0.098	0.6	LOS A	0.5	13.6	0.32	0.16	39.5
North: N Montana Avenue											
7	L2	286	2.0	0.497	1.6	LOS A	3.8	95.5	0.52	0.35	41.8
4	T1	118	2.0	0.497	1.6	LOS A	3.8	95.5	0.52	0.35	42.0
14	R2	104	2.0	0.497	1.6	LOS A	3.8	95.5	0.52	0.35	40.6
Approach		508	2.0	0.497	1.6	LOS A	3.8	95.5	0.52	0.35	41.6
West: Lincoln Road											
5	L2	59	2.0	0.537	5.1	LOS A	4.4	111.5	0.78	0.74	37.7
2	T1	318	2.0	0.537	5.1	LOS A	4.4	111.5	0.78	0.74	37.7
12	R2	43	2.0	0.537	5.1	LOS A	4.4	111.5	0.78	0.74	36.4
Approach		420	2.0	0.537	5.1	LOS A	4.4	111.5	0.78	0.74	37.6
All Vehicles		1248	2.0	0.537	3.1	LOS A	4.4	111.5	0.61	0.50	39.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - PM

L.5 - Single-Lane Roundabout w/ RT Bypass
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	38	2.0	0.195	5.4	LOS A	0.7	17.0	0.35	0.27	41.2
8	T1	124	2.0	0.195	5.4	LOS A	0.7	17.0	0.35	0.27	41.4
18	R2	34	2.0	0.195	5.4	LOS A	0.7	17.0	0.35	0.27	40.0
Approach		196	2.0	0.195	5.4	LOS A	0.7	17.0	0.35	0.27	41.1
East: Lincoln Road											
1	L2	35	2.0	0.246	5.7	LOS A	0.9	22.8	0.33	0.24	37.3
6	T1	224	2.0	0.246	5.7	LOS A	0.9	22.8	0.33	0.24	37.3
16	R2	289	2.0	0.265	5.8	LOS A	1.0	25.4	0.30	0.21	36.4
Approach		548	2.0	0.265	5.8	LOS A	1.0	25.4	0.32	0.22	36.8
North: N Montana Avenue											
7	L2	102	2.0	0.229	5.8	LOS A	0.8	20.6	0.37	0.30	39.8
4	T1	68	2.0	0.229	5.8	LOS A	0.8	20.6	0.37	0.30	40.0
14	R2	59	2.0	0.229	5.8	LOS A	0.8	20.6	0.37	0.30	38.7
Approach		228	2.0	0.229	5.8	LOS A	0.8	20.6	0.37	0.30	39.6
West: Lincoln Road											
5	L2	61	2.0	0.194	5.1	LOS A	0.7	17.2	0.30	0.20	37.1
2	T1	121	2.0	0.194	5.1	LOS A	0.7	17.2	0.30	0.20	37.1
12	R2	26	2.0	0.194	5.1	LOS A	0.7	17.2	0.30	0.20	35.9
Approach		208	2.0	0.194	5.1	LOS A	0.7	17.2	0.30	0.20	36.9
All Vehicles		1180	2.0	0.265	5.6	LOS A	1.0	25.4	0.33	0.24	38.0

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - PM

L.5 - Single-Lane Roundabout w/ RT Bypass
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	38	2.0	0.216	2.0	LOS A	1.2	30.4	0.51	0.37	43.1
8	T1	124	2.0	0.216	2.0	LOS A	1.2	30.4	0.51	0.37	43.4
18	R2	34	2.0	0.216	2.0	LOS A	1.2	30.4	0.51	0.37	41.9
Approach		196	2.0	0.216	2.0	LOS A	1.2	30.4	0.51	0.37	43.1
East: Lincoln Road											
1	L2	35	2.0	0.217	1.1	LOS A	1.3	32.6	0.44	0.28	39.3
6	T1	224	2.0	0.217	1.1	LOS A	1.3	32.6	0.44	0.28	39.3
16	R2	289	2.0	0.234	1.0	LOS A	1.4	35.5	0.40	0.25	38.9
Approach		548	2.0	0.234	1.0	LOS A	1.4	35.5	0.42	0.26	39.1
North: N Montana Avenue											
7	L2	102	2.0	0.257	2.2	LOS A	1.5	38.0	0.54	0.41	42.1
4	T1	68	2.0	0.257	2.2	LOS A	1.5	38.0	0.54	0.41	42.3
14	R2	59	2.0	0.257	2.2	LOS A	1.5	38.0	0.54	0.41	40.9
Approach		228	2.0	0.257	2.2	LOS A	1.5	38.0	0.54	0.41	41.8
West: Lincoln Road											
5	L2	61	2.0	0.214	1.5	LOS A	1.2	31.3	0.45	0.30	38.8
2	T1	121	2.0	0.214	1.5	LOS A	1.2	31.3	0.45	0.30	38.8
12	R2	26	2.0	0.214	1.5	LOS A	1.2	31.3	0.45	0.30	37.5
Approach		208	2.0	0.214	1.5	LOS A	1.2	31.3	0.45	0.30	38.6
All Vehicles		1180	2.0	0.257	1.5	LOS A	1.5	38.0	0.46	0.32	40.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - AM

L.6 - Multi-Lane Roundabout
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	36	2.0	0.120	5.9	LOS A	0.4	8.9	0.46	0.45	40.6
8	T1	58	2.0	0.120	5.9	LOS A	0.4	8.9	0.46	0.45	40.7
18	R2	59	2.0	0.076	5.4	LOS A	0.2	5.5	0.45	0.42	41.2
Approach		152	2.0	0.120	5.7	LOS A	0.4	8.9	0.46	0.44	40.9
East: Lincoln Road											
1	L2	22	2.0	0.110	4.2	LOS A	0.4	9.0	0.23	0.14	39.0
6	T1	101	2.0	0.110	4.2	LOS A	0.4	9.0	0.23	0.14	38.9
16	R2	45	2.0	0.039	3.5	LOS A	0.1	3.0	0.19	0.09	38.4
Approach		168	2.0	0.110	4.0	LOS A	0.4	9.0	0.22	0.12	38.8
North: N Montana Avenue											
7	L2	286	2.0	0.257	5.6	LOS A	1.0	24.6	0.28	0.18	38.1
4	T1	118	2.0	0.199	5.0	LOS A	0.7	17.9	0.26	0.16	43.2
14	R2	104	2.0	0.199	5.0	LOS A	0.7	17.9	0.26	0.16	41.5
Approach		508	2.0	0.257	5.4	LOS A	1.0	24.6	0.27	0.17	39.8
West: Lincoln Road											
5	L2	59	2.0	0.064	4.5	LOS A	0.2	4.7	0.36	0.29	35.6
2	T1	318	2.0	0.392	8.4	LOS A	1.5	38.1	0.48	0.46	37.1
12	R2	43	2.0	0.392	8.4	LOS A	1.5	38.1	0.48	0.46	35.5
Approach		420	2.0	0.392	7.8	LOS A	1.5	38.1	0.46	0.44	36.7
All Vehicles		1248	2.0	0.392	6.1	LOS A	1.5	38.1	0.35	0.29	38.7

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - PM

L.6 - Multi-Lane Roundabout
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	38	2.0	0.153	1.1	LOS A	0.6	15.9	0.38	0.26	44.1
8	T1	124	2.0	0.153	1.1	LOS A	0.6	15.9	0.38	0.26	44.1
18	R2	34	2.0	0.055	2.3	LOS A	0.2	5.1	0.42	0.32	43.7
Approach		196	2.0	0.153	1.3	LOS A	0.6	15.9	0.38	0.27	44.1
East: Lincoln Road											
1	L2	35	2.0	0.187	0.9	LOS A	1.1	27.6	0.40	0.23	40.2
6	T1	224	2.0	0.187	0.9	LOS A	1.1	27.6	0.40	0.23	40.2
16	R2	289	2.0	0.203	0.8	LOS A	1.2	30.0	0.37	0.21	39.5
Approach		548	2.0	0.203	0.8	LOS A	1.2	30.0	0.38	0.22	39.8
North: N Montana Avenue											
7	L2	102	2.0	0.093	1.4	LOS A	0.5	12.6	0.46	0.30	40.2
4	T1	68	2.0	0.097	1.1	LOS A	0.5	13.7	0.44	0.27	45.2
14	R2	59	2.0	0.097	1.1	LOS A	0.5	13.7	0.44	0.27	43.3
Approach		228	2.0	0.097	1.2	LOS A	0.5	13.7	0.45	0.28	42.3
West: Lincoln Road											
5	L2	61	2.0	0.072	1.1	LOS A	0.3	7.2	0.35	0.23	37.0
2	T1	121	2.0	0.132	0.8	LOS A	0.6	14.2	0.33	0.20	41.1
12	R2	26	2.0	0.132	0.8	LOS A	0.6	14.2	0.33	0.20	39.1
Approach		208	2.0	0.132	0.9	LOS A	0.6	14.2	0.34	0.20	39.5
All Vehicles		1180	2.0	0.203	1.0	LOS A	1.2	30.0	0.39	0.24	40.9

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - AM

L.6 - Multi-Lane Roundabout
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	36	2.0	0.108	2.1	LOS A	0.4	10.7	0.52	0.41	42.7
8	T1	58	2.0	0.108	2.1	LOS A	0.4	10.7	0.52	0.41	42.7
18	R2	59	2.0	0.080	2.5	LOS A	0.3	7.7	0.53	0.46	43.4
Approach		152	2.0	0.108	2.2	LOS A	0.4	10.7	0.52	0.43	43.0
East: Lincoln Road											
1	L2	22	2.0	0.085	0.5	LOS A	0.5	11.5	0.31	0.15	40.5
6	T1	101	2.0	0.085	0.5	LOS A	0.5	11.5	0.31	0.15	40.4
16	R2	45	2.0	0.030	0.4	LOS A	0.2	3.8	0.25	0.10	39.9
Approach		168	2.0	0.085	0.5	LOS A	0.5	11.5	0.29	0.14	40.3
North: N Montana Avenue											
7	L2	286	2.0	0.198	0.6	LOS A	1.1	29.0	0.34	0.18	40.6
4	T1	118	2.0	0.179	0.8	LOS A	1.0	25.2	0.35	0.20	45.7
14	R2	104	2.0	0.179	0.8	LOS A	1.0	25.2	0.35	0.20	43.8
Approach		508	2.0	0.198	0.7	LOS A	1.1	29.0	0.34	0.19	42.3
West: Lincoln Road											
5	L2	59	2.0	0.108	3.4	LOS A	0.4	10.4	0.51	0.46	36.2
2	T1	318	2.0	0.370	1.9	LOS A	1.8	46.5	0.54	0.38	40.0
12	R2	43	2.0	0.370	1.9	LOS A	1.8	46.5	0.54	0.38	38.2
Approach		420	2.0	0.370	2.1	LOS A	1.8	46.5	0.53	0.39	39.2
All Vehicles		1248	2.0	0.370	1.3	LOS A	1.8	46.5	0.42	0.28	41.0

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

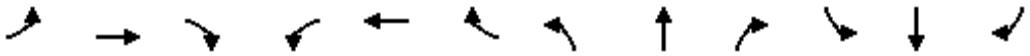
Site: Lincoln Road / N Montana Avenue - PM

L.6 - Multi-Lane Roundabout
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	38	2.0	0.159	5.0	LOS A	0.5	12.6	0.32	0.24	42.0
8	T1	124	2.0	0.159	5.0	LOS A	0.5	12.6	0.32	0.24	42.1
18	R2	34	2.0	0.033	3.8	LOS A	0.1	2.3	0.29	0.18	42.5
Approach		196	2.0	0.159	4.8	LOS A	0.5	12.6	0.31	0.23	42.1
East: Lincoln Road											
1	L2	35	2.0	0.246	5.7	LOS A	0.9	22.8	0.33	0.24	38.2
6	T1	224	2.0	0.246	5.7	LOS A	0.9	22.8	0.33	0.24	38.1
16	R2	289	2.0	0.265	5.8	LOS A	1.0	25.4	0.30	0.21	36.9
Approach		548	2.0	0.265	5.8	LOS A	1.0	25.4	0.32	0.22	37.5
North: N Montana Avenue											
7	L2	102	2.0	0.102	4.5	LOS A	0.3	8.2	0.33	0.24	38.8
4	T1	68	2.0	0.127	4.8	LOS A	0.4	10.4	0.34	0.25	43.5
14	R2	59	2.0	0.127	4.8	LOS A	0.4	10.4	0.34	0.25	41.7
Approach		228	2.0	0.127	4.7	LOS A	0.4	10.4	0.34	0.25	40.8
West: Lincoln Road											
5	L2	61	2.0	0.056	3.8	LOS A	0.2	4.1	0.24	0.15	35.9
2	T1	121	2.0	0.135	4.5	LOS A	0.4	10.6	0.26	0.17	39.5
12	R2	26	2.0	0.135	4.5	LOS A	0.4	10.6	0.26	0.17	37.7
Approach		208	2.0	0.135	4.3	LOS A	0.4	10.6	0.26	0.17	38.1
All Vehicles		1180	2.0	0.265	5.1	LOS A	1.0	25.4	0.31	0.22	38.9

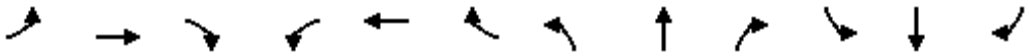
Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	44	643	187	154	0	0	0	0	2	0	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.77	0.77	0.77	0.75	0.75	0.75	0.92	0.92	0.92	0.75	0.75	0.75
Hourly flow rate (vph)	0	57	835	249	205	0	0	0	0	3	0	9
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	205			892			1179	1179	475	1179	1596	205
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	205			892			1179	1179	475	1179	1596	205
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			67			100	100	100	98	100	99
cM capacity (veh/h)	1366			760			123	128	590	125	72	835

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	892	455	12
Volume Left	0	249	3
Volume Right	835	0	9
cSH	1700	760	369
Volume to Capacity	0.52	0.33	0.03
Queue Length 95th (ft)	0	36	3
Control Delay (s)	0.0	8.6	15.1
Lane LOS		A	C
Approach Delay (s)	0.0	8.6	15.1
Approach LOS			C

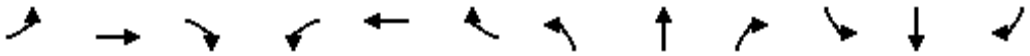
Intersection Summary				
Average Delay	3.0			
Intersection Capacity Utilization	73.8%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	81	160	30	535	0	0	0	0	10	1	30
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.89	0.89	0.89	0.92	0.92	0.92	0.68	0.68	0.68
Hourly flow rate (vph)	0	100	198	34	601	0	0	0	0	15	1	44
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	601			298			868	867	199	867	966	601
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	601			298			868	867	199	867	966	601
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			100	100	100	95	99	91
cM capacity (veh/h)	976			1264			242	283	842	267	248	500

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	298	635	60
Volume Left	0	34	15
Volume Right	198	0	44
cSH	1700	1264	404
Volume to Capacity	0.18	0.03	0.15
Queue Length 95th (ft)	0	2	13
Control Delay (s)	0.0	0.7	15.5
Lane LOS		A	C
Approach Delay (s)	0.0	0.7	15.5
Approach LOS			C

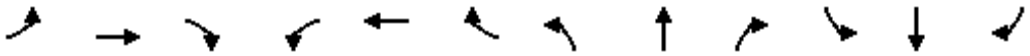
Intersection Summary				
Average Delay	1.4			
Intersection Capacity Utilization	57.2%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	44	643	187	154	0	0	0	0	2	0	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.77	0.77	0.77	0.75	0.75	0.75	0.92	0.92	0.92	0.75	0.75	0.75
Hourly flow rate (vph)	0	57	835	249	205	0	0	0	0	3	0	9
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	205			892			1179	1179	475	1179	1596	205
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	205			892			1179	1179	475	1179	1596	205
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			67			100	100	100	98	100	99
cM capacity (veh/h)	1366			760			123	128	590	125	72	835

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	892	249	205	12
Volume Left	0	249	0	3
Volume Right	835	0	0	9
cSH	1700	760	1700	369
Volume to Capacity	0.52	0.33	0.12	0.03
Queue Length 95th (ft)	0	36	0	3
Control Delay (s)	0.0	12.0	0.0	15.1
Lane LOS		B		C
Approach Delay (s)	0.0	6.6		15.1
Approach LOS				C

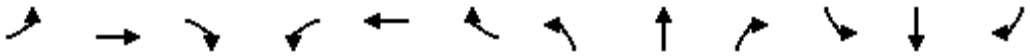
Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	81	160	30	535	0	0	0	0	10	1	30
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.89	0.89	0.89	0.92	0.92	0.92	0.68	0.68	0.68
Hourly flow rate (vph)	0	100	198	34	601	0	0	0	0	15	1	44
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	601			298			868	867	199	867	966	601
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	601			298			868	867	199	867	966	601
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			100	100	100	95	99	91
cM capacity (veh/h)	976			1264			242	283	842	267	248	500

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	298	34	601	60
Volume Left	0	34	0	15
Volume Right	198	0	0	44
cSH	1700	1264	1700	404
Volume to Capacity	0.18	0.03	0.35	0.15
Queue Length 95th (ft)	0	2	0	13
Control Delay (s)	0.0	7.9	0.0	15.5
Lane LOS		A		C
Approach Delay (s)	0.0	0.4		15.5
Approach LOS				C

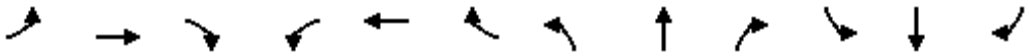
Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	64.5%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	44	643	187	154	0	0	0	0	2	0	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.77	0.77	0.77	0.75	0.75	0.75	0.92	0.92	0.92	0.75	0.75	0.75
Hourly flow rate (vph)	0	57	835	249	205	0	0	0	0	3	0	9
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	205			57			761	761	57	761	761	205
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	205			57			761	761	57	761	761	205
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			84			100	100	100	99	100	99
cM capacity (veh/h)	1366			1547			279	281	1009	282	281	835

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	57	835	455	12
Volume Left	0	0	249	3
Volume Right	0	835	0	9
cSH	1700	1700	1547	582
Volume to Capacity	0.03	0.49	0.16	0.02
Queue Length 95th (ft)	0	0	14	2
Control Delay (s)	0.0	0.0	4.9	11.3
Lane LOS			A	B
Approach Delay (s)	0.0		4.9	11.3
Approach LOS				B

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	71.6%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	81	160	30	535	0	0	0	0	10	1	30
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.89	0.89	0.89	0.92	0.92	0.92	0.68	0.68	0.68
Hourly flow rate (vph)	0	100	198	34	601	0	0	0	0	15	1	44
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	601			100			769	769	100	769	769	601
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	601			100			769	769	100	769	769	601
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			100	100	100	95	100	91
cM capacity (veh/h)	976			1493			284	324	956	313	324	500

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	100	198	635	60
Volume Left	0	0	34	15
Volume Right	0	198	0	44
cSH	1700	1700	1493	431
Volume to Capacity	0.06	0.12	0.02	0.14
Queue Length 95th (ft)	0	0	2	12
Control Delay (s)	0.0	0.0	0.6	14.7
Lane LOS			A	B
Approach Delay (s)	0.0		0.6	14.7
Approach LOS				B

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	53.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	44	643	187	154	0	0	0	0	2	0	7
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1900	1863	0				1900	1863	1900
Adj Flow Rate, veh/h	0	58	846	246	203	0				3	0	9
Adj No. of Lanes	0	1	0	0	1	0				0	1	0
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76				0.76	0.76	0.76
Percent Heavy Veh, %	0	2	2	2	2	0				0	2	0
Cap, veh/h	0	75	1097	279	205	0				41	0	122
Arrive On Green	0.00	0.73	0.73	0.73	0.73	0.00				0.10	0.00	0.10
Sat Flow, veh/h	0	103	1496	254	280	0				407	0	1220
Grp Volume(v), veh/h	0	0	904	449	0	0				12	0	0
Grp Sat Flow(s),veh/h/ln	0	0	1599	534	0	0				1627	0	0
Q Serve(g_s), s	0.0	0.0	20.8	23.2	0.0	0.0				0.4	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	20.8	44.0	0.0	0.0				0.4	0.0	0.0
Prop In Lane	0.00		0.94	0.55		0.00				0.25		0.75
Lane Grp Cap(c), veh/h	0	0	1172	485	0	0				163	0	0
V/C Ratio(X)	0.00	0.00	0.77	0.93	0.00	0.00				0.07	0.00	0.00
Avail Cap(c_a), veh/h	0	0	1172	485	0	0				163	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	1.00	1.00	0.00	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	4.9	16.3	0.0	0.0				24.5	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	3.2	24.0	0.0	0.0				0.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	9.8	10.6	0.0	0.0				0.2	0.0	0.0
LnGrp Delay(d),s/veh	0.0	0.0	8.1	40.3	0.0	0.0				25.4	0.0	0.0
LnGrp LOS			A	D						C		
Approach Vol, veh/h		904			449						12	
Approach Delay, s/veh		8.1			40.3						25.4	
Approach LOS		A			D						C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				49.0		11.0		49.0
Change Period (Y+Rc), s				5.0		5.0		5.0
Max Green Setting (Gmax), s				44.0		6.0		44.0
Max Q Clear Time (g_c+I1), s				22.8		2.4		46.0
Green Ext Time (p_c), s				11.8		0.0		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	18.9
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	81	160	30	535	0	0	0	0	10	1	30
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1900	1863	0				1900	1863	1900
Adj Flow Rate, veh/h	0	92	182	34	608	0				11	1	34
Adj No. of Lanes	0	1	0	0	1	0				0	1	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88				0.88	0.88	0.88
Percent Heavy Veh, %	0	2	2	2	2	0				0	2	0
Cap, veh/h	0	283	559	139	904	0				72	7	224
Arrive On Green	0.00	0.51	0.51	0.51	0.51	0.00				0.19	0.19	0.19
Sat Flow, veh/h	0	560	1107	44	1789	0				390	35	1205
Grp Volume(v), veh/h	0	0	274	642	0	0				46	0	0
Grp Sat Flow(s),veh/h/ln	0	0	1667	1833	0	0				1631	0	0
Q Serve(g_s), s	0.0	0.0	3.1	0.0	0.0	0.0				0.8	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	3.1	8.4	0.0	0.0				0.8	0.0	0.0
Prop In Lane	0.00		0.66	0.05		0.00				0.24		0.74
Lane Grp Cap(c), veh/h	0	0	842	1043	0	0				303	0	0
V/C Ratio(X)	0.00	0.00	0.33	0.62	0.00	0.00				0.15	0.00	0.00
Avail Cap(c_a), veh/h	0	0	1754	2025	0	0				303	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	1.00	1.00	0.00	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	4.7	6.0	0.0	0.0				11.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.2	0.6	0.0	0.0				1.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	1.4	4.3	0.0	0.0				0.4	0.0	0.0
LnGrp Delay(d),s/veh	0.0	0.0	5.0	6.6	0.0	0.0				12.1	0.0	0.0
LnGrp LOS			A	A						B		
Approach Vol, veh/h		274			642						46	
Approach Delay, s/veh		5.0			6.6						12.1	
Approach LOS		A			A						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				21.3		11.0		21.3
Change Period (Y+Rc), s				5.0		5.0		5.0
Max Green Setting (Gmax), s				34.0		6.0		34.0
Max Q Clear Time (g_c+I1), s				5.1		2.8		10.4
Green Ext Time (p_c), s				6.2		0.0		5.9

Intersection Summary	
HCM 2010 Ctrl Delay	6.4
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	44	643	187	154	0	0	0	0	2	0	7
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1863	1900	1863	0				1900	1863	1900
Adj Flow Rate, veh/h	0	58	0	246	203	0				3	0	9
Adj No. of Lanes	0	1	1	0	1	0				0	1	0
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76				0.76	0.76	0.76
Percent Heavy Veh, %	0	2	2	2	2	0				0	2	0
Cap, veh/h	0	695	591	433	287	0				173	0	520
Arrive On Green	0.00	0.37	0.00	0.37	0.37	0.00				0.43	0.00	0.43
Sat Flow, veh/h	0	1863	1583	787	769	0				407	0	1220
Grp Volume(v), veh/h	0	58	0	449	0	0				12	0	0
Grp Sat Flow(s),veh/h/ln	0	1863	1583	1556	0	0				1627	0	0
Q Serve(g_s), s	0.0	0.8	0.0	9.1	0.0	0.0				0.2	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.8	0.0	10.1	0.0	0.0				0.2	0.0	0.0
Prop In Lane	0.00		1.00	0.55		0.00				0.25		0.75
Lane Grp Cap(c), veh/h	0	695	591	720	0	0				693	0	0
V/C Ratio(X)	0.00	0.08	0.00	0.62	0.00	0.00				0.02	0.00	0.00
Avail Cap(c_a), veh/h	0	1634	1389	1494	0	0				693	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	0.68	0.00	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	8.1	0.0	10.9	0.0	0.0				6.6	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.1	0.0	0.6	0.0	0.0				0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.4	0.0	4.4	0.0	0.0				0.1	0.0	0.0
LnGrp Delay(d),s/veh	0.0	8.1	0.0	11.5	0.0	0.0				6.7	0.0	0.0
LnGrp LOS		A		B						A		
Approach Vol, veh/h		58			449						12	
Approach Delay, s/veh		8.1			11.5						6.7	
Approach LOS		A			B						A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				18.9		41.1		18.9
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				35.0		17.0		35.0
Max Q Clear Time (g_c+I1), s				2.8		2.2		12.1
Green Ext Time (p_c), s				3.1		0.0		2.9

Intersection Summary	
HCM 2010 Ctrl Delay	11.0
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	81	160	30	535	0	0	0	0	10	1	30
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1863	1900	1863	0				1900	1863	1900
Adj Flow Rate, veh/h	0	92	0	34	608	0				11	1	34
Adj No. of Lanes	0	1	1	0	1	0				0	1	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88				0.88	0.88	0.88
Percent Heavy Veh, %	0	2	2	2	2	0				0	2	0
Cap, veh/h	0	738	627	111	711	0				160	15	495
Arrive On Green	0.00	0.40	0.00	0.79	0.79	0.00				0.41	0.41	0.41
Sat Flow, veh/h	0	1863	1583	48	1793	0				390	35	1205
Grp Volume(v), veh/h	0	92	0	642	0	0				46	0	0
Grp Sat Flow(s),veh/h/ln	0	1863	1583	1842	0	0				1631	0	0
Q Serve(g_s), s	0.0	1.3	0.0	1.5	0.0	0.0				0.7	0.0	0.0
Cycle Q Clear(g_c), s	0.0	1.3	0.0	9.6	0.0	0.0				0.7	0.0	0.0
Prop In Lane	0.00		1.00	0.05		0.00				0.24		0.74
Lane Grp Cap(c), veh/h	0	738	627	821	0	0				670	0	0
V/C Ratio(X)	0.00	0.12	0.00	0.78	0.00	0.00				0.07	0.00	0.00
Avail Cap(c_a), veh/h	0	1800	1530	1859	0	0				670	0	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	0.87	0.00	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	7.9	0.0	3.6	0.0	0.0				7.4	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.1	0.0	1.4	0.0	0.0				0.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.7	0.0	4.3	0.0	0.0				0.4	0.0	0.0
LnGrp Delay(d),s/veh	0.0	8.0	0.0	5.0	0.0	0.0				7.6	0.0	0.0
LnGrp LOS		A		A						A		
Approach Vol, veh/h		92			642						46	
Approach Delay, s/veh		8.0			5.0						7.6	
Approach LOS		A			A						A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				20.4		44.6		20.4
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				40.0		17.0		40.0
Max Q Clear Time (g_c+I1), s				3.3		2.7		11.6
Green Ext Time (p_c), s				4.9		0.0		4.8

Intersection Summary	
HCM 2010 Ctrl Delay	5.5
HCM 2010 LOS	A

Intersection	
Intersection Delay, s/veh	46.8
Intersection LOS	E

Approach	EB	WB	NB	SB
Entry Lanes	1	1	0	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	904	449	0	12
Demand Flow Rate, veh/h	922	458	0	12
Vehicles Circulating, veh/h	254	0	62	458
Vehicles Exiting, veh/h	216	62	1114	0
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	66.9	7.5	0.0	5.2
Approach LOS	F	A	-	A

Lane	Left	Left	Left
Designated Moves	TR	LT	LTR
Assumed Moves	TR	LT	LTR
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	922	458	12
Cap Entry Lane, veh/h	876	1130	715
Entry HV Adj Factor	0.980	0.980	1.000
Flow Entry, veh/h	904	449	12
Cap Entry, veh/h	859	1108	715
V/C Ratio	1.052	0.405	0.017
Control Delay, s/veh	66.9	7.5	5.2
LOS	F	A	A
95th %tile Queue, veh	21	2	0

Intersection	
Intersection Delay, s/veh	9.1
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	0	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	274	642	0	46
Demand Flow Rate, veh/h	280	655	0	47
Vehicles Circulating, veh/h	47	0	105	655
Vehicles Exiting, veh/h	655	105	222	0
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.9	10.5	0.0	7.2
Approach LOS	A	B	-	A

Lane	Left	Left	Left
Designated Moves	TR	LT	LTR
Assumed Moves	TR	LT	LTR
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	280	655	47
Cap Entry Lane, veh/h	1078	1130	587
Entry HV Adj Factor	0.979	0.980	0.978
Flow Entry, veh/h	274	642	46
Cap Entry, veh/h	1056	1107	574
V/C Ratio	0.260	0.580	0.080
Control Delay, s/veh	5.9	10.5	7.2
LOS	A	B	A
95th %tile Queue, veh	1	4	0

Intersection	
Intersection Delay, s/veh	2.7
Intersection LOS	A

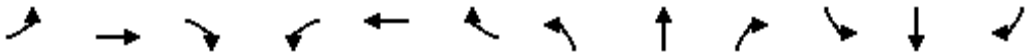
Approach	EB	WB	NB	SB
Entry Lanes	1	1	0	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	904	449	0	12
Demand Flow Rate, veh/h	922	458	0	12
Vehicles Circulating, veh/h	254	0	62	458
Vehicles Exiting, veh/h	216	62	251	0
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.3	7.5	0.0	5.2
Approach LOS	A	A	-	A

Lane	Left	Bypass	Left		Left
Designated Moves	T	R	LT		LTR
Assumed Moves	T	R	LT		LTR
RT Channelized		Free			
Lane Util	1.000		1.000		1.000
Critical Headway, s	5.193		5.193		5.193
Entry Flow, veh/h	59	863	458		12
Cap Entry Lane, veh/h	876	1938	1130		715
Entry HV Adj Factor	0.980	0.980	0.980		1.000
Flow Entry, veh/h	58	846	449		12
Cap Entry, veh/h	859	1900	1108		715
V/C Ratio	0.067	0.445	0.405		0.017
Control Delay, s/veh	4.8	0.0	7.5		5.2
LOS	A	A	A		A
95th %tile Queue, veh	0	2	2		0

Intersection	
Intersection Delay, s/veh	7.8
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	0	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	274	642	0	46
Demand Flow Rate, veh/h	280	655	0	47
Vehicles Circulating, veh/h	47	0	105	655
Vehicles Exiting, veh/h	655	105	36	0
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	1.4	10.5	0.0	7.2
Approach LOS	A	B	-	A

Lane	Left	Bypass	Left	Left
Designated Moves	T	R	LT	LTR
Assumed Moves	T	R	LT	LTR
RT Channelized		Free		
Lane Util	1.000		1.000	1.000
Critical Headway, s	5.193		5.193	5.193
Entry Flow, veh/h	94	186	655	47
Cap Entry Lane, veh/h	1078	1938	1130	587
Entry HV Adj Factor	0.980	0.980	0.980	0.978
Flow Entry, veh/h	92	182	642	46
Cap Entry, veh/h	1057	1900	1107	574
V/C Ratio	0.087	0.096	0.580	0.080
Control Delay, s/veh	4.2	0.0	10.5	7.2
LOS	A	A	B	A
95th %tile Queue, veh	0	0	4	0



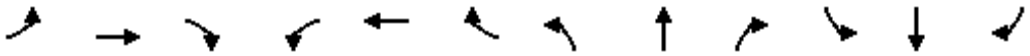
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	15	19	0	0	257	2	86	0	16	0	0	0
Peak Hour Factor	0.77	0.77	0.77	0.70	0.70	0.70	0.58	0.58	0.58	0.92	0.92	0.92
Hourly flow rate (vph)	19	25	0	0	367	3	148	0	28	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	44	370	176
Volume Left (vph)	19	0	148
Volume Right (vph)	0	3	28
Hadj (s)	0.12	0.03	0.11
Departure Headway (s)	4.9	4.5	5.0
Degree Utilization, x	0.06	0.46	0.24
Capacity (veh/h)	680	780	675
Control Delay (s)	8.2	11.2	9.6
Approach Delay (s)	8.2	11.2	9.6
Approach LOS	A	B	A

Intersection Summary				
Delay	10.5			
Level of Service	B			
Intersection Capacity Utilization	26.8%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
8: I-15 NB Off/I-15 NB On & Linconl Road/Lincoln Road

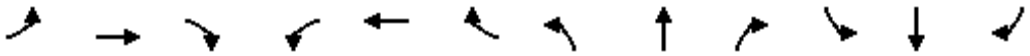
6/24/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	21	60	0	0	115	0	483	0	124	0	0	0
Peak Hour Factor	0.78	0.78	0.78	0.74	0.74	0.74	0.80	0.80	0.80	0.92	0.92	0.92
Hourly flow rate (vph)	27	77	0	0	155	0	604	0	155	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	104	155	759
Volume Left (vph)	27	0	604
Volume Right (vph)	0	0	155
Hadj (s)	0.09	0.03	0.07
Departure Headway (s)	6.2	6.0	4.8
Degree Utilization, x	0.18	0.26	1.0
Capacity (veh/h)	571	584	759
Control Delay (s)	10.5	11.1	56.9
Approach Delay (s)	10.5	11.1	56.9
Approach LOS	B	B	F

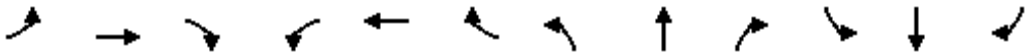
Intersection Summary				
Delay	45.2			
Level of Service	E			
Intersection Capacity Utilization	52.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	15	19	0	0	257	2	86	0	16	0	0	0
Peak Hour Factor	0.77	0.77	0.77	0.70	0.70	0.70	0.58	0.58	0.58	0.92	0.92	0.92
Hourly flow rate (vph)	19	25	0	0	367	3	148	0	28	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total (vph)	44	370	148	28
Volume Left (vph)	19	0	148	0
Volume Right (vph)	0	3	0	28
Hadj (s)	0.12	0.03	0.53	-0.67
Departure Headway (s)	5.0	4.5	6.0	4.8
Degree Utilization, x	0.06	0.46	0.25	0.04
Capacity (veh/h)	673	771	565	696
Control Delay (s)	8.3	11.3	9.8	6.8
Approach Delay (s)	8.3	11.3	9.3	
Approach LOS	A	B	A	

Intersection Summary			
Delay	10.5		
Level of Service	B		
Intersection Capacity Utilization	25.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	21	60	0	0	115	0	483	0	124	0	0	0
Peak Hour Factor	0.78	0.78	0.78	0.74	0.74	0.74	0.80	0.80	0.80	0.92	0.92	0.92
Hourly flow rate (vph)	27	77	0	0	155	0	604	0	155	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total (vph)	104	155	604	155
Volume Left (vph)	27	0	604	0
Volume Right (vph)	0	0	0	155
Hadj (s)	0.09	0.03	0.53	-0.67
Departure Headway (s)	6.2	6.0	5.9	4.6
Degree Utilization, x	0.18	0.26	0.98	0.20
Capacity (veh/h)	573	587	604	765
Control Delay (s)	10.5	11.2	54.4	7.6
Approach Delay (s)	10.5	11.2	44.9	
Approach LOS	B	B	E	

Intersection Summary				
Delay	36.2			
Level of Service	E			
Intersection Capacity Utilization	44.4%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	15	19	0	0	257	2	86	0	16	0	0	0
Number	7	4	14	3	8	18	5	2	12			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1900	1863	0	0	1863	1900	1900	1863	1863			
Adj Flow Rate, veh/h	19	25	0	0	367	3	148	0	28			
Adj No. of Lanes	0	1	0	0	1	0	0	1	1			
Peak Hour Factor	0.77	0.77	0.77	0.70	0.70	0.70	0.58	0.58	0.58			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	178	186	0	0	512	4	777	0	694			
Arrive On Green	0.28	0.28	0.00	0.00	0.28	0.28	0.44	0.00	0.44			
Sat Flow, veh/h	208	671	0	0	1845	15	1774	0	1583			
Grp Volume(v), veh/h	44	0	0	0	0	370	148	0	28			
Grp Sat Flow(s),veh/h/ln	880	0	0	0	0	1860	1774	0	1583			
Q Serve(g_s), s	0.2	0.0	0.0	0.0	0.0	7.7	2.2	0.0	0.4			
Cycle Q Clear(g_c), s	7.9	0.0	0.0	0.0	0.0	7.7	2.2	0.0	0.4			
Prop In Lane	0.43		0.00	0.00		0.01	1.00		1.00			
Lane Grp Cap(c), veh/h	364	0	0	0	0	516	777	0	694			
V/C Ratio(X)	0.12	0.00	0.00	0.00	0.00	0.72	0.19	0.00	0.04			
Avail Cap(c_a), veh/h	907	0	0	0	0	1257	777	0	694			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	11.8	0.0	0.0	0.0	0.0	14.0	7.4	0.0	6.9			
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.0	0.0	1.9	0.5	0.0	0.1			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.0	0.0	0.0	4.2	1.2	0.0	0.2			
LnGrp Delay(d),s/veh	11.9	0.0	0.0	0.0	0.0	15.9	7.9	0.0	7.0			
LnGrp LOS	B					B	A		A			
Approach Vol, veh/h		44			370			176				
Approach Delay, s/veh		11.9			15.9			7.8				
Approach LOS		B			B			A				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		25.2		17.7				17.7
Change Period (Y+Rc), s		6.4		5.8				5.8
Max Green Setting (Gmax), s		18.8		29.0				29.0
Max Q Clear Time (g_c+I1), s		4.2		9.9				9.7
Green Ext Time (p_c), s		0.0		2.1				2.1

Intersection Summary	
HCM 2010 Ctrl Delay	13.2
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	21	60	0	0	115	0	483	0	124	0	0	0
Number	7	4	14	3	8	18	5	2	12			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1900	1863	0	0	1863	1900	1900	1863	1863			
Adj Flow Rate, veh/h	26	75	0	0	144	0	604	0	155			
Adj No. of Lanes	0	1	0	0	1	0	0	1	1			
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	206	197	0	0	302	0	690	0	616			
Arrive On Green	0.16	0.16	0.00	0.00	0.16	0.00	0.39	0.00	0.39			
Sat Flow, veh/h	241	1218	0	0	1863	0	1774	0	1583			
Grp Volume(v), veh/h	101	0	0	0	144	0	604	0	155			
Grp Sat Flow(s),veh/h/ln	1458	0	0	0	1863	0	1774	0	1583			
Q Serve(g_s), s	0.1	0.0	0.0	0.0	1.9	0.0	8.6	0.0	1.8			
Cycle Q Clear(g_c), s	2.0	0.0	0.0	0.0	1.9	0.0	8.6	0.0	1.8			
Prop In Lane	0.26		0.00	0.00		0.00	1.00		1.00			
Lane Grp Cap(c), veh/h	403	0	0	0	302	0	690	0	616			
V/C Ratio(X)	0.25	0.00	0.00	0.00	0.48	0.00	0.88	0.00	0.25			
Avail Cap(c_a), veh/h	1895	0	0	0	1987	0	1879	0	1677			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	10.1	0.0	0.0	0.0	10.3	0.0	7.7	0.0	5.6			
Incr Delay (d2), s/veh	0.3	0.0	0.0	0.0	1.2	0.0	3.7	0.0	0.2			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.7	0.0	0.0	0.0	1.1	0.0	4.7	0.0	0.8			
LnGrp Delay(d),s/veh	10.5	0.0	0.0	0.0	11.5	0.0	11.4	0.0	5.8			
LnGrp LOS	B				B		B		A			
Approach Vol, veh/h		101			144			759				
Approach Delay, s/veh		10.5			11.5			10.3				
Approach LOS		B			B			B				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		17.0		10.2				10.2
Change Period (Y+Rc), s		6.4		5.8				5.8
Max Green Setting (Gmax), s		28.8		29.0				29.0
Max Q Clear Time (g_c+I1), s		10.6		4.0				3.9
Green Ext Time (p_c), s		0.0		1.2				1.2

Intersection Summary	
HCM 2010 Ctrl Delay	10.5
HCM 2010 LOS	B

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - AM

N.4 - Single-Lane Roundabout
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	148	2.0	0.146	4.2	LOS A	0.5	12.6	0.12	0.04	33.6
8	T1	2	2.0	0.146	4.2	LOS A	0.5	12.6	0.12	0.04	33.4
18	R2	28	2.0	0.146	4.2	LOS A	0.5	12.6	0.12	0.04	32.4
Approach		178	2.0	0.146	4.2	LOS A	0.5	12.6	0.12	0.04	33.4
East: Lincoln Road											
6	T1	365	2.0	0.334	6.6	LOS A	1.4	34.7	0.31	0.21	34.8
16	R2	3	2.0	0.334	6.6	LOS A	1.4	34.7	0.31	0.21	33.7
Approach		368	2.0	0.334	6.6	LOS A	1.4	34.7	0.31	0.21	34.8
West: Lincoln Road											
5	L2	19	2.0	0.035	3.1	LOS A	0.0	0.0	0.00	0.00	37.1
2	T1	25	2.0	0.035	3.1	LOS A	0.0	0.0	0.00	0.00	37.0
Approach		44	2.0	0.035	3.1	LOS A	0.0	0.0	0.00	0.00	37.0
All Vehicles		589	2.0	0.334	5.6	LOS A	1.4	34.7	0.23	0.15	34.5

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - AM

N.4 - Single-Lane Roundabout
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	148	2.0	0.149	0.3	LOS A	0.8	19.1	0.17	0.06	35.3
8	T1	2	2.0	0.149	0.3	LOS A	0.8	19.1	0.17	0.06	35.1
18	R2	28	2.0	0.149	0.3	LOS A	0.8	19.1	0.17	0.06	34.0
Approach		178	2.0	0.149	0.3	LOS A	0.8	19.1	0.17	0.06	35.1
East: Lincoln Road											
6	T1	365	2.0	0.349	1.4	LOS A	2.2	55.5	0.44	0.29	36.9
16	R2	3	2.0	0.349	1.4	LOS A	2.2	55.5	0.44	0.29	35.7
Approach		368	2.0	0.349	1.4	LOS A	2.2	55.5	0.44	0.29	36.9
West: Lincoln Road											
5	L2	19	2.0	0.035	0.0	LOS A	0.0	0.0	0.00	0.00	37.1
2	T1	25	2.0	0.035	0.0	LOS A	0.0	0.0	0.00	0.00	37.0
Approach		44	2.0	0.035	0.0	LOS A	0.0	0.0	0.00	0.00	37.0
All Vehicles		589	2.0	0.349	0.9	LOS A	2.2	55.5	0.33	0.20	36.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - PM

N.4 - Single-Lane Roundabout
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	605	2.0	0.655	12.1	LOS B	4.7	119.2	0.42	0.25	30.2
8	T1	1	2.0	0.655	12.1	LOS B	4.7	119.2	0.42	0.25	30.1
18	R2	155	2.0	0.655	12.1	LOS B	4.7	119.2	0.42	0.25	29.3
Approach		761	2.0	0.655	12.1	LOS B	4.7	119.2	0.42	0.25	30.0
East: Lincoln Road											
6	T1	156	2.0	0.206	7.0	LOS A	0.7	17.2	0.51	0.51	34.6
16	R2	1	2.0	0.206	7.0	LOS A	0.7	17.2	0.51	0.51	33.5
Approach		157	2.0	0.206	7.0	LOS A	0.7	17.2	0.51	0.51	34.6
West: Lincoln Road											
5	L2	27	2.0	0.082	3.5	LOS A	0.0	0.0	0.00	0.00	37.8
2	T1	77	2.0	0.082	3.5	LOS A	0.0	0.0	0.00	0.00	37.6
Approach		104	2.0	0.082	3.5	LOS A	0.0	0.0	0.00	0.00	37.7
All Vehicles		1022	2.0	0.655	10.4	LOS B	4.7	119.2	0.39	0.26	31.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - PM

N.4 - Single-Lane Roundabout
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	605	2.0	0.678	1.5	LOS A	6.9	174.5	0.55	0.32	34.5
8	T1	1	2.0	0.678	1.5	LOS A	6.9	174.5	0.55	0.32	34.4
18	R2	155	2.0	0.678	1.5	LOS A	6.9	174.5	0.55	0.32	33.3
Approach		761	2.0	0.678	1.5	LOS A	6.9	174.5	0.55	0.32	34.3
East: Lincoln Road											
6	T1	156	2.0	0.240	4.7	LOS A	1.5	37.3	0.75	0.67	35.7
16	R2	1	2.0	0.240	4.7	LOS A	1.5	37.3	0.75	0.67	34.6
Approach		157	2.0	0.240	4.7	LOS A	1.5	37.3	0.75	0.67	35.7
West: Lincoln Road											
5	L2	27	2.0	0.084	0.0	LOS A	0.0	0.0	0.00	0.00	37.8
2	T1	77	2.0	0.084	0.0	LOS A	0.0	0.0	0.00	0.00	37.6
Approach		104	2.0	0.084	0.0	LOS A	0.0	0.0	0.00	0.00	37.7
All Vehicles		1022	2.0	0.678	1.9	LOS A	6.9	174.5	0.52	0.34	34.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - AM

N.5 - Single-Lane Roundabout w/ RT Bypass

Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	148	2.0	0.123	4.0	LOS A	0.4	10.4	0.12	0.04	33.3
8	T1	2	2.0	0.123	4.0	LOS A	0.4	10.4	0.12	0.04	33.1
18	R2	28	2.0	0.022	3.1	LOS A	0.1	1.7	0.07	0.02	35.4
Approach		178	2.0	0.123	3.8	LOS A	0.4	10.4	0.11	0.04	33.6
East: Lincoln Road											
6	T1	365	2.0	0.334	6.6	LOS A	1.4	34.7	0.31	0.21	34.8
16	R2	3	2.0	0.334	6.6	LOS A	1.4	34.7	0.31	0.21	33.7
Approach		368	2.0	0.334	6.6	LOS A	1.4	34.7	0.31	0.21	34.8
West: Lincoln Road											
5	L2	19	2.0	0.035	3.1	LOS A	0.0	0.0	0.00	0.00	37.1
2	T1	25	2.0	0.035	3.1	LOS A	0.0	0.0	0.00	0.00	37.0
Approach		44	2.0	0.035	3.1	LOS A	0.0	0.0	0.00	0.00	37.0
All Vehicles		589	2.0	0.334	5.5	LOS A	1.4	34.7	0.23	0.14	34.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - AM

N.5 - Single-Lane Roundabout w/ RT Bypass

Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	148	2.0	0.106	0.2	LOS A	0.5	13.0	0.15	0.05	34.9
8	T1	2	2.0	0.106	0.2	LOS A	0.5	13.0	0.15	0.05	34.7
18	R2	28	2.0	0.019	0.1	LOS A	0.1	2.2	0.10	0.02	36.9
Approach		178	2.0	0.106	0.2	LOS A	0.5	13.0	0.14	0.05	35.1
East: Lincoln Road											
6	T1	365	2.0	0.349	1.4	LOS A	2.2	55.2	0.44	0.29	36.9
16	R2	3	2.0	0.349	1.4	LOS A	2.2	55.2	0.44	0.29	35.7
Approach		368	2.0	0.349	1.4	LOS A	2.2	55.2	0.44	0.29	36.9
West: Lincoln Road											
5	L2	19	2.0	0.035	0.0	LOS A	0.0	0.0	0.00	0.00	37.1
2	T1	25	2.0	0.035	0.0	LOS A	0.0	0.0	0.00	0.00	37.0
Approach		44	2.0	0.035	0.0	LOS A	0.0	0.0	0.00	0.00	37.0
All Vehicles		589	2.0	0.349	0.9	LOS A	2.2	55.2	0.32	0.19	36.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - PM

N.5 - Single-Lane Roundabout w/ RT Bypass

Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	605	2.0	0.522	9.0	LOS A	2.9	73.3	0.32	0.19	31.0
8	T1	1	2.0	0.522	9.0	LOS A	2.9	73.3	0.32	0.19	30.9
18	R2	155	2.0	0.131	4.1	LOS A	0.4	11.1	0.16	0.07	34.8
Approach		761	2.0	0.522	8.0	LOS A	2.9	73.3	0.29	0.16	31.7
East: Lincoln Road											
6	T1	156	2.0	0.206	7.0	LOS A	0.7	17.2	0.51	0.51	34.6
16	R2	1	2.0	0.206	7.0	LOS A	0.7	17.2	0.51	0.51	33.5
Approach		157	2.0	0.206	7.0	LOS A	0.7	17.2	0.51	0.51	34.6
West: Lincoln Road											
5	L2	27	2.0	0.082	3.5	LOS A	0.0	0.0	0.00	0.00	37.8
2	T1	77	2.0	0.082	3.5	LOS A	0.0	0.0	0.00	0.00	37.6
Approach		104	2.0	0.082	3.5	LOS A	0.0	0.0	0.00	0.00	37.7
All Vehicles		1022	2.0	0.522	7.4	LOS A	2.9	73.3	0.29	0.20	32.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - PM

N.5 - Single-Lane Roundabout w/ RT Bypass

Roundabout

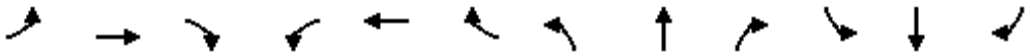
Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	605	2.0	0.447	0.7	LOS A	3.1	79.8	0.35	0.18	34.3
8	T1	1	2.0	0.447	0.7	LOS A	3.1	79.8	0.35	0.18	34.2
18	R2	155	2.0	0.112	0.3	LOS A	0.5	14.0	0.21	0.09	36.6
Approach		761	2.0	0.447	0.6	LOS A	3.1	79.8	0.32	0.16	34.8
East: Lincoln Road											
6	T1	156	2.0	0.230	4.7	LOS A	1.4	34.3	0.72	0.64	35.8
16	R2	1	2.0	0.230	4.7	LOS A	1.4	34.3	0.72	0.64	34.7
Approach		157	2.0	0.230	4.7	LOS A	1.4	34.3	0.72	0.64	35.8
West: Lincoln Road											
5	L2	27	2.0	0.084	0.0	LOS A	0.0	0.0	0.00	0.00	37.8
2	T1	77	2.0	0.084	0.0	LOS A	0.0	0.0	0.00	0.00	37.6
Approach		104	2.0	0.084	0.0	LOS A	0.0	0.0	0.00	0.00	37.7
All Vehicles		1022	2.0	0.447	1.2	LOS A	3.1	79.8	0.35	0.22	35.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPENDIX C

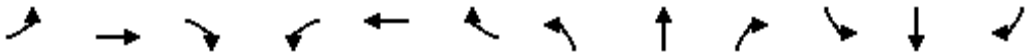
Short-Term Year (2018) Operational Analysis



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	57	306	41	21	94	42	29	47	48	240	99	87
Peak Hour Factor	0.96	0.96	0.96	0.94	0.94	0.94	0.82	0.82	0.82	0.84	0.84	0.84
Hourly flow rate (vph)	66	357	48	26	115	51	42	68	70	340	140	123

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	471	192	180	604
Volume Left (vph)	67	26	42	340
Volume Right (vph)	48	51	70	123
Hadj (s)	0.00	-0.10	-0.15	0.02
Departure Headway (s)	6.9	7.7	7.7	6.9
Degree Utilization, x	0.91	0.41	0.38	1.0
Capacity (veh/h)	512	433	433	514
Control Delay (s)	46.6	16.0	15.4	115.2
Approach Delay (s)	46.6	16.0	15.4	115.2
Approach LOS	E	C	C	F

Intersection Summary			
Delay	67.3		
Level of Service	F		
Intersection Capacity Utilization	74.7%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	54	107	23	31	198	255	37	122	33	90	60	52
Peak Hour Factor	0.89	0.89	0.89	0.88	0.88	0.88	0.98	0.98	0.98	0.89	0.89	0.89
Hourly flow rate (vph)	68	135	29	41	259	333	45	148	40	120	80	70

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	232	633	233	270
Volume Left (vph)	68	41	45	120
Volume Right (vph)	29	333	40	70
Hadj (s)	0.02	-0.27	-0.03	-0.03
Departure Headway (s)	7.1	6.1	7.3	7.2
Degree Utilization, x	0.46	1.0	0.47	0.54
Capacity (veh/h)	476	579	463	480
Control Delay (s)	15.9	81.9	16.6	18.1
Approach Delay (s)	15.9	81.9	16.6	18.1
Approach LOS	C	F	C	C

Intersection Summary				
Delay	47.0			
Level of Service	E			
Intersection Capacity Utilization	67.3%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	57	306	41	21	94	42	29	47	48	240	99	87
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	190.0	186.3	190.0	190.0	186.3	186.3	186.3	186.3	190.0	186.3	186.3	190.0
Adj Flow Rate, veh/h	68	365	49	26	115	51	37	60	61	304	125	110
Adj No. of Lanes	0	1	0	0	1	1	1	1	0	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	154	500	63	159	559	787	388	124	126	527	234	206
Arrive On Green	0.35	0.35	0.35	0.35	0.35	0.35	0.03	0.15	0.15	0.14	0.26	0.26
Sat Flow, veh/h	158	1411	178	161	1577	1583	1774	848	862	1774	915	805
Grp Volume(v), veh/h	482	0	0	141	0	51	37	0	121	304	0	235
Grp Sat Flow(s),veh/h/ln	1747	0	0	1739	0	1583	1774	0	1711	1774	0	1721
Q Serve(g_s), s	5.1	0.0	0.0	0.0	0.0	0.7	0.7	0.0	2.7	5.8	0.0	4.9
Cycle Q Clear(g_c), s	10.2	0.0	0.0	2.2	0.0	0.7	0.7	0.0	2.7	5.8	0.0	4.9
Prop In Lane	0.14		0.10	0.18		1.00	1.00		0.50	1.00		0.47
Lane Grp Cap(c), veh/h	716	0	0	717	0	787	388	0	250	527	0	439
V/C Ratio(X)	0.67	0.00	0.00	0.20	0.00	0.06	0.10	0.00	0.48	0.58	0.00	0.53
Avail Cap(c_a), veh/h	1005	0	0	987	0	1055	497	0	692	527	0	778
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	12.0	0.0	0.0	9.5	0.0	5.5	14.4	0.0	16.5	11.8	0.0	13.5
Incr Delay (d2), s/veh	1.1	0.0	0.0	0.1	0.0	0.0	0.1	0.0	1.5	1.6	0.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.2	0.0	0.0	1.2	0.0	0.3	0.4	0.0	1.4	3.0	0.0	2.5
LnGrp Delay(d),s/veh	13.1	0.0	0.0	9.6	0.0	5.5	14.6	0.0	17.9	13.3	0.0	14.5
LnGrp LOS	B			A		A	B		B	B		B
Approach Vol, veh/h		482			192			158			539	
Approach Delay, s/veh		13.1			8.5			17.1			13.8	
Approach LOS		B			A			B			B	

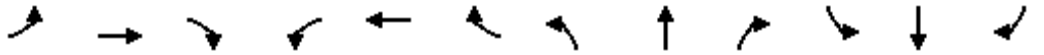
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.0	11.1		19.9	6.4	15.7		19.9
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0
Max Green Setting (Gmax), s	6.0	17.0		22.0	4.0	19.0		22.0
Max Q Clear Time (g_c+I1), s	7.8	4.7		12.2	2.7	6.9		4.2
Green Ext Time (p_c), s	0.0	1.4		2.7	0.0	1.4		3.6

Intersection Summary	
HCM 2010 Ctrl Delay	13.2
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	54	107	23	31	198	255	37	122	33	90	60	52
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	190.0	186.3	190.0	190.0	186.3	186.3	186.3	186.3	190.0	186.3	186.3	190.0
Adj Flow Rate, veh/h	66	132	28	39	250	322	48	160	43	118	78	68
Adj No. of Lanes	0	1	0	0	1	1	1	1	0	1	1	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	139	228	40	113	442	528	645	546	147	610	379	330
Arrive On Green	0.27	0.27	0.27	0.27	0.27	0.27	0.04	0.39	0.39	0.06	0.41	0.41
Sat Flow, veh/h	194	848	147	137	1643	1583	1774	1415	380	1774	920	802
Grp Volume(v), veh/h	226	0	0	289	0	322	48	0	203	118	0	146
Grp Sat Flow(s),veh/h/ln	1189	0	0	1780	0	1583	1774	0	1796	1774	0	1721
Q Serve(g_s), s	2.6	0.0	0.0	0.0	0.0	9.1	0.9	0.0	4.2	2.1	0.0	2.9
Cycle Q Clear(g_c), s	9.9	0.0	0.0	7.3	0.0	9.1	0.9	0.0	4.2	2.1	0.0	2.9
Prop In Lane	0.29		0.12	0.13		1.00	1.00		0.21	1.00		0.47
Lane Grp Cap(c), veh/h	407	0	0	555	0	528	645	0	693	610	0	709
V/C Ratio(X)	0.56	0.00	0.00	0.52	0.00	0.61	0.07	0.00	0.29	0.19	0.00	0.21
Avail Cap(c_a), veh/h	524	0	0	706	0	665	710	0	693	729	0	709
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	17.1	0.0	0.0	16.9	0.0	14.9	9.1	0.0	11.4	8.8	0.0	10.1
Incr Delay (d2), s/veh	1.2	0.0	0.0	0.8	0.0	1.1	0.0	0.0	1.1	0.2	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.1	0.0	0.0	3.8	0.0	4.1	0.4	0.0	2.2	1.0	0.0	1.5
LnGrp Delay(d),s/veh	18.3	0.0	0.0	17.7	0.0	16.0	9.2	0.0	12.4	9.0	0.0	10.7
LnGrp LOS	B			B		B	A		B	A		B
Approach Vol, veh/h		226			611			251			264	
Approach Delay, s/veh		18.3			16.8			11.8			10.0	
Approach LOS		B			B			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.4	25.6		19.4	7.0	27.0		19.4
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0
Max Green Setting (Gmax), s	7.0	19.0		19.0	4.0	22.0		19.0
Max Q Clear Time (g_c+I1), s	4.1	6.2		11.9	2.9	4.9		11.1
Green Ext Time (p_c), s	0.1	1.4		2.5	0.0	1.5		2.6

Intersection Summary	
HCM 2010 Ctrl Delay	14.8
HCM 2010 LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	57	306	41	21	94	42	29	47	48	240	99	87
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	68	365	49	26	115	51	37	60	61	304	125	110
Adj No. of Lanes	1	1	0	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	522	492	66	293	522	676	363	118	120	505	232	204
Arrive On Green	0.05	0.31	0.31	0.02	0.28	0.28	0.03	0.14	0.14	0.15	0.25	0.25
Sat Flow, veh/h	1774	1609	216	1774	1863	1583	1774	848	862	1774	915	805
Grp Volume(v), veh/h	68	0	414	26	115	51	37	0	121	304	0	235
Grp Sat Flow(s),veh/h/ln	1774	0	1825	1774	1863	1583	1774	0	1711	1774	0	1721
Q Serve(g_s), s	1.3	0.0	9.7	0.5	2.3	0.9	0.8	0.0	3.1	6.6	0.0	5.6
Cycle Q Clear(g_c), s	1.3	0.0	9.7	0.5	2.3	0.9	0.8	0.0	3.1	6.6	0.0	5.6
Prop In Lane	1.00		0.12	1.00		1.00	1.00		0.50	1.00		0.47
Lane Grp Cap(c), veh/h	522	0	558	293	522	676	363	0	238	505	0	436
V/C Ratio(X)	0.13	0.00	0.74	0.09	0.22	0.08	0.10	0.00	0.51	0.60	0.00	0.54
Avail Cap(c_a), veh/h	657	0	1111	492	1153	1213	529	0	689	505	0	730
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.0	0.0	14.9	12.5	13.2	8.1	16.7	0.0	19.0	13.3	0.0	15.4
Incr Delay (d2), s/veh	0.1	0.0	2.0	0.1	0.2	0.0	0.1	0.0	1.7	2.0	0.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	5.1	0.2	1.2	0.4	0.4	0.0	1.6	3.4	0.0	2.8
LnGrp Delay(d),s/veh	11.2	0.0	16.8	12.6	13.4	8.1	16.8	0.0	20.7	15.4	0.0	16.4
LnGrp LOS	B		B	B	B	A	B		C	B		B
Approach Vol, veh/h		482			192			158			539	
Approach Delay, s/veh		16.0			11.9			19.8			15.8	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.0	13.1	4.2	20.4	4.5	18.6	5.4	19.1
Change Period (Y+Rc), s	3.0	6.5	3.0	5.8	3.0	6.5	3.0	5.8
Max Green Setting (Gmax), s	7.0	19.2	6.5	29.0	6.0	20.2	6.0	29.5
Max Q Clear Time (g_c+I1), s	8.6	5.1	2.5	11.7	2.8	7.6	3.3	4.3
Green Ext Time (p_c), s	0.0	1.5	0.0	2.8	0.0	1.4	0.0	3.2

Intersection Summary	
HCM 2010 Ctrl Delay	15.8
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	54	107	23	31	198	255	37	122	33	90	60	52
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	66	132	28	39	250	322	48	160	43	118	78	68
Adj No. of Lanes	1	1	0	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	318	402	85	420	479	511	551	462	124	520	327	285
Arrive On Green	0.04	0.27	0.27	0.03	0.26	0.26	0.04	0.33	0.33	0.07	0.36	0.36
Sat Flow, veh/h	1774	1491	316	1774	1863	1583	1774	1415	380	1774	920	802
Grp Volume(v), veh/h	66	0	160	39	250	322	48	0	203	118	0	146
Grp Sat Flow(s),veh/h/ln	1774	0	1807	1774	1863	1583	1774	0	1796	1774	0	1721
Q Serve(g_s), s	1.6	0.0	4.2	1.0	6.9	10.3	1.1	0.0	5.1	2.5	0.0	3.6
Cycle Q Clear(g_c), s	1.6	0.0	4.2	1.0	6.9	10.3	1.1	0.0	5.1	2.5	0.0	3.6
Prop In Lane	1.00		0.17	1.00		1.00	1.00		0.21	1.00		0.47
Lane Grp Cap(c), veh/h	318	0	487	420	479	511	551	0	586	520	0	612
V/C Ratio(X)	0.21	0.00	0.33	0.09	0.52	0.63	0.09	0.00	0.35	0.23	0.00	0.24
Avail Cap(c_a), veh/h	417	0	883	541	910	878	664	0	586	611	0	612
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.6	0.0	17.5	15.6	19.1	17.2	12.5	0.0	15.3	11.7	0.0	13.6
Incr Delay (d2), s/veh	0.3	0.0	0.4	0.1	0.9	1.3	0.1	0.0	1.6	0.2	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	0.0	2.1	0.5	3.7	4.7	0.5	0.0	2.8	1.2	0.0	1.9
LnGrp Delay(d),s/veh	15.9	0.0	17.9	15.6	19.9	18.5	12.6	0.0	16.9	11.9	0.0	14.5
LnGrp LOS	B		B	B	B	B	B		B	B		B
Approach Vol, veh/h		226			611			251			264	
Approach Delay, s/veh		17.3			18.9			16.1			13.3	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.9	26.0	4.9	21.9	5.2	27.7	5.7	21.2
Change Period (Y+Rc), s	3.0	6.5	3.0	5.8	3.0	6.5	3.0	5.8
Max Green Setting (Gmax), s	7.0	19.5	6.0	29.2	6.0	20.5	6.0	29.2
Max Q Clear Time (g_c+I1), s	4.5	7.1	3.0	6.2	3.1	5.6	3.6	12.3
Green Ext Time (p_c), s	0.1	1.3	0.0	3.3	0.0	1.5	0.0	3.0

Intersection Summary	
HCM 2010 Ctrl Delay	17.0
HCM 2010 LOS	B

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - AM

L.4 - Single-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 5 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	42	2.0	0.262	8.4	LOS A	0.9	22.1	0.56	0.56	38.9
8	T1	68	2.0	0.262	8.4	LOS A	0.9	22.1	0.56	0.56	39.1
18	R2	70	2.0	0.262	8.4	LOS A	0.9	22.1	0.56	0.56	37.9
Approach		180	2.0	0.262	8.4	LOS A	0.9	22.1	0.56	0.56	38.6
East: Lincoln Road											
1	L2	26	2.0	0.177	4.9	LOS A	0.6	15.4	0.27	0.17	37.8
6	T1	116	2.0	0.177	4.9	LOS A	0.6	15.4	0.27	0.17	37.8
16	R2	52	2.0	0.177	4.9	LOS A	0.6	15.4	0.27	0.17	36.6
Approach		194	2.0	0.177	4.9	LOS A	0.6	15.4	0.27	0.17	37.5
North: N Montana Avenue											
7	L2	340	2.0	0.554	10.1	LOS B	3.0	77.3	0.44	0.32	36.6
4	T1	140	2.0	0.554	10.1	LOS B	3.0	77.3	0.44	0.32	36.8
14	R2	123	2.0	0.554	10.1	LOS B	3.0	77.3	0.44	0.32	35.7
Approach		603	2.0	0.554	10.1	LOS B	3.0	77.3	0.44	0.32	36.5
West: Lincoln Road											
5	L2	66	2.0	0.558	12.3	LOS B	3.0	76.2	0.63	0.67	33.7
2	T1	356	2.0	0.558	12.3	LOS B	3.0	76.2	0.63	0.67	33.7
12	R2	48	2.0	0.558	12.3	LOS B	3.0	76.2	0.63	0.67	32.7
Approach		471	2.0	0.558	12.3	LOS B	3.0	76.2	0.63	0.67	33.6
All Vehicles		1448	2.0	0.558	9.9	LOS A	3.0	77.3	0.50	0.45	35.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - AM

L.4 - Single-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 5 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	42	2.0	0.332	6.7	LOS A	2.1	53.5	0.83	0.81	40.0
8	T1	68	2.0	0.332	6.7	LOS A	2.1	53.5	0.83	0.81	40.2
18	R2	70	2.0	0.332	6.7	LOS A	2.1	53.5	0.83	0.81	38.9
Approach		180	2.0	0.332	6.7	LOS A	2.1	53.5	0.83	0.81	39.7
East: Lincoln Road											
1	L2	26	2.0	0.194	1.2	LOS A	1.1	28.5	0.42	0.27	39.5
6	T1	116	2.0	0.194	1.2	LOS A	1.1	28.5	0.42	0.27	39.5
16	R2	52	2.0	0.194	1.2	LOS A	1.1	28.5	0.42	0.27	38.1
Approach		194	2.0	0.194	1.2	LOS A	1.1	28.5	0.42	0.27	39.1
North: N Montana Avenue											
7	L2	340	2.0	0.608	2.2	LOS A	5.3	133.9	0.64	0.46	41.4
4	T1	140	2.0	0.608	2.2	LOS A	5.3	133.9	0.64	0.46	41.6
14	R2	123	2.0	0.608	2.2	LOS A	5.3	133.9	0.64	0.46	40.2
Approach		603	2.0	0.608	2.2	LOS A	5.3	133.9	0.64	0.46	41.2
West: Lincoln Road											
5	L2	66	2.0	0.662	8.7	LOS A	6.9	175.2	0.90	0.97	35.6
2	T1	356	2.0	0.662	8.7	LOS A	6.9	175.2	0.90	0.97	35.6
12	R2	48	2.0	0.662	8.7	LOS A	6.9	175.2	0.90	0.97	34.5
Approach		471	2.0	0.662	8.7	LOS A	6.9	175.2	0.90	0.97	35.5
All Vehicles		1448	2.0	0.662	4.7	LOS A	6.9	175.2	0.72	0.64	38.7

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - PM

L.4 - Single-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 5 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	45	2.0	0.239	6.0	LOS A	0.8	21.6	0.39	0.32	40.7
8	T1	148	2.0	0.239	6.0	LOS A	0.8	21.6	0.39	0.32	40.9
18	R2	40	2.0	0.239	6.0	LOS A	0.8	21.6	0.39	0.32	39.6
Approach		233	2.0	0.239	6.0	LOS A	0.8	21.6	0.39	0.32	40.7
East: Lincoln Road											
1	L2	41	2.0	0.617	12.1	LOS B	4.0	101.6	0.56	0.49	34.0
6	T1	259	2.0	0.617	12.1	LOS B	4.0	101.6	0.56	0.49	33.9
16	R2	333	2.0	0.617	12.1	LOS B	4.0	101.6	0.56	0.49	32.9
Approach		632	2.0	0.617	12.1	LOS B	4.0	101.6	0.56	0.49	33.4
North: N Montana Avenue											
7	L2	121	2.0	0.282	6.6	LOS A	1.0	26.4	0.42	0.36	39.2
4	T1	80	2.0	0.282	6.6	LOS A	1.0	26.4	0.42	0.36	39.4
14	R2	70	2.0	0.282	6.6	LOS A	1.0	26.4	0.42	0.36	38.2
Approach		271	2.0	0.282	6.6	LOS A	1.0	26.4	0.42	0.36	39.0
West: Lincoln Road											
5	L2	68	2.0	0.224	5.6	LOS A	0.8	20.3	0.33	0.25	36.8
2	T1	135	2.0	0.224	5.6	LOS A	0.8	20.3	0.33	0.25	36.8
12	R2	29	2.0	0.224	5.6	LOS A	0.8	20.3	0.33	0.25	35.6
Approach		233	2.0	0.224	5.6	LOS A	0.8	20.3	0.33	0.25	36.7
All Vehicles		1369	2.0	0.617	8.9	LOS A	4.0	101.6	0.46	0.39	36.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - PM

L.4 - Single-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 5 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	45	2.0	0.266	2.4	LOS A	1.5	39.2	0.56	0.44	42.9
8	T1	148	2.0	0.266	2.4	LOS A	1.5	39.2	0.56	0.44	43.1
18	R2	40	2.0	0.266	2.4	LOS A	1.5	39.2	0.56	0.44	41.6
Approach		233	2.0	0.266	2.4	LOS A	1.5	39.2	0.56	0.44	42.8
East: Lincoln Road											
1	L2	41	2.0	0.685	4.8	LOS A	7.6	193.6	0.79	0.69	38.0
6	T1	259	2.0	0.685	4.8	LOS A	7.6	193.6	0.79	0.69	38.0
16	R2	333	2.0	0.685	4.8	LOS A	7.6	193.6	0.79	0.69	36.7
Approach		632	2.0	0.685	4.8	LOS A	7.6	193.6	0.79	0.69	37.3
North: N Montana Avenue											
7	L2	121	2.0	0.328	2.7	LOS A	2.1	53.5	0.64	0.52	41.7
4	T1	80	2.0	0.328	2.7	LOS A	2.1	53.5	0.64	0.52	41.9
14	R2	70	2.0	0.328	2.7	LOS A	2.1	53.5	0.64	0.52	40.5
Approach		271	2.0	0.328	2.7	LOS A	2.1	53.5	0.64	0.52	41.4
West: Lincoln Road											
5	L2	68	2.0	0.250	1.8	LOS A	1.5	38.0	0.51	0.36	38.6
2	T1	135	2.0	0.250	1.8	LOS A	1.5	38.0	0.51	0.36	38.5
12	R2	29	2.0	0.250	1.8	LOS A	1.5	38.0	0.51	0.36	37.2
Approach		233	2.0	0.250	1.8	LOS A	1.5	38.0	0.51	0.36	38.4
All Vehicles		1369	2.0	0.685	3.5	LOS A	7.6	193.6	0.67	0.56	39.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - AM

L.5 - Single-Lane Roundabout w/ RT Bypass
Roundabout
Design Life Analysis (Final Year): Results for 5 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	42	2.0	0.262	8.4	LOS A	0.9	22.1	0.56	0.56	38.9
8	T1	68	2.0	0.262	8.4	LOS A	0.9	22.1	0.56	0.56	39.1
18	R2	70	2.0	0.262	8.4	LOS A	0.9	22.1	0.56	0.56	37.9
Approach		180	2.0	0.262	8.4	LOS A	0.9	22.1	0.56	0.56	38.6
East: Lincoln Road											
1	L2	26	2.0	0.130	4.4	LOS A	0.4	10.8	0.26	0.16	38.0
6	T1	116	2.0	0.130	4.4	LOS A	0.4	10.8	0.26	0.16	37.9
16	R2	52	2.0	0.046	3.6	LOS A	0.1	3.5	0.21	0.10	37.8
Approach		194	2.0	0.130	4.2	LOS A	0.4	10.8	0.24	0.15	37.9
North: N Montana Avenue											
7	L2	340	2.0	0.554	10.1	LOS B	3.0	77.3	0.44	0.32	36.6
4	T1	140	2.0	0.554	10.1	LOS B	3.0	77.3	0.44	0.32	36.8
14	R2	123	2.0	0.554	10.1	LOS B	3.0	77.3	0.44	0.32	35.7
Approach		603	2.0	0.554	10.1	LOS B	3.0	77.3	0.44	0.32	36.5
West: Lincoln Road											
5	L2	66	2.0	0.558	12.3	LOS B	3.0	76.2	0.63	0.67	33.7
2	T1	356	2.0	0.558	12.3	LOS B	3.0	76.2	0.63	0.67	33.7
12	R2	48	2.0	0.558	12.3	LOS B	3.0	76.2	0.63	0.67	32.7
Approach		471	2.0	0.558	12.3	LOS B	3.0	76.2	0.63	0.67	33.6
All Vehicles		1448	2.0	0.558	9.8	LOS A	3.0	77.3	0.49	0.44	35.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - AM

L.5 - Single-Lane Roundabout w/ RT Bypass
Roundabout
Design Life Analysis (Final Year): Results for 5 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	42	2.0	0.332	6.7	LOS A	2.1	53.5	0.83	0.81	40.0
8	T1	68	2.0	0.332	6.7	LOS A	2.1	53.5	0.83	0.81	40.2
18	R2	70	2.0	0.332	6.7	LOS A	2.1	53.5	0.83	0.81	38.9
Approach		180	2.0	0.332	6.7	LOS A	2.1	53.5	0.83	0.81	39.7
East: Lincoln Road											
1	L2	26	2.0	0.115	0.8	LOS A	0.6	16.5	0.37	0.21	39.5
6	T1	116	2.0	0.115	0.8	LOS A	0.6	16.5	0.37	0.21	39.4
16	R2	52	2.0	0.040	0.6	LOS A	0.2	5.4	0.30	0.14	39.2
Approach		194	2.0	0.115	0.7	LOS A	0.6	16.5	0.35	0.19	39.4
North: N Montana Avenue											
7	L2	340	2.0	0.607	2.2	LOS A	5.2	132.6	0.64	0.46	41.4
4	T1	140	2.0	0.607	2.2	LOS A	5.2	132.6	0.64	0.46	41.6
14	R2	123	2.0	0.607	2.2	LOS A	5.2	132.6	0.64	0.46	40.2
Approach		603	2.0	0.607	2.2	LOS A	5.2	132.6	0.64	0.46	41.2
West: Lincoln Road											
5	L2	66	2.0	0.662	8.6	LOS A	6.9	174.9	0.90	0.97	35.6
2	T1	356	2.0	0.662	8.6	LOS A	6.9	174.9	0.90	0.97	35.6
12	R2	48	2.0	0.662	8.6	LOS A	6.9	174.9	0.90	0.97	34.5
Approach		471	2.0	0.662	8.6	LOS A	6.9	174.9	0.90	0.97	35.5
All Vehicles		1448	2.0	0.662	4.7	LOS A	6.9	174.9	0.71	0.63	38.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - PM

L.5 - Single-Lane Roundabout w/ RT Bypass
Roundabout
Design Life Analysis (Final Year): Results for 5 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	45	2.0	0.239	6.0	LOS A	0.8	21.6	0.39	0.32	40.7
8	T1	148	2.0	0.239	6.0	LOS A	0.8	21.6	0.39	0.32	40.9
18	R2	40	2.0	0.239	6.0	LOS A	0.8	21.6	0.39	0.32	39.6
Approach		233	2.0	0.239	6.0	LOS A	0.8	21.6	0.39	0.32	40.7
East: Lincoln Road											
1	L2	41	2.0	0.292	6.4	LOS A	1.1	28.2	0.37	0.29	36.9
6	T1	259	2.0	0.292	6.4	LOS A	1.1	28.2	0.37	0.29	36.9
16	R2	333	2.0	0.314	6.5	LOS A	1.2	31.4	0.35	0.25	36.0
Approach		632	2.0	0.314	6.5	LOS A	1.2	31.4	0.36	0.27	36.4
North: N Montana Avenue											
7	L2	121	2.0	0.282	6.6	LOS A	1.0	26.4	0.42	0.36	39.2
4	T1	80	2.0	0.282	6.6	LOS A	1.0	26.4	0.42	0.36	39.4
14	R2	70	2.0	0.282	6.6	LOS A	1.0	26.4	0.42	0.36	38.2
Approach		271	2.0	0.282	6.6	LOS A	1.0	26.4	0.42	0.36	39.0
West: Lincoln Road											
5	L2	68	2.0	0.224	5.6	LOS A	0.8	20.3	0.33	0.25	36.8
2	T1	135	2.0	0.224	5.6	LOS A	0.8	20.3	0.33	0.25	36.8
12	R2	29	2.0	0.224	5.6	LOS A	0.8	20.3	0.33	0.25	35.6
Approach		233	2.0	0.224	5.6	LOS A	0.8	20.3	0.33	0.25	36.7
All Vehicles		1369	2.0	0.314	6.3	LOS A	1.2	31.4	0.37	0.29	37.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - PM

L.5 - Single-Lane Roundabout w/ RT Bypass
Roundabout
Design Life Analysis (Final Year): Results for 5 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	45	2.0	0.266	2.4	LOS A	1.5	39.2	0.56	0.44	42.9
8	T1	148	2.0	0.266	2.4	LOS A	1.5	39.2	0.56	0.44	43.1
18	R2	40	2.0	0.266	2.4	LOS A	1.5	39.2	0.56	0.44	41.6
Approach		233	2.0	0.266	2.4	LOS A	1.5	39.2	0.56	0.44	42.8
East: Lincoln Road											
1	L2	41	2.0	0.259	1.4	LOS A	1.6	40.6	0.49	0.33	39.1
6	T1	259	2.0	0.259	1.4	LOS A	1.6	40.6	0.49	0.33	39.1
16	R2	333	2.0	0.277	1.2	LOS A	1.7	44.1	0.45	0.29	38.8
Approach		632	2.0	0.277	1.3	LOS A	1.7	44.1	0.47	0.31	38.9
North: N Montana Avenue											
7	L2	121	2.0	0.320	2.7	LOS A	2.0	49.8	0.61	0.49	41.7
4	T1	80	2.0	0.320	2.7	LOS A	2.0	49.8	0.61	0.49	42.0
14	R2	70	2.0	0.320	2.7	LOS A	2.0	49.8	0.61	0.49	40.6
Approach		271	2.0	0.320	2.7	LOS A	2.0	49.8	0.61	0.49	41.5
West: Lincoln Road											
5	L2	68	2.0	0.249	1.8	LOS A	1.5	37.7	0.51	0.36	38.6
2	T1	135	2.0	0.249	1.8	LOS A	1.5	37.7	0.51	0.36	38.5
12	R2	29	2.0	0.249	1.8	LOS A	1.5	37.7	0.51	0.36	37.3
Approach		233	2.0	0.249	1.8	LOS A	1.5	37.7	0.51	0.36	38.4
All Vehicles		1369	2.0	0.320	1.8	LOS A	2.0	49.8	0.52	0.38	39.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - AM

L.6 - Multi-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 5 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	42	2.0	0.154	6.7	LOS A	0.5	11.6	0.50	0.50	40.1
8	T1	68	2.0	0.154	6.7	LOS A	0.5	11.6	0.50	0.50	40.1
18	R2	70	2.0	0.097	6.0	LOS A	0.3	7.1	0.48	0.48	40.7
Approach		180	2.0	0.154	6.4	LOS A	0.5	11.6	0.49	0.49	40.3
East: Lincoln Road											
1	L2	26	2.0	0.130	4.4	LOS A	0.4	10.8	0.26	0.16	38.8
6	T1	116	2.0	0.130	4.4	LOS A	0.4	10.8	0.26	0.16	38.8
16	R2	52	2.0	0.046	3.6	LOS A	0.1	3.5	0.21	0.10	38.3
Approach		194	2.0	0.130	4.2	LOS A	0.4	10.8	0.24	0.15	38.7
North: N Montana Avenue											
7	L2	340	2.0	0.312	6.4	LOS A	1.2	31.4	0.32	0.22	37.7
4	T1	140	2.0	0.242	5.6	LOS A	0.9	22.5	0.30	0.20	42.8
14	R2	123	2.0	0.242	5.6	LOS A	0.9	22.5	0.30	0.20	41.1
Approach		603	2.0	0.312	6.0	LOS A	1.2	31.4	0.31	0.21	39.4
West: Lincoln Road											
5	L2	66	2.0	0.076	4.9	LOS A	0.2	5.6	0.40	0.34	35.4
2	T1	356	2.0	0.465	10.0	LOS B	2.0	51.5	0.55	0.57	36.1
12	R2	48	2.0	0.465	10.0	LOS B	2.0	51.5	0.55	0.57	34.6
Approach		471	2.0	0.465	9.3	LOS A	2.0	51.5	0.53	0.54	35.8
All Vehicles		1448	2.0	0.465	6.9	LOS A	2.0	51.5	0.39	0.34	38.2

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - AM

L.6 - Multi-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 5 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	42	2.0	0.135	2.4	LOS A	0.5	13.8	0.56	0.46	42.4
8	T1	68	2.0	0.135	2.4	LOS A	0.5	13.8	0.56	0.46	42.5
18	R2	70	2.0	0.102	2.9	LOS A	0.4	9.9	0.56	0.53	43.2
Approach		180	2.0	0.135	2.6	LOS A	0.5	13.8	0.56	0.49	42.7
East: Lincoln Road											
1	L2	26	2.0	0.100	0.6	LOS A	0.5	13.9	0.34	0.18	40.3
6	T1	116	2.0	0.100	0.6	LOS A	0.5	13.9	0.34	0.18	40.3
16	R2	52	2.0	0.035	0.4	LOS A	0.2	4.6	0.28	0.12	39.8
Approach		194	2.0	0.100	0.6	LOS A	0.5	13.9	0.32	0.16	40.2
North: N Montana Avenue											
7	L2	340	2.0	0.239	0.8	LOS A	1.4	36.6	0.38	0.22	40.5
4	T1	140	2.0	0.218	1.0	LOS A	1.3	31.9	0.39	0.24	45.5
14	R2	123	2.0	0.218	1.0	LOS A	1.3	31.9	0.39	0.24	43.6
Approach		603	2.0	0.239	0.9	LOS A	1.4	36.6	0.39	0.23	42.1
West: Lincoln Road											
5	L2	66	2.0	0.129	4.0	LOS A	0.5	12.4	0.55	0.52	35.9
2	T1	356	2.0	0.434	2.5	LOS A	2.3	59.1	0.60	0.46	39.7
12	R2	48	2.0	0.434	2.5	LOS A	2.3	59.1	0.60	0.46	37.9
Approach		471	2.0	0.434	2.7	LOS A	2.3	59.1	0.59	0.47	38.9
All Vehicles		1448	2.0	0.434	1.6	LOS A	2.3	59.1	0.47	0.33	40.8

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - PM

L.6 - Multi-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 5 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	45	2.0	0.194	5.5	LOS A	0.6	15.8	0.35	0.28	41.6
8	T1	148	2.0	0.194	5.5	LOS A	0.6	15.8	0.35	0.28	41.7
18	R2	40	2.0	0.040	4.0	LOS A	0.1	2.9	0.31	0.21	42.3
Approach		233	2.0	0.194	5.2	LOS A	0.6	15.8	0.34	0.27	41.8
East: Lincoln Road											
1	L2	41	2.0	0.292	6.4	LOS A	1.1	28.2	0.37	0.29	37.8
6	T1	259	2.0	0.292	6.4	LOS A	1.1	28.2	0.37	0.29	37.7
16	R2	333	2.0	0.314	6.5	LOS A	1.2	31.4	0.35	0.25	36.5
Approach		632	2.0	0.314	6.5	LOS A	1.2	31.4	0.36	0.27	37.1
North: N Montana Avenue											
7	L2	121	2.0	0.126	4.9	LOS A	0.4	10.3	0.36	0.29	38.6
4	T1	80	2.0	0.156	5.2	LOS A	0.5	13.1	0.37	0.30	43.1
14	R2	70	2.0	0.156	5.2	LOS A	0.5	13.1	0.37	0.30	41.4
Approach		271	2.0	0.156	5.1	LOS A	0.5	13.1	0.37	0.30	40.5
West: Lincoln Road											
5	L2	68	2.0	0.065	4.0	LOS A	0.2	4.7	0.27	0.18	35.9
2	T1	135	2.0	0.156	4.8	LOS A	0.5	12.4	0.29	0.21	39.3
12	R2	29	2.0	0.156	4.8	LOS A	0.5	12.4	0.29	0.21	37.5
Approach		233	2.0	0.156	4.6	LOS A	0.5	12.4	0.29	0.20	38.0
All Vehicles		1369	2.0	0.314	5.7	LOS A	1.2	31.4	0.35	0.26	38.6

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

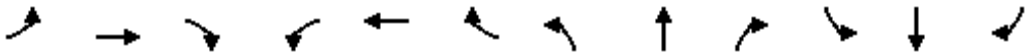
Site: Lincoln Road / N Montana Avenue - PM

L.6 - Multi-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 5 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	45	2.0	0.186	1.3	LOS A	0.8	19.8	0.41	0.29	43.9
8	T1	148	2.0	0.186	1.3	LOS A	0.8	19.8	0.41	0.29	44.0
18	R2	40	2.0	0.068	2.6	LOS A	0.2	6.3	0.45	0.36	43.4
Approach		233	2.0	0.186	1.5	LOS A	0.8	19.8	0.42	0.30	43.9
East: Lincoln Road											
1	L2	41	2.0	0.222	1.1	LOS A	1.3	34.1	0.45	0.27	40.0
6	T1	259	2.0	0.222	1.1	LOS A	1.3	34.1	0.45	0.27	40.0
16	R2	333	2.0	0.240	0.9	LOS A	1.5	36.9	0.41	0.25	39.3
Approach		632	2.0	0.240	1.0	LOS A	1.5	36.9	0.43	0.26	39.6
North: N Montana Avenue											
7	L2	121	2.0	0.115	1.7	LOS A	0.6	16.2	0.50	0.35	40.0
4	T1	80	2.0	0.119	1.3	LOS A	0.7	17.6	0.49	0.32	44.9
14	R2	70	2.0	0.119	1.3	LOS A	0.7	17.6	0.49	0.32	43.1
Approach		271	2.0	0.119	1.5	LOS A	0.7	17.6	0.50	0.33	42.1
West: Lincoln Road											
5	L2	68	2.0	0.083	1.3	LOS A	0.3	8.3	0.38	0.26	36.9
2	T1	135	2.0	0.152	0.9	LOS A	0.7	16.6	0.37	0.22	40.9
12	R2	29	2.0	0.152	0.9	LOS A	0.7	16.6	0.37	0.22	38.9
Approach		233	2.0	0.152	1.0	LOS A	0.7	16.6	0.37	0.24	39.4
All Vehicles		1369	2.0	0.240	1.2	LOS A	1.5	36.9	0.43	0.28	40.7

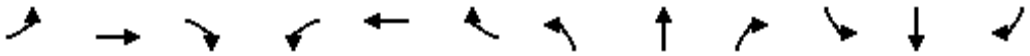
Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	44	643	187	154	0	0	0	0	2	0	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.77	0.77	0.77	0.75	0.75	0.75	0.92	0.92	0.92	0.75	0.75	0.75
Hourly flow rate (vph)	0	66	960	297	244	0	0	0	0	3	0	10
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	244			1026			1384	1384	546	1384	1864	244
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	244			1026			1384	1384	546	1384	1864	244
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			56			100	100	100	96	100	99
cM capacity (veh/h)	1322			677			78	81	538	79	41	794

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	1026	541	13
Volume Left	0	297	3
Volume Right	960	0	10
cSH	1700	677	265
Volume to Capacity	0.60	0.44	0.05
Queue Length 95th (ft)	0	56	4
Control Delay (s)	0.0	11.2	19.3
Lane LOS		B	C
Approach Delay (s)	0.0	11.2	19.3
Approach LOS			C

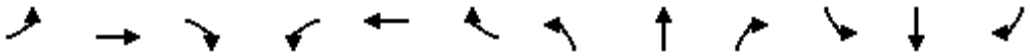
Intersection Summary			
Average Delay	4.0		
Intersection Capacity Utilization	83.7%	ICU Level of Service	E
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	81	160	30	535	0	0	0	0	10	1	30
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.89	0.89	0.89	0.92	0.92	0.92	0.68	0.68	0.68
Hourly flow rate (vph)	0	115	227	40	715	0	0	0	0	16	2	48
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	715			342			1025	1024	229	1024	1138	715
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	715			342			1025	1024	229	1024	1138	715
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			100	100	100	92	99	89
cM capacity (veh/h)	885			1217			184	228	811	208	195	431

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	342	755	66
Volume Left	0	40	16
Volume Right	227	0	48
cSH	1700	1217	334
Volume to Capacity	0.20	0.03	0.20
Queue Length 95th (ft)	0	3	18
Control Delay (s)	0.0	0.9	18.4
Lane LOS		A	C
Approach Delay (s)	0.0	0.9	18.4
Approach LOS			C

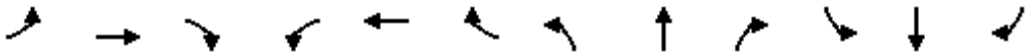
Intersection Summary				
Average Delay	1.6			
Intersection Capacity Utilization	65.0%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	44	643	187	154	0	0	0	0	2	0	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.77	0.77	0.77	0.75	0.75	0.75	0.92	0.92	0.92	0.75	0.75	0.75
Hourly flow rate (vph)	0	66	960	297	244	0	0	0	0	3	0	10
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	244			1026			1384	1384	546	1384	1864	244
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	244			1026			1384	1384	546	1384	1864	244
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			56			100	100	100	96	100	99
cM capacity (veh/h)	1322			677			78	81	538	79	41	794

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	1026	297	244	13
Volume Left	0	297	0	3
Volume Right	960	0	0	10
cSH	1700	677	1700	265
Volume to Capacity	0.60	0.44	0.14	0.05
Queue Length 95th (ft)	0	56	0	4
Control Delay (s)	0.0	14.4	0.0	19.3
Lane LOS		B		C
Approach Delay (s)	0.0	7.9		19.3
Approach LOS				C

Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	81	160	30	535	0	0	0	0	10	1	30
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.89	0.89	0.89	0.92	0.92	0.92	0.68	0.68	0.68
Hourly flow rate (vph)	0	115	227	40	715	0	0	0	0	16	2	48
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	715			342			1025	1024	229	1024	1138	715
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	715			342			1025	1024	229	1024	1138	715
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			100	100	100	92	99	89
cM capacity (veh/h)	885			1217			184	228	811	208	195	431

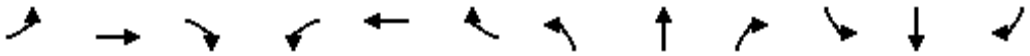
Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	342	40	715	66
Volume Left	0	40	0	16
Volume Right	227	0	0	48
cSH	1700	1217	1700	334
Volume to Capacity	0.20	0.03	0.42	0.20
Queue Length 95th (ft)	0	3	0	18
Control Delay (s)	0.0	8.1	0.0	18.4
Lane LOS		A		C
Approach Delay (s)	0.0	0.4		18.4
Approach LOS				C

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	73.2%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	44	643	187	154	0	0	0	0	2	0	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.77	0.77	0.77	0.75	0.75	0.75	0.92	0.92	0.92	0.75	0.75	0.75
Hourly flow rate (vph)	0	66	960	297	244	0	0	0	0	3	0	10
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	244			66			903	903	66	903	903	244
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	244			66			903	903	66	903	903	244
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			81			100	100	100	99	100	99
cM capacity (veh/h)	1322			1536			217	223	998	220	223	794

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	66	960	541	13
Volume Left	0	0	297	3
Volume Right	0	960	0	10
cSH	1700	1700	1536	502
Volume to Capacity	0.04	0.56	0.19	0.03
Queue Length 95th (ft)	0	0	18	2
Control Delay (s)	0.0	0.0	5.1	12.4
Lane LOS			A	B
Approach Delay (s)	0.0		5.1	12.4
Approach LOS				B

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	81.1%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	81	160	30	535	0	0	0	0	10	1	30
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.89	0.89	0.89	0.92	0.92	0.92	0.68	0.68	0.68
Hourly flow rate (vph)	0	115	227	40	715	0	0	0	0	16	2	48
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	715			115			911	911	115	911	911	715
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	715			115			911	911	115	911	911	715
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			100	100	100	94	99	89
cM capacity (veh/h)	885			1474			221	267	937	250	267	431

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	115	227	755	66
Volume Left	0	0	40	16
Volume Right	0	227	0	48
cSH	1700	1700	1474	361
Volume to Capacity	0.07	0.13	0.03	0.18
Queue Length 95th (ft)	0	0	2	16
Control Delay (s)	0.0	0.0	0.7	17.2
Lane LOS			A	C
Approach Delay (s)	0.0		0.7	17.2
Approach LOS				C

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	44	643	187	154	0	0	0	0	2	0	7
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1900	1863	0				1900	1863	1900
Adj Flow Rate, veh/h	0	67	973	293	241	0				3	0	10
Adj No. of Lanes	0	1	0	0	1	0				0	1	0
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76				0.76	0.76	0.76
Percent Heavy Veh, %	0	2	2	2	2	0				0	2	0
Cap, veh/h	0	76	1097	196	136	0				37	0	125
Arrive On Green	0.00	0.73	0.73	0.73	0.73	0.00				0.10	0.00	0.10
Sat Flow, veh/h	0	103	1496	141	186	0				375	0	1249
Grp Volume(v), veh/h	0	0	1040	534	0	0				13	0	0
Grp Sat Flow(s),veh/h/ln	0	0	1599	327	0	0				1624	0	0
Q Serve(g_s), s	0.0	0.0	29.8	14.2	0.0	0.0				0.4	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	29.8	44.0	0.0	0.0				0.4	0.0	0.0
Prop In Lane	0.00		0.94	0.55		0.00				0.23		0.77
Lane Grp Cap(c), veh/h	0	0	1172	332	0	0				162	0	0
V/C Ratio(X)	0.00	0.00	0.89	1.61	0.00	0.00				0.08	0.00	0.00
Avail Cap(c_a), veh/h	0	0	1172	332	0	0				162	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	1.00	1.00	0.00	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	6.1	19.3	0.0	0.0				24.5	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	8.5	286.5	0.0	0.0				1.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	15.2	31.9	0.0	0.0				0.2	0.0	0.0
LnGrp Delay(d),s/veh	0.0	0.0	14.6	305.9	0.0	0.0				25.5	0.0	0.0
LnGrp LOS			B	F						C		
Approach Vol, veh/h		1040			534						13	
Approach Delay, s/veh		14.6			305.9						25.5	
Approach LOS		B			F						C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				49.0		11.0		49.0
Change Period (Y+Rc), s				5.0		5.0		5.0
Max Green Setting (Gmax), s				44.0		6.0		44.0
Max Q Clear Time (g_c+I1), s				31.8		2.4		46.0
Green Ext Time (p_c), s				9.4		0.0		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	112.7
HCM 2010 LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	81	160	30	535	0	0	0	0	10	1	30
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1900	1863	0				1900	1863	1900
Adj Flow Rate, veh/h	0	106	209	41	723	0				12	1	37
Adj No. of Lanes	0	1	0	0	1	0				0	1	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88				0.88	0.88	0.88
Percent Heavy Veh, %	0	2	2	2	2	0				0	2	0
Cap, veh/h	0	314	619	137	997	0				57	5	177
Arrive On Green	0.00	0.56	0.56	0.56	0.56	0.00				0.15	0.15	0.15
Sat Flow, veh/h	0	561	1106	46	1781	0				391	33	1206
Grp Volume(v), veh/h	0	0	315	764	0	0				50	0	0
Grp Sat Flow(s),veh/h/ln	0	0	1668	1828	0	0				1630	0	0
Q Serve(g_s), s	0.0	0.0	3.5	0.6	0.0	0.0				0.9	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	3.5	10.5	0.0	0.0				0.9	0.0	0.0
Prop In Lane	0.00		0.66	0.05		0.00				0.24		0.74
Lane Grp Cap(c), veh/h	0	0	933	1134	0	0				239	0	0
V/C Ratio(X)	0.00	0.00	0.34	0.67	0.00	0.00				0.21	0.00	0.00
Avail Cap(c_a), veh/h	0	0	1469	1709	0	0				239	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	1.00	1.00	0.00	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	4.1	5.6	0.0	0.0				12.8	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.2	0.7	0.0	0.0				2.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	1.6	5.3	0.0	0.0				0.5	0.0	0.0
LnGrp Delay(d),s/veh	0.0	0.0	4.3	6.3	0.0	0.0				14.8	0.0	0.0
LnGrp LOS			A	A						B		
Approach Vol, veh/h		315			764						50	
Approach Delay, s/veh		4.3			6.3						14.8	
Approach LOS		A			A						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				24.1		10.0		24.1
Change Period (Y+Rc), s				5.0		5.0		5.0
Max Green Setting (Gmax), s				30.0		5.0		30.0
Max Q Clear Time (g_c+I1), s				5.5		2.9		12.5
Green Ext Time (p_c), s				7.6		0.0		6.6

Intersection Summary	
HCM 2010 Ctrl Delay	6.1
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	44	643	187	154	0	0	0	0	2	0	7
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1863	1900	1863	0				1900	1863	1900
Adj Flow Rate, veh/h	0	67	0	293	241	0				3	0	10
Adj No. of Lanes	0	1	1	0	1	0				0	1	0
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76				0.76	0.76	0.76
Percent Heavy Veh, %	0	2	2	2	2	0				0	2	0
Cap, veh/h	0	764	649	462	299	0				147	0	491
Arrive On Green	0.00	0.41	0.00	0.68	0.68	0.00				0.39	0.00	0.39
Sat Flow, veh/h	0	1863	1583	792	728	0				375	0	1249
Grp Volume(v), veh/h	0	67	0	534	0	0				13	0	0
Grp Sat Flow(s),veh/h/ln	0	1863	1583	1521	0	0				1624	0	0
Q Serve(g_s), s	0.0	0.9	0.0	10.0	0.0	0.0				0.2	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.9	0.0	10.9	0.0	0.0				0.2	0.0	0.0
Prop In Lane	0.00		1.00	0.55		0.00				0.23		0.77
Lane Grp Cap(c), veh/h	0	764	649	761	0	0				639	0	0
V/C Ratio(X)	0.00	0.09	0.00	0.70	0.00	0.00				0.02	0.00	0.00
Avail Cap(c_a), veh/h	0	1877	1596	1673	0	0				639	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	0.63	0.00	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	7.3	0.0	5.5	0.0	0.0				7.5	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.8	0.0	0.0				0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.5	0.0	4.3	0.0	0.0				0.1	0.0	0.0
LnGrp Delay(d),s/veh	0.0	7.4	0.0	6.3	0.0	0.0				7.6	0.0	0.0
LnGrp LOS		A		A						A		
Approach Vol, veh/h		67			534						13	
Approach Delay, s/veh		7.4			6.3						7.6	
Approach LOS		A			A						A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				20.7		44.3		20.7
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				41.0		16.0		41.0
Max Q Clear Time (g_c+I1), s				2.9		2.2		12.9
Green Ext Time (p_c), s				3.9		0.0		3.8

Intersection Summary	
HCM 2010 Ctrl Delay	6.4
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	81	160	30	535	0	0	0	0	10	1	30
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1863	1900	1863	0				1900	1863	1900
Adj Flow Rate, veh/h	0	106	0	41	723	0				12	1	37
Adj No. of Lanes	0	1	1	0	1	0				0	1	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88				0.88	0.88	0.88
Percent Heavy Veh, %	0	2	2	2	2	0				0	2	0
Cap, veh/h	0	983	835	102	943	0				123	10	380
Arrive On Green	0.00	0.53	0.00	0.17	0.17	0.00				0.32	0.32	0.32
Sat Flow, veh/h	0	1863	1583	52	1787	0				391	33	1206
Grp Volume(v), veh/h	0	106	0	764	0	0				50	0	0
Grp Sat Flow(s),veh/h/ln	0	1863	1583	1839	0	0				1630	0	0
Q Serve(g_s), s	0.0	1.4	0.0	7.5	0.0	0.0				1.1	0.0	0.0
Cycle Q Clear(g_c), s	0.0	1.4	0.0	20.1	0.0	0.0				1.1	0.0	0.0
Prop In Lane	0.00		1.00	0.05		0.00				0.24		0.74
Lane Grp Cap(c), veh/h	0	983	835	1045	0	0				514	0	0
V/C Ratio(X)	0.00	0.11	0.00	0.73	0.00	0.00				0.10	0.00	0.00
Avail Cap(c_a), veh/h	0	1320	1122	1375	0	0				514	0	0
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	0.85	0.00	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	6.0	0.0	18.2	0.0	0.0				12.3	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	1.2	0.0	0.0				0.4	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.7	0.0	10.6	0.0	0.0				0.5	0.0	0.0
LnGrp Delay(d),s/veh	0.0	6.1	0.0	19.4	0.0	0.0				12.7	0.0	0.0
LnGrp LOS		A		B						B		
Approach Vol, veh/h		106			764						50	
Approach Delay, s/veh		6.1			19.4						12.7	
Approach LOS		A			B						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				30.8		29.2		30.8
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				36.0		16.0		36.0
Max Q Clear Time (g_c+I1), s				3.4		3.1		22.1
Green Ext Time (p_c), s				6.3		0.0		4.7

Intersection Summary	
HCM 2010 Ctrl Delay	17.5
HCM 2010 LOS	B

Intersection	
Intersection Delay, s/veh	100.2
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	1	1	0	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	1040	534	0	13
Demand Flow Rate, veh/h	1060	545	0	13
Vehicles Circulating, veh/h	302	0	71	545
Vehicles Exiting, veh/h	256	71	1291	0
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	148.4	8.7	0.0	5.7
Approach LOS	F	A	-	A

Lane	Left	Left	Left
Designated Moves	TR	LT	LTR
Assumed Moves	TR	LT	LTR
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	1060	545	13
Cap Entry Lane, veh/h	835	1130	655
Entry HV Adj Factor	0.981	0.980	1.000
Flow Entry, veh/h	1040	534	13
Cap Entry, veh/h	819	1108	655
V/C Ratio	1.269	0.482	0.020
Control Delay, s/veh	148.4	8.7	5.7
LOS	F	A	A
95th %tile Queue, veh	38	3	0

Intersection	
Intersection Delay, s/veh	11.3
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	0	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	315	764	0	50
Demand Flow Rate, veh/h	321	779	0	51
Vehicles Circulating, veh/h	55	0	120	779
Vehicles Exiting, veh/h	775	120	256	0
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	6.4	13.6	0.0	8.3
Approach LOS	A	B	-	A

Lane	Left	Left	Left
Designated Moves	TR	LT	LTR
Assumed Moves	TR	LT	LTR
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	321	779	51
Cap Entry Lane, veh/h	1069	1130	518
Entry HV Adj Factor	0.981	0.980	0.980
Flow Entry, veh/h	315	764	50
Cap Entry, veh/h	1049	1108	508
V/C Ratio	0.300	0.689	0.098
Control Delay, s/veh	6.4	13.6	8.3
LOS	A	B	A
95th %tile Queue, veh	1	6	0

Intersection	
Intersection Delay, s/veh	3.2
Intersection LOS	A

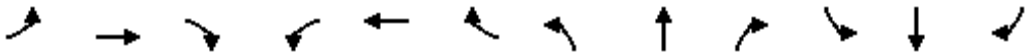
Approach	EB	WB	NB	SB
Entry Lanes	1	1	0	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	1040	534	0	13
Demand Flow Rate, veh/h	1060	545	0	13
Vehicles Circulating, veh/h	302	0	71	545
Vehicles Exiting, veh/h	256	71	299	0
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.3	8.7	0.0	5.7
Approach LOS	A	A	-	A

Lane	Left	Bypass	Left	Left
Designated Moves	T	R	LT	LTR
Assumed Moves	T	R	LT	LTR
RT Channelized		Free		
Lane Util	1.000		1.000	1.000
Critical Headway, s	5.193		5.193	5.193
Entry Flow, veh/h	68	992	545	13
Cap Entry Lane, veh/h	835	1938	1130	655
Entry HV Adj Factor	0.980	0.980	0.980	1.000
Flow Entry, veh/h	67	973	534	13
Cap Entry, veh/h	819	1900	1108	655
V/C Ratio	0.081	0.512	0.482	0.020
Control Delay, s/veh	5.2	0.0	8.7	5.7
LOS	A	A	A	A
95th %tile Queue, veh	0	3	3	0

Intersection	
Intersection Delay, s/veh	10.0
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	0	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	315	764	0	50
Demand Flow Rate, veh/h	321	779	0	51
Vehicles Circulating, veh/h	55	0	120	779
Vehicles Exiting, veh/h	775	120	43	0
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	1.5	13.6	0.0	8.3
Approach LOS	A	B	-	A

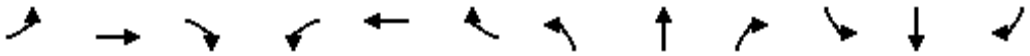
Lane	Left	Bypass	Left	Left
Designated Moves	T	R	LT	LTR
Assumed Moves	T	R	LT	LTR
RT Channelized		Free		
Lane Util	1.000		1.000	1.000
Critical Headway, s	5.193		5.193	5.193
Entry Flow, veh/h	108	213	779	51
Cap Entry Lane, veh/h	1069	1938	1130	518
Entry HV Adj Factor	0.980	0.980	0.980	0.980
Flow Entry, veh/h	106	209	764	50
Cap Entry, veh/h	1049	1900	1108	508
V/C Ratio	0.101	0.110	0.689	0.098
Control Delay, s/veh	4.3	0.0	13.6	8.3
LOS	A	A	B	A
95th %tile Queue, veh	0	0	6	0



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	15	19	0	0	257	2	86	0	16	0	0	0
Peak Hour Factor	0.77	0.77	0.77	0.70	0.70	0.70	0.58	0.58	0.58	0.92	0.92	0.92
Hourly flow rate (vph)	22	28	0	0	437	3	171	0	33	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	51	440	203
Volume Left (vph)	22	0	171
Volume Right (vph)	0	3	33
Hadj (s)	0.12	0.03	0.10
Departure Headway (s)	5.1	4.6	5.2
Degree Utilization, x	0.07	0.56	0.29
Capacity (veh/h)	650	763	647
Control Delay (s)	8.5	13.2	10.3
Approach Delay (s)	8.5	13.2	10.3
Approach LOS	A	B	B

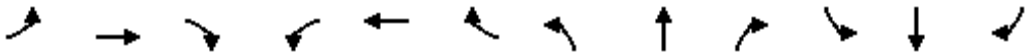
Intersection Summary				
Delay	12.0			
Level of Service	B			
Intersection Capacity Utilization	29.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	21	60	0	0	115	0	483	0	124	0	0	0
Peak Hour Factor	0.78	0.78	0.78	0.74	0.74	0.74	0.80	0.80	0.80	0.92	0.92	0.92
Hourly flow rate (vph)	31	88	0	0	185	0	694	0	184	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	119	185	879
Volume Left (vph)	31	0	694
Volume Right (vph)	0	0	184
Hadj (s)	0.09	0.03	0.07
Departure Headway (s)	6.2	6.1	4.9
Degree Utilization, x	0.21	0.31	1.0
Capacity (veh/h)	565	581	741
Control Delay (s)	10.9	11.8	121.5
Approach Delay (s)	10.9	11.8	121.5
Approach LOS	B	B	F

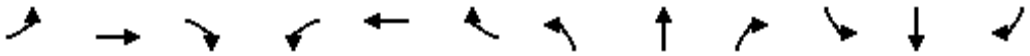
Intersection Summary				
Delay	93.2			
Level of Service	F			
Intersection Capacity Utilization	61.9%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	15	19	0	0	257	2	86	0	16	0	0	0
Peak Hour Factor	0.77	0.77	0.77	0.70	0.70	0.70	0.58	0.58	0.58	0.92	0.92	0.92
Hourly flow rate (vph)	22	28	0	0	437	3	171	0	33	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total (vph)	51	440	171	33
Volume Left (vph)	22	0	171	0
Volume Right (vph)	0	3	0	33
Hadj (s)	0.12	0.03	0.53	-0.67
Departure Headway (s)	5.2	4.6	6.2	5.0
Degree Utilization, x	0.07	0.56	0.30	0.05
Capacity (veh/h)	643	755	545	665
Control Delay (s)	8.6	13.4	10.6	7.1
Approach Delay (s)	8.6	13.4	10.0	
Approach LOS	A	B	B	

Intersection Summary				
Delay	12.1			
Level of Service	B			
Intersection Capacity Utilization	28.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	21	60	0	0	115	0	483	0	124	0	0	0
Peak Hour Factor	0.78	0.78	0.78	0.74	0.74	0.74	0.80	0.80	0.80	0.92	0.92	0.92
Hourly flow rate (vph)	31	88	0	0	185	0	694	0	184	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total (vph)	119	185	694	184
Volume Left (vph)	31	0	694	0
Volume Right (vph)	0	0	0	184
Hadj (s)	0.09	0.03	0.53	-0.67
Departure Headway (s)	6.2	6.0	6.0	4.8
Degree Utilization, x	0.21	0.31	1.0	0.25
Capacity (veh/h)	567	584	607	744
Control Delay (s)	10.8	11.7	108.7	8.1
Approach Delay (s)	10.8	11.7	87.6	
Approach LOS	B	B	F	

Intersection Summary				
Delay		68.0		
Level of Service		F		
Intersection Capacity Utilization		52.9%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	15	19	0	0	257	2	86	0	16	0	0	0
Number	7	4	14	3	8	18	5	2	12			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1900	1863	0	0	1863	1900	1900	1863	1863			
Adj Flow Rate, veh/h	22	28	0	0	437	3	171	0	33			
Adj No. of Lanes	0	1	0	0	1	0	0	1	1			
Peak Hour Factor	0.77	0.77	0.77	0.70	0.70	0.70	0.58	0.58	0.58			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	175	180	0	0	586	4	735	0	656			
Arrive On Green	0.32	0.32	0.00	0.00	0.32	0.32	0.41	0.00	0.41			
Sat Flow, veh/h	191	568	0	0	1848	13	1774	0	1583			
Grp Volume(v), veh/h	50	0	0	0	0	440	171	0	33			
Grp Sat Flow(s),veh/h/ln	759	0	0	0	0	1861	1774	0	1583			
Q Serve(g_s), s	0.3	0.0	0.0	0.0	0.0	9.6	2.8	0.0	0.6			
Cycle Q Clear(g_c), s	9.9	0.0	0.0	0.0	0.0	9.6	2.8	0.0	0.6			
Prop In Lane	0.44		0.00	0.00		0.01	1.00		1.00			
Lane Grp Cap(c), veh/h	355	0	0	0	0	590	735	0	656			
V/C Ratio(X)	0.14	0.00	0.00	0.00	0.00	0.75	0.23	0.00	0.05			
Avail Cap(c_a), veh/h	775	0	0	0	0	1189	735	0	656			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	11.5	0.0	0.0	0.0	0.0	13.9	8.6	0.0	8.0			
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.0	0.0	1.9	0.7	0.0	0.1			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.0	0.0	0.0	5.2	1.5	0.0	0.3			
LnGrp Delay(d),s/veh	11.6	0.0	0.0	0.0	0.0	15.8	9.4	0.0	8.1			
LnGrp LOS	B					B	A		A			
Approach Vol, veh/h		50			440			204				
Approach Delay, s/veh		11.6			15.8			9.2				
Approach LOS		B			B			A				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		25.2		20.2				20.2
Change Period (Y+Rc), s		6.4		5.8				5.8
Max Green Setting (Gmax), s		18.8		29.0				29.0
Max Q Clear Time (g_c+I1), s		4.8		11.9				11.6
Green Ext Time (p_c), s		0.0		2.5				2.5

Intersection Summary	
HCM 2010 Ctrl Delay	13.5
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	21	60	0	0	115	0	483	0	124	0	0	0
Number	7	4	14	3	8	18	5	2	12			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1900	1863	0	0	1863	1900	1900	1863	1863			
Adj Flow Rate, veh/h	30	86	0	0	171	0	694	0	184			
Adj No. of Lanes	0	1	0	0	1	0	0	1	1			
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	186	227	0	0	333	0	763	0	681			
Arrive On Green	0.18	0.18	0.00	0.00	0.18	0.00	0.43	0.00	0.43			
Sat Flow, veh/h	226	1269	0	0	1863	0	1774	0	1583			
Grp Volume(v), veh/h	116	0	0	0	171	0	694	0	184			
Grp Sat Flow(s),veh/h/ln	1496	0	0	0	1863	0	1774	0	1583			
Q Serve(g_s), s	0.1	0.0	0.0	0.0	2.6	0.0	11.4	0.0	2.3			
Cycle Q Clear(g_c), s	2.6	0.0	0.0	0.0	2.6	0.0	11.4	0.0	2.3			
Prop In Lane	0.26		0.00	0.00		0.00	1.00		1.00			
Lane Grp Cap(c), veh/h	413	0	0	0	333	0	763	0	681			
V/C Ratio(X)	0.28	0.00	0.00	0.00	0.51	0.00	0.91	0.00	0.27			
Avail Cap(c_a), veh/h	1639	0	0	0	1731	0	1069	0	954			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	11.2	0.0	0.0	0.0	11.6	0.0	8.3	0.0	5.7			
Incr Delay (d2), s/veh	0.4	0.0	0.0	0.0	1.2	0.0	8.7	0.0	0.2			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.9	0.0	0.0	0.0	1.4	0.0	7.3	0.0	1.1			
LnGrp Delay(d),s/veh	11.6	0.0	0.0	0.0	12.8	0.0	17.1	0.0	5.9			
LnGrp LOS	B				B		B		A			
Approach Vol, veh/h		116			171			878				
Approach Delay, s/veh		11.6			12.8			14.7				
Approach LOS		B			B			B				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		19.8		11.4				11.4
Change Period (Y+Rc), s		6.4		5.8				5.8
Max Green Setting (Gmax), s		18.8		29.0				29.0
Max Q Clear Time (g_c+I1), s		13.4		4.6				4.6
Green Ext Time (p_c), s		0.0		1.4				1.4

Intersection Summary	
HCM 2010 Ctrl Delay	14.1
HCM 2010 LOS	B

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - AM

N.4 - Single-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 5 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	171	2.0	0.170	4.4	LOS A	0.6	15.0	0.13	0.05	33.5
8	T1	2	2.0	0.170	4.4	LOS A	0.6	15.0	0.13	0.05	33.3
18	R2	33	2.0	0.170	4.4	LOS A	0.6	15.0	0.13	0.05	32.3
Approach		206	2.0	0.170	4.4	LOS A	0.6	15.0	0.13	0.05	33.3
East: Lincoln Road											
6	T1	434	2.0	0.405	7.6	LOS A	1.8	45.5	0.37	0.27	34.3
16	R2	3	2.0	0.405	7.6	LOS A	1.8	45.5	0.37	0.27	33.2
Approach		437	2.0	0.405	7.6	LOS A	1.8	45.5	0.37	0.27	34.3
West: Lincoln Road											
5	L2	22	2.0	0.040	3.2	LOS A	0.0	0.0	0.00	0.00	37.1
2	T1	28	2.0	0.040	3.2	LOS A	0.0	0.0	0.00	0.00	37.0
Approach		51	2.0	0.040	3.2	LOS A	0.0	0.0	0.00	0.00	37.0
All Vehicles		693	2.0	0.405	6.3	LOS A	1.8	45.5	0.27	0.18	34.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - AM

N.4 - Single-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 5 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	171	2.0	0.174	0.3	LOS A	0.9	22.9	0.19	0.08	35.3
8	T1	2	2.0	0.174	0.3	LOS A	0.9	22.9	0.19	0.08	35.1
18	R2	33	2.0	0.174	0.3	LOS A	0.9	22.9	0.19	0.08	34.0
Approach		206	2.0	0.174	0.3	LOS A	0.9	22.9	0.19	0.08	35.1
East: Lincoln Road											
6	T1	434	2.0	0.425	1.7	LOS A	2.9	72.8	0.51	0.35	36.6
16	R2	3	2.0	0.425	1.7	LOS A	2.9	72.8	0.51	0.35	35.4
Approach		437	2.0	0.425	1.7	LOS A	2.9	72.8	0.51	0.35	36.6
West: Lincoln Road											
5	L2	22	2.0	0.041	0.0	LOS A	0.0	0.0	0.00	0.00	37.1
2	T1	28	2.0	0.041	0.0	LOS A	0.0	0.0	0.00	0.00	37.0
Approach		51	2.0	0.041	0.0	LOS A	0.0	0.0	0.00	0.00	37.0
All Vehicles		693	2.0	0.425	1.2	LOS A	2.9	72.8	0.38	0.24	36.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - PM

N.4 - Single-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 5 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	697	2.0	0.770	16.6	LOS C	7.3	185.3	0.59	0.38	28.5
8	T1	1	2.0	0.770	16.6	LOS C	7.3	185.3	0.59	0.38	28.4
18	R2	184	2.0	0.770	16.6	LOS C	7.3	185.3	0.59	0.38	27.7
Approach		883	2.0	0.770	16.6	LOS C	7.3	185.3	0.59	0.38	28.4
East: Lincoln Road											
6	T1	185	2.0	0.265	8.2	LOS A	0.9	22.5	0.55	0.55	33.9
16	R2	2	2.0	0.265	8.2	LOS A	0.9	22.5	0.55	0.55	32.9
Approach		187	2.0	0.265	8.2	LOS A	0.9	22.5	0.55	0.55	33.9
West: Lincoln Road											
5	L2	31	2.0	0.095	3.6	LOS A	0.0	0.0	0.00	0.00	37.8
2	T1	89	2.0	0.095	3.6	LOS A	0.0	0.0	0.00	0.00	37.6
Approach		120	2.0	0.095	3.6	LOS A	0.0	0.0	0.00	0.00	37.7
All Vehicles		1190	2.0	0.770	14.0	LOS B	7.3	185.3	0.52	0.37	29.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - PM

N.4 - Single-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 5 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	697	2.0	0.798	2.5	LOS A	10.6	269.0	0.76	0.48	34.1
8	T1	1	2.0	0.798	2.5	LOS A	10.6	269.0	0.76	0.48	33.9
18	R2	184	2.0	0.798	2.5	LOS A	10.6	269.0	0.76	0.48	32.9
Approach		883	2.0	0.798	2.5	LOS A	10.6	269.0	0.76	0.48	33.8
East: Lincoln Road											
6	T1	185	2.0	0.337	6.0	LOS A	2.3	57.3	0.85	0.82	35.1
16	R2	2	2.0	0.337	6.0	LOS A	2.3	57.3	0.85	0.82	34.0
Approach		187	2.0	0.337	6.0	LOS A	2.3	57.3	0.85	0.82	35.1
West: Lincoln Road											
5	L2	31	2.0	0.097	0.0	LOS A	0.0	0.0	0.00	0.00	37.8
2	T1	89	2.0	0.097	0.0	LOS A	0.0	0.0	0.00	0.00	37.6
Approach		120	2.0	0.097	0.0	LOS A	0.0	0.0	0.00	0.00	37.7
All Vehicles		1190	2.0	0.798	2.8	LOS A	10.6	269.0	0.69	0.48	34.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - AM

N.5 - Single-Lane Roundabout w/ RT Bypass

Roundabout
Design Life Analysis (Final Year): Results for 5 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	171	2.0	0.143	4.2	LOS A	0.5	12.3	0.13	0.05	33.2
8	T1	2	2.0	0.143	4.2	LOS A	0.5	12.3	0.13	0.05	33.0
18	R2	33	2.0	0.027	3.1	LOS A	0.1	2.0	0.08	0.02	35.4
Approach		206	2.0	0.143	4.0	LOS A	0.5	12.3	0.12	0.05	33.5
East: Lincoln Road											
6	T1	434	2.0	0.405	7.6	LOS A	1.8	45.5	0.37	0.27	34.3
16	R2	3	2.0	0.405	7.6	LOS A	1.8	45.5	0.37	0.27	33.2
Approach		437	2.0	0.405	7.6	LOS A	1.8	45.5	0.37	0.27	34.3
West: Lincoln Road											
5	L2	22	2.0	0.040	3.2	LOS A	0.0	0.0	0.00	0.00	37.1
2	T1	28	2.0	0.040	3.2	LOS A	0.0	0.0	0.00	0.00	37.0
Approach		51	2.0	0.040	3.2	LOS A	0.0	0.0	0.00	0.00	37.0
All Vehicles		693	2.0	0.405	6.2	LOS A	1.8	45.5	0.27	0.18	34.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - AM

N.5 - Single-Lane Roundabout w/ RT Bypass

Roundabout
Design Life Analysis (Final Year): Results for 5 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	171	2.0	0.122	0.2	LOS A	0.6	15.4	0.17	0.06	34.8
8	T1	2	2.0	0.122	0.2	LOS A	0.6	15.4	0.17	0.06	34.7
18	R2	33	2.0	0.023	0.1	LOS A	0.1	2.6	0.11	0.03	36.9
Approach		206	2.0	0.122	0.2	LOS A	0.6	15.4	0.16	0.05	35.1
East: Lincoln Road											
6	T1	434	2.0	0.425	1.7	LOS A	2.8	72.4	0.51	0.35	36.6
16	R2	3	2.0	0.425	1.7	LOS A	2.8	72.4	0.51	0.35	35.4
Approach		437	2.0	0.425	1.7	LOS A	2.8	72.4	0.51	0.35	36.6
West: Lincoln Road											
5	L2	22	2.0	0.041	0.0	LOS A	0.0	0.0	0.00	0.00	37.1
2	T1	28	2.0	0.041	0.0	LOS A	0.0	0.0	0.00	0.00	37.0
Approach		51	2.0	0.041	0.0	LOS A	0.0	0.0	0.00	0.00	37.0
All Vehicles		693	2.0	0.425	1.1	LOS A	2.8	72.4	0.37	0.24	36.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - PM

N.5 - Single-Lane Roundabout w/ RT Bypass

Roundabout
Design Life Analysis (Final Year): Results for 5 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	697	2.0	0.610	11.0	LOS B	3.9	99.1	0.40	0.25	30.3
8	T1	1	2.0	0.610	11.0	LOS B	3.9	99.1	0.40	0.25	30.1
18	R2	184	2.0	0.157	4.4	LOS A	0.5	13.6	0.18	0.09	34.7
Approach		883	2.0	0.610	9.6	LOS A	3.9	99.1	0.36	0.22	31.0
East: Lincoln Road											
6	T1	185	2.0	0.265	8.2	LOS A	0.9	22.5	0.55	0.55	33.9
16	R2	2	2.0	0.265	8.2	LOS A	0.9	22.5	0.55	0.55	32.9
Approach		187	2.0	0.265	8.2	LOS A	0.9	22.5	0.55	0.55	33.9
West: Lincoln Road											
5	L2	31	2.0	0.095	3.6	LOS A	0.0	0.0	0.00	0.00	37.8
2	T1	89	2.0	0.095	3.6	LOS A	0.0	0.0	0.00	0.00	37.6
Approach		120	2.0	0.095	3.6	LOS A	0.0	0.0	0.00	0.00	37.7
All Vehicles		1190	2.0	0.610	8.8	LOS A	3.9	99.1	0.35	0.25	32.0

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - PM

N.5 - Single-Lane Roundabout w/ RT Bypass

Roundabout
Design Life Analysis (Final Year): Results for 5 years

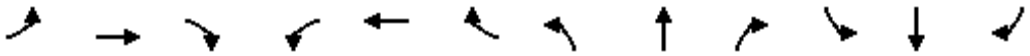
Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	697	2.0	0.522	0.9	LOS A	4.0	102.5	0.41	0.23	34.2
8	T1	1	2.0	0.522	0.9	LOS A	4.0	102.5	0.41	0.23	34.0
18	R2	184	2.0	0.134	0.4	LOS A	0.7	17.1	0.23	0.10	36.6
Approach		883	2.0	0.522	0.8	LOS A	4.0	102.5	0.37	0.20	34.6
East: Lincoln Road											
6	T1	185	2.0	0.306	6.0	LOS A	1.9	48.6	0.80	0.76	35.1
16	R2	2	2.0	0.306	6.0	LOS A	1.9	48.6	0.80	0.76	34.0
Approach		187	2.0	0.306	6.0	LOS A	1.9	48.6	0.80	0.76	35.1
West: Lincoln Road											
5	L2	31	2.0	0.097	0.0	LOS A	0.0	0.0	0.00	0.00	37.8
2	T1	89	2.0	0.097	0.0	LOS A	0.0	0.0	0.00	0.00	37.6
Approach		120	2.0	0.097	0.0	LOS A	0.0	0.0	0.00	0.00	37.7
All Vehicles		1190	2.0	0.522	1.6	LOS A	4.0	102.5	0.40	0.27	35.0

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPENDIX D

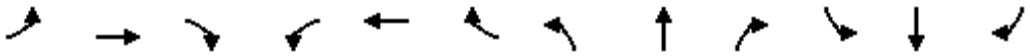
Interim Year (2028)
Operational Analysis



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	57	306	41	21	94	42	29	47	48	240	99	87
Peak Hour Factor	0.96	0.96	0.96	0.94	0.94	0.94	0.82	0.82	0.82	0.84	0.84	0.84
Hourly flow rate (vph)	84	449	60	34	154	69	59	96	98	480	198	174

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	593	257	254	852
Volume Left (vph)	84	34	59	480
Volume Right (vph)	60	69	98	174
Hadj (s)	0.00	-0.10	-0.15	0.02
Departure Headway (s)	7.7	8.4	8.4	7.7
Degree Utilization, x	1.0	0.60	0.59	1.0
Capacity (veh/h)	475	412	413	470
Control Delay (s)	160.4	23.2	22.8	398.5
Approach Delay (s)	160.4	23.2	22.8	398.5
Approach LOS	F	C	C	F

Intersection Summary			
Delay	228.2		
Level of Service	F		
Intersection Capacity Utilization	103.4%	ICU Level of Service	G
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	54	107	23	31	198	255	37	122	33	90	60	52
Peak Hour Factor	0.89	0.89	0.89	0.88	0.88	0.88	0.98	0.98	0.98	0.89	0.89	0.89
Hourly flow rate (vph)	86	170	36	54	346	446	63	209	57	170	113	98

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	292	847	329	381
Volume Left (vph)	86	54	63	170
Volume Right (vph)	36	446	57	98
Hadj (s)	0.02	-0.27	-0.03	-0.03
Departure Headway (s)	8.7	7.9	8.5	8.3
Degree Utilization, x	0.71	1.0	0.78	0.88
Capacity (veh/h)	390	454	400	424
Control Delay (s)	30.1	416.4	35.4	47.1
Approach Delay (s)	30.1	416.4	35.4	47.1
Approach LOS	D	F	E	E

Intersection Summary			
Delay	211.5		
Level of Service	F		
Intersection Capacity Utilization	89.8%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	57	306	41	21	94	42	29	47	48	240	99	87
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	190.0	186.3	190.0	190.0	186.3	186.3	186.3	186.3	190.0	186.3	186.3	190.0
Adj Flow Rate, veh/h	86	459	62	34	154	69	52	84	86	429	177	155
Adj No. of Lanes	0	1	0	0	1	1	1	1	0	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	143	558	72	138	555	919	325	135	138	513	270	236
Arrive On Green	0.41	0.41	0.41	0.41	0.41	0.41	0.04	0.16	0.16	0.17	0.29	0.29
Sat Flow, veh/h	176	1372	176	157	1363	1583	1774	845	865	1774	917	803
Grp Volume(v), veh/h	607	0	0	188	0	69	52	0	170	429	0	332
Grp Sat Flow(s),veh/h/ln	1724	0	0	1520	0	1583	1774	0	1710	1774	0	1721
Q Serve(g_s), s	12.2	0.0	0.0	0.0	0.0	1.1	1.4	0.0	5.4	10.0	0.0	9.7
Cycle Q Clear(g_c), s	18.4	0.0	0.0	3.8	0.0	1.1	1.4	0.0	5.4	10.0	0.0	9.7
Prop In Lane	0.14		0.10	0.18		1.00	1.00		0.51	1.00		0.47
Lane Grp Cap(c), veh/h	773	0	0	692	0	919	325	0	273	513	0	506
V/C Ratio(X)	0.79	0.00	0.00	0.27	0.00	0.08	0.16	0.00	0.62	0.84	0.00	0.66
Avail Cap(c_a), veh/h	905	0	0	814	0	1043	378	0	504	513	0	686
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.5	0.0	0.0	11.3	0.0	5.3	19.1	0.0	22.6	16.9	0.0	17.8
Incr Delay (d2), s/veh	4.0	0.0	0.0	0.2	0.0	0.0	0.2	0.0	2.3	11.5	0.0	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.6	0.0	0.0	2.0	0.0	0.5	0.7	0.0	2.7	3.6	0.0	4.8
LnGrp Delay(d),s/veh	19.4	0.0	0.0	11.5	0.0	5.3	19.3	0.0	24.9	28.3	0.0	19.3
LnGrp LOS	B			B		A	B		C	C		B
Approach Vol, veh/h		607			257			222			761	
Approach Delay, s/veh		19.4			9.8			23.6			24.4	
Approach LOS		B			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	15.0	14.2		28.5	7.3	21.9		28.5
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0
Max Green Setting (Gmax), s	10.0	17.0		28.0	4.0	23.0		28.0
Max Q Clear Time (g_c+I1), s	12.0	7.4		20.4	3.4	11.7		5.8
Green Ext Time (p_c), s	0.0	1.9		3.0	0.0	2.0		5.3

Intersection Summary	
HCM 2010 Ctrl Delay	20.6
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	54	107	23	31	198	255	37	122	33	90	60	52
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	190.0	186.3	190.0	190.0	186.3	186.3	186.3	186.3	190.0	186.3	186.3	190.0
Adj Flow Rate, veh/h	84	166	36	52	335	432	68	225	61	166	111	96
Adj No. of Lanes	0	1	0	0	1	1	1	1	0	1	1	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	139	245	44	117	540	689	507	435	118	468	321	278
Arrive On Green	0.35	0.35	0.35	0.35	0.35	0.35	0.05	0.31	0.31	0.09	0.35	0.35
Sat Flow, veh/h	171	702	126	136	1545	1583	1774	1412	383	1774	923	799
Grp Volume(v), veh/h	286	0	0	387	0	432	68	0	286	166	0	207
Grp Sat Flow(s),veh/h/ln	999	0	0	1680	0	1583	1774	0	1795	1774	0	1722
Q Serve(g_s), s	5.7	0.0	0.0	0.0	0.0	12.4	1.5	0.0	7.7	3.7	0.0	5.2
Cycle Q Clear(g_c), s	16.5	0.0	0.0	10.8	0.0	12.4	1.5	0.0	7.7	3.7	0.0	5.2
Prop In Lane	0.29		0.13	0.13		1.00	1.00		0.21	1.00		0.46
Lane Grp Cap(c), veh/h	429	0	0	657	0	689	507	0	553	468	0	599
V/C Ratio(X)	0.67	0.00	0.00	0.59	0.00	0.63	0.13	0.00	0.52	0.35	0.00	0.35
Avail Cap(c_a), veh/h	462	0	0	704	0	732	548	0	553	468	0	599
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	17.0	0.0	0.0	15.7	0.0	12.8	12.8	0.0	16.6	12.4	0.0	14.1
Incr Delay (d2), s/veh	3.3	0.0	0.0	1.1	0.0	1.6	0.1	0.0	3.4	0.5	0.0	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.7	0.0	0.0	5.4	0.0	5.7	0.7	0.0	4.3	1.8	0.0	2.7
LnGrp Delay(d),s/veh	20.3	0.0	0.0	16.8	0.0	14.4	12.9	0.0	20.1	12.9	0.0	15.7
LnGrp LOS	C			B		B	B		C	B		B
Approach Vol, veh/h		286			819			354			373	
Approach Delay, s/veh		20.3			15.5			18.7			14.4	
Approach LOS		C			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	10.0	23.0		25.4	7.7	25.3		25.4
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0
Max Green Setting (Gmax), s	5.0	18.0		22.0	4.0	19.0		22.0
Max Q Clear Time (g_c+I1), s	5.7	9.7		18.5	3.5	7.2		14.4
Green Ext Time (p_c), s	0.0	1.6		1.9	0.0	2.0		3.5

Intersection Summary	
HCM 2010 Ctrl Delay	16.7
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	57	306	41	21	94	42	29	47	48	240	99	87
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	86	459	62	34	154	69	52	84	86	429	177	155
Adj No. of Lanes	1	1	0	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	533	568	77	264	615	721	273	140	143	439	230	201
Arrive On Green	0.05	0.35	0.35	0.03	0.33	0.33	0.04	0.17	0.17	0.13	0.25	0.25
Sat Flow, veh/h	1774	1607	217	1774	1863	1583	1774	845	865	1774	917	803
Grp Volume(v), veh/h	86	0	521	34	154	69	52	0	170	429	0	332
Grp Sat Flow(s),veh/h/ln	1774	0	1824	1774	1863	1583	1774	0	1710	1774	0	1721
Q Serve(g_s), s	1.7	0.0	14.5	0.7	3.4	1.4	1.3	0.0	5.2	7.0	0.0	10.0
Cycle Q Clear(g_c), s	1.7	0.0	14.5	0.7	3.4	1.4	1.3	0.0	5.2	7.0	0.0	10.0
Prop In Lane	1.00		0.12	1.00		1.00	1.00		0.51	1.00		0.47
Lane Grp Cap(c), veh/h	533	0	645	264	615	721	273	0	283	439	0	431
V/C Ratio(X)	0.16	0.00	0.81	0.13	0.25	0.10	0.19	0.00	0.60	0.98	0.00	0.77
Avail Cap(c_a), veh/h	630	0	945	418	981	1032	393	0	586	439	0	621
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.1	0.0	16.4	13.3	13.7	8.7	18.5	0.0	21.7	19.9	0.0	19.5
Incr Delay (d2), s/veh	0.1	0.0	3.3	0.2	0.2	0.1	0.3	0.0	2.1	37.0	0.0	3.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.0	7.8	0.4	1.7	0.6	0.7	0.0	2.6	7.7	0.0	5.1
LnGrp Delay(d),s/veh	11.3	0.0	19.7	13.5	13.9	8.7	18.8	0.0	23.7	57.0	0.0	23.1
LnGrp LOS	B		B	B	B	A	B		C	E		C
Approach Vol, veh/h		607			257			222			761	
Approach Delay, s/veh		18.5			12.5			22.6			42.2	
Approach LOS		B			B			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.0	15.8	4.6	25.6	5.2	20.5	6.0	24.3
Change Period (Y+Rc), s	3.0	6.5	3.0	5.8	3.0	6.5	3.0	5.8
Max Green Setting (Gmax), s	7.0	19.2	6.5	29.0	6.0	20.2	6.0	29.5
Max Q Clear Time (g_c+I1), s	9.0	7.2	2.7	16.5	3.3	12.0	3.7	5.4
Green Ext Time (p_c), s	0.0	2.1	0.0	3.3	0.0	1.7	0.0	4.2

Intersection Summary	
HCM 2010 Ctrl Delay	27.9
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	54	107	23	31	198	255	37	122	33	90	60	52
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	84	166	36	52	335	432	68	225	61	166	111	96
Adj No. of Lanes	1	1	0	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	302	476	103	447	574	626	463	407	110	427	307	266
Arrive On Green	0.05	0.32	0.32	0.04	0.31	0.31	0.04	0.29	0.29	0.09	0.33	0.33
Sat Flow, veh/h	1774	1484	322	1774	1863	1583	1774	1412	383	1774	923	799
Grp Volume(v), veh/h	84	0	202	52	335	432	68	0	286	166	0	207
Grp Sat Flow(s),veh/h/ln	1774	0	1806	1774	1863	1583	1774	0	1795	1774	0	1722
Q Serve(g_s), s	2.2	0.0	5.9	1.4	10.4	15.5	1.8	0.0	9.2	4.2	0.0	6.2
Cycle Q Clear(g_c), s	2.2	0.0	5.9	1.4	10.4	15.5	1.8	0.0	9.2	4.2	0.0	6.2
Prop In Lane	1.00		0.18	1.00		1.00	1.00		0.21	1.00		0.46
Lane Grp Cap(c), veh/h	302	0	579	447	574	626	463	0	517	427	0	573
V/C Ratio(X)	0.28	0.00	0.35	0.12	0.58	0.69	0.15	0.00	0.55	0.39	0.00	0.36
Avail Cap(c_a), veh/h	370	0	766	537	790	809	544	0	517	453	0	573
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.7	0.0	17.8	15.3	20.0	17.2	16.0	0.0	20.6	14.5	0.0	17.3
Incr Delay (d2), s/veh	0.5	0.0	0.4	0.1	0.9	1.7	0.1	0.0	4.2	0.6	0.0	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.0	3.0	0.7	5.5	7.1	0.9	0.0	5.1	2.1	0.0	3.2
LnGrp Delay(d),s/veh	16.2	0.0	18.1	15.4	20.9	18.9	16.2	0.0	24.8	15.0	0.0	19.1
LnGrp LOS	B		B	B	C	B	B		C	B		B
Approach Vol, veh/h		286			819			354			373	
Approach Delay, s/veh		17.6			19.5			23.2			17.3	
Approach LOS		B			B			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	26.2	5.5	27.7	5.9	29.3	6.4	26.9
Change Period (Y+Rc), s	3.0	6.5	3.0	5.8	3.0	6.5	3.0	5.8
Max Green Setting (Gmax), s	7.0	19.7	6.0	29.0	6.0	20.7	6.0	29.0
Max Q Clear Time (g_c+I1), s	6.2	11.2	3.4	7.9	3.8	8.2	4.2	17.5
Green Ext Time (p_c), s	0.0	1.6	0.0	4.5	0.0	2.0	0.0	3.6

Intersection Summary	
HCM 2010 Ctrl Delay	19.5
HCM 2010 LOS	B

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - AM

L.4 - Single-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 15 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	60	2.0	0.450	13.7	LOS B	1.8	45.4	0.69	0.73	35.7
8	T1	96	2.0	0.450	13.7	LOS B	1.8	45.4	0.69	0.73	35.8
18	R2	99	2.0	0.450	13.7	LOS B	1.8	45.4	0.69	0.73	34.8
Approach		255	2.0	0.450	13.7	LOS B	1.8	45.4	0.69	0.73	35.4
East: Lincoln Road											
1	L2	34	2.0	0.247	5.8	LOS A	0.9	22.9	0.34	0.25	37.3
6	T1	154	2.0	0.247	5.8	LOS A	0.9	22.9	0.34	0.25	37.2
16	R2	69	2.0	0.247	5.8	LOS A	0.9	22.9	0.34	0.25	36.0
Approach		258	2.0	0.247	5.8	LOS A	0.9	22.9	0.34	0.25	36.9
North: N Montana Avenue											
7	L2	479	2.0	0.822	21.3	LOS C	9.8	249.3	0.82	0.76	31.1
4	T1	198	2.0	0.822	21.3	LOS C	9.8	249.3	0.82	0.76	31.3
14	R2	174	2.0	0.822	21.3	LOS C	9.8	249.3	0.82	0.76	30.5
Approach		851	2.0	0.822	21.3	LOS C	9.8	249.3	0.82	0.76	31.0
West: Lincoln Road											
5	L2	83	2.0	0.824	28.1	LOS D	7.0	177.3	0.86	1.05	27.3
2	T1	447	2.0	0.824	28.1	LOS D	7.0	177.3	0.86	1.05	27.3
12	R2	60	2.0	0.824	28.1	LOS D	7.0	177.3	0.86	1.05	26.7
Approach		591	2.0	0.824	28.1	LOS D	7.0	177.3	0.86	1.05	27.3
All Vehicles		1954	2.0	0.824	20.3	LOS C	9.8	249.3	0.75	0.78	30.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - AM

L.4 - Single-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 15 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	60	2.0	0.586	16.6	LOS B	5.2	132.0	0.97	1.08	34.1
8	T1	96	2.0	0.586	16.6	LOS B	5.2	132.0	0.97	1.08	34.3
18	R2	99	2.0	0.586	16.6	LOS B	5.2	132.0	0.97	1.08	33.3
Approach		255	2.0	0.586	16.6	LOS B	5.2	132.0	0.97	1.08	33.9
East: Lincoln Road											
1	L2	34	2.0	0.275	1.7	LOS A	1.7	43.8	0.52	0.37	39.1
6	T1	154	2.0	0.275	1.7	LOS A	1.7	43.8	0.52	0.37	39.1
16	R2	69	2.0	0.275	1.7	LOS A	1.7	43.8	0.52	0.37	37.8
Approach		258	2.0	0.275	1.7	LOS A	1.7	43.8	0.52	0.37	38.7
North: N Montana Avenue											
7	L2	479	2.0	0.916	14.6	LOS B	22.2	564.2	1.00	1.03	34.2
4	T1	198	2.0	0.916	14.6	LOS B	22.2	564.2	1.00	1.03	34.3
14	R2	174	2.0	0.916	14.6	LOS B	22.2	564.2	1.00	1.03	33.4
Approach		851	2.0	0.916	14.6	LOS B	22.2	564.2	1.00	1.03	34.1
West: Lincoln Road											
5	L2	83	2.0	1.161	101.2	LOS F	44.1	1119.8	1.00	2.22	14.6
2	T1	447	2.0	1.161	101.2	LOS F	44.1	1119.8	1.00	2.22	14.6
12	R2	60	2.0	1.161	101.2	LOS F	44.1	1119.8	1.00	2.22	14.4
Approach		591	2.0	1.161	101.2	LOS F	44.1	1119.8	1.00	2.22	14.6
All Vehicles		1954	2.0	1.161	39.4	LOS D	44.1	1119.8	0.93	1.31	24.5

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - PM

L.4 - Single-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 15 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	63	2.0	0.365	8.1	LOS A	1.4	36.1	0.49	0.47	39.3
8	T1	209	2.0	0.365	8.1	LOS A	1.4	36.1	0.49	0.47	39.5
18	R2	56	2.0	0.365	8.1	LOS A	1.4	36.1	0.49	0.47	38.2
Approach		328	2.0	0.365	8.1	LOS A	1.4	36.1	0.49	0.47	39.2
East: Lincoln Road											
1	L2	54	2.0	0.887	29.2	LOS D	12.5	317.5	0.97	1.13	27.0
6	T1	344	2.0	0.887	29.2	LOS D	12.5	317.5	0.97	1.13	27.0
16	R2	443	2.0	0.887	29.2	LOS D	12.5	317.5	0.97	1.13	26.3
Approach		842	2.0	0.887	29.2	LOS D	12.5	317.5	0.97	1.13	26.6
North: N Montana Avenue											
7	L2	170	2.0	0.437	9.5	LOS A	1.9	48.8	0.54	0.55	37.4
4	T1	113	2.0	0.437	9.5	LOS A	1.9	48.8	0.54	0.55	37.6
14	R2	98	2.0	0.437	9.5	LOS A	1.9	48.8	0.54	0.55	36.5
Approach		382	2.0	0.437	9.5	LOS A	1.9	48.8	0.54	0.55	37.2
West: Lincoln Road											
5	L2	86	2.0	0.303	6.9	LOS A	1.1	29.0	0.42	0.36	36.1
2	T1	170	2.0	0.303	6.9	LOS A	1.1	29.0	0.42	0.36	36.1
12	R2	37	2.0	0.303	6.9	LOS A	1.1	29.0	0.42	0.36	34.9
Approach		292	2.0	0.303	6.9	LOS A	1.1	29.0	0.42	0.36	35.9
All Vehicles		1844	2.0	0.887	17.8	LOS C	12.5	317.5	0.71	0.77	31.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - PM

L.4 - Single-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 15 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	63	2.0	0.415	3.7	LOS A	2.7	68.5	0.70	0.61	42.1
8	T1	209	2.0	0.415	3.7	LOS A	2.7	68.5	0.70	0.61	42.3
18	R2	56	2.0	0.415	3.7	LOS A	2.7	68.5	0.70	0.61	40.9
Approach		328	2.0	0.415	3.7	LOS A	2.7	68.5	0.70	0.61	42.0
East: Lincoln Road											
1	L2	54	2.0	1.010	35.7	LOS F	34.4	874.7	1.00	1.55	25.0
6	T1	344	2.0	1.010	35.7	LOS F	34.4	874.7	1.00	1.55	25.0
16	R2	443	2.0	1.010	35.7	LOS F	34.4	874.7	1.00	1.55	24.5
Approach		842	2.0	1.010	35.7	LOS E	34.4	874.7	1.00	1.55	24.7
North: N Montana Avenue											
7	L2	170	2.0	0.534	5.4	LOS A	4.5	113.9	0.83	0.79	40.1
4	T1	113	2.0	0.534	5.4	LOS A	4.5	113.9	0.83	0.79	40.3
14	R2	98	2.0	0.534	5.4	LOS A	4.5	113.9	0.83	0.79	39.0
Approach		382	2.0	0.534	5.4	LOS A	4.5	113.9	0.83	0.79	39.8
West: Lincoln Road											
5	L2	86	2.0	0.350	2.7	LOS A	2.3	58.2	0.64	0.51	38.0
2	T1	170	2.0	0.350	2.7	LOS A	2.3	58.2	0.64	0.51	38.0
12	R2	37	2.0	0.350	2.7	LOS A	2.3	58.2	0.64	0.51	36.7
Approach		292	2.0	0.350	2.7	LOS A	2.3	58.2	0.64	0.51	37.8
All Vehicles		1844	2.0	1.010	18.5	LOS C	34.4	874.7	0.85	1.06	31.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - AM

L.5 - Single-Lane Roundabout w/ RT Bypass
Roundabout
Design Life Analysis (Final Year): Results for 15 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	60	2.0	0.450	13.7	LOS B	1.8	45.4	0.69	0.73	35.7
8	T1	96	2.0	0.450	13.7	LOS B	1.8	45.4	0.69	0.73	35.8
18	R2	99	2.0	0.450	13.7	LOS B	1.8	45.4	0.69	0.73	34.8
Approach		255	2.0	0.450	13.7	LOS B	1.8	45.4	0.69	0.73	35.4
East: Lincoln Road											
1	L2	34	2.0	0.181	5.1	LOS A	0.6	15.7	0.32	0.23	37.5
6	T1	154	2.0	0.181	5.1	LOS A	0.6	15.7	0.32	0.23	37.5
16	R2	69	2.0	0.063	3.8	LOS A	0.2	4.9	0.25	0.14	37.6
Approach		258	2.0	0.181	4.8	LOS A	0.6	15.7	0.30	0.21	37.5
North: N Montana Avenue											
7	L2	479	2.0	0.822	21.3	LOS C	9.8	249.3	0.82	0.76	31.1
4	T1	198	2.0	0.822	21.3	LOS C	9.8	249.3	0.82	0.76	31.3
14	R2	174	2.0	0.822	21.3	LOS C	9.8	249.3	0.82	0.76	30.5
Approach		851	2.0	0.822	21.3	LOS C	9.8	249.3	0.82	0.76	31.0
West: Lincoln Road											
5	L2	83	2.0	0.824	28.1	LOS D	7.0	177.3	0.86	1.05	27.3
2	T1	447	2.0	0.824	28.1	LOS D	7.0	177.3	0.86	1.05	27.3
12	R2	60	2.0	0.824	28.1	LOS D	7.0	177.3	0.86	1.05	26.7
Approach		591	2.0	0.824	28.1	LOS D	7.0	177.3	0.86	1.05	27.3
All Vehicles		1954	2.0	0.824	20.2	LOS C	9.8	249.3	0.75	0.77	30.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - AM

L.5 - Single-Lane Roundabout w/ RT Bypass
Roundabout
Design Life Analysis (Final Year): Results for 15 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	60	2.0	0.586	16.6	LOS C	5.2	132.0	0.97	1.08	34.1
8	T1	96	2.0	0.586	16.6	LOS C	5.2	132.0	0.97	1.08	34.3
18	R2	99	2.0	0.586	16.6	LOS C	5.2	132.0	0.97	1.08	33.3
Approach		255	2.0	0.586	16.6	LOS C	5.2	132.0	0.97	1.08	33.9
East: Lincoln Road											
1	L2	34	2.0	0.161	1.1	LOS A	1.0	24.7	0.45	0.28	39.1
6	T1	154	2.0	0.161	1.1	LOS A	1.0	24.7	0.45	0.28	39.1
16	R2	69	2.0	0.056	0.7	LOS A	0.3	7.7	0.35	0.18	39.1
Approach		258	2.0	0.161	1.0	LOS A	1.0	24.7	0.42	0.25	39.1
North: N Montana Avenue											
7	L2	479	2.0	0.913	14.3	LOS B	21.8	554.2	1.00	1.02	34.3
4	T1	198	2.0	0.913	14.3	LOS B	21.8	554.2	1.00	1.02	34.5
14	R2	174	2.0	0.913	14.3	LOS B	21.8	554.2	1.00	1.02	33.5
Approach		851	2.0	0.913	14.3	LOS B	21.8	554.2	1.00	1.02	34.2
West: Lincoln Road											
5	L2	83	2.0	1.161	101.2	LOS F	44.1	1119.8	1.00	2.22	14.6
2	T1	447	2.0	1.161	101.2	LOS F	44.1	1119.8	1.00	2.22	14.6
12	R2	60	2.0	1.161	101.2	LOS F	44.1	1119.8	1.00	2.22	14.4
Approach		591	2.0	1.161	101.2	LOS F	44.1	1119.8	1.00	2.22	14.6
All Vehicles		1954	2.0	1.161	39.1	LOS E	44.1	1119.8	0.92	1.29	24.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - PM

L.5 - Single-Lane Roundabout w/ RT Bypass
Roundabout
Design Life Analysis (Final Year): Results for 15 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	63	2.0	0.365	8.1	LOS A	1.4	36.1	0.49	0.47	39.3
8	T1	209	2.0	0.365	8.1	LOS A	1.4	36.1	0.49	0.47	39.5
18	R2	56	2.0	0.365	8.1	LOS A	1.4	36.1	0.49	0.47	38.2
Approach		328	2.0	0.365	8.1	LOS A	1.4	36.1	0.49	0.47	39.2
East: Lincoln Road											
1	L2	54	2.0	0.419	8.6	LOS A	1.8	45.1	0.49	0.44	35.7
6	T1	344	2.0	0.419	8.6	LOS A	1.8	45.1	0.49	0.44	35.7
16	R2	443	2.0	0.444	8.7	LOS A	2.0	50.2	0.46	0.39	34.8
Approach		842	2.0	0.444	8.6	LOS A	2.0	50.2	0.47	0.42	35.2
North: N Montana Avenue											
7	L2	170	2.0	0.437	9.5	LOS A	1.9	48.8	0.54	0.55	37.4
4	T1	113	2.0	0.437	9.5	LOS A	1.9	48.8	0.54	0.55	37.6
14	R2	98	2.0	0.437	9.5	LOS A	1.9	48.8	0.54	0.55	36.5
Approach		382	2.0	0.437	9.5	LOS A	1.9	48.8	0.54	0.55	37.2
West: Lincoln Road											
5	L2	86	2.0	0.303	6.9	LOS A	1.1	29.0	0.42	0.36	36.1
2	T1	170	2.0	0.303	6.9	LOS A	1.1	29.0	0.42	0.36	36.1
12	R2	37	2.0	0.303	6.9	LOS A	1.1	29.0	0.42	0.36	34.9
Approach		292	2.0	0.303	6.9	LOS A	1.1	29.0	0.42	0.36	35.9
All Vehicles		1844	2.0	0.444	8.4	LOS A	2.0	50.2	0.48	0.44	36.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - PM

L.5 - Single-Lane Roundabout w/ RT Bypass
Roundabout
Design Life Analysis (Final Year): Results for 15 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	63	2.0	0.415	3.7	LOS A	2.7	68.4	0.70	0.61	42.1
8	T1	209	2.0	0.415	3.7	LOS A	2.7	68.4	0.70	0.61	42.3
18	R2	56	2.0	0.415	3.7	LOS A	2.7	68.4	0.70	0.61	40.9
Approach		328	2.0	0.415	3.7	LOS A	2.7	68.4	0.70	0.61	42.0
East: Lincoln Road											
1	L2	54	2.0	0.376	2.2	LOS A	2.6	66.3	0.63	0.46	38.5
6	T1	344	2.0	0.376	2.2	LOS A	2.6	66.3	0.63	0.46	38.5
16	R2	443	2.0	0.396	1.8	LOS A	2.8	71.0	0.59	0.43	38.4
Approach		842	2.0	0.396	2.0	LOS A	2.8	71.0	0.61	0.44	38.4
North: N Montana Avenue											
7	L2	170	2.0	0.512	5.2	LOS A	4.0	102.4	0.79	0.75	40.2
4	T1	113	2.0	0.512	5.2	LOS A	4.0	102.4	0.79	0.75	40.4
14	R2	98	2.0	0.512	5.2	LOS A	4.0	102.4	0.79	0.75	39.1
Approach		382	2.0	0.512	5.2	LOS A	4.0	102.4	0.79	0.75	40.0
West: Lincoln Road											
5	L2	86	2.0	0.348	2.7	LOS A	2.3	57.6	0.64	0.51	38.0
2	T1	170	2.0	0.348	2.7	LOS A	2.3	57.6	0.64	0.51	38.0
12	R2	37	2.0	0.348	2.7	LOS A	2.3	57.6	0.64	0.51	36.7
Approach		292	2.0	0.348	2.7	LOS A	2.3	57.6	0.64	0.51	37.8
All Vehicles		1844	2.0	0.512	3.1	LOS A	4.0	102.4	0.67	0.55	39.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - AM

L.6 - Multi-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 15 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	60	2.0	0.260	9.4	LOS A	0.8	20.3	0.60	0.60	38.3
8	T1	96	2.0	0.260	9.4	LOS A	0.8	20.3	0.60	0.60	38.3
18	R2	99	2.0	0.164	8.0	LOS A	0.5	12.1	0.57	0.57	39.3
Approach		255	2.0	0.260	8.9	LOS A	0.8	20.3	0.59	0.59	38.7
East: Lincoln Road											
1	L2	34	2.0	0.181	5.1	LOS A	0.6	15.7	0.32	0.23	38.4
6	T1	154	2.0	0.181	5.1	LOS A	0.6	15.7	0.32	0.23	38.3
16	R2	69	2.0	0.063	3.8	LOS A	0.2	4.9	0.25	0.14	38.1
Approach		258	2.0	0.181	4.8	LOS A	0.6	15.7	0.30	0.21	38.3
North: N Montana Avenue											
7	L2	479	2.0	0.463	8.8	LOS A	2.2	54.7	0.44	0.35	36.4
4	T1	198	2.0	0.359	7.2	LOS A	1.5	37.4	0.39	0.30	41.5
14	R2	174	2.0	0.359	7.2	LOS A	1.5	37.4	0.39	0.30	39.9
Approach		851	2.0	0.463	8.1	LOS A	2.2	54.7	0.42	0.33	38.1
West: Lincoln Road											
5	L2	83	2.0	0.112	6.0	LOS A	0.3	8.2	0.47	0.47	34.8
2	T1	447	2.0	0.679	17.8	LOS C	4.0	101.3	0.73	0.82	32.2
12	R2	60	2.0	0.679	17.8	LOS C	4.0	101.3	0.73	0.82	31.0
Approach		591	2.0	0.679	16.1	LOS C	4.0	101.3	0.69	0.77	32.4
All Vehicles		1954	2.0	0.679	10.2	LOS B	4.0	101.3	0.51	0.48	36.3

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - AM

L.6 - Multi-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 15 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	60	2.0	0.220	3.2	LOS A	1.0	24.6	0.66	0.59	41.9
8	T1	96	2.0	0.220	3.2	LOS A	1.0	24.6	0.66	0.59	41.9
18	R2	99	2.0	0.170	4.0	LOS A	0.7	17.7	0.65	0.65	42.3
Approach		255	2.0	0.220	3.5	LOS A	1.0	24.6	0.66	0.61	42.1
East: Lincoln Road											
1	L2	34	2.0	0.139	0.9	LOS A	0.8	20.6	0.42	0.24	40.0
6	T1	154	2.0	0.139	0.9	LOS A	0.8	20.6	0.42	0.24	40.0
16	R2	69	2.0	0.049	0.6	LOS A	0.3	6.5	0.33	0.16	39.6
Approach		258	2.0	0.139	0.8	LOS A	0.8	20.6	0.39	0.22	39.9
North: N Montana Avenue											
7	L2	479	2.0	0.354	1.2	LOS A	2.4	60.9	0.49	0.32	40.1
4	T1	198	2.0	0.326	1.5	LOS A	2.1	52.8	0.50	0.35	44.9
14	R2	174	2.0	0.326	1.5	LOS A	2.1	52.8	0.50	0.35	43.0
Approach		851	2.0	0.354	1.3	LOS A	2.4	60.9	0.50	0.33	41.6
West: Lincoln Road											
5	L2	83	2.0	0.187	5.4	LOS A	0.7	18.6	0.63	0.63	35.1
2	T1	447	2.0	0.619	5.2	LOS A	4.5	114.6	0.77	0.81	38.8
12	R2	60	2.0	0.619	5.2	LOS A	4.5	114.6	0.77	0.81	37.1
Approach		591	2.0	0.619	5.2	LOS A	4.5	114.6	0.75	0.78	38.1
All Vehicles		1954	2.0	0.619	2.7	LOS A	4.5	114.6	0.58	0.49	40.3

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - PM

L.6 - Multi-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 15 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	63	2.0	0.295	7.0	LOS A	1.0	25.9	0.44	0.41	40.5
8	T1	209	2.0	0.295	7.0	LOS A	1.0	25.9	0.44	0.41	40.6
18	R2	56	2.0	0.061	4.5	LOS A	0.2	4.4	0.36	0.29	41.9
Approach		328	2.0	0.295	6.6	LOS A	1.0	25.9	0.42	0.38	40.8
East: Lincoln Road											
1	L2	54	2.0	0.419	8.6	LOS A	1.8	45.1	0.49	0.44	36.5
6	T1	344	2.0	0.419	8.6	LOS A	1.8	45.1	0.49	0.44	36.4
16	R2	443	2.0	0.444	8.7	LOS A	2.0	50.2	0.46	0.39	35.2
Approach		842	2.0	0.444	8.6	LOS A	2.0	50.2	0.47	0.42	35.8
North: N Montana Avenue											
7	L2	170	2.0	0.195	6.1	LOS A	0.7	16.5	0.44	0.40	37.9
4	T1	113	2.0	0.242	6.6	LOS A	0.8	21.3	0.46	0.43	42.0
14	R2	98	2.0	0.242	6.6	LOS A	0.8	21.3	0.46	0.43	40.3
Approach		382	2.0	0.242	6.4	LOS A	0.8	21.3	0.45	0.42	39.6
West: Lincoln Road											
5	L2	86	2.0	0.087	4.4	LOS A	0.3	6.5	0.33	0.25	35.6
2	T1	170	2.0	0.210	5.7	LOS A	0.7	17.3	0.36	0.30	38.7
12	R2	37	2.0	0.210	5.7	LOS A	0.7	17.3	0.36	0.30	37.0
Approach		292	2.0	0.210	5.3	LOS A	0.7	17.3	0.35	0.29	37.5
All Vehicles		1844	2.0	0.444	7.3	LOS A	2.0	50.2	0.44	0.39	37.7

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

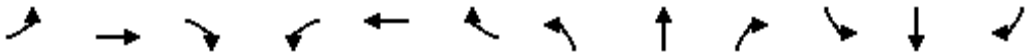
Site: Lincoln Road / N Montana Avenue - PM

L.6 - Multi-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 15 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	63	2.0	0.278	1.7	LOS A	1.3	31.8	0.49	0.37	43.4
8	T1	209	2.0	0.278	1.7	LOS A	1.3	31.8	0.49	0.37	43.5
18	R2	56	2.0	0.103	3.4	LOS A	0.4	9.7	0.51	0.45	42.8
Approach		328	2.0	0.278	2.0	LOS A	1.3	31.8	0.49	0.39	43.4
East: Lincoln Road											
1	L2	54	2.0	0.318	1.7	LOS A	2.1	54.1	0.57	0.37	39.4
6	T1	344	2.0	0.318	1.7	LOS A	2.1	54.1	0.57	0.37	39.4
16	R2	443	2.0	0.338	1.4	LOS A	2.3	57.9	0.53	0.36	38.9
Approach		842	2.0	0.338	1.5	LOS A	2.3	57.9	0.55	0.37	39.2
North: N Montana Avenue											
7	L2	170	2.0	0.183	2.5	LOS A	1.1	28.0	0.62	0.48	39.6
4	T1	113	2.0	0.185	2.0	LOS A	1.2	30.2	0.61	0.44	44.3
14	R2	98	2.0	0.185	2.0	LOS A	1.2	30.2	0.61	0.44	42.5
Approach		382	2.0	0.185	2.2	LOS A	1.2	30.2	0.61	0.46	41.6
West: Lincoln Road											
5	L2	86	2.0	0.114	1.9	LOS A	0.5	11.6	0.45	0.36	36.7
2	T1	170	2.0	0.204	1.3	LOS A	0.9	23.2	0.45	0.29	40.5
12	R2	37	2.0	0.204	1.3	LOS A	0.9	23.2	0.45	0.29	38.6
Approach		292	2.0	0.204	1.5	LOS A	0.9	23.2	0.45	0.31	39.0
All Vehicles		1844	2.0	0.338	1.8	LOS A	2.3	57.9	0.53	0.38	40.3

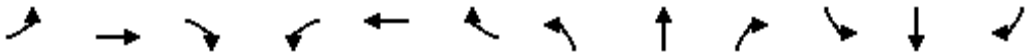
Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	44	643	187	154	0	0	0	0	2	0	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.77	0.77	0.77	0.75	0.75	0.75	0.92	0.92	0.92	0.75	0.75	0.75
Hourly flow rate (vph)	0	88	1286	419	345	0	0	0	0	3	0	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	345			1374			1914	1914	731	1914	2557	345
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	345			1374			1914	1914	731	1914	2557	345
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			16			100	100	100	77	100	98
cM capacity (veh/h)	1214			499			15	11	422	15	4	698

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	1374	764	16
Volume Left	0	419	3
Volume Right	1286	0	12
cSH	1700	499	63
Volume to Capacity	0.81	0.84	0.25
Queue Length 95th (ft)	0	212	22
Control Delay (s)	0.0	39.5	79.7
Lane LOS		E	F
Approach Delay (s)	0.0	39.5	79.7
Approach LOS			F

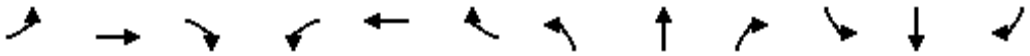
Intersection Summary			
Average Delay	14.6		
Intersection Capacity Utilization	109.1%	ICU Level of Service	H
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	81	160	30	535	0	0	0	0	10	1	30
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.89	0.89	0.89	0.92	0.92	0.92	0.68	0.68	0.68
Hourly flow rate (vph)	0	154	304	57	1010	0	0	0	0	19	2	58
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1010			458			1430	1429	306	1429	1581	1010
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1010			458			1430	1429	306	1429	1581	1010
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			95			100	100	100	82	98	80
cM capacity (veh/h)	686			1103			85	128	734	108	103	291

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	458	1067	79
Volume Left	0	57	19
Volume Right	304	0	58
cSH	1700	1103	200
Volume to Capacity	0.27	0.05	0.40
Queue Length 95th (ft)	0	4	44
Control Delay (s)	0.0	1.5	34.3
Lane LOS		A	D
Approach Delay (s)	0.0	1.5	34.3
Approach LOS			D

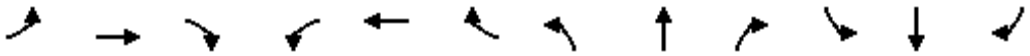
Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	85.1%	ICU Level of Service	E
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	44	643	187	154	0	0	0	0	2	0	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.77	0.77	0.77	0.75	0.75	0.75	0.92	0.92	0.92	0.75	0.75	0.75
Hourly flow rate (vph)	0	88	1286	419	345	0	0	0	0	3	0	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	345			1374			1914	1914	731	1914	2557	345
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	345			1374			1914	1914	731	1914	2557	345
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			16			100	100	100	77	100	98
cM capacity (veh/h)	1214			499			15	11	422	15	4	698

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	1374	419	345	16
Volume Left	0	419	0	3
Volume Right	1286	0	0	12
cSH	1700	499	1700	63
Volume to Capacity	0.81	0.84	0.20	0.25
Queue Length 95th (ft)	0	212	0	22
Control Delay (s)	0.0	39.5	0.0	79.7
Lane LOS		E		F
Approach Delay (s)	0.0	21.7		79.7
Approach LOS				F

Intersection Summary			
Average Delay	8.3		
Intersection Capacity Utilization	95.5%	ICU Level of Service	F
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	81	160	30	535	0	0	0	0	10	1	30
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.89	0.89	0.89	0.92	0.92	0.92	0.68	0.68	0.68
Hourly flow rate (vph)	0	154	304	57	1010	0	0	0	0	19	2	58
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1010			458			1430	1429	306	1429	1581	1010
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1010			458			1430	1429	306	1429	1581	1010
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			95			100	100	100	82	98	80
cM capacity (veh/h)	686			1103			85	128	734	108	103	291

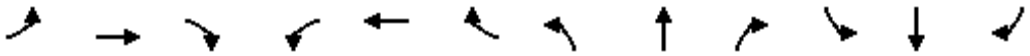
Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	458	57	1010	79
Volume Left	0	57	0	19
Volume Right	304	0	0	58
cSH	1700	1103	1700	200
Volume to Capacity	0.27	0.05	0.59	0.40
Queue Length 95th (ft)	0	4	0	44
Control Delay (s)	0.0	8.4	0.0	34.3
Lane LOS		A		D
Approach Delay (s)	0.0	0.4		34.3
Approach LOS				D

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	95.8%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	44	643	187	154	0	0	0	0	2	0	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.77	0.77	0.77	0.75	0.75	0.75	0.92	0.92	0.92	0.75	0.75	0.75
Hourly flow rate (vph)	0	88	1286	419	345	0	0	0	0	3	0	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	345			88			1271	1271	88	1271	1271	345
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	345			88			1271	1271	88	1271	1271	345
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			72			100	100	100	97	100	98
cM capacity (veh/h)	1214			1508			112	121	970	114	121	698

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	88	1286	764	16
Volume Left	0	0	419	3
Volume Right	0	1286	0	12
cSH	1700	1700	1508	326
Volume to Capacity	0.05	0.76	0.28	0.05
Queue Length 95th (ft)	0	0	29	4
Control Delay (s)	0.0	0.0	5.9	16.6
Lane LOS			A	C
Approach Delay (s)	0.0		5.9	16.6
Approach LOS				C

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	105.6%	ICU Level of Service	G
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	81	160	30	535	0	0	0	0	10	1	30
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.89	0.89	0.89	0.92	0.92	0.92	0.68	0.68	0.68
Hourly flow rate (vph)	0	154	304	57	1010	0	0	0	0	19	2	58
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1010			154			1278	1277	154	1277	1277	1010
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1010			154			1278	1277	154	1277	1277	1010
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			96			100	100	100	86	99	80
cM capacity (veh/h)	686			1426			110	160	892	139	160	291

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	154	304	1067	79
Volume Left	0	0	57	19
Volume Right	0	304	0	58
cSH	1700	1700	1426	226
Volume to Capacity	0.09	0.18	0.04	0.35
Queue Length 95th (ft)	0	0	3	37
Control Delay (s)	0.0	0.0	1.1	29.2
Lane LOS			A	D
Approach Delay (s)	0.0		1.1	29.2
Approach LOS				D

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	78.7%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	44	643	187	154	0	0	0	0	2	0	7
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1900	1863	0				1900	1863	1900
Adj Flow Rate, veh/h	0	89	1303	413	340	0				3	0	12
Adj No. of Lanes	0	1	0	0	1	0				0	1	0
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76				0.76	0.76	0.76
Percent Heavy Veh, %	0	2	2	2	2	0				0	2	0
Cap, veh/h	0	66	964	124	25	0				43	0	173
Arrive On Green	0.00	0.64	0.64	0.64	0.64	0.00				0.13	0.00	0.13
Sat Flow, veh/h	0	102	1496	0	38	0				324	0	1294
Grp Volume(v), veh/h	0	0	1392	753	0	0				15	0	0
Grp Sat Flow(s),veh/h/ln	0	0	1599	38	0	0				1618	0	0
Q Serve(g_s), s	0.0	0.0	29.0	0.0	0.0	0.0				0.4	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	29.0	29.0	0.0	0.0				0.4	0.0	0.0
Prop In Lane	0.00		0.94	0.55		0.00				0.20		0.80
Lane Grp Cap(c), veh/h	0	0	1030	148	0	0				216	0	0
V/C Ratio(X)	0.00	0.00	1.35	5.07	0.00	0.00				0.07	0.00	0.00
Avail Cap(c_a), veh/h	0	0	1030	148	0	0				216	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	1.00	1.00	0.00	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	8.0	17.8	0.0	0.0				17.1	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	164.5	1848.5	0.0	0.0				0.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	59.4	78.0	0.0	0.0				0.2	0.0	0.0
LnGrp Delay(d),s/veh	0.0	0.0	172.5	1866.3	0.0	0.0				17.7	0.0	0.0
LnGrp LOS			F	F						B		
Approach Vol, veh/h		1392			753						15	
Approach Delay, s/veh		172.5			1866.3						17.7	
Approach LOS		F			F						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				34.0		11.0		34.0
Change Period (Y+Rc), s				5.0		5.0		5.0
Max Green Setting (Gmax), s				29.0		6.0		29.0
Max Q Clear Time (g_c+I1), s				31.0		2.4		31.0
Green Ext Time (p_c), s				0.0		0.0		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	761.9
HCM 2010 LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	81	160	30	535	0	0	0	0	10	1	30
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1900	1863	0				1900	1863	1900
Adj Flow Rate, veh/h	0	142	280	57	1021	0				15	1	45
Adj No. of Lanes	0	1	0	0	1	0				0	1	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88				0.88	0.88	0.88
Percent Heavy Veh, %	0	2	2	2	2	0				0	2	0
Cap, veh/h	0	393	775	114	1231	0				40	3	120
Arrive On Green	0.00	0.70	0.70	0.70	0.70	0.00				0.10	0.10	0.10
Sat Flow, veh/h	0	561	1106	55	1757	0				401	27	1203
Grp Volume(v), veh/h	0	0	422	1078	0	0				61	0	0
Grp Sat Flow(s),veh/h/ln	0	0	1667	1812	0	0				1630	0	0
Q Serve(g_s), s	0.0	0.0	5.1	6.7	0.0	0.0				1.8	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	5.1	21.4	0.0	0.0				1.8	0.0	0.0
Prop In Lane	0.00		0.66	0.05		0.00				0.25		0.74
Lane Grp Cap(c), veh/h	0	0	1168	1345	0	0				163	0	0
V/C Ratio(X)	0.00	0.00	0.36	0.80	0.00	0.00				0.37	0.00	0.00
Avail Cap(c_a), veh/h	0	0	1498	1696	0	0				163	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	1.00	1.00	0.00	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	3.0	5.4	0.0	0.0				21.1	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.2	2.3	0.0	0.0				6.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	2.3	11.0	0.0	0.0				1.1	0.0	0.0
LnGrp Delay(d),s/veh	0.0	0.0	3.2	7.6	0.0	0.0				27.6	0.0	0.0
LnGrp LOS			A	A						C		
Approach Vol, veh/h		422			1078						61	
Approach Delay, s/veh		3.2			7.6						27.6	
Approach LOS		A			A						C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				40.1		10.0		40.1
Change Period (Y+Rc), s				5.0		5.0		5.0
Max Green Setting (Gmax), s				45.0		5.0		45.0
Max Q Clear Time (g_c+I1), s				7.1		3.8		23.4
Green Ext Time (p_c), s				15.4		0.0		11.7

Intersection Summary	
HCM 2010 Ctrl Delay	7.2
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	44	643	187	154	0	0	0	0	2	0	7
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1863	1900	1863	0				1900	1863	1900
Adj Flow Rate, veh/h	0	89	0	413	340	0				3	0	12
Adj No. of Lanes	0	1	1	0	1	0				0	1	0
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76				0.76	0.76	0.76
Percent Heavy Veh, %	0	2	2	2	2	0				0	2	0
Cap, veh/h	0	1011	859	555	369	0				99	0	395
Arrive On Green	0.00	0.54	0.00	0.91	0.91	0.00				0.30	0.00	0.30
Sat Flow, veh/h	0	1863	1583	827	681	0				324	0	1294
Grp Volume(v), veh/h	0	89	0	753	0	0				15	0	0
Grp Sat Flow(s),veh/h/ln	0	1863	1583	1507	0	0				1618	0	0
Q Serve(g_s), s	0.0	1.2	0.0	14.8	0.0	0.0				0.3	0.0	0.0
Cycle Q Clear(g_c), s	0.0	1.2	0.0	14.8	0.0	0.0				0.3	0.0	0.0
Prop In Lane	0.00		1.00	0.55		0.00				0.20		0.80
Lane Grp Cap(c), veh/h	0	1011	859	924	0	0				493	0	0
V/C Ratio(X)	0.00	0.09	0.00	0.81	0.00	0.00				0.03	0.00	0.00
Avail Cap(c_a), veh/h	0	3407	2896	2863	0	0				493	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	0.56	0.00	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	5.8	0.0	1.8	0.0	0.0				12.8	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	1.0	0.0	0.0				0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.6	0.0	4.4	0.0	0.0				0.2	0.0	0.0
LnGrp Delay(d),s/veh	0.0	5.8	0.0	2.8	0.0	0.0				12.9	0.0	0.0
LnGrp LOS		A		A						B		
Approach Vol, veh/h		89			753						15	
Approach Delay, s/veh		5.8			2.8						12.9	
Approach LOS		A			A						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				30.0		90.0		30.0
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				96.0		16.0		96.0
Max Q Clear Time (g_c+I1), s				3.2		2.3		16.8
Green Ext Time (p_c), s				6.7		0.0		6.7

Intersection Summary	
HCM 2010 Ctrl Delay	3.3
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	81	160	30	535	0	0	0	0	10	1	30
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1863	1900	1863	0				1900	1863	1900
Adj Flow Rate, veh/h	0	142	0	57	1021	0				15	1	45
Adj No. of Lanes	0	1	1	0	1	0				0	1	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88				0.88	0.88	0.88
Percent Heavy Veh, %	0	2	2	2	2	0				0	2	0
Cap, veh/h	0	1018	865	103	971	0				121	8	364
Arrive On Green	0.00	0.55	0.00	1.00	1.00	0.00				0.30	0.30	0.30
Sat Flow, veh/h	0	1863	1583	58	1776	0				401	27	1203
Grp Volume(v), veh/h	0	142	0	1078	0	0				61	0	0
Grp Sat Flow(s),veh/h/ln	0	1863	1583	1834	0	0				1630	0	0
Q Serve(g_s), s	0.0	2.0	0.0	17.5	0.0	0.0				1.4	0.0	0.0
Cycle Q Clear(g_c), s	0.0	2.0	0.0	28.9	0.0	0.0				1.4	0.0	0.0
Prop In Lane	0.00		1.00	0.05		0.00				0.25		0.74
Lane Grp Cap(c), veh/h	0	1018	865	1074	0	0				493	0	0
V/C Ratio(X)	0.00	0.14	0.00	1.00	0.00	0.00				0.12	0.00	0.00
Avail Cap(c_a), veh/h	0	2146	1825	2173	0	0				493	0	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	0.61	0.00	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	5.9	0.0	0.9	0.0	0.0				13.4	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.1	0.0	10.9	0.0	0.0				0.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.0	0.0	9.8	0.0	0.0				0.7	0.0	0.0
LnGrp Delay(d),s/veh	0.0	6.0	0.0	11.7	0.0	0.0				13.9	0.0	0.0
LnGrp LOS		A		F						B		
Approach Vol, veh/h		142			1078						61	
Approach Delay, s/veh		6.0			11.7						13.9	
Approach LOS		A			B						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				39.5		45.5		39.5
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				61.0		16.0		61.0
Max Q Clear Time (g_c+I1), s				4.0		3.4		30.9
Green Ext Time (p_c), s				13.0		0.0		11.1

Intersection Summary	
HCM 2010 Ctrl Delay	11.2
HCM 2010 LOS	B

Intersection	
Intersection Delay, s/veh	284.5
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	1	1	0	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	1392	753	0	15
Demand Flow Rate, veh/h	1420	768	0	15
Vehicles Circulating, veh/h	424	0	94	768
Vehicles Exiting, veh/h	359	94	1750	0
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	434.2	13.2	0.0	7.2
Approach LOS	F	B	-	A

Lane	Left	Left	Left
Designated Moves	TR	LT	LTR
Assumed Moves	TR	LT	LTR
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	1420	768	15
Cap Entry Lane, veh/h	739	1130	524
Entry HV Adj Factor	0.980	0.981	1.000
Flow Entry, veh/h	1392	753	15
Cap Entry, veh/h	725	1108	524
V/C Ratio	1.920	0.680	0.029
Control Delay, s/veh	434.2	13.2	7.2
LOS	F	B	A
95th %tile Queue, veh	89	6	0

Intersection	
Intersection Delay, s/veh	30.4
Intersection LOS	D

Approach	EB	WB	NB	SB
Entry Lanes	1	1	0	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	422	1078	0	61
Demand Flow Rate, veh/h	431	1099	0	62
Vehicles Circulating, veh/h	74	0	160	1099
Vehicles Exiting, veh/h	1087	160	345	0
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	8.0	40.2	0.0	12.5
Approach LOS	A	E	-	B

Lane	Left	Left	Left
Designated Moves	TR	LT	LTR
Assumed Moves	TR	LT	LTR
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	431	1099	62
Cap Entry Lane, veh/h	1049	1130	377
Entry HV Adj Factor	0.979	0.981	0.984
Flow Entry, veh/h	422	1078	61
Cap Entry, veh/h	1028	1108	370
V/C Ratio	0.411	0.973	0.165
Control Delay, s/veh	8.0	40.2	12.5
LOS	A	E	B
95th %tile Queue, veh	2	18	1

Intersection	
Intersection Delay, s/veh	4.9
Intersection LOS	A

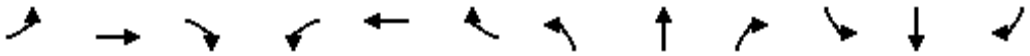
Approach	EB	WB	NB	SB
Entry Lanes	1	1	0	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	1392	753	0	15
Demand Flow Rate, veh/h	1420	768	0	15
Vehicles Circulating, veh/h	424	0	94	768
Vehicles Exiting, veh/h	359	94	421	0
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.4	13.2	0.0	7.2
Approach LOS	A	B	-	A

Lane	Left	Bypass	Left	Left
Designated Moves	T	R	LT	LTR
Assumed Moves	T	R	LT	LTR
RT Channelized		Free		
Lane Util	1.000		1.000	1.000
Critical Headway, s	5.193		5.193	5.193
Entry Flow, veh/h	91	1329	768	15
Cap Entry Lane, veh/h	739	1938	1130	524
Entry HV Adj Factor	0.980	0.980	0.981	1.000
Flow Entry, veh/h	89	1303	753	15
Cap Entry, veh/h	725	1900	1108	524
V/C Ratio	0.123	0.686	0.680	0.029
Control Delay, s/veh	6.3	0.0	13.2	7.2
LOS	A	A	B	A
95th %tile Queue, veh	0	6	6	0

Intersection	
Intersection Delay, s/veh	28.6
Intersection LOS	D

Approach	EB	WB	NB	SB
Entry Lanes	1	1	0	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	422	1078	0	61
Demand Flow Rate, veh/h	431	1099	0	62
Vehicles Circulating, veh/h	74	0	160	1099
Vehicles Exiting, veh/h	1087	160	59	0
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	1.6	40.2	0.0	12.5
Approach LOS	A	E	-	B

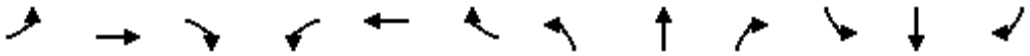
Lane	Left	Bypass	Left	Left
Designated Moves	T	R	LT	LTR
Assumed Moves	T	R	LT	LTR
RT Channelized		Free		
Lane Util	1.000		1.000	1.000
Critical Headway, s	5.193		5.193	5.193
Entry Flow, veh/h	145	286	1099	62
Cap Entry Lane, veh/h	1049	1938	1130	377
Entry HV Adj Factor	0.980	0.980	0.981	0.984
Flow Entry, veh/h	142	280	1078	61
Cap Entry, veh/h	1029	1900	1108	370
V/C Ratio	0.138	0.147	0.973	0.165
Control Delay, s/veh	4.8	0.0	40.2	12.5
LOS	A	A	E	B
95th %tile Queue, veh	0	1	18	1



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	15	19	0	0	257	2	86	0	16	0	0	0
Peak Hour Factor	0.77	0.77	0.77	0.70	0.70	0.70	0.58	0.58	0.58	0.92	0.92	0.92
Hourly flow rate (vph)	30	38	0	0	617	5	228	0	46	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	68	622	275
Volume Left (vph)	30	0	228
Volume Right (vph)	0	5	46
Hadj (s)	0.12	0.03	0.10
Departure Headway (s)	5.7	4.9	5.8
Degree Utilization, x	0.11	0.85	0.44
Capacity (veh/h)	583	723	593
Control Delay (s)	9.4	28.6	13.2
Approach Delay (s)	9.4	28.6	13.2
Approach LOS	A	D	B

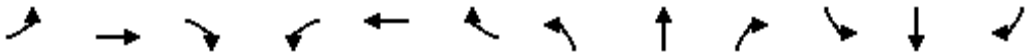
Intersection Summary				
Delay	22.9			
Level of Service	C			
Intersection Capacity Utilization	38.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	21	60	0	0	115	0	483	0	124	0	0	0
Peak Hour Factor	0.78	0.78	0.78	0.74	0.74	0.74	0.80	0.80	0.80	0.92	0.92	0.92
Hourly flow rate (vph)	41	118	0	0	261	0	930	0	260	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	160	261	1190
Volume Left (vph)	41	0	930
Volume Right (vph)	0	0	260
Hadj (s)	0.09	0.03	0.06
Departure Headway (s)	6.4	6.2	5.3
Degree Utilization, x	0.28	0.45	1.0
Capacity (veh/h)	550	574	689
Control Delay (s)	11.9	14.0	355.8
Approach Delay (s)	11.9	14.0	355.8
Approach LOS	B	B	F

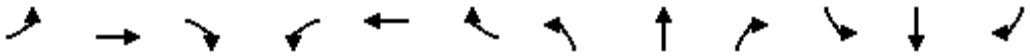
Intersection Summary				
Delay	266.3			
Level of Service	F			
Intersection Capacity Utilization	80.7%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	15	19	0	0	257	2	86	0	16	0	0	0
Peak Hour Factor	0.77	0.77	0.77	0.70	0.70	0.70	0.58	0.58	0.58	0.92	0.92	0.92
Hourly flow rate (vph)	30	38	0	0	617	5	228	0	46	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total (vph)	68	622	228	46
Volume Left (vph)	30	0	228	0
Volume Right (vph)	0	5	0	46
Hadj (s)	0.12	0.03	0.53	-0.67
Departure Headway (s)	5.8	4.9	6.8	5.6
Degree Utilization, x	0.11	0.85	0.43	0.07
Capacity (veh/h)	580	717	506	604
Control Delay (s)	9.5	29.7	13.8	7.9
Approach Delay (s)	9.5	29.7	12.8	
Approach LOS	A	D	B	

Intersection Summary				
Delay		23.4		
Level of Service		C		
Intersection Capacity Utilization		36.9%	ICU Level of Service	A
Analysis Period (min)		15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	21	60	0	0	115	0	483	0	124	0	0	0
Peak Hour Factor	0.78	0.78	0.78	0.74	0.74	0.74	0.80	0.80	0.80	0.92	0.92	0.92
Hourly flow rate (vph)	41	118	0	0	261	0	930	0	260	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total (vph)	160	261	930	260
Volume Left (vph)	41	0	930	0
Volume Right (vph)	0	0	0	260
Hadj (s)	0.09	0.03	0.53	-0.67
Departure Headway (s)	6.4	6.1	6.4	5.1
Degree Utilization, x	0.28	0.44	1.0	0.37
Capacity (veh/h)	552	576	572	692
Control Delay (s)	11.9	13.9	312.5	10.0
Approach Delay (s)	11.9	13.9	246.3	
Approach LOS	B	B	F	

Intersection Summary			
Delay	185.4		
Level of Service	F		
Intersection Capacity Utilization	68.0%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	15	19	0	0	257	2	86	0	16	0	0	0
Number	7	4	14	3	8	18	5	2	12			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1900	1863	0	0	1863	1900	1900	1863	1863			
Adj Flow Rate, veh/h	30	38	0	0	617	5	228	0	46			
Adj No. of Lanes	0	1	0	0	1	0	0	1	1			
Peak Hour Factor	0.77	0.77	0.77	0.70	0.70	0.70	0.58	0.58	0.58			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	157	165	0	0	764	6	641	0	572			
Arrive On Green	0.41	0.41	0.00	0.00	0.41	0.41	0.36	0.00	0.36			
Sat Flow, veh/h	149	399	0	0	1845	15	1774	0	1583			
Grp Volume(v), veh/h	68	0	0	0	0	622	228	0	46			
Grp Sat Flow(s),veh/h/ln	548	0	0	0	0	1860	1774	0	1583			
Q Serve(g_s), s	0.8	0.0	0.0	0.0	0.0	16.0	5.1	0.0	1.0			
Cycle Q Clear(g_c), s	16.8	0.0	0.0	0.0	0.0	16.0	5.1	0.0	1.0			
Prop In Lane	0.44		0.00	0.00		0.01	1.00		1.00			
Lane Grp Cap(c), veh/h	323	0	0	0	0	770	641	0	572			
V/C Ratio(X)	0.21	0.00	0.00	0.00	0.00	0.81	0.36	0.00	0.08			
Avail Cap(c_a), veh/h	555	0	0	0	0	1138	641	0	572			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	11.4	0.0	0.0	0.0	0.0	14.0	12.7	0.0	11.4			
Incr Delay (d2), s/veh	0.3	0.0	0.0	0.0	0.0	2.8	1.5	0.0	0.3			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.6	0.0	0.0	0.0	0.0	8.7	2.7	0.0	0.5			
LnGrp Delay(d),s/veh	11.8	0.0	0.0	0.0	0.0	16.8	14.2	0.0	11.7			
LnGrp LOS	B					B	B		B			
Approach Vol, veh/h		68			622			274				
Approach Delay, s/veh		11.8			16.8			13.8				
Approach LOS		B			B			B				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		26.0		28.3				28.3
Change Period (Y+Rc), s		6.4		5.8				5.8
Max Green Setting (Gmax), s		19.6		33.2				33.2
Max Q Clear Time (g_c+I1), s		7.1		18.8				18.0
Green Ext Time (p_c), s		0.0		3.7				3.7

Intersection Summary	
HCM 2010 Ctrl Delay	15.6
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	21	60	0	0	115	0	483	0	124	0	0	0
Number	7	4	14	3	8	18	5	2	12			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1900	1863	0	0	1863	1900	1900	1863	1863			
Adj Flow Rate, veh/h	40	116	0	0	242	0	930	0	260			
Adj No. of Lanes	0	1	0	0	1	0	0	1	1			
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	129	240	0	0	383	0	965	0	861			
Arrive On Green	0.21	0.21	0.00	0.00	0.21	0.00	0.54	0.00	0.54			
Sat Flow, veh/h	173	1168	0	0	1863	0	1774	0	1583			
Grp Volume(v), veh/h	156	0	0	0	242	0	930	0	260			
Grp Sat Flow(s),veh/h/ln	1341	0	0	0	1863	0	1774	0	1583			
Q Serve(g_s), s	0.2	0.0	0.0	0.0	5.8	0.0	24.4	0.0	4.4			
Cycle Q Clear(g_c), s	6.0	0.0	0.0	0.0	5.8	0.0	24.4	0.0	4.4			
Prop In Lane	0.26		0.00	0.00		0.00	1.00		1.00			
Lane Grp Cap(c), veh/h	368	0	0	0	383	0	965	0	861			
V/C Ratio(X)	0.42	0.00	0.00	0.00	0.63	0.00	0.96	0.00	0.30			
Avail Cap(c_a), veh/h	993	0	0	0	1111	0	1598	0	1426			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	16.8	0.0	0.0	0.0	17.6	0.0	10.6	0.0	6.1			
Incr Delay (d2), s/veh	0.8	0.0	0.0	0.0	1.7	0.0	10.5	0.0	0.2			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.9	0.0	0.0	0.0	3.1	0.0	14.4	0.0	1.9			
LnGrp Delay(d),s/veh	17.6	0.0	0.0	0.0	19.4	0.0	21.1	0.0	6.3			
LnGrp LOS	B				B		C		A			
Approach Vol, veh/h		156			242			1190				
Approach Delay, s/veh		17.6			19.4			17.9				
Approach LOS		B			B			B				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		32.8		15.8				15.8
Change Period (Y+Rc), s		6.4		5.8				5.8
Max Green Setting (Gmax), s		43.8		29.0				29.0
Max Q Clear Time (g_c+I1), s		26.4		8.0				7.8
Green Ext Time (p_c), s		0.0		2.0				2.0

Intersection Summary	
HCM 2010 Ctrl Delay	18.1
HCM 2010 LOS	B

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - AM

N.4 - Single-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 15 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	228	2.0	0.231	5.1	LOS A	0.9	21.9	0.17	0.08	33.2
8	T1	2	2.0	0.231	5.1	LOS A	0.9	21.9	0.17	0.08	33.0
18	R2	46	2.0	0.231	5.1	LOS A	0.9	21.9	0.17	0.08	32.1
Approach		276	2.0	0.231	5.1	LOS A	0.9	21.9	0.17	0.08	33.0
East: Lincoln Road											
6	T1	612	2.0	0.601	11.6	LOS B	3.7	95.0	0.55	0.48	32.3
16	R2	5	2.0	0.601	11.6	LOS B	3.7	95.0	0.55	0.48	31.4
Approach		616	2.0	0.601	11.6	LOS B	3.7	95.0	0.55	0.48	32.3
West: Lincoln Road											
5	L2	30	2.0	0.054	3.3	LOS A	0.0	0.0	0.00	0.00	37.1
2	T1	38	2.0	0.054	3.3	LOS A	0.0	0.0	0.00	0.00	37.0
Approach		68	2.0	0.054	3.3	LOS A	0.0	0.0	0.00	0.00	37.0
All Vehicles		960	2.0	0.601	9.2	LOS A	3.7	95.0	0.40	0.33	32.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - AM

N.4 - Single-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 15 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	228	2.0	0.237	0.5	LOS A	1.3	33.2	0.24	0.11	35.2
8	T1	2	2.0	0.237	0.5	LOS A	1.3	33.2	0.24	0.11	35.0
18	R2	46	2.0	0.237	0.5	LOS A	1.3	33.2	0.24	0.11	33.9
Approach		276	2.0	0.237	0.5	LOS A	1.3	33.2	0.24	0.11	35.0
East: Lincoln Road											
6	T1	612	2.0	0.637	3.8	LOS A	6.1	155.4	0.72	0.60	35.9
16	R2	5	2.0	0.637	3.8	LOS A	6.1	155.4	0.72	0.60	34.7
Approach		616	2.0	0.637	3.8	LOS A	6.1	155.4	0.72	0.60	35.8
West: Lincoln Road											
5	L2	30	2.0	0.054	0.0	LOS A	0.0	0.0	0.00	0.00	37.1
2	T1	38	2.0	0.054	0.0	LOS A	0.0	0.0	0.00	0.00	37.0
Approach		68	2.0	0.054	0.0	LOS A	0.0	0.0	0.00	0.00	37.0
All Vehicles		960	2.0	0.637	2.6	LOS A	6.1	155.4	0.53	0.42	35.7

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - PM

N.4 - Single-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 15 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	928	2.0	1.071	66.9	LOS F	60.3	1532.1	1.00	1.46	17.7
8	T1	2	2.0	1.071	66.9	LOS F	60.3	1532.1	1.00	1.46	17.6
18	R2	260	2.0	1.071	66.9	LOS F	60.3	1532.1	1.00	1.46	17.3
Approach		1190	2.0	1.071	66.9	LOS F	60.3	1532.1	1.00	1.46	17.6
East: Lincoln Road											
6	T1	261	2.0	0.430	12.4	LOS B	1.7	43.5	0.65	0.69	32.0
16	R2	2	2.0	0.430	12.4	LOS B	1.7	43.5	0.65	0.69	31.0
Approach		264	2.0	0.430	12.4	LOS B	1.7	43.5	0.65	0.69	32.0
West: Lincoln Road											
5	L2	41	2.0	0.127	3.9	LOS A	0.0	0.0	0.00	0.00	37.8
2	T1	118	2.0	0.127	3.9	LOS A	0.0	0.0	0.00	0.00	37.6
Approach		160	2.0	0.127	3.9	LOS A	0.0	0.0	0.00	0.00	37.7
All Vehicles		1613	2.0	1.071	51.8	LOS F	60.3	1532.1	0.84	1.19	20.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - PM

N.4 - Single-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 15 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	928	2.0	1.115	64.7	LOS F	74.8	1901.0	1.00	1.62	18.0
8	T1	2	2.0	1.115	64.7	LOS F	74.8	1901.0	1.00	1.62	17.9
18	R2	260	2.0	1.115	64.7	LOS F	74.8	1901.0	1.00	1.62	17.6
Approach		1190	2.0	1.115	64.7	LOS F	74.8	1901.0	1.00	1.62	17.9
East: Lincoln Road											
6	T1	261	2.0	0.645	16.4	LOS C	6.2	158.7	1.00	1.14	30.3
16	R2	2	2.0	0.645	16.4	LOS C	6.2	158.7	1.00	1.14	29.4
Approach		264	2.0	0.645	16.4	LOS C	6.2	158.7	1.00	1.14	30.3
West: Lincoln Road											
5	L2	41	2.0	0.129	0.0	LOS A	0.0	0.0	0.00	0.00	37.8
2	T1	118	2.0	0.129	0.0	LOS A	0.0	0.0	0.00	0.00	37.6
Approach		160	2.0	0.129	0.0	LOS A	0.0	0.0	0.00	0.00	37.7
All Vehicles		1613	2.0	1.115	50.4	LOS F	74.8	1901.0	0.90	1.38	20.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - AM

N.5 - Single-Lane Roundabout w/ RT Bypass

Roundabout
Design Life Analysis (Final Year): Results for 15 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	228	2.0	0.192	4.7	LOS A	0.7	17.4	0.16	0.07	32.9
8	T1	2	2.0	0.192	4.7	LOS A	0.7	17.4	0.16	0.07	32.8
18	R2	46	2.0	0.038	3.2	LOS A	0.1	2.9	0.10	0.03	35.3
Approach		276	2.0	0.192	4.4	LOS A	0.7	17.4	0.15	0.07	33.3
East: Lincoln Road											
6	T1	612	2.0	0.601	11.6	LOS B	3.7	95.0	0.55	0.48	32.3
16	R2	5	2.0	0.601	11.6	LOS B	3.7	95.0	0.55	0.48	31.4
Approach		616	2.0	0.601	11.6	LOS B	3.7	95.0	0.55	0.48	32.3
West: Lincoln Road											
5	L2	30	2.0	0.054	3.3	LOS A	0.0	0.0	0.00	0.00	37.1
2	T1	38	2.0	0.054	3.3	LOS A	0.0	0.0	0.00	0.00	37.0
Approach		68	2.0	0.054	3.3	LOS A	0.0	0.0	0.00	0.00	37.0
All Vehicles		960	2.0	0.601	9.0	LOS A	3.7	95.0	0.39	0.32	32.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - AM

N.5 - Single-Lane Roundabout w/ RT Bypass

Roundabout
Design Life Analysis (Final Year): Results for 15 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	228	2.0	0.165	0.3	LOS A	0.8	21.6	0.20	0.08	34.7
8	T1	2	2.0	0.165	0.3	LOS A	0.8	21.6	0.20	0.08	34.6
18	R2	46	2.0	0.032	0.1	LOS A	0.1	3.7	0.13	0.04	36.9
Approach		276	2.0	0.165	0.3	LOS A	0.8	21.6	0.19	0.08	35.0
East: Lincoln Road											
6	T1	612	2.0	0.635	3.8	LOS A	6.1	153.9	0.71	0.60	35.9
16	R2	5	2.0	0.635	3.8	LOS A	6.1	153.9	0.71	0.60	34.7
Approach		616	2.0	0.635	3.8	LOS A	6.1	153.9	0.71	0.60	35.9
West: Lincoln Road											
5	L2	30	2.0	0.054	0.0	LOS A	0.0	0.0	0.00	0.00	37.1
2	T1	38	2.0	0.054	0.0	LOS A	0.0	0.0	0.00	0.00	37.0
Approach		68	2.0	0.054	0.0	LOS A	0.0	0.0	0.00	0.00	37.0
All Vehicles		960	2.0	0.635	2.5	LOS A	6.1	153.9	0.51	0.40	35.7

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - PM

N.5 - Single-Lane Roundabout w/ RT Bypass

Roundabout
Design Life Analysis (Final Year): Results for 15 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	928	2.0	0.837	21.4	LOS C	11.1	281.3	0.78	0.61	26.7
8	T1	2	2.0	0.837	21.4	LOS C	11.1	281.3	0.78	0.61	26.6
18	R2	260	2.0	0.227	5.2	LOS A	0.8	21.1	0.23	0.13	34.3
Approach		1190	2.0	0.837	17.9	LOS C	11.1	281.3	0.66	0.50	28.0
East: Lincoln Road											
6	T1	261	2.0	0.452	13.4	LOS B	1.8	46.2	0.68	0.73	31.5
16	R2	2	2.0	0.452	13.4	LOS B	1.8	46.2	0.68	0.73	30.6
Approach		264	2.0	0.452	13.4	LOS B	1.8	46.2	0.68	0.73	31.5
West: Lincoln Road											
5	L2	41	2.0	0.127	3.9	LOS A	0.0	0.0	0.00	0.00	37.8
2	T1	118	2.0	0.127	3.9	LOS A	0.0	0.0	0.00	0.00	37.6
Approach		160	2.0	0.127	3.9	LOS A	0.0	0.0	0.00	0.00	37.7
All Vehicles		1613	2.0	0.837	15.8	LOS C	11.1	281.3	0.60	0.49	29.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - PM

N.5 - Single-Lane Roundabout w/ RT Bypass

Roundabout
Design Life Analysis (Final Year): Results for 15 years

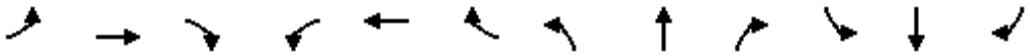
Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	928	2.0	0.715	1.8	LOS A	7.4	187.8	0.63	0.40	33.6
8	T1	2	2.0	0.715	1.8	LOS A	7.4	187.8	0.63	0.40	33.5
18	R2	260	2.0	0.194	0.6	LOS A	1.0	26.1	0.28	0.14	36.4
Approach		1190	2.0	0.715	1.5	LOS A	7.4	187.8	0.55	0.35	34.2
East: Lincoln Road											
6	T1	261	2.0	0.632	19.3	LOS C	6.1	154.4	1.00	1.16	29.2
16	R2	2	2.0	0.632	19.3	LOS C	6.1	154.4	1.00	1.16	28.4
Approach		264	2.0	0.632	19.3	LOS C	6.1	154.4	1.00	1.16	29.1
West: Lincoln Road											
5	L2	41	2.0	0.129	0.0	LOS A	0.0	0.0	0.00	0.00	37.8
2	T1	118	2.0	0.129	0.0	LOS A	0.0	0.0	0.00	0.00	37.6
Approach		160	2.0	0.129	0.0	LOS A	0.0	0.0	0.00	0.00	37.7
All Vehicles		1613	2.0	0.715	4.3	LOS A	7.4	187.8	0.57	0.45	33.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPENDIX E

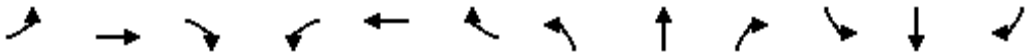
Future Year (2038) Operational Analysis



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	57	306	41	21	94	42	29	47	48	240	99	87
Peak Hour Factor	0.96	0.96	0.96	0.94	0.94	0.94	0.82	0.82	0.82	0.84	0.84	0.84
Hourly flow rate (vph)	105	564	76	46	204	91	83	135	138	674	278	244

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	745	341	357	1197
Volume Left (vph)	105	46	83	674
Volume Right (vph)	76	91	138	244
Hadj (s)	0.00	-0.10	-0.15	0.02
Departure Headway (s)	9.0	9.2	9.1	9.0
Degree Utilization, x	1.0	0.87	0.90	1.0
Capacity (veh/h)	405	379	387	411
Control Delay (s)	418.3	49.9	54.2	924.9
Approach Delay (s)	418.3	49.9	54.2	924.9
Approach LOS	F	E	F	F

Intersection Summary				
Delay	551.3			
Level of Service	F			
Intersection Capacity Utilization	135.0%	ICU Level of Service	H	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	54	107	23	31	198	255	37	122	33	90	60	52
Peak Hour Factor	0.89	0.89	0.89	0.88	0.88	0.88	0.98	0.98	0.98	0.89	0.89	0.89
Hourly flow rate (vph)	107	213	46	72	459	591	89	294	79	239	159	138

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	366	1122	462	536
Volume Left (vph)	107	72	89	239
Volume Right (vph)	46	591	79	138
Hadj (s)	0.02	-0.27	-0.03	-0.03
Departure Headway (s)	9.6	9.2	9.5	9.5
Degree Utilization, x	0.97	1.0	1.0	1.0
Capacity (veh/h)	366	401	385	390
Control Delay (s)	71.8	870.9	148.0	224.7
Approach Delay (s)	71.8	870.9	148.0	224.7
Approach LOS	F	F	F	F

Intersection Summary			
Delay	479.6		
Level of Service	F		
Intersection Capacity Utilization	119.9%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	57	306	41	21	94	42	29	47	48	240	99	87
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	190.0	186.3	190.0	190.0	186.3	186.3	186.3	186.3	190.0	186.3	186.3	190.0
Adj Flow Rate, veh/h	107	576	77	46	204	91	73	118	121	603	249	218
Adj No. of Lanes	0	1	0	0	1	1	1	1	0	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	123	528	69	103	427	1066	277	141	144	548	339	297
Arrive On Green	0.43	0.43	0.43	0.43	0.43	0.43	0.04	0.17	0.17	0.25	0.37	0.37
Sat Flow, veh/h	186	1236	160	134	1000	1583	1774	844	866	1774	918	803
Grp Volume(v), veh/h	760	0	0	250	0	91	73	0	239	603	0	467
Grp Sat Flow(s),veh/h/ln	1582	0	0	1134	0	1583	1774	0	1710	1774	0	1721
Q Serve(g_s), s	31.7	0.0	0.0	0.0	0.0	1.9	3.2	0.0	12.7	23.0	0.0	22.0
Cycle Q Clear(g_c), s	40.0	0.0	0.0	8.3	0.0	1.9	3.2	0.0	12.7	23.0	0.0	22.0
Prop In Lane	0.14		0.10	0.18		1.00	1.00		0.51	1.00		0.47
Lane Grp Cap(c), veh/h	720	0	0	530	0	1066	277	0	285	548	0	636
V/C Ratio(X)	1.06	0.00	0.00	0.47	0.00	0.09	0.26	0.00	0.84	1.10	0.00	0.73
Avail Cap(c_a), veh/h	720	0	0	530	0	1066	277	0	311	548	0	662
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	28.6	0.0	0.0	17.7	0.0	5.3	30.6	0.0	37.8	23.6	0.0	25.5
Incr Delay (d2), s/veh	49.1	0.0	0.0	0.7	0.0	0.0	0.5	0.0	17.0	68.5	0.0	4.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	28.2	0.0	0.0	4.3	0.0	0.8	1.6	0.0	7.3	21.7	0.0	11.1
LnGrp Delay(d),s/veh	77.7	0.0	0.0	18.4	0.0	5.3	31.1	0.0	54.7	92.1	0.0	29.6
LnGrp LOS	F			B		A	C		D	F		C
Approach Vol, veh/h		760			341			312			1070	
Approach Delay, s/veh		77.7			14.9			49.2			64.8	
Approach LOS		E			B			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	28.0	20.6		45.0	9.0	39.6		45.0
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0
Max Green Setting (Gmax), s	23.0	17.0		40.0	4.0	36.0		40.0
Max Q Clear Time (g_c+I1), s	25.0	14.7		42.0	5.2	24.0		10.3
Green Ext Time (p_c), s	0.0	0.9		0.0	0.0	3.1		8.1

Intersection Summary	
HCM 2010 Ctrl Delay	59.9
HCM 2010 LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	54	107	23	31	198	255	37	122	33	90	60	52
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	190.0	186.3	190.0	190.0	186.3	186.3	186.3	186.3	190.0	186.3	186.3	190.0
Adj Flow Rate, veh/h	105	208	45	69	444	572	96	316	86	233	156	135
Adj No. of Lanes	0	1	0	0	1	1	1	1	0	1	1	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	109	190	33	118	564	755	398	412	112	333	289	250
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40	0.06	0.29	0.29	0.08	0.31	0.31
Sat Flow, veh/h	92	475	82	138	1410	1583	1774	1411	384	1774	923	799
Grp Volume(v), veh/h	358	0	0	513	0	572	96	0	402	233	0	291
Grp Sat Flow(s),veh/h/ln	649	0	0	1548	0	1583	1774	0	1795	1774	0	1722
Q Serve(g_s), s	7.6	0.0	0.0	0.0	0.0	19.2	2.4	0.0	13.3	5.0	0.0	9.1
Cycle Q Clear(g_c), s	26.0	0.0	0.0	18.4	0.0	19.2	2.4	0.0	13.3	5.0	0.0	9.1
Prop In Lane	0.29		0.13	0.13		1.00	1.00		0.21	1.00		0.46
Lane Grp Cap(c), veh/h	331	0	0	682	0	755	398	0	525	333	0	539
V/C Ratio(X)	1.08	0.00	0.00	0.75	0.00	0.76	0.24	0.00	0.77	0.70	0.00	0.54
Avail Cap(c_a), veh/h	331	0	0	682	0	755	408	0	525	333	0	539
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.5	0.0	0.0	16.7	0.0	13.9	15.1	0.0	21.0	18.8	0.0	18.4
Incr Delay (d2), s/veh	72.6	0.0	0.0	4.7	0.0	4.4	0.3	0.0	10.2	6.3	0.0	3.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.6	0.0	0.0	8.9	0.0	9.2	1.2	0.0	8.0	2.3	0.0	4.9
LnGrp Delay(d),s/veh	94.1	0.0	0.0	21.4	0.0	18.4	15.4	0.0	31.2	25.2	0.0	22.3
LnGrp LOS	F			C		B	B		C	C		C
Approach Vol, veh/h		358			1085			498			524	
Approach Delay, s/veh		94.1			19.8			28.2			23.6	
Approach LOS		F			B			C			C	

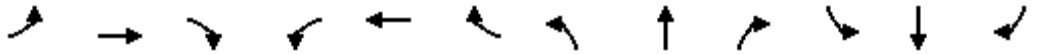
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	10.0	24.0		31.0	8.6	25.4		31.0
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0
Max Green Setting (Gmax), s	5.0	19.0		26.0	4.0	20.0		26.0
Max Q Clear Time (g_c+I1), s	7.0	15.3		28.0	4.4	11.1		21.2
Green Ext Time (p_c), s	0.0	1.3		0.0	0.0	2.5		3.1

Intersection Summary	
HCM 2010 Ctrl Delay	33.1
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	57	306	41	21	94	42	29	47	48	240	99	87
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	107	576	77	46	204	91	73	118	121	603	249	218
Adj No. of Lanes	1	1	0	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	453	594	79	137	639	941	282	141	145	554	341	299
Arrive On Green	0.05	0.37	0.37	0.03	0.34	0.34	0.05	0.17	0.17	0.25	0.37	0.37
Sat Flow, veh/h	1774	1610	215	1774	1863	1583	1774	844	866	1774	918	803
Grp Volume(v), veh/h	107	0	653	46	204	91	73	0	239	603	0	467
Grp Sat Flow(s),veh/h/ln	1774	0	1825	1774	1863	1583	1774	0	1710	1774	0	1721
Q Serve(g_s), s	3.7	0.0	35.0	1.7	8.0	2.5	3.4	0.0	13.5	25.0	0.0	23.3
Cycle Q Clear(g_c), s	3.7	0.0	35.0	1.7	8.0	2.5	3.4	0.0	13.5	25.0	0.0	23.3
Prop In Lane	1.00		0.12	1.00		1.00	1.00		0.51	1.00		0.47
Lane Grp Cap(c), veh/h	453	0	673	137	639	941	282	0	286	554	0	640
V/C Ratio(X)	0.24	0.00	0.97	0.34	0.32	0.10	0.26	0.00	0.84	1.09	0.00	0.73
Avail Cap(c_a), veh/h	462	0	673	201	696	990	306	0	318	554	0	648
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	18.7	0.0	30.9	25.8	24.1	8.7	32.1	0.0	40.1	24.6	0.0	27.0
Incr Delay (d2), s/veh	0.3	0.0	27.4	1.4	0.3	0.0	0.5	0.0	16.1	64.3	0.0	4.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	0.0	22.7	0.9	4.2	1.1	1.7	0.0	7.7	22.1	0.0	11.8
LnGrp Delay(d),s/veh	19.0	0.0	58.2	27.2	24.4	8.7	32.6	0.0	56.2	88.9	0.0	31.1
LnGrp LOS	B		E	C	C	A	C		E	F		C
Approach Vol, veh/h		760			341			312			1070	
Approach Delay, s/veh		52.7			20.6			50.7			63.7	
Approach LOS		D			C			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	28.0	23.1	5.9	42.5	7.7	43.5	8.5	39.9
Change Period (Y+Rc), s	3.0	6.5	3.0	5.8	3.0	6.5	3.0	5.8
Max Green Setting (Gmax), s	25.0	18.5	6.5	36.7	6.0	37.5	6.0	37.2
Max Q Clear Time (g_c+I1), s	27.0	15.5	3.7	37.0	5.4	25.3	5.7	10.0
Green Ext Time (p_c), s	0.0	1.2	0.0	0.0	0.0	3.1	0.0	5.9

Intersection Summary	
HCM 2010 Ctrl Delay	52.8
HCM 2010 LOS	D



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	54	107	23	31	198	255	37	122	33	90	60	52
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	105	208	45	69	444	572	96	316	86	233	156	135
Adj No. of Lanes	1	1	0	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	282	561	121	474	674	696	350	378	103	286	267	231
Arrive On Green	0.06	0.38	0.38	0.04	0.36	0.36	0.06	0.27	0.27	0.08	0.29	0.29
Sat Flow, veh/h	1774	1485	321	1774	1863	1583	1774	1411	384	1774	923	799
Grp Volume(v), veh/h	105	0	253	69	444	572	96	0	402	233	0	291
Grp Sat Flow(s),veh/h/ln	1774	0	1806	1774	1863	1583	1774	0	1795	1774	0	1722
Q Serve(g_s), s	2.8	0.0	7.8	1.9	15.4	24.5	3.0	0.0	16.3	6.0	0.0	11.2
Cycle Q Clear(g_c), s	2.8	0.0	7.8	1.9	15.4	24.5	3.0	0.0	16.3	6.0	0.0	11.2
Prop In Lane	1.00		0.18	1.00		1.00	1.00		0.21	1.00		0.46
Lane Grp Cap(c), veh/h	282	0	682	474	674	696	350	0	481	286	0	497
V/C Ratio(X)	0.37	0.00	0.37	0.15	0.66	0.82	0.27	0.00	0.84	0.81	0.00	0.58
Avail Cap(c_a), veh/h	320	0	682	541	699	717	387	0	481	286	0	497
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.7	0.0	17.4	14.7	20.7	19.0	19.3	0.0	26.7	23.7	0.0	23.5
Incr Delay (d2), s/veh	0.8	0.0	0.3	0.1	2.2	7.5	0.4	0.0	15.8	16.3	0.0	5.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	3.9	0.9	8.3	12.0	1.5	0.0	10.1	3.3	0.0	5.9
LnGrp Delay(d),s/veh	16.6	0.0	17.7	14.8	22.8	26.5	19.7	0.0	42.5	40.1	0.0	28.5
LnGrp LOS	B		B	B	C	C	B		D	D		C
Approach Vol, veh/h		358			1085			498			524	
Approach Delay, s/veh		17.4			24.3			38.1			33.6	
Approach LOS		B			C			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	27.2	6.1	35.0	7.4	28.8	7.3	33.8
Change Period (Y+Rc), s	3.0	6.5	3.0	5.8	3.0	6.5	3.0	5.8
Max Green Setting (Gmax), s	6.0	20.7	6.0	29.0	6.0	20.7	6.0	29.0
Max Q Clear Time (g_c+I1), s	8.0	18.3	3.9	9.8	5.0	13.2	4.8	26.5
Green Ext Time (p_c), s	0.0	0.9	0.0	6.1	0.0	2.3	0.0	1.5

Intersection Summary	
HCM 2010 Ctrl Delay	28.0
HCM 2010 LOS	C

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - AM

L.4 - Single-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 25 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	84	2.0	0.703	25.5	LOS D	3.7	93.5	0.82	0.93	30.1
8	T1	136	2.0	0.703	25.5	LOS D	3.7	93.5	0.82	0.93	30.2
18	R2	139	2.0	0.703	25.5	LOS D	3.7	93.5	0.82	0.93	29.5
Approach		359	2.0	0.703	25.5	LOS D	3.7	93.5	0.82	0.93	29.9
East: Lincoln Road											
1	L2	46	2.0	0.349	7.4	LOS A	1.4	35.2	0.43	0.36	36.3
6	T1	205	2.0	0.349	7.4	LOS A	1.4	35.2	0.43	0.36	36.3
16	R2	92	2.0	0.349	7.4	LOS A	1.4	35.2	0.43	0.36	35.2
Approach		343	2.0	0.349	7.4	LOS A	1.4	35.2	0.43	0.36	36.0
North: N Montana Avenue											
7	L2	676	2.0	1.242	134.2	LOS F	93.2	2368.4	1.00	2.92	12.4
4	T1	279	2.0	1.242	134.2	LOS F	93.2	2368.4	1.00	2.92	12.4
14	R2	245	2.0	1.242	134.2	LOS F	93.2	2368.4	1.00	2.92	12.3
Approach		1200	2.0	1.242	134.2	LOS F	93.2	2368.4	1.00	2.92	12.4
West: Lincoln Road											
5	L2	105	2.0	1.123	97.4	LOS F	37.3	948.5	1.00	2.54	15.0
2	T1	562	2.0	1.123	97.4	LOS F	37.3	948.5	1.00	2.54	15.0
12	R2	75	2.0	1.123	97.4	LOS F	37.3	948.5	1.00	2.54	14.8
Approach		741	2.0	1.123	97.4	LOS F	37.3	948.5	1.00	2.54	14.9
All Vehicles		2644	2.0	1.242	92.6	LOS F	93.2	2368.4	0.90	2.21	15.7

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - AM

L.4 - Single-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 25 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	84	2.0	0.820	31.0	LOS C	10.9	277.7	1.00	1.28	28.1
8	T1	136	2.0	0.820	31.0	LOS C	10.9	277.7	1.00	1.28	28.2
18	R2	139	2.0	0.820	31.0	LOS C	10.9	277.7	1.00	1.28	27.5
Approach		359	2.0	0.820	31.0	LOS C	10.9	277.7	1.00	1.28	27.9
East: Lincoln Road											
1	L2	46	2.0	0.393	2.4	LOS A	2.7	69.0	0.64	0.49	38.7
6	T1	205	2.0	0.393	2.4	LOS A	2.7	69.0	0.64	0.49	38.6
16	R2	92	2.0	0.393	2.4	LOS A	2.7	69.0	0.64	0.49	37.3
Approach		343	2.0	0.393	2.4	LOS A	2.7	69.0	0.64	0.49	38.3
North: N Montana Avenue											
7	L2	676	2.0	1.413	197.3	LOS F	134.3	3410.6	1.00	3.18	9.2
4	T1	279	2.0	1.413	197.3	LOS F	134.3	3410.6	1.00	3.18	9.3
14	R2	245	2.0	1.413	197.3	LOS F	134.3	3410.6	1.00	3.18	9.2
Approach		1200	2.0	1.413	197.3	LOS F	134.3	3410.6	1.00	3.18	9.2
West: Lincoln Road											
5	L2	105	2.0	1.473	232.2	LOS F	92.4	2346.9	1.00	3.26	8.0
2	T1	562	2.0	1.473	232.2	LOS F	92.4	2346.9	1.00	3.26	8.0
12	R2	75	2.0	1.473	232.2	LOS F	92.4	2346.9	1.00	3.26	7.9
Approach		741	2.0	1.473	232.2	LOS F	92.4	2346.9	1.00	3.26	8.0
All Vehicles		2644	2.0	1.473	159.2	LOS F	134.3	3410.6	0.95	2.59	10.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - PM

L.4 - Single-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 25 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	89	2.0	0.573	13.1	LOS B	3.1	79.0	0.66	0.70	36.2
8	T1	294	2.0	0.573	13.1	LOS B	3.1	79.0	0.66	0.70	36.3
18	R2	80	2.0	0.573	13.1	LOS B	3.1	79.0	0.66	0.70	35.3
Approach		463	2.0	0.573	13.1	LOS B	3.1	79.0	0.66	0.70	36.1
East: Lincoln Road											
1	L2	72	2.0	1.312	165.5	LOS F	98.6	2503.3	1.00	3.92	10.3
6	T1	458	2.0	1.312	165.5	LOS F	98.6	2503.3	1.00	3.92	10.3
16	R2	590	2.0	1.312	165.5	LOS F	98.6	2503.3	1.00	3.92	10.2
Approach		1120	2.0	1.312	165.5	LOS F	98.6	2503.3	1.00	3.92	10.2
North: N Montana Avenue											
7	L2	240	2.0	0.632	14.3	LOS B	3.9	99.8	0.68	0.73	34.7
4	T1	160	2.0	0.632	14.3	LOS B	3.9	99.8	0.68	0.73	34.8
14	R2	139	2.0	0.632	14.3	LOS B	3.9	99.8	0.68	0.73	33.9
Approach		539	2.0	0.632	14.3	LOS B	3.9	99.8	0.68	0.73	34.5
West: Lincoln Road											
5	L2	108	2.0	0.418	9.1	LOS A	1.8	45.1	0.53	0.53	34.9
2	T1	213	2.0	0.418	9.1	LOS A	1.8	45.1	0.53	0.53	34.8
12	R2	46	2.0	0.418	9.1	LOS A	1.8	45.1	0.53	0.53	33.8
Approach		367	2.0	0.418	9.1	LOS A	1.8	45.1	0.53	0.53	34.7
All Vehicles		2489	2.0	1.312	81.4	LOS F	98.6	2503.3	0.80	2.13	16.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - PM

L.4 - Single-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 25 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	89	2.0	0.676	10.1	LOS B	7.1	181.0	0.91	1.00	38.0
8	T1	294	2.0	0.676	10.1	LOS B	7.1	181.0	0.91	1.00	38.2
18	R2	80	2.0	0.676	10.1	LOS B	7.1	181.0	0.91	1.00	37.0
Approach		463	2.0	0.676	10.1	LOS B	7.1	181.0	0.91	1.00	37.9
East: Lincoln Road											
1	L2	72	2.0	1.576	271.9	LOS F	149.6	3798.6	1.00	4.13	6.9
6	T1	458	2.0	1.576	271.9	LOS F	149.6	3798.6	1.00	4.13	6.9
16	R2	590	2.0	1.576	271.9	LOS F	149.6	3798.6	1.00	4.13	6.9
Approach		1120	2.0	1.576	271.9	LOS F	149.6	3798.6	1.00	4.13	6.9
North: N Montana Avenue											
7	L2	240	2.0	0.719	8.7	LOS A	8.6	218.0	0.93	0.96	37.9
4	T1	160	2.0	0.719	8.7	LOS A	8.6	218.0	0.93	0.96	38.1
14	R2	139	2.0	0.719	8.7	LOS A	8.6	218.0	0.93	0.96	36.9
Approach		539	2.0	0.719	8.7	LOS A	8.6	218.0	0.93	0.96	37.7
West: Lincoln Road											
5	L2	108	2.0	0.501	4.7	LOS A	4.0	100.8	0.80	0.75	37.2
2	T1	213	2.0	0.501	4.7	LOS A	4.0	100.8	0.80	0.75	37.1
12	R2	46	2.0	0.501	4.7	LOS A	4.0	100.8	0.80	0.75	35.9
Approach		367	2.0	0.501	4.7	LOS A	4.0	100.8	0.80	0.75	37.0
All Vehicles		2489	2.0	1.576	126.8	LOS F	149.6	3798.6	0.94	2.36	12.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - AM

L.5 - Single-Lane Roundabout w/ RT Bypass
Roundabout
Design Life Analysis (Final Year): Results for 25 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	84	2.0	0.703	25.5	LOS D	3.7	93.5	0.82	0.93	30.1
8	T1	136	2.0	0.703	25.5	LOS D	3.7	93.5	0.82	0.93	30.2
18	R2	139	2.0	0.703	25.5	LOS D	3.7	93.5	0.82	0.93	29.5
Approach		359	2.0	0.703	25.5	LOS D	3.7	93.5	0.82	0.93	29.9
East: Lincoln Road											
1	L2	46	2.0	0.256	6.2	LOS A	0.9	23.5	0.39	0.32	36.9
6	T1	205	2.0	0.256	6.2	LOS A	0.9	23.5	0.39	0.32	36.9
16	R2	92	2.0	0.087	4.2	LOS A	0.3	7.0	0.29	0.19	37.4
Approach		343	2.0	0.256	5.7	LOS A	0.9	23.5	0.36	0.28	37.0
North: N Montana Avenue											
7	L2	676	2.0	1.242	134.2	LOS F	93.2	2368.4	1.00	2.92	12.4
4	T1	279	2.0	1.242	134.2	LOS F	93.2	2368.4	1.00	2.92	12.4
14	R2	245	2.0	1.242	134.2	LOS F	93.2	2368.4	1.00	2.92	12.3
Approach		1200	2.0	1.242	134.2	LOS F	93.2	2368.4	1.00	2.92	12.4
West: Lincoln Road											
5	L2	105	2.0	1.123	97.4	LOS F	37.3	948.5	1.00	2.54	15.0
2	T1	562	2.0	1.123	97.4	LOS F	37.3	948.5	1.00	2.54	15.0
12	R2	75	2.0	1.123	97.4	LOS F	37.3	948.5	1.00	2.54	14.8
Approach		741	2.0	1.123	97.4	LOS F	37.3	948.5	1.00	2.54	14.9
All Vehicles		2644	2.0	1.242	92.4	LOS F	93.2	2368.4	0.89	2.20	15.7

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - AM

L.5 - Single-Lane Roundabout w/ RT Bypass
Roundabout
Design Life Analysis (Final Year): Results for 25 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	84	2.0	0.821	31.2	LOS D	11.0	278.8	1.00	1.28	28.0
8	T1	136	2.0	0.821	31.2	LOS D	11.0	278.8	1.00	1.28	28.1
18	R2	139	2.0	0.821	31.2	LOS D	11.0	278.8	1.00	1.28	27.5
Approach		359	2.0	0.821	31.2	LOS D	11.0	278.8	1.00	1.28	27.8
East: Lincoln Road											
1	L2	46	2.0	0.228	1.5	LOS A	1.5	37.5	0.54	0.36	38.8
6	T1	205	2.0	0.228	1.5	LOS A	1.5	37.5	0.54	0.36	38.8
16	R2	92	2.0	0.077	0.9	LOS A	0.4	11.0	0.40	0.23	38.9
Approach		343	2.0	0.228	1.3	LOS A	1.5	37.5	0.50	0.32	38.8
North: N Montana Avenue											
7	L2	676	2.0	1.404	193.3	LOS F	132.5	3365.5	1.00	3.16	9.4
4	T1	279	2.0	1.404	193.3	LOS F	132.5	3365.5	1.00	3.16	9.4
14	R2	245	2.0	1.404	193.3	LOS F	132.5	3365.5	1.00	3.16	9.3
Approach		1200	2.0	1.404	193.3	LOS F	132.5	3365.5	1.00	3.16	9.4
West: Lincoln Road											
5	L2	105	2.0	1.483	236.7	LOS F	93.5	2373.8	1.00	3.28	7.8
2	T1	562	2.0	1.483	236.7	LOS F	93.5	2373.8	1.00	3.28	7.8
12	R2	75	2.0	1.483	236.7	LOS F	93.5	2373.8	1.00	3.28	7.8
Approach		741	2.0	1.483	236.7	LOS F	93.5	2373.8	1.00	3.28	7.8
All Vehicles		2644	2.0	1.483	158.5	LOS F	132.5	3365.5	0.94	2.57	10.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - PM

L.5 - Single-Lane Roundabout w/ RT Bypass
Roundabout
Design Life Analysis (Final Year): Results for 25 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	89	2.0	0.573	13.1	LOS B	3.1	79.0	0.66	0.70	36.2
8	T1	294	2.0	0.573	13.1	LOS B	3.1	79.0	0.66	0.70	36.3
18	R2	80	2.0	0.573	13.1	LOS B	3.1	79.0	0.66	0.70	35.3
Approach		463	2.0	0.573	13.1	LOS B	3.1	79.0	0.66	0.70	36.1
East: Lincoln Road											
1	L2	72	2.0	0.621	14.0	LOS B	3.8	95.9	0.67	0.73	32.9
6	T1	458	2.0	0.621	14.0	LOS B	3.8	95.9	0.67	0.73	32.9
16	R2	590	2.0	0.644	14.0	LOS B	4.3	108.5	0.66	0.70	32.1
Approach		1120	2.0	0.644	14.0	LOS B	4.3	108.5	0.66	0.71	32.5
North: N Montana Avenue											
7	L2	240	2.0	0.699	18.2	LOS C	4.6	117.9	0.76	0.84	32.8
4	T1	160	2.0	0.699	18.2	LOS C	4.6	117.9	0.76	0.84	32.9
14	R2	139	2.0	0.699	18.2	LOS C	4.6	117.9	0.76	0.84	32.0
Approach		539	2.0	0.699	18.2	LOS C	4.6	117.9	0.76	0.84	32.6
West: Lincoln Road											
5	L2	108	2.0	0.423	9.3	LOS A	1.8	46.1	0.54	0.55	34.8
2	T1	213	2.0	0.423	9.3	LOS A	1.8	46.1	0.54	0.55	34.7
12	R2	46	2.0	0.423	9.3	LOS A	1.8	46.1	0.54	0.55	33.7
Approach		367	2.0	0.423	9.3	LOS A	1.8	46.1	0.54	0.55	34.6
All Vehicles		2489	2.0	0.699	14.0	LOS B	4.6	117.9	0.66	0.71	33.5

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - PM

L.5 - Single-Lane Roundabout w/ RT Bypass
Roundabout
Design Life Analysis (Final Year): Results for 25 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	89	2.0	0.677	10.1	LOS B	7.2	182.0	0.92	1.01	38.0
8	T1	294	2.0	0.677	10.1	LOS B	7.2	182.0	0.92	1.01	38.1
18	R2	80	2.0	0.677	10.1	LOS B	7.2	182.0	0.92	1.01	37.0
Approach		463	2.0	0.677	10.1	LOS B	7.2	182.0	0.92	1.01	37.9
East: Lincoln Road											
1	L2	72	2.0	0.576	4.8	LOS A	5.5	140.1	0.85	0.79	37.5
6	T1	458	2.0	0.576	4.8	LOS A	5.5	140.1	0.85	0.79	37.5
16	R2	590	2.0	0.587	3.9	LOS A	5.6	142.1	0.80	0.70	37.6
Approach		1120	2.0	0.587	4.3	LOS A	5.6	142.1	0.82	0.74	37.6
North: N Montana Avenue											
7	L2	240	2.0	0.888	24.0	LOS C	15.4	390.7	1.00	1.30	30.3
4	T1	160	2.0	0.888	24.0	LOS C	15.4	390.7	1.00	1.30	30.4
14	R2	139	2.0	0.888	24.0	LOS C	15.4	390.7	1.00	1.30	29.7
Approach		539	2.0	0.888	24.0	LOS C	15.4	390.7	1.00	1.30	30.2
West: Lincoln Road											
5	L2	108	2.0	0.516	5.3	LOS A	4.2	107.1	0.82	0.79	37.0
2	T1	213	2.0	0.516	5.3	LOS A	4.2	107.1	0.82	0.79	36.9
12	R2	46	2.0	0.516	5.3	LOS A	4.2	107.1	0.82	0.79	35.7
Approach		367	2.0	0.516	5.3	LOS A	4.2	107.1	0.82	0.79	36.8
All Vehicles		2489	2.0	0.888	9.8	LOS A	15.4	390.7	0.88	0.92	35.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - AM

L.6 - Multi-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 25 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	84	2.0	0.459	16.0	LOS C	1.7	42.1	0.75	0.79	34.6
8	T1	136	2.0	0.459	16.0	LOS C	1.7	42.1	0.75	0.79	34.6
18	R2	139	2.0	0.290	12.0	LOS B	0.9	22.7	0.69	0.71	36.7
Approach		359	2.0	0.459	14.5	LOS B	1.7	42.1	0.73	0.76	35.4
East: Lincoln Road											
1	L2	46	2.0	0.258	6.3	LOS A	0.9	23.7	0.40	0.33	37.7
6	T1	205	2.0	0.258	6.3	LOS A	0.9	23.7	0.40	0.33	37.6
16	R2	92	2.0	0.088	4.2	LOS A	0.3	7.0	0.29	0.20	37.9
Approach		343	2.0	0.258	5.7	LOS A	0.9	23.7	0.37	0.30	37.7
North: N Montana Avenue											
7	L2	676	2.0	0.700	15.4	LOS C	5.5	138.6	0.69	0.68	33.0
4	T1	279	2.0	0.542	10.8	LOS B	3.0	75.0	0.55	0.51	39.0
14	R2	245	2.0	0.542	10.8	LOS B	3.0	75.0	0.55	0.51	37.6
Approach		1200	2.0	0.700	13.4	LOS B	5.5	138.6	0.63	0.61	35.1
West: Lincoln Road											
5	L2	105	2.0	0.173	8.1	LOS A	0.5	12.9	0.57	0.57	33.8
2	T1	562	2.0	1.056	78.2	LOS F	22.6	573.7	1.00	2.03	17.5
12	R2	75	2.0	1.056	78.2	LOS F	22.6	573.7	1.00	2.03	17.1
Approach		741	2.0	1.056	68.3	LOS F	22.6	573.7	0.94	1.83	18.8
All Vehicles		2644	2.0	1.056	27.9	LOS D	22.6	573.7	0.69	0.93	28.5

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - AM

L.6 - Multi-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 25 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	84	2.0	0.384	5.4	LOS A	2.0	51.0	0.79	0.80	40.8
8	T1	136	2.0	0.384	5.4	LOS A	2.0	51.0	0.79	0.80	40.9
18	R2	139	2.0	0.308	6.1	LOS A	1.4	35.6	0.76	0.77	40.7
Approach		359	2.0	0.384	5.7	LOS A	2.0	51.0	0.78	0.79	40.8
East: Lincoln Road											
1	L2	46	2.0	0.199	1.3	LOS A	1.3	31.9	0.52	0.32	39.5
6	T1	205	2.0	0.199	1.3	LOS A	1.3	31.9	0.52	0.32	39.5
16	R2	92	2.0	0.068	0.8	LOS A	0.4	9.5	0.40	0.22	39.4
Approach		343	2.0	0.199	1.2	LOS A	1.3	31.9	0.48	0.29	39.5
North: N Montana Avenue											
7	L2	676	2.0	0.533	2.0	LOS A	4.3	109.9	0.66	0.50	39.4
4	T1	279	2.0	0.498	2.5	LOS A	3.7	94.6	0.67	0.51	44.0
14	R2	245	2.0	0.498	2.5	LOS A	3.7	94.6	0.67	0.51	42.2
Approach		1200	2.0	0.533	2.2	LOS A	4.3	109.9	0.67	0.50	40.9
West: Lincoln Road											
5	L2	105	2.0	0.293	7.5	LOS A	1.2	31.6	0.73	0.74	34.1
2	T1	562	2.0	0.963	25.2	LOS C	16.3	413.1	1.00	1.50	29.2
12	R2	75	2.0	0.963	25.2	LOS C	16.3	413.1	1.00	1.50	28.2
Approach		741	2.0	0.963	22.7	LOS C	16.3	413.1	0.96	1.39	29.7
All Vehicles		2644	2.0	0.963	8.3	LOS A	16.3	413.1	0.74	0.76	36.8

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / N Montana Avenue - PM

L.6 - Multi-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 25 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	89	2.0	0.460	10.2	LOS B	2.0	50.0	0.56	0.58	38.4
8	T1	294	2.0	0.460	10.2	LOS B	2.0	50.0	0.56	0.58	38.4
18	R2	80	2.0	0.095	5.2	LOS A	0.3	7.0	0.42	0.38	41.3
Approach		463	2.0	0.460	9.4	LOS A	2.0	50.0	0.54	0.55	38.9
East: Lincoln Road											
1	L2	72	2.0	0.621	14.0	LOS B	3.8	95.9	0.67	0.73	33.6
6	T1	458	2.0	0.621	14.0	LOS B	3.8	95.9	0.67	0.73	33.6
16	R2	590	2.0	0.644	14.0	LOS B	4.3	108.5	0.66	0.70	32.5
Approach		1120	2.0	0.644	14.0	LOS B	4.3	108.5	0.66	0.71	33.0
North: N Montana Avenue											
7	L2	240	2.0	0.311	8.3	LOS A	1.1	28.0	0.54	0.54	36.6
4	T1	160	2.0	0.387	9.5	LOS A	1.5	39.1	0.57	0.59	39.9
14	R2	139	2.0	0.387	9.5	LOS A	1.5	39.1	0.57	0.59	38.4
Approach		539	2.0	0.387	9.0	LOS A	1.5	39.1	0.56	0.57	37.9
West: Lincoln Road											
5	L2	108	2.0	0.121	5.2	LOS A	0.4	9.1	0.40	0.35	35.2
2	T1	213	2.0	0.291	7.1	LOS A	1.0	25.2	0.46	0.44	37.8
12	R2	46	2.0	0.291	7.1	LOS A	1.0	25.2	0.46	0.44	36.1
Approach		367	2.0	0.291	6.6	LOS A	1.0	25.2	0.44	0.41	36.8
All Vehicles		2489	2.0	0.644	10.9	LOS B	4.3	108.5	0.58	0.61	35.6

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

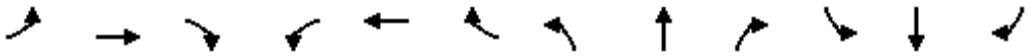
Site: Lincoln Road / N Montana Avenue - PM

L.6 - Multi-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 25 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: N Montana Avenue											
3	L2	89	2.0	0.426	2.7	LOS A	2.2	56.7	0.61	0.52	42.7
8	T1	294	2.0	0.426	2.7	LOS A	2.2	56.7	0.61	0.52	42.8
18	R2	80	2.0	0.161	4.4	LOS A	0.6	15.6	0.57	0.57	42.0
Approach		463	2.0	0.426	3.0	LOS A	2.2	56.7	0.61	0.52	42.6
East: Lincoln Road											
1	L2	72	2.0	0.472	2.8	LOS A	3.7	94.1	0.75	0.53	38.6
6	T1	458	2.0	0.472	2.8	LOS A	3.7	94.1	0.75	0.53	38.6
16	R2	590	2.0	0.489	2.3	LOS A	3.9	97.8	0.69	0.54	38.4
Approach		1120	2.0	0.489	2.5	LOS A	3.9	97.8	0.72	0.54	38.5
North: N Montana Avenue											
7	L2	240	2.0	0.312	4.0	LOS A	2.1	54.4	0.78	0.69	39.1
4	T1	160	2.0	0.307	3.2	LOS A	2.3	58.6	0.78	0.62	43.4
14	R2	139	2.0	0.307	3.2	LOS A	2.3	58.6	0.78	0.62	41.6
Approach		539	2.0	0.312	3.6	LOS A	2.3	58.6	0.78	0.65	40.9
West: Lincoln Road											
5	L2	108	2.0	0.160	2.6	LOS A	0.7	16.8	0.54	0.48	36.5
2	T1	213	2.0	0.282	1.8	LOS A	1.3	34.2	0.55	0.38	40.0
12	R2	46	2.0	0.282	1.8	LOS A	1.3	34.2	0.55	0.38	38.1
Approach		367	2.0	0.282	2.0	LOS A	1.3	34.2	0.55	0.41	38.6
All Vehicles		2489	2.0	0.489	2.8	LOS A	3.9	97.8	0.69	0.54	39.7

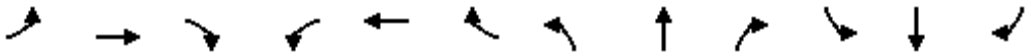
Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	44	643	187	154	0	0	0	0	2	0	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.77	0.77	0.77	0.75	0.75	0.75	0.92	0.92	0.92	0.75	0.75	0.75
Hourly flow rate (vph)	0	117	1704	588	485	0	0	0	0	4	0	15
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	485			1820			2630	2630	968	2630	3482	485
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	485			1820			2630	2630	968	2630	3482	485
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			0			0	0	100	0	0	97
cM capacity (veh/h)	1078			336			0	0	308	0	0	582

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	1820	1073	19
Volume Left	0	588	4
Volume Right	1704	0	15
cSH	1700	336	0
Volume to Capacity	1.07	1.75	Err
Queue Length 95th (ft)	0	935	Err
Control Delay (s)	0.0	376.5	Err
Lane LOS		F	F
Approach Delay (s)	0.0	376.5	Err
Approach LOS			F

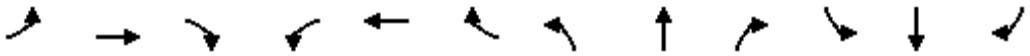
Intersection Summary			
Average Delay			Err
Intersection Capacity Utilization		142.7%	ICU Level of Service H
Analysis Period (min)			15



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	81	160	30	535	0	0	0	0	10	1	30
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.89	0.89	0.89	0.92	0.92	0.92	0.68	0.68	0.68
Hourly flow rate (vph)	0	204	403	80	1419	0	0	0	0	23	2	69
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1419			607			1984	1983	405	1983	2185	1419
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1419			607			1984	1983	405	1983	2185	1419
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			92			100	100	100	47	95	59
cM capacity (veh/h)	480			971			24	56	645	43	42	168

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	607	1498	94
Volume Left	0	80	23
Volume Right	403	0	69
cSH	1700	971	94
Volume to Capacity	0.36	0.08	1.00
Queue Length 95th (ft)	0	7	148
Control Delay (s)	0.0	4.7	174.1
Lane LOS		A	F
Approach Delay (s)	0.0	4.7	174.1
Approach LOS			F

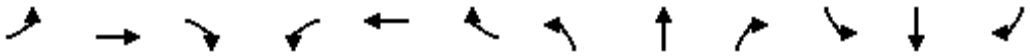
Intersection Summary			
Average Delay	10.7		
Intersection Capacity Utilization	112.9%	ICU Level of Service	H
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	44	643	187	154	0	0	0	0	2	0	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.77	0.77	0.77	0.75	0.75	0.75	0.92	0.92	0.92	0.75	0.75	0.75
Hourly flow rate (vph)	0	117	1704	588	485	0	0	0	0	4	0	15
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	485			1820			2630	2630	968	2630	3482	485
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	485			1820			2630	2630	968	2630	3482	485
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			0			0	0	100	0	0	97
cM capacity (veh/h)	1078			336			0	0	308	0	0	582

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	1820	588	485	19
Volume Left	0	588	0	4
Volume Right	1704	0	0	15
cSH	1700	336	1700	0
Volume to Capacity	1.07	1.75	0.29	Err
Queue Length 95th (ft)	0	935	0	Err
Control Delay (s)	0.0	376.5	0.0	Err
Lane LOS		F		F
Approach Delay (s)	0.0	206.5		Err
Approach LOS				F

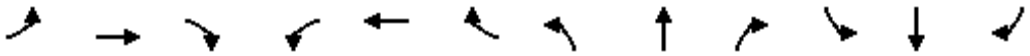
Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	123.6%	ICU Level of Service	H
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	81	160	30	535	0	0	0	0	10	1	30
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.89	0.89	0.89	0.92	0.92	0.92	0.68	0.68	0.68
Hourly flow rate (vph)	0	204	403	80	1419	0	0	0	0	23	2	69
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1419			607			1984	1983	405	1983	2185	1419
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1419			607			1984	1983	405	1983	2185	1419
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			92			100	100	100	47	95	59
cM capacity (veh/h)	480			971			24	56	645	43	42	168

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	607	80	1419	94
Volume Left	0	80	0	23
Volume Right	403	0	0	69
cSH	1700	971	1700	94
Volume to Capacity	0.36	0.08	0.83	1.00
Queue Length 95th (ft)	0	7	0	148
Control Delay (s)	0.0	9.0	0.0	174.1
Lane LOS		A		F
Approach Delay (s)	0.0	0.5		174.1
Approach LOS				F

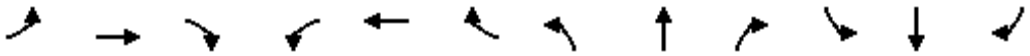
Intersection Summary			
Average Delay	7.8		
Intersection Capacity Utilization	125.5%	ICU Level of Service	H
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	44	643	187	154	0	0	0	0	2	0	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.77	0.77	0.77	0.75	0.75	0.75	0.92	0.92	0.92	0.75	0.75	0.75
Hourly flow rate (vph)	0	117	1704	588	485	0	0	0	0	4	0	15
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	485			117			1778	1778	117	1778	1778	485
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	485			117			1778	1778	117	1778	1778	485
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			60			100	100	100	91	100	97
cM capacity (veh/h)	1078			1472			43	49	936	44	49	582

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	117	1704	1073	19
Volume Left	0	0	588	4
Volume Right	0	1704	0	15
cSH	1700	1700	1472	157
Volume to Capacity	0.07	1.00	0.40	0.12
Queue Length 95th (ft)	0	0	49	10
Control Delay (s)	0.0	0.0	7.3	31.0
Lane LOS			A	D
Approach Delay (s)	0.0		7.3	31.0
Approach LOS				D

Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	138.1%	ICU Level of Service	H
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	81	160	30	535	0	0	0	0	10	1	30
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.89	0.89	0.89	0.92	0.92	0.92	0.68	0.68	0.68
Hourly flow rate (vph)	0	204	403	80	1419	0	0	0	0	23	2	69
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1419			204			1783	1782	204	1782	1782	1419
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1419			204			1783	1782	204	1782	1782	1419
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			94			100	100	100	62	97	59
cM capacity (veh/h)	480			1368			35	77	837	61	77	168

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	204	403	1498	94
Volume Left	0	0	80	23
Volume Right	0	403	0	69
cSH	1700	1700	1368	115
Volume to Capacity	0.12	0.24	0.06	0.82
Queue Length 95th (ft)	0	0	5	119
Control Delay (s)	0.0	0.0	3.0	110.0
Lane LOS			A	F
Approach Delay (s)	0.0		3.0	110.0
Approach LOS				F

Intersection Summary			
Average Delay	6.8		
Intersection Capacity Utilization	104.4%	ICU Level of Service	G
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	44	643	187	154	0	0	0	0	2	0	7
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1900	1863	0				1900	1863	1900
Adj Flow Rate, veh/h	0	118	1726	581	478	0				4	0	14
Adj No. of Lanes	0	1	0	0	1	0				0	1	0
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76				0.76	0.76	0.76
Percent Heavy Veh, %	0	2	2	2	2	0				0	2	0
Cap, veh/h	0	66	964	124	0	0				48	0	168
Arrive On Green	0.00	0.64	0.64	0.64	0.64	0.00				0.13	0.00	0.13
Sat Flow, veh/h	0	102	1496	0	0	0				360	0	1262
Grp Volume(v), veh/h	0	0	1844	1059	0	0				18	0	0
Grp Sat Flow(s),veh/h/ln	0	0	1599	0	0	0				1622	0	0
Q Serve(g_s), s	0.0	0.0	29.0	0.0	0.0	0.0				0.4	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	29.0	29.0	0.0	0.0				0.4	0.0	0.0
Prop In Lane	0.00		0.94	0.55		0.00				0.22		0.78
Lane Grp Cap(c), veh/h	0	0	1030	124	0	0				216	0	0
V/C Ratio(X)	0.00	0.00	1.79	8.55	0.00	0.00				0.08	0.00	0.00
Avail Cap(c_a), veh/h	0	0	1030	124	0	0				216	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	1.00	1.00	0.00	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	8.0	22.5	0.0	0.0				17.1	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	359.3	3412.9	0.0	0.0				0.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	115.1	119.0	0.0	0.0				0.2	0.0	0.0
LnGrp Delay(d),s/veh	0.0	0.0	367.3	3435.4	0.0	0.0				17.8	0.0	0.0
LnGrp LOS			F	F						B		
Approach Vol, veh/h		1844			1059						18	
Approach Delay, s/veh		367.3			3435.4						17.8	
Approach LOS		F			F						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				34.0		11.0		34.0
Change Period (Y+Rc), s				5.0		5.0		5.0
Max Green Setting (Gmax), s				29.0		6.0		29.0
Max Q Clear Time (g_c+I1), s				31.0		2.4		31.0
Green Ext Time (p_c), s				0.0		0.0		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	1477.5
HCM 2010 LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	81	160	30	535	0	0	0	0	10	1	30
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1900	1863	0				1900	1863	1900
Adj Flow Rate, veh/h	0	188	371	80	1435	0				18	2	53
Adj No. of Lanes	0	1	0	0	1	0				0	1	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88				0.88	0.88	0.88
Percent Heavy Veh, %	0	2	2	2	2	0				0	2	0
Cap, veh/h	0	421	830	111	1292	0				34	4	99
Arrive On Green	0.00	0.75	0.75	0.75	0.75	0.00				0.08	0.08	0.08
Sat Flow, veh/h	0	561	1107	64	1723	0				403	45	1186
Grp Volume(v), veh/h	0	0	559	1515	0	0				73	0	0
Grp Sat Flow(s),veh/h/ln	0	0	1667	1786	0	0				1633	0	0
Q Serve(g_s), s	0.0	0.0	7.6	30.9	0.0	0.0				2.6	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	7.6	45.0	0.0	0.0				2.6	0.0	0.0
Prop In Lane	0.00		0.66	0.05		0.00				0.25		0.73
Lane Grp Cap(c), veh/h	0	0	1251	1403	0	0				136	0	0
V/C Ratio(X)	0.00	0.00	0.45	1.08	0.00	0.00				0.54	0.00	0.00
Avail Cap(c_a), veh/h	0	0	1251	1403	0	0				136	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	1.00	1.00	0.00	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	2.8	8.2	0.0	0.0				26.4	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.3	48.7	0.0	0.0				14.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	3.5	42.0	0.0	0.0				1.7	0.0	0.0
LnGrp Delay(d),s/veh	0.0	0.0	3.1	56.9	0.0	0.0				40.7	0.0	0.0
LnGrp LOS			A	F						D		
Approach Vol, veh/h		559			1515						73	
Approach Delay, s/veh		3.1			56.9						40.7	
Approach LOS		A			E						D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				50.0		10.0		50.0
Change Period (Y+Rc), s				5.0		5.0		5.0
Max Green Setting (Gmax), s				45.0		5.0		45.0
Max Q Clear Time (g_c+I1), s				9.6		4.6		47.0
Green Ext Time (p_c), s				28.0		0.0		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	42.4
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	44	643	187	154	0	0	0	0	2	0	7
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1863	1900	1863	0				1900	1863	1900
Adj Flow Rate, veh/h	0	118	0	581	478	0				4	0	14
Adj No. of Lanes	0	1	1	0	1	0				0	1	0
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76				0.76	0.76	0.76
Percent Heavy Veh, %	0	2	2	2	2	0				0	2	0
Cap, veh/h	0	1287	1094	634	462	0				74	0	260
Arrive On Green	0.00	0.69	0.00	1.00	1.00	0.00				0.21	0.00	0.21
Sat Flow, veh/h	0	1863	1583	813	669	0				360	0	1262
Grp Volume(v), veh/h	0	118	0	1059	0	0				18	0	0
Grp Sat Flow(s),veh/h/ln	0	1863	1583	1482	0	0				1622	0	0
Q Serve(g_s), s	0.0	1.6	0.0	53.7	0.0	0.0				0.7	0.0	0.0
Cycle Q Clear(g_c), s	0.0	1.6	0.0	53.7	0.0	0.0				0.7	0.0	0.0
Prop In Lane	0.00		1.00	0.55		0.00				0.22		0.78
Lane Grp Cap(c), veh/h	0	1287	1094	1096	0	0				334	0	0
V/C Ratio(X)	0.00	0.09	0.00	0.97	0.00	0.00				0.05	0.00	0.00
Avail Cap(c_a), veh/h	0	2302	1956	1903	0	0				334	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	0.51	0.00	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	4.0	0.0	0.9	0.0	0.0				24.8	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	5.4	0.0	0.0				0.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.8	0.0	11.0	0.0	0.0				0.3	0.0	0.0
LnGrp Delay(d),s/veh	0.0	4.0	0.0	6.3	0.0	0.0				25.1	0.0	0.0
LnGrp LOS		A		A						C		
Approach Vol, veh/h		118			1059						18	
Approach Delay, s/veh		4.0			6.3						25.1	
Approach LOS		A			A						C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				64.8		55.2		64.8
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				96.0		16.0		96.0
Max Q Clear Time (g_c+I1), s				3.6		2.7		55.7
Green Ext Time (p_c), s				13.6		0.0		12.3

Intersection Summary	
HCM 2010 Ctrl Delay	6.4
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	81	160	30	535	0	0	0	0	10	1	30
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1863	1900	1863	0				1900	1863	1900
Adj Flow Rate, veh/h	0	188	0	80	1435	0				18	2	53
Adj No. of Lanes	0	1	1	0	1	0				0	1	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88				0.88	0.88	0.88
Percent Heavy Veh, %	0	2	2	2	2	0				0	2	0
Cap, veh/h	0	1490	1267	94	1392	0				54	6	158
Arrive On Green	0.00	0.80	0.00	1.00	1.00	0.00				0.13	0.13	0.13
Sat Flow, veh/h	0	1863	1583	78	1741	0				403	45	1186
Grp Volume(v), veh/h	0	188	0	1515	0	0				73	0	0
Grp Sat Flow(s),veh/h/ln	0	1863	1583	1819	0	0				1633	0	0
Q Serve(g_s), s	0.0	2.7	0.0	78.5	0.0	0.0				4.9	0.0	0.0
Cycle Q Clear(g_c), s	0.0	2.7	0.0	96.0	0.0	0.0				4.9	0.0	0.0
Prop In Lane	0.00		1.00	0.05		0.00				0.25		0.73
Lane Grp Cap(c), veh/h	0	1490	1267	1487	0	0				218	0	0
V/C Ratio(X)	0.00	0.13	0.00	1.02	0.00	0.00				0.34	0.00	0.00
Avail Cap(c_a), veh/h	0	1490	1267	1487	0	0				218	0	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	0.53	0.00	0.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	2.7	0.0	0.8	0.0	0.0				47.2	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	22.0	0.0	0.0				4.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.4	0.0	29.7	0.0	0.0				2.4	0.0	0.0
LnGrp Delay(d),s/veh	0.0	2.7	0.0	22.9	0.0	0.0				51.3	0.0	0.0
LnGrp LOS		A		F						D		
Approach Vol, veh/h		188			1515						73	
Approach Delay, s/veh		2.7			22.9						51.3	
Approach LOS		A			C						D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				100.0		20.0		100.0
Change Period (Y+Rc), s				4.0		4.0		4.0
Max Green Setting (Gmax), s				96.0		16.0		96.0
Max Q Clear Time (g_c+I1), s				4.7		6.9		98.0
Green Ext Time (p_c), s				42.3		0.0		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	21.9
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	600.8
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	1	1	0	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	1844	1059	0	18
Demand Flow Rate, veh/h	1881	1081	0	18
Vehicles Circulating, veh/h	597	0	124	1081
Vehicles Exiting, veh/h	502	124	2354	0
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	930.5	36.9	0.0	10.1
Approach LOS	F	E	-	B

Lane	Left	Left	Left
Designated Moves	TR	LT	LTR
Assumed Moves	TR	LT	LTR
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	1881	1081	18
Cap Entry Lane, veh/h	622	1130	383
Entry HV Adj Factor	0.980	0.980	1.000
Flow Entry, veh/h	1844	1059	18
Cap Entry, veh/h	610	1107	383
V/C Ratio	3.024	0.957	0.047
Control Delay, s/veh	930.5	36.9	10.1
LOS	F	E	B
95th %tile Queue, veh	159	17	0

Intersection	
Intersection Delay, s/veh	134.3
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	1	1	0	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	559	1515	0	73
Demand Flow Rate, veh/h	570	1546	0	74
Vehicles Circulating, veh/h	102	0	210	1546
Vehicles Exiting, veh/h	1518	210	462	0
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	10.8	185.3	0.0	23.3
Approach LOS	B	F	-	C

Lane	Left	Left	Left
Designated Moves	TR	LT	LTR
Assumed Moves	TR	LT	LTR
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	570	1546	74
Cap Entry Lane, veh/h	1020	1130	241
Entry HV Adj Factor	0.981	0.980	0.986
Flow Entry, veh/h	559	1515	73
Cap Entry, veh/h	1001	1108	237
V/C Ratio	0.559	1.368	0.307
Control Delay, s/veh	10.8	185.3	23.3
LOS	B	F	C
95th %tile Queue, veh	4	60	1

Intersection	
Intersection Delay, s/veh	13.8
Intersection LOS	B

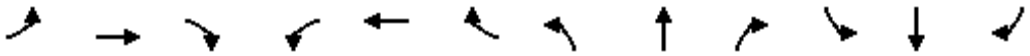
Approach	EB	WB	NB	SB
Entry Lanes	1	1	0	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	1844	1059	0	18
Demand Flow Rate, veh/h	1881	1081	0	18
Vehicles Circulating, veh/h	597	0	124	1081
Vehicles Exiting, veh/h	502	124	593	0
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.5	36.9	0.0	10.1
Approach LOS	A	E	-	B

Lane	Left	Bypass	Left	Left
Designated Moves	T	R	LT	LTR
Assumed Moves	T	R	LT	LTR
RT Channelized		Free		
Lane Util	1.000		1.000	1.000
Critical Headway, s	5.193		5.193	5.193
Entry Flow, veh/h	120	1761	1081	18
Cap Entry Lane, veh/h	622	1938	1130	383
Entry HV Adj Factor	0.980	0.980	0.980	1.000
Flow Entry, veh/h	118	1726	1059	18
Cap Entry, veh/h	610	1900	1107	383
V/C Ratio	0.193	0.908	0.957	0.047
Control Delay, s/veh	8.3	0.0	36.9	10.1
LOS	A	A	E	B
95th %tile Queue, veh	1	17	17	0

Intersection	
Intersection Delay, s/veh	132.0
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	1	1	0	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	559	1515	0	73
Demand Flow Rate, veh/h	570	1546	0	74
Vehicles Circulating, veh/h	102	0	210	1546
Vehicles Exiting, veh/h	1518	210	84	0
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	1.8	185.3	0.0	23.3
Approach LOS	A	F	-	C

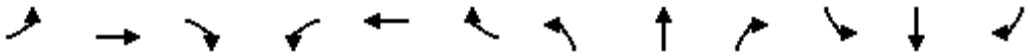
Lane	Left	Bypass	Left	Left
Designated Moves	T	R	LT	LTR
Assumed Moves	T	R	LT	LTR
RT Channelized		Free		
Lane Util	1.000		1.000	1.000
Critical Headway, s	5.193		5.193	5.193
Entry Flow, veh/h	192	378	1546	74
Cap Entry Lane, veh/h	1020	1938	1130	241
Entry HV Adj Factor	0.980	0.980	0.980	0.986
Flow Entry, veh/h	188	371	1515	73
Cap Entry, veh/h	1000	1900	1108	237
V/C Ratio	0.188	0.195	1.368	0.307
Control Delay, s/veh	5.4	0.0	185.3	23.3
LOS	A	A	F	C
95th %tile Queue, veh	1	1	60	1



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	15	19	0	0	257	2	86	0	16	0	0	0
Peak Hour Factor	0.77	0.77	0.77	0.70	0.70	0.70	0.58	0.58	0.58	0.92	0.92	0.92
Hourly flow rate (vph)	40	50	0	0	866	7	302	0	65	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	90	873	368
Volume Left (vph)	40	0	302
Volume Right (vph)	0	7	65
Hadj (s)	0.12	0.03	0.09
Departure Headway (s)	6.2	5.3	6.1
Degree Utilization, x	0.16	1.0	0.62
Capacity (veh/h)	548	669	579
Control Delay (s)	10.4	159.0	18.4
Approach Delay (s)	10.4	159.0	18.4
Approach LOS	B	F	C

Intersection Summary				
Delay	110.1			
Level of Service	F			
Intersection Capacity Utilization	50.9%	ICU Level of Service	A	
Analysis Period (min)	15			



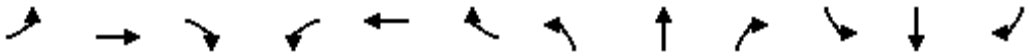
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	21	60	0	0	115	0	483	0	124	0	0	0
Peak Hour Factor	0.78	0.78	0.78	0.74	0.74	0.74	0.80	0.80	0.80	0.92	0.92	0.92
Hourly flow rate (vph)	55	157	0	0	367	0	1232	0	366	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	212	367	1597
Volume Left (vph)	55	0	1232
Volume Right (vph)	0	0	366
Hadj (s)	0.09	0.03	0.05
Departure Headway (s)	6.6	6.3	5.8
Degree Utilization, x	0.39	0.64	1.0
Capacity (veh/h)	531	565	626
Control Delay (s)	13.8	19.8	719.9
Approach Delay (s)	13.8	19.8	719.9
Approach LOS	B	C	F

Intersection Summary				
Delay	533.2			
Level of Service	F			
Intersection Capacity Utilization	105.5%	ICU Level of Service	G	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
8: I-15 NB Off/I-15 NB On & Lincoln Road

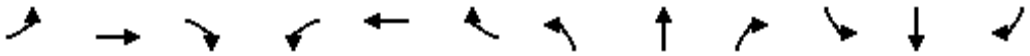
6/24/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	15	19	0	0	257	2	86	0	16	0	0	0
Peak Hour Factor	0.77	0.77	0.77	0.70	0.70	0.70	0.58	0.58	0.58	0.92	0.92	0.92
Hourly flow rate (vph)	40	50	0	0	866	7	302	0	65	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total (vph)	90	873	302	65
Volume Left (vph)	40	0	302	0
Volume Right (vph)	0	7	0	65
Hadj (s)	0.12	0.03	0.53	-0.67
Departure Headway (s)	6.3	5.3	7.1	5.9
Degree Utilization, x	0.16	1.0	0.60	0.11
Capacity (veh/h)	549	667	494	600
Control Delay (s)	10.4	159.5	18.8	8.4
Approach Delay (s)	10.4	159.5	17.0	
Approach LOS	B	F	C	

Intersection Summary			
Delay	110.0		
Level of Service	F		
Intersection Capacity Utilization	48.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	21	60	0	0	115	0	483	0	124	0	0	0
Peak Hour Factor	0.78	0.78	0.78	0.74	0.74	0.74	0.80	0.80	0.80	0.92	0.92	0.92
Hourly flow rate (vph)	55	157	0	0	367	0	1232	0	366	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total (vph)	212	367	1232	366
Volume Left (vph)	55	0	1232	0
Volume Right (vph)	0	0	0	366
Hadj (s)	0.09	0.03	0.53	-0.67
Departure Headway (s)	6.6	6.3	6.9	5.6
Degree Utilization, x	0.39	0.64	1.0	0.57
Capacity (veh/h)	532	567	535	633
Control Delay (s)	13.8	19.6	626.5	14.8
Approach Delay (s)	13.8	19.6	486.4	
Approach LOS	B	C	F	

Intersection Summary				
Delay	361.7			
Level of Service	F			
Intersection Capacity Utilization	87.7%	ICU Level of Service	E	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	15	19	0	0	257	2	86	0	16	0	0	0
Number	7	4	14	3	8	18	5	2	12			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1900	1863	0	0	1863	1900	1900	1863	1863			
Adj Flow Rate, veh/h	40	50	0	0	866	7	302	0	65			
Adj No. of Lanes	0	1	0	0	1	0	0	1	1			
Peak Hour Factor	0.77	0.77	0.77	0.70	0.70	0.70	0.58	0.58	0.58			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	130	138	0	0	1002	8	526	0	470			
Arrive On Green	0.54	0.54	0.00	0.00	0.54	0.54	0.30	0.00	0.30			
Sat Flow, veh/h	114	255	0	0	1845	15	1774	0	1583			
Grp Volume(v), veh/h	90	0	0	0	0	873	302	0	65			
Grp Sat Flow(s),veh/h/ln	368	0	0	0	0	1860	1774	0	1583			
Q Serve(g_s), s	2.8	0.0	0.0	0.0	0.0	30.8	11.0	0.0	2.3			
Cycle Q Clear(g_c), s	33.6	0.0	0.0	0.0	0.0	30.8	11.0	0.0	2.3			
Prop In Lane	0.44		0.00	0.00		0.01	1.00		1.00			
Lane Grp Cap(c), veh/h	268	0	0	0	0	1010	526	0	470			
V/C Ratio(X)	0.34	0.00	0.00	0.00	0.00	0.86	0.57	0.00	0.14			
Avail Cap(c_a), veh/h	384	0	0	0	0	1226	526	0	470			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	14.1	0.0	0.0	0.0	0.0	15.0	22.7	0.0	19.6			
Incr Delay (d2), s/veh	0.7	0.0	0.0	0.0	0.0	5.7	4.5	0.0	0.6			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.0	0.0	0.0	0.0	0.0	17.1	6.0	0.0	1.1			
LnGrp Delay(d),s/veh	14.9	0.0	0.0	0.0	0.0	20.7	27.2	0.0	20.3			
LnGrp LOS	B					C	C		C			
Approach Vol, veh/h		90			873			367				
Approach Delay, s/veh		14.9			20.7			26.0				
Approach LOS		B			C			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		29.0		47.2				47.2
Change Period (Y+Rc), s		6.4		5.8				5.8
Max Green Setting (Gmax), s		22.6		50.2				50.2
Max Q Clear Time (g_c+I1), s		13.0		35.6				32.8
Green Ext Time (p_c), s		0.0		5.8				6.3

Intersection Summary	
HCM 2010 Ctrl Delay	21.7
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	21	60	0	0	115	0	483	0	124	0	0	0
Number	7	4	14	3	8	18	5	2	12			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1900	1863	0	0	1863	1900	1900	1863	1863			
Adj Flow Rate, veh/h	54	153	0	0	339	0	1232	0	366			
Adj No. of Lanes	0	1	0	0	1	0	0	1	1			
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	94	234	0	0	487	0	1048	0	935			
Arrive On Green	0.26	0.26	0.00	0.00	0.26	0.00	0.59	0.00	0.59			
Sat Flow, veh/h	150	894	0	0	1863	0	1774	0	1583			
Grp Volume(v), veh/h	207	0	0	0	339	0	1232	0	366			
Grp Sat Flow(s),veh/h/ln	1044	0	0	0	1863	0	1774	0	1583			
Q Serve(g_s), s	4.0	0.0	0.0	0.0	13.6	0.0	48.8	0.0	10.2			
Cycle Q Clear(g_c), s	17.5	0.0	0.0	0.0	13.6	0.0	48.8	0.0	10.2			
Prop In Lane	0.26		0.00	0.00		0.00	1.00		1.00			
Lane Grp Cap(c), veh/h	328	0	0	0	487	0	1048	0	935			
V/C Ratio(X)	0.63	0.00	0.00	0.00	0.70	0.00	1.18	0.00	0.39			
Avail Cap(c_a), veh/h	466	0	0	0	654	0	1048	0	935			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	27.8	0.0	0.0	0.0	27.5	0.0	16.9	0.0	9.0			
Incr Delay (d2), s/veh	2.0	0.0	0.0	0.0	2.0	0.0	89.3	0.0	0.3			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	4.7	0.0	0.0	0.0	7.2	0.0	49.6	0.0	4.4			
LnGrp Delay(d),s/veh	29.8	0.0	0.0	0.0	29.6	0.0	106.2	0.0	9.3			
LnGrp LOS	C				C		F		A			
Approach Vol, veh/h		207			339			1598				
Approach Delay, s/veh		29.8			29.6			84.0				
Approach LOS		C			C			F				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		55.2		27.4				27.4
Change Period (Y+Rc), s		6.4		5.8				5.8
Max Green Setting (Gmax), s		48.8		29.0				29.0
Max Q Clear Time (g_c+I1), s		50.8		19.5				15.6
Green Ext Time (p_c), s		0.0		2.1				2.5

Intersection Summary	
HCM 2010 Ctrl Delay	70.2
HCM 2010 LOS	E

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - AM

N.4 - Single-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 25 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	303	2.0	0.316	6.1	LOS A	1.3	33.0	0.22	0.12	32.7
8	T1	3	2.0	0.316	6.1	LOS A	1.3	33.0	0.22	0.12	32.6
18	R2	65	2.0	0.316	6.1	LOS A	1.3	33.0	0.22	0.12	31.7
Approach		371	2.0	0.316	6.1	LOS A	1.3	33.0	0.22	0.12	32.5
East: Lincoln Road											
6	T1	863	2.0	0.907	31.8	LOS D	14.3	362.1	1.00	1.20	25.1
16	R2	7	2.0	0.907	31.8	LOS D	14.3	362.1	1.00	1.20	24.6
Approach		869	2.0	0.907	31.8	LOS D	14.3	362.1	1.00	1.20	25.1
West: Lincoln Road											
5	L2	40	2.0	0.071	3.4	LOS A	0.0	0.0	0.00	0.00	37.1
2	T1	50	2.0	0.071	3.4	LOS A	0.0	0.0	0.00	0.00	37.0
Approach		90	2.0	0.071	3.4	LOS A	0.0	0.0	0.00	0.00	37.0
All Vehicles		1330	2.0	0.907	22.7	LOS C	14.3	362.1	0.71	0.81	27.5

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - AM

N.4 - Single-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 25 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	303	2.0	0.326	0.7	LOS A	2.0	50.0	0.31	0.16	35.0
8	T1	3	2.0	0.326	0.7	LOS A	2.0	50.0	0.31	0.16	34.9
18	R2	65	2.0	0.326	0.7	LOS A	2.0	50.0	0.31	0.16	33.8
Approach		371	2.0	0.326	0.7	LOS A	2.0	50.0	0.31	0.16	34.8
East: Lincoln Road											
6	T1	863	2.0	0.973	26.0	LOS D	29.2	740.5	1.00	1.42	26.9
16	R2	7	2.0	0.973	26.0	LOS D	29.2	740.5	1.00	1.42	26.2
Approach		869	2.0	0.973	26.0	LOS D	29.2	740.5	1.00	1.42	26.9
West: Lincoln Road											
5	L2	40	2.0	0.072	0.0	LOS A	0.0	0.0	0.00	0.00	37.1
2	T1	50	2.0	0.072	0.0	LOS A	0.0	0.0	0.00	0.00	37.0
Approach		90	2.0	0.072	0.0	LOS A	0.0	0.0	0.00	0.00	37.0
All Vehicles		1330	2.0	0.973	17.2	LOS C	29.2	740.5	0.74	0.98	29.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - PM

N.4 - Single-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 25 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	1235	2.0	1.506	245.7	LOS F	199.8	5075.4	1.00	4.44	7.5
8	T1	2	2.0	1.506	245.7	LOS F	199.8	5075.4	1.00	4.44	7.5
18	R2	367	2.0	1.506	245.7	LOS F	199.8	5075.4	1.00	4.44	7.4
Approach		1604	2.0	1.506	245.7	LOS F	199.8	5075.4	1.00	4.44	7.5
East: Lincoln Road											
6	T1	369	2.0	0.592	16.6	LOS C	2.9	74.2	0.72	0.80	30.2
16	R2	3	2.0	0.592	16.6	LOS C	2.9	74.2	0.72	0.80	29.4
Approach		372	2.0	0.592	16.6	LOS C	2.9	74.2	0.72	0.80	30.2
West: Lincoln Road											
5	L2	55	2.0	0.169	4.3	LOS A	0.0	0.0	0.00	0.00	37.8
2	T1	157	2.0	0.169	4.3	LOS A	0.0	0.0	0.00	0.00	37.6
Approach		212	2.0	0.169	4.3	LOS A	0.0	0.0	0.00	0.00	37.7
All Vehicles		2189	2.0	1.506	183.3	LOS F	199.8	5075.4	0.85	3.39	9.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - PM

N.4 - Single-Lane Roundabout
Roundabout
Design Life Analysis (Final Year): Results for 25 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	1235	2.0	1.575	267.2	LOS F	215.9	5482.9	1.00	4.11	7.0
8	T1	2	2.0	1.575	267.2	LOS F	215.9	5482.9	1.00	4.11	7.0
18	R2	367	2.0	1.575	267.2	LOS F	215.9	5482.9	1.00	4.11	7.0
Approach		1604	2.0	1.575	267.2	LOS F	215.9	5482.9	1.00	4.11	7.0
East: Lincoln Road											
6	T1	369	2.0	0.852	29.3	LOS D	12.0	304.4	1.00	1.34	25.8
16	R2	3	2.0	0.852	29.3	LOS D	12.0	304.4	1.00	1.34	25.2
Approach		372	2.0	0.852	29.3	LOS D	12.0	304.4	1.00	1.34	25.8
West: Lincoln Road											
5	L2	55	2.0	0.171	0.0	LOS A	0.0	0.0	0.00	0.00	37.8
2	T1	157	2.0	0.171	0.0	LOS A	0.0	0.0	0.00	0.00	37.6
Approach		212	2.0	0.171	0.0	LOS A	0.0	0.0	0.00	0.00	37.7
All Vehicles		2189	2.0	1.575	200.8	LOS F	215.9	5482.9	0.90	3.24	8.7

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - AM

N.5 - Single-Lane Roundabout w/ RT Bypass

Roundabout
Design Life Analysis (Final Year): Results for 25 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	303	2.0	0.260	5.4	LOS A	1.0	25.4	0.21	0.11	32.6
8	T1	3	2.0	0.260	5.4	LOS A	1.0	25.4	0.21	0.11	32.4
18	R2	65	2.0	0.054	3.4	LOS A	0.2	4.2	0.12	0.04	35.2
Approach		371	2.0	0.260	5.1	LOS A	1.0	25.4	0.19	0.09	33.0
East: Lincoln Road											
6	T1	863	2.0	0.907	31.8	LOS D	14.3	362.1	1.00	1.20	25.1
16	R2	7	2.0	0.907	31.8	LOS D	14.3	362.1	1.00	1.20	24.6
Approach		869	2.0	0.907	31.8	LOS D	14.3	362.1	1.00	1.20	25.1
West: Lincoln Road											
5	L2	40	2.0	0.071	3.4	LOS A	0.0	0.0	0.00	0.00	37.1
2	T1	50	2.0	0.071	3.4	LOS A	0.0	0.0	0.00	0.00	37.0
Approach		90	2.0	0.071	3.4	LOS A	0.0	0.0	0.00	0.00	37.0
All Vehicles		1330	2.0	0.907	22.4	LOS C	14.3	362.1	0.71	0.81	27.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - AM

N.5 - Single-Lane Roundabout w/ RT Bypass

Roundabout
Design Life Analysis (Final Year): Results for 25 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	303	2.0	0.223	0.5	LOS A	1.2	30.9	0.25	0.12	34.6
8	T1	3	2.0	0.223	0.5	LOS A	1.2	30.9	0.25	0.12	34.4
18	R2	65	2.0	0.046	0.2	LOS A	0.2	5.4	0.15	0.05	36.8
Approach		371	2.0	0.223	0.4	LOS A	1.2	30.9	0.23	0.11	34.9
East: Lincoln Road											
6	T1	863	2.0	0.968	25.1	LOS D	28.5	723.4	1.00	1.41	27.1
16	R2	7	2.0	0.968	25.1	LOS D	28.5	723.4	1.00	1.41	26.5
Approach		869	2.0	0.968	25.1	LOS D	28.5	723.4	1.00	1.41	27.1
West: Lincoln Road											
5	L2	40	2.0	0.072	0.0	LOS A	0.0	0.0	0.00	0.00	37.1
2	T1	50	2.0	0.072	0.0	LOS A	0.0	0.0	0.00	0.00	37.0
Approach		90	2.0	0.072	0.0	LOS A	0.0	0.0	0.00	0.00	37.0
All Vehicles		1330	2.0	0.968	16.5	LOS C	28.5	723.4	0.72	0.95	29.5

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - PM

N.5 - Single-Lane Roundabout w/ RT Bypass

Roundabout
Design Life Analysis (Final Year): Results for 25 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	1235	2.0	1.162	100.3	LOS F	82.0	2083.4	1.00	2.35	14.1
8	T1	2	2.0	1.162	100.3	LOS F	82.0	2083.4	1.00	2.35	14.1
18	R2	367	2.0	0.330	6.5	LOS A	1.3	34.2	0.30	0.20	33.6
Approach		1604	2.0	1.162	78.9	LOS F	82.0	2083.4	0.84	1.86	16.1
East: Lincoln Road											
6	T1	369	2.0	0.718	26.2	LOS D	3.9	98.6	0.83	0.98	26.8
16	R2	3	2.0	0.718	26.2	LOS D	3.9	98.6	0.83	0.98	26.1
Approach		372	2.0	0.718	26.2	LOS D	3.9	98.6	0.83	0.98	26.8
West: Lincoln Road											
5	L2	55	2.0	0.169	4.3	LOS A	0.0	0.0	0.00	0.00	37.8
2	T1	157	2.0	0.169	4.3	LOS A	0.0	0.0	0.00	0.00	37.6
Approach		212	2.0	0.169	4.3	LOS A	0.0	0.0	0.00	0.00	37.7
All Vehicles		2189	2.0	1.162	62.7	LOS F	82.0	2083.4	0.76	1.53	18.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Lincoln Road / I-15 NB - PM

N.5 - Single-Lane Roundabout w/ RT Bypass

Roundabout
Design Life Analysis (Final Year): Results for 25 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: I-15 NB Off Ramp											
3	L2	1235	2.0	0.988	19.5	LOS C	39.1	994.0	1.00	1.07	27.3
8	T1	2	2.0	0.988	19.5	LOS C	39.1	994.0	1.00	1.07	27.2
18	R2	367	2.0	0.282	0.9	LOS A	1.6	41.3	0.36	0.21	36.2
Approach		1604	2.0	0.988	15.3	LOS C	39.1	994.0	0.85	0.87	28.8
East: Lincoln Road											
6	T1	369	2.0	2.030	516.9	LOS F	77.3	1963.0	1.00	2.60	4.0
16	R2	3	2.0	2.030	516.9	LOS F	77.3	1963.0	1.00	2.60	3.9
Approach		372	2.0	2.030	516.9	LOS F	77.3	1963.0	1.00	2.60	4.0
West: Lincoln Road											
5	L2	55	2.0	0.171	0.0	LOS A	0.0	0.0	0.00	0.00	37.8
2	T1	157	2.0	0.171	0.0	LOS A	0.0	0.0	0.00	0.00	37.6
Approach		212	2.0	0.171	0.0	LOS A	0.0	0.0	0.00	0.00	37.7
All Vehicles		2189	2.0	2.030	99.0	LOS F	77.3	1963.0	0.80	1.08	14.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPENDIX F

Public Outreach

LINCOLN RD—MONTANA TO I-15

Corridor Improvement Options

Date:
Thursday
November 6, 2014

Time:
Open House: 5:00 PM
Presentation: 6:00 PM

Location:
Helena Regional Airport
2nd Floor Reception Rm
2850 Mercer Loop

Please park in the long-term parking lot.

Informational Meeting

The Montana Department of Transportation (MDT) will discuss potential improvement options to the Lincoln Road Corridor, between the intersection with Montana Avenue and the Interstate 15 northbound off-ramp in Helena, MT, Lewis and Clark County.

The purpose of the meeting is to inform interested parties about the scope and purpose of the potential improvements, and to solicit input from the public.

Please visit the project website for more information: http://www.mdt.mt.gov/pubinvolve/lincoln/

Contacts:

Steve Prinzing, PE
Pre-Construction Engineer
(406) 454-5899
sprinzing@mt.gov

Scott Randall, PE, PTOE
RPA Project Manager
(406) 447-5000
scottr@rpa-hln.com

MONTANA MDT DEPARTMENT OF TRANSPORTATION

The meeting is open to the public and will be recorded. MDT attempts to provide accommodations for any known disability that may interfere with a person's participation in any department service, program or activity. For reasonable accommodations to participate in this meeting, please contact Paul Grant at (406) 444-9415 at least two days before the meeting. For the hearing impaired, the TTY number is (406) 444-7696 or (800) 335-7592, or Montana Relay at 711. Alternative accessible formats of this information will be provided upon request.

LINCOLN RD—MONTANA TO I-15

Corridor Improvement Options

PROJECT NEWSLETTER—OCTOBER 2014

IN THIS ISSUE:

INFORMATIONAL MEETING

Please Join Us!

Thursday
November 6, 2014
Open House: 5:00 PM
Presentation: 6:00 PM
Helena Regional Airport
2nd Floor Reception Rm
2850 Mercer Loop

Please park in the long-term parking lot.

The public is welcome and encouraged to attend.
We hope to see you there!

PROJECT DESCRIPTION

The study area is located approximately six miles north of Helena and includes the intersections of Lincoln Road with North Montana Avenue and the Interstate 15 (I-15) ramp terminals at the Lincoln Interchange. The land use adjacent to Lincoln Road currently consists of irrigated farm land, commercial businesses, and residential dwellings.

The north valley outside of Helena has experienced rapid growth in recent years due in part to development activity and changes in land use. Traffic volumes have been increasing rapidly near the Lincoln Interchange. The recent construction of the Custer Interchange has also resulted in changes to traffic patterns and operations at the Lincoln Interchange. As a result, traffic performance has deteriorated as congestion has increased. The area is currently experiencing heavy vehicle congestion during the peak hours and is expected to experience increased growth in the coming years due to continued development. If remained unchanged, increasing vehicle delay and safety issues are likely to compound.

A draft traffic study has been completed to identify and evaluate potential options to improve safety and operations for the Lincoln Road Interchange and the intersection of Lincoln Road and North Montana Avenue. The alternatives identified in the study are intended to be implementable in the short-term and do not include full reconstruction of the Lincoln Interchange or the Lincoln Road corridor. Potential barriers and constraints to project development are important to help determine the feasibility of developing the alternatives.

PROJECT WEBSITE

A project website has been established and will be updated periodically as information becomes available. The website address is: http://www.mdt.mt.gov/pubinvolve/lincoln/

POTENTIAL ROUNDABOUT CONFIGURATIONS

Lincoln Road / North Montana Avenue

Advantages:

- Reduced delay
- Improved safety
- Improved off-peak performance

Disadvantages:

- Long-term AM peak hour capacity constraints
- May be difficult to expand to increase capacity in the future

Lincoln Road / I-15 Northbound Ramps

Advantages:

- Reduced delay
- Improved safety
- Improved off-peak performance

Disadvantages:

- Extensive construction impacts
- Impacts to adjacent lands
- Long-term PM peak hour capacity constraints

POTENTIAL TRAFFIC SIGNAL CONFIGURATIONS

Lincoln Road / North Montana Avenue

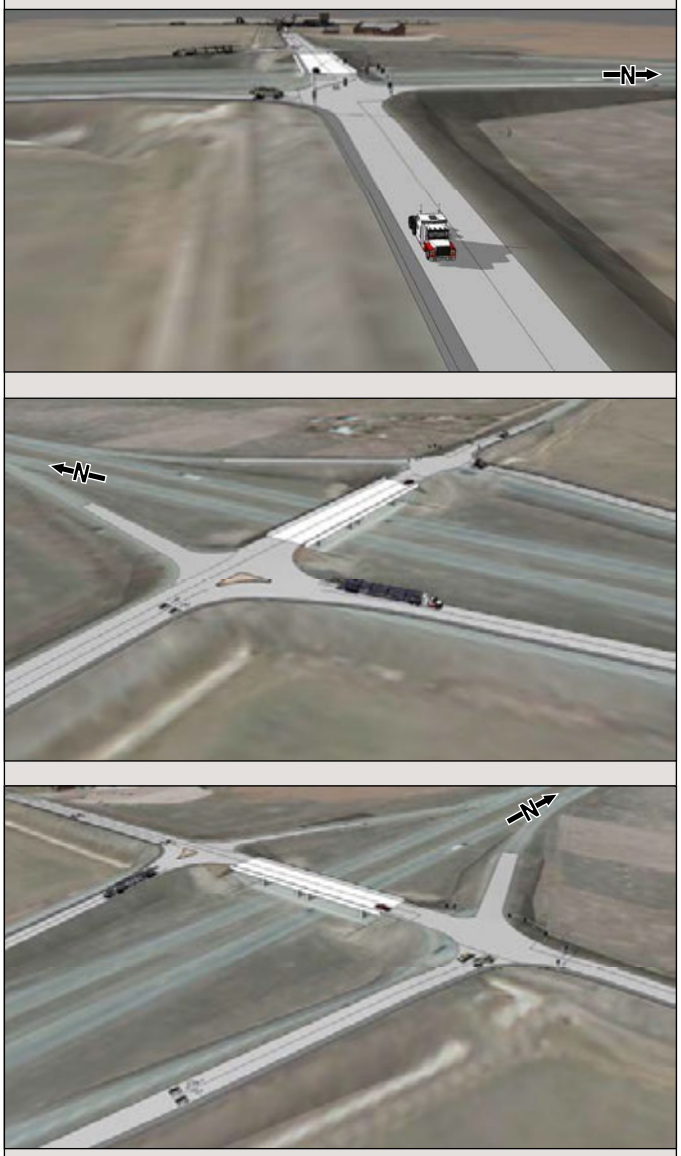
Advantages:

- Reduced delay
- Improved long-term performance

Disadvantages:

- Induced delay during off-peak hours
- High vehicle speeds
- Potential for increase in severe crashes

Lincoln Road / I-15 Northbound Ramp



Advantages:

- Reduced delay
- Increased capacity
- Additional vehicle storage along northbound off-ramp

Disadvantages:

- Induced delay during off-peak hours
- Sight distance concerns
- High vehicle speeds

Contacts:

Steve Prinzing, PE
Pre-Construction Engineer
MDT Great Falls District
406-454-5899
sprinzing@mt.gov

Scott Randall, PE, PTOE
RPA Project Manager
Robert Peccia & Associates
406-447-5000
scottr@rpa-hln.com

INFORMATIONAL MEETING

An informational meeting is scheduled to discuss potential improvement options to the Lincoln Road Corridor, between the intersection with Montana Avenue and the Interstate 15 northbound ramps in Helena, MT, Lewis and Clark County. The informational meeting will consist of an Open House beginning at 5:00 PM, followed by a presentation at 6:00 PM, on Thursday, November 6, 2014 at the Helena Regional Airport, 2850 Mercer Loop, 2nd Floor Reception Room, in Helena, MT. Please park in the long-term parking lot.

The purpose of the meeting is to inform interested parties about the scope and purpose of potential improvements, and to solicit input from the public. A draft traffic study has recently been prepared that examined potential improvements for the Lincoln Road Corridor; specifically the intersections of Montana Avenue & Lincoln Road, and the on- and off-ramps to Interstate 15 (from Lincoln Road). The traffic study has examined the potential for both modern roundabouts and traffic signals at these locations. The key findings of the traffic study will be presented at the informational meeting.

Community participation is a very important part of the process, and the public is encouraged to attend. Comments and concerns may be submitted in writing at the meeting or by mail to Steve Prinzing, Great Falls District Pre-Construction Engineer, at MDT, PO Box 1359, Great Falls, MT 59403; or online at: www.mdt.mt.gov/mdt/comment_form.shtml

Please indicate comments are for the Lincoln Road Corridor Project, UPN 8559000. The deadline for comments is December 5, 2014.

The meeting is open to the public and will be recorded. MDT attempts to provide accommodations for any known disability that may interfere with a person's participation in any department service, program or activity. For reasonable accommodations to participate in this meeting, please contact Paul Grant at (406) 444-9415 at least two days before the meeting. For the hearing impaired, the TTY number is (406) 444-7696 or (800) 335-7592, or Montana Relay at 711. Alternative accessible formats of this information will be provided upon request.

ROBERT PECCIA & ASSOCIATES
PO BOX 5653
HELENA, MT 59602

LINCOLN RD – MONTANA TO I-15

Corridor Improvement Options

11/06/2014

Informational Meeting

Welcome and Introductions

- **Introductions**
- **Partners**
  - MDT
  - FHWA
  - Lewis and Clark County
- **Consultant Team**

Meeting Outline

Background

Alternatives Considered

Alternatives Evaluation

Conclusion and Next Steps

Title VI Considerations

This meeting is held pursuant to Title VI of the 1964 Civil Right Act which ensures that no person shall, as provided by Federal and State Civil Rights law, be excluded from participation in, denied the benefits of, or otherwise be subjected to discrimination on the basis of a protected status during any MDT project.

Further information is available in Title VI pamphlets available at the sign-in table.

Background

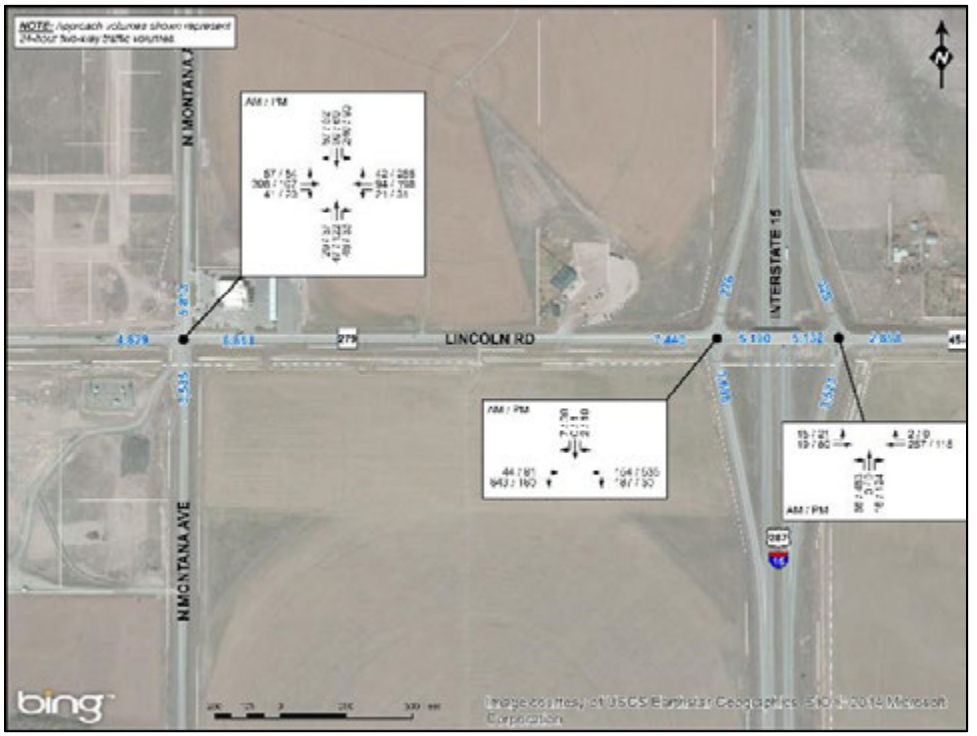
- **Study area**
  - Lincoln Rd - N Montana Ave to I-15
- **Rapid growth**
  - North Valley development
- **Custer Interchange**
  - Changes in travel patterns
  - All-way stop at NB off ramp

Purpose

- **Identify improvement options**
  - Improve safety
  - Improve operations
- **Not full reconstruction of Interchange / Lincoln Rd**
  - Short- to mid-term implementation
- **Identify constraints and opportunities**
  - Feasible alternatives
  - Implementable

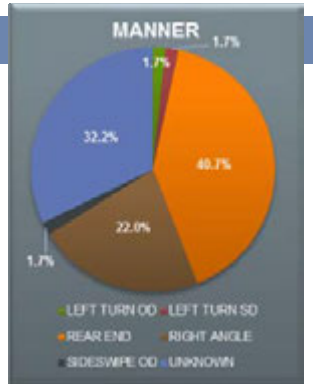
Existing Conditions

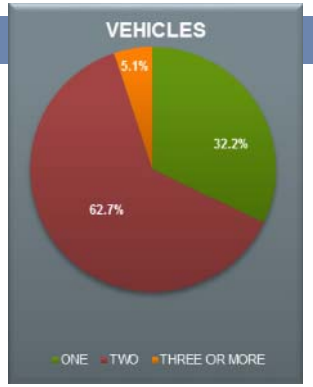
- **Data collected November 2013**
  - Volumes
  - Vehicle classifications
  - Turning movements
  - Queue lengths
- **Peak hours**
- **Site evaluation**

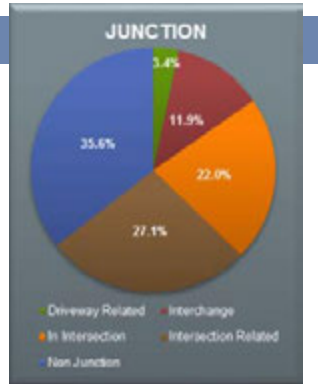


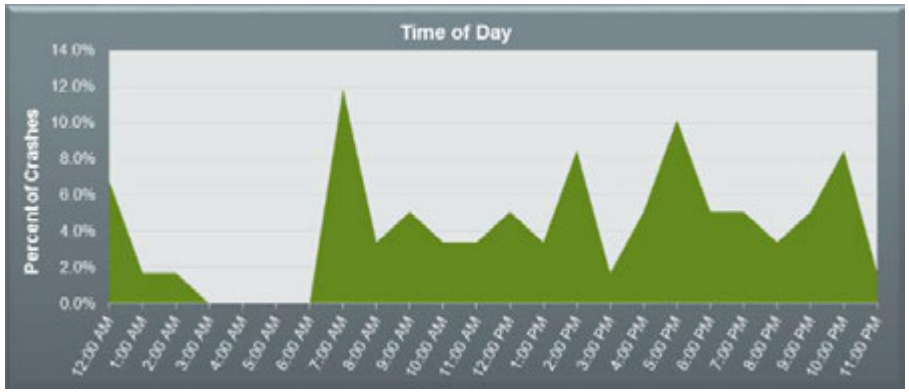
Safety

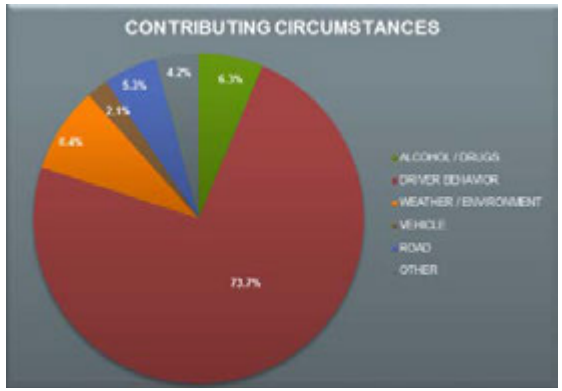
- **July 01, 2003 to June 30, 2013**
  - 59 total crashes
  - 0 fatalities
  - 17 injury crashes
  - 9 crashes at Lincoln / Montana
  - 32 crashes on NB off ramp











Projected Conditions

- **Historic growth**
  - 2004 – 2013
    - 3.35% average annual
- **Projected growth**
  - 25 years (2038)
    - I-15 (1.8%)
    - Lincoln West (2.3%)
    - Lincoln East (3.5%)
    - N Montana Ave (3.5%)

Alternatives Considered

Lincoln / N Montana

- **No Action**
  - AM queuing in SB and EB directions
  - PM queuing in WB direction
- **Traffic Signals**
  - SB and NB left, WB right
  - Left-turn bays in all directions
- **Single-Lane Roundabout**
  - Standard single lane
  - Added RT bypass in WB direction
  - Looked at RT bypass in all directions
- **Multi-Lane Roundabout**
  - Full multi-lane
  - Dual entry in SB direction

Lincoln / I-15 SB

- **No Action**
  - Some WB queuing during AM
  - Future concern
- **Ramp Modifications**
  - Additional on-ramp
  - Separates RT and LT movements
- **Traffic Signals**
  - Not needed for capacity
- **Single-Lane Roundabout**
  - Not needed for capacity
  - Would provide continuity with other ramp if a roundabout

Lincoln / I-15 NB

- **No Action**
  - All-Way Stop
  - NB queuing during PM
  - Future queuing onto interstate
- **Ramp Modifications**
  - Additional off-ramp lane (RT)
- **Traffic Signals**
  - NB right-turn lane
  - Shared through/left-turn
- **Single-Lane Roundabout**
  - Added RT Bypass

Alternatives Comparison

Traffic Signals

- **Pros**
  - Familiarity
  - Signal coordination
  - Handles unbalanced flows well
  - Can be adjusted
- **Cons**
  - Conflict points
  - High speeds
  - Stop on red
  - Maintenance costs
  - Safety
  - Air quality

Roundabouts

- **Pros**
  - Improved safety
  - Reduced delay
  - Reduced operation and maintenance costs
  - Lower traffic speeds
  - Fewer conflict points
  - Air quality
- **Cons**
  - Intimidating to unfamiliar drivers
  - Potential for delay for unbalanced traffic
  - Intimidating for bicycle traffic

Traffic Signals

1. Striping directs vehicles to the proper lane for the desired direction of travel.
2. Pedestrian crossing controlled in conjunction with vehicular traffic.
3. Overhead signal heads direct vehicle traffic.
4. Clear view of traffic traveling on all other legs of the intersection.
5. Possible to have protected, dedicated turn bays.

Canyon Ferry Road and Wylie Drive
Helena, MT

Roundabouts

1. Splitter islands are raised or painted areas used to separate entering and exiting traffic, to guide and slow entering traffic, and provide refuge for pedestrians and bicycles.

2. Vehicles are deflected or guided by the roundabout's central island, resulting in lower speeds overall.

3. Vehicles entering the roundabout must yield to circulating traffic.

4. A mountable apron may be necessary to accommodate large vehicles.

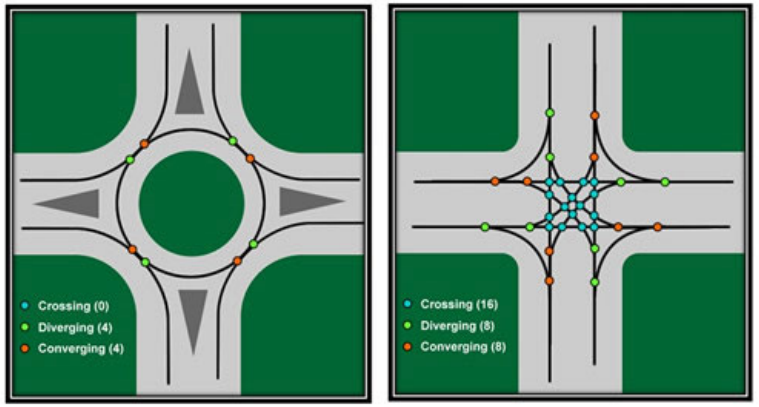
5. The central island is a raised center of a roundabout and can be landscaped for improved aesthetics.

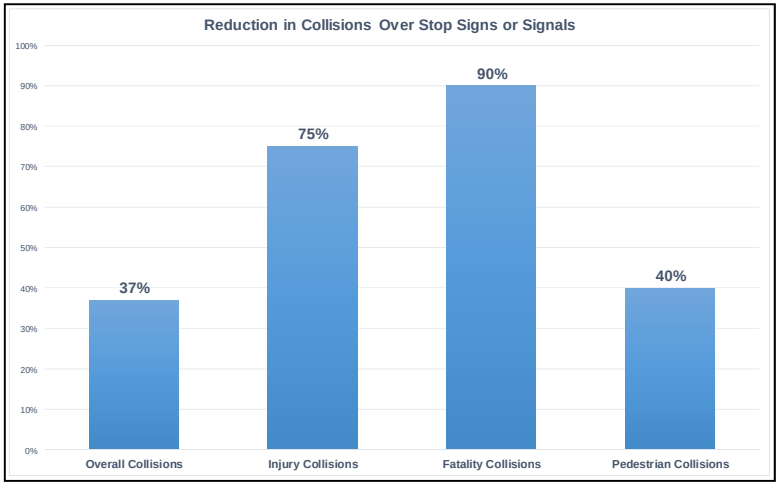
6. All vehicles circulate counter-clockwise around and pass to the right of the central island.

College Street and 11th Avenue
Bozeman, MT

Roundabouts

- **Reduction in conflict points**
  - 32 with standard intersection
  - 8 with roundabout
- **Improved safety**
  - 90% reduction in fatalities
  - 75% reduction in injuries
- **Slower speeds**





Source: Federal Highway Administration and Insurance Institute for Highway Safety (FHWA and IIHS)

Lincoln / N Montana

Existing Configuration

- **AM Peak Hour**
  - Existing LOS D
  - 2018 LOS F
  - SB left-turn
    - ~1,600 ft queue
  - EB through
    - ~750 ft queue
- **PM Peak Hour**
  - Existing LOS C
  - 2018 LOS E
  - WB right-turn
    - ~1,600 ft queue

Traffic Signal

- **AM Peak Hour**
  - Existing LOS B
  - 2028 LOS C
  - Off-peak delay
- **PM Peak Hour**
  - Existing LOS B
  - 2028 LOS B

Roundabout

- **AM Peak Hour**
  - Existing LOS A
  - 2028 LOS E
  - Potential long-term delay on EB approach
- **PM Peak Hour**
  - Existing LOS A
  - 2028 LOS A
  - Right-turn bypass

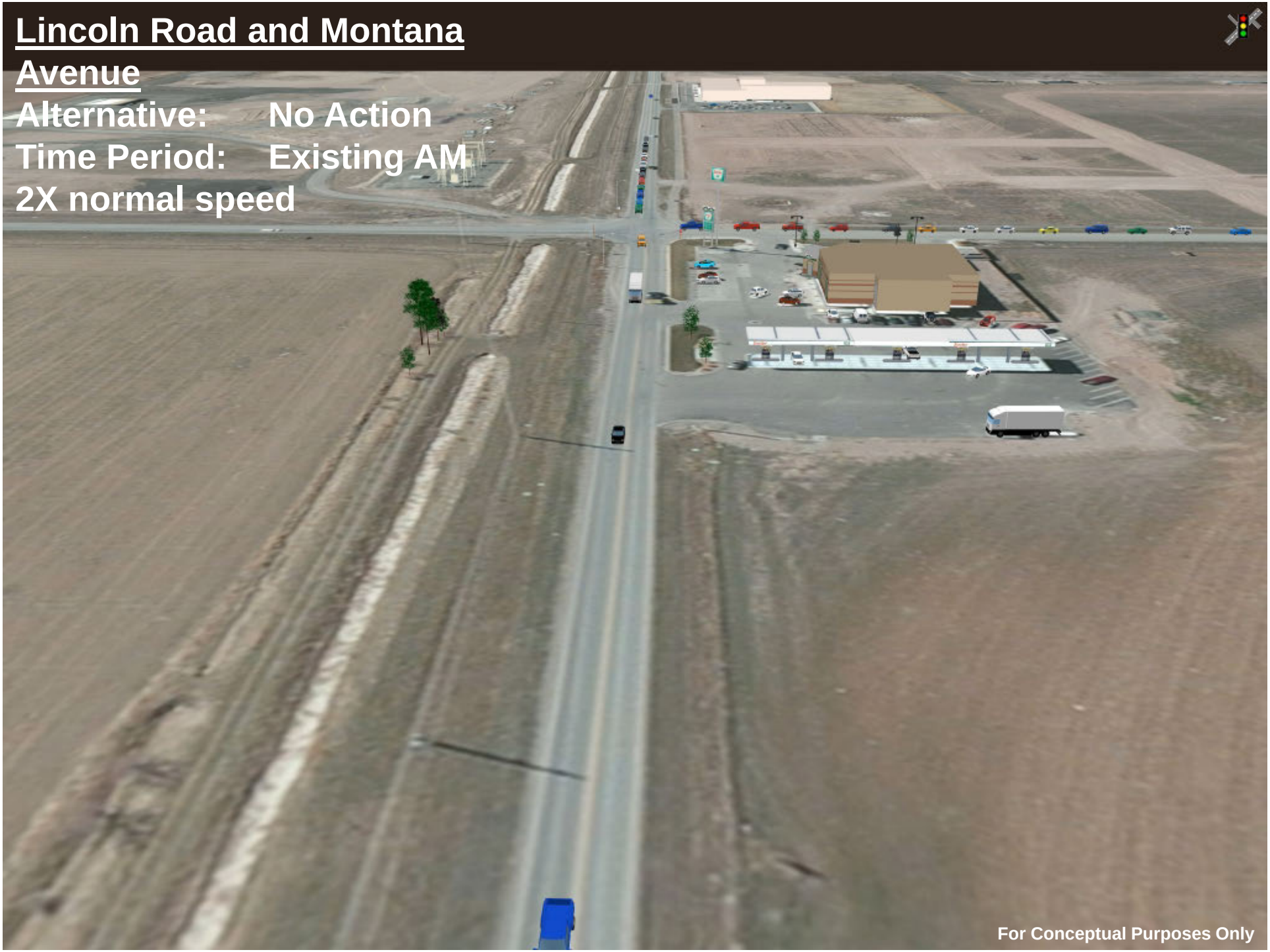
Simulation Video

Lincoln Road and Montana Avenue

Alternative: No Action

Time Period: Existing AM

2X normal speed



For Conceptual Purposes Only


Lincoln Road and Montana Avenue
Alternative: Signal
Time Period: Existing AM
2X normal speed
ONLY
ONLY
ONLY
For Conceptual Purposes Only


Lincoln Road and Montana Avenue
Alternative: Roundabout
Time Period: Existing AM
2X normal speed
For Conceptual Purposes Only


Lincoln Road and Montana Avenue
Alternative: No Action
Time Period: Existing PM
2X normal speed
For Conceptual Purposes Only


Lincoln Road and Montana Avenue
Alternative: Signal
Time Period: Existing PM
2X normal speed
ONLY
ONLY
ONLY
ONLY
ONLY
ONLY
For Conceptual Purposes Only


Lincoln Road and Montana Avenue
Alternative: Roundabout
Time Period: Existing PM
2X normal speed
For Conceptual Purposes Only

I-15 Interchange

Existing Configuration

- **AM Peak Hour**
  - SB on ramp
    - Queuing along bridge
  - Concern as volumes increase
- **PM Peak Hour**
  - Existing LOS E
  - 2018 LOS F
  - Queuing onto interstate

Traffic Signal

- **AM Peak Hour**
  - SB on ramp
    - 2nd lane
- **PM Peak Hour**
  - Existing LOS B
  - 2028 LOS B
  - Off peak delay

Roundabout

- **AM Peak Hour**
  - SB on ramp
    - 2nd lane
- **PM Peak Hour**
  - Existing LOS A
  - 2028 LOS A
  - Potential long-term delay on WB approach
  - Right-turn bypass

Simulation Video


Lincoln Road and I-15
Alternative: No Action
Time Period: Existing AM
2X normal speed
For Conceptual Purposes Only


Lincoln Road and I-15
Alternative: Signal
Time Period: Existing AM
2X normal speed
For Conceptual Purposes Only


Lincoln Road and I-15
Alternative:
Roundabout
Time Period: Existing AM
2X normal speed
For Conceptual Purposes Only


Lincoln Road and I-15
Alternative: No Action
Time Period: Existing PM
2X normal speed
For Conceptual Purposes Only


Lincoln Road and I-15
Alternative: Signal
Time Period: Existing PM
2X normal speed
For Conceptual Purposes Only


Lincoln Road and I-15
Alternative:
Roundabout
Time Period: Existing PM
2X normal speed
For Conceptual Purposes Only

Conclusions and Next Steps

Additional Considerations

- **Safety**
  - Roundabout vs. Signal
- **Speeds**
  - Lincoln (45 mph)
  - N Montana (60/55 mph)
- **Future expansion**
  - Lincoln 5-lane?
- **Growth rates**
  - 25 year projections
- **Changes in travel patterns**
  - Jim Darcy
  - New development
- **Impacts to existing businesses and adjacent properties**

Conclusion

- Questions, concerns, and or comments
  - Public comment by Dec. 5th
  - Website:
    www.mdt.mt.gov/pubinvolve/lincoln
  - Study contact:

Steve Prinzing, PE
Pre-Construction Engineer
MDT Great Falls District
406-454-5899
sprinzing@mt.gov

LINCOLN RD—MONTANA TO I-15

Corridor Improvement Options

PROJECT NEWSLETTER—OCTOBER 2014

IN THIS ISSUE:

Project Description - P.1
Project Website - P.1
Informational Meeting - P.1
Potential Roundabout Configurations - P.2
Potential Traffic Signal Configurations - P.3
Informational Meeting - P.4
Contacts - P.4

INFORMATIONAL MEETING

Please Join Us!

Thursday
November 6, 2014
Open House: 5:00 PM
Presentation: 6:00 PM
Helena Regional Airport
2nd Floor Reception Rm
2850 Mercer Loop

Please park in the long-term parking lot.

The public is welcome and encouraged to attend.
We hope to see you there!

PROJECT DESCRIPTION

The study area is located approximately six miles north of Helena and includes the intersections of Lincoln Road with North Montana Avenue and the Interstate 15 (I-15) ramp terminals at the Lincoln Interchange. The land use adjacent to Lincoln Road currently consists of irrigated farm land, commercial businesses, and residential dwellings.

The north valley outside of Helena has experienced rapid growth in recent years due in part to development activity and changes in land use. Traffic volumes have been increasing rapidly near the Lincoln Interchange. The recent construction of the Custer Interchange has also resulted in changes to traffic patterns and operations at the Lincoln Interchange. As a result, traffic performance has deteriorated as congestion has increased. The area is currently experiencing heavy vehicle congestion during the peak hours and is expected to experience increased growth in the coming years due to continued development. If remained unchanged, increasing vehicle delay and safety issues are likely to compound.

A draft traffic study has been completed to identify and evaluate potential options to improve safety and operations for the Lincoln Road Interchange and the intersection of Lincoln Road and North Montana Avenue. The alternatives identified in the study are intended to be implementable in the short-term and do not include full reconstruction of the Lincoln Interchange or the Lincoln Road corridor. Potential barriers and constraints to project development are important to help determine the feasibility of developing the alternatives.

PROJECT WEBSITE

A project website has been established and will be updated periodically as information becomes available. The website address is: http://www.mdt.mt.gov/pubinvolve/lincoln/

page 1

LINCOLN RD / N MONTANA AVE
no action alternative

Configuration Diagram:

Description:

The intersection of Lincoln Road and North Montana Avenue currently consists of stop control in all directions. No dedicated turn bays are provided on any approach.

The No Action alternative includes existing geometric and traffic conditions if no changes were made to the intersection. This alternative was used to establish baseline conditions and to calibrate the traffic analysis models as accurately as possible.

Advantages:

- No reconstruction required

Disadvantages:

- Does not address identified issues
- Poor LOS and high vehicle delay

For Conceptual Purpose Only

Traffic Operations:

- High volume of southbound left-turn and eastbound through movements during the AM peak hour resulting in high delay and poor LOS
- The westbound approach leg experiences excessive delay and poor LOS due to a high proportion of right-turning traffic during the PM peak hour

Year	AM		PM	
	Delay (s)	LOS	Delay (s)	LOS
2013	29.1	D	21.6	C
2018	67.3	F	47.0	E
2028	228.2	F	211.5	F
2038	551.3	F	479	F

Vehicle Queuing:

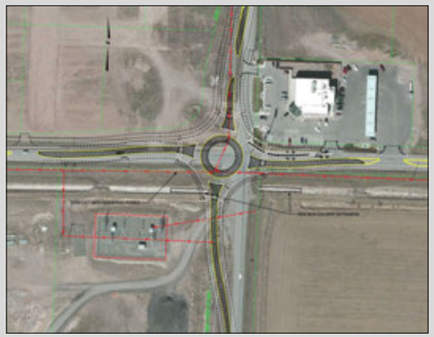
- AM southbound ~ 1,600 ft
- AM eastbound ~ 750 ft
- PM westbound ~ 1,600 ft

Potential Barriers/Constraints:

- N/A

LINCOLN RD / N MONTANA AVE
roundabout alternative

Configuration Diagram:



Description:

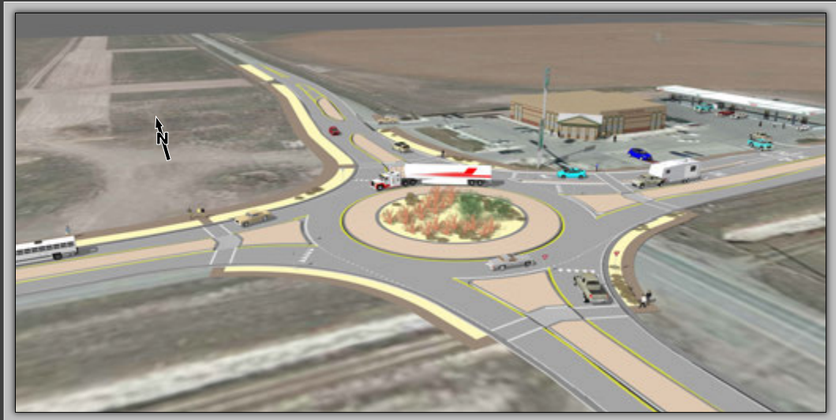
This alternative includes replacing the all-way stop control with a single-lane roundabout. The roundabout would be designed to accommodate large trucks. Also included is a right-turn bypass lane along the westbound approach leg. The bypass lane is included to address the high amount of westbound to northbound right-turn movements during the PM peak hour.

Advantages:

- Improved safety
- Improved off-peak performance

Disadvantages:

- Long-term AM peak hour capacity concerns due to heavy left-turn volume
- May be difficult to expand to increase capacity in the future



For Conceptual Purpose Only

Traffic Operations:

- Lower vehicle delay during the short- and mid -term
- High AM peak hour vehicle delay during the design year (2038)
- LOS of B or better for all analysis years during the PM peak hour
- Improved performance during off-peak hours

	AM		PM	
Year	Delay (s)	LOS	Delay (s)	LOS
2013	3.1	A	1.5	A
2018	4.7	A	1.8	A
2028	39.1	E	3.1	A
2038	158.5	F	9.8	A

Vehicle Queuing:

- AM southbound ~ 18 ft
- AM eastbound ~ 81 ft
- PM westbound ~ 15 ft

Potential Barriers/Constraints:

- Potential impacts to Bob's Valley Market parking lot and site circulation
- Potential impacts to utilities
- Potential impacts to irrigation canal

LINCOLN RD / N MONTANA AVE
traffic signal alternative

Configuration Diagram:

Description:

This alternative includes replacing the all-way stop control with a traffic signal. Dedicated left-turn bays are included along each approach leg. In addition, a right-turn bay is include along the westbound approach leg. This alternative is envisioned as a "full build-out" traffic signal option for the intersection. Protected left-turn phasing is provided for each approach leg. Note that in the short-term, protected phasing may not be necessary for the east- and west-bound directions.

Advantages:

- Improved peak hour LOS

Disadvantages:

- Some induced delay during off-peak hours
- May increase vehicle speed through the intersection
- Potential for increase in severe crashes

For Conceptual Purpose Only

Traffic Operations:

- LOS of C or better up to the year 2028 during the peak hours
- Projected to have increasing delay during the AM peak hour under the design year due to high volumes on the north leg
- Minor increases in average vehicle delay prior to 2038 due to the protected left-turn signal phasing

	AM		PM	
Year	Delay (s)	LOS	Delay (s)	LOS
2013	14.5	B	16.7	B
2018	15.8	B	17.0	B
2028	27.9	C	19.5	B
2038	52.8	D	28.0	C

Vehicle Queuing:

- AM southbound ~ 111 ft
- AM eastbound ~ 81 ft
- PM westbound ~ 60 ft

Potential Barriers/Constraints:

- Potential impacts to Bob's Valley Market parking lot and site circulation
- Potential impacts to utilities
- Potential impacts to irrigation canal

LINCOLN RD / INTERSTATE 15
no action alternative

Configuration Diagram:

Description:

The intersection of Lincoln Road and the northbound interchange ramps currently has stop-control in all directions. The southbound off-ramp currently has stop control. No dedicated turn bays are provided on any approach.

The No Action alternative includes existing geometrics and traffic control and is representative of conditions if no changes were made to the intersection. This alternative was used to establish baseline conditions and to calibrate the traffic analysis models as accurately as possible.

Advantages:

- No reconstruction required

Disadvantages:

- Does not address identified issues

For Conceptual Purpose Only

Northbound Traffic Operations:

- High volumes of northbound left-turn movements during the PM peak hour resulting in high delay and poor LOS
- Existing vehicle queues during the PM peak hour along the northbound off-ramp

Year	AM		PM	
	Delay (s)	LOS	Delay (s)	LOS
2013	10.5	B	45.2	E
2018	12.0	B	93.2	F
2028	22.9	C	266.3	F
2038	110.1	F	533.2	F

Southbound Traffic Operations:

- Observed existing delay and vehicle queuing during AM peak hour due to westbound left-turn movement conflicting with heavy eastbound right-turn movement

Vehicle Queuing:

- AM westbound ~ 350 ft
- PM northbound ~ 700 ft

Potential Barriers/Constraints:

- N/A

LINCOLN RD / INTERSTATE 15
roundabout alternative

Configuration Diagram:

Description:

This option would replace the existing all-way stop control on the northbound ramps with a single-lane roundabout. Additionally, a right-turn bypass lane would be provided along the south approach leg. The bypass lane is intended to increase the capacity of the south approach. Extensive work would be needed along each intersection quadrant to accommodated the roundabout.

An additional southbound on-ramp lane would be added. Eastbound right-turning vehicles would be channelized into the new lane. West-bound left-turning vehicles would have a dedicated receiving lane, separate from the eastbound right-turning vehicles

Advantages:

- Reduced delay under all scenarios
- Improved safety
- Improved off-peak performance

Disadvantages:

- Extensive construction impacts
- Future capacity constraints during PM peak hour

For Conceptual Purpose Only

Northbound Traffic Operations:

- Lowest delay among all options
- LOS C or better during AM peak hour under all scenarios
- Long-term PM peak hour performance concerns

	AM		PM	
Year	Delay (s)	LOS	Delay (s)	LOS
2013	0.9	A	1.2	A
2018	1.1	A	1.6	A
2028	2.5	A	4.3	A
2038	16.5	C	99.0	F

Southbound Traffic Operations:

- Reduces the vehicle delay and queuing currently associated with the conflict between westbound left-turns and eastbound right-turns
- Low vehicle delay and optimum LOS during all analysis periods

Vehicle Queuing:

- AM westbound ~ no queue
- PM northbound ~ 14 ft

Potential Barriers/Constraints:

- Considerable construction impacts
- Potential impacts to irrigation canal
- Potential impacts to irrigated farmland

LINCOLN RD / INTERSTATE 15
traffic signal alternative

Configuration Diagram:

Description:

This option would replace the existing all-way stop control with a traffic signal. The south approach leg would include a shared left/through lane and a dedicated right-turn lane.

An additional southbound on-ramp lane would be added. Eastbound right-turning vehicles would be channelized into the new lane. West-bound left-turning vehicles would have a dedicated receiving lane, separate from the eastbound right-turning vehicles

Advantages:

- Reduced PM peak hour delay
- Increased capacity
- Additional vehicle storage along northbound off-ramp

Disadvantages:

- Some induced delay during off-peak hours

For Conceptual Purpose Only

Northbound Traffic Operations:

- Reduced vehicle delay during PM peak hour under all scenarios
- Reduced vehicle delay during AM peak hour under future scenarios

	AM		PM	
Year	Delay (s)	LOS	Delay (s)	LOS
2013	13.2	B	10.5	B
2018	13.5	B	14.1	B
2028	15.6	A	18.1	B
2038	21.7	C	70.2	E

Southbound Traffic Operations:

- Reduces the vehicle delay and queuing currently associated with the conflict between westbound left-turns and eastbound right-turns
- Low vehicle delay and optimum LOS during all analysis periods

Queuing:

- AM westbound ~ no queue
- PM northbound ~ 102 ft

Potential Barriers/Constraints:

- Some impacts to irrigation canal
- Potential impacts to irrigated farmland

CORRIDOR WIDE
existing and projected conditions

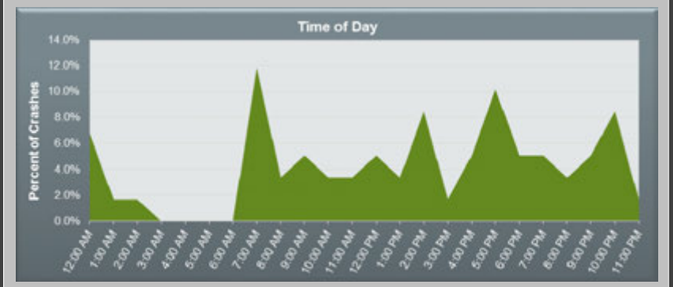
Existing Traffic Volumes (2013):

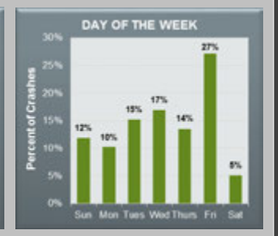
Projected Traffic Volumes (2038):

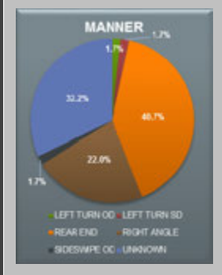
Safety Statistics:

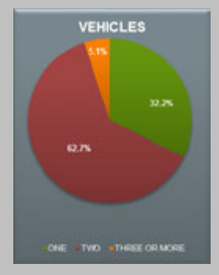
- 59 total crashes
- 0 fatalities
- 17 injury crashes
- 9 crashes at Lincoln / Montana
- 4 crashes on southbound ramp
- 32 crashes on northbound ramp
- 14 crashes on Lincoln between Montana and I-15

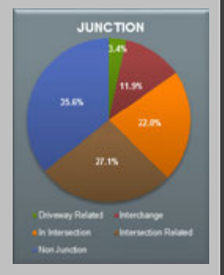
Data from July 1, 2003 to June 30, 2013

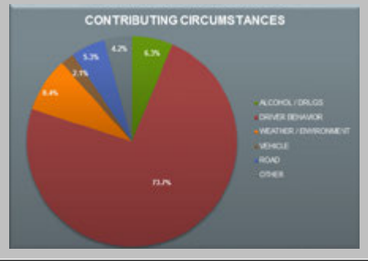


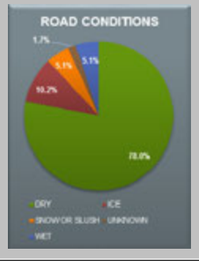












Growth Rates:

Historic Annual Growth Rates (2004—2013):

AADT Count Location							Weighted Average
I-15		Lincoln Road			Montana Avenue		
N of Lincoln	S of Lincoln	E of I-15	W of I-15	W of Montana	N of Lincoln	S of Lincoln	
-0.50%	3.00%	3.54%	3.64%	3.73%	5.75%	3.58%	3.35%

Source: MDT Traffic Data Collection

Annual Growth Rates Used for Modeling:

- Interstate 15: 1.8%
- Lincoln Road (east of I-15) 3.5%
- Lincoln Road (between I-15 and Montana Ave) 2.9%
- Lincoln Road (west of Montana Ave) 2.3%
- Montana Ave (north of Lincoln Road) 3.5%
- Montana Ave (south of Lincoln Road) 3.5%

Rates supplied by MDT

Queues:

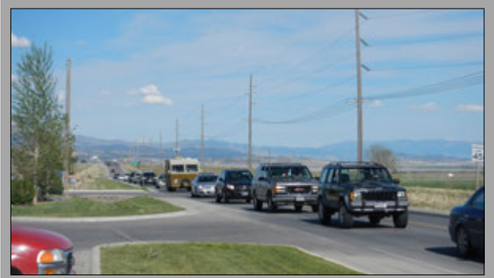
AM Peak Hour:

Lincoln / Montana

- Southbound ~ 1,600 ft
- Eastbound ~ 750 ft

Lincoln / I-15

- Westbound ~ 350 ft, Queue on Bridge



PM Peak Hour:

Lincoln / Montana

- Westbound~ 1,600 ft
- Eastbound ~ 600 ft

Lincoln / I-15

- Northbound ~ 700 ft, Queue on I-15

LINCOLN RD—MONTANA TO I-15
corridor improvement options

MONTANA MDT DEPARTMENT OF TRANSPORTATION

ROUNDABOUTS AND TRAFFIC SIGNALS
a comparison

ROUNDABOUT FEATURES

1. Splitter islands are raised or painted areas used to separate entering and exiting traffic, to guide and slow entering traffic, and provide refuge for pedestrians and bicycles.
2. Vehicles are deflected or guided by the roundabout's central island, resulting in lower speeds overall.
3. Vehicles entering the roundabout must yield to circulating traffic.
4. A mountable apron may be necessary to accommodate large vehicles.
5. The central island is a raised center of a roundabout and can be landscaped for improved aesthetics.
6. All vehicles circulate counter-clockwise around and pass to the right of the central island.

College Street and 11th Avenue
Bozeman, MT

TRAFFIC SIGNAL FEATURES

1. Striping directs vehicles to the proper lane for the desired direction of travel.
2. Pedestrian crossing controlled in conjunction with vehicular traffic.
3. Overhead signal heads direct vehicle traffic.
4. Clear view of traffic traveling on all other legs of the intersection.
5. Possible to have protected, dedicated turn bays.

Canyon Ferry Road and Wylie Drive
Helena, MT

INTERSECTION COMPARISION

♦ Roundabout ♦ Traffic Signal ♦ All-way Stop			Drawback No Difference Benefit
Pedestrians			
Crossing Length	2 lanes	3-4 lanes	2-3 lanes (1 at a time)
Speed of adjacent traffic (relative)	LOW	HIGH	MEDIUM
Crossing regulation	Right-of-way rule	Protected signal phase	Right-of-way rule
Risk related to driver compliance	HIGH; Visibility, right-of-way confusion	MEDIUM; Red-light running, right-turn on red	LOW; Good visibility and decision point distribution
Bicycles			
Comfort/convenience	MEDIUM; Stop always required, multiple conflict points, right-of-way confusion	MEDIUM; Stop often required, need to ride adjacent to and across multiple lanes of traffic	MEDIUM; no stop required, can ride in single traffic stream, intimidating
Speed of adjacent traffic (relative)	LOW	HIGH	MEDIUM
Autos			
Peak hour delay (relative)	HIGH	MEDIUM	LOW
Off-peak delay (relative)	MEDIUM	MEDIUM	LOW
Travel speed	LOW	HIGH	LOW
Convenience	LOW; Highest peak hour delays, stop always required even in off-peak hours	MEDIUM; Delays higher than roundabout	LOW; Lowest delays, stop not required
Collision potential (relative)	LOW	HIGH	LOW
Collision severity (relative)	MEDIUM	HIGH	LOW
Heavy Trucks			
Maneuvers	Limited	Accommodated	Accommodated
General			
Safety	MEDIUM	LOW	HIGH
Sight distance required	MEDIUM	HIGH	LOW
Right-of-way required	LOW	MEDIUM	HIGH

PROS AND CONS

Roundabouts:

Pros:
- Improved safety
- Reduced delay
- Reduced operation and maintenance costs
- Improved pedestrian safety
- Improved aesthetics
- Promotes lower traffic speeds
- Decreased number of conflict points

Cons:
- Intimidating to unfamiliar drivers
- Potential for delay for unbalanced traffic
- Intimidating for bicycle traffic

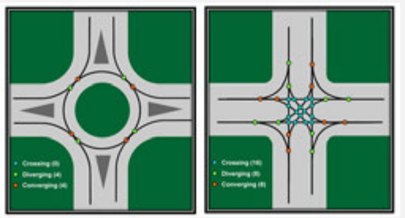
Traffic Signals:

Pros:
- Familiar to all drivers
- Can be coordinated along a corridor
- Handles unbalanced flows well
- Can be tailored for specific times of day
- Clear visibility across the whole intersection

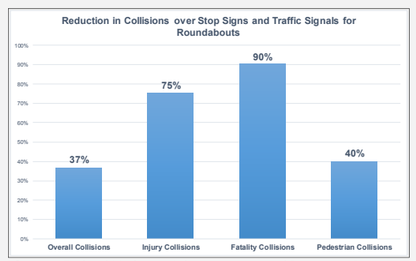
Cons:
- Large number of conflict points
- High speed when signal is green
- Can require a full stop at an empty intersection
- High maintenance costs
- High opportunity for right-angle collisions

SAFETY COMPARISON

Roundabout | Traffic Signal



- 8 conflict points
- 32 conflict points



Source: Federal Highway Administration and Insurance Institute for Highway Safety (FHWA and IIHS)

ROUNDABOUT QUICK FACTS
local examples

Canyon Ferry Road and Lake Helena Drive



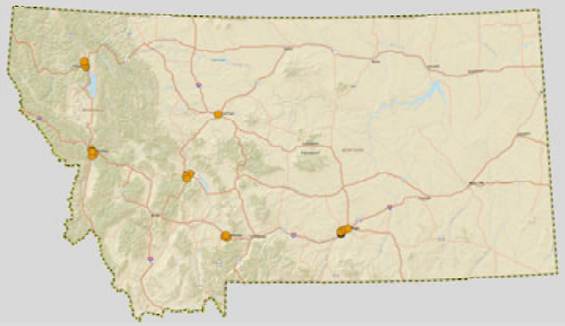
Colonial Drive and Saddle Drive



Jackson Creek Road and Highway 282



Roundabouts in Montana



35 constructed roundabouts:

- Helena 3
- Billings 15
- Bozeman 5
- Missoula 5
- Kalispell 6
- Great Falls 1

Navigating a Roundabout

In a car:

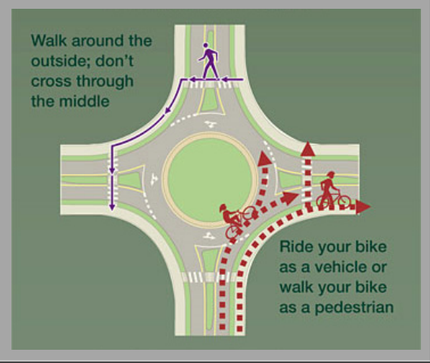
1. Slow down
2. If there is more than one lane, use the left lane to turn left, the right lane to turn right, and all lanes to go through, unless directed otherwise by signs and pavement markings.
3. Yield to pedestrians and bicyclists.
4. Yield at the entry to circulating traffic.
5. Stay in your lane within the roundabout and use your right-turn signal to indicate your intention to exit.
6. Always assume trucks need all available space—don't pass them!
7. Clear the roundabout to allow emergency vehicles to pass.

Walking:

1. Walk around the outside; do not cross through the middle
2. Although you have the right of way, ensure that approaching vehicles see you.
3. Use the splitter island. It allows you to cross one directions of traffic at a time.

On a Bike:

1. Ride your bike as a vehicle, or
2. Walk your bike as a pedestrian.



APPENDIX G

Public Comments

From:	Grant, Paul
To:	Bolan, Danielle; Brelin, Stanton; Hand, Dave; Jeff Key; Patten, Jeff; Peterson, Roy; Prinzing, Stephen; Scott Randall; Shane Forsythe; Weibel, Jerilee
Subject:	FW: Comment on a Project or Study Submitted
Date:	Monday, November 10, 2014 10:14:39 AM

-----Original Message-----
From: www@mdt.mt.gov [mailto:www@mdt.mt.gov]
Sent: Saturday, November 08, 2014 8:13 PM
To: MDT Comments - Project
Subject: Comment on a Project or Study Submitted

A question, comment or request has been submitted via the "Contact Us" web page.

Reason for Submission: Comment on a Project or Study
Submitted: 11/08/2014 20:12:57
Project/Study Commenting On:Other Project or Activity
Name: Carol Cloninger
Email Address: carolcloninger@gmail.com
Other Details: Lincoln Road Corridor Project,UPN 8559000

Comment or Question:
Thank you for making it possible to comment on the Lincoln Road Corridor Project, we were unable to attend the meeting held on November 6,2014. We have lived on North Montana Avenue for for nearly 18 years and have seen huge growth and noted problems accompanied that increase in population. As you are aware of the traffic issues especially at peak hours of the day. Our concern is that a round-about may slow the traffic down but there would still be a constant flow of cars through the area making it difficult and dangerous should anyone attempt to cross Montana Ave to get to the walking path , Bob's Market or Lincoln School at any time , peak hours or not. One can take their life , their children;s or pet in their hands at all times of the day , to cross Montana Ave or even pull on the street. We hear speeding cars,loud mufflers , motorcycles, construction vehicles year round. My husband and I have voiced our concerns to the county numerous times as they ask for public comment on subdivisions.
It seems L&C County is more interested in granting development and avoiding being sued than safety. After looking at the proposed designs, we feel a traffic signal , turn lanes and crosswalks would serve the area better making it safer by managing the stream of cars using the roadway. It is also our hope that Montana Ave is widened out and better patrolled to reduce the offenders of safety and the common good of all. Thank you again and good luck with your project.Sincerely, Leonard and Carol Cloninger, 7725 North Meadow Road

Reference Number = prjcomment_210784912109375

From: Grant, Paul
To: Bolan, Danielle; Brelin, Stanton; Hand, Dave; Jeff Key; Patten, Jeff; Peterson, Roy; Prinzing, Stephen; Scott Randall; Shane Forsythe; Weibel, Jerilee
Subject: FW: Comment on a Project or Study Submitted
Date: Monday, November 17, 2014 1:59:01 PM

-----Original Message-----
From: www@mdt.mt.gov [mailto:www@mdt.mt.gov]
Sent: Monday, November 17, 2014 1:55 PM
To: MDT Comments - Project
Subject: Comment on a Project or Study Submitted

A question, comment or request has been submitted via the "Contact Us" web page.

Reason for Submission: Comment on a Project or Study
Submitted: 11/17/2014 13:55:02
Project/Study Commenting On:Other Project or Activity
Name: Janet Herold
Email Address: jherold@bresnan.net
Other Details: Project ID: CM STWD(246)

Comment or Question:
I am opposed to installing a round-about at the intersection of North Montana Avenue and Lincoln Road as it would aggravate the traffic congestion that occurs at specific times of the day.
However, installing a traffic light that would operate at specific times of the day (weekday mornings between 6 - 8 a.m.
and weekday afternoons between 4 & 6 p.m) would be a good solution to regulate those heavy traffic periods of time.
During non-peak times the intersection could be trreated as a 4-way stop.

Reference Number = prjcomment_38409423828125

From:	Grant, Paul
To:	Bolan, Danielle; Brelin, Stanton; Hand, Dave; Jeff Key; Patten, Jeff; Peterson, Roy; Prinzing, Stephen; Scott Randall; Shane Forsythe; Weibel, Jerilee
Subject:	FW: Comment on a Project or Study Submitted
Date:	Tuesday, November 18, 2014 2:36:05 PM

-----Original Message-----
From: www@mdt.mt.gov [mailto:www@mdt.mt.gov]
Sent: Tuesday, November 18, 2014 2:32 PM
To: MDT Comments - Project
Subject: Comment on a Project or Study Submitted

A question, comment or request has been submitted via the "Contact Us" web page.

Reason for Submission: Comment on a Project or Study
Submitted: 11/18/2014 14:32:25
Project/Study Commenting On:Other Project or Activity
Name: Bob Bennett
Email Address: rebmmb72@bresnan.net

Comment or Question:
I have a comment and a concern. The comment is the Q?????
distances you listed seemed very short compared to what I observe most days, again certain times of the year are much worse than others, not just the time of day.

My concern is for the cross walks at Montana and Lincoln Road.
To get a much more accurate or realistic idea of how much foot and bike traffic there really is, you need to observe a few different times of the day and year.
1. when school is in session before it starts, and when school is out, especially in the spring and fall 2. when school is not in session, for one complete day 2. before and after small fry football practice

Reference Number = prjcomment_213623046875

From:	Grant, Paul
To:	Bolan, Danielle; Brelin, Stanton; Hand, Dave; Jeff Key; Patten, Jeff; Peterson, Roy; Prinzing, Stephen; Scott Randall; Shane Forsythe; Weibel, Jerilee
Subject:	FW: Ask MDT A Question Submitted
Date:	Friday, November 21, 2014 3:16:54 PM

-----Original Message-----
From: www@mdt.mt.gov [mailto:www@mdt.mt.gov]
Sent: Friday, November 21, 2014 2:44 PM
To: MDT Comments - Ask MDT
Subject: Ask MDT A Question Submitted

A question, comment or request has been submitted via the "Contact Us" web page.

Reason for Submission: Ask MDT A Question
Submitted: 11/21/2014 14:44:27
Name: Jake Sandau
Email Address: jake@mttrucking.org

Comment or Question:
I currently live in the North Valley of Helena. There seems to be an increase in traffic during the morning commuting hours as well as the evening hours that leads to major congestion in the intersection of Lincoln Road West and North Montana Ave. Are there any plans for a traffic study in this particular intersection?

Thank you for your time and response.

Reference Number = askmdt_898712158203125

From:	Brelin, Stanton
To:	Weibel, Jerilee; Jeff Key; Scott Randall
Cc:	Bolan, Danielle
Subject:	RE: Proposed Intersection Improvements - Lincoln RD/I-15
Date:	Thursday, December 04, 2014 11:40:58 AM

Thanks Jerilee

I have forwarded this to RPA for consideration

Stan

From: Weibel, Jerilee
Sent: Thursday, December 04, 2014 11:37 AM
To: Brelin, Stanton; Bolan, Danielle
Subject: Proposed Intersection Improvements - Lincoln RD/I-15

Stan and Danielle,

I just got a call from Phil Wirth (Bridge Creek Estates LLC) who wanted to provide his input. I agreed to pass it along to you.

Phil feels that we should be looking at the design that will consider the future of the properties and the area. He feels a ROB is short sided as it doesn't allow for future width for future growth.

Whatever option we decide on, he feels strongly that it needs to allow for future development of the area. He even mentioned we should consider four lanes in between N MT and the Interstate with the intersection improvement project.

He is willing to participate in a land exchange if necessary.

Thanks.

Jerilee

Jerilee Weibel
Field R/W Manager – Great Falls District
PO Box 1359
Great Falls, MT 59403
1-406-454-5893 or Toll Free 1-888-730-0898

Lewis & Clark COUNTY

BOARD OF COUNTY COMMISSIONERS

Andy Hunthausen Michael A. Murray Susan Good Geise

City County Building 316 North Park Helena, Montana 59623 406.447.8304 Fax: 406.447.8370

Montana Department of Transportation
PO Box 201001
Helena MT 59620-1001

December 1, 2014

Att: Director Tooley

RECEIVED
DEC 04 2014
Montana Department of Transportation

Dear Director Tooley:

The Lewis and Clark County Commissioners have participated in the transportation improvement planning options for the Lincoln Road corridor currently being analyzed by Robert Peccia and Associates. We would first like to thank the Montana Department of Transportation for their prompt attention to this important corridor in the Helena area. Secondly, your choice of consultants and the quality of work they have provided is exceptional. The options currently under consideration appear to significantly improve the Lincoln/Montana intersection during peak morning and evening high volume flows.

Having analyzed the options currently under consideration, we would request that the Montana Department of Transportation prioritize solutions that have the greatest long term impacts for the Interchange and Lincoln/Montana intersection. We would request that the safety of motorized and non-motorized traffic be prioritized, and that the option selected eases congestion during the peak volume hours as well as moves traffic efficiently during non-peak hours. The Lewis and Clark County Commissioners believe that the proposed roundabout at Lincoln and Montana accomplishes this goal best. We would ask that you work with the impacted landowners in the intersection to minimize short and long term impacts to their property, especially with the access points to existing commercial properties.

The slip lane directing East bound traffic onto the South bound onramp to I-15 appears essential. Whether you signalize the off ramp for North bound traffic or design and construct a round-about to address the queuing issues on I-15, we support your decision with an understanding that the final selection will be based on improved public safety and easing the congestion problem at that location.

We look forward to assisting in any way possible to make the necessary improvement to this transportation corridor. As always, we thank you for your efforts and look forward to working with you in the future.

Sincerely,

Susan Good Geise - Chair Andy Hunthausen - Commissioner Mike Murray - Commissioner

December 3, 2014

Mark McNearney
940 Terrence Road
Helena, MT 59602

Steve Prinzing, P.E.
Great Falls District Pre-Construction Engineer
Montana Dept. of Transportation
PO Box 1359
Great Falls, MT 59403

Subject: Lincoln Road Corridor Project, UPN 8559000
Public Comment

Steve:

I attended the public meeting held at the Helena Regional Airport, on November 6th, 2014. I support the proposed traffic improvement project, and specifically, support the multi-roundabout alternative.

I do recognize that the multi-lane roundabout alternative does not have the long-term Level of Service capacity, but should provide a much safer intersection and immediate improvement to traffic delays.

I would ask MDT, or their consultant RPA, to evaluate the need for additional data collection on left-turn movements into Bob's Valley Market at peak hours, if not done already. Bob's Valley Market is the only gas station/convenience store in the North Valley, and is a very busy at peak hours. My concern is on the southbound (N. Montana) and eastbound (Lincoln Road) traffic. Left turning movements into Bob's Valley Market may queue up traffic through the roundabout at peak hours.

Further data collection may warrant additional lanes on all 4 legs of the roundabout, in which I would support. I appreciate the opportunity to comment and hope this project gets funded.

I would ask that you respond to my specific question regarding left turn counts into Bob's Valley Market (not just counts at the intersection).

Sincerely,

Mark McNearney
Cell: 438-6502